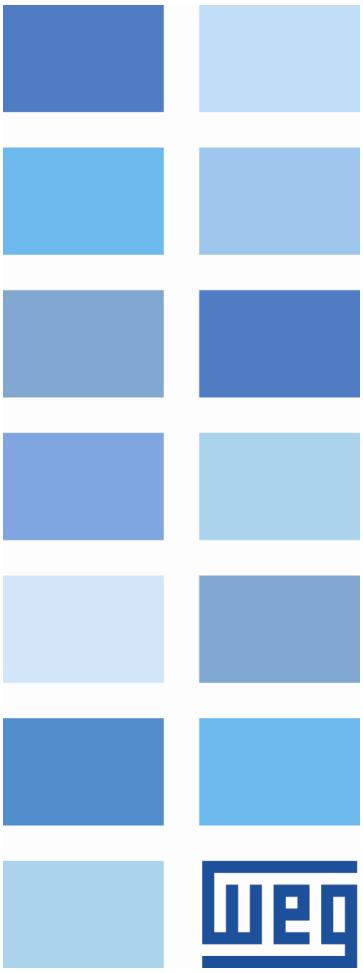
Modbus RTU

SSW900-CRS485-W

User's Guide



Modbus RTU User's Guide

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The information below describes the reviews made in this manual.

Version	Revision	Description
V1.0X	R00	First edition
V1.1X	R01	General revision
V1.2X	R02	General revision

CONTENTS

ABOUT THE MANUAL

This manual supplies the necessary information for the operation of the SSW900 soft-starter using the Modbus RTU protocol. This manual must be used together with the SSW900 user's manual and programming manual.

ABBREVIATIONS AND DEFINITIONS

ASCII American Standard Code for Information Interchange
CRC Cycling Redundancy Check
EIA Electronic Industries Alliance
RTU Remote Terminal Unit
TIA Telecommunications Industry Association
LSB Least Significant Bit/Byte
MSB Most Significant Bit/Byte
ro Read only
rw Read/write

NUMERICAL REPRESENTATION

Decimal numbers are represented by means of digits without suffix. Hexadecimal numbers are represented with the letter 'h' after the number. Binary numbers are represented with the letter 'b' after the number.

DOCUMENTS

The Modbus protocol was developed based on the following specifications and documents:

Document	Version	Source
MODBUS Application Protocol Specification, December 28th 2006.	V1.1b	MODBUS.ORG
MODBUS Protocol Reference Guide, June 1996.	Rev. J	MODICON
MODBUS over Serial Line, December 20th 2006.	V1.02	MODBUS.ORG

In order to obtain this documentation, consult MODBUS.ORG, which is nowadays the organization that keeps, publishes and updates the information related to the Modbus protocol.

1 MAIN CHARACTERISTICS

Below are the main characteristics for Modbus RTU communication of the soft-starter SSW900.

- Interface galvanically insulated and with differential signal, providing more robustness against electromagnetic interference.
- It allows the device to operate as Modbus RTU slave.
- Allows data communication for equipment operation and parameterization.

2 MODBUS COMMUNICATION INTRODUCTION

The Modbus protocol was initially developed in 1979 by Modicon. Nowadays, it is a widely spread open protocol, used by several manufactures in many equipments. It is a protocol of application layer for communication between devices, especially used by industrial automation systems.

2.1 MESSAGE STRUCTURE

Modbus is a protocol based on transactions, which consist of a request followed by a response. Every communication begins with the client (master) making a request to a server (slave), which answers what has been asked.

The communication is based on a packet called PDU (Protocol Data Unit) which is defined by the specification of the protocol in three types:

- Request PDU:
  Function Code: specifies the kind of service or function requested.
  Function Data: specific function data.
- Response PDU:
  Function Code: code of the function corresponding to the request.
  Response Data: specific function data.
- Exception PDU:
  Error Code: function code corresponding to the request with the most significant bit set.
  Exception Code: code specifying the exception.

A transaction can be viewed in figure 2.1.

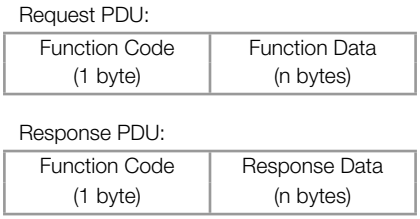


Figure 2.1: *Modbus transaction*

The function code field specifies the kind of service or function requested to the server (reading, writing, etc.). For the list of available functions to access data, refer to item 7.1.

According to the protocol, each function is used to access a specific type of data. Table 2.1 contains the basic types defined in the specification.

Table 2.1: *Modbus data type*

Name	Size	Access
Discrete Input	1 bit	Read Only
Discrete Output (Coils)	1 bit	Read and Write
Input Registers	16 bits	Read Only
Holding Registers (Registers)	16 bits	Read and Write

Each implantation of the Modbus protocol can add to the PDU specific data for the proper processing of the messages through the interface used.

2.2 MODBUS RTU

Two transmission modes are defined in the Modbus protocol specification for the serial interface: ASCII and RTU. These modes define the way the message bytes are transmitted. It is not possible to use the two transmission modes in the same network. The SSW900 soft-starter uses only the RTU mode for the telegram transmission.

It allows up to 247 slaves, but only one master.

It adds to the Modbus PDU an address and error-checking field. The association of these fields to the PDU is called ADU (Application Data Unit).

Modbus RTU telegram format:

- Address: used to identify the slave.
- PDU: Modbus PDU.
- CRC: field for checking the transmission errors.

Figure 2.2: *Modbus RTU ADU*

The master initiates the communication sending a byte with the address of the slave to which the message is destined. When sending the answer, the slave also initiates the telegram with its own address. The master can also send a message to the address 0 (zero), which means that the message is destined to all the slaves in the network (broadcast). In that case, no slave will answer to the master.

The last part of the telegram is the field for checking the transmission errors. The used method is the CRC-16 (Cycling Redundancy Check). This field is formed by two bytes; where first the least significant byte is transmitted (CRC-), and then the most significant (CRC+). The CRC calculation form is described in the protocol specification.

In the RTU mode there is no specific character that indicates the beginning or the end of a telegram. The indication of when a new message begins or when it ends is done by the absence of data transmission in the network, for a minimum period of 3.5 times the transmission time of a data byte (11 bits). Thus, in case a telegram has initiated after the elapsing of this minimum time, the network elements will assume that the first received character represents the beginning of a new telegram. And in the same manner, the network elements will assume that the telegram has reached its end when after receiving the telegram elements, this time has elapsed again.

If during the transmission of a telegram the time between the bytes is longer than this minimum time, the telegram will be considered invalid because the frequency inverter will discard the bytes already received and will mount a new telegram with the bytes that were being transmitted.

For communication rates higher than 19200 bit/s, the used times are the same as for that rate. The next table shows us the times for different communication transmission rates:

Table 2.2: *Communication rates and the time periods involved in the telegram transmission*

Baud rate	T_{11bits}	$T_{3.5x}$
1200 bits/s	9.167 ms	32.083 ms
2400 bits/s	4.583 ms	16.042 ms
4800 bits/s	2.292 ms	8.021 ms
9600 bits/s	1.146 ms	4.010 ms
19200 bits/s	573 μs	2.005 ms
38400 bits/s	573 μs	2.005 ms
57600 bits/s	573 μs	2.005 ms

- T_{11bits} = Time for transmitting one byte of the telegram.

- $T_{3.5x}$ = Minimum interval to indicated beginning and end of a telegram (3.5 x T_{11bits}).

3 INTERFACE DESCRIPTION

The SSW900 soft-starter has two Slots for accessories (Figura 3.1). Parameters S3.5.1 and S3.5.2 present which accessory was recognized by Slot.

The accessories can be connected to any Slot, but only one type of each communication accessory is allowed.

Read the user's manual of the SSW900 soft-starter before installing or using this accessory.

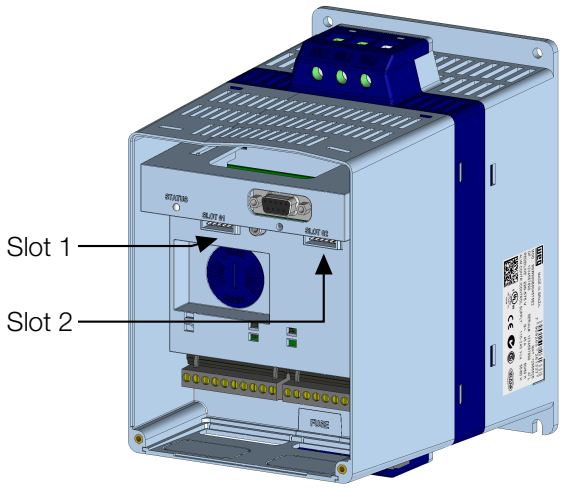
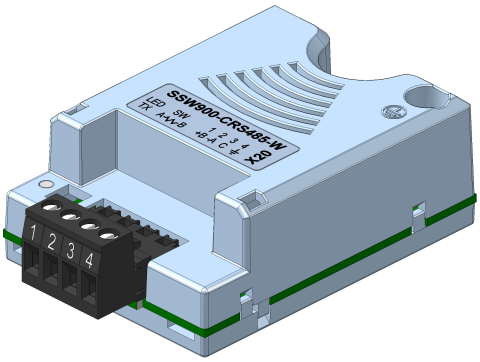


Figure 3.1: *Slots for accessories*

The SSW900 soft-starter uses the RS485 accessory to provide a Modbus RTU interface for communication. Characteristics of this interface are described next.

3.1 RS485 ACCESSORY



SSW900-CRS485-W:

- Supplied items:
  - Installation guide.
  - RS485 communication module.

3.2 CONNECTOR

The accessory for RS485 communication has a connector (X20) for network connection. The connector pinout is presented in table 3.1.

Table 3.1: *Pin assignment of connector for RS485 (X20)*

Pin	Name	Function
1	+B	RxD/TxD positive
2	-A	RxD/TxD negative
3	C	0V isolated from the RS485 circuit, used to enable the connection of this point to the reference 0V of the other network devices
4	Protective earth	Connection to the protective earth, normally used to connect the shield of the communication cable

3.3 TERMINATING RESISTOR

The RS485 communication accessory has switches that can be activated to enable the termination resistor according to figure 3.2. The configurations of the switch to enable the termination resistor are shown in table 3.2.

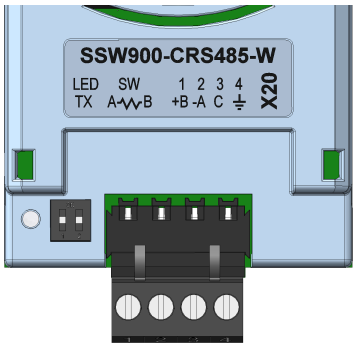


Figure 3.2: *Indication LED and switch to enable the termination resistor*

Table 3.2: *Configurations of the switch (sw) that enables the termination resistor*

Switch Setting	Option
SW.1 = OFF and SW.2 = OFF	RS485 termination off
SW.1 = ON and SW.2 = ON	RS485 termination on
SW.1 = OFF and SW.2 = ON	Combination not allowed
SW.1 = ON and SW.2 = OFF	

3.4 INDICATION LEDS

The SSW900 soft-starter has a green LED (TX) to indicate data transmission by the product (Figure 3.2).

Details on the alarms, communications failures and communication states are made through the keypad (HMI) and product parameters.

4 INSTALLATION OF THE EQUIPMENT IN NETWORK

For the connection of the soft-starter SSW900 using the RS485 interface, the following points must be observed:

4.1 COMMUNICATION RATE

The RS485 interfaces of the SSW900 soft-starter can communicate using the rates defined on the table 4.1.

Table 4.1: *Supported baud rates*

Baud Rate
9600 bit/s
19200 bit/s
38400 bit/s
57600 bit/s

All network equipment must be programmed to use the same communication baud rate.

4.2 ADDRESS IN THE MODBUS RTU NETWORK

Each Modbus RTU network device must have an address, and may range from 1 to 247. This address must be unique for each equipment.

4.3 TERMINATION RESISTOR

The use of termination resistors at the ends of the bus is essential to avoid line reflection, which can impair the signal and cause communication errors. Termination resistors of 120 Ω | 0.25 W must be connected between the signals +B and -A at the ends of the main bus.

It worth to mention that, in order to allow the disconnection of the element from the network without damaging the bus, it is interesting to put active terminations, which are elements that only play the role of the termination. Thus, any equipment in the network can be disconnected from the bus without damaging the termination.

4.4 CABLES

Recommended characteristics of the cable used in the installation:

- It is recommended the use of a shielded cable with a twisted pair for the signals +B and -A, 24 AWG minimum.
- It is also recommended that the cable has one more wire for the interconnection of the 0V reference signal.
- Maximum length for connection between devices: 1000 m.

To perform the installation, it is recommended the use of shielded cables specific for use in industrial environment.

4.5 CONNECTION IN THE NETWORK

In order to interconnect the several network nodes, it is recommended to connect the equipment directly to the main line without using derivations. During the cable installation the passage near to power cables must be avoided, because, due to electromagnetic interference, this makes the occurrence of transmission errors possible.

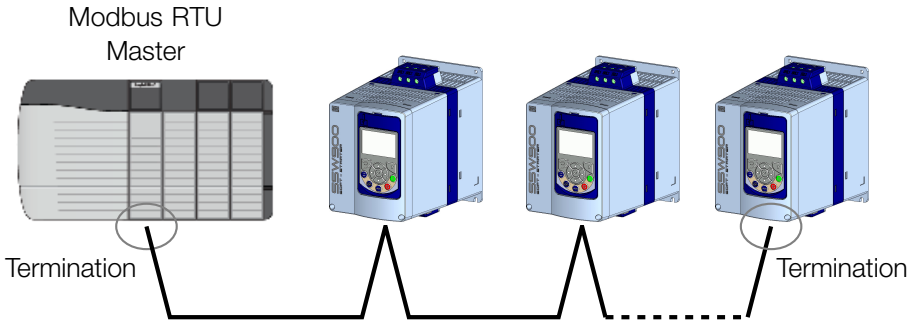


Figure 4.1: *Modbus RTU network installation example*

In order to avoid problems with current circulation caused by difference of potential among ground connections, it is necessary that all the devices be connected to the same ground point.

The maximum number of devices connected to a single segment of the network is limited to 32. Repeaters can be used for connecting a bigger number of devices.

4.6 RECOMMENDATIONS FOR GROUNDING AND CABLE PASSAGE

The correct connection to ground reduces problems caused by interference in an industrial environment. Below are some recommendations regarding grounding and cable passage:

- It is recommended the use of equipment suitable for the industrial environment.
- The cable must be laid separately (and far away if possible) from the power cables.
- All the network devices must be properly grounded, preferably at the same ground connection.
- Always use shielded cables, as well as connectors with metal housing.
- Use fastening clamps in the main grounding point, allowing a greater contact area between the cable shield and the grounding.
- Avoid connection of the cable in multiple grounding points, especially where groundings of different potentials are present.

5 S STATUS

Allows viewing of the SSW reading variables.

S5 COMMUNICATIONS

HMI monitoring parameters of the communication interfaces.

For a detailed description, refer to the Anybus-CC, CANopen, DeviceNet and Modbus RTU User's Manuals of the SSW according to the interface used.

S5.1 Status Word

.1 SSW	0 ... 15 Bit

Description:
Word of SSW status.

.1 SSW Word of SSW status.

Bit	Value/Description
Bit 0 Running	0: The motor is not enabled. 1: The motor is enabled.
Bit 1 Gener. Enabled	0: When it is general disabled by any mean. 1: When it is general enabled by all the means.
Bit 2 JOG	0: The JOG function is inactive. 1: The JOG function is active.
Bit 3 Initial Test	0: None. 1: During the initial tests before the motor starting.
Bit 4 Ramp Up	0: It is not accelerating. 1: During the whole acceleration.
Bit 5 Full Voltage	0: There is no full voltage applied to the motor. 1: Full voltage is being applied to the motor.
Bit 6 Bypass	0: With open bypass. 1: With closed bypass.
Bit 7 Ramp Down	0: It is not decelerating. 1: During the whole deceleration.
Bit 8 Remote	0: Local. 1: Remote.
Bit 9 Braking	0: It is not executing braking. 1: During the braking process.
Bit 10 FWD/REV	0: It is not reverting the rotation direction. 1: During the rotation reversion process.
Bit 11 Reverse	0: Forward rotation. 1: Reverse rotation.
Bit 12 Ton	0: None. 1: Time before start (C5.7.2).
Bit 13 Toff	0: None. 1: Time after stop (C5.7.3).
Bit 14 Alarm	0: The SSW is not in alarm condition. 1: The SSW is in alarm condition. Note: The active alarm codes can be read by means of the menu D2.1.
Bit 15 Fault	0: The SSW is not in fault condition. 1: The SSW is in fault condition. Note: The active fault code can be read by means of the menu D1.1.

S5.2 Command Word

.5 Slot1	0 ... 15 Bit
.6 Slot2	0 ... 15 Bit

Description:
Command word of all sources of the SSW. The RUN/STOP and JOG commands of the sources which are not active will be reset.

.5 Slot1 Control word via any communication accessory connected to Slot 1.

.6 Slot2 Command word via any communication accessory connected to Slot 2.

Bit	Value/Description
Bit 0 Start/Stop	**0**: stopping by ramp. **1**: starting by ramp.
Bit 1 Gener. Enabled	**0**: general disable. **1**: general enable.
Bit 2 JOG	**0**: no JOG. **1**: with JOG.
Bit 3 FWD/REV	**0**: clockwise CW. **1**: counterclockwise CCW.
Bit 4 LOC/REM	**0**: local. **1**: remote.
Bit 5 ... 6 Reserved	
Bit 7 Reset	**0** → **1**: execute fault reset (if a fault is active). Note: Only in the 0 to 1 transition command.
Bit 8 ... 15 Reserved	

NOTE!
If the RUN/STOP and JOG commands are by a certain source and it is active, only these commands can be viewed in S5.2. For security reasons, all the other commands of the other sources which are not active will be reset.

S5.3 Value for Outputs

.1 DO Value	0 ... 15 Bit

Description:
Value for digital and analog outputs via serial communication.

.1 DO Value Value for the digital outputs via network interfaces.

Bit	Value/Description
Bit 0 DO1	**0**: Inactive. **1**: Active.
Bit 1 DO2	**0**: Inactive. **1**: Active.
Bit 2 DO3	**0**: Inactive. **1**: Active.
Bit 3 ... 15 Reserved	

S5.3.2 Value for AO

.1 AO in 10 bits	0 ... 1023

Description:
Value for the analog output via network interfaces.

.1 AO in 10 bits Value for the analog output via network interfaces: 0...1023. 0=0% and 1023=100%.

S5.4 RS485 Serial

.1 Interface Status	0 ... 2
.2 Received Telegram	0 ... 65535
.3 Transmitted Telegram	0 ... 65535
.4 Telegram with Error	0 ... 65535
.5 Reception Errors	0 ... 65535

Description:
Status for RS485 accessory, and the protocols using this interface.

.1 Interface Status Identify whether the RS485 serial interface board is properly installed, and whether the serial communication presents errors.

Indication	Description
0 = Off	Inactive serial interface. The RS485 interface accessory is not installed.
1 = On	The RS485 interface accessory is installed and detected.
2 = Timeout Error	Serial interface is active, but a serial communication alarm or fault is detected - alarm A128 / fault F128.

.2 Received Telegram Cyclic counter that is incremented every time a telegram is received.

.3 Transmitted Telegram Cyclic counter that is incremented every time a telegram is transmitted.

.4 Telegram with Error It shows the number of messages received with incorrect error check field (i.e.: CRC, Checksum).

.5 Reception Errors It shows the number of bytes received with other communication errors.

NOTE!
The contactors are cyclic, that is, above 65535 they return to 0.

6 C CONFIGURATIONS

This menu allows the programming of all SSW configuration parameters.

C8 COMMUNICATION

To change information via communication network, the SSW has several standard protocols.

The following necessary accessories and protocols are available:

Protocol	Accessory
CANopen	SSW900-CAN-W
DeviceNet	SSW900-CDN-N, SSW900-CAN-W
EtherNet/IP	SSW900-CETH-IP-N
Modbus RTU	SSW900-CRS485-W
Modbus TCP	SSW900-CMB-TCP-N
Profibus DP	SSW900-CPDP-N
PROFINET IO	SSW900-CPN-IO-N

For further details regarding the SSW configuration to operate these protocols, refer to the SSW Communication Manual.

C8.1 I/O Data

Configure network data exchange area.

Use this for cyclic communication over SSW900-CAN-W module (DeviceNet), SSW900-CPDP-N, SSW900-CDN-N, SSW900-CETH-IP-N and SSW900-CPN-IO-N. For SSW900-CRS485-W using Modbus RTU protocol or SSW900-CMB-TCP-N module, a contiguous area of holding registers (@1500-@1549 and @1600-@1619) can be accessed using standard Modbus functions.

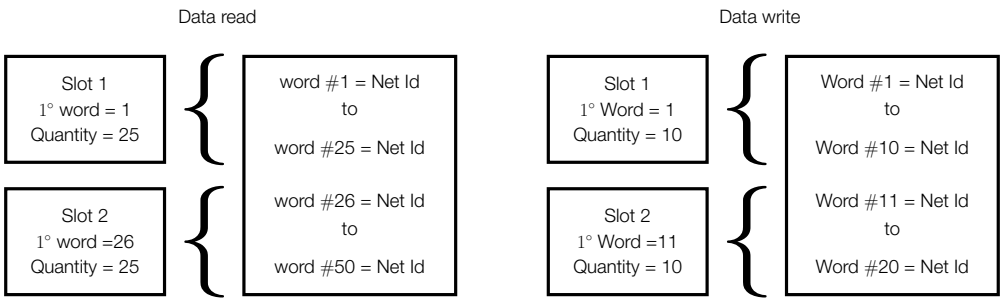


Figure 6.1: *Example of data setting*

C8.1.1 Data Read

Configure a set of 16 bit parameters to read over the network.

C8.1.1 Data Read		
C8.1.1.1 Slot 1 1st Word		
Range:	1 ... 50	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable read word for data communication (inputs for master).

C8.1.1 Data Read		
C8.1.1.2 Slot 1 Quantity		
Range:	1 ... 50	**Default:** 1
Properties:	Stopped	

Description:
It sets the number of read words for data communication (inputs for master), from the first word on.

C8.1.1 Data Read		
C8.1.1.3 Slot 2 1st Word		
Range:	1 ... 50	**Default:** 26
Properties:	Stopped	

Description:
It sets the index of the first programmable read word for data communication (inputs for master).

C8.1.1 Data Read		
C8.1.1.4 Slot 2 Quantity		
Range:	1 ... 50	**Default:** 1
Properties:	Stopped	

Description:
It set the number of read words for data communication (inputs for master), from the first word on.

C8.1.1 Data Read
C8.1.1.5 Word #1

C8.1.1.5 to C8.1.1.54

C8.1.1 Data Read		
C8.1.1.54 Word #50		
Range:	0 ... 65535	**Default:** 0
Properties:	Stopped	

Description:
Select the net address of other parameter, which content will be available as reading data for fieldbus interfaces (inputs: sent to master).

The data size of the referenced parameter must be considered. If data size is bigger than 16 bits, the next data read word configuration must be set to the same net address.

C8.1.2 Data Write

Configure a set of 16 bit parameters to write over the network.

C8.1.2 Data Write		
C8.1.2.1 Slot 1 1st Word		
Range:	1 ... 20	**Default:** 1
Properties:	Stopped	

Description:
It sets the index of the first programmable write word for data communication (outputs for master).

C8.1.2 Data Write

C8.1.2.2 Slot 1 Quantity

Range:	1 ... 20	**Default:** 1
Properties:	Stopped	

Description:
It sets the number of write words for data communication (outputs for master), from the first word on.

C8.1.2 Data Write

C8.1.2.3 Slot 2 1st Word

Range:	1 ... 20	**Default:** 11
Properties:	Stopped	

Description:
It sets the index of the first programmable write word for data communication (outputs for master).

C8.1.2 Data Write

C8.1.2.4 Slot 2 Quantity

Range:	1 ... 20	**Default:** 1
Properties:	Stopped	

Description:
It sets the number of write words for data communication (outputs for master), from the first word on.

C8.1.2 Data Write

C8.1.2.5 Update Delay

Range:	0.0 ... 999.9 s	**Default:** 0.0
Properties:		

Description:
Whenever there is a transition from offline (without cyclic data) to online (with cyclic write data), the data received via communication networks (write words) is ignored during this programmed time, remaining in the state it was before the beginning of the reception.

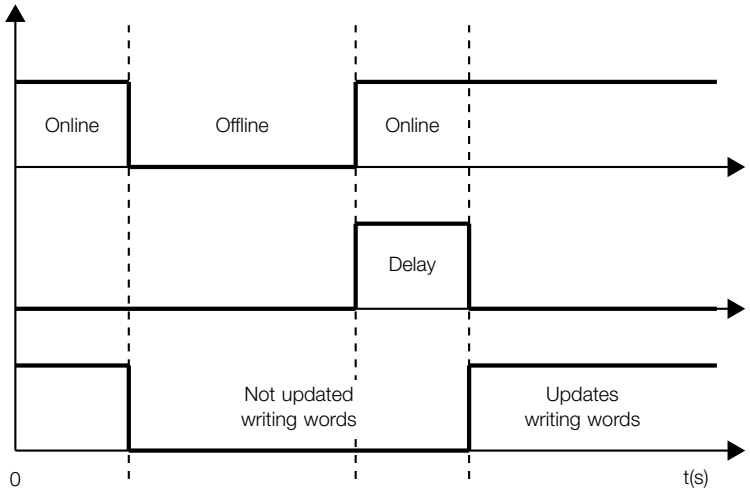


Figure 6.2: *Delay in the update of the I/O words*

C8.1.2 Data Write

C8.1.2.6 Word #1

C8.1.2.6 to C8.1.2.25

C8.1.2 Data Write

C8.1.2.25 Word #20

Range:	0 ... 65535	**Default:** 0
Properties:	Stopped	

Description:
Select the net address of other parameter, which content will be available as writing data for fieldbus interfaces (outputs: received from master).

The data size of the referenced parameter must be considered. If data size is bigger than 16 bits, the next data write word configuration must be set to the same net address.

C8.2 RS485 Serial

Configuration for RS485 accessory, and the protocols using this interface.

For a detailed description, refer to the SSW900 Modbus-RTU User's Manual, supplied in electronic format.

C8.2 RS485 Serial

C8.2.1 Serial Protocol

Range:	0 ... 2	**Default:** 2
Properties:		

Description:
Select the desired protocol for the serial interface.

Indication	Description
0 ... 1 = Reserved	Not avaliable.
2 = Modbus RTU	Modbus RTU serial protocol.

C8.2 RS485 Serial

C8.2.2 Address

Range:	1 ... 247	**Default:** 1
Properties:		

Description:
Select the address used for the serial communication.

It is necessary that each device in the network has an address different from all the others.

C8.2 RS485 Serial

C8.2.3 Baud Rate

Range:	0 ... 3	**Default:** 1
Properties:		

Description:
Select the baud rate for the serial communication interface, in bits per second. This configuration must be identical for all the devices connected to the network.

Indication	Description
0 = 9600 bits/s	Bit rate per second.
1 = 19200 bits/s	Bit rate per second.
2 = 38400 bits/s	Bit rate per second.
3 = 57600 bits/s	Bit rate per second.

C8.2 RS485 Serial

C8.2.4 Bytes Config.

Range: 0 ... 5 **Default:** 1

Properties:

Description:
Select the number of data bits, parity and stop bits of the serial interface bytes. This configuration must be identical for all the devices connected to the network.

Indication	Description
0 = 8 bits, no, 1	8 bits, without parity, 1 stop bit.
1 = 8 bits, even,1	8 bits, with even parity, 1 stop bit.
2 = 8 bits, odd, 1	8 bits, with odd parity, 1 stop bit.
3 = 8 bits, no, 2	8 bits, without parity, 2 stop bit.
4 = 8 bits, even,2	8 bits, with even parity, 2 stop bit.
5 = 8 bits, odd, 2	8 bits, with odd parity, 2 stop bit.

C8.2.5 Timeout

Protection against fault in the RS485 communication.

In case the product does not receive valid telegrams for a period longer than the setting, a communication error will be indicated, alarm A128 or fault F128 will be displayed on the HMI, depending on the programming of C8.2.5.1, and the action programmed in C8.2.5.2 will be executed.

Time will start counting from the first valid telegram received.

C8.2.5 Timeout

C8.2.5.1 Mode

Range: 0 ... 2 **Default:** 0

Properties:

Description:
It allows configuring the protection tripping mode for RS485 communication timeout.

Indication	Description
0 = Inactive	No tripping.
1 = Fault F128	Trips as fault. Disables the motor.
2 = Alarm A128	Trips as alarm. Action described in C8.2.5.2.

C8.2.5 Timeout

C8.2.5.2 Alarm Action

Range: 0 ... 4 **Default:** 3

Properties:

Description:
Action for the RS485 communication timeout alarm.

The actions described in this parameter are executed through the writing of the respective bits in the control word of the SLOT to which the RS485 is connected. Thus, for the commands to be effective, the equipment must be programmed to be controlled by the network interface used. This programming is done through menu C3.

Indication	Description
0 = Indicates Only	No action is taken; the equipment remains in the current state.
1 = Ramp Stop	The stop by ramp command is executed, and the motor stops according to the programmed deceleration ramp.
2 = General Disable	The equipment is general disabled, and the motor stops by inertia.
3 = Change to LOC	The equipment is commanded to local mode.
4 = Change to REM	The equipment is commanded to remote mode.

NOTE!
The alarm action will only have a function if the timeout tripping mode C8.2.5.1 is programmed for Alarm A128.

C8.2.5 Timeout

C8.2.5.3 Timeout

Range: 0.0 ... 999.9 s **Default:** 0.0

Properties:

Description:
Maximum time without communication.

7 OPERATION IN THE MODBUS RTU NETWORK – SLAVE MODE

The SSW900 soft-starter has the following characteristics when operated as a slave in Modbus RTU network:

- Network connection via RS485 serial interface.
- Address, communication rate and byte format defined by equipment parameters.
- It allows the SSW900 soft-starter programming and control via the access to parameters.
- It allows accessing all the markers and data used in the ladder program of the SSW900 soft-starter.

NOTE!

- The RS485, USB and Ethernet interfaces, for using the same functions to access the data and programming of the equipment, must not be used simultaneously to perform program download or on-line monitoring functions of the SSW900 soft-starter, because conflicts may occur during the simultaneous access to the data.

7.1 AVAILABLE FUNCTIONS

In the Modbus specification are defined the functions used to access different types of data. In the SSW900, in order to access those data the following services (or functions) have been made available:

Table 7.1: *Supported Modbus Functions*

Code	Name	Description
01	Read Coils	Reading of bit blocks of the coil type
02	Read Discrete Inputs	Reading of bit blocks of the discrete input type
03	Read Holding Registers	Reading of register blocks of the holding register type
05	Write Single Coil	Writing in a single bit of the coil type
06	Write Single Register	Writing in a single register of the holding type
15	Write Multiple Coils	Writing in bit blocks of the coil type
16	Write Multiple Registers	Writing in register blocks of the holding register type
22	Mask Write Register	Writing in holding register using mask
23	Read/Write Multiple registers	Reading and writing in register blocks of the holding register type
43	Read Device Identification	Identification of the device model

7.2 MEMORY MAP

The soft-starter SSW900 has different types of data accessible through the Modbus communication. These data are mapped at data addresses and access functions as described in the following items.

7.2.1 Parameters

The SSW900 soft-starter Modbus communication is based on the reading/writing of the equipment parameters. All parameters of the equipment are available as 16-bit holding registers. The data addressing is done with the offset equal to zero, which means that the parameter's network address (Net Id) corresponds to the register address.

It is necessary to know the device list of parameters to be able to operate the equipment. Thus, it is possible to identify what data are needed for the status monitoring and the control of the functions. The main parameters are:

Monitoring (reading):

- S5.1.1 (holding register address 680): Status Word SSW.

Command (writing):

- S5.2.5 (holding register address 685): Command Word Slot1.
- S5.2.6 (holding register address 686): Command Word Slot2.

Refer to Appendix A for a complete parameter list of the equipment.

NOTE!

- Depending on the master that is used, those registers are referenced starting from the base address 40000 or 4x. In this case, the address that must be programmed in the master for a parameter is the address showed in the table A.2 added to the base address. Refer to the master documentation to find out how to access holding registers.
- It should be noted that read-only parameters can only be read from the equipment, while other parameters can be read and written through the network.
- Parameters that have the property *Stopped* are only changed when the motor is stopped.
- The data is transmitted as an integer value, without the indication of the decimal places.

7.2.2 Memory Markers

Besides the parameters, other types of data as bit markers, word or float, can also be accessed using the Modbus protocol. Those markers are used mainly by the SoftPLC function, available for the SSW900. Refer to the SoftPLC documentation for the description of those markers, as well as for the addresses via Modbus.

7.2.3 Indirect Parameters

Modbus RTU does not define a channel of cyclic data dedicated like in other networks. However, the SSW900, has dedicated registers so as to optimize the access to non-contiguous parameter areas.

The holding registers with address 1500 to 1549 are used to read, while the ones with address 1600 to 1619 write values of the parameters mapped on menu C8.1.

Table 7.2: *Relationship between configuration parameters and access address*

Programmable Parameter	Indirect Access Register	Description
C8.1.1.5 Data Read Word #1	1500	Register 1500 contains the value of the parameter whose Net Id is configured in C8.1.1.5.
⋮		
C8.1.1.54 Data Read Word #50	1549	Register 1549 contains the value of the parameter whose Net Id is configured in C8.1.1.54.
C8.1.2.6 Data Write Word #1	1600	Register 1600 contains the value of the parameter whose Net Id is configured in C8.1.2.6.
⋮		
C8.1.2.25 Data Write Word #20	1619	Register 1619 contains the value of the parameter whose Net Id is configured in C8.1.2.25.

NOTE!

- For the Modbus protocol, each object referenced in the output area is only changed when the last word mapped for this object is written.

7.2.4 Input words

The SSW900 soft-starter has a reading area with 50 16-bit words available for cyclic data exchange of communication networks. The data available in the reading area (Input) is sent to the master of the network. This area is shared between the two Slots.

To map an object in the reading area, follow the steps below.

1. Configure parameter C8.1.1.1 (Slot 1) or C8.1.1.3 (Slot 2). Those parameters indicate which of the reading words starts the input area for the specific Slot.
2. Configure on parameter C8.1.1.2 (Slot 1) or C8.1.1.4 (Slot 2) the quantity of input words which must be transmitted via network.
3. Parameters C8.1.1.5 to C8.1.1.54 enable to configure the data that must be provided on the reading words. Those parameters must contain the network addresses (Net Id) of the data that must be transmitted on the respective reading words. The Net Id list is available on the table A.2. Consider the size of each parameter mentioned in this list when programming each word.

Example

The example below presents a configuration for Slot 2. Considering the following parameters to be mapped:

- S5.1.1 Status Word SSW.
- S1.2.4 Main Line Voltage Average.
- S1.1.4 Current Average.
- S1.5.4 Output Power & P.F. P. F..

Searching parameter information on the table A.2:

Mapped Parameter	Net Id	Size	Qty Mapped Words	Example Value
S5.1.1 Status Word SSW	680	16bit	1	99 = 0063h
S1.2.4 Main Line Voltage Average	4	16bit	1	2186 = 088Ah
S1.1.4 Current Average	24	32bit	2	23 = 00000017h
S1.5.4 Output Power & P.F. P. F.	8	8bit	1	14 = 0Eh

Therefore, the configuration must be performed as shown below:

1. C8.1.1.3 Data Read Slot 2 1st Word = 26 → first word transmitted via network is the word #26.
2. C8.1.1.4 Data Read Slot 2 Quantity = 5 → sum of the column “Qty mapped words”.
3. Table 7.3 presents the configuration parameters of the words and the content of the reading words.

Table 7.3: *Example of configuration of the writing words.*

Configuration Parameter	Mapped Parameter	Net Id	Input Area Value
C8.1.1.30 Data Read Word #26	S5.1.1	680	0063h
C8.1.1.31 Data Read Word #27	S1.2.4	4	088Ah
C8.1.1.32 Data Read Word #28	S1.1.4	24	0017h (S1.1.4 low word)
C8.1.1.33 Data Read Word #29	S1.1.4	24	0000h (S1.1.4 high word)
C8.1.1.34 Data Read Word #30	S1.5.4	8	000Eh

NOTE!

- Mapping of invalid parameters or not available will return zero value.
- The data is transmitted as an integer value, without the indication of the decimal places.
- To obtain the network address (Net Id) of the parameters, refer to Appendix A.

7.2.5 Output Words

The SSW900 soft-starter has a writing area with 20 16-bit words available for cyclic data exchange of communication networks. The data available in the write area (Output) is received from the network master. This area is shared between the two Slots.

To map an object in the writing area, follow the steps below.

1. Configure parameter C8.1.2.1 (Slot 1) or C8.1.2.3 (Slot 2). Those parameters indicate which of the writing words starts the output area for the specific Slot.
2. Configure on parameter C8.1.2.2 (Slot 1) or C8.1.2.4 (Slot 2) the quantity of reading words which must be transmitted via network.
3. Parameters C8.1.2.6 to C8.1.2.25 enable to configure the data that must be provided on the writing words. Those parameters must contain the network address (Net Id) of the data that must be transmitted on the respective writing words. The Net Id list is available on the table A.2. Consider the size of each parameter mentioned in list when programming each word.

Exemplo

The example below presents a configuration for Slot 1. Considering the following parameters to be mapped:

- S5.2.5 Command Word Slot1.
- S5.3.1 Value for Outputs DO Value.
- S5.3.2.1 Value for AO AO in 10 bits.

Searching parameter information on the table A.2:

Mapped Parameter	Net Id	Size	Qty Mapped Words	Example Value
S5.2.5 Command Word Slot1	685	16bit	1	19 = 0013h
S5.3.1 Value for Outputs DO Value	695	16bit	1	7 = 0007h
S5.3.2.1 Value for AO AO in 10 bits	696	16bit	1	1023 = 03FFh

Therefore, the configuration must be performed as shown below:

1. C8.1.2.1 Data Write Slot 1 1st Word = 1 → first word transmitted via network is the word #1.
2. C8.1.2.2 Data Write Slot 1 Quantity = 3 → sum of column “Qty mapped words”.
3. The table 7.4 presents the configuration parameters of the words and the content of the writing words.

Table 7.4: *Example of configuration of the writing words.*

Configuration Parameter	Mapped Parameter	Net Id	Output Area Value
C8.1.2.6 Data Write Word #1	S5.2.5	685	0013h
C8.1.2.7 Data Write Word #2	S5.3.1	695	0007h
C8.1.2.8 Data Write Word #3	S5.3.2.1	696	03FFh

NOTE!

- Mapping of readonly parameters (status, diagnostics) or invalid parameters will have no effect.
- Parameters that have the property *Stopped*, when mapped on the writing words, are only changed when the motor is stopped.
- The parameters written using these words are not saved in non-volatile memory. Thus, if the equipment is turned off and back on, these parameters will return to their original value.
- The data is transmitted as an integer value, without the indication of the decimal places.
- To obtain the network address (Net Id) of the parameters, refer to Appendix A.

7.3 DATA ACCESS

The Modbus protocol allows the access only by bits or by 16-bit registers.

To make it possible to write or read a block of more than 2 registers without an error return even if there is an invalid register in the selected range, the following definitions have been used:

- Reading registers that do not represent available parameters return the value zero when the requested number of registers is greater than 2. For requests with a quantity equal to 1 or 2 registers, error code 2 (Invalid data address) is returned.
- Write to registers that represent read-only or invalid parameters have no effect and do not return error when the requested number of registers is greater than 2. For requests with a quantity equal to 1 or 2 registers, error code 2 (Invalid data address) is returned.

Data types greater than 16 bits must be accessed as multiple registers. If the number of registers requested is not sufficient to access the full size of the data type, error code 2 (Invalid data address) is returned.

For example, the float data type take four bytes of memory. In the access by registers, it is necessary to read or write two registers in sequence (least significant value in the first register) so that the four bytes will be accessed.

The Modbus protocol defines that in order to transmit a 16-bit register, the most significant byte (MSB) must be transmitted first. Therefore, if four registers are read in a row, from the register with address 0, the content of each register will be transmitted the following way:

1st Register – 0		2nd Register – 1		3rd Register – 2		4th Register – 3	
W0 MSB	W0 LSB	W1 MSB	W1 LSB	W2 MSB	W2 LSB	W3 MSB	W3 LSB

7.4 COMMUNICATION ERRORS

Communication errors may occur in the transmission of telegrams, as well as in the contents of the transmitted telegrams.

In the event of a successful reception, during the treatment of the telegram, the slave may detect problems and send an error message, indicating the kind of problem found:

Table 7.5: *Error codes for Modbus*

Error Code	Description
1	Invalid function: the requested function is not implemented for the equipment.
2	Invalid data address: the data address (register or bit) does not exist.
3	Invalid data value: ▪ Value out of the allowed range. ▪ Writing on data that cannot be changed (read only register or bit).

NOTE!
It is important that it be possible to identify at the client what type of error occurred, in order to be able to diagnose problems during the communication.

8 STARTUP GUIDE

The main steps to start up the SSW900 soft-starter in Modbus TCP network are described below. These steps represent an example of use. Check out the specific chapters for details on the indicated steps.

8.1 INSTALLING THE ACCESSORY

1. Install the communication accessory, as indicated in the installation guide supplied with the accessory.
2. Connect the cables, considering the recommended instructions in network installation, as described in item 4:
   - Use shielded cable.
   - Properly ground network equipment.
   - Avoid laying communication cables next to power cables.

8.2 CONFIGURING THE EQUIPMENT

1. Follow the recommendations described in the user manual to program the device parameters related to the motor parameterization, desired functions for the I/O signals, etc.
2. Program the command sources as desired for the application in menu C3.
3. Configure communication parameters, such as address, baudrate, parity, etc. in C8.2.
4. Configure the timeout for the Modbus RTU communication in C8.2.5.3.
5. Program the desired action for the equipment in case of communication fault in C8.2.5.
6. Define which data will be read and written at soft-starter SSW900, based on its parameter list. It is not necessary to define I/O words. The Modbus RTU protocol enables direct access to any device parameter, and does not distinguish between cyclic and acyclic data. Nevertheless, data exchange areas can be configured via menu C8.1 (see item 7.2.3). Among the main parameters that can be used to control the device, we can mention:
   - S5.1.1 Status Word SSW (read).
   - S5.2.5 Command Word Slot1 (write).
   - S5.2.6 Command Word Slot2 (write).

8.3 CONFIGURING THE MASTER

The way the network configuration is done depends greatly on the used master and the configuration tool. It is essential to know the tools used to perform this activity. In general, the following steps are necessary to perform the network configuration.

1. Configure the master to access the holding registers, based on the defined equipment parameters to read and write. The register address is based on the parameter's network address (Net Id), as shown in Appendix A.
2. It is recommended that reading and writing are done in a cyclic manner, allowing detection of communication errors by timeout. The period of data update must be in accordance with the value programmed in parameter C8.2.5.3.

8.4 COMMUNICATION STATUS

Once the network is assembled and the master programmed, it is possible to use the LEDs and parameters of the equipment to identify some status related to the communication.

- Parameter S5.4.1 indicates the slave communication status.

- Parameters S5.4.2 and S5.4.3 indicate, respectively, the number of Modbus RTU telegrams received and transmitted by the slave.
- Parameters S5.4.4 and S5.4.5 indicate communication errors detected by the slave.

The master of the network must also supply information about the communication with the slave.

9 FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
F128/A128: Serial Communication Timeout	It indicates that the SSW stopped receiving valid telegrams for a period longer than the setting (C8.2.5.3). The time counting starts as soon as it receives the first valid telegram, with address and error-checking field correct.	- Check network installation, broken cable or fault/poor contact on the connections with the network, grounding. - Make sure that the master sends telegrams to the equipment in intervals shorter than the programmed (C8.2.5.3). - Disable this function (C8.2.5.1).

APPENDIX A

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Table A.2: *Characteristics of the parameters for the communication protocol*

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
S1 Status\Measurements						
S1.1	Current					
S1.1.1	R Phase	0.0 to 14544.0 A	1	26	32bit	2
S1.1.2	S Phase	0.0 to 14544.0 A	1	28	32bit	2
S1.1.3	T Phase	0.0 to 14544.0 A	1	30	32bit	2
S1.1.4	Average	0.0 to 14544.0 A	1	24	32bit	2
S1.1.5	Motor %In	0.0 to 999.9 %	1	2	16bit	1
S1.1.6	SSW %In	0.0 to 999.9 %	1	1	16bit	1
S1.2	Main Line Voltage					
S1.2.1	R-S Line	0.0 to 999.9 V	1	33	16bit	1
S1.2.2	S-T Line	0.0 to 999.9 V	1	34	16bit	1
S1.2.3	T-R Line	0.0 to 999.9 V	1	35	16bit	1
S1.2.4	Average	0.0 to 999.9 V	1	4	16bit	1
S1.2.5	Motor %Vn	0.0 to 999.9 %	1	3	16bit	1
S1.2.6	SSW %Vn	0.0 to 999.9 %	1	5	16bit	1
S1.3	Output Voltage					
S1.3.1	Average	0.0 to 999.9 V	1	7	16bit	1
S1.3.2	Motor %Vn	0.0 to 999.9 %	1	6	16bit	1
S1.4	SCR Blocking Voltage					
S1.4.1	R-U Blocking	0.0 to 999.9 V	1	21	16bit	1
S1.4.2	S-V Blocking	0.0 to 999.9 V	1	22	16bit	1
S1.4.3	T-W Blocking	0.0 to 999.9 V	1	23	16bit	1
S1.5	Output Power & P.F.					
S1.5.1	Active	0.0 to 11700.0 kW	1	10	32bit	2
S1.5.2	Apparent	0.0 to 11700.0 kVA	1	12	32bit	2
S1.5.3	Reactive	0.0 to 11700.0 kVAr	1	14	32bit	2
S1.5.4	P. F.	0.0 to 1.0	2	8	8bit	1
S1.6	P.L.L.					
S1.6.1	Status	0 = Off 1 = Ok		16	enum	1
S1.6.2	Frequency	0.0 to 99.9 Hz	1	17	16bit	1
S1.6.3	Sequence	0 = Invalid 1 = RST / 123 2 = RTS / 132		18	enum	1
S1.7	Motor Torque					
S1.7.1	Motor %Tn	0.0 to 999.9 %	1	9	16bit	1
S1.8	Control Voltage					
S1.8.1	Input	0.0 to 999.9 V	1	71	16bit	1
S1.8.2	+5V	0.0 to 9.99 V	2	72	16bit	1
S1.8.3	+12V	0.0 to 99.9 V	1	73	16bit	1
S1.8.4	+Vbat	0.0 to 9.99 V	2	75	16bit	1
S1.8.5	+48V	0.0 to 99.9 V	1	76	16bit	1
S2 Status\I/O						
S2.1	Digital					

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
S2.1.1	Inputs	Bit 0 = DI1 Bit 1 = DI2 Bit 2 = DI3 Bit 3 = DI4 Bit 4 = DI5 Bit 5 = DI6 Bit 6 ... 15 = Reserved		677	16bit	1
S2.1.2	Outputs	Bit 0 = DO1 Bit 1 = DO2 Bit 2 = DO3 Bit 3 ... 15 = Reserved		678	16bit	1
S2.2	Analog Output					
S2.2.1	Percent	0.0 to 100.0 %	2	673	16bit	1
S2.2.2	Current	0.0 to 20.0 mA	3	674	16bit	1
S2.2.3	Voltage	0.0 to 10.0 V	3	675	16bit	1
S2.2.4	10 bits	0 to 1023	0	676	16bit	1
		S3 Status\SSW900				
S3.1	SSW Status					
S3.1.1	Actual	0 = Ready 1 = Initial Test 2 = Fault 3 = Ramp Up 4 = Full Voltage 5 = Bypass 6 = Reserved 7 = Ramp Down 8 = Braking 9 = FWD/REV 10 = Jog 11 = Start Delay 12 = Re-start Delay 13 = General Disabled 14 = Configuration		679	enum	1
S3.1.2	Active Command Source	0 = HMI Keys LOC 1 = HMI Keys REM 2 = DIx LOC 3 = DIx REM 4 = USB LOC 5 = USB REM 6 = SoftPLC LOC 7 = SoftPLC REM 8 = Slot 1 LOC 9 = Slot 1 REM 10 = Slot 2 LOC 11 = Slot 2 REM		232	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
S3.1.3	Status Word					
S3.1.3.1	SSW	Bit 0 = Running Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = Initial Test Bit 4 = Ramp Up Bit 5 = Full Voltage Bit 6 = Bypass Bit 7 = Ramp Down Bit 8 = Remote Bit 9 = Braking Bit 10 = FWD/REV Bit 11 = Reverse Bit 12 = Ton Bit 13 = Toff Bit 14 = Alarm Bit 15 = Fault		680	16bit	1
S3.1.4	Configuration Mode					
S3.1.4.1	Status	Bit 0 = System Initialization Bit 1 = Firmware Download Bit 2 = Oriented Start-Up Bit 3 = Incompatible Bit 4 = Reset Needs Bit 5 = Copy HMI Bit 6 ... 15 = Reserved		692	16bit	1
S3.2	Software Version					
S3.2.1	Package	0.0 to 99.99	2	328	16bit	1
S3.2.2	Details					
S3.2.2.1	Control 1 V	0.0 to 99.99	2	330	16bit	1
S3.2.2.2	Control 1 rev.	-32768 to 32767	0	327	s16bit	1
S3.2.2.3	Bootloader V	0.0 to 99.99	2	329	16bit	1
S3.2.2.4	Bootloader rev.	-32768 to 32767	0	323	s16bit	1
S3.2.2.5	HMI rev.	-32768 to 32767	0	322	s16bit	1
S3.2.2.6	Control 2 V	0.0 to 99.99	2	331	16bit	1
S3.2.2.7	Control 2 rev.	-32768 to 32767	0	326	s16bit	1
S3.2.2.8	Accessory 1 V	0.0 to 99.99	2	333	16bit	1
S3.2.2.9	Accessory 1 rev.	-32768 to 32767	0	324	s16bit	1
S3.2.2.10	Accessory 2 V	0.0 to 99.99	2	334	16bit	1
S3.2.2.11	Accessory 2 rev.	-32768 to 32767	0	325	s16bit	1
S3.3	SSW Model					
S3.3.1	Current	0 = 10 to 30 A 1 = 45 to 105 A 2 = 130 to 200 A 3 = 255 to 412 A 4 = 480 to 670 A 5 = 820 to 950 A		294	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		6 = 1100 to 1400 A				
S3.3.2	Voltage	0 = 220 to 575 V 1 = 400 to 690 V		296	enum	1
S3.3.3	Control Voltage	0 = 110 to 240 V 1 = 110 to 130 V 2 = 220 to 240 V 3 = 24 Vcc		297	enum	1
S3.3.4	Serial Number	0 to 4294967295	0	298	32bit	2
S3.4	Fan Status					
S3.4.1	Actual	0 = Off 1 = On		293	enum	1
S3.5	Accessories					
S3.5.1	Slot 1	0 = Without 1 = Anybus-CC 2 = RS-485 3 = PT100 4 = I/Os Exp. 5 = Profibus 6 = CAN 7 = Ethernet 8 = External Current Acqu.		335	enum	1
S3.5.2	Slot 2	0 = Without 1 = Anybus-CC 2 = RS-485 3 = PT100 4 = I/Os Exp. 5 = Profibus 6 = CAN 7 = Ethernet 8 = External Current Acqu.		336	enum	1
S4 Status\Temperatures						
S4.1	SCRs Temperature					
S4.1.1	Actual	-22 to 260 °C	0	60	s16bit	1
S4.2	Thermal Class Status					
S4.2.1	Of Maximum	0.0 to 100.0 %	1	50	16bit	1
S4.3	Motor Temperature					
S4.3.1	Channel 1	-20 to 260 °C	0	63	s16bit	1
S4.3.2	Channel 2	-20 to 260 °C	0	64	s16bit	1
S4.3.3	Channel 3	-20 to 260 °C	0	65	s16bit	1
S4.3.4	Channel 4	-20 to 260 °C	0	66	s16bit	1
S4.3.5	Channel 5	-20 to 260 °C	0	67	s16bit	1
S4.3.6	Channel 6	-20 to 260 °C	0	68	s16bit	1
S5 Status\Communications						

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
S5.1	Status Word					
S5.1.1	SSW	Bit 0 = Running Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = Initial Test Bit 4 = Ramp Up Bit 5 = Full Voltage Bit 6 = Bypass Bit 7 = Ramp Down Bit 8 = Remote Bit 9 = Braking Bit 10 = FWD/REV Bit 11 = Reverse Bit 12 = Ton Bit 13 = Toff Bit 14 = Alarm Bit 15 = Fault		680	16bit	1
S5.2	Command Word					
S5.2.1	DIx	Bit 0 = Start/Stop Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 = Brake Bit 9 = Emergency Start Bit 10 ... 15 = Reserved		683	16bit	1
S5.2.2	HMI Key	Bit 0 = Start/Stop Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 ... 15 = Reserved		681	16bit	1
S5.2.3	USB	Bit 0 = Start/Stop Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 ... 15 = Reserved		682	16bit	1
S5.2.4	SoftPLC	Bit 0 = Start/Stop		684	16bit	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 ... 15 = Reserved				
S5.2.5	Slot1	Bit 0 = Start/Stop Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 ... 15 = Reserved		685	16bit	1
S5.2.6	Slot2	Bit 0 = Start/Stop Bit 1 = Gener. Enabled Bit 2 = JOG Bit 3 = FWD/REV Bit 4 = LOC/REM Bit 5 ... 6 = Reserved Bit 7 = Reset Bit 8 ... 15 = Reserved		686	16bit	1
S5.3	Value for Outputs					
S5.3.1	DO Value	Bit 0 = DO1 Bit 1 = DO2 Bit 2 = DO3 Bit 3 ... 15 = Reserved		695	16bit	1
S5.3.2	Value for AO					
S5.3.2.1	AO in 10 bits	0 to 1023	0	696	16bit	1
S5.4	RS485 Serial					
S5.4.1	Interface Status	0 = Off 1 = On 2 = Timeout Error		735	enum	1
S5.4.2	Received Telegram	0 to 65535	0	736	16bit	1
S5.4.3	Transmitted Telegram	0 to 65535	0	737	16bit	1
S5.4.4	Telegram with Error	0 to 65535	0	738	16bit	1
S5.4.5	Reception Errors	0 to 65535	0	739	16bit	1
S5.5	Anybus-CC					
S5.5.1	Identification	0 = Disabled 1 ... 15 = Reserved 16 = Profibus DP 17 = DeviceNet 18 = Reserved		750	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		19 = EtherNet/IP 20 = Reserved 21 = Modbus TCP 22 = Reserved 23 = PROFINET IO 24 ... 25 = Reserved				
S5.5.2	Comm. Status	0 = Setup 1 = Init 2 = Wait Comm 3 = Idle 4 = Data Active 5 = Error 6 = Reserved 7 = Exception 8 = Access Error		751	enum	1
S5.6	Configuration Mode					
S5.6.1	Status	Bit 0 = System Initialization Bit 1 = Firmware Download Bit 2 = Oriented Start-Up Bit 3 = Incompatible Bit 4 = Reset Needs Bit 5 = Copy HMI Bit 6 ... 15 = Reserved		692	16bit	1
S5.6.2	Control	Bit 0 = Abort Startup Bit 1 ... 15 = Reserved		693	16bit	1
S5.7	CANopen/DeviceNet					
S5.7.1	CAN Controller Status	0 = Disabled 1 = Auto-baud 2 = CAN Enabled 3 = Warning 4 = Error Passive 5 = Bus Off 6 = No Bus Power		705	enum	1
S5.7.2	Received Telegram	0 to 65535	0	706	16bit	1
S5.7.3	Transmitted Telegram	0 to 65535	0	707	16bit	1
S5.7.4	Bus Off Counter	0 to 65535	0	708	16bit	1
S5.7.5	Lost Messages	0 to 65535	0	709	16bit	1
S5.7.6	CANopen Comm. Status	0 = Disabled 1 = Reserved 2 = Comm. Enabled 3 = ErrorCtrl.Enab 4 = Guarding Error 5 = HeartbeatError		721	enum	1
S5.7.7	CANopen Node State	0 = Disabled		722	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		1 = Initialization 2 = Stopped 3 = Operational 4 = PreOperational				
S5.7.8	DNet Network Status	0 = Offline 1 = OnLine,NotConn 2 = OnLine,Conn 3 = Conn.Timed-out 4 = Link Failure 5 = Auto-Baud		716	enum	1
S5.7.9	DeviceNet Master Status	0 = Run 1 = Idle		717	enum	1
S5.9	Bluetooth					
S5.9.1	MAC Address	00:00:00:00:00:00 to FF:FF:FF:FF:FF:FF		801	MAC_ADDRESS	3
		S6 Status\SoftPLC				
S6.1	SoftPLC Status					
S6.1.1	Actual	0 = No Application 1 = Install. App. 2 = Incompat. App. 3 = App. Stopped 4 = App. Running		1100	enum	1
S6.2	Scan Cycle Time					
S6.2.1	Actual	0 to 65535 ms	0	1102	16bit	1
S6.3	Value for Outputs					
S6.3.1	DO Value	Bit 0 = DO1 Bit 1 = DO2 Bit 2 = DO3 Bit 3 ... 15 = Reserved		697	16bit	1
S6.3.2	AO Value					
S6.3.2.1	AO in 10 bits	0 to 1023	0	698	16bit	1
S6.4	Parameter					
S6.4.1	User #1	-10000 to 10000	0	1110	s32bit	2
S6.4.2	User #2	-10000 to 10000	0	1112	s32bit	2
S6.4.3	User #3	-10000 to 10000	0	1114	s32bit	2
S6.4.4	User #4	-10000 to 10000	0	1116	s32bit	2
S6.4.5	User #5	-10000 to 10000	0	1118	s32bit	2
S6.4.6	User #6	-10000 to 10000	0	1120	s32bit	2
S6.4.7	User #7	-10000 to 10000	0	1122	s32bit	2
S6.4.8	User #8	-10000 to 10000	0	1124	s32bit	2
S6.4.9	User #9	-10000 to 10000	0	1126	s32bit	2
S6.4.10	User #10	-10000 to 10000	0	1128	s32bit	2
S6.4.11	User #11	-10000 to 10000	0	1130	s32bit	2
S6.4.12	User #12	-10000 to 10000	0	1132	s32bit	2
S6.4.13	User #13	-10000 to 10000	0	1134	s32bit	2

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
S6.4.14	User #14	-10000 to 10000	0	1136	s32bit	2
S6.4.15	User #15	-10000 to 10000	0	1138	s32bit	2
S6.4.16	User #16	-10000 to 10000	0	1140	s32bit	2
S6.4.17	User #17	-10000 to 10000	0	1142	s32bit	2
S6.4.18	User #18	-10000 to 10000	0	1144	s32bit	2
S6.4.19	User #19	-10000 to 10000	0	1146	s32bit	2
S6.4.20	User #20	-10000 to 10000	0	1148	s32bit	2
S6.4.21	User #21	-10000 to 10000	0	1150	s32bit	2
S6.4.22	User #22	-10000 to 10000	0	1152	s32bit	2
S6.4.23	User #23	-10000 to 10000	0	1154	s32bit	2
S6.4.24	User #24	-10000 to 10000	0	1156	s32bit	2
S6.4.25	User #25	-10000 to 10000	0	1158	s32bit	2
S6.4.26	User #26	-10000 to 10000	0	1160	s32bit	2
S6.4.27	User #27	-10000 to 10000	0	1162	s32bit	2
S6.4.28	User #28	-10000 to 10000	0	1164	s32bit	2
S6.4.29	User #29	-10000 to 10000	0	1166	s32bit	2
S6.4.30	User #30	-10000 to 10000	0	1168	s32bit	2
S6.4.31	User #31	-10000 to 10000	0	1170	s32bit	2
S6.4.32	User #32	-10000 to 10000	0	1172	s32bit	2
S6.4.33	User #33	-10000 to 10000	0	1174	s32bit	2
S6.4.34	User #34	-10000 to 10000	0	1176	s32bit	2
S6.4.35	User #35	-10000 to 10000	0	1178	s32bit	2
S6.4.36	User #36	-10000 to 10000	0	1180	s32bit	2
S6.4.37	User #37	-10000 to 10000	0	1182	s32bit	2
S6.4.38	User #38	-10000 to 10000	0	1184	s32bit	2
S6.4.39	User #39	-10000 to 10000	0	1186	s32bit	2
S6.4.40	User #40	-10000 to 10000	0	1188	s32bit	2
S6.4.41	User #41	-10000 to 10000	0	1190	s32bit	2
S6.4.42	User #42	-10000 to 10000	0	1192	s32bit	2
S6.4.43	User #43	-10000 to 10000	0	1194	s32bit	2
S6.4.44	User #44	-10000 to 10000	0	1196	s32bit	2
S6.4.45	User #45	-10000 to 10000	0	1198	s32bit	2
S6.4.46	User #46	-10000 to 10000	0	1200	s32bit	2
S6.4.47	User #47	-10000 to 10000	0	1202	s32bit	2
S6.4.48	User #48	-10000 to 10000	0	1204	s32bit	2
S6.4.49	User #49	-10000 to 10000	0	1206	s32bit	2
S6.4.50	User #50	-10000 to 10000	0	1208	s32bit	2
D1 Diagnostics\Fault						
D1.1	Actual					
D1.1.1	Fxxx	0 to 999	0	90	16bit	1
D1.2	Fault History					
D2 Diagnostics\Alarms						
D2.1	Actual					
D2.1.1	Axxx 1	0 to 999	0	91	16bit	1
D2.1.2	Axxx 2	0 to 999	0	92	16bit	1
D2.1.3	Axxx 3	0 to 999	0	93	16bit	1
D2.1.4	Axxx 4	0 to 999	0	94	16bit	1
D2.1.5	Axxx 5	0 to 999	0	95	16bit	1
D2.2	Alarm History					
D3 Diagnostics\Events						

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		D4 Diagnostics\Motor On				
D4.1	Start Current					
D4.1.1	Maximum	0.0 to 14544.0 A	1	36	32bit	2
D4.1.2	Average	0.0 to 14544.0 A	1	38	32bit	2
D4.2	Real Start Time					
D4.2.1	Actual	0 to 999 s	0	48	16bit	1
D4.2.2	Final	0 to 999 s	0	49	16bit	1
D4.3	Current Full Voltage					
D4.3.1	Maximum	0.0 to 14544.0 A	1	40	32bit	2
D4.4	Main Line Voltage					
D4.4.1	Maximum	0.0 to 999.9 V	1	54	16bit	1
D4.4.2	Minimun	0.0 to 999.9 V	1	55	16bit	1
D4.5	Main Line Frequency					
D4.5.1	Maximum	0.0 to 99.9 Hz	1	56	16bit	1
D4.5.2	Minimum	0.0 to 99.9 Hz	1	57	16bit	1
D4.6	kWh Counter					
D4.6.1	Total	0.0 to 214748364.7 kWh	1	52	32bit	2
D4.7	Number Start					
D4.7.1	Total	0 to 65535	0	59	16bit	1
		D5 Diagnostics\Temperatures				
D5.1	SCRs Maximum					
D5.1.1	Total	-22 to 260 °C	0	77	s16bit	1
D5.2	Motor Maximum					
D5.2.1	Channel 1	-20 to 260 °C	0	80	s16bit	1
D5.2.2	Channel 2	-20 to 260 °C	0	81	s16bit	1
D5.2.3	Channel 3	-20 to 260 °C	0	82	s16bit	1
D5.2.4	Channel 4	-20 to 260 °C	0	83	s16bit	1
D5.2.5	Channel 5	-20 to 260 °C	0	84	s16bit	1
D5.2.6	Channel 6	-20 to 260 °C	0	85	s16bit	1
		D6 Diagnostics\Hours Control				
D6.1	Powered	0 to 4294967295 s	0	42	TIME	2
D6.2	Enabled	0 to 4294967295 s	0	44	TIME	2
D6.3	Fan ON	0 to 4294967295 s	0	46	TIME	2
		D7 Diagnostics\Changed Parameters				
		C1 Configurations\Starting and Stopping				
C1.1	Types of Control	0 = Voltage Ramp 1 = Voltage Ramp + Current Limit 2 = Current Limit 3 = Current Ramp 4 = Pump Control 5 = Torque Control 6 = D.O.L. SCR		202	enum	1
C1.2	Initial Start Voltage	25 to 90 %	0	101	8bit	1
C1.3	Maximum Start Time	1 to 999 s	0	102	16bit	1
C1.4	Start End Detection	0 = Time		106	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		1 = Automatic				
C1.5	Initial Current Ramp	150 to 500 %	0	111	16bit	1
C1.6	Current Ramp Time	1 to 99 %	0	112	8bit	1
C1.7	Current Limit	150 to 500 %	0	110	16bit	1
C1.8	Start Torque Chara.	1 = Constant 2 = Linear 3 = Square		120	enum	1
C1.9	Initial Start Torque	10 to 300 %	0	121	16bit	1
C1.10	End Start Torque	10 to 300 %	0	122	16bit	1
C1.11	Minimun Start Torque	10 to 300 %	0	123	16bit	1
C1.12	Min.Start Torq. Time	1 to 99 %	0	124	8bit	1
C1.13	Stop Time	0 to 999 s	0	104	16bit	1
C1.14	Step Down Volt. Stop	60 to 100 %	0	103	8bit	1
C1.15	End Voltage Stop	30 to 55 %	0	105	8bit	1
C1.16	Stop Torque Characte.	1 = Constant 2 = Linear 3 = Square		125	enum	1
C1.17	End Stop Torque	10 to 100 %	0	126	8bit	1
C1.18	Minimum Stop Torque	10 to 100 %	0	127	8bit	1
C1.19	Min. Stop Torque Time	1 to 99 %	0	128	8bit	1
		C2 Configurations\Nominal Motor Data				
C2.1	Voltage	1 to 999 V	0	400	16bit	1
C2.2	Current	0.1 to 2424.0 A	1	401	16bit	1
C2.3	Speed	1 to 3600 rpm	0	402	16bit	1
C2.4	Power	0.1 to 1950.0 kW	1	404	16bit	1
C2.5	P.F. Power Factor	0.01 to 1.0	2	405	8bit	1
C2.6	S.F. Service Factor	0.01 to 1.5	2	406	8bit	1
		C3 Configurations\LOC/REM Selection				
C3.1	Mode	0 = Always LOC 1 = Always REM 2 = HMI LR Key LOC 3 = HMI LR Key REM 4 = DIx 5 = USB LOC 6 = USB REM 7 = SoftPLC LOC 8 = SoftPLC REM 9 = Slot 1 LOC 10 = Slot 1 REM 11 = Slot 2 LOC 12 = Slot 2 REM		220	enum	1
C3.2	LOC Command	0 = HMI Keys 1 = DIx 2 = USB 3 = SoftPLC 4 = Slot 1		229	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		5 = Slot 2				
C3.3	REM Command	0 = HMI Keys 1 = DIx 2 = USB 3 = SoftPLC 4 = Slot 1 5 = Slot 2		230	enum	1
C3.4	Commands Copy	0 = No 1 = Yes		231	enum	1
		C4 Configurations\I/O				
C4.1	Digital Inputs					
C4.1.1	DI1	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM 6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm 10 = Brake 11 = Reset 12 = Load User 1/2 13 ... 16 = Reserved		263	enum	1
C4.1.2	DI2	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM 6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm 10 = Brake 11 = Reset 12 = Load User 1/2 13 ... 16 = Reserved		264	enum	1
C4.1.3	DI3	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM		265	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm 10 = Brake 11 = Reset 12 = Load User 1/2 13 = Reserved 14 = Emergency Start 15 ... 16 = Reserved				
C4.1.4	DI4	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM 6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm 10 = Brake 11 = Reset 12 = Load User 1/2 13 ... 16 = Reserved		266	enum	1
C4.1.5	DI5	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM 6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm 10 = Brake 11 = Reset 12 = Load User 1/2 13 ... 16 = Reserved		267	enum	1
C4.1.6	DI6	0 = Not Used 1 = Start / Stop 2 = Start (3 Wires) 3 = Stop (3 Wires) 4 = General Enable 5 = LOC / REM 6 = JOG 7 = FWD / REV 8 = No External Fault 9 = No External Alarm		268	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		10 = Brake 11 = Reset 12 = Load User 1/2 13 ... 14 = Reserved 15 = Mot. Thermistor A032 16 = Mot. Thermistor F032				
C4.2	Digital Outputs					
C4.2.1	DO1	0 = Not Used 1 = Running 2 = Full Voltage 3 = Bypass 4 = FWD / REV K1 5 = DC Braking 6 = Without Fault 7 = With Fault 8 = Without Alarm 9 = With Alarm 10 = No Fault / Alarm 11 = SoftPLC 12 = Communication 13 = I motor % > Value 14 = Breaker Shunt Trip		275	enum	1
C4.2.2	DO2	0 = Not Used 1 = Running 2 = Full Voltage 3 = Bypass 4 = FWD / REV K2 5 = DC Braking 6 = Without Fault 7 = With Fault 8 = Without Alarm 9 = With Alarm 10 = No Fault / Alarm 11 = SoftPLC 12 = Communication 13 = I motor % > Value 14 = Breaker Shunt Trip		276	enum	1
C4.2.3	DO3	0 = Not Used 1 = Running 2 = Full Voltage 3 = Bypass 4 = Not Used 5 = DC Braking 6 = Without Fault 7 = With Fault 8 = Without Alarm 9 = With Alarm		277	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		10 = No Fault / Alarm 11 = SoftPLC 12 = Communication 13 = I motor % > Value 14 = Breaker Shunt Trip				
C4.2.4	DO Comparison Value	10.0 to 500.0 %	1	278	16bit	1
C4.3	Analog Output					
C4.3.1	Function	0 = Not Used 1 = SSW Current % 2 = Line Voltage % 3 = Output Voltage % 4 = Power Factor 5 = Thermal Class Prot. 6 = Output Power W 7 = Output Power VA 8 = Motor Torque % 9 = Value to AO 10 = SCRs Temperature 11 = SoftPLC		251	enum	1
C4.3.2	Gain	0.0 to 9.999	3	252	16bit	1
C4.3.3	Signal	0 = 0 to 20mA 1 = 4 to 20mA 2 = 20mA to 0 3 = 20 to 4mA 4 = 0 to 10V 5 = 10V to 0		253	enum	1
		C5 Configurations\Protections				
C5.1	Voltage Protections					
C5.1.1	Motor Undervoltage					
C5.1.1.1	Mode	0 = Inactive 1 = Fault F002 2 = Alarm A002		900	enum	1
C5.1.1.2	Level	0 to 30 %Vn	0	901	8bit	1
C5.1.1.3	Time	0.1 to 10.0 s	1	902	8bit	1
C5.1.2	Motor Overvoltage					
C5.1.2.1	Mode	0 = Inactive 1 = Fault F016 2 = Alarm A016		903	enum	1
C5.1.2.2	Level	0 to 20 %Vn	0	904	8bit	1
C5.1.2.3	Time	0.1 to 10.0 s	1	905	8bit	1
C5.1.3	Motor Voltage Imbalance					
C5.1.3.1	Mode	0 = Inactive 1 = Fault F001 2 = Alarm A001		906	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C5.1.3.2	Level	0 to 30 %Vn	0	907	8bit	1
C5.1.3.3	Time	0.1 to 10.0 s	1	908	8bit	1
C5.2	Current Protections					
C5.2.1	Motor Undercurrent					
C5.2.1.1	Mode	0 = Inactive 1 = Fault F065 2 = Alarm A065		910	enum	1
C5.2.1.2	Level	0 to 99 %In	0	911	8bit	1
C5.2.1.3	Time	1 to 99 s	0	912	8bit	1
C5.2.2	Motor Overcurrent					
C5.2.2.1	Mode	0 = Inactive 1 = Fault F066 2 = Alarm A066		913	enum	1
C5.2.2.2	Level	0 to 99 %In	0	914	8bit	1
C5.2.2.3	Time	1 to 99 s	0	915	8bit	1
C5.2.3	Current Imbalance					
C5.2.3.1	Mode	0 = Inactive 1 = Fault F074 2 = Alarm A074		916	enum	1
C5.2.3.2	Level	0 to 30 %In	0	917	8bit	1
C5.2.3.3	Time	1 to 99 s	0	918	8bit	1
C5.3	Torque Protections					
C5.3.1	Undertorque					
C5.3.1.1	Mode	0 = Inactive 1 = Fault F078 2 = Alarm A078		950	enum	1
C5.3.1.2	Level	0 to 99 %Tn	0	951	8bit	1
C5.3.1.3	Time	1 to 99 s	0	952	8bit	1
C5.3.2	Overtorque					
C5.3.2.1	Mode	0 = Inactive 1 = Fault F079 2 = Alarm A079		953	enum	1
C5.3.2.2	Level	0 to 99 %Tn	0	954	8bit	1
C5.3.2.3	Time	1 to 99 s	0	955	8bit	1
C5.4	Power Protections					
C5.4.1	Underpower					
C5.4.1.1	Mode	0 = Inactive 1 = Fault F080 2 = Alarm A080		960	enum	1
C5.4.1.2	Level	0 to 99 %Pn	0	961	8bit	1
C5.4.1.3	Time	1 to 99 s	0	962	8bit	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C5.4.2	Overpower					
C5.4.2.1	Mode	0 = Inactive 1 = Fault F081 2 = Alarm A081		963	enum	1
C5.4.2.2	Level	0 to 99 %Pn	0	964	8bit	1
C5.4.2.3	Time	1 to 99 s	0	965	8bit	1
C5.5	Phase Sequence					
C5.5.1	Mode	0 = Inactive 1 = RST - Fault F067 2 = RTS - Fault F068		930	enum	1
C5.6	Bypass Protections					
C5.6.1	Undercurrent	0 = Inactive 1 = Fault F076		919	enum	1
C5.6.2	Overcurrent	0 = Inactive 1 = Fault F063		920	enum	1
C5.6.3	Closed	0 = Inactive 1 = Fault F077		921	enum	1
C5.7	Time Protections					
C5.7.1	Before Start	0.5 to 999.9 s	1	931	16bit	1
C5.7.2	After Stop	2.0 to 999.9 s	1	932	16bit	1
C5.7.3	Between Start	2 to 9999 s	0	933	16bit	1
C5.8	Motor Thermal Protection					
C5.8.1	Ch1 Installed Sensor					
C5.8.1.1	Mode	0 = Off 1 = On 2 = On Stator		1006	enum	1
C5.8.2	Ch1 Sensor Fault					
C5.8.2.1	Mode	0 = Fault F109 and F117 1 = Alarm A109 and A117		998	enum	1
C5.8.3	Ch1 Overtemperature					
C5.8.3.1	Mode	0 = Fault F101 1 = Alarm A101 2 = F101 and A101		966	enum	1
C5.8.3.2	Fault Level	0 to 250 °C	0	967	8bit	1
C5.8.3.3	Alarm Level	0 to 250 °C	0	968	8bit	1
C5.8.3.4	Alarm Reset	0 to 250 °C	0	969	8bit	1
C5.8.4	Ch2 Installed Sensor					
C5.8.4.1	Mode	0 = Off		1007	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		1 = On 2 = On Stator				
C5.8.5	Ch2 Sensor Fault					
C5.8.5.1	Mode	0 = Fault F110 and F118 1 = Alarm A110 and A118		999	enum	1
C5.8.6	Ch2 Overtemperature					
C5.8.6.1	Mode	0 = Fault F102 1 = Alarm A102 2 = F102 and A102		970	enum	1
C5.8.6.2	Fault Level	0 to 250 °C	0	971	8bit	1
C5.8.6.3	Alarm Level	0 to 250 °C	0	972	8bit	1
C5.8.6.4	Alarm Reset	0 to 250 °C	0	973	8bit	1
C5.8.7	Ch3 Installed Sensor					
C5.8.7.1	Mode	0 = Off 1 = On 2 = On Stator		1008	enum	1
C5.8.8	Ch3 Sensor Fault					
C5.8.8.1	Mode	0 = Fault F111 and F119 1 = Alarm A111 and A119		1000	enum	1
C5.8.9	Ch3 Overtemperature					
C5.8.9.1	Mode	0 = Fault F103 1 = Alarm A103 2 = F103 and A103		974	enum	1
C5.8.9.2	Fault Level	0 to 250 °C	0	975	8bit	1
C5.8.9.3	Alarm Level	0 to 250 °C	0	976	8bit	1
C5.8.9.4	Alarm Reset	0 to 250 °C	0	977	8bit	1
C5.8.10	Ch4 Installed Sensor					
C5.8.10.1	Mode	0 = Off 1 = On 2 = On Stator		1009	enum	1
C5.8.11	Ch4 Sensor Fault					
C5.8.11.1	Mode	0 = Fault F112 and F120 1 = Alarm A112 and A120		1001	enum	1
C5.8.12	Ch4 Overtemperature					
C5.8.12.1	Mode	0 = Fault F104 1 = Alarm A104 2 = F104 and A104		978	enum	1
C5.8.12.2	Fault Level	0 to 250 °C	0	979	8bit	1
C5.8.12.3	Alarm Level	0 to 250 °C	0	980	8bit	1
C5.8.12.4	Alarm Reset	0 to 250 °C	0	981	8bit	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C5.8.13	Ch5 Installed Sensor					
C5.8.13.1	Mode	0 = Off 1 = On 2 = On Stator		1010	enum	1
C5.8.14	Ch5 Sensor Fault					
C5.8.14.1	Mode	0 = Fault F113 and F121 1 = Alarm A113 and A121		1002	enum	1
C5.8.15	Ch5 Overtemperature					
C5.8.15.1	Mode	0 = Fault F105 1 = Alarm A105 2 = F105 and A105		982	enum	1
C5.8.15.2	Fault Level	0 to 250 °C	0	983	8bit	1
C5.8.15.3	Alarm Level	0 to 250 °C	0	984	8bit	1
C5.8.15.4	Alarm Reset	0 to 250 °C	0	985	8bit	1
C5.8.16	Ch6 Installed Sensor					
C5.8.16.1	Mode	0 = Off 1 = On 2 = On Stator		1011	enum	1
C5.8.17	Ch6 Sensor Fault					
C5.8.17.1	Mode	0 = Fault F114 and F122 1 = Alarm A114 and A122		1003	enum	1
C5.8.18	Ch6 Overtemperature					
C5.8.18.1	Mode	0 = Fault F106 1 = Alarm A106 2 = F106 and A106		986	enum	1
C5.8.18.2	Fault Level	0 to 250 °C	0	987	8bit	1
C5.8.18.3	Alarm Level	0 to 250 °C	0	988	8bit	1
C5.8.18.4	Alarm Reset	0 to 250 °C	0	989	8bit	1
C5.9	Motor Thermal Class					
C5.9.1	Programming Mode	0 = Standard 1 = Custom		934	enum	1
C5.9.2	Action Mode	0 = Inactive 1 = Fault F005 2 = Alarm A005 3 = F005 and A005		935	enum	1
C5.9.3	Alarm Level	0 to 100 %	0	936	8bit	1
C5.9.4	Alarm Reset	0 to 100 %	0	937	8bit	1
C5.9.5	Motor Temperature	0 = T.C. + PT100 1 = T.C. + Th.Im.		938	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C5.9.6	Thermal Class	0 = Automatic 1 = Class 10 2 = Class 15 3 = Class 20 4 = Class 25 5 = Class 30 6 = Class 35 7 = Class 40 8 = Class 45		939	enum	1
C5.9.7	Motor Data					
C5.9.7.1	Insulation Class	0 = Class A 105°C 1 = Class E 120°C 2 = Class B 130°C 3 = Class F 155°C 4 = Class H 180°C 5 = Class N 200°C 6 = Class R 220°C 7 = Class S 240°C 8 = Class 250°C		940	enum	1
C5.9.7.2	Temperature Rise	0 to 200 °C	0	942	8bit	1
C5.9.7.3	Ambient Temperature	0 to 200 °C	0	941	8bit	1
C5.9.7.4	Locked Rotor Time	1 to 100 s	0	943	8bit	1
C5.9.7.5	Locked Rotor Current	2.0 to 10.0 x	1	944	8bit	1
C5.9.7.6	Heating Time Constant	1 to 2880 min	0	945	16bit	1
C5.9.7.7	Cooling Time Constant	1 to 8640 min	0	946	16bit	1
C5.9.8	Thermal Image					
C5.9.8.1	Reset	0 to 8640 min	0	947	16bit	1
C5.10	SSW Short Circuit					
C5.10.1	Motor Off	0 = Inactive 1 = Fault F019		922	enum	1
C5.10.2	Motor On	0 = Inactive 1 = Fault F020		923	enum	1
C5.11	Fault Auto-Reset					
C5.11.1	Mode	0 = Off 1 = On		207	enum	1
C5.11.2	Time	3 to 600 s	0	208	16bit	1
		C6 Configurations\HMI				
C6.1	Password					
C6.1.1	Password	0 to 9999	0	210	16bit	1
C6.1.2	Password Options	0 = Off 1 = On 2 = Change Password		200	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C6.2	Language					
C6.2.1	Language	0 = Português 1 = English 2 = Español		201	enum	1
C6.3	Date and Time					
C6.3.1	Date and Time	yy/mm/dd and hh:mm:ss		196	date	4
C6.3.2	Day of the Week	0 = Sunday 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday		195	enum	1
C6.4	Main Screen					
C6.5	LCD Backlight					
C6.5.1	Level	1 to 15	0	218	8bit	1
C6.6	Communication Timeout					
C6.6.1	Mode	0 = Inactive 1 = Fault F127 2 = Alarm A127		190	enum	1
C6.6.2	Alarm Action	0 = Indicates Only 1 = Ramp Stop 2 = General Disable 3 = Change to LOC 4 = Change to REM		191	enum	1
C6.6.3	Time	1 to 999 s	0	192	16bit	1
C7 Configurations\Special Functions						
C7.1	Forward/Reverse					
C7.1.1	Mode	0 = Inactive 1 = By Contactor 2 = Only for JOG		228	enum	1
C7.2	Kick Start					
C7.2.1	Mode	0 = Off 1 = On		520	enum	1
C7.2.2	Time	0.1 to 2.0 s	1	521	8bit	1
C7.2.3	Voltage	70 to 90 %	0	522	8bit	1
C7.2.4	Current	300 to 700 %	0	523	16bit	1
C7.3	Jog					
C7.3.1	Mode	0 = Off 1 = On		510	enum	1
C7.3.2	Level	10 to 100 %	0	511	8bit	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C7.4	Braking					
C7.4.1	Mode	0 = Inactive 1 = Reverse 2 = Optimal 3 = DC		500	enum	1
C7.4.2	Time	1 to 299 s	0	501	16bit	1
C7.4.3	Level	30 to 70 %	0	502	8bit	1
C7.4.4	End	0 = Inactive 1 = Automatic		503	enum	1
		C8 Configurations\Communication				
C8.1	I/O Data					
C8.1.1	Data Read					
C8.1.1.1	Slot 1 1st Word	1 to 50	0	712	8bit	1
C8.1.1.2	Slot 1 Quantity	1 to 50	0	713	8bit	1
C8.1.1.3	Slot 2 1st Word	1 to 50	0	753	8bit	1
C8.1.1.4	Slot 2 Quantity	1 to 50	0	754	8bit	1
C8.1.1.5	Word #1	0 to 65535	0	1300	16bit	1
C8.1.1.6	Word #2	0 to 65535	0	1301	16bit	1
C8.1.1.7	Word #3	0 to 65535	0	1302	16bit	1
C8.1.1.8	Word #4	0 to 65535	0	1303	16bit	1
C8.1.1.9	Word #5	0 to 65535	0	1304	16bit	1
C8.1.1.10	Word #6	0 to 65535	0	1305	16bit	1
C8.1.1.11	Word #7	0 to 65535	0	1306	16bit	1
C8.1.1.12	Word #8	0 to 65535	0	1307	16bit	1
C8.1.1.13	Word #9	0 to 65535	0	1308	16bit	1
C8.1.1.14	Word #10	0 to 65535	0	1309	16bit	1
C8.1.1.15	Word #11	0 to 65535	0	1310	16bit	1
C8.1.1.16	Word #12	0 to 65535	0	1311	16bit	1
C8.1.1.17	Word #13	0 to 65535	0	1312	16bit	1
C8.1.1.18	Word #14	0 to 65535	0	1313	16bit	1
C8.1.1.19	Word #15	0 to 65535	0	1314	16bit	1
C8.1.1.20	Word #16	0 to 65535	0	1315	16bit	1
C8.1.1.21	Word #17	0 to 65535	0	1316	16bit	1
C8.1.1.22	Word #18	0 to 65535	0	1317	16bit	1
C8.1.1.23	Word #19	0 to 65535	0	1318	16bit	1
C8.1.1.24	Word #20	0 to 65535	0	1319	16bit	1
C8.1.1.25	Word #21	0 to 65535	0	1320	16bit	1
C8.1.1.26	Word #22	0 to 65535	0	1321	16bit	1
C8.1.1.27	Word #23	0 to 65535	0	1322	16bit	1
C8.1.1.28	Word #24	0 to 65535	0	1323	16bit	1
C8.1.1.29	Word #25	0 to 65535	0	1324	16bit	1
C8.1.1.30	Word #26	0 to 65535	0	1325	16bit	1
C8.1.1.31	Word #27	0 to 65535	0	1326	16bit	1
C8.1.1.32	Word #28	0 to 65535	0	1327	16bit	1
C8.1.1.33	Word #29	0 to 65535	0	1328	16bit	1
C8.1.1.34	Word #30	0 to 65535	0	1329	16bit	1
C8.1.1.35	Word #31	0 to 65535	0	1330	16bit	1
C8.1.1.36	Word #32	0 to 65535	0	1331	16bit	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C8.1.1.37	Word #33	0 to 65535	0	1332	16bit	1
C8.1.1.38	Word #34	0 to 65535	0	1333	16bit	1
C8.1.1.39	Word #35	0 to 65535	0	1334	16bit	1
C8.1.1.40	Word #36	0 to 65535	0	1335	16bit	1
C8.1.1.41	Word #37	0 to 65535	0	1336	16bit	1
C8.1.1.42	Word #38	0 to 65535	0	1337	16bit	1
C8.1.1.43	Word #39	0 to 65535	0	1338	16bit	1
C8.1.1.44	Word #40	0 to 65535	0	1339	16bit	1
C8.1.1.45	Word #41	0 to 65535	0	1340	16bit	1
C8.1.1.46	Word #42	0 to 65535	0	1341	16bit	1
C8.1.1.47	Word #43	0 to 65535	0	1342	16bit	1
C8.1.1.48	Word #44	0 to 65535	0	1343	16bit	1
C8.1.1.49	Word #45	0 to 65535	0	1344	16bit	1
C8.1.1.50	Word #46	0 to 65535	0	1345	16bit	1
C8.1.1.51	Word #47	0 to 65535	0	1346	16bit	1
C8.1.1.52	Word #48	0 to 65535	0	1347	16bit	1
C8.1.1.53	Word #49	0 to 65535	0	1348	16bit	1
C8.1.1.54	Word #50	0 to 65535	0	1349	16bit	1
C8.1.2	Data Write					
C8.1.2.1	Slot 1 1st Word	1 to 20	0	714	8bit	1
C8.1.2.2	Slot 1 Quantity	1 to 20	0	715	8bit	1
C8.1.2.3	Slot 2 1st Word	1 to 20	0	755	8bit	1
C8.1.2.4	Slot 2 Quantity	1 to 20	0	756	8bit	1
C8.1.2.5	Update Delay	0.0 to 999.9 s	1	899	16bit	1
C8.1.2.6	Word #1	0 to 65535	0	1400	16bit	1
C8.1.2.7	Word #2	0 to 65535	0	1401	16bit	1
C8.1.2.8	Word #3	0 to 65535	0	1402	16bit	1
C8.1.2.9	Word #4	0 to 65535	0	1403	16bit	1
C8.1.2.10	Word #5	0 to 65535	0	1404	16bit	1
C8.1.2.11	Word #6	0 to 65535	0	1405	16bit	1
C8.1.2.12	Word #7	0 to 65535	0	1406	16bit	1
C8.1.2.13	Word #8	0 to 65535	0	1407	16bit	1
C8.1.2.14	Word #9	0 to 65535	0	1408	16bit	1
C8.1.2.15	Word #10	0 to 65535	0	1409	16bit	1
C8.1.2.16	Word #11	0 to 65535	0	1410	16bit	1
C8.1.2.17	Word #12	0 to 65535	0	1411	16bit	1
C8.1.2.18	Word #13	0 to 65535	0	1412	16bit	1
C8.1.2.19	Word #14	0 to 65535	0	1413	16bit	1
C8.1.2.20	Word #15	0 to 65535	0	1414	16bit	1
C8.1.2.21	Word #16	0 to 65535	0	1415	16bit	1
C8.1.2.22	Word #17	0 to 65535	0	1416	16bit	1
C8.1.2.23	Word #18	0 to 65535	0	1417	16bit	1
C8.1.2.24	Word #19	0 to 65535	0	1418	16bit	1
C8.1.2.25	Word #20	0 to 65535	0	1419	16bit	1
C8.2	RS485 Serial					
C8.2.1	Serial Protocol	0 ... 1 = Reserved 2 = Modbus RTU		730	enum	1
C8.2.2	Address	1 to 247	0	731	8bit	1
C8.2.3	Baud Rate			732	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		0 = 9600 bits/s 1 = 19200 bits/s 2 = 38400 bits/s 3 = 57600 bits/s				
C8.2.4	Bytes Config.	0 = 8 bits, no, 1 1 = 8 bits, even,1 2 = 8 bits, odd, 1 3 = 8 bits, no, 2 4 = 8 bits, even,2 5 = 8 bits, odd, 2		733	enum	1
C8.2.5	Timeout					
C8.2.5.1	Mode	0 = Inactive 1 = Fault F128 2 = Alarm A128		740	enum	1
C8.2.5.2	Alarm Action	0 = Indicates Only 1 = Ramp Stop 2 = General Disable 3 = Change to LOC 4 = Change to REM		741	enum	1
C8.2.5.3	Timeout	0.0 to 999.9 s	1	734	16bit	1
C8.3	Anybus-CC					
C8.3.1	Update Configuration	0 = Normal Operation 1 = Update configuration		749	enum	1
C8.3.2	Address	0 to 255	0	757	8bit	1
C8.3.3	Baud Rate	0 = 125 kbps 1 = 250 kbps 2 = 500 kbps 3 = Autobaud		758	enum	1
C8.3.4	IP Address Configuration	0 = Parameters 1 = DHCP 2 = DCP		760	enum	1
C8.3.5	IP Address	0.0.0.0 to 255.255.255.255		762	ip_address	2
C8.3.6	CIDR	0 = Reserved 1 = 128.0.0.0 2 = 192.0.0.0 3 = 224.0.0.0 4 = 240.0.0.0 5 = 248.0.0.0 6 = 252.0.0.0 7 = 254.0.0.0 8 = 255.0.0.0 9 = 255.128.0.0		761	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		10 = 255.192.0.0 11 = 255.224.0.0 12 = 255.240.0.0 13 = 255.248.0.0 14 = 255.252.0.0 15 = 255.254.0.0 16 = 255.255.0.0 17 = 255.255.128.0 18 = 255.255.192.0 19 = 255.255.224.0 20 = 255.255.240.0 21 = 255.255.248.0 22 = 255.255.252.0 23 = 255.255.254.0 24 = 255.255.255.0 25 = 255.255.255.128 26 = 255.255.255.192 27 = 255.255.255.224 28 = 255.255.255.240 29 = 255.255.255.248 30 = 255.255.255.252 31 = 255.255.255.254				
C8.3.7	Gateway	0.0.0.0 to 255.255.255.255		766	ip_address	2
C8.3.8	Station Name Suffix	0 to 254	0	770	8bit	1
C8.3.9	Modbus TCP Timeout					
C8.3.9.1	Mode	0 = Inactive 1 = Fault F131 2 = Alarm A131		771	enum	1
C8.3.9.2	Alarm Action	0 = Indicates Only 1 = Ramp Stop 2 = General Disable 3 = Change to LOC 4 = Change to REM		772	enum	1
C8.3.9.3	Modbus TCP Timeout	0.0 to 999.9 s	1	759	16bit	1
C8.3.10	Off Line Error					
C8.3.10.1	Mode	0 = Inactive 1 = Fault F129 2 = Alarm A129		897	enum	1
C8.3.10.2	Alarm Action	0 = Indicates Only 1 = Ramp Stop 2 = General Disable 3 = Change to LOC 4 = Change to REM		898	enum	1
C8.4	CANopen/DeviceNet					
C8.4.1	Protocol			700	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		0 = Disabled 1 = CANopen 2 = DeviceNet				
C8.4.2	Address	0 to 127	0	701	8bit	1
C8.4.3	Baud Rate	0 = 1 Mbps/Auto 1 = Reserved 2 = 500 Kbps 3 = 250 Kbps 4 = 125 Kbps 5 = 100 Kbps/Auto 6 = 50 Kbps/Auto 7 = 20 Kbps/Auto 8 = 10 Kbps/Auto		702	enum	1
C8.4.4	Bus Off Reset	0 = Manual 1 = Automatic		703	enum	1
C8.4.5	CAN Error					
C8.4.5.1	Mode	0 = Inactive 1 = Fault 2 = Alarm		723	enum	1
C8.4.5.2	Alarm Action	0 = Indicates Only 1 = Ramp Stop 2 = General Disable 3 = Change to LOC 4 = Change to REM		724	enum	1
C8.6	Bluetooth					
C8.6.1	Mode	0 = Off 1 = On		800	enum	1
C8.6.2	PIN	6 to 6	0	804	STRING_NUMERIC	4
C8.6.3	Device Name	1 to 15	0	808	STRING_ASCII	8
C9 Configurations\SSW900						
C9.1	Nominal Data					
C9.1.1	Current	0 = 10 A 1 = 17 A 2 = 24 A 3 = 30 A 4 = 45 A 5 = 61 A 6 = 85 A 7 = 105 A 8 = 130 A 9 = 171 A 10 = 200 A 11 = 255 A		295	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		12 = 312 A 13 = 365 A 14 = 412 A 15 = 480 A 16 = 604 A 17 = 670 A 18 = 820 A 19 = 950 A 20 = 1100 A 21 = 1400 A				
C9.2	Types of Connections					
C9.2.1	Delta Inside	0 = Off 1 = On		150	enum	1
C9.2.2	External Bypass	0 = Without 1 = With		140	enum	1
C9.3	Accessories Config.					
C9.3.1	Slot 1	0 = Automatic 1 = Anybus-CC 2 = RS-485 3 = PT100 4 = I/Os Exp. 5 = Profibus 6 = CAN 7 = Ethernet 8 = External Current Acqu.		337	enum	1
C9.3.2	Slot 2	0 = Automatic 1 = Anybus-CC 2 = RS-485 3 = PT100 4 = I/Os Exp. 5 = Profibus 6 = CAN 7 = Ethernet 8 = External Current Acqu.		338	enum	1
C9.4	Fan Configuration					
C9.4.1	Mode	0 = Always Off 1 = Always On 2 = Controlled		203	enum	1
C10 Configurations\Load / Save Parameters						
C10.1	Load / Save User					
C10.1.1	Mode	0 = Not Used 1 = Load User 1 2 = Load User 2		206	enum	1

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
		3 = Reserved 4 = Save User 1 5 = Save User 2 6 = Reserved				
C10.2	Copy Function HMI					
C10.2.1	Mode	0 = Off 1 = SSW -> HMI 2 = HMI -> SSW		319	enum	1
C10.3	Erase Diagnostics					
C10.3.1	Mode	0 ... 1 = Not Used 2 = Fault 3 = Alarms 4 = Events 5 = Motor ON 6 = Temperaturas 7 = Hours Control 8 = Thermal Class Status		205	enum	1
C10.4	Load Factory Default					
C10.4.1	Mode	0 = No 1 = Yes		204	enum	1
C10.5	Save Changed Param.					
C10.5.1	Mode	0 = No 1 = Yes		209	enum	1
		C11 Configurations\SoftPLC				
C11.1	Mode	0 = Stop Program 1 = Run Program		1101	enum	1
C11.2	Action App. Not Running	0 = Inactive 1 = Alarm A708 2 = Fault F708		1103	enum	1
C11.3	Parameter					
C11.3.1	User #1	-10000 to 10000	0	1110	s32bit	2
C11.3.2	User #2	-10000 to 10000	0	1112	s32bit	2
C11.3.3	User #3	-10000 to 10000	0	1114	s32bit	2
C11.3.4	User #4	-10000 to 10000	0	1116	s32bit	2
C11.3.5	User #5	-10000 to 10000	0	1118	s32bit	2
C11.3.6	User #6	-10000 to 10000	0	1120	s32bit	2
C11.3.7	User #7	-10000 to 10000	0	1122	s32bit	2
C11.3.8	User #8	-10000 to 10000	0	1124	s32bit	2
C11.3.9	User #9	-10000 to 10000	0	1126	s32bit	2
C11.3.10	User #10	-10000 to 10000	0	1128	s32bit	2
C11.3.11	User #11	-10000 to 10000	0	1130	s32bit	2
C11.3.12	User #12	-10000 to 10000	0	1132	s32bit	2
C11.3.13	User #13	-10000 to 10000	0	1134	s32bit	2

Parameter	Description	Range of values	Decimal places	Net Id	Size	Qty mapped words
C11.3.14	User #14	-10000 to 10000	0	1136	s32bit	2
C11.3.15	User #15	-10000 to 10000	0	1138	s32bit	2
C11.3.16	User #16	-10000 to 10000	0	1140	s32bit	2
C11.3.17	User #17	-10000 to 10000	0	1142	s32bit	2
C11.3.18	User #18	-10000 to 10000	0	1144	s32bit	2
C11.3.19	User #19	-10000 to 10000	0	1146	s32bit	2
C11.3.20	User #20	-10000 to 10000	0	1148	s32bit	2
C11.3.21	User #21	-10000 to 10000	0	1150	s32bit	2
C11.3.22	User #22	-10000 to 10000	0	1152	s32bit	2
C11.3.23	User #23	-10000 to 10000	0	1154	s32bit	2
C11.3.24	User #24	-10000 to 10000	0	1156	s32bit	2
C11.3.25	User #25	-10000 to 10000	0	1158	s32bit	2
C11.3.26	User #26	-10000 to 10000	0	1160	s32bit	2
C11.3.27	User #27	-10000 to 10000	0	1162	s32bit	2
C11.3.28	User #28	-10000 to 10000	0	1164	s32bit	2
C11.3.29	User #29	-10000 to 10000	0	1166	s32bit	2
C11.3.30	User #30	-10000 to 10000	0	1168	s32bit	2
C11.3.31	User #31	-10000 to 10000	0	1170	s32bit	2
C11.3.32	User #32	-10000 to 10000	0	1172	s32bit	2
C11.3.33	User #33	-10000 to 10000	0	1174	s32bit	2
C11.3.34	User #34	-10000 to 10000	0	1176	s32bit	2
C11.3.35	User #35	-10000 to 10000	0	1178	s32bit	2
C11.3.36	User #36	-10000 to 10000	0	1180	s32bit	2
C11.3.37	User #37	-10000 to 10000	0	1182	s32bit	2
C11.3.38	User #38	-10000 to 10000	0	1184	s32bit	2
C11.3.39	User #39	-10000 to 10000	0	1186	s32bit	2
C11.3.40	User #40	-10000 to 10000	0	1188	s32bit	2
C11.3.41	User #41	-10000 to 10000	0	1190	s32bit	2
C11.3.42	User #42	-10000 to 10000	0	1192	s32bit	2
C11.3.43	User #43	-10000 to 10000	0	1194	s32bit	2
C11.3.44	User #44	-10000 to 10000	0	1196	s32bit	2
C11.3.45	User #45	-10000 to 10000	0	1198	s32bit	2
C11.3.46	User #46	-10000 to 10000	0	1200	s32bit	2
C11.3.47	User #47	-10000 to 10000	0	1202	s32bit	2
C11.3.48	User #48	-10000 to 10000	0	1204	s32bit	2
C11.3.49	User #49	-10000 to 10000	0	1206	s32bit	2
C11.3.50	User #50	-10000 to 10000	0	1208	s32bit	2
A1 Assistant\Oriented Start-up						
A1.1	Mode	0 = No 1 = Yes		317	enum	1

Table A.3: *Description of the parameter data types*

Data Type	Description
enum	Enumerated type (unsigned 8-bit) contains a list of values with function description for each item.
8bit	Unsigned 8-bit integer, ranges from 0 to 255.
16bit	Unsigned 16-bit integer, ranges from 0 to 65,535.
s16bit	Signed 16-bit integer, ranges from -32,768 to 32,767.
32bit	Unsigned 32-bit integer, ranges from 0 to 4,294,967,295.
s32bit	Signed 32-bit integer, ranges from -2,147,483,648 to 2,147,483,647.
date	Displays the date and time value in the format below: second (1 byte) minute (1 byte) hour (1 byte) day (1 byte) month (1 byte) reserved (1 byte) year (2 bytes)
TIME	Displays the time in the format hh:mm:ss. For network protocols, this data type is transferred as an unsigned 32-bit integer value representing the number of seconds.
ip_address	Unsigned 32-bit integer representing the octets of the IP address.
MAC_ADDRESS	48-bit identifier displayed in XX:XX:XX:XX:XX:XX format.
STRING_ASCII	Text string. For network protocols, this data type is transferred as a string filled with zeros (\0) to the end (maximum parameter size plus one).

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