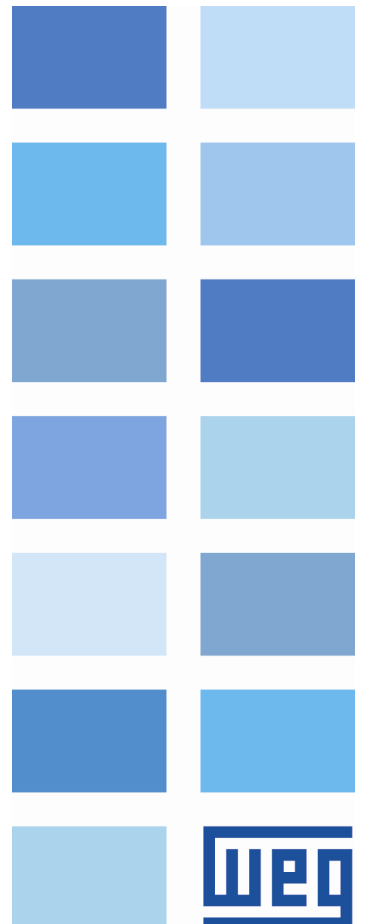


# WEG SSW7000 (EtherNet/IP) communication with Rockwell RSLogix 5000

## Application Notes

Language: English  
Document: 0





# WEG SSW7000 (EtherNet/IP) communication with Rockwell RSLogix 5000

Language: English

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Revision	Description	Chapter
0	First Edition	-

<b>ABOUT THE MANUAL .....</b>	<b>5</b>
ABBREVIATIONS AND DEFINITIONS.....	5
NUMERICAL REPRESENTATION .....	5
USED DOCUMENTS AND MANUALS .....	5
SOFTWARE .....	5
HARDWARE .....	5
<b>SAFETY INSTRUCTIONS .....</b>	<b>7</b>
SAFETY WARNINGS IN THE MANUAL .....	7
PRELIMINARY RECOMMENDATIONS .....	7
<b>1. HARDWARE CONFIGURATION .....</b>	<b>8</b>
1.1 PLC 1 CONFIGURATION .....	8
1.1.1 Hardware architecture. ....	8
1.2 SOFT-STARTER CONFIGURATION .....	9
1.2.1 Installation of the EtherNet Kit .....	9
1.2.3 EtherNet/IP Network Status .....	11
1.2.4 Link/Connection Status.....	11
1.2.5 Soft-Starter user RJ45 connector. ....	12
1.2.6 Recommended network cables.....	12
1.2.7 Connection to the Network.....	13
1.2.8 Module Configuration .....	13
1.2.9 Configuration via WEB .....	15
1.2.10 Access to the Parameters via WEB .....	17
1.3 ETHERNET NETWORK .....	18
1.3.1 Architecture of the EtherNet Network .....	18
<b>2. SOFT-STARTER PARAMETER SETTINGS .....</b>	<b>19</b>
2.2 SELECTION OF THE SOFT-STARTER COMMAND REFERENCES .....	19
2.2.1 Selection of the Operation Control Mode – Local/Remote.....	19
2.2.2 Selection of REMOTE Command – REMOTE Mode .....	20
2.3 CONFIGURATION OF THE PARAMETERS ANYBUS-CC SETTINGS .....	20
2.3.1 Soft-Starter Anybus-CC Settings .....	20
2.3.2 Status Reading Parameter.....	21
<b>3. NUMBER OF EXCHANGED WORDS .....</b>	<b>27</b>
3.1 PARAMETERIZATION.....	27
3.1.1 Reading parameters .....	28
3.1.2 Writing parameters.....	28
<b>4. FAULT AND ALARM INDICATION MESSAGES .....</b>	<b>29</b>
4.1 ERROR INDICATIONS .....	29
<b>5. COMPACT LOGIX L32E.....</b>	<b>30</b>
5.1 CREATING NEW PROJECT .....	30
5.1.1 Add EtherNet Module to PLC.....	30
5.1.2 Add generic module SSW7000.....	32
5.1.3 Generic Module Configuration .....	32
5.1.4 Module Information.....	33
<b>6. MONITORING AND CONTROLLING THE SSW7000 .....</b>	<b>34</b>
6.1 WORDS USED IN THIS PROJECT.....	34
6.1.1 Check the parameters on the HMI.....	34
6.2 READING AND WRITING WORDS.....	35
6.2.1 SSW7000 status read word Off.....	35
6.2.2 SSW7000 status read word On.....	36
6.2.3 Other Reading Words.....	37
6.2.4 Command write word .....	38

## ABOUT THE MANUAL

This document provides information about the configuration and programming for the communication of the Rockwell, 1769-L32E CompactLogix5332 E Controller with the SSW7000 Soft-Starter equipped with EtherNet module. All presented operations assume the user is familiar with the programming of the Rockwell PLC with the Rockwell RSLogix 5000. The equipment is subject to failures and the user must take safety measures for this condition.

## ABBREVIATIONS AND DEFINITIONS

CIP	Common Industrial Protocol
EDS	Electronic Data Sheet – Data base file of the device.
HMI	(HMI) Human Machine Interface
SSW7000	Medium Voltage Soft-Starter
ODVA	Open DeviceNet Vendor Association
OP	Operation Mode
PLC	Programmable Logic Controller
RAM	Random Access Memory
USB	Universal Serial Bus

## NUMERICAL REPRESENTATION

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

## USED DOCUMENTS AND MANUALS

For a better understanding of the information provided hereby, the following manuals may be referred to:

### *MANUAL OF THE MEDIUM VOLTAGE SOFT-STARTER*

Series: SSW7000

Language: Portuguese

Document number: 10001038244

### *EtherNet/IP Drive Profile*

### *Installation Operation and Configuration Guide*

Series: SSW7000

Language: English

Document number: 10001038457

## SOFTWARE

### *RSLogix 5000 Professional / Network Edition*

Software Application: V20.01.00 (CPR 9 SR 5)

Language: English

## HARDWARE

### *SSW7000 medium voltage soft starter*

Firmware Version: 2.10

Manufacturer: WEG

*Anybus ABCC-EIP communication module*

Model: EtherNet/IP (Anybus-S)

Item number: 10509967

Manufacturer: WEG

*CPU CompactLogix*

Model: 1769-L32E CompactLogix5332 E Controller

Manufacturer: Rockwell Automation/Allen-Bradley


Firmware Version: 20.12

# SAFETY INSTRUCTIONS

This manual was developed to be used by people with proper technical training or qualification to operate this kind of equipment.


## SAFETY WARNINGS IN THE MANUAL

In this manual are used the following safety warnings:




**DANGER!**

The not following of the procedures recommended in this warning can lead to death, serious injuries and considerable marterial damages.



**ATTENTION!**


The not following of the procedures recommended in this warning can lead to material damages.



**NOTE!**


The text aims at providing important information for the full understanding and proper operation of the product.

## PRELIMINARY RECOMMENDATIONS



**DANGER!**

Only duly qualified people must operae the SOFT-STARTER. Those people must first read the user manual. Executing unknown commands or not complying with the safety instructions may result in risk of life and/or damages to the machine.



**ATTENTION!**

In order to make the commands on the soft-starter HMI, you must not use pointed tools or instruments. That could damage the keypad screen.

# 1. HARDWARE CONFIGURATION

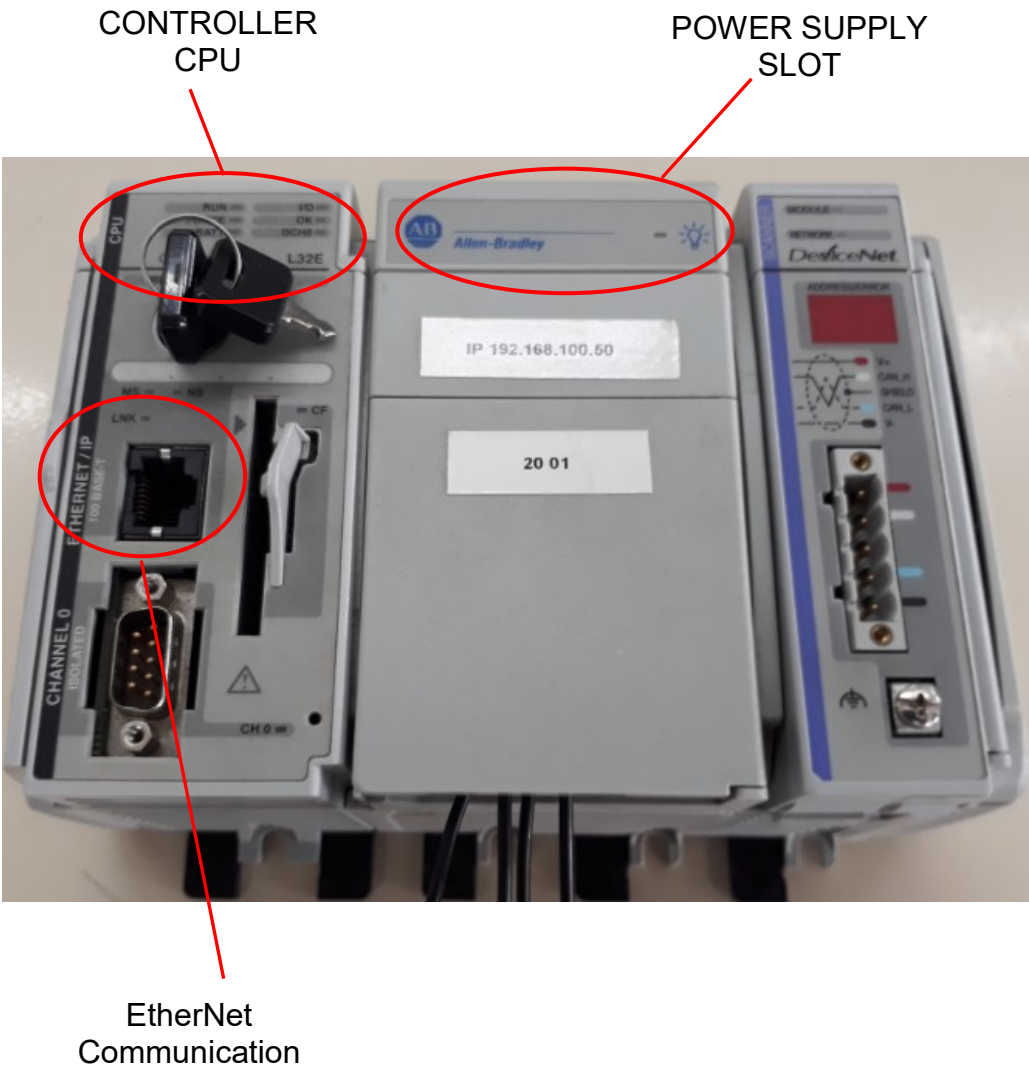
Hardware configuration for communication is described in details below.

## 1.1 PLC 1 CONFIGURATION

### 1.1.1 Hardware architecture.

The hardware configuration required for communication over EtherNet / IP is shown in the figure below. It consists of the set formed by the power supply, the CPU board (1769-L32E) with the EtherNet/IP communication port used for downloading, monitoring and communication with the soft-starter SSW7000 Weg.

The EtherNet module is connected to the slot located on the left side of the equipment.



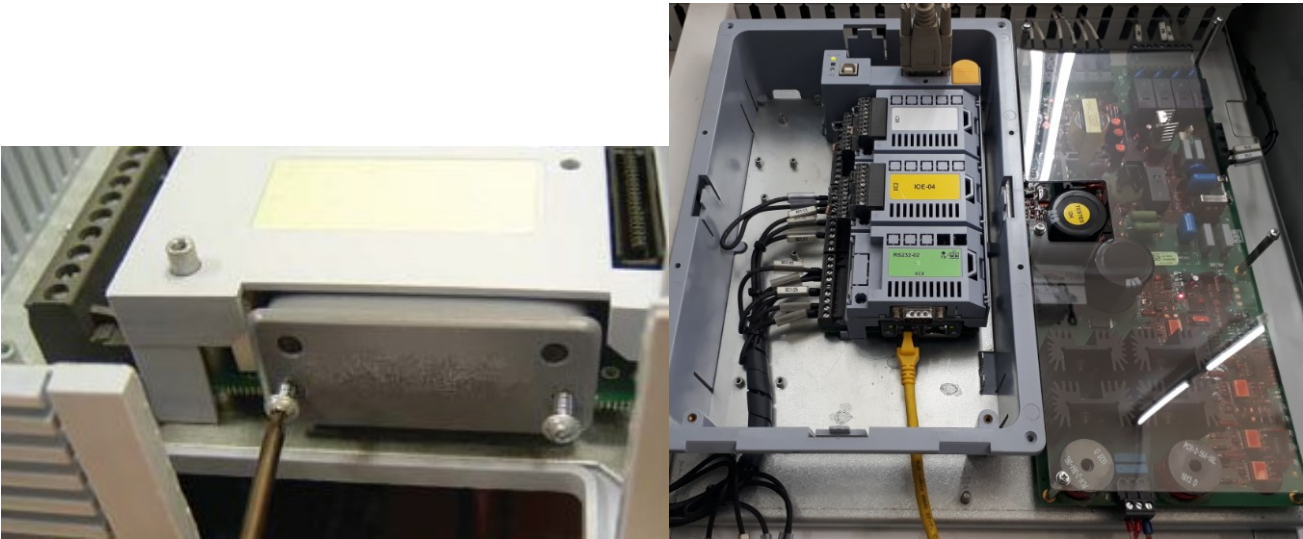
*Figure 1.1.1 – PLC hardware Architecture*



## 1.2 SOFT-STARTER CONFIGURATION

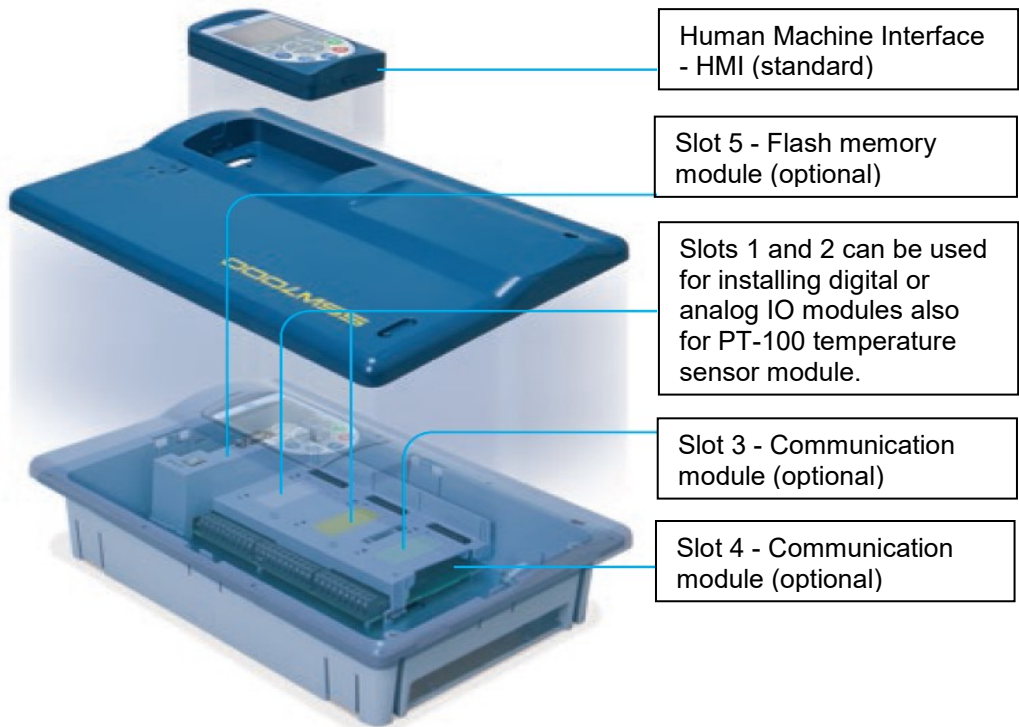
### 1.2.1 Installation of the EtherNet Kit

The hardware configuration to perform the communication in EtherNet/IP network is described in the figure below. It is composed of a Medium Voltage Soft-Starter SSW7000 and an EtherNet/IP interface module.



*Figure 1.2.2 – Architecture of the soft-starter hardware*

The EtherNet/IP interface module must be installed directly in Slot 4 - Communication Control Board and fixed by screws that act on spacers.



*Figure 1.2.3 – SSW7000 soft-starter control board modules.*

1.2.2 Kit EHERNETIP-05.

The next figure shows the Module EtherNet.

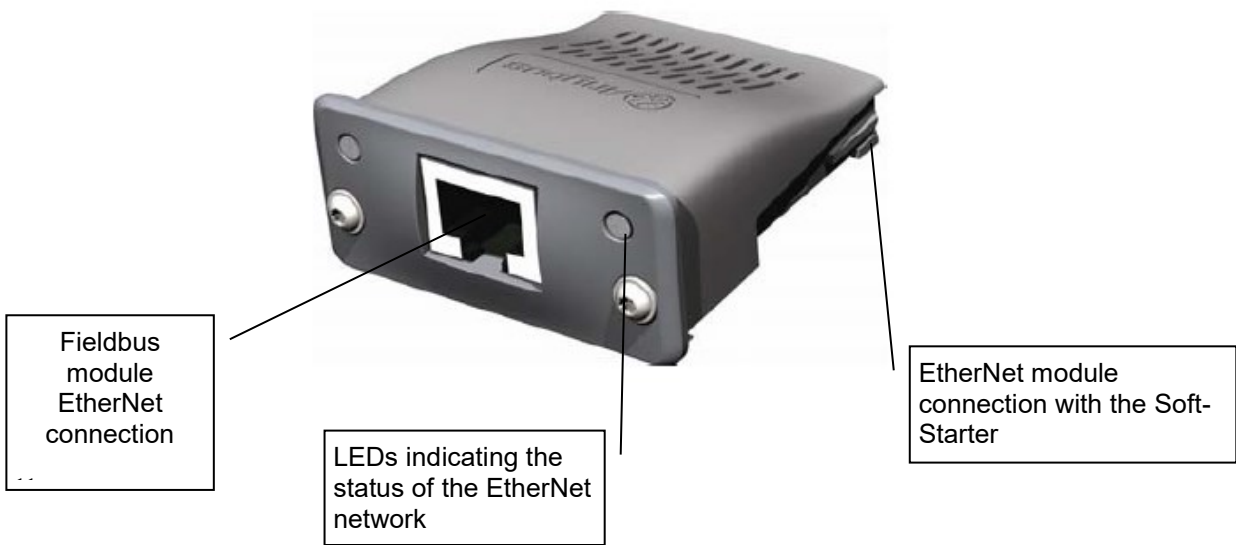


Figure 1.2.4 – Architecture of the EtherNet

- WEG part number: 10509967.
- It is composed by the Anybus ABCC-EIP communication module, mounting instructions and a torx screwdriver for fixing the module.
- Standard RJ45 connector.
- ODVA certified interface.
- It allows access (reading/writing) to certain parameters via WEB.



**NOTE!**

- With the Soft-Starter turned off, install the module in Slot4.
- Make sure it is properly installed and fastened by the screws.
- Power up the Soft-Starter



**NOTE!**

- Red LEDs can indicate network or hardware problems with the electronics board.
- The reset is performed by de-energizing and re-energizing the soft-starter. If the problem persists, replace the electronic card.

1.2.3 EtherNet/IP Network Status


EtherNet/IP defines two states, one for the communication module (MS) and another for the network (NS). The MS LED indicates the conditions of the module. The table below shows the possible states:

The NS LED indicates the EtherNet/IP network conditions.

Status	Description
Off	Without power supply
Green	Module controlled by a scanner in RUN mode
Flashing green	Not configured or scanner in IDLE mode
Red	Unrecoverable fault. Equipment must be reinitialized
Flashing red	Recoverable fault. The return to the normal state occurs automatically after the fault cause has been corrected
Flashing green/Red	Equipment performing self-test. Occurs during the initialization

Figure 1.2.5 – Operation mode status.

For a better interpretation of the above indications, refer to sections 7.6, 7.7 and 7.8 of the WEG-SSW7000-anybus-10001038457-installation-guide-english manual.



**NOTE!**

The red signalizations may indicate hardware problems on the electronic board. Its reset is performed by cycling the power of the soft-starter. If the problem persists, replace the electronic board.

1.2.4 Link/Conection Status

The LINK LED indicates the status of the network physical connection, as well as the activity on the bus.

Status	Description
Off	Without connection, without activity
Green	Connection has been established
Flashing green	Activity in the bus. It indicates that there is effectively data exchange between master and slave

Figure 1.2.6 – Conection status.

1.2.5 **Soft-Starter user RJ45 connector.**

Connector: socket for RJ-45 plug with 8 ways. Pinout: There are two standards for straight-through Ethernet cables: T-568A and T-568B. The cable to be used must follow one of these two standards. In addition, a single pattern should be used in making the cable. That is, the plugs at the ends of a cable must be crimped according to standard T-568A or T-568B.

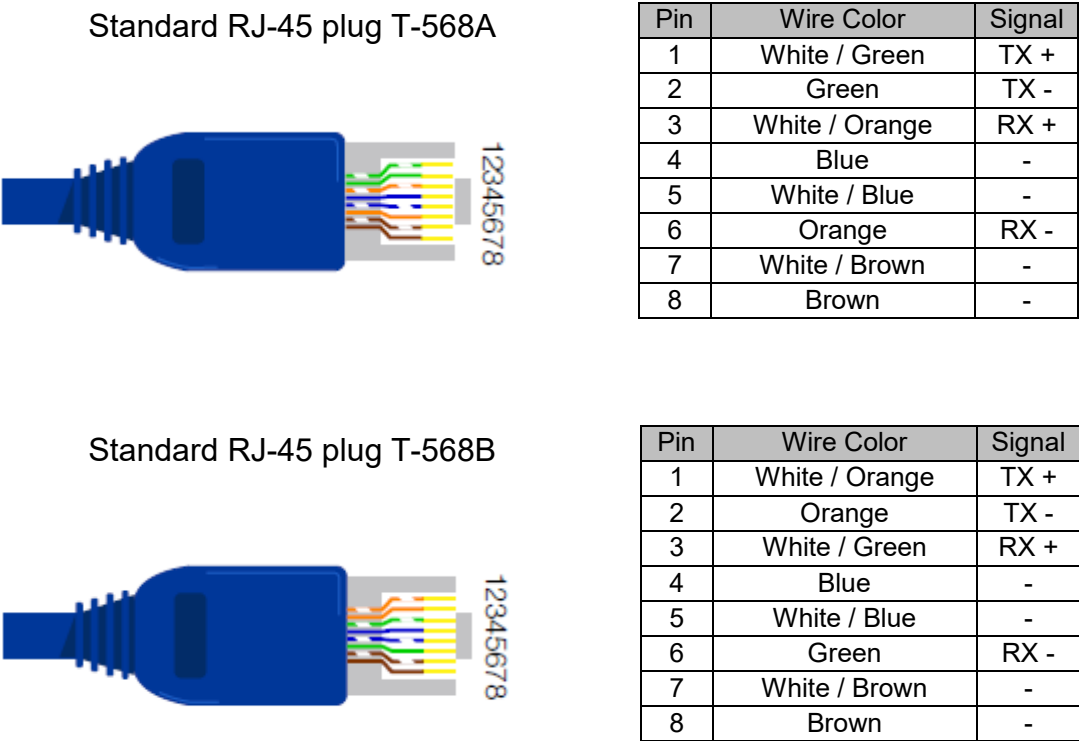


Figure 1.2.7 – Direct Ethernet cable standards (Straight-Through).

1.2.6 **Recommended network cables**

The recommended network cables are CAT5e and CAT6 (maximum length 100 meters), in turn, less susceptible to noise and meets the demand for this communication.



Figure 1.2.8 – 5M PATCH CORD Cable CAT5e

### 1.2.7 Connection to the Network

For the connection of the SSW7000 using the active EtherNet/IP interface, the following points must be observed:

- The SSW7000 must be connected to an EtherNet/IP network preferably by means of switches. Hubs are not recommended because they do not use the channel in an efficient way (great number of collisions).
- The most common topology is in star, exactly the way it is done with computer networks.
- It is recommended to use equipment (cables, switches) prepared for industrial environment.
- Each cable segment (switch  $\Leftrightarrow$  SSW7000) with a maximum length of 100 m.

### 1.2.8 Module Configuration

In order to configure the EtherNet/IP module follow the steps indicated below:

- With the SSW7000 switched off, install the module on the XC44 connector. Make sure it is fitted in correctly and secured by the screws.
- Apply power to the SSW7000.
- Observe the content of the parameter P0723. Verify whether the module has been recognized. The detection occurs automatically and does not require any user intervention. The MS and NS LEDs from the module must be flashing in green<sup>4</sup>
- Connect a network cable to the module. The other extreme of the cable must be connected to a hub/switch or, occasionally a PC (for the PC  $\Leftrightarrow$  SSW7000 connection use a cross-over cable). If the network cable is installed correctly, the LINK LED will go on in solid green indicating that a successful connection occurred. If this does not occur, make sure the cable is in good conditions and the hub/switch is on.
- With the aid of a PC connected to the same network where the SSW7000 with the EtherNet/IP is present, execute the HMS AnyBus Ipconfig<sup>5</sup> program. This software will scan the network for the module. In the example below a module with the IP 192.168.0.4 was found.

**NOTE!**

<sup>4</sup> The SSW7000 with EtherNet/IP communication module will be recognized by the network configuration software as Anybus-CC Ethernet/IP.

<sup>5</sup> It is available on the CD-ROM that comes with the SSW7000.

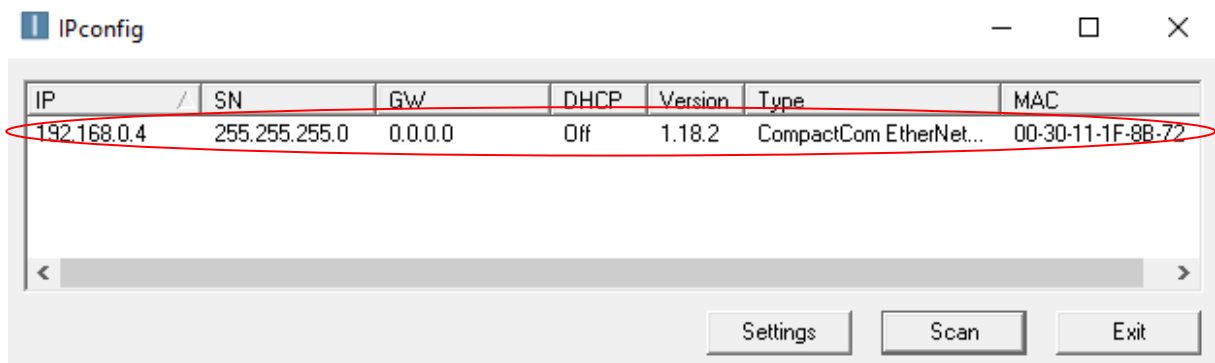


Figure 1.2.9 – EtherNet node address configuration.

- In order to change those configurations, double-click the module IP address. The window below will be displayed. Set those parameters according to the network where the SSW7000 will be installed. Remember that the IP address is unique, i.e., each equipment in the network has its own address. The IP duplicity is a critical fault and causes serious communication problems among the devices.

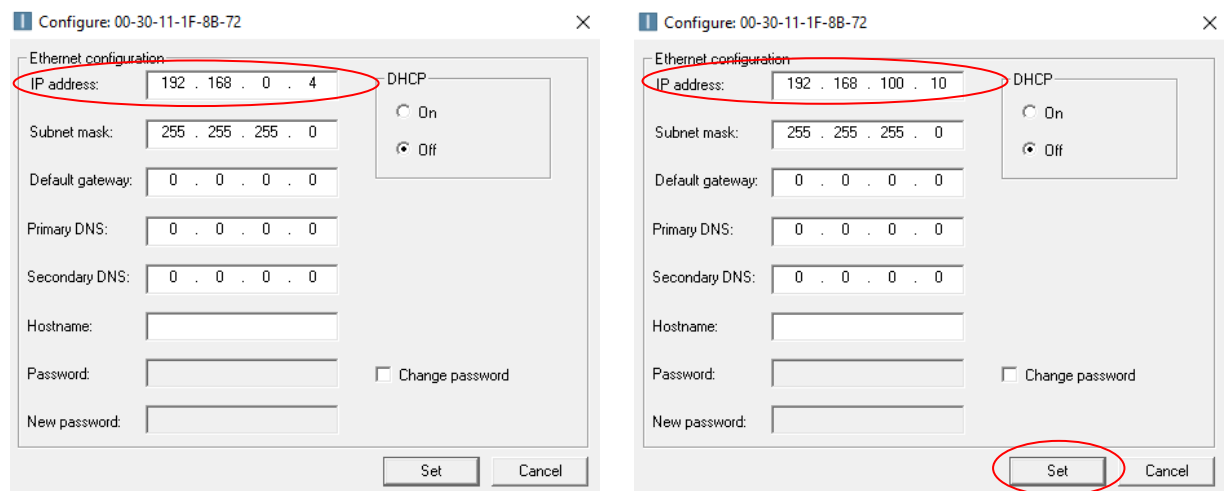


Figure 1.2.10 – Change Ethernet Node Address.

- The number of words to be exchanged with the network master is defined automatically (refer to the section 4.2). The default is 1 input and 1 output word. The same number of words must be adjusted at the EtherNet/IP Master.
- Connect the network cable to the module.
- If everything is configured correctly, the NS LED will go on in solid green and the LINK LED will start blinking indicating normal network activity.

For more information regarding the mentioned parameters, refer to the section 3.



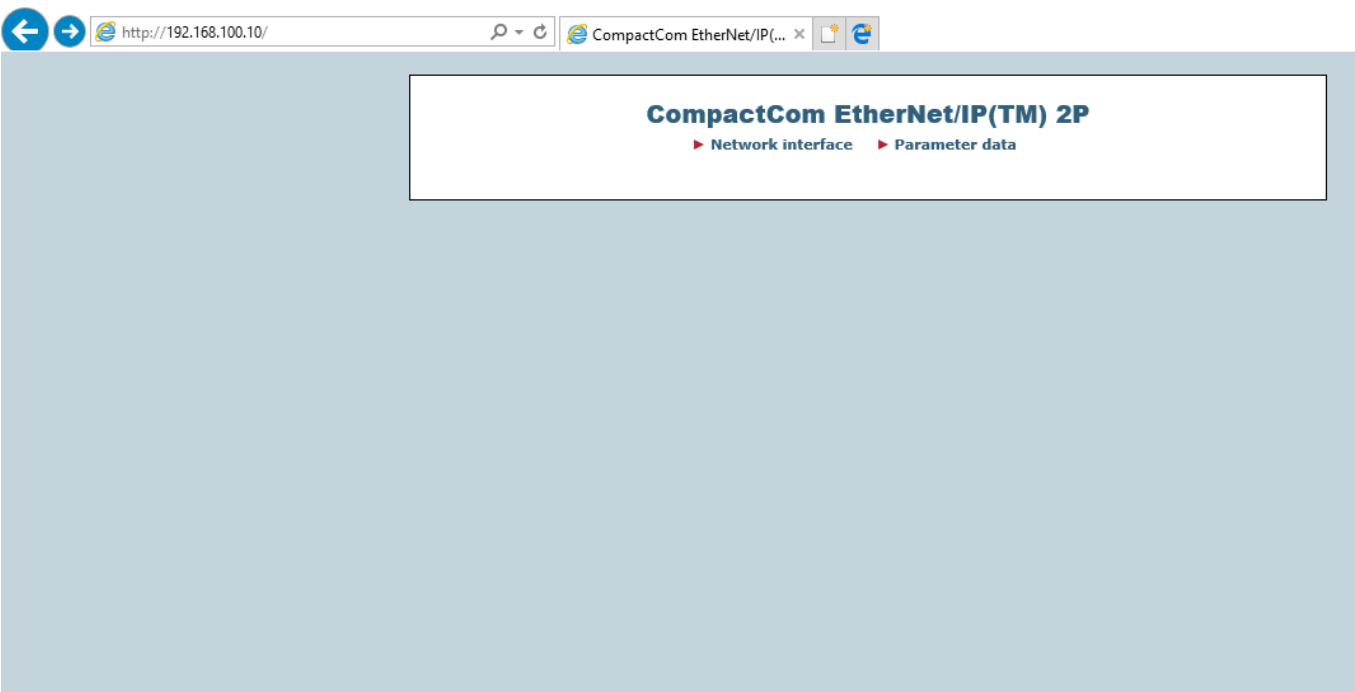
**NOTE!**

See section 3 and 4.2 of the WEG-ssw7000-installation-guide-english manual:  
<https://static.weg.net/medias/downloadcenter/h4e/h6c/WEG-ssw7000-anybus-10001038457-installation-guide-english.pdf>


### 1.2.9 Configuration via WEB

The SSW7000 with EtherNet/IP kit works in networks with 10 Mbps or 100 Mps rates, in half-duplex or full-duplex mode. When working at 100 Mbps full-duplex, the effective baud rate doubles, changing to 200 Mbps. The baud rate setting is done only via software, as illustrated below:

- In order to perform such setting, it is necessary to have a PC with an Internet browser connected to the same network (same IP addressing range) of the SSW7000.
- Open the browser and type the hostname or the IP address of the SSW7000. In the example below, we use the IP 192.168.100.10.



**Figure 1.2.11** – Establishing communication with the website



**NOTE!**

Your computer must be in the same range of EtherNet/IP address of the module to be able to establish communication with the Website.

- Click on 'Network interface'. A window with information about the communication module will be displayed.

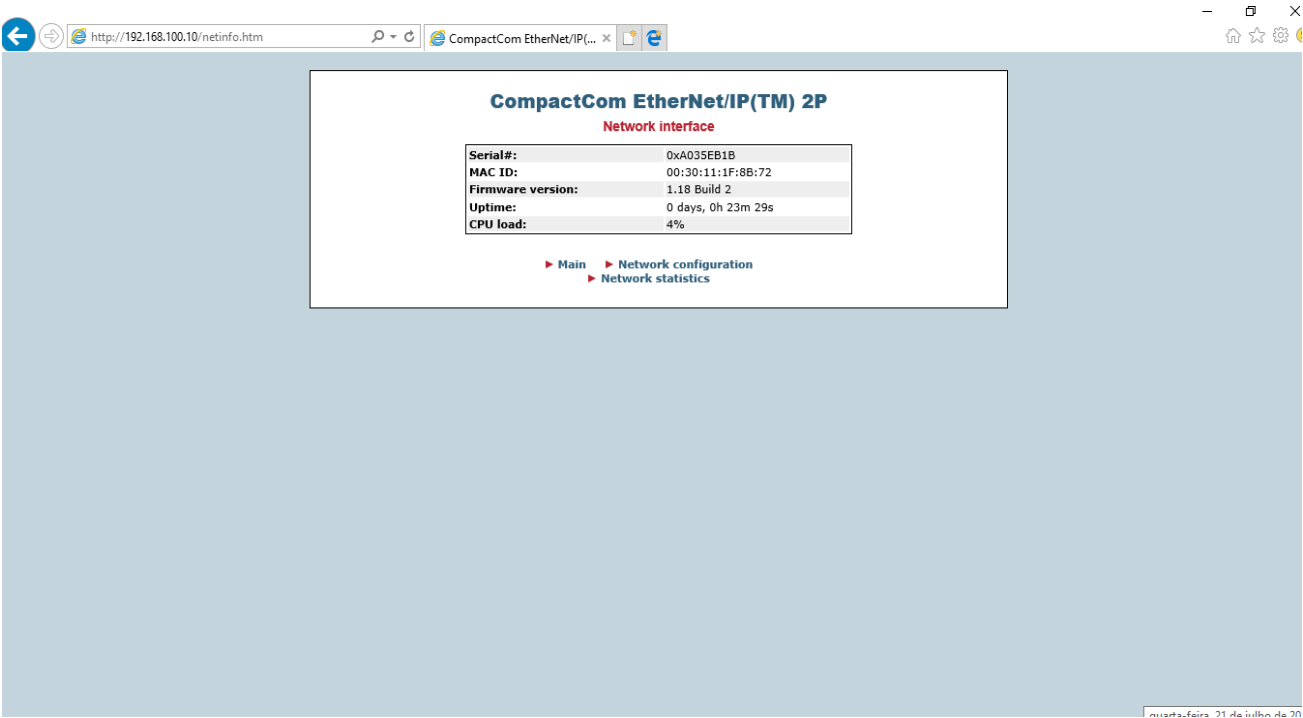


Figure 1.2.12 – Network Interface

- Next, click on ‘Network Configuration’. In order to set the baud rate, select the option ‘Comm Settings’.
- Save the modifications clicking on the ‘Store Settings’ button.

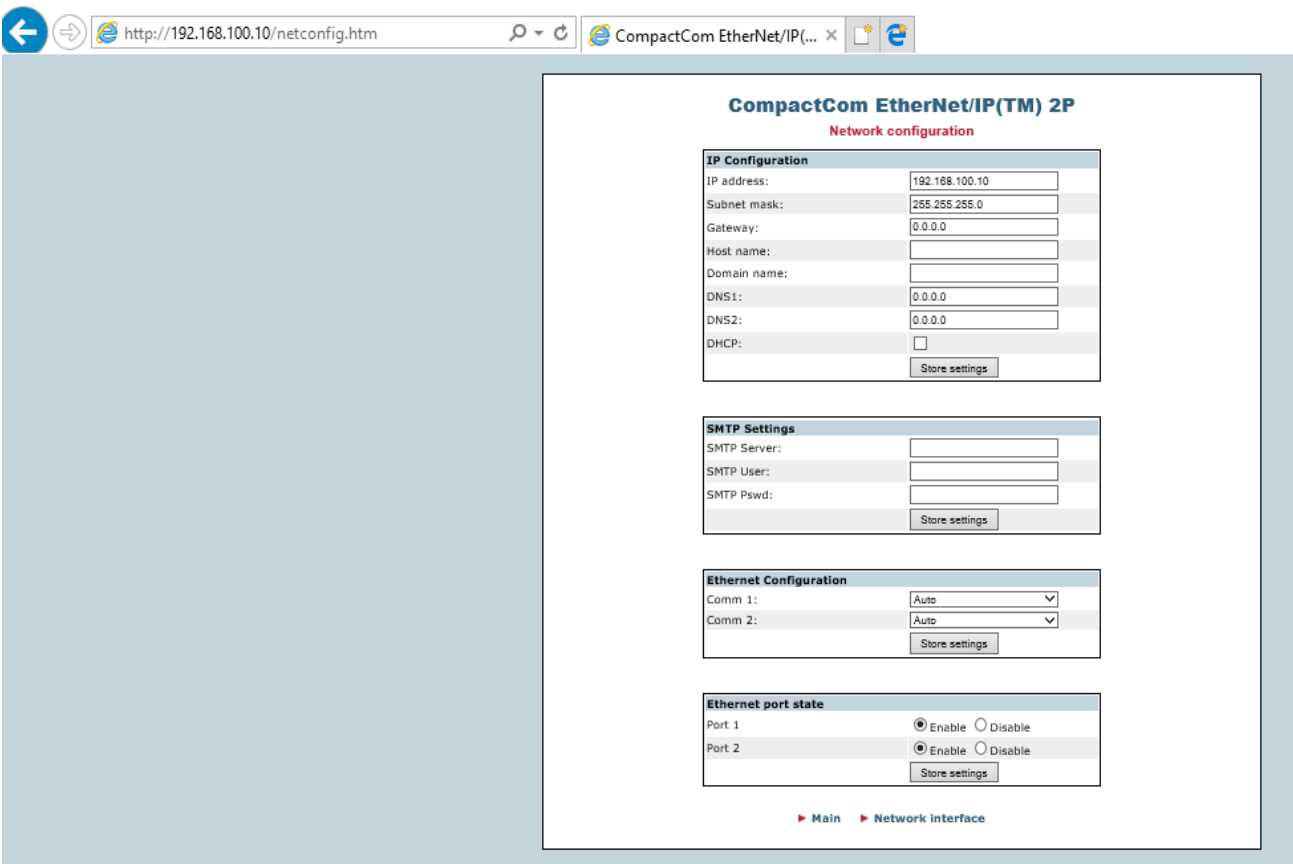


Figure 1.2.13 – Network Configuration



1.2.10 Access to the Parameters via WEB

The SSW7000 allows access for reading and writing via web certain parameters previously programmed by the user (refer to the section 7). This function allows the operator to monitor the SSW7000 status, being necessary only a computer with access to the industrial plant network.

In order to use this function, follow the steps indicated below:

- Make sure the SSW7000 is online. Verify the Anybus communication status via the parameter P0724.
- Again, it is necessary to have a PC with an Internet Browser connected to the same network (same IP addressing range) of the SSW7000.
- Open the browser and type the hostname or the IP address of the SSW7000. In this example, the SSW7000 has the IP 192.168.100.10. The window showed in the figure **Figure 1.2.12** will be displayed.
- Click on 'Parameter data'. Another window containing the reading and writing parameters will be showed. In this case, one reading parameter (SSW7000 Status Word) and one writing parameter (Anybus-CC Control Word) are showed. This window will show all the parameters programmed by the user.

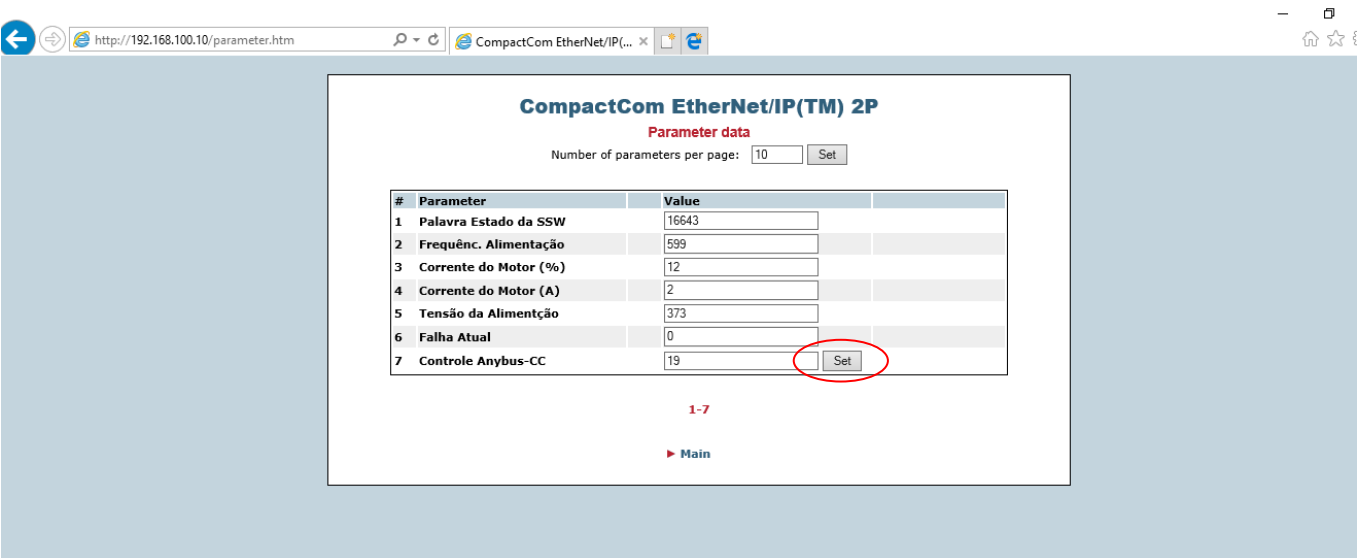


Figure 1.2.14 – Parameter Data

Important: The parameter writing via WEB (acyclic) is performed in a way similar to the I/O data (cyclic). Thus, if a specific variable is accessible via cyclic as well as acyclic connections, one will be overwritten by the other. In the case above, writing in the 'Anybus-CC Control Word' will be almost immediately overwritten by the value sent via the I/O cyclic connection. The same happens with the next word. In this case one gets the wrong impression that the command had not been executed.

1.3 ETHERNET NETWORK

EtherNet/IP was introduced in 2001, one more member of the protocol family that use the CIP (the same used by DeviceNet) in the application layer, as illustrated in the figure below. CIP comprises a wide message application suite and services for a variety of industrial automation applications, including control, security, synchronization, configuration and information.

1.3.1 Architecture of the EtherNet Network

Due to a strong integration existent between the TCP/IP protocols suite and the EtherNet, the user has the possibility of integrating in single communication architecture the corporative network and the “plant floor” network. The benefit of this integration reflects in the involved costs, since this is a technology proved and used to connect millions of computers worldwide.

The figure below shows an example of EtherNet network architecture.



Figure 1.3.1 – Architecture of the EtherNet Network

2. SOFT-STARTER PARAMETER SETTINGS

Below are the parameters that must be verified and configured in order to perform the communication in EtherNet network.

This parameter setting can be used as a basic example and uploaded directly to the soft-starter SSW7000 by SuperDrive programming application, which can be downloaded at WEG’s website.

**NOTE!**

The detailed description of these parameters is found in the Soft-Starter SSW7000 Programming Manual.

2.1 SYMBOLS FOR PROPERTIES DESCRIPTION

- RO** Read-only parameter.
- CFG** Parameter that can be changed only with a stopped motor.
- Net** Parameter visible on the HMI if the SSW7000 has a network interface installed – RS232, RS485, CAN, Anybus-CC, Profibus – or if the USB interface is connected.
- Serial** Serial Parameters visible on the HMI if the SSW7000 has the RS232 or the RS485 interface installed.
- USB** Parameters visible on the HMI if the SSW7000 USB interface is connected.
- Anybus** Parameters visible on the HMI if the Anybus-CC module is connected.

2.2 SELECTION OF THE SOFT-STARTER COMMAND REFERENCES

The Soft-starter control references (Local and Remote) must be programmed properly. In this example, the local references are programmed so that the sof-starter control is done via its own HMI and the remote references are programmed for the soft-starter to be controlled by the PLC via EtherNet network.

Next, only the SSW7000 parameters related to the Anybus-CC communication will be presented.

2.2.1 Selection of the Operation Control Mode – Local/Remote

P0220 – LOCAL/REMOTE Source Selection

Adjustable Range:	0 to 14	Value: 8
Properties:	CFG	
Access groups via HMI:		

Description:

It defines the command origin source which will select between LOCAL control and REMOTE control.

It also defines which control mode the soft-starter will adopt when it is powered up. In this example, the soft-starter will be programmed for **value 8 “Anybus-CC REM”**.

**NOTE!**

The detailed description of these parameters is found in the Soft-Starter SSW7000 Programming Manual.



2.2.2 Selection of REMOTE Command – REMOTE Mode

P0230 – REMOTE Command Selection

Adjustable	0 to 4	Value: 3
Range:		
Properties:	CFG	
Access groups via HMI:		

**Description:**  
Sets soft-starter command selection in REMOTE control mode.  
In this example, the soft-starter will be programmed for **value 3 “Anybus-CC”**.

2.3 CONFIGURATION OF THE PARAMETERS ANYBUS-CC SETTINGS

2.3.1 Soft-Starter Anybus-CC Settings

P0313 – Communication Error Action

Adjustable	0 to 5	Value: 0
Range:		
Properties:	CFG, Net	
Access groups via HMI:		


**Description:**  
It allows programming the action the SSW7000 must take if a communication error is detected.

Options	Description
0 = Off	No action is taken and the SSW7000 remains in the existing status.
1 = Ramp Stop	A stop command with deceleration ramp is executed and the motor stops according to the programmed deceleration ramp.
2 = General Disable	The SSW7000 is General Disabled and the motor coasts to stop.
3 = Goes to Local	The SSW7000 is commanded to the local mode.
4 = Off	No action is taken and the SSW7000 remains in the existing status.
5 = Causes Fault	Instead of an alarm, a communication error causes an SSW7000 fault, and it is necessary to perform a fault reset in order to restore the normal operation.

Tabela 2.1 – Parameter P0313 options

For the Anybus-CC interface, the events of Anybus-CC module offline (A129 alarm/F229 fault) and Anybus-CC module access error (A130 alarm/F230 fault) are considered communication errors.

The actions described in this parameter are executed by means of the automatic writing of the respective bits in the Anybus-CC control word – P0686. In order to be effective, it is necessary that the SSW7000 be programmed to be controlled via Anybus. This programming is done by means of the parameters P0220, P0229 and P0230.



**NOTE!**  
The detailed description of these parameters is found in the Soft-Starter SSW7000 Programming Manual.

**NOTE!**

Restart the drive to validate these changes; otherwise, it keeps working on the previous configuration.

2.3.2 Status Reading Parameter

P0006 – SSW Status Word

Adjustable	0 - 14	Factory setting: -
Range:		
Properties:	RO	
Access groups via HMI:		

Description:

This parameter allows the user to check the current status of the SSW7000 soft-starter via HMI.

P0006	Abbreviated form shown in the left corner of the HMI	Description of SSW7000 State
0	Ready	Ready to start the motor
1	Initial tests	In initial test of the power supply and motor
2	Failure	failed
3	Acceleration	Acceleration ramp
4	full voltage	In full voltage
5	Bypass	With bypass contactor activated
6	No function	Reserved
7	Deceleration	On deceleration ramp
8	Braking	In braking
9	Turning direction	In exchange for the direction of rotation
10	Jog	In Jog
11	TmpP831	Waiting for the time of P0831
12	General shutdown	Disable General
13	Configuration	In Configuration mode: - test mode; - guided start-up routine; - HMI copy function; - self-guided flash memory card routine; - has parameterization incompatibility; - secure sectioning.
14	D.O.L	With direct departure via contactors

Tabela 2.2 – Description of SSW7000 states P0006

P0680 – SSW Status Word

Adjustable	0000h - FFFFh	Factory setting: -
Range:		
Properties:	RO	
Access groups via HMI:		

Description:

Allows the user to identify the SSW7000 status via the communication network.



Bits	Values
Bit 0 Running	0: The motor is stopped. 1: The motor is running
Bit 1 General 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 Acceleration Ramp	0: It is not accelerating. 1: During the whole acceleration.
Bit 4 P0831 Time	0: It is not in the interval after stopping. 1: the interval after stopping – P0831 - is elapsing.
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 Alarm	0: The SSW7000 is not in alarm condition. 1: The SSW7000 is with an alarm. Note: The alarm number can be read by means of the parameter P0021 – Present Alarm.
Bit 7 Deceleration	0: It is not decelerating. 1: During the whole deceleration.
Bit 8 Remote	0: SSW7000 in Local situation. 1: SSW7000 in Remote situation.
Bit 9 Braking	0: It is not braking. 1: During the braking process.
Bit 10 Rotation direction	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 By-pass	0: With open by-pass. 1: With closed by-pass.
Bit 13 In configuration mode	0: SSW7000 operating normally. 1: SSW7000 in configuration mode. It indicates a special condition during which the SSW7000 cannot be enabled: <ul style="list-style-type: none"><li>• Executing the self-tuning routine;</li><li>• Executing the oriented start-up routine;</li><li>• Executing the HMI copy function;</li><li>• Executing the flash memory card guided routine;</li><li>• There is a parameter setting incompatibility;</li><li>• Without power at the power section.</li></ul> Note: It is possible to obtain the exact description of the special operation mode at the parameter P0692.
Bit 14 Power supply section	0: No power supply present. 1: The power supply is higher than 15 V at the 3 phases
Bit 15 Fault	0: The SSW7000 is not in a fault condition. 1: The SSW7000 has detected a fault. Note: The fault number can be ready means of the parameter P0020 – Present Fault.

Tabela 2.3 – Parameter P0686 status bit functions

P0686 – SSW Status Word

Adjustable Range:	0000h - FFFFh	Factory setting: 0000h
Properties:	RO, Anybus	
Access groups via HMI:		

Description:

It is the SSW7000 Anybus-CC interface control word. This parameter can only be changed via Anybus-CC. For the sources (HMI, Serial, etc.) it behaves like a read-only parameter.

In order that the commands written in this parameter be executed, it is necessary that the SSW7000 to be programmed to be controlled via Anybus-CC. This programming is done by means of the parameters P0220, P0229 and 0230.

Bits	Values
Bit 0 - Start/Stop	0: It stops the motor with deceleration ramp (when programmed). 1: It starts the motor according to the programmed control type.
Bit 1 - General Enable	0: General Disable 1: General Enable.
Bit 2 - JOG	0: It disables the JOG function. 1: It enables the JOG function.
Bit 3 - FWD/REV	0: Forward rotation direction. 1: Reverse rotation direction.
Bit 4 - LOC/REM	0: Local situation. 1: Remote situation.
Bit 5 - Reserved	Reserved.
Bit 6 - Reserved	Reserved.
Bit 7 - Reset	0: No function 1: It executes a reset (if in a fault condition).
Bits 8 to 15 - Reserved	Reserved.

Tabela 2.4 – Parameter P0686 bit functions

Each bit of this word represents a command that can be executed at the SSW7000.

**P0692 – Configuration Mode Status**

Adjustable	0000h - FFFFh	Factory setting: -
Range:		
Properties:	Net	
Access groups via HMI:		

**Description:**

It allows the user to identify the SSW7000 configuration mode status.

Bits	Values
Bit 0 - Orie. Start-up	0: It is not in the oriented start-up. 1: During the oriented start-up.
Bit 1 - C1-C2 Wait.Com.	0: The communication between C1 and C2 is normal. 1: Waiting for the communication between C1 and C2.
Bit 2 - Test Mode	0: It is not in test mode. 1: During the test mode.
Bit 3 - Copy Mem. Card	0: It is not copying data. 1: It is copying data from or to the flash memory module.
Bit 4 - Copy HMI	0: It is not copying data. 1: It is copying data from or to the HMI.
Bit 5 - Copy Firmware	0: It is not copying data. 1: It is copying the firmware.
Bit 6 - Reset Needs	0: OK. 1: Necessary Reset.
Bit 7 - Types Control	0: It is not in alteration of the types of control. 1: During the alteration of the types of control.
Bit 8 - Incompatible	0: OK. 1: There is an incompatibility between parameters.
Bits 9 to 15 - Reserved	Reserved.

Tabela 2.5 – Parameter P0692 bit functions



P0693 – Configuration Mode Commands

Adjustable	0000h - FFFFh	Factory setting: -
Range:		
Properties:	Net	
Access groups via HMI:		

Description:

It allows the user to change the SSW7000 configuration mode.

Bits	Values
Bit 0 Abort Start-up	0: It does not abort the oriented start-up. 1: It aborts the oriented start-up.
Bit 1 Reserved	Reserved
Bit 2 Abort T. Mode	0: It does not abort the Teste Mode. 1: It aborts the Teste Mode.
Bit 3 to 6 Reserved	Reserved
Bit 7 Abort Control	0: It does not abort the alteration of the types of control. 1: It aborts the alteration of the types of control.
Bits 6 to 15 Reserved	Reserved

Tabela 2.6 – Parameter P0693 bit functions.

P0695 – Value for the Digital Outputs

Adjustable	0000h - FFFFh	Factory setting: 0000h
Range:		
Properties:	Net	
Access groups via HMI:		

Description:

It allows the control of the digital outputs by means of the network interfaces (Serial, USB, Anybus-CC, etc.). This parameter cannot be changed via the HMI.

Each bit of this parameter corresponds to the desired value for a digital output. In order to have the correspondent digital output controlled according to this content, it is necessary that its function be programmed for “P0695 Content” at the parameters P0275 to P0277.

Bits	Values
Bit 0 Setting for DO1 (RL1)	0: DO1 output open 1: DO1 output closed
Bit 1 Setting for DO2 (RL2)	0: DO2 output open 1: DO2 output closed
Bit 2 Setting for DO3 (RL3)	0: DO3 output open 1: DO3 output closed
Bits 3 to 15	Reserved

Tabela 2.7 – Parameter P0695 bit functions



**P0696 – Value 1 for Analog Outputs**

**P0697 – Value 2 for Analog Outputs**


Adjustable Range:	-32768 - 32767	Factory setting: 0
Properties:	Net	
Access groups via HMI:		

**Description:**

They allow the control of the analog outputs by means of the network interfaces (Serial, USB, Anybus-CC, etc.). These parameters cannot be changed via the HMI. The value written in those parameters is used as the analog output value, providing that the function for the desired analog output is programmed for “P0696/7 Value”, at the parameter P0251 or P0254.

The value must be written in a 15-bit scale (7FFFh = 32767)<sup>6</sup> to represent 100% of the output desired value, i.e.:

- P0696 = 0000h (0 decimal) → analog output value = 0 %
- P0696 = 7FFFh (32767 decimal) → analog output value = 100 %




**NOTE!**

<sup>6</sup> Refer to the Soft-Starter SSW7000 User’s Manual to find the actual output resolution.

The showed example was for the parameter P0696, but the same scale is also used for the parameter P0697. For instance, to control the analog output 1 via serial interface, the following programming must be done:

- Choose a parameter, P0696 or P0697, to be used by the analog output 1. For this example, we are going to choose P0696.
- Program the option “P0696 Value” as the function for the analog output 1 in P0251.
- Using the serial interface, write in P0696 the desired value for the analog output 1, between 0 and 100%, according to the parameter scale.



**NOTE!**

If the analog output is programmed to operate from -10 V to 10 V, negative values must be programmed at the specific parameter to command the output with negative voltages, i.e., -32768 to 32767 represent a variation from -10 V to 10 V the analog output.

**P0723 – Anybus Identification**

Adjustable Range:	0 to 25	Factory setting: -
Properties:	RO	
Access groups via HMI:		



**Description:**

It allows identifying the Anybus-CC module connected to the SSW7000.

Options	Model
0 = Inactive	No communication module is installed
1 = RS232	RS232 passive module
2 = RS422	RS485/422 passive module installed and configured for RS422
3 = USB	USB passive module
4 = Serial Server	Serial Server (Ethernet) passive module
5 = Bluetooth	Bluetooth passive module
6 = Zigbee	Zigbee passive module
7 = WLAN	WLAN passive module
8...9 = Reserved	Reserved for future use
10 = RS485	Passive module RS485/422 installed and configured for RS485
11...15 = Reserved	Reserved for future use
16 = Profibus DP	Profibus DP active module
17 = DeviceNet	DeviceNet active module
18 = CANopen	CANopen active module
19 = Ethernet/IP	EtherNet/IP active module
20 = CC-Link	CC-Link active module
21 = Modbus-TCP	Modbus-TCP active module
22 = Modbus-RTU	Modbus-RTU active module
23 = Profinet IO	Profinet IO active module
24 = Reserved	Reserved for future use
25 = Reserved	Reserved for future use

Tabela 2.8 – Parameter P0723 bit functions.

**P0724 – Anybus Communication Status**

Adjustable	0 to 4	Factory setting: -
Range:		
Properties:	RO, Anybus	
Access groups via HMI:		

**Description:**

It informs the communication module status.

Status	Description
0 = Inactive	Anybus-CC communication module has not been detected.
1 = Not Supported	The detected Anybus-CC module is not supported by the SSW7000.
2 = Access Error	Data access problem between the SSW7000 and the Anybus-CC communication module has been detected.
3 = Offline	Communication problems. There is no cyclic data exchange with the master.
4 = Online	Normal communication. Cyclic and acyclic data exchange between the SSW7000 and the

Tabela 2.9 – Parameter P0724 options

### 3. NUMBER OF EXCHANGED WORDS

Below are the read and write parameters for EtherNet/IP communication

#### 3.1 PARAMETERIZATION

The SSW7000 presents an automatic definition of the number of words exchanged for the communication. The default value of exchanged words is 1 reading word (Parameter P0680) and 1 writing word (Parameter P0686). P0728 to P0750 define the parameters that can be read and P0751 to P0755 define the ones that can be written through the communication network. Parameters P0728 to P0755 are initialized with 0, thus determining that there are no parameters for reading or writing.

The automatic definition of the number of words exchanged for the communication verifies the value of parameters P0728 to P0755. If their content is different from zero, one word is incremented in the reading or writing number of words. However, P0728 to P0750 and P0751 to P0755 must be configured sequentially, because the verification is canceled by finding the first reading or writing parameter with value zero, no longer verifying the others.

Example:

In order to monitor the following parameters: P0001, P0002, P0003, P0004 and P0020.

1. SSW7000 programming:

```
P0728 = 1;  
P0729 = 2;  
P0730 = 3;  
P0731 = 4;  
P0732 = 20;  
P0733 to P0750 = 0;  
P0751 to P0755 = 0;
```

2. Reset the SSW7000 after this programming;

3. The automatic definition of the number of words exchanged for the communication is executed during the SSW7000 initialization. The result of the automatic definition is the following:

Reading: 6 words:

```
1st Status word (P0680);  
2nd P0001 content;  
3rd P0002 content;  
4th P0003 content;  
5th P0004 content;  
6th P0020 content;
```


Writing: 1 word:

```
1st Anybus-CC control word (P0686);
```

3.1.1 Reading parameters


Readout parameters can be configured. Remembering that the first parameter is P0680 and it is fixed, reserved to indicate the soft-starter status, but another 23 reading words that can be configured in any SSW7000 reading parameter.

These parameters allow the user to program the reading of any other parameter of the equipment<sup>8</sup> via the network. In other words, they contain the number of another parameter. E.g., P0728 = 5. In this case the content of P0005 (motor frequency) will be sent via network.



**NOTE!**

<sup>8</sup> Except the parameter P0000, which is considered invalid.



**NOTE!**


Every modification of the parameters P0728 to P0755 requires an SSW7000 reset.

3.1.2 Writing parameters

Write parameters can be configured. Remembering that the first parameter is P686 and it is fixed, reserved for soft-starter commands, but the other 5 writing words can be configured in any SSW7000 writing parameter.


These parameters allow the user to program the writing of any other parameter of the equipment via the network<sup>9</sup>. In other words, they contain the number of another parameter.

E.g., P0734 = 100. In this case, the content to be written in P0100 will be sent via network.



**NOTE!**

<sup>9</sup> Except the parameter P0000, which is considered invalid.



**NOTE!**

Every modification of the parameters P0728 to P755 requires an SSW7000 reset.



**NOTE!**

For more information about the SSW7000 soft-starter parameterization, consult the programming manual available at:  
<https://static.weg.net/medias/downloadcenter/hf4/hd7/WEG-SSW7000-programming-manual-10001038255-1.7x-en.pdf>

4. FAULT AND ALARM INDICATION MESSAGES

Possible fault and alarm message that may occur during the communication:

4.1 ERROR INDICATIONS

During the Fieldbus reading/writing process the following error indications may occur and will be informed at the Status Word variable. Status Word variable inactions:

Fault / Alarm	Description:	Performance:	Correction:
A129/F129: <b>Offline Anybus-CC Module</b>	It indicates interruption in the Anybus-CC communication. The communication module went to the offline state.	<p>It occurs when for any reason there is an interruption in the communication between the SSW7000 and the network master.</p> <p>In this case, the alarm A129 or the fault F229, depending on the P0313 programming, will be signaled through the HMI. In case of alarms, the alarm indication will automatically disappear at the moment the condition that caused the error no longer exists.</p> <p>It occurs only when the SSW7000 is online.</p>	<p>-Verify cables and connectors. A bad contact in these elements may cause intermittent alarms.</p> <p>-Make sure the PLC is in execution mode (RUN).</p>
A130/F130: <b>Anybus-CC Module Access Error</b>	It indicates Anybus-CC communication module access error.	<p>It occurs when the control board is not able to read information from the module or when there is hardware incompatibility.</p> <p>In this case, the alarm A130 or the fault F230, depending on the P0313 programming, will be signaled through the HMI. It is necessary to cycle power of the SSW7000 so that a new attempt to access the Anybus-CC module be made.</p>	<p>-Verify whether the Anybus-CC module is fitted in correctly on the XC44 connector.</p> <p>-Make sure there are not two options (WEG board and passive Anybus-CC module) installed simultaneously having the same interface (RS232 or RS485). In such case, the WEG optional board will have preference over the Anybus-CC module that will remain disabled and indicating A130.</p>

Figure 4.1 – Fault and alarm messages description



NOTE!

For further information on the faults and alarms, refer to the programming manual available for download on:  
<https://static.weg.net/medias/downloadcenter/h4e/h6c/WEG-ssw7000-anybus-10001038457-installation-guide-english.pdf>

## 5. COMPACT LOGIX L32E

In this chapter we will introduce the development of an example of a project with the PLC CompactLogix L32E and the soft-starter Weg SSW7000, how to establish EtherNet/IP communication, control and monitor the Soft-Starter.



### ATTENTION!

Disclaimer WEG is not responsible for any support over this application and customer must take all responsibility for the use of this content.

### 5.1 Creating new project

Add a new project using RSLogix 5000, you should check and define the model and version of the PLC to be used in the application, also name it.

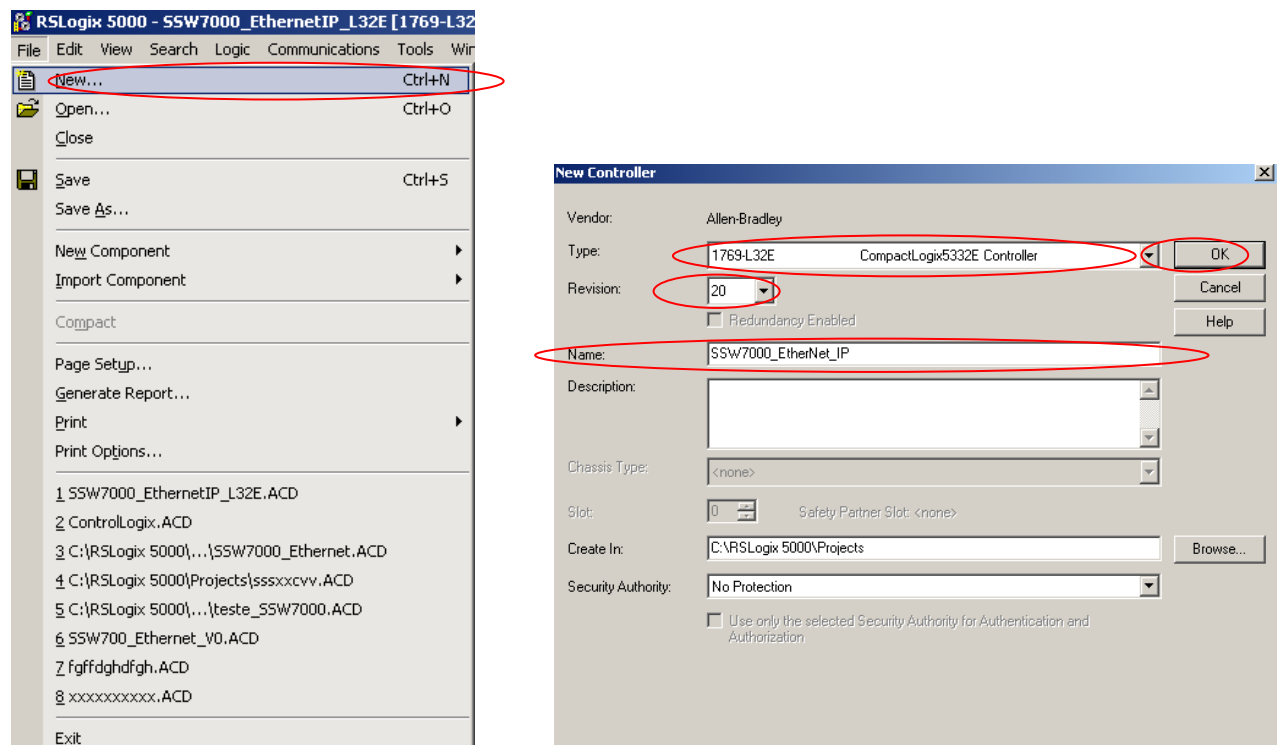


Figure 5.1 – New project

#### 5.1.1 Add EtherNet Module to PLC

Open the RSLogix 5000 programming software, in the controller organizer tab under the I/O configuration option, choose 1769-L32E EtherNet LocalEnb and right-click, then the properties option will appear.

Now click with the left mouse button on properties and a new window will appear to address the PLC IP: 192.168.100.50 in this example.

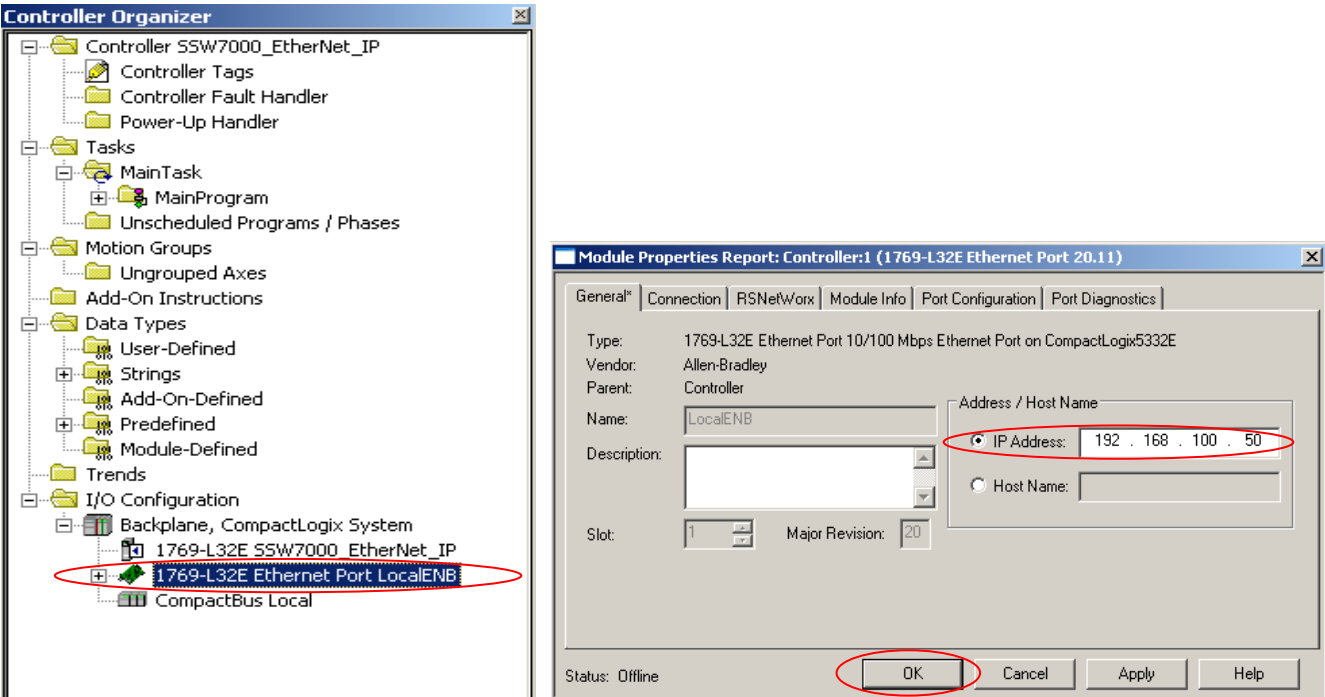


Figure 5.2 – Adding PLC EtherNet module and addressing it.

Now go to the communication tab and set who active, then CompactLogix SSW7000\_EtherNet\_IP\_L32E and a Go Online.

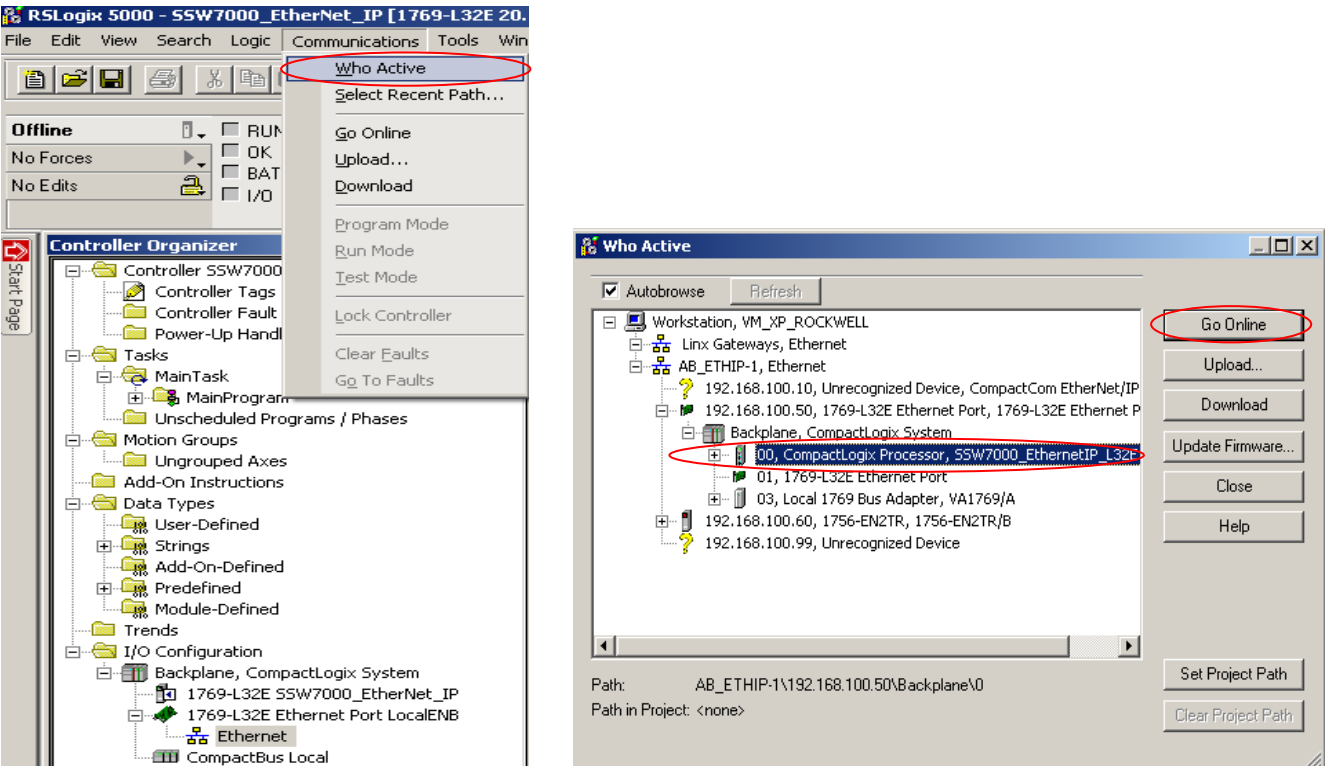


Figure 5.3 – Establishing communication with the PLC.

5.1.2 Add generic module SSW7000

Open the RSLogix 5000 programming software, in the Controller organizer tab in the I/O configuration option choose Ethernet and click with the right mouse button, then the New Module option will appear. Now click with the left mouse button on New Module.

To communicate with the SSW7000 the user must add a Generic Module in Ethernet/IP configuration, for this follow the steps bellow.

Under I/O Configuration, right click on network communication module for the intended SSW7000 drive and select “New Module”.

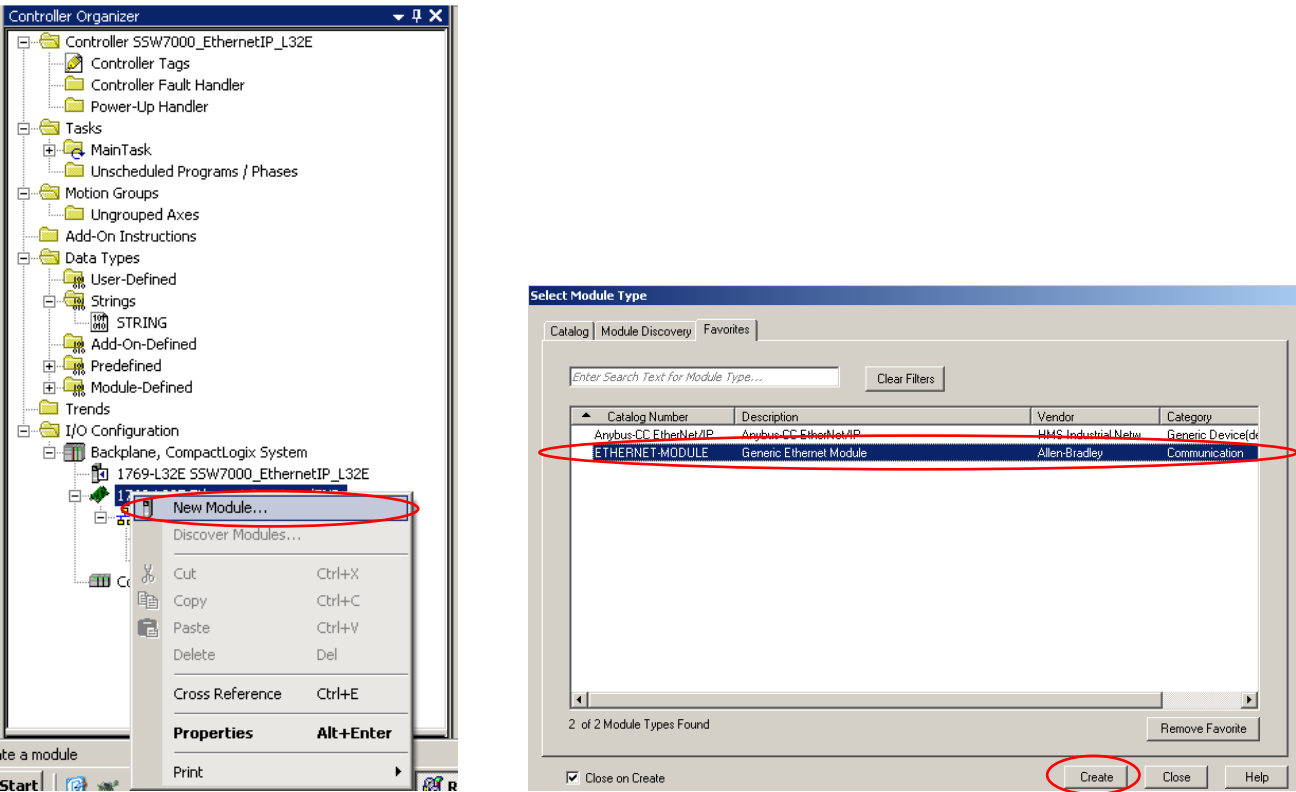


Figure 5.4 – Accessing the news EDS file

Now choose the option EtherNet-Module - Generic Ethernet Module and click on the Create button.

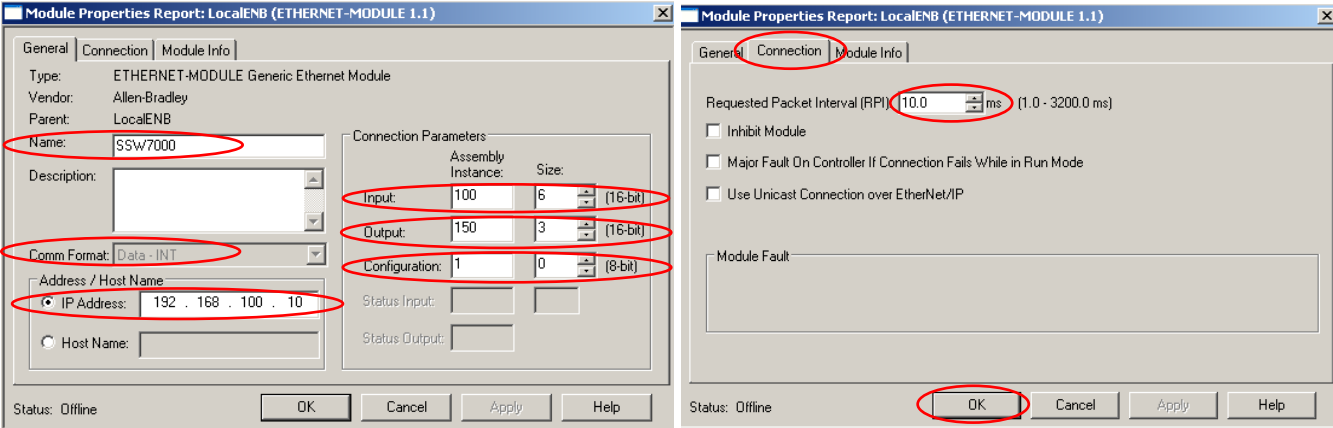
5.1.3 Generic Module Configuration

Properties Report module:

- Give a name to the Module;
- Determine the format of the information, Data - INT;
- Address the generic module of the soft-starter SSW7000, IP: 192.168.100.10 for example;
- Assembly instance input equal to 100 and the number of connections of the reading parameters equal to size 6;
- Assembly instance output equal to 150 and the number of connections of the writing parameters equal to size 3;
- Configuration setting equal to 1.



The figure below shows the parameters circled in red, which are the parameters to be configured for this application.

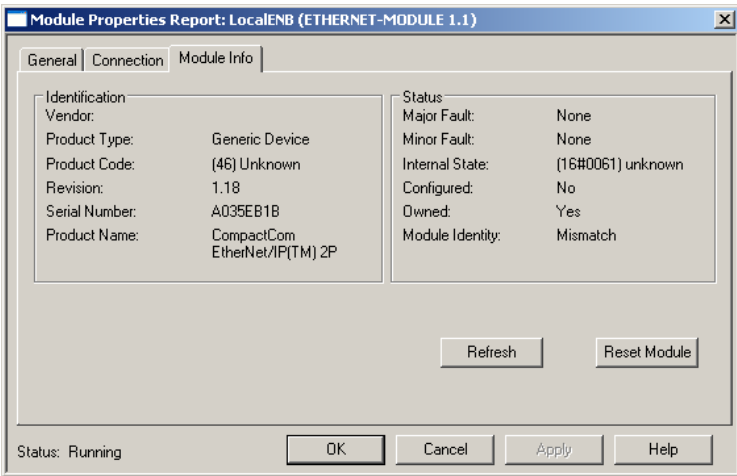


**Figure 5.5 – Configuration the new Module.**

Then click on the Connection tab to configure the requested Packet Interval (RPI) in 10.0 ms then click on the Ok button.

**5.1.4 Module Information**

Module information after downloading the application to the PLC and putting it in run mode.



**Figure 5.6 – Status the new Module**

## 6. MONITORING AND CONTROLLING THE SSW7000

Some examples of how to control and monitor the Soft-Starter SSW7000 through the EtherNet / IP network via PLC can be seen sequentially.

### 6.1 Words used in this project

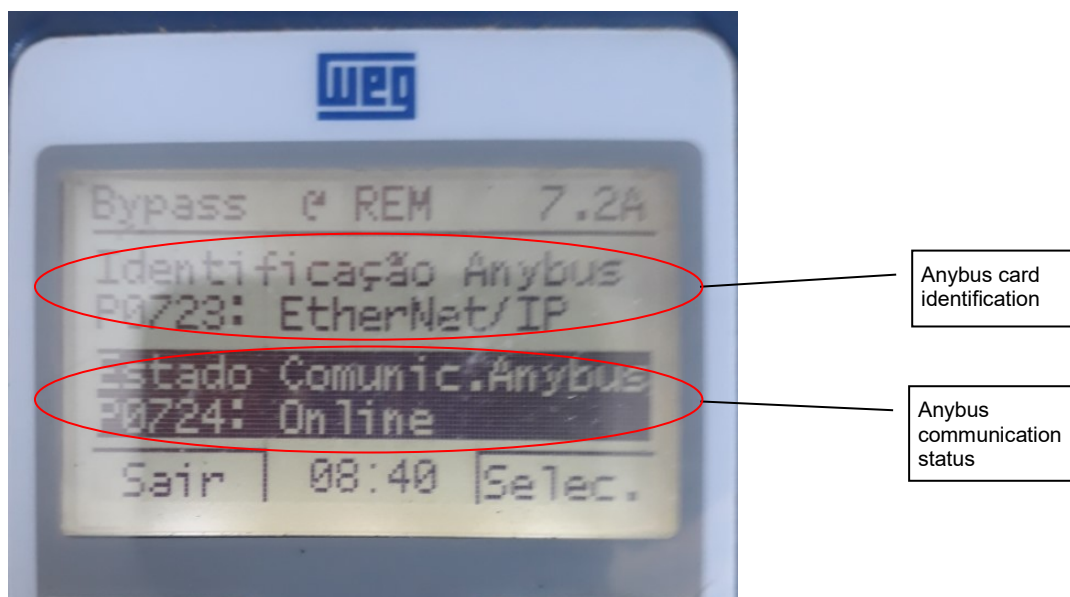
Follows the table with all the read and write words used in this EtherNet/IP communication project between the rockwell PLC and the soft-starter WEG SSW7000.

Words	Read or Write	SSW7000 Anybus	SSW7000 parameters	SSW7000 Description	Style SSW7000	Name PLC	Style PLC
1	Read	P0680	P0680	SSW7000 Status	Hexadecimal	SSW7000. I. [0]	Decimal
2	Read	P0728	P0002	SSW7000 Current %	Decimal	SSW7000. I. [1]	Decimal
3	Read	P0729	P0003	Motor current %	Decimal	SSW7000. I. [2]	Decimal
4	Read	P0730	P0004	Motor Current (A)	Decimal	SSW7000. I. [3]	Decimal
5	Read	P0731	P0005	Supply Voltage (V)	Decimal	SSW7000. I. [4]	Decimal
6	Read	P0732	P0006	Power Frequency (Hz)	Decimal	SSW7000. I. [5]	Decimal
1	Write	P0686	P0686	Command	Hexadecimal	SSW7000. O. [0]	Decimal
2	Write	P0751	-----	Word 2	Decimal	SSW7000. O. [1]	Decimal
3	Write	P0752	-----	Word 3	Decimal	SSW7000. O. [2]	Decimal

**Tabela 3.0** – Parameter list.

#### 6.1.1 Check the parameters on the HMI

First, check Parameters P0723 and P0724 on the HMI to see if the soft-starter SSW7000 has taken over the EtherNet/IP card and if the Anybus card is On-line.



**Figure 6.1** – Reading and writing words of this project

## 6.2 Reading and writing words

The figure below shows all read and write words programmed for this application example: 6 read words and 3 write words.

Name	Value	Force Mask	Style	Data Type	Description
SSW7000.C	{...}	{...}		AB:ETHERNE...	
SSW7000.I	{...}	{...}		AB:ETHERNE...	
SSW7000.I.Data	{...}	{...}		Decimal INT[6]	
SSW7000.I.Data[0]	2			Decimal INT	SSW Status
SSW7000.I.Data[1]	0			Decimal INT	SSW Current %
SSW7000.I.Data[2]	0			Decimal INT	Motor Current %
SSW7000.I.Data[3]	0			Decimal INT	Motor Current A
SSW7000.I.Data[4]	0			Decimal INT	Supply Voltage V
SSW7000.I.Data[5]	0			Decimal INT	Power Frequency Hz
SSW7000.O	{...}	Forced		AB:ETHERNE...	
SSW7000.O.Data	{...}	{...}		Decimal INT[3]	
SSW7000.O.Data[0]	0			Decimal INT	Command
SSW7000.O.Data[1]	0			Decimal INT	Word 2
SSW7000.O.Data[2]	0			Decimal INT	Word 3

The figure shows 6 reading words

The figure shows 3 writing words

Figure 6.2 – Reading and writing words of this project.

### 6.2.1 SSW7000 status read word Off

The figure below shows the first reading word, which indicates the status of the SSW7000, which is the parameter P0680 of the HMI. Indicates that the SSW7000 soft-starter is turned off and ready to go.

Name	Value	Force Mask	Style	Data Type	Description
SSW7000.C	{...}	{...}		AB:ETHERNE...	
SSW7000.I	{...}	{...}		AB:ETHERNE...	
SSW7000.I.Data	{...}	{...}		Decimal INT[6]	
SSW7000.I.Data[0]	2			Decimal INT	SSW Status
SSW7000.I.Data[0].0	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].1	1			Decimal BOOL	SSW Status
SSW7000.I.Data[0].2	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].3	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].4	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].5	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].6	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].7	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].8	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].9	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].10	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].11	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].12	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].13	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].14	0			Decimal BOOL	SSW Status
SSW7000.I.Data[0].15	0			Decimal BOOL	SSW Status

Pronta a LOC 0.8A  
Palavra Estado da SSW 0680: 0002h  
Controle Anybus-CC  
P0686: 0000h  
Sair 08:41 Selec.

Figure 6.3 – SSW7000 status read word Off.

The next figure shows the first read word in binary, the Data(0).1 bit is at a high level and indicates that the soft-starter SSW7000 has the general enabled bit.

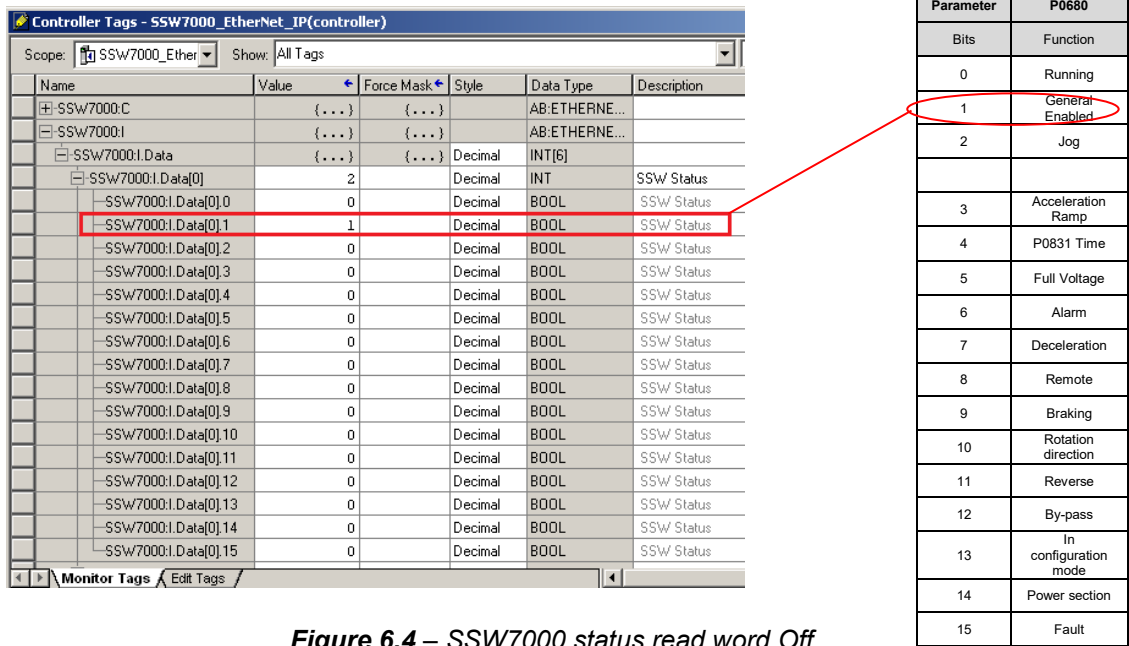


Figure 6.4 – SSW7000 status read word Off.

6.2.2 SSW7000 status read word On

The figure below shows the first reading word SSW7000.I.Data(0)= 20771 (decimal), which indicates the status of the SSW7000, which is the parameter P0680=5123h (hexadecimal) on the HMI. It indicates that the soft-starter SSW7000 received the command SSW7000.O.data (0)= 19 of writing, in the HMI it is P0686=13h (hexadecimal).

Then it executed the commands and switched the soft-starter to remote, executed the motor start and bypassed.

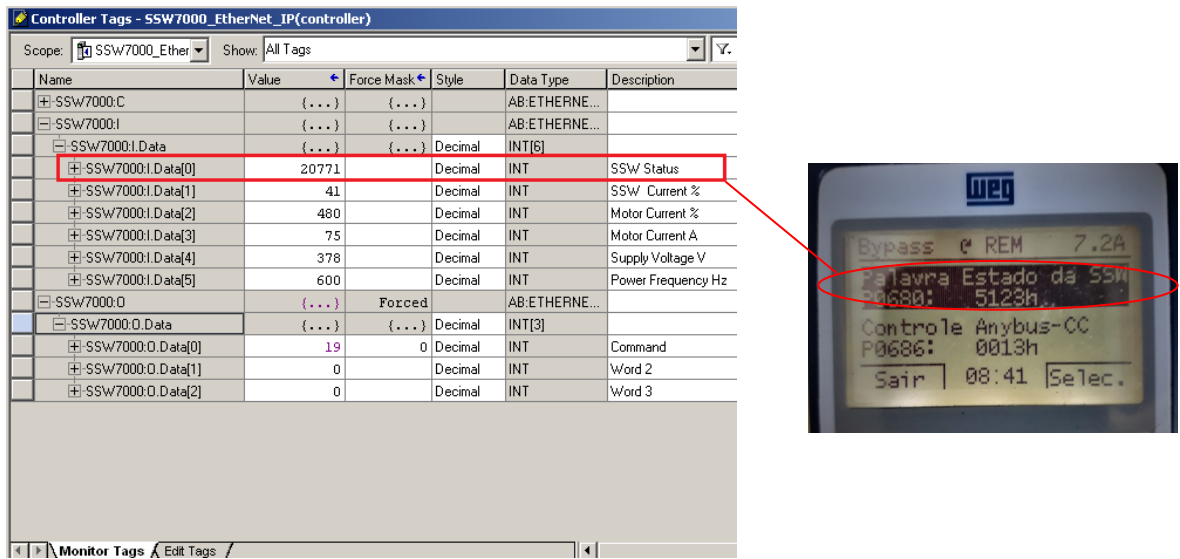


Figure 6.5 – SSW7000 status read word On.

The figure below shows the first reading of the word SSW7000.I.Data (0) = 20771 (decimal), just below we have this number in binary = 0101 0001 0010 0011 and on the side we have a table that shows what each bit one of these means .

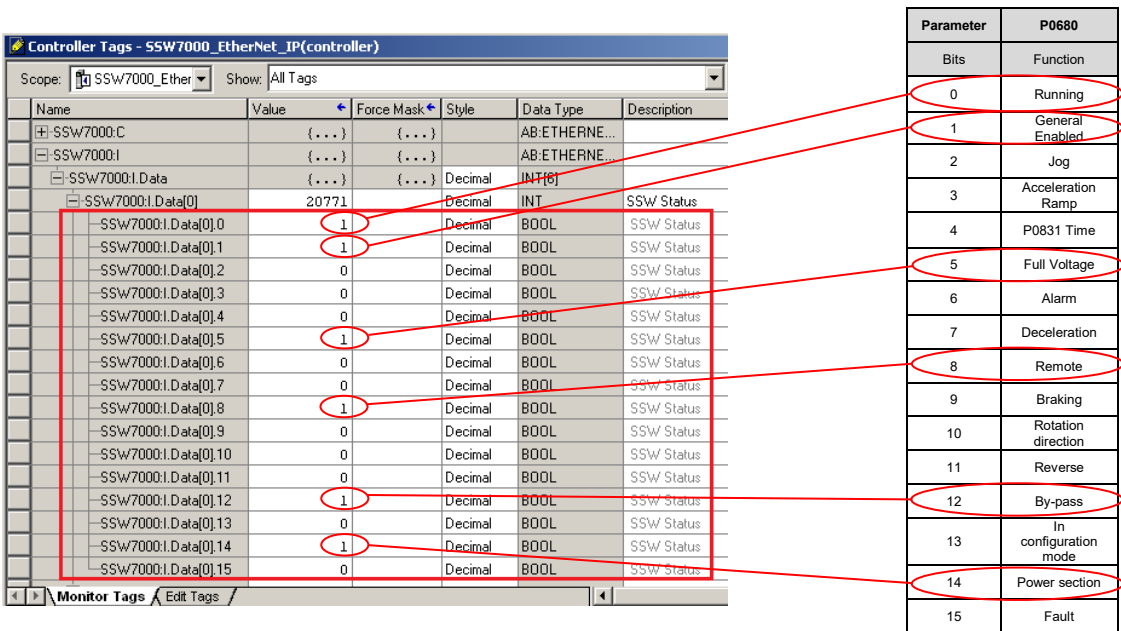


Figure 6.6 – SSW7000 status read word on.

6.2.3 Other Reading Words

The following figure shows the other 5 read words configured to read parameters 2, 3, 4, 5, and 6 of the soft-starter SSW7000. Note that in the PLC the variables are read in decimal but do not show the commas as in the HMI variables.

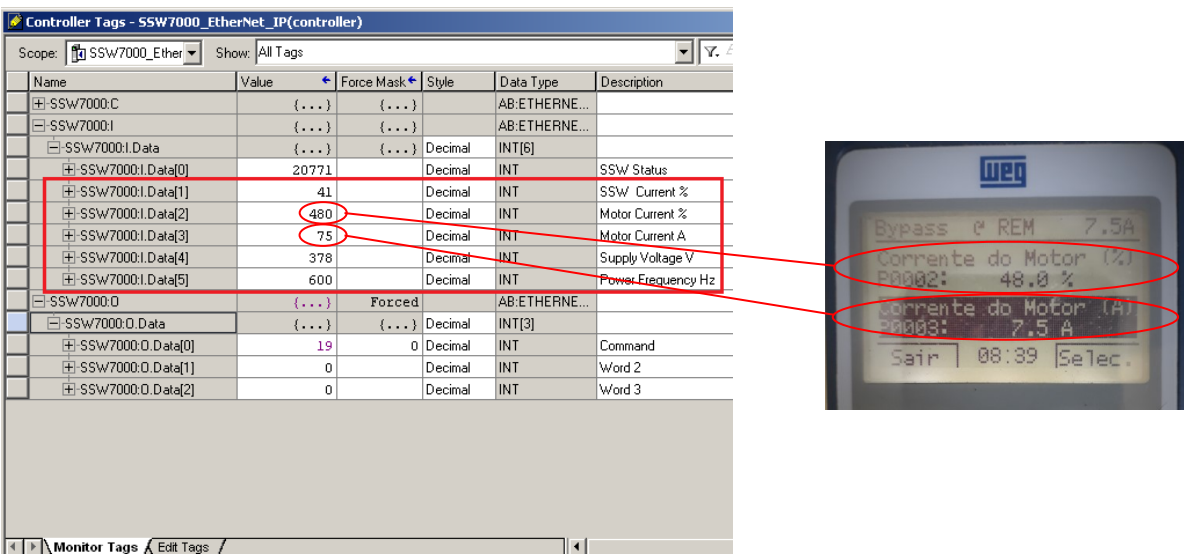


Figure 6.7 – Other reading words from the SSW7000

### 6.2.4 Command write word

The figure below shows the writing word SSW7000.O.Data (0) = 0 (decimal), turn off and write this command value in parameter P0686 of the soft-starter SSW700 Weg.

Controller Tags - SSW7000_EtherNet_IP(controller)					
Scope:	SSW7000_Ether	Show:	All Tags		
Name	Value	Force Mask	Style	Data Type	Description
SSW7000.O	{...}	Forced		AB:ETHERNE...	
SSW7000.O.Data	{...}	{...}	Decimal	INT[3]	
SSW7000.O.Data[0]	0	0	0	Decimal	Command
SSW7000.O.Data[0].0	0	0	0	Decimal	Start/Stop
SSW7000.O.Data[0].1	0	0	0	Decimal	General Enable
SSW7000.O.Data[0].2	0	0	0	Decimal	Jog
SSW7000.O.Data[0].3	0	0	0	Decimal	Forward/Reverse
SSW7000.O.Data[0].4	0	0	0	Decimal	Local/Remote
SSW7000.O.Data[0].5	0	0	0	Decimal	Reserved
SSW7000.O.Data[0].6	0	0	0	Decimal	Reserved
SSW7000.O.Data[0].7	0	0	0	Decimal	No Function
SSW7000.O.Data[0].8	0	0	0	Decimal	Reserved
SSW7000.O.Data[0].9	0	0	0	Decimal	Command
SSW7000.O.Data[0].10	0	0	0	Decimal	Command
SSW7000.O.Data[0].11	0	0	0	Decimal	Command
SSW7000.O.Data[0].12	0	0	0	Decimal	Command
SSW7000.O.Data[0].13	0	0	0	Decimal	Command
SSW7000.O.Data[0].14	0	0	0	Decimal	Command
SSW7000.O.Data[0].15	0	0	0	Decimal	Command
SSW7000.O.Data[1]	0			Decimal	Word 2

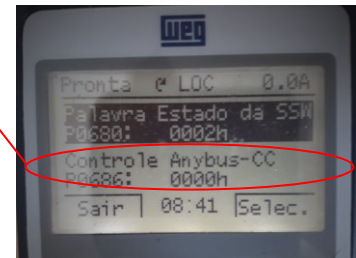


Figure 6.8 – SSW7000 Off command write word.

The figure below shows the first writing word (Command) SSW7000.O.data (0) = 19 (Decimal) being sent to soft-starter and writing on the HMI is P0686 = 13h (hex).

Controller Tags - SSW7000_EtherNet_IP(controller)					
Scope:	SSW7000_Ether	Show:	All Tags		
Name	Value	Force Mask	Style	Data Type	Description
SSW7000.C	{...}	{...}		AB:ETHERNE...	
SSW7000.I	{...}	{...}		AB:ETHERNE...	
SSW7000.I.Data	{...}	{...}	Decimal	INT[6]	
SSW7000.I.Data[0]	20771			Decimal	SSW Status
SSW7000.I.Data[1]	41			Decimal	SSW Current %
SSW7000.I.Data[2]	480			Decimal	Motor Current %
SSW7000.I.Data[3]	75			Decimal	Motor Current A
SSW7000.I.Data[4]	378			Decimal	Supply Voltage V
SSW7000.I.Data[5]	600			Decimal	Power Frequency Hz
SSW7000.O	{...}	Forced		AB:ETHERNE...	
SSW7000.O.Data	{...}	{...}	Decimal	INT[3]	
SSW7000.O.Data[0]	19	0	0	Decimal	Command
SSW7000.O.Data[1]	0			Decimal	Word 2
SSW7000.O.Data[2]	0			Decimal	Word 3

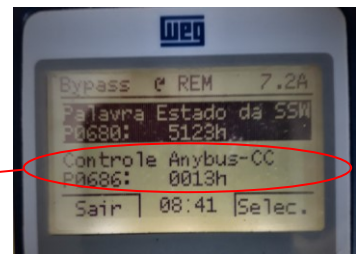


Figure 6.9 – SSW7000 On command write word.

The next figure shows the first writing word (Command) SSW7000.O.data (0) = 19, decomposed into binary and meaning each bit of information to be sent to soft-starter SSW7000.

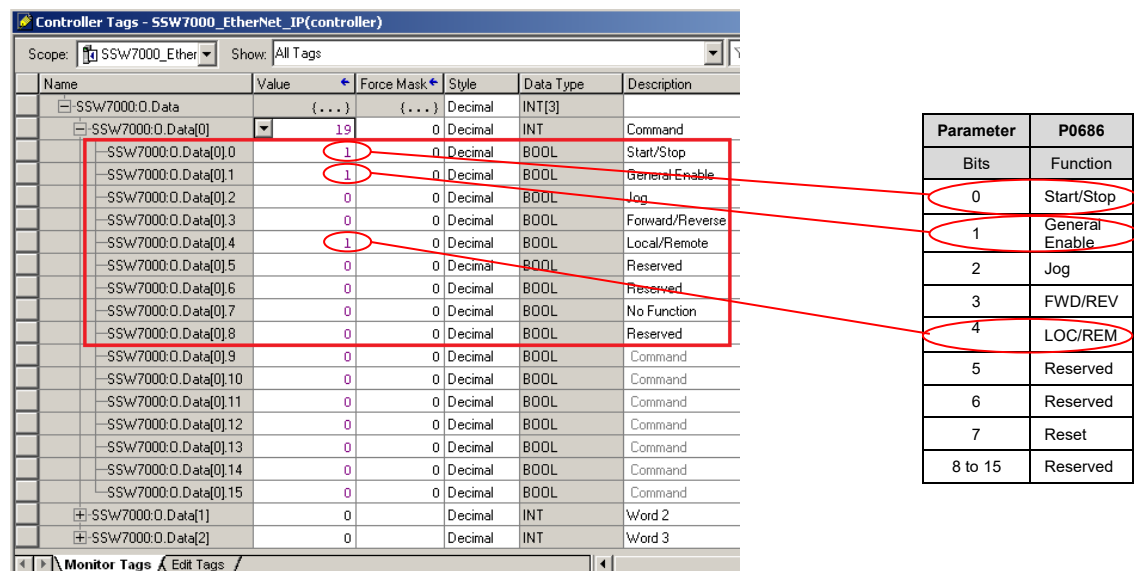


Figure 6.10 – SSW7000 On command write word in binary.

The next figure shows that the bits of the Command write word SSW7000.O.data[0].9 to SSW7000.O.data[0].15 are spare and not usable.

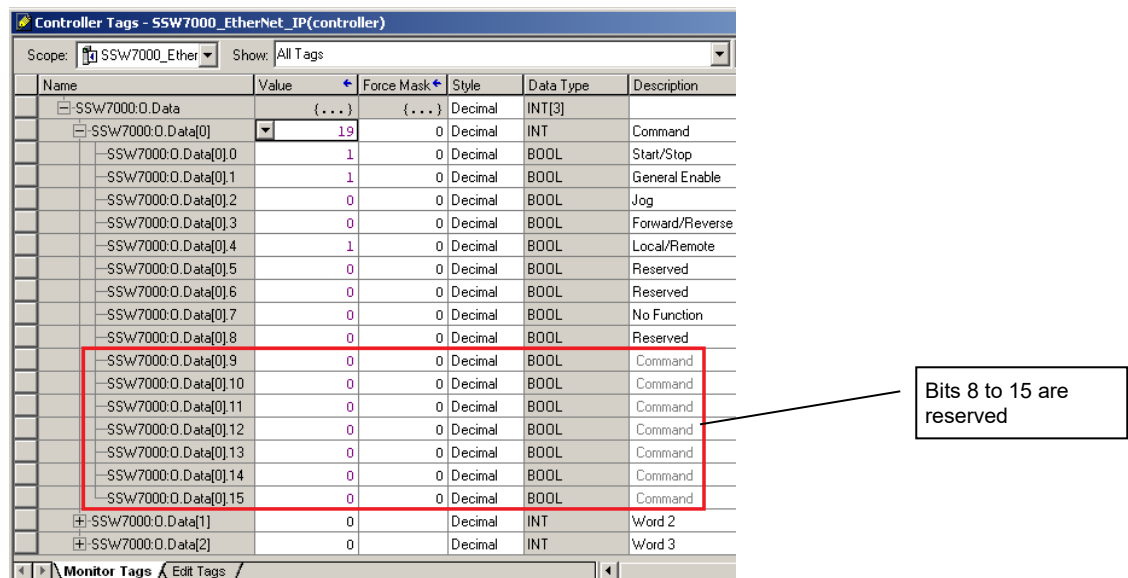
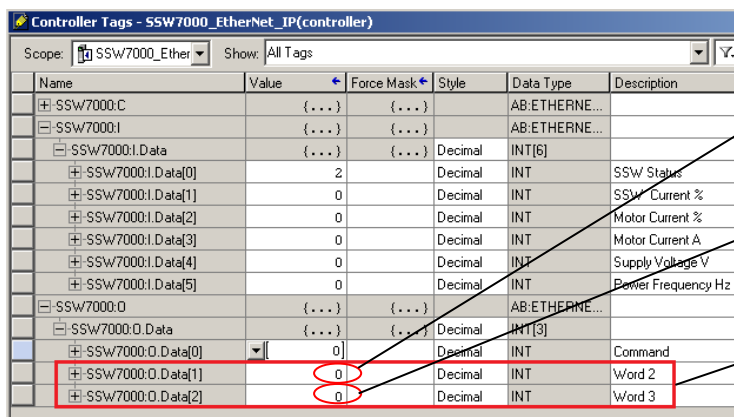


Figure 6.11 – Reserved command word bits.



The next figure shows two other writing words added in this application example and which can be configured as desired by the customer, as long as they are writing parameters of the soft-starter SSW700 Weg.



Name	Value	Force Mask	Style	Data Type	Description
SSW7000.C	{...}	{...}		AB:ETHERNE...	
SSW7000.I	{...}	{...}		AB:ETHERNE...	
SSW7000.I.Data	{...}	{...}		Decimal	
SSW7000.I.Data[0]	2			Decimal	SSW Status
SSW7000.I.Data[1]	0			Decimal	SSW Current %
SSW7000.I.Data[2]	0			Decimal	Motor Current %
SSW7000.I.Data[3]	0			Decimal	Motor Current A
SSW7000.I.Data[4]	0			Decimal	Supply Voltage V
SSW7000.I.Data[5]	0			Decimal	Power Frequency Hz
SSW7000.O	{...}	{...}		AB:ETHERNE...	
SSW7000.O.Data	{...}	{...}		Decimal	
SSW7000.O.Data[0]	0			Decimal	Command
SSW7000.O.Data[1]	0			Decimal	Word 2
SSW7000.O.Data[2]	0			Decimal	Word 3

In this case, the writing word 2 is not configured with the SSW700 parameter.parameter configured.

In this case, the writing word 3 is not configured with the SSW700 parameter.parameter configured.

Configurable writing parameters

Figure 6.12 – Configurable write words for SSW7000 parameters.

## NOTE!

For more information about the writing parameters of the soft-starter SSW7000 Weg, consult the programming manual available for download at:

<https://static.weg.net/medias/downloadcenter/hf4/hd7/WEG-SSW7000-programming-manual-10001038255-1.7x-en.pdf>



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