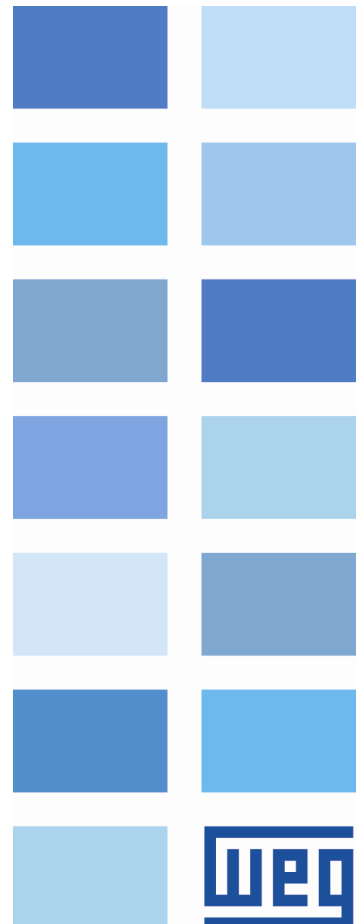


Anybus-CC

SSW7000

User's Manual





Anybus-CC User's Manual

Series: SSW7000

Language: English

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Dear Customer,

The SSW7000 Soft-Starter is a product developed with quality and efficiency levels that ensure excellent performance.

This product must be properly identified and handled, since it requires certain special procedures, such as storage, installation and maintenance.

If you need any further explanation, contact WEG.

Keep this manual always close to the SSW, so it can be referred to when needed.



ATENÇÃO!

1. It is imperative to follow the procedures contained in this manual for the warranty to be valid
2. The SSW installation, operation and maintenance procedures must be performed by qualified personnel.



NOTAS!

1. Copying of the information contained in this manual, in whole or in part, is permitted provided that the source is mentioned.
2. In case this manual is lost, the electronic file in PDF format is available at www.weg.net or another printed copy may be requested.

Revision	Description	Chapter
01	First Edition	-
02	Inclusion Modbus TCP Kit	2
03	New product communication features	2
04	New features in product parameterization	2,3

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ABOUT THE MANUAL

This manual provides the necessary information for the operation of the SSW7000 soft-starter using the Anybus-CC modules. This manual must be used together with the SSW7000 user manual.

ABBREVIATIONS AND DEFINITIONS

ASCII	American Standard Code for Information Interchange
CAN	Controller Area Network
CIP	Common Industrial Protocol
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
DP	Decentralized Periphery
FMS	Fieldbus Message Specification
HMI	Human Machine Interface
IP	Internet Protocol
MAC	Medium Access Control
MS	Module Status
NS	Network Status
ODVA	Open DeviceNet Vendor Association
OP	Operation Mode
PI	Profibus International
PLC	Programmable Logic Controller
ST	Status
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

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.

1 INTRODUCTION TO THE FIELDBUS

The Fieldbus is a digital communication system used in the industry to interconnect automation primary elements, such as PLC's, drives, valves, sensors, actuators, etc., as illustrated in the figure below.

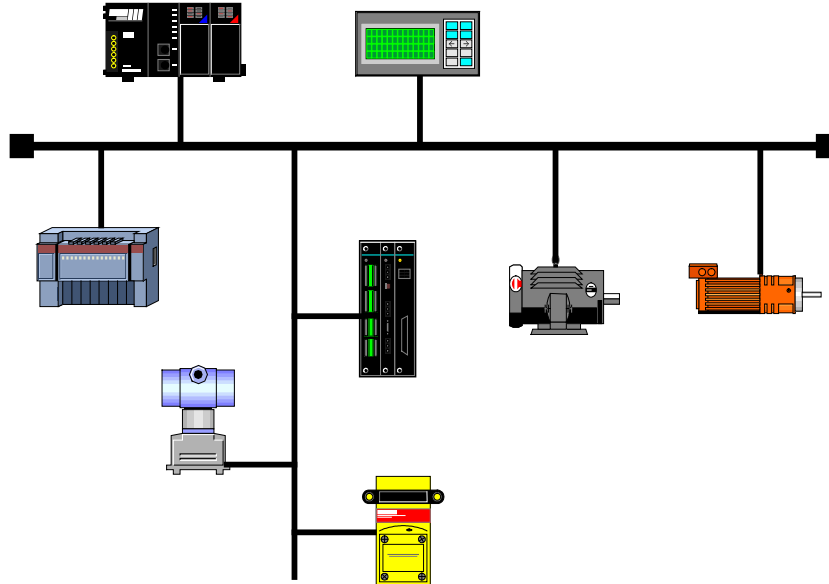


Figure 1.1: Illustration of a Fieldbus network

Nowadays, there is a great variety of protocols in the market, each one with its advantages and disadvantages. It is up to the user/project designer to evaluate what the necessary requirements for the application are and choose among the available options.

Regardless of the choice, the main advantages of the industrial networks are:

- Significant reduction in cable and installation costs;
- Reduction in the *start-up* time;
- More reliability and efficiency;
- Addition, removal and replacement of equipment with the network under load (supply);
- Integration of several suppliers (standardization);
- Effective process monitoring;
- Configuration of devices via the network.

By means of the Anybus-CC communication modules, the SSW7000 supports protocols widely spread in the industry, like DeviceNet, Profibus DP-V1, EtherNet/IP, Modbus TCP, PROFINET IO. Besides this, by means of passive modules, RS232 and RS485/422 interfaces are also available.

Following, the characteristics for Anybus-CC modules available for the soft-starter SSW7000 are presented.

2 ACCESSORY KITS

Soft-starter SSW7000 features as accessory the Anybus-CC communication modules. Anybus-CC modules are divided into two types: active and passive.

Active Module: it has all the required hardware and software to perform the communication. The following active modules are available for SSW7000:

- DeviceNet
- Profibus DP-V1
- EtherNet/IP
- Modbus TCP
- PROFINET IO

Passive Module: these passive devices work only as physical layer, not performing any processing over the data flow. SSW7000 features the following interfaces:

- RS232
- RS485/422



NOTE!

For the passive modules, communication is performed through the serial interface of the product. Therefore, the manual of serial communication must be referred to in order to obtain information about how to configure and operate the product using this interface.

2.1 DEVICENET

2.1.1 DEVICENET-05 Accessory



- WEG part number: 11008158.
- Composed by the Anybus ABCC-DEV communication module, mounting instructions and a “torx” screw driver for fixing the module.
- ODVA certified interface.
- It allows the programming of the Soft-starter via network configuration software.

Connector Pin Function

The DeviceNet communication module presents a male *plug-in* connector with the following pin assignment:

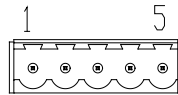


Table 2.1: DeviceNet plug-in connector pin assignment

Pin	Name	Function
1	V-	Power supply negative pole
2	CAN_L	CAN_L signal
3	Shield	Cable shield
4	CAN_H	CAN_H signal
5	V+	Power supply positive pole

Power Supply

The power supply of the network must be able to supply enough current to power up the equipment and interfaces connected to the network. The data for individual consumption and input voltage for the DEVICENET-05 accessory are presented in table 2.2.

Table 2.2: Characteristics of power supply for the interface

Power Supply (V _{DC})		
Minimum	Maximum	Recommended
11	25	24
Current (mA)		
Typical		Maximum
36		38

Indications

DeviceNet defines two LEDs for state indication: one for the communication module (MS) and another for the network (NS).

The MS LED indicates the conditions of the module itself. That is, whether it is able to work or not. The table below shows the possible states:

Table 2.3: State of the DeviceNet module

LED Status	Description	Comments
Off	Without power supply	-
Green	Module operating and in normal conditions	-
Red	Module in error	Reinitializing the equipment is required.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The NS LED provides information about the status of the DeviceNet network. The table below presents the description of those states.

Table 2.4: Status of the DeviceNet network

LED Status	Description	Comments
Off	Without power supply or not online	Equipment is not connected to a DeviceNet network with other equipment at the same communication rate.
Green	<i>Online</i> , connected	Master has allocated a set of I/O type connection with the slave. In this stage data exchange by means of I/O type connections does effectively occur.
Flashing green	<i>Online</i> , not connected	Slave has successfully completed the Mac ID verification procedure. This means that the configured communication is correct (or was detected correctly in the case of use of autobaud) and that there are no other nodes in the network with the same address. However, in this stage, there is not a set of I/O type connections established.
Flashing red	One or more I/O type connections have expired	The I/O data exchange has been interrupted.
Red	Serious fault in the link	It indicates that the slave cannot enter the network because of addressing problems or due to the occurrence of <i>bus off</i> . Verify if the address is being used by another device, if the chosen communication rate is correct or if there are installation problems.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

2.1.2 Installation of the DeviceNet network

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

Communication Rate

Equipment with Anybus-CC interface in general allow to configure the desired communication rate, which may vary from 125 Kbit/s to 500 Kbit/s. A communication rate (baud rate) that can be used by a device also depends on the length of the cable used in the installation. 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. The table 2.5 shows the relation between the communication rates and the maximum lengths of the cable which can be used in the installation, according to the recommendation of ODVA.

Table 2.5: Communication rates supported and cable length

Communication Rate	Length of the cable
500 Kbit/s	100 m
250 Kbit/s	250 m
125 Kbit/s	500 m

All the equipment of the network must be set to use the same communication rate.

Address in the DeviceNet network

Every device in the Anybus-CC network must have an address, or MAC ID, between 0 and 63. This address must be different for each device.

Termination resistors

The use of termination resistors at the ends of the CAN bus is essential to prevent reflection in the line, which may damage the signal transmitted and cause errors in the communication. Termination resistors of 121 Ω / 0.25 W must be connected between the signals CAN_H and CAN_L at the ends of the main bus.

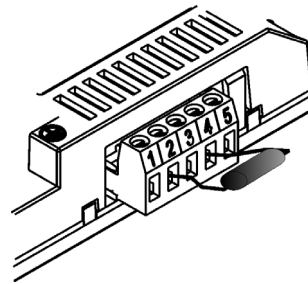


Figure 2: Example of installation of the termination resistor

Cables

A shielded cable must be used with two pairs of wires, as specified in the DeviceNet protocol.

Installation recommendations

In order to interconnect the network nodes, it is recommended the connection of the equipment directly from the main line, without the use of derivations. If you use derivations, the limits of length for derivation defined by the DeviceNet specification must be observed. During the installation of the cables, you must avoid passing them close to power cables, since that can cause errors during the transmission due to electromagnetic interference.

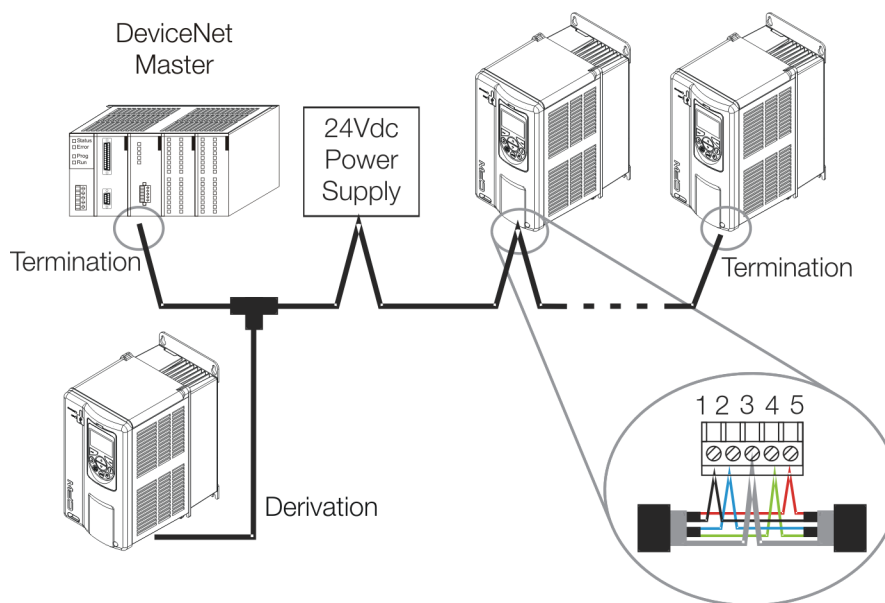


Figure 3: Example of installation in DeviceNet network

The grounding of the cable shield must be done only in one point, thus avoiding long current loops. This point is normally the network own power supply. It is recommended that the network be powered in only one point, and the power supply signal be taken to all devices by means of the cable. In case more than one power supply is required, they must have the same point as reference.

2.1.3 Configuration of the Communication

In order to configure and use the DeviceNet module, follow the steps below:

- With the module installed, during the recognition stage, a warning message will be displayed on the product HMI, and the MS and NS LEDs test routine performed. After this stage, the MS LED must turn on in green.

- Observe the content of parameter P0723. Check if the module was recognized. The detection is done automatically and does not require the user's intervention.
- Set the parameters as desired for the application:
 - Address: the address of the equipment is set in parameter P0725.
 - Communication rate: the communication rate is set in parameter P0726.
 - I/O configuration: program in P0728 to P0755 the number of words to be exchanged with the network master (see item 3). This same value must be set in the DeviceNet master.
- Once the parameters are set, if any of the parameters described in the previous item were changed, it is necessary to restart the equipment.

Once the equipment is set, it is necessary to configure the communication in the network master:

- EDS file: register the EDS file in the network configuration tool. The EDS configuration file can be obtained with the manufacturer. It is necessary to observe the equipment software version in order to use an EDS file which is compatible with this version.
- I/O data setting: during the configuration of the network, it is necessary to define the quantity of I/O data communicated between master and slave, as well as the transmission method of these data. The DeviceNet protocol defines different methods of data exchange, seeing that the module supports the following methods:
 - *Polled*: communication method in which the master sends a telegram to each of the slaves of its list (*scan list*). As soon as it receives the request, the slave immediately answers the request of the master. This process is repeated until all slaves are polled, restarting the cycle.
 - *Bit-strobe*: communication method in which the master sends a telegram to the network containing 8 bytes of data. Each bit of these 8 bytes represents one slave that, if addressed, answers according to the programmed.
 - *Change of State*: communication method in which the data exchange between master and slave only occurs when there are changes in the values monitored/controlled up to a certain time limit. When this limit is reached, the transmission and reception will take place even if changes have not occurred.
 - *Cyclic*: another communication method very similar to the previous one. The only difference is the production and consumption of messages. In this type of communication, every data exchange occurs at regular time intervals, no matter if they have been changed or not.

If everything is correctly configured, the NS LED of the module will be on in green. It is in this condition that cyclic data exchange effectively occurs between the slave and the master of the network.

2.1.4 Access to Parameters – Acyclic messages

Besides the I/O data (cyclic) communication, the DeviceNet protocol also defines a kind of acyclic telegram (*explicit messages*), used especially in asynchronous tasks, such as parameter setting and configuration of the equipment.

After the registration of the EDS file in the network configuration software, the user will have access to the full parameter list of the equipment, which can be accessed via *explicit messages*. Each parameter is accessed using an addressing based on class, instance and attribute. The table 2.6 shows how to address the parameters of the SSW7000.

Table 2.6: Addressing of the parameters

Parameter	Class	Instance	Attribute
P0001	Class 162 (A2h)	1	5
P0002	Class 162 (A2h)	2	5
P0003	Class 162 (A2h)	3	5
...
P0400	Class 162 (A2h)	400	5
...

2.2 PROFIBUS

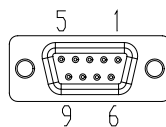
2.2.1 PROFIBUS-05 Accessory



- WEG part number: 11008107.
- It is composed by the Anybus ABCC-DPV1 communication module, mounting instructions and a “torx” screw driver for fixing the module.
- Interface certified by Profibus International.
- It supports DP-V1 (acyclic messages).

Connector Pin Function

The Profibus DP-V1 communication module has a female DB9 connector with the following pin assignment:


Table 2.7: Profibus female DB9 connector pin assignment

Pin	Name	Function
1	-	-
2	-	-
3	B-Line (+)	RxD/TxD positive
4	RTS	Request To Send
5	GND	Reference (0 V) of the RS485 interface (isolated)
6	+5 V	+5 V for active termination (RS485 isolated power supply)
7	-	-
8	A-Line (-)	RxD/TxD negative
9	-	-

Indications

Profibus defines two LEDs for status indication: one for the communication module (ST) and another for the operating mode (OP).

The ST LED indicates the conditions of the module itself. That is, whether it is able to work or not. The table 2.8 shows the possible states:

Table 2.8: Status of the Profibus DP-V1 module

LED Status	Description	Comments
Off	Without power supply or not initialized	-
Green	Module initialized	-
Flashing green	Initialized, but in event diagnosis	It indicates that a problem was diagnosed in the module and an alarm was generated.
Red	In error	Reinitializing the equipment is required.

The OP LED provides information about the status of the Profibus network. The table 2.9 presents a brief description of those states.

Table 2.9: Status of the operating mode

LED Status	Description	Comments
Off	Without power supply or not <i>online</i>	-
Green	Device <i>online</i>	In this state, data exchange effectively occurs.
Flashing green	<i>Online</i> but in the <i>clear</i> state	In this state, data exchange occurs, but the outputs are not updated.
Flashing red (1 flash)	Error in parameter setting	Incorrect configuration of the Profibus communication properties in the master of the network.
Flashing red (2 flashes)	Error in the Profibus configuration	It indicates that the quantity of I/O words (or the order of these words) set in the master is different from that set in the equipment.

2.2.2 Installation of the Profibus network

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

Communication Rate

It is not necessary to set the communication rate of the Profibus module because it features autobaud and, therefore, this configuration is done in the master of the network.

Address

Every device in the Profibus network, master or slave, is identified in the network by means of an address. This address must be different for each device. Valid values: 1 to 126.

Termination resistors

For each segment of the Profibus DP network, it is necessary to enable a termination resistor at the ends of the main bus. Connectors suitable for the Profibus network that feature a switch to enable the resistor may be used, but the switch must only be enabled (ON position) if the equipment is the first or last element in the segment. It is 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. So any equipment in the network can be disconnected from the bus without damaging the termination.

Cables

It is recommended that the installation be done with A-type cable, whose features are described in table 2.10. The cable has a pair of wires that must be shielded and twisted in order to guarantee greater immunity to electromagnetic interference.

Table 2.10: Properties of cable A-type cable

Impedance	135 to 165 Ω
Capacitance	30 pf/m
Resistance in loop	110 Ω /km
Diameter of the cable	> 0.64 mm
Cross section of the wire	> 0.34 mm

Connectors

There are different types of connectors specifically designed for applications in the Profibus network. For SSW7000 soft-starter, it is recommended to use connectors with cable connection in 180 degrees, because, in general, connectors with different angles can not be used due to mechanical characteristics of the product.

Installation recommendations

The Profibus DP protocol, using physical medium RS485, allows the connection of up to 32 devices per segment, without the use of repeaters. With repeaters, up to 126 addressable devices can be connected to the network. Each repeater must also be included as a device connected to the segment, although it will not take an address in the network.

It is recommended that the connection of all the devices present in the Profibus DP network be done from the main bus. In general, the connector of the Profibus network itself has one input and one output for the cable, allowing the connection to be taken to the other points of the network. Derivations from the main line are not recommended, especially for communication rates over or equal to 1.5Mbps.

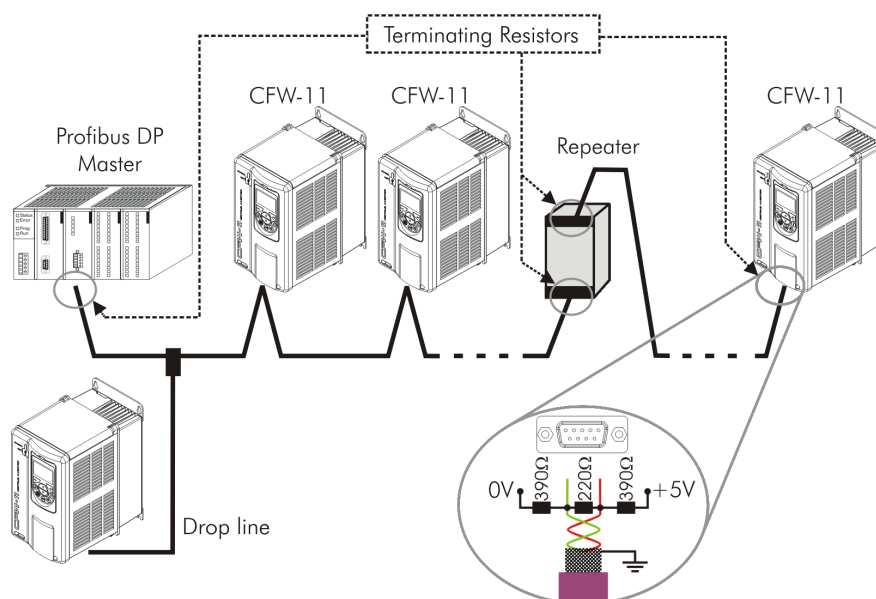


Figure 4: Example of installation of the Profibus DP network

The Profibus DP network cables must be laid separately (and far away if possible) from the power cables. All the drives must be properly grounded, preferably at the same ground point. The Profibus cable shield must also be grounded. The DB9 connector itself already has a connection with the protective ground and, therefore, makes the connection of the shield to the ground when the Profibus cable is connected to the drive. However, a better connection, implemented by clamps that connect the shield to a ground point, is also recommended.

2.2.3 Configuration of the Module

In order to configure and use the Profibus DP-V1 module, follow the steps below:

- With the module installed, during the acknowledgement stage, a warning message will be displayed on the product HMI, and the ST and OP LEDs test routine performed. Then the ST LED of the module must turn on in green.
- Observe the content of parameter P0723. Check if the module was recognized. The detection is done automatically and does not require the user's intervention.
- Set the parameters as desired for the application:
 - Address: the address of the equipment is set in parameter P0725.
 - I/O configuration: Program in P0728 to P0755 the number of words to be exchanged with the network master (see item 3). This same value must be set in the Profibus master.
- Once the parameters are set, if any of the parameters described in the previous item are changed, it is necessary to restart the equipment.

Once the equipment is set, it is necessary to configure the communication in the master of the network:

- GSD file: every element of the Profibus DP network has an associated configuration file with extension GSD. This file describes the features of each device and it is used by the configuration tool of the master of the Profibus DP network. During the configuration of the master, the GSD configuration file, supplied with the equipment, must be used. This file must be registered in the master of the Profibus DP network. The module will be recognized as "*Anybus CompactCom DPV1*" in the category "*General*".
- I/O data setting: add the SSW7000 to the device list of the master, setting the number of I/O words according to parameters P0728 to P0755.

If everything is correctly configured, the OP LED of the module will be on in green. It is in this condition that cyclic data exchange effectively occurs between the drive and the master of the network.



NOTE!

In the configuration software of the Profibus network, first you must select all the input words (*inputs*) and then select the output words (*outputs*), according to parameters P0728 to P0755.



NOTE!

For further information on the parameters mentioned above, refer to item 3.

2.2.4 Access of the Parameter – Acyclic Messages

The PROFIBUS-05 communication kit allows parameter reading/writing services by means of DP-V1 acyclic functions. The parameter mapping is done based on the slot and index addressing, as showed in the formula below:

- Slot: $(\text{parameter number} - 1) / 255$.
- Index: $(\text{parameter number} - 1) \text{ MOD } 255$.

NOTE: MOD represents the remainder of the integer division.

2.3 ETHERNET/IP

2.3.1 ETHERNETIP-05 and ETHERNET-2P-05 Accessory



- Ethernet-05 part number: 10933688 (1 Ethernet port).
- Ethernet-2P-05 part number: 12272760 (2 Ethernet ports with integrated switch).
- Composed by the Anybus ABCC-EIP communication module, mounting instructions and a “torx” screw driver for fixing the module.
- Standard RJ45 connector.
- ODVA certified interface.

Connector

The EtherNet/IP communication module has a standard female RJ45 connector (T-568A or T-568B).

Indications

EtherNet/IP defines two LEDs for status indication: one for the communication module (MS) and another for the network (NS).

The MS LED indicates the conditions of the module itself. That is, whether it is able to work or not. The table below shows the possible states:

Table 2.11: State of the EtherNet/IP module

LED Status	Description	Comments
Off	Without power supply	-
Green	Module controlled by a scanner in RUN mode.	In this state, data exchange effectively occurs.
Flashing green	Not configured or scanner in IDLE mode	In this stage there is no cyclic data communication with the scanner, or the scanner is in IDLE mode.
Red	Major fault	Internal error of the module. Equipment must be reinitialized.
Flashing red	Recoverable fault	Internal error of the module, but the return to the normal state occurs automatically after the cause of the fault is corrected.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The NS LED indicates the conditions of the EtherNet/IP network.

Table 2.12: Status of the EtherNet/IP network

LED Status	Description	Comments
Off	Without power supply or IP address	The software IPconfig must be used to configure the communication module address.
Green	<i>Online</i> , connected	Master has allocated a set of I/O type connection with the slave. In this stage data exchange by means of I/O type connections does effectively occur.
Flashing green	<i>Online</i> , not connected	In this stage, there is not a set of I/O type connections established.
Red	Major fault or duplicated IP address	Equipment must be reinitialized to exit the fault state. Check the IP addresses in the network.
Flashing red	One or more I/O type connections have expired	The I/O data exchange has been interrupted.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The LINK LED indicates the state of the physical connection of the network, as well as the activity in the bus.

Table 2.13: Status of the connection

LED Status	Description	Comments
Off	Without link	Without connection, without activity
Green	Link	Ethernet link established but without data exchange.
Flashing green	Activity in the bus	It effectively indicates that there is exchange of telegrams with the network.

2.3.2 Installation of the Ethernet network

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

Communication Rate

The Ethernet interfaces of the Anybus-CC communication cards can communicate using the 10 or 100 Mbps rates in *half* or *full* duplex mode. As default, the modules are configured with automatic detection of the communication rate.

MAC Address

Each Anybus-CC module has a unique MAC address, which is indicated on a label in its lower part. This MAC address may be useful during the stage of configuration of the interface, when it may be necessary to make a differentiation in case several modules are simultaneously configured, and it must be written down before its installation.

Address in the Ethernet network

Every device in an Ethernet network needs an IP address and subnet mask.

The IP addressing is unique in the network, and each device must have a different IP. The subnet mask is used to define which IP address range is valid in the network.

These attributes can be automatically configured by means of a DHCP server present in the network, as long as this option is enabled in the Anybus-CC module.

Cables

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

Installation recommendations

- Each cable segment must have at most 90 m.
- It must be used a direct cable to connect the module to a concentrating element (*switch*), or a *cross-over* cable for direct connection between the module and the PC/CLP.
- As for topology, there are two models of Anybus-CC card: with one or two Ethernet ports.
 - For the models with one port, the most usual topology is star, exactly as it is done with computer networks. In this case all the equipment must be connected to a concentrating element (switch).

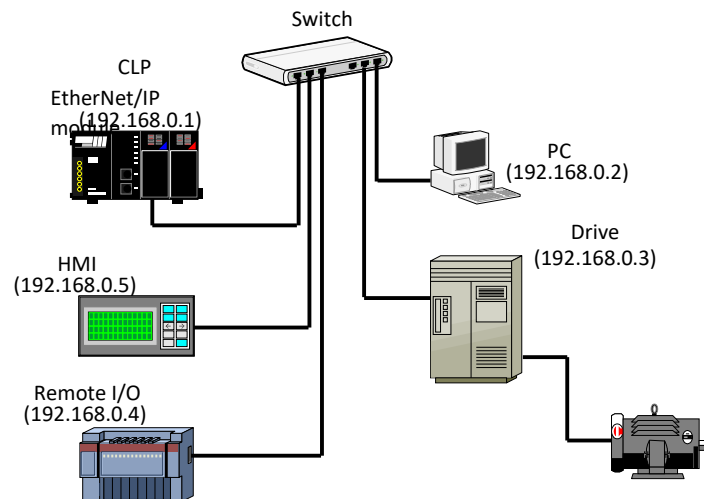


Figure 5: Star topology.

- The models with two ports have an integrated switch. Thus, besides the connection of the equipment in star for a concentrating element, it is also possible to make the connection in *daisy chain*, allowing a topology equivalent to a bus.

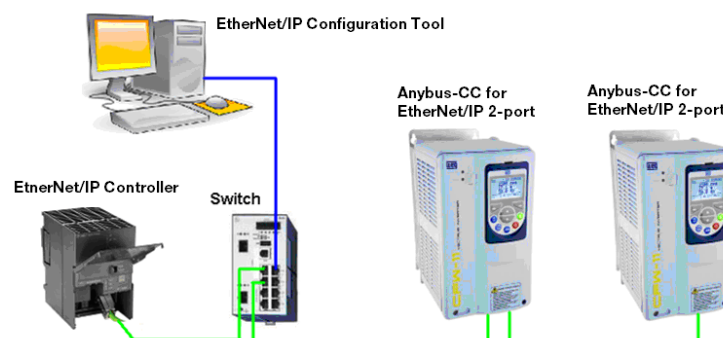


Figure 6: Daisy chain topology.

2.3.3 Configuration of the Ethernet Interface

In order to configure the Ethernet interface of the communication modules, it is possible to connect the module to a PC to use different software or to configure using parameters.

Parameter

The IP address, gateway, and subnet can be configured via parameter. The parameters are described in Chapter 3.

HMS Anybus IPconfig

This software is used to program the IP address of the module. When you execute this software, it will automatically scan the network in order to find out which modules are connected. The modules found will be listed, showing the information of IP address, subnet, gateway, etc. If more than a module is found, it is necessary to make the differentiation through the MAC address indicated in the lower part of the Anybus-CC module.

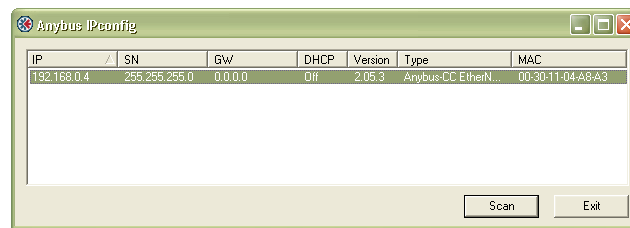


Figure 7: HMS Anybus IPconfig.

To edit this information, you just click twice on the desired module to open new window, where you can modify these fields.

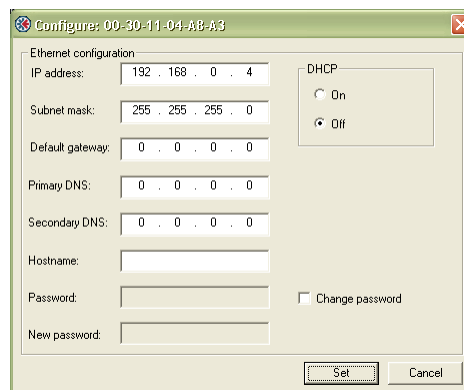


Figure 8: IPconfig software information editing.

Web Browser

In case the IP address is known, it is possible to use a web browser to access the data configuration of the Anybus-CC module. Typing the IP address in the address bar of the browser, you will see a webpage with links for the configurations of the interface or for the data of the equipment.

In the interface configurations, you will find several fields to program IP address, subnet, DHCP, among others.

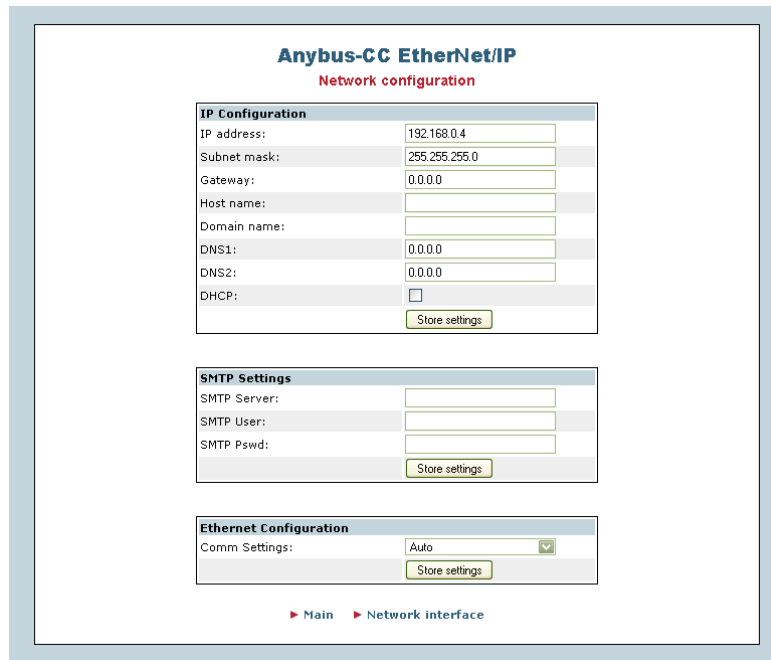


Figure 9: Webpage of interface configuration

The data mapped in the input/output (I/O) areas can also be accessed by means of the web browser through the link “Parameter Data”. Through this page, it is possible to read the monitoring data, as well as to modify the equipment control data.

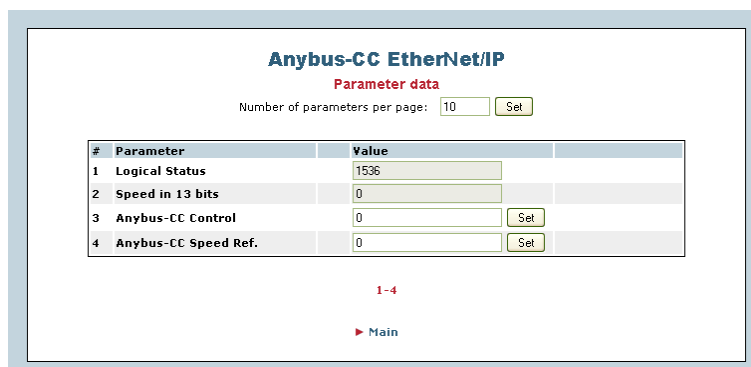


Figure 10: Web page with input/output data



NOTE!

- If there is cyclic communication between the module and the master of the network, the control data sent by the master will overwrite the data sent through this page. Thus, the commands sent by this page will only be executed in case the module is in the offline state.
- The value presented on this page is always an integer value and does not consider the number of decimal places. You must know the number of decimal places for each parameter programmed in this list to make the correct data interpretation.

2.3.4 Configuration of the Communication

In order to configure and use the EtherNet/IP module, follow the steps below:

- With the module installed, during the recognition stage, a warning message will be displayed on the product HMI, and the MS and NS LEDs test routine performed. After this stage, the MS LED must turn on in green.

- Observe the content of parameter P0723. Check if the module was recognized. The detection is done automatically and does not require the user's intervention.
- Set the parameters as desired for the application:
 - Configurations of IP address and communication rate are explained in item 2.3.3.
 - I/O configuration: program in P0728 to P0755 the number of words to be exchanged with the network master (see item 3). This same value must be set in the EtherNet/IP scanner.
- Once the parameters are set, if any of the parameters described in the previous item are changed, it is necessary to restart the equipment.

Once the equipment is set, it is necessary to configure the communication in the master of the network:

- EDS file: register the EDS file in the network configuration file. The EDS configuration file can be obtained with the manufacturer.
- For the configuration of the master, besides the IP address used by the EtherNet/IP module, it is necessary to indicate a number of the instances of I/O and the quantity of data exchanged with the master in each instance. For the EtherNet/IP communication module, the following values must be programmed:
 - Input instance (input): 100
 - Output instance (output): 150
- The EtherNet/IP module is described in the network as "Generic Ethernet Module". Using these configurations it is possible to program the master of the network to communicate with the equipment.

If everything is correctly configured, the NS LED of the module will be on in green. It is in this condition that cyclic data exchange effectively occurs between the slave and the master of the network.

2.3.5 Access to Parameters – Acyclic messages

Besides the cyclic data communication, the EtherNet/IP protocol also defines a kind of acyclic telegram, used especially in asynchronous tasks, such as parameter setting and configuration of the equipment. The table 2.6 brings the class, instance and attribute for the access of the parameters of the equipment.

2.3.6 Modbus TCP Connections

The EtherNet / IP communication accessory provides up to 2 Modbus TCP connections. These connections can be used to parameterize the equipment.

2.4 MODBUS TCP

2.4.1 MODBUSTCP-05 and MODBUSTCP-2P-05 Accessory



- MODBUSTCP-05 part number: 11550476 (1 Ethernet port).
- MODBUSTCP-2P-05 part number: 14033951 (2 Ethernet ports with integrated switch).
- Composed by the Anybus ABCC-EIT communication module, mounting instructions and a "torx" screw driver for fixing the module.

- Standard RJ45 connector.

Connector

The Modbus TCP communication modules has standard female RJ45 connectors (T-568A or T-568B).

Indications

Modbus TCP defines two LEDs for status indication: one for the communication module (MS) and another for the network (NS).

The MS LED indicates the conditions of the module itself. That is, whether it is able to work or not. Table 2.14 shows the possible states:

Table 2.14: Status of the Modbus TCP module

LED Status	Description	Comments
Off	Without power supply	-
Green	Normal operation	-
Red	Serious fault.	Internal error of the module. Equipment must be reinitialized.
Flashing red	Recoverable fault or conflict of IP address	Internal error of the module, but the return to the normal state occurs automatically after the cause of the fault is corrected. Check the IP addresses in the network.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The NS LED indicates the conditions of the Modbus TCP network.

Table 2.15: Status of the Modbus TCP network

LED Status	Description	Comments
Off	Without power supply or IP address	The software IPconfig must be used to configure the communication module address.
Green	Module is in Process Active or Idle state	-
Flashing green	Waiting for connections	-
Red	Major fault or conflict of IP address	Equipment must be reinitialized to exit the fault state. Check the IP addresses in the network.
Flashing red	Timeout	The data exchange has been interrupted.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The LINK LED indicates the state of the physical connection of the network, as well as the activity in the bus.

Table 2.16: Status of the connection

LED Status	Description	Comments
Off	Without link	Without connection, without activity
Green	Link	Ethernet link established but without data exchange between master and slave.
Flashing green	Activity in the bus	It effectively indicates that there is data exchange between the master and the slave.

2.4.2 Installation of the Ethernet Network

For the connection of the soft-starter using the Ethernet interface, refer to item 2.3.2.

2.4.3 Configuration of the Ethernet Interface

To configure the Ethernet interface of the communication module, refer to item 2.3.3.

2.4.4 Configuration of the Communication

In order to configure and use the Modbus TCP, follow the steps below:

- With the module installed, during the recognition stage, a warning message will be displayed on the product HMI, and the MS and NS LEDs test routine performed. After this stage, the MS LED must turn on in green.
- Observe the content of parameter P0723. Check if the module was recognized. The detection is done automatically and does not require the user's intervention.
- Set the parameters as desired for the application:
 - Configurations of IP address and communication rate are explained in item 2.3.3
 - I/O configuration: Define which data will be read and written at device, based on its parameter list. It is not necessary to define I/O words. The Modbus TCP protocol enables direct access to any device parameter, and does not distinguish between cyclic and acyclic data.
- Once the parameters are set, if any of the parameters described in the previous item are changed, it is necessary to restart the equipment.

Once the equipment is set, it is necessary to configure the communication in the master of the network. The way the network configuration is done depends greatly on the used client 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:

- Configure the client to access the holding registers, based on the defined equipment parameters to read and write. The register address is based on the parameter's number.
- 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 P0762
- To configure the timeout of the communication can be use the web browser according to the figure 11 or parameter P0762.

Figure 11: Webpage with configuration of the timeout and order of the bytes

- The field “Comm tmo” is used to configure the timeout of the TCP connection and the field Process tmo allows to program the time for the detection of communication error. The Process tmo configuration is valid only if the value programmed in P0762 is zero, otherwise this configuration is overwritten by the value programmed in P0762
- Connect the network cable to the module.
- If everything is correctly configured, the NS LED of the module will be on in green and the LINK LED will start to flash indicating normal activity in the network.



NOTE!

For further information on the parameters mentioned above, refer to item 3.

2.4.5 Addressing of the data

Soft-starter SSW7000 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 number 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. Modbus TCP does not define a channel of cyclic data dedicated like in other networks.

Register addresses depend on the programming done in the product parameters. Parameter P0774 describes the available Modbus register addresses according to its configuration.

2.5 PROFINET

2.5.1 PROFINETIO-05 Accessory



- WEG part number: 11550548.
- Composed by the Anybus ABCC-EIT communication module, mounting instructions and a “torx” screw driver for fixing the module.
- Two Standard RJ45 connectors.

Connector

The PROFINET IO communication module has two standard female RJ45 connectors (T-568A or T-568B). It features integrated switch, enabling the connection in *daisy chain*.

Indications

PROFINET IO defines two LEDs for status indication: one for the communication module (MS) and another for the network (NS). Figure 12 describes the indication LEDs.

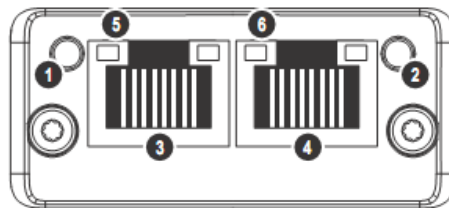


Figure 12: Description of the indication LEDs of the PROFINET module

The MS LED (2) indicates the conditions of the module itself. Table 2.17 shows the possible states:

Table 2.17: Status of the operating mode

Status	Description	COMMENTS
Off	Without power supply	-
Green	Normal operation	-
Flashing green - flashes once	Present diagnosis	No used.
Flashing green - flashes twice	acknowledgement	Signaling used by an engineering tool to recognize the equipment in the network.
Red	Major fault	Internal error in the communication between the Anybus-CC module and drive (Exception). Equipment must be reinitialized.
Flashing red - flashes once	Configuration error	It indicated that the quantity of I/O words (or the order of these words) was not correctly configured in the master of the network.
Flashing red - flashes once	IP address not configured	The software IPconfig must be used to configure the communication module address or use the PROFINET master to choose the automatic configuration of the IP address.
Flashing red - flashes three times	Station name not configured	The equipment must be configured in a PROFINET network so that the station name is attributed by the master of the network.
Flashing red - flashes three times	Internal error	Equipment must be reinitialized.
Flashing green/red	Equipment performing self-diagnosis	It occurs during initialization.

The NS LED (1) indicates the conditions of the PROFINET network.

Table 2.18: Status of the PROFINET network

LED Status	Description	Comments
Off	Offline	Module without power supply Without connection with the master of the network.
Green	Online (RUN)	Connection with the master of the network established. Master of the network in RUN.
Flashing green	Online (STOP)	Connection with the master of the network established. Master of the network in STOP.

The LINK LEDs (5 and 6) indicates the state of the physical connection of the network, as well as the activity in the bus.

Table 2.19: Status of the connection

LED Status	Description	Comments
Off	Without link	Without connection, without activity.
Green	Link	Ethernet link established but without data exchange between master and slave.
Flashing green	Activity in the bus	It indicates that there is data exchange between the

		master and the slave.
--	--	-----------------------

2.5.2 Installation of the Ethernet Network

For the connection of the soft-starter using the Ethernet interface, refer to item 2.3.2.

2.5.3 Configuration of the Ethernet Interface

To configure the Ethernet interface of the communication module, refer to item 2.3.3.

2.5.4 Configuration of the Communication

In order to configure and use the PROFINET IO module, follow the steps below:

- With the module installed, during the recognition stage, a warning message will be displayed on the product HMI, and the MS and NS LEDs test routine performed. After this stage, the MS LED must turn on in green.
- Observe the content of parameter P0723. Check if the module was recognized. The detection is done automatically and does not require the user's intervention.
- Set the parameters as desired for the application:
 - Configurations of IP address and communication rate are explained in item 2.3.3.
 - I/O configuration: program in P0728 to P0755 the number of words to be exchanged with the network master (see item 3). This same value must be set in the PROFINET master.
- Once the parameters are set, if any of the parameters described in the previous item are changed, it is necessary to restart the equipment.

Once the equipment is set, it is necessary to configure the communication in the master of the network:

- GSD file: register the GSD file for PROFINET (GSDML) in the configuration software of the network. The GSD configuration file can be obtained with the manufacturer. The module will be recognized as "*Anybus CompactCom PRT 2-Port*" in the category "*General*".
- For the configuration of the master, the following points must be observed:
 - The same quantity of data set in the slave must be set in the master. These data must be programmed observing the following order: first all input words and then all output words;
 - The IP address of the slave can be configured manually (via IPconfig) or attributed automatically by the PROFINET master (in case it has this function);
 - The network topology must be informed, indicating precisely the connections between the PROFINET equipment.



NOTE!

For further information on the parameters mentioned above, refer to item 3.

2.5.5 Access to Parameters – Acyclic messages

Besides the cyclic communication, the PROFINET protocol also allows to perform acyclic requests used specially to transmit diagnosis data, parameter setting and configuration of the equipment. For the drive which uses the Anybus module, practically all the parameters can be accessed by means of this way of communication.

The PROFINET protocol defines the following structures for the addressing of the components used in the configuration of the network:

- AR (Application Relation);
- API (Application Process Identifier);
- Slot;
- Subslot.

AR and API are used to identify the Anybus module during the stage of configuration of the network. Slot/Subslot are not relevant for acyclic access of the data for the drive. Once the module is identified, the parameters are accessed indicating the Index and the size of the data (Length) accessed:

- Index: it represents the number of the parameter;
- Length: the size of the data accessed. All the parameters of the drive are accessed as Word (2 bytes).

2.5.6 Modbus TCP Connections

The PROFINET communication accessory provides up to 2 Modbus TCP connections. These connections can be used to parameterize the equipment.

2.6 RS232

2.6.1 RS232-05 Accessory



- WEG part number: 11008160.
- Composed by the Anybus ABCC-RS232 communication module, mounting instructions and a “torx” screw driver for fixing the module.
- It allows transmission rates up to 57.6 kbps.

Connector Pin Function

The RS232 communication module presents a male DB9 connector with the following pin assignment:

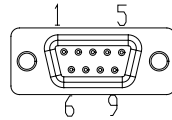


Table 2.20: RS232 DB9 male connector pin assignment

Pin	Name	Function
1	-	-
2	RxD	RS232 data reception
3	TxD	RS232 data transmission
4	-	-
5	GND	Reference (0 V) of the interface
6	-	-
7	RTS	Request To Send
8	-	-
9	-	-

Indications

PWR LED: Green LED. When on, it indicates that the module is powered.

Connection with the Network

For the connection of the device using the passive RS232 interface, the following points must be observed:

- Use good quality cables, preferably shielded.
- Keep the cable length within the limits stipulated by the standard, normally about 10m.
- Avoid passing the cables close to power cables.



NOTE!

The RS232-05 accessory can not be used with the RS232 or RS485 accessory connected to Slot 3.

2.7 RS485

2.7.1 RS485-05 Accessory



- WEG part number: 11008161.
- Composed by the Anybus ABCC-RS485, mounting instructions and a “torx” screw driver for fixing the module.
- It allows transmission rates up to 57.6 kbps.

Connector Pin Function

The RS485/422 interface module presents a female DB9 connector with the following pin assignment:

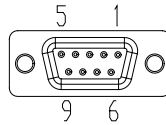


Table 2.21: RS485/422 female DB9 connector

Pin	RS422 Mode	RS485 Mode	Function
1	Term Pwr	Term Pwr	+5 V for active termination (isolated)
2	-	-	-
3	-	-	-
4	Mode Select	Mode Select	Not connected: RS485 mode Connected to GND: RS422 mode
5	GND	GND	Reference (0 V) for the interface circuit (isolated)
6	RxD	-	Data reception line in RS422 mode
7	RxD (inverted)	-	Not connected in RS485 mode
8	TxD	RxD/TxD	Data transmission line in RS422 mode
9	TxD (inverted)	RxD/TxD (inverted)	Bidirectional data line in RS485 mode.

Indications

PWR LED: Green LED. When on, it indicates that the module is powered.

Connection with the Network

For the connection of the device using the passive RS485 interface, the following points must be observed:

- Use good quality shielded cables.
- Keep the cable length within the limits stipulated by the standard, normally about 1000 meters.
- Avoid passing the communication cables close to power cables.
- Put termination resistors between the data signal wires (RxD/TxD and TxD/RxD) at the network extreme nodes. This will avoid reflections in the line.



NOTE!

The RS485-05 accessory can not be used with the RS232 or RS485 accessory connected to Slot 3.

3 SSW PARAMETER SETTINGS

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

3.1 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 SSW 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 SSW has the RS232 or the RS485 interface installed.
USB	Parameters visible on the HMI if the SSW USB interface is connected.
Anybus	Parameters visible on the HMI if the Anybus-CC module is connected.

P0220 – LOCAL/REMOTE Mode Selection

P0229 – LOCAL Command Selection

P0230 – REMOTE Command Selection

These parameters are used for the configuration of the SSW local and remote mode command sources. In order that the SSW is controlled through the Anybus-CC interface, one of the 'Anybus-CC' options available in the parameters must be selected.

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

P0313 – Communication Error Action

Adjustable 0 = Off **Factory setting:** 0

Range:

- 1 = Ramp Stop
- 2 = General Disable
- 3 = Goes to Local
- 4 = Off
- 5 = Causes Fault

Properties: CFG, Net

Access groups via HMI: 01 PARAMETER GROUPS

- └ 33 Communication
- └└ 131 RS232/485 Serial

Description:

It allows programming the action the SSW must take if a communication error is detected.

Table 2.1: Parameter P0313 options

Options	Description
0 = Off	No action is taken and the SSW 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 SSW is General Disabled and the motor coasts to stop.
3 = Goes to Local	The SSW is commanded to the local mode.
4 = Off	No action is taken and the SSW remains in the existing status.
5 = Causes Fault	Instead of an alarm, a communication error causes a SSW fault, and it is necessary to perform a fault reset in order to restore the normal operation.

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 SSW be programmed to be controlled via Anybus. This programming is done by means of the parameters P0220, P0229 and P0230.

P0680 – SSW Status Word

Adjustable 0000h – FFFFh **Factory setting:** -

Range:

Properties: RO

Access groups via HMI: 01 PARAMETER GROUPS

- L 33 Communication
- L 130 Status/Commands

Description:

It allows the user to identify the status of the SSW.

Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Function	Fault	Power Section Supply	Configuration Mode	By-pass	Reverse Rotation	Rotation Reversion	Braking	Remote	Deceleration Ramp	Alarm	Full Voltage	P0631 Time	Acceleration Ramp	JOG	General Enabled	Running

Table 2.2: Parameter P0680 bit functions

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 SSW is not in alarm condition. 1: The SSW 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: SSW in Local situation. 1: SSW 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: SSW operating normally. 1: SSW in configuration mode. It indicates a special condition during which the SSW cannot be enabled: <ul style="list-style-type: none"> ▪ Executing the self tuning routine; ▪ Executing the oriented start-up routine; ▪ Executing the HMI copy function; ▪ Executing the flash memory card guided routine; ▪ There is a parameter setting incompatibility; ▪ Without power at the power section. Note: It is possible to obtain the exact description of the special operation mode at the parameter P0692.
Bit 14 Power section supply	0: No power supply present. 1: With power supply at the 3 phases.
Bit 15 Fault	0: The SSW is not in a fault condition. 1: The SSW has detected a fault. Note: The fault number can be read by means of the parameter P0020 – Present Fault.

P0686 – Anybus-CC Control Word

Adjustable 0000h – FFFFh **Factory setting:** 0000h

Range:

Properties: RO, Anybus

Access groups via HMI: 01 PARAMETER GROUPS

- └ 33 Communication
- └ 132 Anybus

Description:

It is the SSW Anybus-CC interface control word. This parameter can only be changed via Anybus-CC. For the other 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 SSW be programmed to be controlled via Anybus-CC. This programming is done by means of the parameters P0220, P0229 and P0230.

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

Bits	15 to 8	7	6	5	4	3	2	1	0
Function	Reserved	Reset	Reserved	Reserved	LOC/REM	FWD/REV	JOG	General Enable	Start/Stop

Table 2.3: Parameter P0686 bit functions

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.

P0692 – Configuration Mode Status

Adjustable 0000h – FFFFh **Factory setting:** -

Range:

Properties: Net

Access groups via HMI: 01 PARAMETER GROUPS

- L 33 Communication
- L 130 Status/Commands

Description:

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

Bits	15 to 9	8	7	6	5	4	3	2	1	0
Function	Reserved	Incompatible	Types Control	Reset Needs	Copy Firmware	Copy HMI	Copy Mem. Card	Test Mode	C1-C2 Wait.Com.	Orie. Start-up

Table 2.4: Parameter P0692 bit functions

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.

P0693 – Configuration Mode Commands

Adjustable	0000h – FFFFh	Factory setting: -
Range:		
Properties: Net		
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px; display: inline-block;">01 PARAMETER GROUPS</div> └─ <div style="border: 1px solid black; padding: 2px; display: inline-block;">33 Communication</div> └─ <div style="border: 1px solid black; padding: 2px; display: inline-block;">130 Status/Commands</div>	

Description:

It allows the user to change the SSW configuration mode.

Bits	15 to 8	7	6	5	4	3	2	1	0
Function	Reserved	Abort Control	Reserved	Reserved	Reserved	Reserved	Abort T. Mode	Reserved	Abort Start-up

Table 2.5: Parameter P0693 bit functions

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

P0695 – Value for the Digital Outputs

Adjustable	0000h – FFFFh	Factory setting: 0000h
Range:		
Properties: Net		
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px; display: inline-block;">01 PARAMETER GROUPS</div> └─ <div style="border: 1px solid black; padding: 2px; display: inline-block;">33 Communication</div> └─ <div style="border: 1px solid black; padding: 2px; display: inline-block;">130 Status/Commands</div>	

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	15 to 3	2	1	0
Function	Reserved	Setting for DO3 (RL3)	Setting for DO2 (RL2)	Setting for DO1 (RL1)

Table 2.6: Parameter P0695 bit functions

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

P0696 – Value 1 for Analog Outputs

P0697 – Value 2 for Analog Outputs

Adjustable	-32768 – 32767	Factory setting: 0
Range:		
Properties: Net		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/>	
	└─ <input type="text" value="33 Communication"/>	
	└─ <input type="text" value="130 Status/Commands"/>	

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)¹ 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 %

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 at the analog output.

P0723 – Anybus Identification

Adjustable	0 to 25	Factory setting: -
Range:		
Properties: RO		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/>	
	<input type="text" value="L 33 Communication"/>	
	<input type="text" value="L 132 Anybus"/>	

Description:

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

¹ Refer to the Soft-Starter SSW7000 User’s Manual to find the actual output resolution.

Table 2.7: Parameter P0723 options

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...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 = Profinet IRT	Profinet IO active module
25 = EtherCAT	EtherCAT active module

P0724 – Anybus Communication Status

Adjustable	0 = Inactive	Factory setting: -
Range:	1 = Not Supported 2 = Access Error 3 = Offline 4 = Online	
Properties: RO, Anybus		
Access groups via HMI:	01 PARAMETER GROUPS └ 33 Communication └ 132 Anybus	

Description:

It informs the communication module status.

Table 2.8: Parameter P0724 options

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 SSW SSW.
2 = Access Error	Data access problem between the SSW 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 SSW and the network master is effective.

P0725 – Anybus Address
Adjustable 0 to 255 **Factory setting:** 0

Range:
Properties: Anybus

Access groups via HMI: 01 PARAMETER GROUPS

L 33 Communication

L 132 Anybus

Description:

It allows configuring the SSW address in the network. The address range varies according to the used protocol. For DeviceNet the higher limit is 63 (0 to 63) and for Profibus it is 126 (1 to 126). For EtherNet/IP, the node address is defined by the HMS Anybus IPconfig, and follows the Internet Protocol (IP) rules.

Refer to the section **Erro! Fonte de referência não encontrada.** for details on the EtherNet/IP module configuration.

P0726 – Anybus Baud Rate

Adjustable	0 to 3	Factory setting: 0
Range:		
Properties: Anybus		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/>	
	<input type="text" value="33 Communication"/>	
	<input type="text" value="132 Anybus"/>	

Description:

It allows programming the desired baud rate value for the Anybus-CC module, in bits per second. This baud rate must be the same for all the devices connected to the network and it varies according to the used protocol.

- DeviceNet: 0 = 125 kbps, 1 = 250 kbps, 2 = 500 kbps and 3 = autobaud.
- Profibus²: Autobaud (baud rate defined by the master).
- EtherNet/IP²: 10/100 Mbps half- or full-duplex (configured by the module own WEB server).

3.2 NUMBER OF EXCHANGED WORDS

The SSW 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.

² Parameter not visible on the HMI.

1. SSW programming:

P0728 = 1;

P0729 = 2;

P0730 = 3;

P0731 = 4;

P0732 = 20;

P0733 to P0750 = 0;

P0751 to P0755 = 0;

2. Reset the SSW after this programming;

3. The automatic definition of the number of words exchanged for the communication is executed during the SSW 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);

P0728 – Anybus Reading # 2

P0729 – Anybus Reading # 3

P0730 – Anybus Reading # 4

P0731 – Anybus Reading # 5

P0732 – Anybus Reading # 6

P0733 – Anybus Reading # 7

P0734 – Anybus Reading # 8

P0735 – Anybus Reading # 9

P0736 – Anybus Reading # 10

P0737 – Anybus Reading # 11

P0738 – Anybus Reading # 12

P0739 – Anybus Reading # 13

P0740 – Anybus Reading # 14

P0741 – Anybus Reading # 15

P0742 – Anybus Reading # 16

P0743 – Anybus Reading # 17

P0744 – Anybus Reading # 18

P0745 – Anybus Reading # 19

P0746 – Anybus Reading # 20

P0747 – Anybus Reading # 21

P0748 – Anybus Reading # 22

P0749 – Anybus Reading # 23

P0750 – Anybus Reading # 24

Adjustable	0 to 1059	Factory setting: 0
Range:		
Properties: Anybus		
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 5px;">01 PARAMETER GROUPS</div> <ul style="list-style-type: none"> <li style="margin-bottom: 5px;">└ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">33 Communication</div> └ <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-right: 5px;">132 Anybus</div> 	

Description:

These parameters allow the user to program the reading of any other parameter of the equipment³ via the network. In other words, they contain the number of another parameter.

E.g., P0728 = 3. In this case the content of P0003 (motor current) will be sent via network.



NOTE!

Every modification of the parameters P0728 to P0755 requires a SSW reset.

³ Except the parameter P0000, which is considered invalid.

P0751 – Anybus Writing # 2

P0752 – Anybus Writing # 3

P0753 – Anybus Writing # 4

P0754 – Anybus Writing # 5


P0755 – Anybus Writing # 6

Adjustable	0 to 1059	Factory setting: 0
Range:		
Properties: Anybus		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/>	
	↳ <input type="text" value="33 Communication"/>	
	↳ <input type="text" value="132 Anybus"/>	

Description:

These parameters allow the user to program the writing of any other parameter of the equipment via the network⁴. 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!
Every modification of the parameters P0728 to P0755 requires a SSW reset.

⁴ Except the parameter P0000, which is considered invalid.

P0760 – Anybus status

Range: 0 to 8 **Default:** 0

Properties: RO, Anybus

Access groups via HMI: 01 PARAMETER GROUPS

- └ 33 Communication
- └ 132 Anybus

Description:

The parameter indicates the Anybus-CC communication module status.

Indicação	Descrição
0 = Setup	Module identified, waiting for configuration data (automatic).
1 = Init	Module executing the interface initialization (automatic).
2 = Wait Comm	Module initialized, but without communication with the network master.
3 = Idle	Communication with the network master established but in idle or programming mode.
4 = Data Active	Communication with the network master established and I/O data being communicated successfully. "Online"
5 = Error	Not available.
6 = Reserved	
7 = Exception	Serious error on the communication interface. The interface requires reinitialization.
8 = Access Error	Access error between the equipment and Anybus interface. Required interface reset.

P0761 – Ethernet Communication rate

Range: 0 to 4 **Default:** 0

Properties: Anybus

Access groups via HMI: 01 PARAMETER GROUPS

- └ 33 Communication
- └ 132 Anybus

Description:

The parameter indicates the Anybus-CC communication accessory communication rate for Ethernet-based modules. For modules with 2 ports the configuration is valid for both ports.

Indication
0 = Auto
1 = 10 Mbps, half duplex
2 = 10 Mbps, full duplex
3 = 100 Mbps, half duplex
4 = 100 Mbps, full duplex

P0762 – Timeout Modbus TCP

Range	0 to 655	Default: 0
Properties:	Anybus	
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">01 PARAMETER GROUPS</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">L 33 Communication</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">L 132 Anybus</div> </div> </div>	

Description:

The parameter sets the maximum time without Modbus TCP communication. The count starts from the first valid Modbus TCP telegram received. A value 0 disables the function.


NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

When the time is reached the following error is reported:

- Alarm A129/ Fault F229.

P0763 – IP Address Configuration

Range:	0 = Parameters	Default: 1
	1 = DHCP	
	2 = DCP	
	3 = IPconfig	
Properties:	Anybus	
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px;">01 PARAMETER GROUPS</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">L 33 Communication</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">L 132 Anybus</div> </div> </div>	

Description:

It allows to choose how to set the IP configuration for the Anybus-CC Ethernet modules.

0 = Parameters: The programming of IP address, configuration of the subnet mask and gateway must be done through parameters P0764 up to P0772.

1 = DHCP: Enables the DHCP function. The IP address and other network configurations are received from a DHCP server by network.

2 = DCP: The IP address and other network configurations are received by DCP (PROFINET IO).

3 = IPConfig: The IP address and other network configurations must be done through IPconfig software.

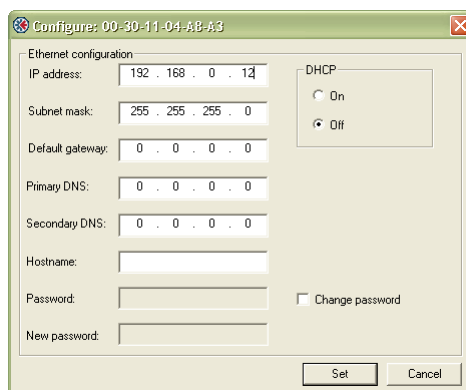


Figura 2.1: Software IPconfig



NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

P0764 – IP1 address

P0765 – IP2 address

P0766 – IP3 address

P0767 – IP4 address

Range	0 to 255	Default: 192.168.0.10
Properties: Anybus		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/> <ul style="list-style-type: none"> ↳ <input type="text" value="33 Communication"/> ↳ <input type="text" value="132 Anybus"/> 	

Description:

It allows programming the IP address of the module Anybus-CCC Ethernet/IP, Modbus TCP ou PROFINET IO. It is only effective if P0763 = Parameters.



NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

P0768 – CIDR

Range	0 to 31	Default: 24
Properties: Anybus		
Access groups via HMI:	<input type="text" value="01 PARAMETER GROUPS"/> <ul style="list-style-type: none"> ↳ <input type="text" value="33 Communication"/> ↳ <input type="text" value="132 Anybus"/> 	

Description:

It allows programming the subnet mask used by the module Anybus-CC Ethernet/IP, Modbus TCP or PROFINET IO. It is only effective if P0763 = Parameters.

Indication	Indication
0 = Reserved	17 = 255.255.128.0
1 = 128.0.0.0	18 = 255.255.192.0
2 = 192.0.0.0	19 = 255.255.224.0
3 = 224.0.0.0	20 = 255.255.240.0
4 = 240.0.0.0	21 = 255.255.248.0
5 = 248.0.0.0	22 = 255.255.252.0
6 = 252.0.0.0	23 = 255.255.254.0
7 = 254.0.0.0	24 = 255.255.255.0
8 = 255.0.0.0	25 = 255.255.255.128
9 = 255.128.0.0	26 = 255.255.255.192
10 = 255.192.0.0	27 = 255.255.255.224
11 = 255.224.0.0	28 = 255.255.255.240
12 = 255.240.0.0	29 = 255.255.255.248
13 = 255.248.0.0	30 = 255.255.255.252
14 = 255.252.0.0	31 = 255.255.255.254
15 = 255.254.0.0	
16 = 255.255.0.0	


NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

P0769 – Gateway 1
P0770 – Gateway 2
P0771 – Gateway 3
P0772 – Gateway 4

Range:	0 to 255	Default: 0.0.0.0
Properties: Anybus		
Access groups via HMI: <input style="width: 100%;" type="text" value="01 PARAMETER GROUPS"/>		
	└ <input style="width: 100%;" type="text" value="33 Communication"/>	
	└ <input style="width: 100%;" type="text" value="132 Anybus"/>	

Description:

It allows programming the IP address of the standard gateway used by the module Anybus-CC Ethernet/IP, Modbus TCP or PROFINET IO in the format "P0769.P0770.P0771.P0772". It is only effective if P0763 = Parameters.


NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

P0773 – Station Name

Range:	0 to 254	Default: 0
Properties: Anybus		
Access groups via HMI: <input style="width: 100%;" type="text" value="01 PARAMETER GROUPS"/>		
	└ <input style="width: 100%;" type="text" value="33 Communication"/>	
	└ <input style="width: 100%;" type="text" value="132 Anybus"/>	

Description:

It allows programming the suffix of PROFINET Station Name. the station name has SSW7000-XXX format where XXX represents the number set in this parameter. Example: P0773 = 42 then Station name = SSW7000-042.

The value 0 (zero) allows the Station Name to be assigned by DCP


NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

P0774 – Compatibility mode

Range:	0 – Modbus WEG 1 – Modbus Anybus	Default: 0
Properties:	Anybus	
Access groups via HMI:	<div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">01 PARAMETER GROUPS</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">L 33 Communication</div> <div style="margin-left: 20px;"> <div style="border: 1px solid black; padding: 2px;">L 132 Anybus</div> </div> </div>	

Description:

It allows defining the address mode of the Anybus-CC Modbus TCP.

0 - Modbus WEG: all drive parameters are accessed directly by parameter number. In this mode the settings configured at parameters P0728 to P0755 have not effect because all drive parameters are accessed directly. The parameters of the drive can be accessed only as holding registers.

Table 2.22: Holding Registers Address Table for WEG Mode

Parameter	Modbus Address	Access
P0000 - Access to Parameters	0	Read only
P0001 - SSW Current	1	Read only
P0002 - Motor Current (%)	2	Read only
...		
P0101 - Initial Start Voltage	101	Read/write
P0102 - Maximum Start Time	102	Read/write
...		
P0680 - SSW Status Word	680	Read only
...		
P0686 - Anybus-CC Control	686	Read/write
...		

1 - Modbus Anybus: The mode is Anybus the parameters P0728 to P0755 sets the number of words to be exchange with the network master.

The Modbus mapping is presented in the table below:

Table 2.23: Holding Registers Addressing for Anybus Mode

Address range	Description
0000h ... 00FFh	Anybus Writing Words
0100h ... 01FFh	Anybus Reading Words
0210h ... FFFFh	Parameters of the drive To find the address of the register corresponding to the parameter: $ADDR = 210h + (Parameter\ Number - 1)$ Example: $P0003 = 210h + (3h - 1h) = 212h$ $P0100 = 210h + (64h - 1h) = 273h$

Table 2.24: Addressing for Input Registers

Address range	Description
0000h ... 00FFh	Anybus Reading Words

Table 2.25: Addressing for Coils

Address range	Description
0000h ... 00FFh	Anybus Writing Words

Table 2.26: Addressing for Discrete Inputs

Bit address range	Description
0000h ... 00FFh	Reading Words Anybus

The field “Word order” configures the order of the bytes of each word in little endian (byte 1 most significant) or big endian (byte 0 least significant).



NOTE!

If this parameter is changed, it becomes valid only after cycling the power of the product.

**NOTE!**

Writings in reading words will have no effect, and the reading of not used registers will return to value zero.

**NOTE!**

For the complete parameter list, as well the access and data types, consult programming manual.

4 FAULTS AND ALARMS RELATED TO THE ANYBUS-CC COMMUNICATION

A129/F229 – ANYBUS-CC MODULE OFFLINE

Description:

It indicates interruption in the Anybus-CC communication. The communication module went to the Offline state.

Actuation:

It occurs when for any reason there is an interruption in the communication between the SSW7000 and the network master.

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.

Corrections:

- Verify whether the network master is configured correctly and operating normally.
- Search for short-circuit or bad contact in the communication cables.
- Make sure the cables are not changed or inverted.
- Depending on the interface, verify whether termination resistors with correct values were installed only at the extremes of the main bus.
- Verify the entire network installation – cable passage, grounding.

A130/F230 – ANYBUS-CC MODULE ACCESS ERROR

Description:

It indicates Anybus-CC communication module access error.

Actuation:

It occurs when the control board is not able to read information from the module or when there is hardware incompatibility.

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 device so that a new attempt to access the Anybus-CC module be made.

Corrections:

- Verify if the Anybus-CC module is fitted in correctly on the XC44 connector.
- Verify whether the Anybus-CC interface configuration parameters do not present values that are invalid for the type of connected module, or whether the number of programmed I/O words does not exceed the allowed limit for the module.
- 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/F250.



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