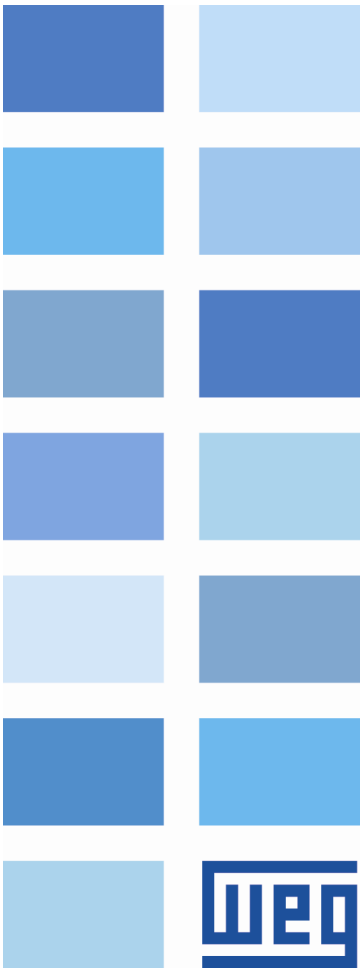
CANopen

RUW100

User's Guide



CANopen User's Guide

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The information below describes the reviews made in this manual.

Version	Revision	Description
V2.0X	R00	First edition

CONTENTS

ABOUT THE MANUAL

This manual supplies the necessary information for the operation of the RUW100 Remote Unit using the CANopen protocol. This manual must be used together with the RUW100 user's manual and programming manual.

ABBREVIATIONS AND DEFINITIONS

ASCII American Standard Code for Information Interchange
CAN Controller Area Network
CiA CAN in Automation
CIP Common Industrial Protocol
CRC Cycling Redundancy Check
HMI Human-Machine Interface
ISO International Organization for Standardization
ODVA Open DeviceNet Vendor Association
OSI Open Systems Interconnection
PLC Programmable Logic Controller
ro Read only
rw Read/write
RTR Remote Transmission Request

NUMERICAL REPRESENTATION

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

DOCUMENTS

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

Document	Version	Source
CAN Specification	2.0	CiA
CiA DS 301 CANopen Application Layer and Communication Profile	4.02	CiA
CiA DRP 303-1 Cabling and Connector Pin Assignment	1.1.1	CiA
CiA DSP 303-3 CANopen Indicator Specification	1.0	CiA
CiA DSP 306 Electronic Data Sheet Specification for CANopen	1.1	CiA
CiA DP 401 Device Profile Device Profile for Generic I/O Modules	2.1	CiA
Planning and Installation Manual - DeviceNet Cable System	PUB00027R1	ODVA

1 MAIN CHARACTERISTICS

Below are the main characteristics for communication of the Remote Unit RUW100 with CANopen accessory.

- Network management task (NMT).
- 32 transmission PDOs.
- 32 reception PDOs.
- Heartbeat Consumer.
- Heartbeat Producer.
- Node Guarding.
- SDO Client.
- SYNC producer/consumer.
- It is supplied with an EDS file for the network master configuration.
- Acyclic data available for parameterization.

2 INTERFACE DESCRIPTION

2.1 CHARACTERISTICS OF THE CAN INTERFACE

- Interface galvanically insulated and with differential signal, providing more robustness against electromagnetic interference.
- External power supply of 24 V.
- It allows the connection of up to 64 devices to the same segment. More devices can be connected by using repeaters.
- Maximum bus length of 1000 meters.

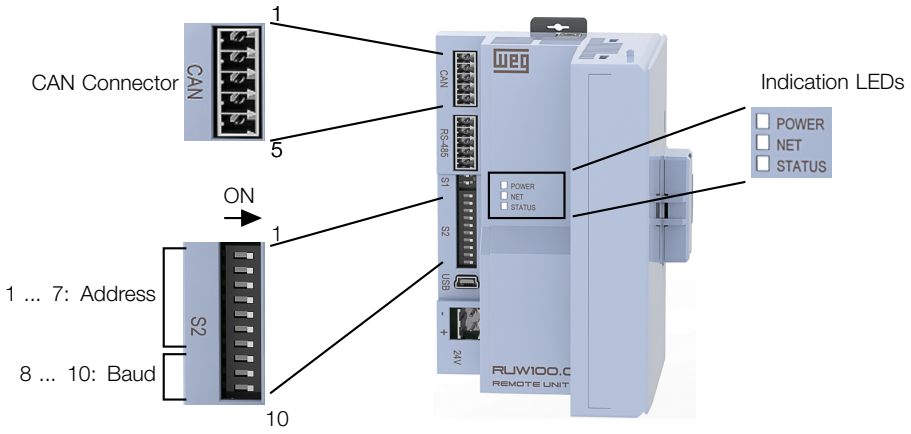

Figure 2.1: *Connector, indications and configurations for RUW100*

2.2 CONNECTOR

The interface is available through a 5-wire plug-in connector with the following pin assignment:

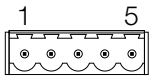

Table 2.1: *Pin assignment of connector for CANopen interface*

Pin	Name	Function
1	CAN_GND	0V for CAN insulated interface circuit
2	CAN_L	Communication signal CAN_L
3	Shield	Cable shield
4	CAN_H	Communication signal CAN_H
5	-	Not connected

2.3 ADDRESS

The product address is configured using switches 1 to 7 of the DIP switch S2.

- Valid addresses: 1 to 127;

Table 2.2: DIP switch S2 configuration for address programming

DIP settings (DIP1 ... DIP7)	Address	Configuration
0 0 0 0 0 0 0	0	Invalid setting
1 0 0 0 0 0 0	1	CANopen Address
0 1 0 0 0 0 0	2	CANopen Address
1 1 0 0 0 0 0	3	CANopen Address
0 0 1 0 0 0 0	4	CANopen Address
1 0 1 0 0 0 0	5	CANopen Address
0 1 1 0 0 0 0	6	CANopen Address
1 1 1 0 0 0 0	7	CANopen Address
0 0 0 1 0 0 0	8	CANopen Address
...	...	...
1 1 1 1 1 1 1	127	CANopen Address

NOTE!
If the address is changed, it will only be valid after power cycle the device.

2.4 BAUD RATE

The product baud rate is configured using switches 8 to 10 of the DIP switch S2.

Table 2.3: DIP switch S2 configuration for baud rate programming

DIP settings (DIP8 ... DIP10)	Value	Baud Rate
0 0 0	00	1000Mbps
1 0 0	01	reserved
0 1 0	02	500Kbps
1 1 0	03	250Kbps
0 0 1	04	125Kbps
1 0 1	05	100Kbps
0 1 1	06	50Kbps
1 1 1	07	20Kbps

NOTE!
If the baud rate is changed, it will only be valid after power cycle the device.

2.5 INDICATION LED

The Remote Unit RUW100 has a bicolor LED (green and red), as shown in figure 2.1, which indicates the status of the communication. For the indication to occur for the protocol CANopen, it is necessary to configure P0628 - LED NET - Configuration with the value zero.

The table below show the behavior of this LED depending on the state of the Remote Unit:

Table 2.4: *LED NET - GREEN*

Indication	State	Description
Off	-	Powered off.
Green, one flash	Stopped	Device is in the ”Stopped” state. PDOs and SDOs are not available at this state.
Green, alternating each 200ms	Pre-operational	Device is in the ”Pre-operational” state. PDOs are not available for communication.
Green, solid	Operational	Device is in the ”Operational” state.

Table 2.5: *LED NET - RED*

Indication	State	Description
Off	No error	Device is operating normally.
Red, one flash	Warning	Indicates the CAN interface is in Warning or Error Passive state. It may occur, for instance, it is the only device connected to network.
Red, two flashes	Node Guarding or Heartbeat error	An comminication error has been detected using CANopen error control mechanism - guarding or heartbeat.
Red, solid	BUS OFF error	CAN interface is in the bus-off state. It indicates a critical communication error condition, normally associated with installation problems or incorrect baud rate configuration. It is necessary to power cycle the device to restore communication.
Red, alternating each 50ms	CANopen not initialized	CANopen communication could not be properly initialized. Verify if it is configured to a valid address (01h – 7Fh).

3 CANOPEN NETWORK INSTALLATION

The CANopen network, such as several industrial communication networks, for being many times applied in aggressive environments with high exposure to electromagnetic interference, requires that certain precautions be taken in order to guarantee a low communication error rate during its operation. Recommendations to perform the connection of the product in this network are presented next.

NOTE!
Detailed recommendations on how to perform the installation are available at document "Planning and Installation Manual" (item DOCUMENTS).

3.1 BAUD RATE

Equipments with CANopen interface generally allow the configuration of the desired baud rate, ranging from 10 kbit/s to 1 Mbit/s. The baud rate that can be used by the equipment depends on the length of the cable used in the installation. The table 3.1 shows the baud rates and the maximum cable length that can be used in the installation, according to the protocol recommendation.

Table 3.1: *Supported baud rates and cable length*

Baud Rate	Cable length
10 kbit/s	1000 m
20 kbit/s	1000 m
50 kbit/s	1000 m
100 kbit/s	600 m
125 kbit/s	500 m
250 kbit/s	250 m
500 kbit/s	100 m
800 kbit/s	50 m
1 Mbit/s	25 m

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

3.2 ADDRESS IN THE CANOPEN NETWORK

Each CANopen network device must have an address or Node-ID, and may range from 1 to 127. This address must be unique for each equipment.

3.3 TERMINATION RESISTOR

The use of termination resistors at the ends of the bus is essential to avoid line reflection, which can impair the signal and cause communication errors. Termination resistors of 121 Ω | 0.25 W must be connected between the signals CAN_H and CAN_L at the ends of the main bus.

3.4 CABLE

The connection of CAN_L and CAN_H signals must be done with shielded twisted pair cable. The following table shows the recommended characteristics for the cable.

Table 3.2: CANopen cable characteristics

Cable Length (m)	Resistence per Meter (mΩ/m)	Conductor Cross Section (mm^2)
0 ... 40	70	0.25 ... 0.34
40 ... 300	<60	0.34 ... 0.60
300 ... 600	<40	0.50 ... 0.60
600 ... 1000	<26	0.75 ... 0.80

It is necessary to use a twisted pair cable to provide additional 24Vdc power supply to equipments that need this signal. It is recommended to use a certified DeviceNet cable.

3.5 CONNECTION TO THE NETWORK

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

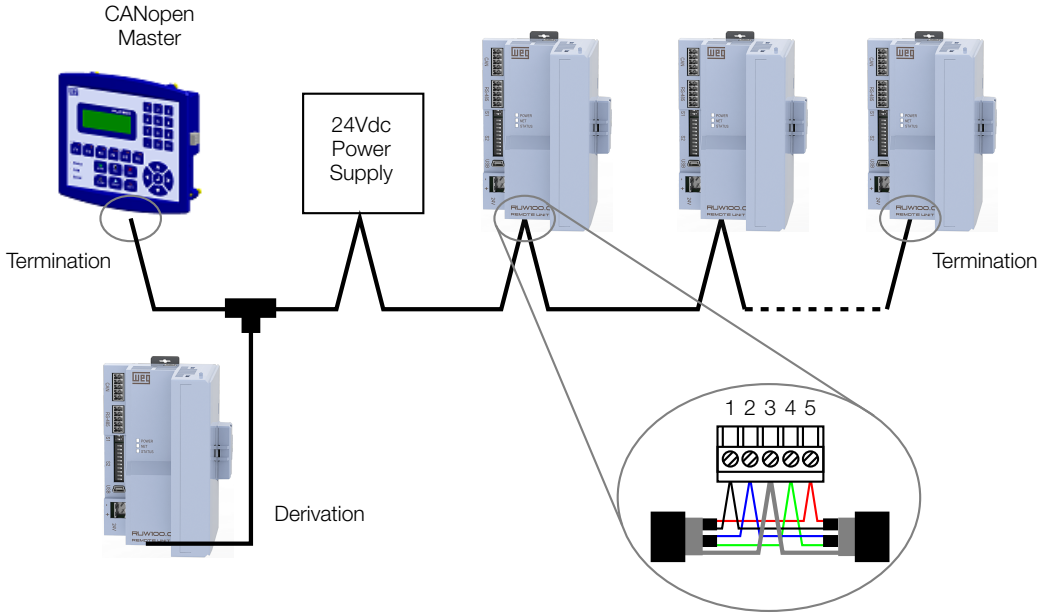

Figure 3.1: CANopen network installation example

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

To avoid voltage difference problems between the power supplies of the network devices, it is recommended that the network is fed by only one power supply and the signal is provided to all devices through the cable. If it is required more than one power supply, these should be referenced to the same point. Use the power supply to power the bus cable system only.

The maximum number of devices connected to a single segment of the network is limited to 64. Repeaters can be used for connecting a bigger number of devices.

4 RUW100

Allows access to status and configuration parameters of the main module of RUW100 Remote Unit.

Parameters P000 to P999 refer to the RUW100 network head.
The parameters above P1000 refer to accessories and obey the following logic:

P-x-y-z-w

X-Accessory model as:
1-Digital Models;
3-Analog Inputs (AI, TH, RTD);
5-Analog Outputs;
7-Load cell input.

Y-Intrabus address of the accessory according to the position it is connected to:
1-Slot 1 (first accessory);
2-Slot 2 (second accessory);
...
8-Slot 8 (eighth accessory).

NOTE!
In this manual we will not present the detailed description of the parameters for all intarbus addresses (Slot1, Slot2 ... Slot8) since the description would be the same for any position. For example: if you want to know the description of the P1200, P1300, P1400, P1500, P1600, P1700 or P1800, just see the description of the P1100.

NOTE!
RUW100 parameters by default **are not retentive**. In order for a parameter or configuration to be kept after the remote is turned off, it is necessary to save the parameters in Flash memory through P204. This is generally not necessary as the configuration is mostly done by the network master.

NOTE!
The complete list of parameters can be seen in Appendix A.

RUW100.1 STATUS

Parameters for status indication and inputs reading of the main module.

RUW100.1.2 Errors and Faults

RUW100.1.2 Errors and Faults		
P0100: Last Fault		
Range:	0 ... 255	**Default:** 0

Description:
Indicates the last 5 failures that occurred, as shown in the table below.

Indication	Description
0 = NO ERROR	No Error
1 = RS485 SERIAL WATCHDOG	Serial communication watchdog
2 = CAN WARNING	Check the canopen manual
3 = CAN ERROR PASSIVE	Check the canopen manual
4 = CAN BUS OFF	Check the canopen manual
5 = CAN NO BUS POWER	Check the canopen manual
6 = CAN INIT ERROR	Check the canopen manual
7 = CAN ERROR ENABLE	Check the canopen manual
8 = CANOPEN NODE GUARD ERROR	Check the canopen manual
9 = CANOPEN HEARTBEAT ERROR	Check the canopen manual
10 ... 13 = INTERNAL ERROR	Internal error
14 = RETENTIVE MEMORY	Retentive memory error
15 = FLASH MEMORY 50%	Number of writes in flash memory reached 50%
16 = FLASH MEMORY 100%	Number of writes in flash memory reached 100%
17 = NUMBER OF ACCESSORIES EXCEEDED	Number of accessories exceeded
18 = INTRABUS ADDRESSING ERROR	Intrabus addressing error
19 = INTRAUBS IDENTIFICATION ERROR	Intrabus identification error
20 = INTERNAL ERROR	Internal error
21 = IDENTIFICATION ERROR SLOT 1	SLOT1 identification error
22 = IDENTIFICATION ERROR SLOT 2	SLOT2 identification error
23 = IDENTIFICATION ERROR SLOT 3	SLOT3 identification error
24 = IDENTIFICATION ERROR SLOT 4	SLOT4 identification error
25 = IDENTIFICATION ERROR SLOT 5	SLOT5 identification error
26 = IDENTIFICATION ERROR SLOT 6	SLOT6 identification error
27 = IDENTIFICATION ERROR SLOT 7	SLOT7 identification error
28 = IDENTIFICATION ERROR SLOT 8	SLOT8 identification error
29 ... 30 = INTERNAL ERROR	Internal error
31 = INTRABUS TIMEOUT SLOT 1	Intrabus timeout error SLOT1
32 = INTRABUS TIMEOUT SLOT 2	Intrabus timeout error SLOT2
33 = INTRABUS TIMEOUT SLOT 3	Intrabus timeout error SLOT3
34 = INTRABUS TIMEOUT SLOT 4	Intrabus timeout error SLOT4
35 = INTRABUS TIMEOUT SLOT 5	Intrabus timeout error SLOT5
36 = INTRABUS TIMEOUT SLOT 6	Intrabus timeout error SLOT6
37 = INTRABUS TIMEOUT SLOT 7	Intrabus timeout error SLOT7
38 = INTRABUS TIMEOUT SLOT 8	Intrabus timeout error SLOT8
39 ... 40 = INTERNAL ERROR	Internal error
41 = INTRABUS CRC ERROR SLOT 1	Intrabus CRC error SLOT1
42 = INTRABUS CRC ERROR SLOT 2	Intrabus CRC error SLOT2
43 = INTRABUS CRC ERROR SLOT 3	Intrabus CRC error SLOT3
44 = INTRABUS CRC ERROR SLOT 4	Intrabus CRC error SLOT4
45 = INTRABUS CRC ERROR SLOT 5	Intrabus CRC error SLOT5
46 = INTRABUS CRC ERROR SLOT 6	Intrabus CRC error SLOT6
47 = INTRABUS CRC ERROR SLOT 7	Intrabus CRC error SLOT7
48 = INTRABUS CRC ERROR SLOT 8	Intrabus CRC error SLOT8
49 ... 50 = Reserved	Internal error
51 = INTRABUS COOMAND ERROR SLOT 1	Intrabus command error SLOT1
52 = INTRABUS COOMAND ERROR SLOT 2	Intrabus command error SLOT2
53 = INTRABUS COOMAND ERROR SLOT 3	Intrabus command error SLOT3
54 = INTRABUS COOMAND ERROR SLOT 4	Intrabus command error SLOT4
55 = INTRABUS COOMAND ERROR SLOT 5	Intrabus command error SLOT5
56 = INTRABUS COOMAND ERROR SLOT 6	Intrabus command error SLOT6
57 = INTRABUS COOMAND ERROR SLOT 7	Intrabus command error SLOT7
58 = INTRABUS COOMAND ERROR SLOT 8	Intrabus command error SLOT8
59 ... 70 = INTERNAL ERROR	Internal error

RUW100.1.2 Errors and Faults

P0105: Last Alarm

Range: 0 ... 255 **Default:** 0

Description:
Indicates the last 5 alarms that occurred, as shown in the table below.

Indication	Description
0 = NO ERROR	No Error
1 = RS485 SERIAL WATCHDOG	Serial communication watchdog
2 = CAN WARNING	Check the canopen manual
3 = CAN ERROR PASSIVE	Check the canopen manual
4 = CAN BUS OFF	Check the canopen manual
5 = CAN NO BUS POWER	Check the canopen manual
6 = CAN INIT ERROR	Check the canopen manual
7 = CAN ERROR ENABLE	Check the canopen manual
8 = CANOPEN NODE GUARD ERROR	Check the canopen manual
9 = CANOPEN HEARTBEAT ERROR	Check the canopen manual
10 ... 13 = INTERNAL ERROR	Internal error
14 = RETENTIVE MEMORY	Retentive memory error
15 = FLASH MEMORY 50%	Number of writes in flash memory reached 50%
16 = FLASH MEMORY 100%	Number of writes in flash memory reached 100%
17 = NUMBER OF ACCESSORIES EXCEEDED	Number of accessories exceeded
18 = INTRABUS ADDRESSING ERROR	Intrabus addressing error
19 = INTRAUBS IDENTIFICATION ERROR	Intrabus identification error
20 = INTERNAL ERROR	Internal error
21 = IDENTIFICATION ERROR SLOT 1	SLOT1 identification error
22 = IDENTIFICATION ERROR SLOT 2	SLOT2 identification error
23 = IDENTIFICATION ERROR SLOT 3	SLOT3 identification error
24 = IDENTIFICATION ERROR SLOT 4	SLOT4 identification error
25 = IDENTIFICATION ERROR SLOT 5	SLOT5 identification error
26 = IDENTIFICATION ERROR SLOT 6	SLOT6 identification error
27 = IDENTIFICATION ERROR SLOT 7	SLOT7 identification error
28 = IDENTIFICATION ERROR SLOT 8	SLOT8 identification error
29 ... 30 = INTERNAL ERROR	Internal error
31 = INTRABUS TIMEOUT SLOT 1	Intrabus timeout error SLOT1
32 = INTRABUS TIMEOUT SLOT 2	Intrabus timeout error SLOT2
33 = INTRABUS TIMEOUT SLOT 3	Intrabus timeout error SLOT3
34 = INTRABUS TIMEOUT SLOT 4	Intrabus timeout error SLOT4
35 = INTRABUS TIMEOUT SLOT 5	Intrabus timeout error SLOT5
36 = INTRABUS TIMEOUT SLOT 6	Intrabus timeout error SLOT6
37 = INTRABUS TIMEOUT SLOT 7	Intrabus timeout error SLOT7
38 = INTRABUS TIMEOUT SLOT 8	Intrabus timeout error SLOT8
39 ... 40 = INTERNAL ERROR	Internal error
41 = INTRABUS CRC ERROR SLOT 1	Intrabus CRC error SLOT1
42 = INTRABUS CRC ERROR SLOT 2	Intrabus CRC error SLOT2
43 = INTRABUS CRC ERROR SLOT 3	Intrabus CRC error SLOT3
44 = INTRABUS CRC ERROR SLOT 4	Intrabus CRC error SLOT4
45 = INTRABUS CRC ERROR SLOT 5	Intrabus CRC error SLOT5
46 = INTRABUS CRC ERROR SLOT 6	Intrabus CRC error SLOT6
47 = INTRABUS CRC ERROR SLOT 7	Intrabus CRC error SLOT7
48 = INTRABUS CRC ERROR SLOT 8	Intrabus CRC error SLOT8
49 ... 50 = Reserved	Internal error
51 = INTRABUS COOMAND ERROR SLOT 1	Intrabus command error SLOT1
52 = INTRABUS COOMAND ERROR SLOT 2	Intrabus command error SLOT2
53 = INTRABUS COOMAND ERROR SLOT 3	Intrabus command error SLOT3
54 = INTRABUS COOMAND ERROR SLOT 4	Intrabus command error SLOT4
55 = INTRABUS COOMAND ERROR SLOT 5	Intrabus command error SLOT5
56 = INTRABUS COOMAND ERROR SLOT 6	Intrabus command error SLOT6
57 = INTRABUS COOMAND ERROR SLOT 7	Intrabus command error SLOT7
58 = INTRABUS COOMAND ERROR SLOT 8	Intrabus command error SLOT8
59 ... 70 = INTERNAL ERROR	Internal error

RUW100.1.2 Errors and Faults

P0110: Errors Counter

Range: 0 ... 255 **Default:** 0

Description:
Add help at: 110_errorCounter

RUW100.2 CONFIGURATION

Allows accessing to write variables of the main module of RUW100 Remote Unit.

RUW100.2.2 Communication

It allows configuring the communication for RUW100 Remote Unit.

RUW100.2.2 Communication

P0624: Action for Communication Fault

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

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

Indication	Description
0 = No Action	No tripping.
1 = According to Error Mode	Put the product outputs as programmed in the error mode of each output.

RUW100.2.2 Communication

P0602: CAN - Bus Off Reset

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

Description:
It allows programming the inverter behavior when detecting a bus off error at the CAN interface.

Indication	Description
0 = Manual	If bus off occurs, LED will indicate this condition and the communication will be disabled. The action programmed in parameter P0624 - Action for Communication Fault will be performed. In order that the device communicates again through the CAN interface, it will be necessary to power cycle the device.
1 = Automatic	If bus off occurs, the communication will be reinitiated automatically and the error will be ignored. In this case it will not indicate this error at LEDs and the device will not perform any error action.

5 OPERATION IN THE CANOPEN NETWORK

5.1 ACCESS TO THE DATA

Each slave of the CANopen network has a list called object dictionary that contains all the data accessible via network. Each object of this list is identified with an index, which is used during the equipment configuration as well as during message exchanges. This index is used to identify the object being transmitted.

5.2 CYCLIC DATA

Cyclic data is the data normally used for status monitoring and equipment control. For CANopen protocol, the interface supports 32 receive PDOs and 32 transmit PDOs.

It is necessary the configuration to be made both at the slave and master.

5.3 ACYCLIC DATA

In addition to the cyclic data, the interface also provides acyclic data via SDO. Using this type of communication, you can access any equipment parameter. Access to this type of data is commonly done using instructions for reading or writing data, which should indicate the index and sub-index to the desired parameter. The item 6.4 describes how to address the parameters for RUW100 Remote Unit.

5.4 COMMUNICATION OBJECTS - COB

There is a specific set of objects that are responsible for the communication among the network devices. Those objects are divided according to the type of data and the way they are sent or received by a device. The following communication objects (COBs) are described by the specification:

Table 5.1: *Types of Communication Objects (COBs)*

Type of object	Description
Service Data Object (SDO)	SDO are objects responsible for the direct access to the object dictionary of a device. By means of messages using SDO, it is possible to indicate explicitly (by the object index) what data is being handled. There are two SDO types: Client SDO, responsible for doing a read or write request to a network device, and the Server SDO, responsible for taking care of that request. Since SDO are usually used for the configuration of a network node, they have less priority than other types of message.
Process Data Object (PDO)	PDO are used for accessing equipment data without the need of indicating explicitly which dictionary object is being accessed. Therefore, it is necessary to configure previously which data the PDO will be transmitting (data mapping). There are also two types of PDO: Receive PDO and Transmit PDO. They are usually utilized for transmission and reception of data used in the device operation, and for that reason they have higher priority than the SDO.
Emergency Object (EMCY)	This object is responsible for sending messages to indicate the occurrence of errors in the device. When an error occurs in a specific device (EMCY producer), it can send a message to the network. In the case that any network device be monitoring that message (EMCY consumer), it can be programmed so that an action be taken (disabling the other devices, error reset, etc.).
Syncronization Object (SYNC)	In the CANopen network, it is possible to program a device (SYNC producer) to send periodically a synchronization message for all the network devices. Those devices (SYNC consumers) will then be able, for instance, to send a certain datum that needs to be made available periodically.
Network Management (NMT)	Every CANopen network needs a master that controls the other devices (slaves) in the network. This master will be responsible for a set of services that control the slave communications and their state in the CANopen network. The slaves are responsible for receiving the commands sent by the master and for executing the requested actions. The protocol describes two types of service: device control service, with which the master controls the state of each network slave, and error control service (Node Guarding an Heartbeat), with which the device sends periodic messages to inform that the connection is active.

All the communication of the slave with the network is performed using those objects, and the data that can be accessed are the existent in the device object dictionary.

5.5 COB-ID

A telegram of the CANopen network is always transmitted by a communication object (COB). Every COB has an identifier that indicates the type of data that is being transported. This identifier, called COB-ID has an 11 bit size, and it is transmitted in the identifier field of a CAN telegram. It can be subdivided in two parts:

Function Code				Address						
bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0

- Function Code: indicates the type of object that is being transmitted.
- Adrress: indicates with which network device the telegram is linked.

A table with the standard values for the different communication objects is presented next. Notice that the standard value of the object depends on the slave address, with the exception of the COB-ID for NMT and SYNC, which are common for all the network elements. Those values can also be changed during the device configuration stage.

Table 5.2: *COB-ID for the different objects*

COB	Function Code (bits 10-7)	COB-ID Resultant COB-ID (function + address)
NMT	0000	0
SYNC	0001	128 (80h)
EMCY	0001	129 - 255 (81h - FFh)
PDO1 (tx)	0011	385 - 511 (181h - 1FFh)
PDO1 (rx)	0100	513 - 639 (201h - 27Fh)
PDO2 (tx)	0101	641 - 767 (281h - 2FFh)
PDO2 (rx)	0110	769 - 895 (301h - 37Fh)
PDO3 (tx)	0111	897 - 1023 (381h - 3FFh)
PDO3 (rx)	1000	1025 - 1151 (401h - 47Fh)
PDO4 (tx)	1001	1153 - 1279 (481h - 4FFh)
PDO4 (rx)	1010	1281 - 1407 (501h - 57Fh)
SDO (tx)	1011	1409 - 1535 (581h - 5FFh)
SDO (rx)	1100	1537 - 1663 (601h - 67Fh)
Node Guarding/Heartbeat	1110	1793 - 1919 (701h - 77Fh)

5.6 EDS FILE

Each device on an CANopen network has an EDS configuration file, which contains information about the device functions on the network. This file is used by a master or configuration software to program devices present at CANopen network.

The EDS file is available from WEG website (http://www.weg.net). It is important to note if the EDS configuration file is compatible with the firmware version of the RUW100 Remote Unit.

6 OBJECT DICTIONARY

The object dictionary is a list containing several equipment data which can be accessed via CANopen network. An object of this list is identified by means of a 16-bit index, and it is based in that list that all the data exchange between devices is performed.

The CiA DS 301 document defines a set of minimum objects that every CANopen network slave must have. The objects available in that list are grouped according to the type of function they execute. The objects are arranged in the dictionary in the following manner:

Table 6.1: *Object dictionary groupings*

Index	Objects	Description
0001h - 025Fh	Data type definition	Used as reference for the data type supported by the system.
1000h - 1FFFh	Communication objects	They are objects common to all the CANopen devices. They contain general information about the equipment and also data for the communication configuration.
2000h – 5FFFh	Manufacturer specific objects	In this range, each CANopen equipment manufacturer is free to define which data those objects will represent.
6000h – 9FFFh	Standardized device objects	This range is reserved to objects that describe the behavior of similar equipment, regardless of the manufacturer.

The other indexes that are not referred in this list are reserved for future use.

6.1 DICTIONARY STRUCTRE

The general structure of the dictionary has the following format:

Index	Object	Name	Type	Access

- **Index:** indicates directly the object index in the dictionary.
- **Object:** describes which information the index stores (simple variable, array, record, etc.).
- **Name:** contains the name of the object in order to facilitate its identification.
- **Type:** indicates directly the stored data type. For simple variables, this type may be an integer, a float, etc. For arrays, it indicates the type of data contained in the array. For records, it indicates the record format according to the types described in the first part of the object dictionary (indexes 0001h – 0360h).
- **Access:** informs if the object in question is accessible only for reading (ro), for reading and writing (rw), or if it is a constant (const).

For objects of the array or record type, a sub-index that is not described in the dictionary structure is also necessary.

6.2 DATA TYPE

The first part of the object dictionary (index 0001h – 025Fh) describes the data types that can be accessed at a CANopen network device. They can be basic types, as integers and floats, or compound types formed by a set of entries, as records and arrays.

6.3 COMMUNICATION PROFILE - COMMUNICATION OBJECTS

The indexes from 1000h to 1FFFh in the object dictionary correspond to the part responsible for the CANopen network communication configuration. Those objects are common to all the devices, however only a few are obligatory. A list with the objects of this range that are supported by the Remote Unit RUW100 is presented next.

Table 6.2: Object list – Communication Profile

Index	Object	Name	Type	Access
1000h	VAR	device type	UNSIGNED32	ro
1001h	VAR	error register	UNSIGNED8	ro
1005h	VAR	COB-ID SYNC	UNSIGNED32	rw
100Ch	VAR	guard time	UNSIGNED16	rw
100Dh	VAR	life time factor	UNSIGNED8	rw
1016h	ARRAY	consume heartbeat time	UNSIGNED32	rw
1017h	VAR	producer heartbeat time	UNSIGNED16	rw
1018h	RECORD	Identity Object	Identity	ro
Server SDO Parameter				
1200h	RECORD	1st Server SDO parameter	SDO Parameter	ro
Receive PDO Communication Parameter				
1400h	RECORD	1st receive PDO Parameter	PDO CommPar	rw
1401h	RECORD	2nd receive PDO Parameter	PDO CommPar	rw
1402h	RECORD	3rd receive PDO Parameter	PDO CommPar	rw
1403h	RECORD	4th receive PDO Parameter	PDO CommPar	rw
...	...	...	...	...
141Fh	RECORD	32nd receive PDO Parameter	PDO CommPar	rw
Receive PDO Mapping Parameter				
1600h	RECORD	1st receive PDO mapping	PDO Mapping	rw
1601h	RECORD	2nd receive PDO mapping	PDO Mapping	rw
1602h	RECORD	3rd receive PDO mapping	PDO Mapping	rw
1603h	RECORD	4th receive PDO mapping	PDO Mapping	rw
...	...	...	...	...
161Fh	RECORD	32nd receive PDO mapping	PDO Mapping	rw
Transmit PDO Communication Parameter				
1800h	RECORD	1st transmit PDO Parameter	PDO CommPar	rw
1801h	RECORD	2nd transmit PDO Parameter	PDO CommPar	rw
1802h	RECORD	3rd transmit PDO Parameter	PDO CommPar	rw
1803h	RECORD	4th transmit PDO Parameter	PDO CommPar	rw
...	...	...	...	...
181Fh	RECORD	32nd transmit PDO Parameter	PDO CommPar	rw
Transmit PDO Mapping Parameter				
1A00h	RECORD	1st transmit PDO mapping	PDO Mapping	rw
1A01h	RECORD	2nd transmit PDO mapping	PDO Mapping	rw
1A02h	RECORD	3rd transmit PDO mapping	PDO Mapping	rw
1A03h	RECORD	4th transmit PDO mapping	PDO Mapping	rw
...	...	...	...	...
1A1Fh	RECORD	32nd transmit PDO mapping	PDO Mapping	rw

These objects can only be read and written via the CANopen network, it is not available in other network interface. The network master, in general, is the equipment responsible for setting up the equipment before starting the operation. The EDS configuration file brings the list of all supported communication objects.

Refer to item 7 for more details on the available objects in this range of the objects dictionary.

6.4 MANUFACTURER SPECIFIC OBJECTS

For indexes from 2000h to 5FFFh, each manufacture is free to define which objects will be present, and also the type and function of each one. In the case of the RUW100, the whole list of parameters was made available in this object range. It is possible to operate the RUW100 by means of these parameters, carrying out any function that the inverter can execute. The parameters were made available starting from the index 2000h, and by adding their Net Id to this index their position in the dictionary is obtained. To identify how the parameters are distributed in the object dictionary, refer to the item A.

In order to be able to program the RUW100 operation correctly via the CANopen network, it is necessary to know its

operation through the parameters.

Refer to the RUW100 Remote Unit programming manual for a complete list of the parameters and their detailed description.

6.5 DEVICE PROFILE - OBJECTS FOR GENERIC I/O MODULES

The CANopen documentation also includes suggestions for standardization of certain device types. The RUW100 Remote Unit follows the CiA DPS 401 – Device Profile for Generic I/O Modules. This document describes a set of objects that must be common for I/O modules, regardless of the manufacturer. This makes the interaction between devices with the same function easier (as for remote I/O modules), because the data, as well the device behavior, are made available in a standardized manner.

The indexes from 6000h to 9FFFh were reserved for these objects. It is possible to operate RUW100 Remote Unit through the CANopen network, both using parameters (located from the index 2000h) as well these standardized objects.

Refer to item 8 for more details on the available objects in this range of the objects dictionary.

7 COMMUNICATION OBJECTS DESCRIPTION

This item describes in detail each of the communication objects available for the RUW100 Remote Unit. It is necessary to know how to operate these objects to be able to use the available functions for the RUW100 Remote Unit communication.

7.1 IDENTIFICATION OBJECT

There is a set of objects in the dictionary which are used for equipment identification; however, they do not have influence on their behavior in the CANopen network.

7.1.1 Object 1000h - Device Type

This object gives a 32-bit code that describes the type of object and its functionality.

Table 7.1: *Object 1000h - Device Type*

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1000h	0	Device Type	UNSIGNED32	RO	No	0

This code can be divided into two parts: 16 low-order bits describing the type of profile that the device uses, and 16 high-order bits indicating a specific function according to the specified profile.

7.1.2 Object 1001h - Error Register

This object indicates whether or not an error in the device occurred. The type of error registered for the equipment follows what is described in the table 7.2.

Table 7.2: *Object 1001h - Error Register*

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1001h	0	Error register	UNSIGNED8	RO	yes	0

Table 7.3: *Structure of the object Error Register*

Bit	Meaning
0	Generic error
1	Currrent
2	Voltage
3	Temperature
4	Communication
5	Reservaded (always 0)
6	Reservaded (always 0)
7	Specific of the manufacturer

If the device presents any error, the equivalent bit must be activated. The first bit (generic error) must be activated with any error condition.

7.1.3 Object 1018h - Identity Object

It brings general information about the device.

Table 7.4: *Object 1018h - Identity Object*

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1018h	0	Number of the last sub-index	UNSIGNED8	RO	No	4
	1	Vendor ID	UNSIGNED32	RO	No	0000.0123h
	2	Product code	UNSIGNED32	RO	No	0000.1500h
	3	Revision number	UNSIGNED32	RO	No	According to the equipment firmware version
	4	Serial number	UNSIGNED32	RO	No	Different for each RUW100

The vendor ID is the number that identifies the manufacturer at the CiA. The product code is defined by the manufacturer according to the type of product. The revision number represents the equipment firmware version. The sub-index 4 is a unique serial number for each Remote Unit RUW100 in CANopen network.

7.2 SERVICE DATA OBJECTS - SDOS

The SDOs are responsible for the direct access to the object dictionary of a specific device in the network. They are used for the configuration and therefore have low priority, since they do not have to be used for communicating data necessary for the device operation.

There are two types of SDOs: client and server. Basically, the communication initiates with the client (usually the master of the network) making a read (upload) or write (download) request to a server, and then this server answers the request.

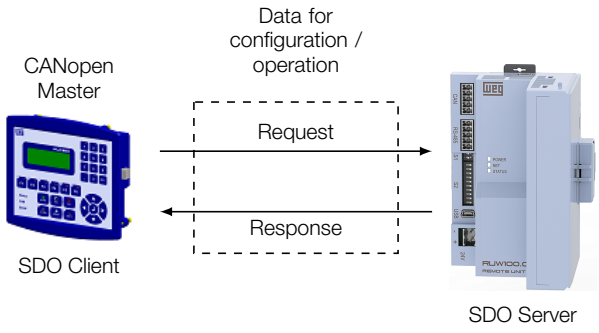

Figure 7.1: *Communication between SDO client and server*

7.2.1 Object 1200h - SDO Server

The Remote Unit RUW100 Remote Unit has only one SDO of the server type, which makes it possible the access to its entire object dictionary. Through it, an SDO client can configure the communication, the parameters and the the RUW100 operation. Every SDO server has an object, of the SDO_PARAMETER type, for its configuration, having the following structure:

Table 7.5: *Objet 1200h - SDO Server*

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1200h	0	Number of the last sub-index	UNSIGNED8	RO	No	2
	1	COB-ID Client - Server (rx)	UNSIGNED32	RO	No	600h + Node-ID
	2	COB-ID Server - Client (tx)	UNSIGNED32	RO	No	580h + Node-ID

7.2.2 SDOs Operation

A telegram sent by an SDO has an 8 byte size, with the following structure:

Identifier	8 data bytes							
11 bits	Command	Index		Subindex	Object data			
	byte 0	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7

The identifier depends on the transmission direction (rx or tx) and on the address (or Node-ID) of the destination server. For instance, a client that makes a request to a server which Node-ID is 1, must send a message with the identifier 601h. The server will receive this message and answer with a telegram which COB-ID is equal to 581h.

The command code depends on the used function type. For the transmissions from a client to a server, the following commands can be used:

Table 7.6: *Command codes for SDO client*

Command	Function	Description	Object Data
22h	Download	Write object	Not defined
23h	Download	Write object	4 byte
2Bh	Download	Write object	2 byte
2Fh	Download	Write object	1 byte
40h	Upload	Read object	Not used
60h ou 70h	Upload segment	Segmented read	Not used

When making a request, the client will indicate through its COB-ID, the address of the slave to which this request is destined. Only one slave (using its respective SDO server) will be able to answer the received telegram to the client. The answer telegram will have also the same structure of the request telegram, the commands however are different:

Table 7.7: *Command codes for SDO server*

Command	Function	Description	Object Data
60h	Download	Write object	Not used
43h	Upload	Write object	4 byte
4Bh	Upload	Write object	2 byte
4Fh	Upload	Write object	1 byte
41h	Upload segment	Initiates segmented response for read	4 byte
01h ou 0Dh	Upload segment	Last data segment for read	8 ... 2 bytes

For readings of up to four data bytes, a single message can be transmitted by the server; for the reading of a bigger quantity of bytes, it is necessary that the client and the server exchange multiple telegrams.

A telegram is only completed after the acknowledgement of the server to the request of the client. If any error is detected during telegram exchanges (for instance, no answer from the server), the client will be able to abort the process by means of a warning message with the command code equal to 80h.

NOTE!
When the SDO is used for writing in objects that represent the RUW100 parameters (objects starting from the index 2000h), this value is saved in the nonvolatile frequency inverter memory. Therefore, the configured values are not lost after the equipment is switched off or reset. For all the other objects these values are not saved automatically, so that it is necessary to rewrite the desired values.

E.g.: A client SDO requests for a slave at address 1 the reading of the object identified by the index 2000h, sub-index 0 (zero), which represents an 16-bit integer. The master telegram has the following format:

Identifier	Command	Index		Subindex	Data			
601h	40h	00h	20h	00h	00h	00h	00h	00h

The slave responds to the request indicating that the value of the referred object is equal to 999 [1]:

Identifier	Command	Index		Subindex	Data			
581h	4Bh	00h	20h	00h	E7h	03h	00h	00h

7.3 PROCESS DATA OBJECTS - PDOS

The PDOs are used to send and receive data used during the device operation, which must often be transmitted in a fast and efficient manner. Therefore, they have a higher priority than the SDOs.

In the PDOs only data are transmitted in the telegram (index and sub-index are omitted), and in this way it is possible to do a more efficient transmission, with larger volume of data in a single telegram. However it is necessary to configure previously what is being transmitted by the PDO, so that even without the indication of the index and sub-index, it is possible to know the content of the telegram.

There are two types of PDOs, the receive PDO and the transmit PDO. The transmit PDOs are responsible for sending data to the network, whereas the receive PDOs remain responsible for receiving and handling these data. In this way it is possible to have communication among slaves of the CANopen network, it is only necessary to configure one slave to transmit information and one or more slaves to receive this information.

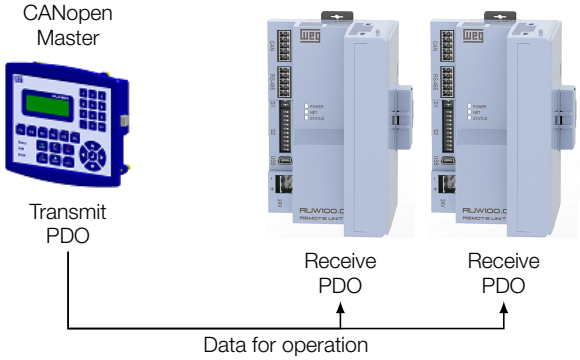

Figure 7.2: *Communication using PDOs*

NOTE!
PDOs can only be transmitted or received when the device is in the operational state.

7.3.1 PDO Mapping Objects

In order to be able to be transmitted by a PDO, it is necessary that an object be mapped into this PDO content. In the description of communication objects (1000h – 1FFFh), the filed “PDO Mapping” informs this possibility. Usually only information necessary for the operation of the device can be mapped, such as enabling commands, device status, reference, etc. Information on the device configuration are not accessible through PDOs, and if it is necessary to access them one must use the SDOs.

For the manufacturer’s specific objects (2000h – 5FFFh), the table A presents some PDO mapping objects. Read-only parameters (ro) can be used only by transmit PDOs, whereas the other parameters can be used only by receive PDOs.

[1] Do not forget that for any integer type of data, the byte transfer order is from the least significant to the most significant.

The EDS file brings the list of all objects available, informing whether the object can be mapped or not.

7.3.2 Receive PDOs

The receive PDOs, or RPDOs, are responsible for receiving data that other devices send to the CANopen network. The Remote Unit RUW100 has 32 receive PDOs, each one being able to receive up to 8 bytes. Each RPDO has two parameters for its configuration, a PDO_COMM_PARAMETER and a PDO_MAPPING, as described next.

PDO_COMM_PARAMETER

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1400h - 141Fh	0	Number of the last sub-index	UNSIGNED8	RO	No	2
	1	COB-ID used by the PDO	UNSIGNED32	RW	No	200h / 300h 400h / 500h + Node-ID
	2	Transmission Type	UNSIGNED8	RW	No	254

The sub-index 1 contains the receive PDO COB-ID. Every time a message is sent to the network, this object will read the COB-ID of that message and, if it is equal to the value of this field, the message will be received by the device. This field is formed by an UNSIGNED32 with the following structure:

Table 7.8: *COB-ID description*

Bit	Value	Description
31 (MSB)	0	PDO is enabled
	1	PDO is disabled
30	0	RTR permitted
29	0	Identifier size = 11 bits
28 - 11	0	Not used, always 0
10 - 0 (LSB)	X	11-bit COB-ID

The bit 31 allows enabling or disabling the PDO. The bits 29 and 30 must be kept in 0 (zero), they indicate respectively that the PDO accepts remote frames (RTR frames) and that it uses an 11-bit identifier. Since the RUW100 does not use 29-bit identifiers, the bits from 28 to 11 must be kept in 0 (zero), whereas the bits from 10 to 0 (zero) are used to configure the COB-ID for the PDO.

The sub-index 2 indicates the transmission type of this object, according to the next table.

Table 7.9: *Transmission type description*

Type of transmission	PDOs transmission				
	Cyclic	Acyclic	Synchronous	Asynchronous	RTR
0		•	•		
1 - 240	•		•		
241 - 251	Reserved				
252			•		•
253				•	•
254				•	
255				•	

- **Values 0 – 240:** any RPDO programmed in this range presents the same performance. When detecting a message, it will receive the data; however it won't update the received values until detecting the next SYNC telegram.
- **Values 252 e 253:** not allowed for receive PDOs.
- **Values 254 e 255:** they indicated that there is no relationship with the synchronization object. When receiving a message, its values are updated immediately.

PDO_MAPPING

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1600h - 161Fh	0	Number of mapped objects	0 = disable 1-4=number of mapped objects	RO	No	0
	1 - 4	1 to 4 object mapped in the PDO	UNSIGNED32	RW	No	According EDS file

This parameter indicates the mapped objects in the RUW100 Remote Unit receive PDOs. The default value of these objects is indicated in the product's EDS file. It is possible to map up to 4 different objects for each RPDO, provided that the total length does not exceed eight bytes. The mapping of an object is done indicating its index, sub-index[2] and size (in bits) in an UNSIGNED32, field with the following format:

UNSIGNED32		
Index (16 bits)	Sub-index (8 bits)	Objects size (8 bits)

For instance, analyzing the receive PDO standard mapping, we have:

- **Sub-index 0 = 2:** This PDO has two mapped objects.
- **Sub-index 1 = 22AD.0010h:** the first mapped object has an index equal to 22ADh, sub-index 0 (zero), and a size of 16 bits. This object corresponds to the parameter P0902 - RUW100 - Write Digital Outputs (DOs).
- **Sub-index 2 = 22B8.0010h:** the second mapped object has an index equal to 22B8h, sub-index 0 (zero), and a size of 16 bits. This object corresponds to the parameter P1102 - Slot 1 - Write Digital Outputs (DOs).

It is possible to modify this mapping by changing the quantity or the number of mapped objects. Remembering that only 8 bytes can be mapped at maximum.

NOTE!

- In order to change the mapped objects in a PDO, it is first necessary to write the value 0 (zero) in the sub-index 0 (zero). In that way the values of the sub-indexes 1 to 4 can be changed. After the desired mapping has been done, one must write again in the sub-index 0 (zero) the number of objects that have been mapped, enabling again the PDO.
- Do not forget that PDOs can only be received if the device is in the operational state.

7.3.3 Transmit PDOs

The transmit PDOs, or TPDOs, as the name says, are responsible for transmitting data for the CANopen network. The Remote Unit RUW100 Remote Unit has 32 transmit PDOs, each one being able to transmit up to 8 data bytes. In a manner similar to RPDOs, each TPDO has two parameters for its configuration, a PDO_COMM_PARAMETER and a PDO_MAPPING, as described next.

PDO_COMM_PARAMETER

[2] If the object is of the VAR type and does not have sub-index, the value 0 (zero) must be indicated for the sub-index.

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1800h - 181Fh	0	Number of the last sub-index	UNSIGNED8	RO	No	5
	1	COB-ID used by the PDO	UNSIGNED32	RW	No	180h / 280h / 380h / 480h + Node-ID
	2	Transmission Type	UNSIGNED8	RW	No	254
	3	Time between transmissions	UNSIGNED16	RW	No	-
	4	Compability entry	UNSIGNED8	RW	No	-
	5	Event timer	UNSIGNED16	RW	No	0

The sub-index 1 contains the transmit PDO COB-ID. Every time this PDO sends a message to the network, the identifier of that message will be this COB-ID. The structure of this field is described in table 7.8.

The sub-index 2 indicates the transmission type of this object, which follows the table 7.9 description. Its working is however different for transmit PDOs:

- **Value 0:** indicates that the transmission must occur immediately after the reception of a SYNC telegram, but not periodically.
- **Values 1 – 240:** the PDO must be transmitted at each detected SYNC telegram (or multiple occurrences of SYNC, according to the number chosen between 1 and 240).
- **Value 252:** indicates that the message content must be updated (but not sent) after the reception of a SYNC telegram. The transmission of the message must be done after the reception of a remote frame (RTR frame).
- **Value 253:** the PDO must update and send a message as soon as it receives a remote frame.
- **Value 254:** The object must be transmitted according to the timer programmed in sub-index 5.
- **Value 255:** the object is transmitted automatically when the value of any of the objects mapped in this PDO is changed. It works by changing the state (Change of State). This type does also allow that the PDO be transmitted according to the timer programmed in sub-index 5.

In the sub-index 3 it is possible to program a minimum time (in multiples of 100 µs) that must elapse after the a telegram has been sent, so that a new one can be sent by this PDO. The value 0 (zero) disables this function.

The sub-index 4 has no function and exists only for compatibility reasons.

The sub-index 5 contains a value to enable a timer for the automatic sending of a PDO. Therefore, whenever a PDO is configured as the asynchronous type, it is possible to program the value of this timer (in multiples of 1 ms), so that the PDO is transmitted periodically in the programmed time.

NOTE!

- The value of this timer must be programmed according to the used transmission rate. Very short times (close to the transmission time of the telegram) are able to monopolize the bus, causing indefinite retransmission of the PDO, and avoiding that other less priority objects transmit their data
- The minimum time allowed for this Function in the Remote Unit RUW100 is 2 ms.
- It is important to observe the time between transmissions programmed in the sub-index 3, especially when the PDO is programmed with the value 255 in the sub-index 2 (Change of State).
- Do not forget that PDOs can only be received if the slave is in the operational state.

PDO_MAPPING

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1A00h - 1A1Fh	0	Number of the last sub-index	UNSIGNED8	RO	No	0
	1 - 4	1 up to 4 object mapped in the PDO	UNSIGNED32	RW	No	0

The PDO MAPPING for the transmission works in similar way than for the reception, however in this case the data to be transmitted by the PDO are defined. Each mapped object must be put in the list according to the description showed next:

UNSIGNED32		
Index (16 bits)	Sub-index (8 bits)	Object size (8 bits)

For instance, analyzing the standard mapping of the fourth transmit PDO, we have:

- **Sub-índice 0 = 2:** This PDO has two mapped objects.
- **Sub-índice 1 = 22A8.0010h:** the first mapped object has an index equal to 22A8h, sub-index 0 (zero), and a size of 32 bits. This object corresponds to the parameter P0900 - RUW100 - Read Digital Inputs (DIs).
- **Sub-índice 2 = 2018.0020h:** the second mapped object has an index equal to 2018h, sub- index 0 (zero), and a size of 32 bits. This object corresponds to the parameter P1100 - Slot 1 - Read Digital Inputs (DIs).

It is possible to modify this mapping by changing the quantity or the number of mapped objects. Remember that a maximum of 8 bytes can be mapped.

NOTE!
In order to change the mapped objects in a PDO, it is first necessary to write the value 0 (zero) in the sub-index 0 (zero). In that way the values of the sub-indexes 1 to 4 can be changed. After the desired mapping has been done, one must write again in the sub-index 0 (zero) the number of objects that have been mapped, enabling again the PDO.

7.4 SYNCHRONIZATION OBJECT - SYNC

This object is transmitted with the purpose of allowing the synchronization of events among the CANopen network devices. It is transmitted by a SYNC producer, and the devices that detect its transmission are named SYNC consumers.

The Remote Unit RUW100 has the function of a SYNC consumer and, therefore, it can program its PDOs to be synchronous. Synchronous PDOs are those related to the synchronization object, thus they can be programmed to be transmitted or updated based in this object.

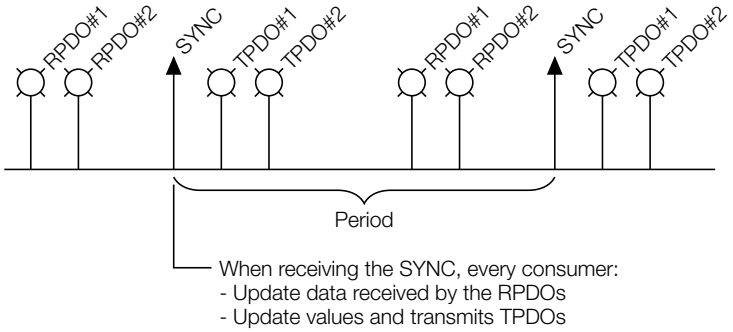

Figure 7.3: *SYNC*

The SYNC message transmitted by the producer does not have any data in its data field, because its purpose is to provide a time base for the other objects. The following object is available for the configuration of the SYNC consumer:

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1005h	0	COB-ID SYNC	UNSIGNED32	RW	No	80h

NOTE!
The period of the SYNC telegrams must be programmed in the producer according to the transmission rate and the number of synchronous PDOs to be transmitted. There must be enough time for the transmission of these objects, and it is also recommended that there is a tolerance to make it possible the transmission of asynchronous messages, such as EMCY, asynchronous PDOs and SDOs.

7.5 NETWORK MANAGEMENT - NMT

The network management object is responsible for a series of services that control the communication of the device in a CANopen network. For this object, the services of node control and error control are available (using Node Guarding or Heartbeat).

7.5.1 Slave State Control

With respect to the communication, a CANopen network device can be described by the following state machine:

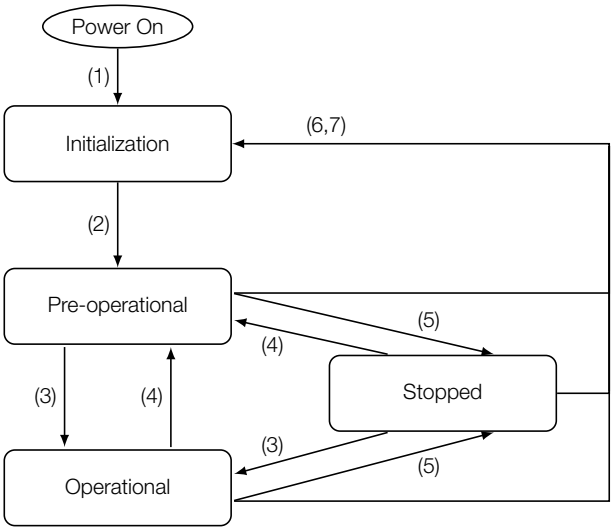

Figure 7.4: *CANopen node state diagram*

Table 7.10: *Transitions Description*

Transition	Description
1	The device is switched on and initiates the initialization (automatic)
2	Initialization concluded, it goes to the preoperational state (automatic)
3	It receives the Start Node command for entering the operational state
4	It receives the Enter Pre-Operational command, and goes to the preoperational state
5	It receives the Stop Node command for entering the stopped state
6	It receives the Reset Node command, when it executes the device complete reset
7	It receives the Reset Communication command, when it reinitializes the object values and the CANopen device communication

During the initialization the Node-ID is defined, the objects are created and the interface with the CAN network is configured. Communication with the device is not possible during this stage, which is concluded automatically. At the end of this stage the slave sends to the network a telegram of the Boot-up Object, used only to indicate that the initialization has been concluded and that the slave has entered the preoperational state. This telegram has the identifier 700h + Node-ID, and only one data byte with value equal to 0 (zero).

In the preoperational state it is already possible to communicate with the slave. But its PDOs are not yet available

for operation. In the operational state all the objects are available, whereas in the stopped state only the NMT object can receive or transmit telegrams to the network. The next table shows the objects available for each state.

Table 7.11: *Objects accessible in each state*

	Initialization	Preoperational	Operational	Stopped
PDO			•	
SDO		•	•	
SYNC		•	•	
EMCY		•	•	
Boot-up	•			
NMT		•	•	•

This state machine is controlled by the network master, which sends to each slave the commands so that the desired state change be executed. These telegrams do not have confirmation, what means that the slave does only receive the telegram without returning an answer to the master. The received telegrams have the following structure:

Identifier	byte 1	byte 2
00h	Command Code	Destination Node-ID

Table 7.12: *Commands for the state transition*

Command Code	Destination Node ID
1 = START node (transition 3) 2 = STOP node (transition 4) 128 = Enter preoperational (transition 5) 129 = Reset node (transition 6) 130 = Reset comunication (transition 7)	0 = All the slaves 1 ... 127 = Specific slave

The transitions indicated in the command code correspond to the state transitions executed by the node after receiving the command (according to the figure 7.4). The Reset node command makes the slave execute a complete reset of the device, while the Reset communication command causes the device to reinitialize only the objects pertinent to the CANopen communication.

7.5.2 Error Control - Node Guarding

This service is used to make it possible the monitoring of the communication with the CANopen network, both by the master and the slave as well. In this type of service the master sends periodical telegrams to the slave, which responds to the received telegram. If some error that interrupts the communication occurs, it will be possible to identify this error, because the master as well as the slave will be notified by the Timeout in the execution of this service. The error events are called Node Guarding for the master and Life Guarding for the slave.

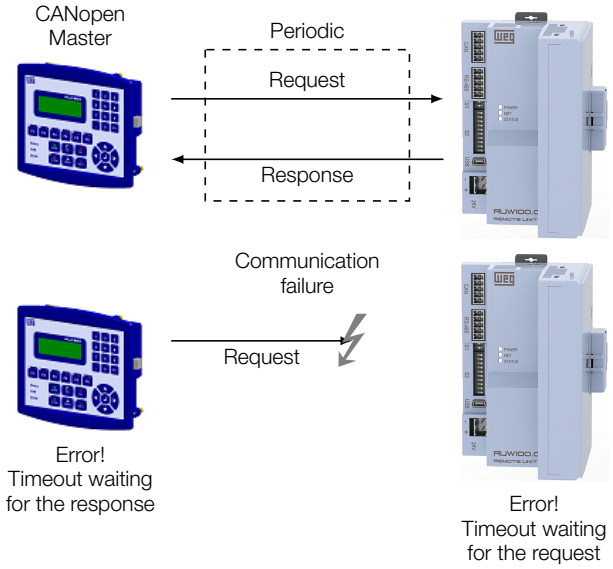

Figure 7.5: *Error control service – Node Guarding*

There are two objects of the dictionary for the configuration of the error detection times for the Node Guarding service:

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
100Ch	0	Guard Time	UNSIGNED16	RW	No	0

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
100Dh	0	Life Time Factor	UNSIGNED8	RW	No	0

The 100Ch object allows programming the time necessary (in milliseconds) for a fault occurrence being detected, in case the slave does not receive any telegram from the master. The 100Dh object indicates how many faults in sequence are necessary until it be considered that there was really a communication error. Therefore, the multiplication of these two values will result in the total necessary time for the communication error detection using this object. The value 0 (zero) disables this function.

Once configured, the slave starts counting these times starting from the first Node Guarding telegram received from the network master. The master's telegram is of the remote type, not having data bytes. The identifier is equal to 700h + Node-ID of the destination slave. However the slave response telegram has 1 data byte with the following structure:

Identificador	byte 1	
	bit 7	bit 6 ... 0
700h + Node ID	Toogle	Estado do Escravo

This telegram has one single data byte. This byte contains, in the seven least significant bits, a value to indicate the slave state (4 = stopped, 5 = operational and 127 = preoperational), and in the eighth bit, a value that must be changed at every telegram sent by the slave (toggle bit).

If the Remote Unit RUW100 detects an error using this mechanism, it will turn automatically to the preoperational state and indicate with the LED of error.

NOTE!

- This object is active even in the stopped state (see table 7.11).
- The value 0 (zero) in any of these two objects will disable this function.
- If after the error detection the service is enabled again, then the error indication will be removed.
- The minimum value accepted by the RUW100 Remote Unit is 2 ms. But considering the transmission rate and the number of nodes in the network, the times programmed for this function must be consistent, so that there is enough time for the transmission of the telegrams and also that the rest of the communication be able to be processed.
- For any slave only one of the two services - Heartbeat or Node Guarding – can be enabled.

7.5.3 Error Control - Heartbeat

The error detection through the Heartbeat mechanism is done using two types of objects: the Heartbeat producer and the Heartbeat consumer. The producer is responsible for sending periodic telegrams to the network, simulating a heartbeat, indicating that the communication is active and without errors. One or more consumers can monitor these periodic telegrams, and if they cease occurring, it means that any communication problem occurred.

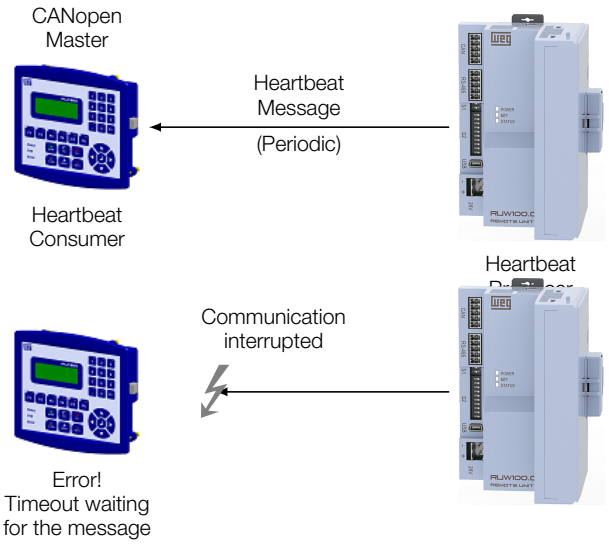

Figure 7.6: *Error control service – Heartbeat*

One device of the network can be both producer and consumer of heartbeat messages. For example, the network master can consume messages sent by a slave, making it possible to detect communication problems with the master, and simultaneously the slave can consume heartbeat messages sent by the master, also making it possible to the slave detect communication fault with the master.

The RUW100 Remote Unit has the producer and consumer of heartbeat services. As a consumer, it is possible to program up to 4 different producers to be monitored by the equipment:

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1016h	0	Number of the last sub-index	UNSIGNED8	RO	No	2
	1 - 2	Consumer Heartbeat Time 1 – 2	UNSIGNED32	RW	No	0

At sub-indexes 1 to 2, it is possible to program the consumer by writing a value with the following format:

UNSIGNED32		
Reserved (8 bits)	Node-ID (8 bits)	HeartBeat time (16 bits)

- Node-ID: it allows programming the Node-ID for the heartbeat producer to be monitored.
- Heartbeat time: it allows programming the time, in 1 millisecond multiples, until the error detection if no message of the producer is received. The value 0 (zero) in this field disables the consumer.

Once configured, the heartbeat consumer initiates the monitoring after the reception of the first telegram sent by the producer. In case that an error is detected because the consumer stopped receiving messages from the heartbeat producer, it will turn automatically to the preoperational state and indicate with the LED of error.

As a producer, the RUW100 Remote Unit has an object for the configuration of that service:

Index	Sub-index	Name	Type	Access	PDO Mapping	Value
1017h	0	Producer Heartbeat Time	UNSIGNED16	RW	No	0

The 1017h object allows programming the time in milliseconds during which the producer has to send a heartbeat telegram to the network. Once programmed, the device initiates the transmission of messages with the following format:

Identifier	byte 1	
	bit 7	bit 6 ... 0
700h + Node ID	Always 0	Slave State

NOTE!

- This object is active even in the stopped state (see table 7.11).
- The value 0 (zero) in any of these two objects will disable this function.
- If after the error detection the service is enabled again, then the error indication will be removed.
- The minimum value accepted by the RUW100 Remote Unit is 2 ms. But considering the transmission rate and the number of nodes in the network, the times programmed for this function must be consistent, so that there is enough time for the transmission of the telegrams and also that the rest of the communication be able to be processed.
- For any slave only one of the two services - Heartbeat or Node Guarding – can be enabled.

7.6 INITIALIZATION PROCEDURE

Once the operation of the objects available for the RUW100 Remote Unit is known, then it becomes necessary to program the different objects to operate combined in the network. In a general manner, the procedure for the initialization of the objects in a CANopen network follows the description of the next flowchart:

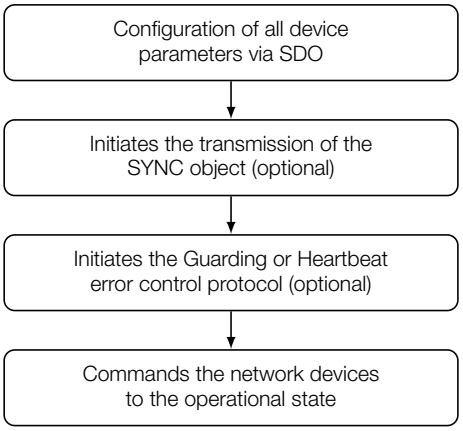

Figure 7.7: *Initialization process flowchart*

It is necessary to observe that the RUW100 Remote Unit communication objects (1000h to 1FFFh) are not stored in the nonvolatile memory. Therefore, every time the equipment is reset or switched off, it is necessary to redo the communication objects parameter setting. The manufacturer specific objects (starting from 2000h that represents the parameters), they are stored in the nonvolatile memory and, thus, could be set just once.

8 CIA 401 - DEVICE PROFILE FOR GENERIC I/O MODULES

This item will describe the common objects for generic I/O modules, defined by the CANopen specification, in the document CiA DS 401. The objects mentioned here have similar description and operation, regardless of the manufacturer of the I/O module. This makes easy interoperability and interchangeability between different devices.

The following table shows the list of objects available for the RUW100 Remote Unit.

Table 8.1: *Object List – Device Profile for Generic I/O Modules*

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6000h	Array	Read Input 8 Bit	UINT8	ro	Yes
6100h	Array	Read Input 16 Bit	UINT16	ro	Yes
6200h	Array	Write Output 8 Bit	UINT8	rw	Yes
6300h	Array	Write Output 16 Bit	UINT16	rw	Yes
6306h	Array	Error Mode Output 16 Bit	UINT16	rw	No
6307h	Array	Error Value Output 16 Bit	UNIT16	rw	No
6401h	Array	Read Analogue Input 16 Bit	UINT16	ro	Yes
6402h	Array	Read Analogue Input 32 Bit	INT32	ro	Yes
6411h	Array	Write Analogue Output 16 Bit	INT16	rw	Yes

8.1 OBJECT 6000H – READ INPUT 8 BIT

It makes possible to read the digital inputs. The digital inputs are mapped sequentially in each sub-index of the object 6000h with 8-bit size.

For instance, if the main module has 16 digital inputs, these will be mapped in sub-indexes 1 and 2. For the first expansion module with digital inputs, these will be mapped from the next sub-index on.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6000h	0	Number of Entries	UINT8	ro	No
	1	Inputs 1 to 8	UINT8	rw	Yes
	2	Inputs 9 to 16	UINT8	rw	Yes
	3	Inputs 17 to 24	UINT8	rw	Yes
	4	Inputs 25 to 32	UINT8	rw	Yes
	5	Inputs 33 to 40	UINT8	rw	Yes
	6	Inputs 41 to 48	UINT8	rw	Yes
	7	Inputs 49 to 56	UINT8	rw	Yes
	8	Inputs 57 to 64	UINT8	rw	Yes
	9	Inputs 65 to 72	UINT8	rw	Yes
	10	Inputs 73 to 80	UINT8	rw	Yes
	11	Inputs 81 to 88	UINT8	rw	Yes
	12	Inputs 89 to 96	UINT8	rw	Yes
	13	Inputs 97 to 104	UINT8	rw	Yes
	14	Inputs 105 to 112	UINT8	rw	Yes
	15	Inputs 113 to 120	UINT8	rw	Yes
	16	Inputs 121 to 128	UINT8	rw	Yes
	17	Inputs 129 to 136	UINT8	rw	Yes
	18	Inputs 137 to 144	UINT8	rw	Yes
	19	Inputs 145 to 152	UINT8	rw	Yes
	20	Inputs 153 to 160	UINT8	rw	Yes
	21	Inputs 161 to 168	UINT8	rw	Yes
	22	Inputs 169 to 176	UINT8	rw	Yes
	23	Inputs 177 to 184	UINT8	rw	Yes
	24	Inputs 185 to 192	UINT8	rw	Yes
	25	Inputs 193 to 200	UINT8	rw	Yes
	26	Inputs 201 to 208	UINT8	rw	Yes

8.2 OBJECT 6100H – READ INPUT 16 BIT

It makes possible to read the digital inputs. The digital inputs are mapped sequentially in each sub-index of the object 6100h with 16-bit size.

For instance, if the main module has 16 digital inputs, these will be mapped in sub-index 1. For the first expansion module with digital inputs, these will be mapped from the next sub-index on.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6100h	0	Number of Entries	UINT8	ro	No
	1	Inputs 1 to 16	UINT8	rw	Yes
	2	Inputs 17 to 32	UINT8	rw	Yes
	3	Inputs 33 to 48	UINT8	rw	Yes
	4	Inputs 48 to 64	UINT8	rw	Yes
	5	Inputs 65 to 80	UINT8	rw	Yes
	6	Inputs 81 to 96	UINT8	rw	Yes
	7	Inputs 97 to 112	UINT8	rw	Yes
	8	Inputs 113 to 128	UINT8	rw	Yes
	9	Inputs 129 to 144	UINT8	rw	Yes
	10	Inputs 145 to 160	UINT8	rw	Yes
	11	Inputs 161 to 176	UINT8	rw	Yes
	12	Inputs 177 to 192	UINT8	rw	Yes
	13	Inputs 193 to 208	UINT8	rw	Yes

NOTE!
The objects 6000h and 6100h allow access to the same product data. Only the size of each object changes, allowing different mapping procedure.

NOTE!
For each expansion module, the inputs mapping will be aligned to a new 16-bit sub-index. For example, if the module has 24 inputs, they will be mapped into two 16-bit sub-indexes, and the last 8 bits of the second sub-index will be reserved. The next module added will have its inputs mapped to the next free sub-index.

8.3 OBJECT 6200H – WRITE OUTPUT 8 BIT

It makes possible to write the digital outputs. The digital outputs are mapped sequentially in each sub-index of the object 6200h with 8-bit size.

For instance, if the main module has 16 digital outputs, these will be mapped in sub-indexes 1 and 2. For the first expansion module with digital outputs, these will be mapped from the next sub-index on.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6200h	0	Number of Entries	UINT8	ro	No
	1	Outputs 1 to 8	UINT8	rw	Yes
	2	Outputs 9 to 16	UINT8	rw	Yes
	3	Outputs 17 to 24	UINT8	rw	Yes
	4	Outputs 25 to 32	UINT8	rw	Yes
	5	Outputs 33 to 40	UINT8	rw	Yes
	6	Outputs 41 to 48	UINT8	rw	Yes
	7	Outputs 49 to 56	UINT8	rw	Yes
	8	Outputs 57 to 64	UINT8	rw	Yes
	9	Outputs 65 to 72	UINT8	rw	Yes
	10	Outputs 73 to 80	UINT8	rw	Yes
	11	Outputs 81 to 88	UINT8	rw	Yes
	12	Outputs 89 to 96	UINT8	rw	Yes
	13	Outputs 97 to 104	UINT8	rw	Yes
	14	Outputs 105 to 112	UINT8	rw	Yes
	15	Outputs 113 to 120	UINT8	rw	Yes
	16	Outputs 121 to 128	UINT8	rw	Yes
	17	Outputs 129 to 136	UINT8	rw	Yes
	18	Outputs 137 to 144	UINT8	rw	Yes
	19	Outputs 145 to 152	UINT8	rw	Yes
	20	Outputs 153 to 160	UINT8	rw	Yes
	21	Outputs 161 to 168	UINT8	rw	Yes
	22	Outputs 169 to 176	UINT8	rw	Yes
	23	Outputs 177 to 184	UINT8	rw	Yes
	24	Outputs 185 to 192	UINT8	rw	Yes
	25	Outputs 193 to 200	UINT8	rw	Yes
	26	Outputs 201 to 208	UINT8	rw	Yes

8.4 OBJECT 6300H – WRITE OUTPUT 16 BIT

It makes possible to write the digital outputs. The digital outputs are mapped sequentially in each sub-index of the object 6300h with 16-bit size.

For instance, if the main module has 16 digital outputs, these will be mapped in sub-index 1. For the first expansion module with digital outputs, these will be mapped from the next sub-index on.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6300h	0	Number of Entries	UINT8	ro	No
	1	Outputs 1 to 16	UINT8	rw	Yes
	2	Outputs 17 to 32	UINT8	rw	Yes
	3	Outputs 33 to 48	UINT8	rw	Yes
	4	Outputs 48 to 64	UINT8	rw	Yes
	5	Outputs 65 to 80	UINT8	rw	Yes
	6	Outputs 81 to 96	UINT8	rw	Yes
	7	Outputs 97 to 112	UINT8	rw	Yes
	8	Outputs 113 to 128	UINT8	rw	Yes
	9	Outputs 129 to 144	UINT8	rw	Yes
	10	Outputs 145 to 160	UINT8	rw	Yes
	11	Outputs 161 to 176	UINT8	rw	Yes
	12	Outputs 177 to 192	UINT8	rw	Yes
	13	Outputs 193 to 208	UINT8	rw	Yes

NOTE!
The objects 6200h and 6300h allow access to the same product data. Only the size of each object changes, allowing different mapping procedure.

NOTE!
For each expansion module, the outputs mapping will be aligned to a new 16-bit sub-index. For example, if the module has 24 outputs, they will be mapped into two 16-bit sub-indexes, and the last 8 bits of the second sub-index will be reserved. The next module added will have its outputs mapped to the next free sub-index.

8.5 OBJECT 6306H – ERROR MODE OUTPUT 16 BIT

This object defines whether a digital output receives a pre-defined value (object 6307h) in case of an internal error or when the RUW100 Remote Unit goes to STOP MODE. Each sub-index defines a WORD (16-bit) where each bit of this WORD configures the action for an output.

- 1 - output value is pre-defined in object 6307h;
- 0 - output value maintained in case of error.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6306h	0	Number of Entries	UINT8	ro	No
	1	Outputs 1 to 16	UINT8	rw	Yes
	2	Outputs 17 to 32	UINT8	rw	Yes
	3	Outputs 33 to 48	UINT8	rw	Yes
	4	Outputs 48 to 64	UINT8	rw	Yes
	5	Outputs 65 to 80	UINT8	rw	Yes
	6	Outputs 81 to 96	UINT8	rw	Yes
	7	Outputs 97 to 112	UINT8	rw	Yes
	8	Outputs 113 to 128	UINT8	rw	Yes
	9	Outputs 129 to 144	UINT8	rw	Yes
	10	Outputs 145 to 160	UINT8	rw	Yes
	11	Outputs 161 to 176	UINT8	rw	Yes
	12	Outputs 177 to 192	UINT8	rw	Yes
	13	Outputs 193 to 208	UINT8	rw	Yes

8.6 OBJECT 6307H – ERROR VALUE OUTPUT 16 BIT

In this object, the value that the digital output should present in case of internal error or when the RUW100 Remote Unit goes to STOP MODE is parameterized. Each sub-Index defines a WORD (16-bit) where each bit of this WORD configures the action for a group of outputs.

- 1 - output value is 1 (on) if enabled on object 6306h;
- 0 - output value is 0 (off) if enabled on object 6306h.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6307h	0	Number of Entries	UINT8	ro	No
	1	Outputs 1 to 16	UINT8	rw	Yes
	2	Outputs 17 to 32	UINT8	rw	Yes
	3	Outputs 33 to 48	UINT8	rw	Yes
	4	Outputs 48 to 64	UINT8	rw	Yes
	5	Outputs 65 to 80	UINT8	rw	Yes
	6	Outputs 81 to 96	UINT8	rw	Yes
	7	Outputs 97 to 112	UINT8	rw	Yes
	8	Outputs 113 to 128	UINT8	rw	Yes
	9	Outputs 129 to 144	UINT8	rw	Yes
	10	Outputs 145 to 160	UINT8	rw	Yes
	11	Outputs 161 to 176	UINT8	rw	Yes
	12	Outputs 177 to 192	UINT8	rw	Yes
	13	Outputs 193 to 208	UINT8	rw	Yes

8.7 OBJECT 6401H – READ ANALOGUE INPUT 16 BIT

Each sub-index of this object has a 16-bit value of an analog input.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6401h	0	Number of Entries	INT16	ro	No
	1	Output 1	INT16	rw	Yes
	2	Output 2	INT16	rw	Yes
	3	Output 3	INT16	rw	Yes
	4	Output 4	INT16	rw	Yes
	5	Output 5	INT16	rw	Yes
	6	Output 6	INT16	rw	Yes
	7	Output 7	INT16	rw	Yes
	8	Output 8	INT16	rw	Yes
	...	...	...	...	...
	10	Output 64	INT16	rw	Yes

8.8 OBJECT 6402H – READ ANALOGUE INPUT 32 BIT

Each sub-index of this object has a 32-bit value of an analog input.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6402h	0	Number of Entries	INT32	ro	No
	1	Output 1	INT32	rw	Yes
	2	Output 2	INT32	rw	Yes
	3	Output 3	INT32	rw	Yes
	4	Output 4	INT32	rw	Yes
	5	Output 5	INT32	rw	Yes
	6	Output 6	INT32	rw	Yes
	7	Output 7	INT32	rw	Yes
	8	Output 8	INT32	rw	Yes
	...	...	...	...	...
	10	Output 64	INT32	rw	Yes

8.9 OBJECT 6411H – WRITE ANALOGUE INPUT 16 BIT

Each sub-index of this object writes a 16-bit value to an analog output.

Index	Sub-Index	Name	Type	Acess	PDO Mapping
6411h	0	Number of Entries	INT16	ro	No
	1	Output 1	INT16	rw	Yes
	2	Output 2	INT16	rw	Yes
	3	Output 3	INT16	rw	Yes
	4	Output 4	INT16	rw	Yes
	5	Output 5	INT16	rw	Yes
	6	Output 6	INT16	rw	Yes
	7	Output 7	INT16	rw	Yes
	8	Output 8	INT16	rw	Yes
	...	...	...	...	...
	10	Output 64	INT16	rw	Yes

9 STARTUP GUIDE

The main steps to start up the RUW100 Remote Unit in CANopen network are described below. These steps represent an example of use. Check out the specific chapters for details on the indicated steps.

9.1 INSTALLING THE PRODUCT ON THE NETWORK

1. Install RUW100 Remote Unit on the CANopen network and make the necessary configurations for operation, as described in item 2.
2. Connect the cable to the accessory, considering the recommended instructions in network installation, as described in item 3.5:
   - Use shielded cable.
   - Properly ground network equipment.
   - Avoid laying communication cables next to power cables.

9.2 CONFIGURING THE EQUIPMENT

1. Follow the recommendations described in the user manual to program the device parameters.
2. Configure communication setting, such as address and baud rate at DIP switch S2.
3. Program the desired action for the equipment in case of communication fault in P0624: Action for Communication Fault.

9.3 CONFIGURING THE MASTER

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.

1. Load the EDS file[3] to the list of devices in the network configuration tool.
2. Select RUW100 Remote Unit from the available list of devices on the network configuration tool. This can be done manually or automatically, if allowed by the tool.
3. During the configuration of the network, it is necessary to define which data will be read and written at Remote Unit RUW100 by configuring the transmission and reception PDOs as described in item 7.3. Among the main parameters that can be used to control the device, we can mention:
4. Configure error control using the Node Guarding or Heartbeat services as described in item 7.5.

Once configured, the network status P0610: CAN - CANopen Communication Status indicates 2 or 3 and the node state P0611: CAN - CANopen Slave Status indicates 3. It is in this condition that PDO transmission and reception effectively occurs.

9.4 COMMUNICATION STATUS

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

[3]The EDS file is available from WEG website (http://www.weg.net). It is important to note if the EDS configuration file is compatible with the firmware version of the RUW100 Remote Unit.

- The NET1 AND NET2 LEDs provide information about the status of the interface.
- The parameters P0610: CAN - CANopen Communication Status and P0611: CAN - CANopen Slave Status indicate the status of CANopen communication.

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

9.5 OPERATION USING PROCESS DATA

Once the communication is established, the data mapped in the PDOs is automatically updated.

It is important to know these parameters to program the master as desired for the application.

9.6 ACCESS TO PARAMETERS – ACYCLIC MESSAGES

Besides the cyclic communication using PDOs, the CANopen protocol also defines a kind of acyclic message via SDO, used especially in asynchronous tasks, such as parameter setting and configuration of the equipment.

The EDS file provides the full parameter list of the equipment, which can be accessed via SDO. The item 6.4 describes how to address the parameters of the Remote Unit RUW100 via SDO.

10 FAULTS AND ALARMS

Fault/Alarm	Description	Possible Causes
Bus Off	The bus off error in the CAN interface has been detected. If the number of reception or transmission errors detected by the CAN interface is too high, the CAN controller can be taken to the bus off state, where it interrupts the communication and disables the CAN interface. In order that the communication be reestablished, it will be necessary to cycle the power of the product, or remove the power supply from the CAN interface and apply it again, so that the communication be reinitiated. In this case, it will be signaled through the red ERROR led on the front of the remote unit. Communication is reestablished automatically if the 225Ah object has a value of 1. If the value of the 225Ah object is 0, it will be necessary to turn the remote unit off and on to reestablish communication.	- Verify if there is any short-circuit between the CAN circuit transmission cables. - Verify if the cables have not been changed or inverted. - Verify if all the network devices use the same baud rate. - Verify if termination resistors with the correct values were installed only at the extremes of the main bus. - Verify if the CAN network installation was carried out in proper manner.
CANopen Offline	It occurs when CANopen node state changes from operational to pre-operational.	- Verify the error control mechanisms operation (Heartbeat/Node Guarding). - Verify if the master is sending the guarding/heartbeat telegrams in the programmed time. - Verify communication problems that can cause telegram losses or transmission delays.

APPENDIX A QUICK REFERENCES

Table A.2: *Parameters quick reference*

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
RUW100.1 RUW100\Status							
RUW100.1.1	Ladder						
P0099	Ladder - Program status	0 = Stopped 1 = Running 2 = No program 3 = Invalid 4 = Installing	-	ro, enum	99	2063h	0
RUW100.1.2	Errors and Faults						
P0100	Last Fault - 1 ... 5	0 = NO ERROR 1 = RS485 SERIAL WATCHDOG 2 = CAN WARNING 3 = CAN ERROR PASSIVE 4 = CAN BUS OFF 5 = CAN NO BUS POWER 6 = CAN INIT ERROR 7 = CAN ERROR ENABLE 8 = CANOPEN NODE GUARD ERROR 9 = CANOPEN HEARTBEAT ERROR 10 ... 13 = INTERNAL ERROR 14 = RETENTIVE MEMORY 15 = FLASH MEMORY 50% 16 = FLASH MEMORY 100% 17 = NUMBER OF ACCESSORIES EXCEEDED 18 = INTRABUS ADDRESSING ERROR 19 = INTRAUBS IDENTIFICATION ERROR 20 = INTERNAL ERROR 21 = IDENTIFICATION ERROR SLOT 1 22 = IDENTIFICATION ERROR SLOT 2 23 = IDENTIFICATION ERROR SLOT 3 24 = IDENTIFICATION ERROR SLOT 4 25 = IDENTIFICATION ERROR SLOT 5 26 = IDENTIFICATION ERROR SLOT 6 27 = IDENTIFICATION ERROR SLOT 7 28 = IDENTIFICATION ERROR SLOT 8 29 ... 30 = INTERNAL ERROR 31 = INTRABUS TIMEOUT SLOT 1 32 = INTRABUS TIMEOUT SLOT 2 33 = INTRABUS TIMEOUT SLOT 3 34 = INTRABUS TIMEOUT SLOT 4 35 = INTRABUS TIMEOUT SLOT 5 36 = INTRABUS TIMEOUT SLOT 6 37 = INTRABUS TIMEOUT SLOT 7 38 = INTRABUS TIMEOUT SLOT 8	-	ro, enum	100	2064h	0 ... 5

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		39 ... 40 = INTERNAL ERROR 41 = INTRABUS CRC ERROR SLOT 1 42 = INTRABUS CRC ERROR SLOT 2 43 = INTRABUS CRC ERROR SLOT 3 44 = INTRABUS CRC ERROR SLOT 4 45 = INTRABUS CRC ERROR SLOT 5 46 = INTRABUS CRC ERROR SLOT 6 47 = INTRABUS CRC ERROR SLOT 7 48 = INTRABUS CRC ERROR SLOT 8 49 ... 50 = Reserved 51 = INTRABUS COOMAND ERROR SLOT 1 52 = INTRABUS COOMAND ERROR SLOT 2 53 = INTRABUS COOMAND ERROR SLOT 3 54 = INTRABUS COOMAND ERROR SLOT 4 55 = INTRABUS COOMAND ERROR SLOT 5 56 = INTRABUS COOMAND ERROR SLOT 6 57 = INTRABUS COOMAND ERROR SLOT 7 58 = INTRABUS COOMAND ERROR SLOT 8 59 ... 70 = INTERNAL ERROR					
P0105	Last Alarm - 1 ... 5	0 = NO ERROR 1 = RS485 SERIAL WATCHDOG 2 = CAN WARNING 3 = CAN ERROR PASSIVE 4 = CAN BUS OFF 5 = CAN NO BUS POWER 6 = CAN INIT ERROR 7 = CAN ERROR ENABLE 8 = CANOPEN NODE GUARD ERROR 9 = CANOPEN HEARTBEAT ERROR 10 ... 13 = INTERNAL ERROR 14 = RETENTIVE MEMORY 15 = FLASH MEMORY 50% 16 = FLASH MEMORY 100% 17 = NUMBER OF ACCESSORIES EXCEEDED 18 = INTRABUS ADDRESSING ERROR 19 = INTRAUBS IDENTIFICATION ERROR 20 = INTERNAL ERROR 21 = IDENTIFICATION ERROR SLOT 1 22 = IDENTIFICATION ERROR SLOT 2 23 = IDENTIFICATION ERROR SLOT 3	-	ro, enum	105	2069h	0 ... 5

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		24 = IDENTIFICATION ERROR SLOT 4 25 = IDENTIFICATION ERROR SLOT 5 26 = IDENTIFICATION ERROR SLOT 6 27 = IDENTIFICATION ERROR SLOT 7 28 = IDENTIFICATION ERROR SLOT 8 29 ... 30 = INTERNAL ERROR 31 = INTRABUS TIMEOUT SLOT 1 32 = INTRABUS TIMEOUT SLOT 2 33 = INTRABUS TIMEOUT SLOT 3 34 = INTRABUS TIMEOUT SLOT 4 35 = INTRABUS TIMEOUT SLOT 5 36 = INTRABUS TIMEOUT SLOT 6 37 = INTRABUS TIMEOUT SLOT 7 38 = INTRABUS TIMEOUT SLOT 8 39 ... 40 = INTERNAL ERROR 41 = INTRABUS CRC ERROR SLOT 1 42 = INTRABUS CRC ERROR SLOT 2 43 = INTRABUS CRC ERROR SLOT 3 44 = INTRABUS CRC ERROR SLOT 4 45 = INTRABUS CRC ERROR SLOT 5 46 = INTRABUS CRC ERROR SLOT 6 47 = INTRABUS CRC ERROR SLOT 7 48 = INTRABUS CRC ERROR SLOT 8 49 ... 50 = Reserved 51 = INTRABUS COOMAND ERROR SLOT 1 52 = INTRABUS COOMAND ERROR SLOT 2 53 = INTRABUS COOMAND ERROR SLOT 3 54 = INTRABUS COOMAND ERROR SLOT 4 55 = INTRABUS COOMAND ERROR SLOT 5 56 = INTRABUS COOMAND ERROR SLOT 6 57 = INTRABUS COOMAND ERROR SLOT 7 58 = INTRABUS COOMAND ERROR SLOT 8 59 ... 70 = INTERNAL ERROR					
RUW100.1.3	CAN						
P0600	CAN - Address	1 to 127	-	ro, 16bit	600	2258h	0
P0601	CAN - Baudrate	0 = 1 Mbit/s 1 = 800 Kbit/s 2 = 500 Kbit/s 3 = 250 Kbit/s 4 = 125 Kbit/s 5 = 100 Kbit/s	-	ro, enum	601	2259h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		6 = 50 Kbit/s 7 = 20 Kbit/s					
P0605	CAN - Controller Status	0 = Disable 1 = Auto-baud 2 = CAN Enabled 3 = Warning 4 = Error Passive 5 = Bus Off	-	ro, enum	605	225Dh	0
P0606	CAN - RX CAN Telegrams	0 to 65535	-	ro, 16bit	606	225Eh	0
P0607	CAN - TX CAN Telegrams	0 to 65535	-	ro, 16bit	607	225Fh	0
P0608	CAN - Bus Off counter	0 to 65535	-	ro, 16bit	608	2260h	0
P0609	CAN - Lost Telegrams	0 to 65535	-	ro, 16bit	609	2261h	0
P0610	CAN - CANopen Communication Status	0 = Disabled 1 = Reserved 2 = Comm Enabled 3 = Error Ctrl. Enab. 4 = Guarding Error 5 = Heartbeat Error	-	ro, enum	610	2262h	0
P0611	CAN - CANopen Slave Status	0 = Disabled 1 = Initialization 2 = Stopped 3 = Operational 4 = PreOperational	-	ro, enum	611	2263h	0
RUW100.1.4	RS485						
P0620	RS485 - Current Address	1 to 247	-	ro, 8bit	620	226Ch	0
P0621	RS485 - Current Baudrate	0 = 9600 bit/s 1 = 19200 bit/s 2 = 38400 bit/s 3 = 57600 bit/s 4 = 76800 bit/s	-	ro, enum	621	226Dh	0
P0622	RS485 - Current Bytes Configuration	0 = no parity, 2 stop bits 1 = even parity, 1 stop bit 2 = odd parity, 1 stop bit	-	ro, enum	622	226Eh	0
RUW100.1.5	Firmware Version/Revision/Model						
P0401	Model (RUW)	0 = RUW100.0 - 00DO/00DI 1 = RUW100.1 - 08DO/16DI 2 = RUW100.2 - 10DO/14DI	-	ro, enum	401	2191h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P0402	Models (SLOTS) - 1 ... 8	5 = MOD03.00 - 8 AO 6 = MOD03.10 - 8 AO 7 = MOD07.00 - 6RE 16 = MOD1.00 - 24DI 17 = MOD1.10 - 24DO 18 = MOD1.30 - 08DO/16DI 19 = MOD1.20 - 16DO/08DI 128 = MOD02.00 - 7 AI 129 = MOD04.00 - 7 TH 130 = MOD05.00 - 4 RTD 131 = MOD06.00 - 2 SG 255 = Not Connected	-	ro, enum	402	2192h	0 ... 8
P0500	Firmware Version (RUW)	0.0 to 19.99	-	ro, 16bit	500	21F4h	0
P0501	Firmware Version (SLOTS) - 1 ... 8	0.0 to 19.99	-	ro, 16bit	501	21F5h	0 ... 8
P0520	Firmware Revision (RUW)	-32768 to 32767	-	ro, s16bit	520	2208h	0
P0540	Bootloader Version	20.0 to 60.0	-	ro, 16bit	540	221Ch	0
P0560	Product Serial Number	0 to 4294967295	-	ro, 32bit	560	2230h	0
P0400	Number Slots	0 to 255	-	ro, 8bit	400	2190h	0
RUW100.1.6	Scan/Tick						
P0700	Tick 100us	0 to 4294967295	-	ro, 32bit	700	22BCh	0
P0702	Scan Cycle	0.0 to 6553.5	-	ro, 16bit	702	22BEh	0
RUW100.1.7	Read Inputs (DIs)						
P0900	RUW100 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05 Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16	-	ro, 32bit	900	2384h	0
		RUW100.2 RUW100\Configuration					
RUW100.2.1	Flash						
P0204	Load Parameters	0 = External Flash Memory 1 = Save Parameters to Flash	0	rw, enum	204	20CCh	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		2 = Load Parameters From Flash 3 = Reset RUW100 4 = Load Factory Default 5 = Reconfigure Expansions					
RUW100.2.2	Communication						
P0625	RS485 - Configuration Source	0 = Switch 1 = Parameter	0	rw, enum	625	2271h	0
P0627	RS485 - Address via Parameter	0 to 247	0	rw, 8bit	627	2273h	0
P0626	RS485 - Baud/Bytes Config. via Param.	0 = 9600 bit/s No parity, 2 stop bits 1 = 19200 bit/s No parity, 2 stop bits 2 = 38400 bit/s No parity, 2 stop bits 3 = 57600 bit/s No parity, 2 stop bits 4 = 76800 bit/s No parity, 2 stop bits 5 = 9600 bit/s Even parity, 1 stop bit 6 = 19200 bit/s Even parity, 1 stop bit 7 = 38400 bit/s Even parity, 1 stop bit 8 = 57600 bit/s Even parity, 1 stop bit 9 = 76800 bit/s Even parity, 1 stop bit 10 = 9600 bit/s Odd parity, 1 stop bit 11 = 19200 bit/s Odd parity, 1 stop bit 12 = 38400 bit/s Odd parity, 1 stop bit 13 = 57600 bit/s Odd parity, 1 stop bit 14 = 76800 bit/s Odd parity, 1 stop bit 15 = Reserved	0	rw, enum	626	2272h	0
P0623	RS485 - Watchdog time	0.0 to 6553.5 s	0.0 s	rw, 16bit	623	226Fh	0
P0624	Action for Communication Fault	0 = No Action 1 = According to Error Mode	1	rw, enum	624	2270h	0
P0602	CAN - Bus Off Reset	0 = Manual 1 = Automatic	0	rw, enum	602	225Ah	0
RUW100.2.3	Digital Input/Output						
P0904	RUW100 - Error Mode Output	0 to 4294967295	0	rw, 32bit	904	2388h	0
P0906	RUW100 - Error Value	0 to 4294967295	0	rw, 32bit	906	238Ah	0
RUW100.2.4	Write Outputs (DOs)						
P0902	RUW100 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06	0	rw, 32bit	902	2386h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10					
RUW100.2.5	Clear Errors						
P0200	Clear Errors	0 to 255	0	rw, 8bit	200	20C8h	0
RUW100.2.6	LED						
P0628	LED NET - Configuration	0 = CAN 1 = RS485	0	rw, 8bit	628	2274h	0
		RUW100.3 RUW100\User					
P0800	User Parameter - 1 ... 20	-2147483648 to 2147483647	0	rw, s32bit	800	2320h	0 ... 20
		SLOT1.1 Slot 1\Digital Input/Output					
SLOT1.1.1	Write Outputs (DOs)						
P1102	Slot 1 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1102	244Eh	0
SLOT1.1.2	Read Inputs (DIs)						
P1100	Slot 1 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1100	244Ch	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT1.1.3	Configuration						
P1104	Slot 1 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1104	2450h	0
P1106	Slot 1 - Error Value	0 to 4294967295	0	rw, 32bit	1106	2452h	0
		SLOT1.2 Slot 1\Analog Input (AI, TH, RTD)					
SLOT1.2.1	Configuration						
SLOT1.2.1.1	Channel Enable						
P3135	Slot 1 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3135	2C3Fh	0 ... 7
SLOT1.2.1.2	Channel Type						
P3142	Slot 1 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3142	2C46h	0 ... 7
SLOT1.2.1.3	Channel Unit						
P3149	Slot 1 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3149	2C4Dh	0 ... 7
SLOT1.2.1.4	Channel Decimal Digit						
P3156	Slot 1 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3156	2C54h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT1.2.1.5	Channel Filter						
P3163	Slot 1 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3163	2C5Bh	0 ... 7
SLOT1.2.1.6	Channel Gain						
P3170	Slot 1 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3170	2C62h	0 ... 7
SLOT1.2.1.7	Channel Offset						
P3178	Slot 1 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3178	2C6Ah	0 ... 7
SLOT1.2.2	Status						
SLOT1.2.2.1	Analogue Input 16 Bits						
P3100	Slot 1 - Read Analogue Input 16 bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3100	2C1Ch	0 ... 7
SLOT1.2.2.2	Analogue Channel Status						
P3107	Slot 1 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3107	2C23h	0 ... 7
		SLOT1.3 Slot 1\Analog Output					
SLOT1.3.1	Configuration						
SLOT1.3.1.1	Error Mode						
P5108	Slot 1 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5108	33F4h	0 ... 8
SLOT1.3.1.2	Error Value						
P5116	Slot 1 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5116	33FCh	0 ... 8
SLOT1.3.1.3	Channel Gain						
P5132	Slot 1 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5132	340Ch	0 ... 8
SLOT1.3.1.4	Channel Offset						
P5140	Slot 1 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5140	3414h	0 ... 8
SLOT1.3.2	Analogue Output Value 16 Bits						
P5100	Slot 1 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5100	33ECh	0 ... 8
		SLOT1.4 Slot 1\Analog Input (SG)					
SLOT1.4.1	Configuration						
SLOT1.4.1.1	Channel Enable						
P7118	Slot 1 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7118	3BCEh	0 ... 2
SLOT1.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7120	Slot 1 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7120	3BD0h	0 ... 2
SLOT1.4.1.3	Channel Filter						
P7122	Slot 1 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7122	3BD2h	0 ... 2
SLOT1.4.1.4	Channel Gain						
P7124	Slot 1 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7124	3BD4h	0 ... 2
SLOT1.4.1.5	Channel Offset						
P7126	Slot 1 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7126	3BD6h	0 ... 2
SLOT1.4.1.6	Channel Full Scale						
P7130	Slot 1 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7130	3BDAh	0 ... 2
SLOT1.4.1.7	Channel Sensibility						
P7132	Slot 1 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7132	3BDCh	0 ... 2
SLOT1.4.1.8	Channel Sample Rate						
P7134	Slot 1 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7134	3BDEh	0 ... 2
SLOT1.4.1.9	Channel Maximum Variation						
P7136	Slot 1 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7136	3BE0h	0 ... 2
SLOT1.4.1.10	Channel Discart Value						
P7140	Slot 1 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7140	3BE4h	0 ... 2
SLOT1.4.1.11	Channel TAU						
P7142	Slot 1 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7142	3BE6h	0 ... 2
SLOT1.4.1.12	Channel Variation Step						
P7144	Slot 1 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7144	3BE8h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT1.4.2	Status						
SLOT1.4.2.1	Read Weight 16 Bits						
P7100	Slot 1 - Read Weight 16 Bit - 1 ... 2	-32768 to 32767	-	ro, s16bit	7100	3BBCh	0 ... 2
SLOT1.4.2.2	Read Weight 32 Bits						
P7102	Slot 1 - Read Weight 32 Bit - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7102	3BBEh	0 ... 2
SLOT1.4.2.3	SG Analogue Channel Status						
P7106	Slot 1 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7106	3BC2h	0 ... 2
		SLOT2.1 Slot 2\Digital Input/Output					
SLOT2.1.1	Write Outputs (DOs)						
P1202	Slot 2 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1202	24B2h	0
SLOT2.1.2	Read Inputs (DIs)						
P1200	Slot 2 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1200	24B0h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT2.1.3	Configuration						
P1204	Slot 2 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1204	24B4h	0
P1206	Slot 2 - Error Value	0 to 4294967295	0	rw, 32bit	1206	24B6h	0
		SLOT2.2 Slot 2\Analog Input (AI, TH, RTD)					
SLOT2.2.1	Configuration						
SLOT2.2.1.1	Channel Enable						
P3235	Slot 2 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3235	2CA3h	0 ... 7
SLOT2.2.1.2	Channel Type						
P3242	Slot 2 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3242	2CAAh	0 ... 7
SLOT2.2.1.3	Channel Unit						
P3249	Slot 2 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3249	2CB1h	0 ... 7
SLOT2.2.1.4	Channel Decimal Digit						
P3256	Slot 2 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3256	2CB8h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT2.2.1.5	Channel Filter						
P3263	Slot 2 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3263	2CBFh	0 ... 7
SLOT2.2.1.6	Channel Gain						
P3270	Slot 2 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3270	2CC6h	0 ... 7
SLOT2.2.1.7	Channel Offset						
P3278	Slot 2 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3278	2CCEh	0 ... 7
SLOT2.2.2	Status						
SLOT2.2.2.1	Analogue Input 16 Bits						
P3200	Slot 2 - Read Analogue Input 16 bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3200	2C80h	0 ... 7
SLOT2.2.2.2	Analogue Channel Status						
P3207	Slot 2 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3207	2C87h	0 ... 7
		SLOT2.3 Slot 2\Analog Output					
SLOT2.3.1	Configuration						
SLOT2.3.1.1	Error Mode						
P5208	Slot 2 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5208	3458h	0 ... 8
SLOT2.3.1.2	Error Value						
P5216	Slot 2 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5216	3460h	0 ... 8
SLOT2.3.1.3	Channel Gain						
P5232	Slot 2 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5232	3470h	0 ... 8
SLOT2.3.1.4	Channel Offset						
P5240	Slot 2 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5240	3478h	0 ... 8
SLOT2.3.2	Analogue Output Value 16 Bits						
P5200	Slot 2 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5200	3450h	0 ... 8
		SLOT2.4 Slot 2\Analog Input (SG)					
SLOT2.4.1	Configuration						
SLOT2.4.1.1	Channel Enable						
P7218	Slot 2 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7218	3C32h	0 ... 2
SLOT2.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7220	Slot 2 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7220	3C34h	0 ... 2
SLOT2.4.1.3	Channel Filter						
P7222	Slot 2 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7222	3C36h	0 ... 2
SLOT2.4.1.4	Channel Gain						
P7224	Slot 2 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7224	3C38h	0 ... 2
SLOT2.4.1.5	Channel Offset						
P7226	Slot 2 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7226	3C3Ah	0 ... 2
SLOT2.4.1.6	Channel Full Scale						
P7230	Slot 2 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7230	3C3Eh	0 ... 2
SLOT2.4.1.7	Channel Sensibility						
P7232	Slot 2 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7232	3C40h	0 ... 2
SLOT2.4.1.8	Channel Sample Rate						
P7234	Slot 2 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7234	3C42h	0 ... 2
SLOT2.4.1.9	Channel Maximum Variation						
P7236	Slot 2 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7236	3C44h	0 ... 2
SLOT2.4.1.10	Channel Discart Value						
P7240	Slot 2 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7240	3C48h	0 ... 2
SLOT2.4.1.11	Channel TAU						
P7242	Slot 2 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7242	3C4Ah	0 ... 2
SLOT2.4.1.12	Channel Variation Step						
P7244	Slot 2 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7244	3C4Ch	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT2.4.2	Status						
SLOT2.4.2.1	Read Weight 16 Bits						
P7200	Slot 2 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7200	3C20h	0 ... 2
SLOT2.4.2.2	Read Weight 32 Bits						
P7202	Slot 2 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7202	3C22h	0 ... 2
SLOT2.4.2.3	SG Analogue Channel Status						
P7206	Slot 2 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7206	3C26h	0 ... 2
		SLOT3.1 Slot 3\Digital Input/Output					
SLOT3.1.1	Write Outputs (DOs)						
P1302	Slot 3 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1302	2516h	0
SLOT3.1.2	Read Inputs (DIs)						
P1300	Slot 3 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1300	2514h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT3.1.3	Configuration						
P1304	Slot 3 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1304	2518h	0
P1306	Slot 3 - Error Value	0 to 4294967295	0	rw, 32bit	1306	251Ah	0
		SLOT3.2 Slot 3\Analog Input (AI, TH, RTD)					
SLOT3.2.1	Configuration						
SLOT3.2.1.1	Channel Enable						
P3335	Slot 3 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3335	2D07h	0 ... 7
SLOT3.2.1.2	Channel Type						
P3342	Slot 3 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3342	2D0Eh	0 ... 7
SLOT3.2.1.3	Channel Unit						
P3349	Slot 3 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3349	2D15h	0 ... 7
SLOT3.2.1.4	Channel Decimal Digit						
P3356	Slot 3 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3356	2D1Ch	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT3.2.1.5	Channel Filter						
P3363	Slot 3 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3363	2D23h	0 ... 7
SLOT3.2.1.6	Channel Gain						
P3370	Slot 3 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3370	2D2Ah	0 ... 7
SLOT3.2.1.7	Channel Offset						
P3378	Slot 3 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3378	2D32h	0 ... 7
SLOT3.2.2	Status						
SLOT3.2.2.1	Analogue Input 16 Bits						
P3300	Slot 3 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3300	2CE4h	0 ... 7
SLOT3.2.2.2	Analogue Channel Status						
P3307	Slot 3 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3307	2CEBh	0 ... 7
		SLOT3.3 Slot 3\Analog Output					
SLOT3.3.1	Configuration						
SLOT3.3.1.1	Error Mode						
P5308	Slot 3 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5308	34BCh	0 ... 8
SLOT3.3.1.2	Error Value						
P5316	Slot 3 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5316	34C4h	0 ... 8
SLOT3.3.1.3	Channel Gain						
P5332	Slot 3 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5332	34D4h	0 ... 8
SLOT3.3.1.4	Channel Offset						
P5340	Slot 3 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5340	34DCh	0 ... 8
SLOT3.3.2	Analogue Output Value 16 Bits						
P5300	Slot 3 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5300	34B4h	0 ... 8
		SLOT3.4 Slot 3\Analog Input (SG)					
SLOT3.4.1	Configuration						
SLOT3.4.1.1	Channel Enable						
P7318	Slot 3 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	255	rw, enum	7318	3C96h	0 ... 2
SLOT3.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7320	Slot 3 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7320	3C98h	0 ... 2
SLOT3.4.1.3	Channel Filter						
P7322	Slot 3 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7322	3C9Ah	0 ... 2
SLOT3.4.1.4	Channel Gain						
P7324	Slot 3 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7324	3C9Ch	0 ... 2
SLOT3.4.1.5	Channel Offset						
P7326	Slot 3 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7326	3C9Eh	0 ... 2
SLOT3.4.1.6	Channel Full Scale						
P7330	Slot 3 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7330	3CA2h	0 ... 2
SLOT3.4.1.7	Channel Sensibility						
P7332	Slot 3 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7332	3CA4h	0 ... 2
SLOT3.4.1.8	Channel Sample Rate						
P7334	Slot 3 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7334	3CA6h	0 ... 2
SLOT3.4.1.9	Channel Maximum Variation						
P7336	Slot 3 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7336	3CA8h	0 ... 2
SLOT3.4.1.10	Channel Discart Value						
P7340	Slot 3 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7340	3CACh	0 ... 2
SLOT3.4.1.11	Channel TAU						
P7342	Slot 3 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7342	3CAEh	0 ... 2
SLOT3.4.1.12	Channel Variation Step						
P7344	Slot 3 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7344	3CB0h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT3.4.2	Status						
SLOT3.4.2.1	Read Weight 16 Bits						
P7300	Slot 3 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7300	3C84h	0 ... 2
SLOT3.4.2.2	Read Weight 32 Bits						
P7302	Slot 3 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7302	3C86h	0 ... 2
SLOT3.4.2.3	SG Analogue Channel Status						
P7306	Slot 3 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7306	3C8Ah	0 ... 2
		SLOT4.1 Slot 4\Digital Input/Output					
SLOT4.1.1	Write Outputs (DOs)						
P1402	Slot 4 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1402	257Ah	0
SLOT4.1.2	Read Inputs (DIs)						
P1400	Slot 4 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1400	2578h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT4.1.3	Configuration						
P1404	Slot 4 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1404	257Ch	0
P1406	Slot 4 - Error Value	0 to 4294967295	0	rw, 32bit	1406	257Eh	0
		SLOT4.2 Slot 4\Analog Input (AI, TH, RTD)					
SLOT4.2.1	Configuration						
SLOT4.2.1.1	Channel Enable						
P3435	Slot 4 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3435	2D6Bh	0 ... 7
SLOT4.2.1.2	Channel Type						
P3442	Slot 4 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3442	2D72h	0 ... 7
SLOT4.2.1.3	Channel Unit						
P3449	Slot 4 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3449	2D79h	0 ... 7
SLOT4.2.1.4	Channel Decimal Digit						
P3456	Slot 4 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3456	2D80h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT4.2.1.5	Channel Filter						
P3463	Slot 4 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3463	2D87h	0 ... 7
SLOT4.2.1.6	Channel Gain						
P3470	Slot 4 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3470	2D8Eh	0 ... 7
SLOT4.2.1.7	Channel Offset						
P3478	Slot 4 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3478	2D96h	0 ... 7
SLOT4.2.2	Status						
SLOT4.2.2.1	Analogue Input 16 Bits						
P3400	Slot 4 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3400	2D48h	0 ... 7
SLOT4.2.2.2	Analogue Channel Status						
P3407	Slot 4 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3407	2D4Fh	0 ... 7
		SLOT4.3 Slot 4\Analog Output					
SLOT4.3.1	Configuration						
SLOT4.3.1.1	Error Mode						
P5408	Slot 4 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5408	3520h	0 ... 8
SLOT4.3.1.2	Error Value						
P5416	Slot 4 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5416	3528h	0 ... 8
SLOT4.3.1.3	Channel Gain						
P5432	Slot 4 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5432	3538h	0 ... 8
SLOT4.3.1.4	Channel Offset						
P5440	Slot 4 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5440	3540h	0 ... 8
SLOT4.3.2	Analogue Output Value 16 Bits						
P5400	Slot 4 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5400	3518h	0 ... 8
		SLOT4.4 Slot 4\Analog Input (SG)					
SLOT4.4.1	Configuration						
SLOT4.4.1.1	Channel Enable						
P7418	Slot 4 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7418	3CFAh	0 ... 2
SLOT4.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7420	Slot 4 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7420	3CFCh	0 ... 2
SLOT4.4.1.3	Channel Filter						
P7422	Slot 4 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7422	3CFEh	0 ... 2
SLOT4.4.1.4	Channel Gain						
P7424	Slot 4 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7424	3D00h	0 ... 2
SLOT4.4.1.5	Channel Offset						
P7426	Slot 4 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7426	3D02h	0 ... 2
SLOT4.4.1.6	Channel Full Scale						
P7430	Slot 4 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7430	3D06h	0 ... 2
SLOT4.4.1.7	Channel Sensibility						
P7432	Slot 4 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7432	3D08h	0 ... 2
SLOT4.4.1.8	Channel Sample Rate						
P7434	Slot 4 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7434	3D0Ah	0 ... 2
SLOT4.4.1.9	Channel Maximum Variation						
P7436	Slot 4 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7436	3D0Ch	0 ... 2
SLOT4.4.1.10	Channel Discart Value						
P7440	Slot 4 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7440	3D10h	0 ... 2
SLOT4.4.1.11	Channel TAU						
P7442	Slot 4 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7442	3D12h	0 ... 2
SLOT4.4.1.12	Channel Variation Step						
P7444	Slot 4 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7444	3D14h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT4.4.2	Status						
SLOT4.4.2.1	Read Weight 16 Bits						
P7400	Slot 4 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7400	3CE8h	0 ... 2
SLOT4.4.2.2	Read Weight 32 Bits						
P7402	Slot 4 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7402	3CEAh	0 ... 2
SLOT4.4.2.3	SG Analogue Channel Status						
P7406	Slot 4 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7406	3CEEh	0 ... 2
		SLOT5.1 Slot 5\Digital Input/Output					
SLOT5.1.1	Write Outputs (DOs)						
P1502	Slot 5 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1502	25DEh	0
SLOT5.1.2	Read Inputs (DIs)						
P1500	Slot 5 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1500	25DCh	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT5.1.3	Configuration						
P1504	Slot 5 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1504	25E0h	0
P1506	Slot 5 - Error Value	0 to 4294967295	0	rw, 32bit	1506	25E2h	0
		SLOT5.2 Slot 5\Analog Input (AI, TH, RTD)					
SLOT5.2.1	Configuration						
SLOT5.2.1.1	Channel Enable						
P3535	Slot 5 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3535	2DCFh	0 ... 7
SLOT5.2.1.2	Channel Type						
P3542	Slot 5 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3542	2DD6h	0 ... 7
SLOT5.2.1.3	Channel Unit						
P3549	Slot 5 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3549	2DDDh	0 ... 7
SLOT5.2.1.4	Channel Decimal Digit						
P3556	Slot 5 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3556	2DE4h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT5.2.1.5	Channel Filter						
P3563	Slot 5 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3563	2DEBh	0 ... 7
SLOT5.2.1.6	Channel Gain						
P3570	Slot 5 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3570	2DF2h	0 ... 7
SLOT5.2.1.7	Channel Offset						
P3578	Slot 5 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3578	2DFAh	0 ... 7
SLOT5.2.2	Status						
SLOT5.2.2.1	Analogue Input 16 Bits						
P3500	Slot 5 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3500	2DACh	0 ... 7
SLOT5.2.2.2	Analogue Channel Status						
P3507	Slot 5 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3507	2DB3h	0 ... 7
		SLOT5.3 Slot 5\Analog Output					
SLOT5.3.1	Configuration						
SLOT5.3.1.1	Error Mode						
P5508	Slot 5 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5508	3584h	0 ... 8
SLOT5.3.1.2	Error Value						
P5516	Slot 5 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5516	358Ch	0 ... 8
SLOT5.3.1.3	Channel Gain						
P5532	Slot 5 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5532	359Ch	0 ... 8
SLOT5.3.1.4	Channel Offset						
P5540	Slot 5 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5540	35A4h	0 ... 8
SLOT5.3.2	Analogue Output Value 16 Bits						
P5500	Slot 5 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5500	357Ch	0 ... 8
		SLOT5.4 Slot 5\Analog Input (SG)					
SLOT5.4.1	Configuration						
SLOT5.4.1.1	Channel Enable						
P7518	Slot 5 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7518	3D5Eh	0 ... 2
SLOT5.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7520	Slot 5 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7520	3D60h	0 ... 2
SLOT5.4.1.3	Channel Filter						
P7522	Slot 5 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7522	3D62h	0 ... 2
SLOT5.4.1.4	Channel Gain						
P7524	Slot 5 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7524	3D64h	0 ... 2
SLOT5.4.1.5	Channel Offset						
P7526	Slot 5 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7526	3D66h	0 ... 2
SLOT5.4.1.6	Channel Full Scale						
P7530	Slot 5 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7530	3D6Ah	0 ... 2
SLOT5.4.1.7	Channel Sensibility						
P7532	Slot 5 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7532	3D6Ch	0 ... 2
SLOT5.4.1.8	Channel Sample Rate						
P7534	Slot 5 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7534	3D6Eh	0 ... 2
SLOT5.4.1.9	Channel Maximum Variation						
P7536	Slot 5 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7536	3D70h	0 ... 2
SLOT5.4.1.10	Channel Discart Value						
P7540	Slot 5 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7540	3D74h	0 ... 2
SLOT5.4.1.11	Channel TAU						
P7542	Slot 5 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7542	3D76h	0 ... 2
SLOT5.4.1.12	Channel Variation Step						
P7544	Slot 5 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7544	3D78h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT5.4.2	Status						
SLOT5.4.2.1	Read Weight 16 Bits						
P7500	Slot 5 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7500	3D4Ch	0 ... 2
SLOT5.4.2.2	Read Weight 32 Bits						
P7502	Slot 5 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7502	3D4Eh	0 ... 2
SLOT5.4.2.3	SG Analogue Channel Status						
P7506	Slot 5 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7506	3D52h	0 ... 2
SLOT6.1 Slot 6\Digital Input/Output							
SLOT6.1.1	Write Outputs (DOs)						
P1602	Slot 6 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1602	2642h	0
SLOT6.1.2	Read Inputs (DIs)						
P1600	Slot 6 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1600	2640h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT6.1.3	Configuration						
P1604	Slot 6 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1604	2644h	0
P1606	Slot 6 - Error Value	0 to 4294967295	0	rw, 32bit	1606	2646h	0
		SLOT6.2 Slot 6\Analog Input (AI, TH, RTD)					
SLOT6.2.1	Configuration						
SLOT6.2.1.1	Channel Enable						
P3635	Slot 6 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3635	2E33h	0 ... 7
SLOT6.2.1.2	Channel Type						
P3642	Slot 6 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3642	2E3Ah	0 ... 7
SLOT6.2.1.3	Channel Unit						
P3649	Slot 6 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3649	2E41h	0 ... 7
SLOT6.2.1.4	Channel Decimal Digit						
P3656	Slot 6 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3656	2E48h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT6.2.1.5	Channel Filter						
P3663	Slot 6 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3663	2E4Fh	0 ... 7
SLOT6.2.1.6	Channel Gain						
P3670	Slot 6 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3670	2E56h	0 ... 7
SLOT6.2.1.7	Channel Offset						
P3678	Slot 6 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3678	2E5Eh	0 ... 7
SLOT6.2.2	Status						
SLOT6.2.2.1	Analogue Input 16 Bits						
P3600	Slot 6 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3600	2E10h	0 ... 7
SLOT6.2.2.2	Analogue Channel Status						
P3607	Slot 6 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3607	2E17h	0 ... 7
		SLOT6.3 Slot 6\Analog Output					
SLOT6.3.1	Configuration						
SLOT6.3.1.1	Error Mode						
P5608	Slot 6 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5608	35E8h	0 ... 8
SLOT6.3.1.2	Error Value						
P5616	Slot 6 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5616	35F0h	0 ... 8
SLOT6.3.1.3	Channel Gain						
P5632	Slot 6 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5632	3600h	0 ... 8
SLOT6.3.1.4	Channel Offset						
P5640	Slot 6 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5640	3608h	0 ... 8
SLOT6.3.2	Analogue Output Value 16 Bits						
P5600	Slot 6 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5600	35E0h	0 ... 8
		SLOT6.4 Slot 6\Analog Input (SG)					
SLOT6.4.1	Configuration						
SLOT6.4.1.1	Channel Enable						
P7618	Slot 6 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7618	3DC2h	0 ... 2
SLOT6.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7620	Slot 6 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7620	3DC4h	0 ... 2
SLOT6.4.1.3	Channel Filter						
P7622	Slot 6 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7622	3DC6h	0 ... 2
SLOT6.4.1.4	Channel Gain						
P7624	Slot 6 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7624	3DC8h	0 ... 2
SLOT6.4.1.5	Channel Offset						
P7626	Slot 6 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7626	3DCAh	0 ... 2
SLOT6.4.1.6	Channel Full Scale						
P7630	Slot 6 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7630	3DCEh	0 ... 2
SLOT6.4.1.7	Channel Sensibility						
P7632	Slot 6 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7632	3DD0h	0 ... 2
SLOT6.4.1.8	Channel Sample Rate						
P7634	Slot 6 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7634	3DD2h	0 ... 2
SLOT6.4.1.9	Channel Maximum Variation						
P7636	Slot 6 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7636	3DD4h	0 ... 2
SLOT6.4.1.10	Channel Discart Value						
P7640	Slot 6 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7640	3DD8h	0 ... 2
SLOT6.4.1.11	Channel TAU						
P7642	Slot 6 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7642	3DDAh	0 ... 2
SLOT6.4.1.12	Channel Variation Step						
P7644	Slot 6 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7644	3DDCh	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT6.4.2	Status						
SLOT6.4.2.1	Read Weight 16 Bits						
P7600	Slot 6 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7600	3DB0h	0 ... 2
SLOT6.4.2.2	Read Weight 32 Bits						
P7602	Slot 6 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7602	3DB2h	0 ... 2
SLOT6.4.2.3	SG Analogue Channel Status						
P7606	Slot 6 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7606	3DB6h	0 ... 2
		SLOT7.1 Slot 7\Digital Input/Output					
SLOT7.1.1	Write Outputs (DOs)						
P1702	Slot 7 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1702	26A6h	0
SLOT7.1.2	Read Inputs (DIs)						
P1700	Slot 7 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1700	26A4h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT7.1.3	Configuration						
P1704	Slot 7 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1704	26A8h	0
P1706	Slot 7 - Error Value	0 to 4294967295	0	rw, 32bit	1706	26AAh	0
		SLOT7.2 Slot 7\Analog Input (AI, TH, RTD)					
SLOT7.2.1	Configuration						
SLOT7.2.1.1	Channel Enable						
P3735	Slot 7 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3735	2E97h	0 ... 7
SLOT7.2.1.2	Channel Type						
P3742	Slot 7 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3742	2E9Eh	0 ... 7
SLOT7.2.1.3	Channel Unit						
P3749	Slot 7 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3749	2EA5h	0 ... 7
SLOT7.2.1.4	Channel Decimal Digit						
P3756	Slot 7 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3756	2EACh	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT7.2.1.5	Channel Filter						
P3763	Slot 7 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3763	2EB3h	0 ... 7
SLOT7.2.1.6	Channel Gain						
P3770	Slot 7 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3770	2EBAh	0 ... 7
SLOT7.2.1.7	Channel Offset						
P3778	Slot 7 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3778	2EC2h	0 ... 7
SLOT7.2.2	Status						
SLOT7.2.2.1	Analogue Input 16 Bits						
P3700	Slot 7 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3700	2E74h	0 ... 7
SLOT7.2.2.2	Analogue Channel Status						
P3707	Slot 7 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3707	2E7Bh	0 ... 7
		SLOT7.3 Slot 7\Analog Output					
SLOT7.3.1	Configuration						
SLOT7.3.1.1	Error Mode						
P5708	Slot 7 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5708	364Ch	0 ... 8
SLOT7.3.1.2	Error Value						
P5716	Slot 7 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5716	3654h	0 ... 8
SLOT7.3.1.3	Channel Gain						
P5732	Slot 7 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5732	3664h	0 ... 8
SLOT7.3.1.4	Channel Offset						
P5740	Slot 7 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5740	366Ch	0 ... 8
SLOT7.3.2	Analogue Output Value 16 Bits						
P5700	Slot 7 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5700	3644h	0 ... 8
		SLOT7.4 Slot 7\Analog Input (SG)					
SLOT7.4.1	Configuration						
SLOT7.4.1.1	Channel Enable						
P7718	Slot 7 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7718	3E26h	0 ... 2
SLOT7.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7720	Slot 7 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7720	3E28h	0 ... 2
SLOT7.4.1.3	Channel Filter						
P7722	Slot 7 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7722	3E2Ah	0 ... 2
SLOT7.4.1.4	Channel Gain						
P7724	Slot 7 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7724	3E2Ch	0 ... 2
SLOT7.4.1.5	Channel Offset						
P7726	Slot 7 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7726	3E2Eh	0 ... 2
SLOT7.4.1.6	Channel Full Scale						
P7730	Slot 7 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7730	3E32h	0 ... 2
SLOT7.4.1.7	Channel Sensibility						
P7732	Slot 7 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7732	3E34h	0 ... 2
SLOT7.4.1.8	Channel Sample Rate						
P7734	Slot 7 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7734	3E36h	0 ... 2
SLOT7.4.1.9	Channel Maximum Variation						
P7736	Slot 7 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7736	3E38h	0 ... 2
SLOT7.4.1.10	Channel Discart Value						
P7740	Slot 7 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7740	3E3Ch	0 ... 2
SLOT7.4.1.11	Channel TAU						
P7742	Slot 7 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7742	3E3Eh	0 ... 2
SLOT7.4.1.12	Channel Variation Step						
P7744	Slot 7 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7744	3E40h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT7.4.2	Status						
SLOT7.4.2.1	Read Weight 16 Bits						
P7700	Slot 7 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7700	3E14h	0 ... 2
SLOT7.4.2.2	Read Weight 32 Bits						
P7702	Slot 7 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7702	3E16h	0 ... 2
SLOT7.4.2.3	SG Analogue Channel Status						
P7706	Slot 7 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7706	3E1Ah	0 ... 2
		SLOT8.1 Slot 8\Digital Input/Output					
SLOT8.1.1	Write Outputs (DOs)						
P1802	Slot 8 - Write Digital Outputs (DOs)	Bit 0 = DO01 Bit 1 = DO02 Bit 2 = DO03 Bit 3 = DO04 Bit 4 = DO05 Bit 5 = DO06 Bit 6 = DO07 Bit 7 = DO08 Bit 8 = DO09 Bit 9 = DO10 Bit 10 = DO11 Bit 11 = DO12 Bit 12 = DO13 Bit 13 = DO14 Bit 14 = DO15 Bit 15 = DO16 Bit 16 = DO17 Bit 17 = DO18 Bit 18 = DO19 Bit 19 = DO20 Bit 20 = DO21 Bit 21 = DO22 Bit 22 = DO23 Bit 23 = DO24	0	rw, 32bit	1802	270Ah	0
SLOT8.1.2	Read Inputs (DIs)						
P1800	Slot 8 - Read Digital Inputs (DIs)	Bit 0 = DI01 Bit 1 = DI02 Bit 2 = DI03 Bit 3 = DI04 Bit 4 = DI05	-	ro, 32bit	1800	2708h	0

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		Bit 5 = DI06 Bit 6 = DI07 Bit 7 = DI08 Bit 8 = DI09 Bit 9 = DI10 Bit 10 = DI11 Bit 11 = DI12 Bit 12 = DI13 Bit 13 = DI14 Bit 14 = DI15 Bit 15 = DI16 Bit 16 = DI17 Bit 17 = DI18 Bit 18 = DI19 Bit 19 = DI20 Bit 20 = DI21 Bit 21 = DI22 Bit 22 = DI23 Bit 23 = DI24					
SLOT8.1.3	Configuration						
P1804	Slot 8 - Error Mode Output	0 to 4294967295	0	rw, 32bit	1804	270Ch	0
P1806	Slot 8 - Error Value	0 to 4294967295	0	rw, 32bit	1806	270Eh	0
		SLOT8.2 Slot 8\Analog Input (AI, TH, RTD)					
SLOT8.2.1	Configuration						
SLOT8.2.1.1	Channel Enable						
P3835	Slot 8 - Analogue Input Channel Enable - 1 ... 7	0 = Disable / Disable / Disable 1 = Enable / Enable With CJC / Enable 2 = Reserv / Enable No CJC / Reserv	1	rw, enum	3835	2EFBh	0 ... 7
SLOT8.2.1.2	Channel Type						
P3842	Slot 8 - Analogue Input Channel Type - 1 ... 7	0 = AI: 0-10V / TH: J / PT100 1 = AI: 0-20mA / TH: K / PT1000 2 = AI: 4-20mA / TH: T / Reserv	0	rw, enum	3842	2F02h	0 ... 7
SLOT8.2.1.3	Channel Unit						
P3849	Slot 8 - Analogue Input Channel Unit 1 - 1 ... 7	0 = ai: Not Used / th: °C / rtd: °C 1 = ai: Not Used / th: °F / rtd: °F 2 = ai: Not Used / th: K / rtd: K	0	rw, enum	3849	2F09h	0 ... 7
SLOT8.2.1.4	Channel Decimal Digit						
P3856	Slot 8 - Analogue Input Channel Decimal Digit - 1 ... 7	0 = ai: 0 / th: 0 / rtd: 0 1 = ai: 1 / th: 1 / rtd: 1 2 = ai: 2 / th: 1 / rtd: 1	1	rw, enum	3856	2F10h	0 ... 7

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = ai: 3 / th: 1 / rtd: 1					
SLOT8.2.1.5	Channel Filter						
P3863	Slot 8 - Analogue Input Channel Filter - 1 ... 7	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	3863	2F17h	0 ... 7
SLOT8.2.1.6	Channel Gain						
P3870	Slot 8 - Analogue Input Channel Gain - 1 ... 7	-32768 to 32767	1000	rw, s16bit	3870	2F1Eh	0 ... 7
SLOT8.2.1.7	Channel Offset						
P3878	Slot 8 - Analogue Input Channel Offset - 1 ... 7	-32768 to 32767	0	rw, s16bit	3878	2F26h	0 ... 7
SLOT8.2.2	Status						
SLOT8.2.2.1	Analogue Input 16 Bits						
P3800	Slot 8 - Read Analogue Input 16 Bits - 1 ... 7	-32768 to 32767	-	ro, s16bit	3800	2ED8h	0 ... 7
SLOT8.2.2.2	Analogue Channel Status						
P3807	Slot 8 - Analogue Channel Status - 1 ... 7	0 = ai: Disabled / th: Disabled / rtd: Disabled 1 = ai: Enabled / th: Enabled / rdt: Enabled 2 = ai: Open / th: Open / rtd: Open	-	ro, enum	3807	2EDFh	0 ... 7
		SLOT8.3 Slot 8\Analog Output					
SLOT8.3.1	Configuration						
SLOT8.3.1.1	Error Mode						
P5808	Slot 8 - Analogue Output Error Mode - 1 ... 8	0 to 255	0	rw, 8bit	5808	36B0h	0 ... 8
SLOT8.3.1.2	Error Value						
P5816	Slot 8 - Analogue Output Error Value - 1 ... 8	-32768 to 32767	0	rw, s16bit	5816	36B8h	0 ... 8
SLOT8.3.1.3	Channel Gain						
P5832	Slot 8 - Analogue Output Channel Gain - 1 ... 8	0 to 65535	1000	rw, 16bit	5832	36C8h	0 ... 8
SLOT8.3.1.4	Channel Offset						
P5840	Slot 8 - Analogue Output Channel Offset - 1 ... 8	-32768 to 32767	0	rw, s16bit	5840	36D0h	0 ... 8
SLOT8.3.2	Analogue Output Value 16 Bits						
P5800	Slot 8 - Write Analogue Output 16-Bit - 1 ... 8	-32768 to 32767	0	rw, s16bit	5800	36A8h	0 ... 8
		SLOT8.4 Slot 8\Analog Input (SG)					
SLOT8.4.1	Configuration						
SLOT8.4.1.1	Channel Enable						
P7818	Slot 8 - Analogue SG Channel Enable - 1 ... 2	0 = Disable 1 = Enable	1	rw, enum	7818	3E8Ah	0 ... 2
SLOT8.4.1.2	Channel Unit						

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
P7820	Slot 8 - Analogue SG Channel Unit - 1 ... 2	0 = g 1 = kg 2 = t	0	rw, enum	7820	3E8Ch	0 ... 2
SLOT8.4.1.3	Channel Filter						
P7822	Slot 8 - Analogue SG Channel Filter - 1 ... 2	0 = No Filter 1 = Average 2 Values 2 = Average 4 Values 3 = Average 8 Values 4 = Average 16 Values 5 = Average 32 Values	4	rw, enum	7822	3E8Eh	0 ... 2
SLOT8.4.1.4	Channel Gain						
P7824	Slot 8 - Analogue SG Channel Gain - 1 ... 2	-32768 to 32767	1000	rw, s16bit	7824	3E90h	0 ... 2
SLOT8.4.1.5	Channel Offset						
P7826	Slot 8 - Analogue SG Channel Offset - 1 ... 2	-2147483648 to 2147483647	0	rw, s32bit	7826	3E92h	0 ... 2
SLOT8.4.1.6	Channel Full Scale						
P7830	Slot 8 - Analogue SG Channel Full Scale - 1 ... 2	0 to 65535	10000	rw, 16bit	7830	3E96h	0 ... 2
SLOT8.4.1.7	Channel Sensibility						
P7832	Slot 8 - Analogue SG Channel Sensibility - 1 ... 2	0 to 255	2	rw, 8bit	7832	3E98h	0 ... 2
SLOT8.4.1.8	Channel Sample Rate						
P7834	Slot 8 - Analogue SG Channel Sample Rate - 1 ... 2	0 = 1.68 SPS (596.12 ms) 1 = 3.35 SPS (298.06 ms) 2 = 6.71 SPS (149.03 ms) 3 = 13.42 SPS (74.52 ms) 4 = 26.83 SPS (36.27 ms) 5 = 53.66 SPS (18.64 ms) 6 = 107.32 SPS (9.32 ms)	4	rw, enum	7834	3E9Ah	0 ... 2
SLOT8.4.1.9	Channel Maximum Variation						
P7836	Slot 8 - Analogue SG Channel Maximum Variation - 1 ... 2	0 to 4294967295	100000	rw, 32bit	7836	3E9Ch	0 ... 2
SLOT8.4.1.10	Channel Discart Value						
P7840	Slot 8 - Analogue SG Channel Discard Value - 1 ... 2	0 = Keep 1 = Discard	0	rw, enum	7840	3EA0h	0 ... 2
SLOT8.4.1.11	Channel TAU						
P7842	Slot 8 - Analogue SG Channel Filter TAU - 1 ... 2	0 to 65535	0	rw, 16bit	7842	3EA2h	0 ... 2
SLOT8.4.1.12	Channel Variation Step						
P7844	Slot 8 - Analogue SG Channel Variation Step - 1 ... 2	0 = step 1 (000, 001, 002, 003...) 1 = step 2 (000, 002, 004, 006...) 2 = step 5 (000, 005, 010, 015...)	0	rw, enum	7844	3EA4h	0 ... 2

Parameter	Description	Range of values	Factory setting	Properties	Communication Address	CANopen Index	Sub-Index
		3 = step 10 (000, 010, 020, 030...) 4 = step 50 (000, 050, 100, 150...)					
SLOT8.4.2	Status						
SLOT8.4.2.1	Read Weight 16 Bits						
P7800	Slot 8 - Read Weight 16 Bits - 1 ... 2	-32768 to 32767	-	ro, s16bit	7800	3E78h	0 ... 2
SLOT8.4.2.2	Read Weight 32 Bits						
P7802	Slot 8 - Read Weight 32 Bits - 1 ... 2	-2147483648 to 2147483647	-	ro, s32bit	7802	3E7Ah	0 ... 2
SLOT8.4.2.3	SG Analogue Channel Status						
P7806	Slot 8 - Analogue SG Channel Status - 1 ... 2	0 = Disable 1 = Enable	-	ro, enum	7806	3E7Eh	0 ... 2

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

Data Type	Description
enum	Enumerated type (unsigned 8-bit) contains a list of values with function description for each item.
8bit	Unsigned 8-bit integer, ranges from 0 to 255.
16bit	Unsigned 16-bit integer, ranges from 0 to 65,535.
s16bit	Signed 16-bit integer, ranges from -32,768 to 32,767.
32bit	Unsigned 32-bit integer, ranges from 0 to 4,294,967,295.
s32bit	Signed 32-bit integer, ranges from -2,147,483,648 to 2,147,483,647.

WEG Drives & Controls - Automação LTDA.
Jaraguá do Sul – SC – Brazil
Phone 55 (47) 3276-4000 – Fax 55 (47) 3276-4020
São Paulo – SP – Brazil
Phone 55 (11) 5053-2300 – Fax 55 (11) 5052-4212
automacao@weg.net
www.weg.net