Pixsys®
ELECTRONICS

DRR460 CAN

Controller

User manual

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Introduction

Thanks for choosing a Pixsys controller.
The DRR460 series integrates in a single device the main elements of the control loop: reading of temperature sensor, control output by SSR module, reading and control of the current on the load by means of integrated current CT. Serial communication RS485 and ModbusRTU or CANopen protocol allow the connection to PC/HMI Panels for supervisory functions/remote control.
This device is provided with alarms functions, management of double action heating/cooling installation and possibility to be used as expansion controlled by PLC.

1 Safety standards

Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device.
Disconnect power supply before proceeding to hardware settings or electrical wirings.
Only qualified personnel should be allowed to use the device and/or service it and in accordance to technical data and environmental conditions listed in this manual.
Do not dispose electric tools together with household waste material. In observance European Directive 2002/96/EC on waste electrical and electronic equipment and its implementation in accordance with national law, electric tools that have reached the end of their life must be collected separately and returned to an environmentally compatible recycling facility.

2 Model identification

DRR460-12A-T128	Power supply 24Vdc ±15% + 1 analogue input + 2 logic output 24Vdc/50mA + 1 output 0/4...20mA + RS485 +C.T.
DRR460-12A-CAN	Power supply 24Vdc ±15% + 1 analogue input + 2 logic output 24Vdc/50mA + 1 output 0/4...20mA + CANopen +C.T.

3 Technical data

3.1 Main features

Operating temperature	0-45°C, humidity 35..95uR%
Contenitore	DIN43880, 18 x 90 x 64 mm
Material	Box: PC UL94V0 self-extinguishing; front panel: PC UL94V0 self-extinguishing
Protezione	IP20 (box and terminal blocks)
Peso	Approx. 30 g

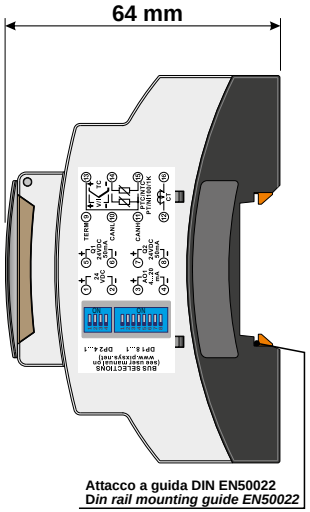
3.2 Hardware features

Power supply	24 VDC ±15%	Consumption: max. 3 VA
Analogue input	**1**: AN1 Configurable via software. **Input**: Thermocouple type K, S, R, J, T, E, N, B. Automatic compensation of cold junction from 0..50°C. **Thermoresistance**: PT100, PT500, PT1000, Ni100, PTC1K, NTC10K (β 3435K). **Input V/I**: 0-10 V, 0-20 or 4-20 mA, 0-60 mV. **Pot. input**: Configurable 1..150kΩ, **1**: C.T.: 50 mAAC 50/60 Hz	Tolerance (25 °C) +/-0.3% ±1 digit (su F.s.) for thermocouple, thermoresistance and V / mA. Cold junction accuracy 0.1 °C/°C **Impedence**: **0-10 V**: Ri>110 kΩ **0-20 mA**: Ri<50 Ω **4-20 mA**: Ri<50 Ω **0-60 mV**: Ri>500 kΩ
Logics output	**2** SSR. Configurable as command or alarm output	+24VDC ±15%/ 50mA
Analogue output	**1** 0/4..20 mA. Configurable as command output, alarm output or retransmission	0..20 mA: 42500 points, ±0.3% on F.S. 4..20 mA 34000 points, ±0.3% on F.S.

3.3 Software features

Regulation algorithms	ON-OFF with hysteresis. P, PI, PID, PD proportional time.
Proportional band	0..999°C or °F
Integral time	0,0..999,9 s (0 excludes integral function)
Derivative time	0,0..999,9 s (0 excludes derivative function)
Controller functions	Manual or automatic tuning, configurable alarm, Start/Stop, "expansion" function.

4 Dimensions and Installation

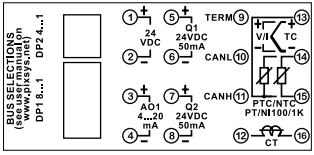


5 Electrical wirings

This controller has been designed and manufactured in conformity to Low Voltage Directive 2006/95/EC , 2014/35/EU (LVD) and EMC Directive 2004/108/EC, 2014/30/EU (EMC). For installation in industrial environments please observe following safety guidelines:

- Separate control line from power wires.
- Avoid proximity of remote control switches, electromagnetic contactors, powerful engines and use specific filters.
- Avoid proximity of power groups, especially those with phase control.
- It is strongly recommended to install adequate mains filter on power supply of the machine where the controller is installed, particularly if supplied 230Vac. The controller is designed and conceived to be incorporated into other machines, therefore CE marking on the controller does not exempt the manufacturer of machines from safety and conformity requirements applying to the machine itself.

5.1 Wiring diagram

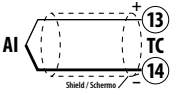


DRR460-12A-CAN

5.1.a Power Supply

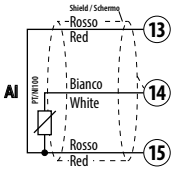
Power supply 24 VDC ±15%

5.1.b Analogue Input



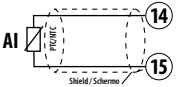
For thermocouples K, S, R, J, T, E, N, B.

- Comply with polarity
- For possible extensions, use compensated cable and terminals suitable for the thermocouples used(compensated)
- When shielded cable is used, it should be grounded at one side only



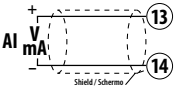
For thermoresistances PT100, Ni100.

- For the three-wire connection use wires with the same section
- For the two-wire connection short-circuit terminals 13 and 15
- When shielded cable is used, it should be grounded at one side only



For thermoresistances NTC, PTC, PT500, PT1000 and linear potentiometers

When shielded cable is used, it should be grounded at one side only to avoid ground loop currents

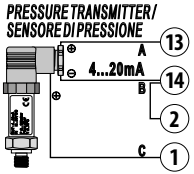


For linear signals in Volt and mA

Comply with polarity

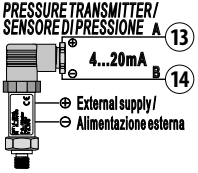
When shielded cable is used, it should be grounded at one side only to avoid ground loop currents

5.1.c Examples of connection for Volt and mA inputs



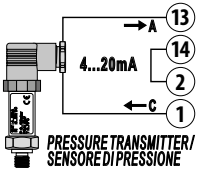
For linear signals 0/4..20 mA with three-wires sensors.
Comply with polarity:
A= Sensor output
B= Sensor ground
C= Sensor supply (24VDC)

Short circuit pins 2 and 14.



For linear signals 0/4..20 mA with external power supply for sensor.

Comply with polarity:
A= Sensor output
B= Sensor ground

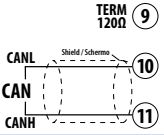


For linear signals 0/4..20 mA with two-wires sensors.

Comply with polarity:
A= Sensor output
C= Sensor supply (24VDC)

Short circuit pins 2 and 14.

5.1.d Serial input



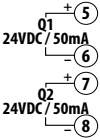
Communication CANopen Slave galvanically insulated from the sensor. When shielded cable is used, it should be grounded at the Master side only.

Short circuit pins 9 and 10 to enter on the bus a 120Ω termination resistance.

5.1.e CT input

Input for CT 50mA.
Sampling time 100 µs.
Current measure true RMS for Heater Break Alarm and overcurrent alarm functions.

5.1.f Digital outputs



Digital output **24VDC** ±15%/ 50mA max.

5.1.g Analogue output

Linear output in mA (galvanically insulated from the sensor) configurable as command (Index 0x3000 Sub-Index 16) or retransmission of process-setpoint (Index 0x3000 Sub-Index 100)

6 Leds and key function

6.1 Meaning of status lights (LED)

RUN ●
- See paragraph no. 10
- Normally it indicates the status of output OUT1.
- During test (pressing key), if the command output is OUT1, blinks with frequency 50ms.

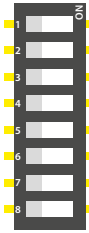
OUT1 ●
- At the end of current acquisition by the CT, blinks with frequency 0.5s if the operation has been done successfully,
- In case of error, it blinks in alternation with the led OUT 2 (ex. broken sensor).
- Normally indicates the status of output OUT2.
- During test (pressing key), if the command output is OUT2, blinks with frequency 50ms.

OUT2 ●
- At the end of current acquisition by the CT, blinks with frequency 0.5s if the operation has been done successfully
- In case of error, it blinks in alternation with the led OUT 1 (ex. broken sensor).

6.2 Key

- If pressed it enables the command output: press for more than 3 seconds to manage the threshold current reading for the Heater Break Alarm control.
- If pressed during the modbus address assignment function, it stores the value assigned by the master (only if the dip1 is all in OFF).

6.3 Dip switch

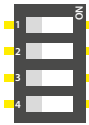


DIP 1 – Slave address:

- If contacts 1..8 are in OFF position, the slave address for the CANopen device is selected on Index 0x3000 Sub-Index 111.
- Determines the CANopen slave address in binary code, as shown in the following example:
  0000001=1; 0000010=2; 0000011=3; 0000100=4; 0000101=5; 0000110=6; 0000111=7; 1111010=122; 1111011=123; 1111100=124; 1111101=125; 1111110=126; 1111111=127.

The leftmost digit of the binary code corresponds to the DIP contact 7, while the rightmost digit corresponds to the DIP contact 1. N.B.: DIP CONTACT 8 MUST BE KEPT OFF

DIP 2 - Baud rate e caricamento valori di fabbrica



- If contacts 1..3 are in OFF position, the baud rate for the CANopen device is selected on Index 0x3000 Sub-Index 112.
- If contact 4 is in ON position, the parameters and all eeprom data are loaded with default values.
- Determines the CANopen baud rate, using the following values:
  001=50kBit/s; 010=62.5kBit/s; 011=100kBit/s; 100=125kBit/s; 101=250kBit/s; 110=500kBit/s; 111=1MBit/s.
  The leftmost digit corresponds to the DIP contact 3, while de rightmost digit corresponds to the DIP contact 1.

7 Controller functions

7.1 Loading default values

This procedure allows to restore default settings as pre-selected at the factory.
There are two reset modes:

- Close contact 4 of the dip switch 2 and reopen it at restart (fast blink of all leds).
- Write "load" on Index 0x1011 Sub-Index 1.

After the restore, device restarts.

7.2 Automatic tuning

Select 1 on Index 0x3000 Sub-Index 31. Automatic tuning is always active and analyses constantly the difference setpoint-process. If this difference is greater than the value selected on Index 0x3000 Sub-Index 47 (Max Gap Tune), the DRR460 decides autonomously when to modify PID parameters.

7.3 Manual tuning

Select 2 on Index 0x3000 Sub-Index 31. The manual procedure allows the user a greater flexibility on deciding when to update PID algorithm parameters.
This procedure is activated writing 1 on Index 0x400E. The reference threshold to calculate the new PID parameters is given by the result of the following operation:

Tune threshold = **Setpoint** (Index 0x4000) – **Par. 32** $S.dEu.$ (Index 0x3000 Sub-Index 32)
Ex.: if setpoint is 100.0°C and Par. 32 $S.dEu.$ is 20.0°C, the threshold to calculate PID parameters is (100.0–20.0) = 80.0°C.
N.B.: for greater accuracy in the calculation of PID parameters it is recommended to launch the manual tuning when the process is far from setpoint (at least 30%).

7.4 AutoTuning Launch "Once"

Set 3 on Index 0x3000, Sub-Index 31. Autotuning procedure is executed only once at next DRR460 restart. If the procedure doesn't work, will be executed at next restart.

7.5 Synchronized tuning

Select 4 on Index 0x3000, Sub-Index 31. This procedure has been conceived to calculate correct PID values on multi-zone systems, where each temperature is influenced by the adjacent zones.
Writing on Index 0x400E, the device works as follows:

Value Index 0x400E	Action
0	Tune off.
1	Command output OFF
2	Command output ON
3	Tune active
4	Tune completed: command output OFF (read only)
5	Tune not available: softstart function enabled (only reading)

The operation of this Tuning mode is the following: the master switches-off or turns-on all zones (value 1 or 2 on Index 0x400E) for a time long enough to create inertia on the system.
At this point the autotuning is launched (value 3 on Index 0x400E). The controller calculates the new PID values. When the procedure ends, it switches-off the control output and sets the value 4 on Index 0x400E. The master, which should always read the Index 0x400E, checks the various zones and when all of them have reached the value 4 it will bring to 0 the value of Index 0x400E.
The various devices will regulate the temperature basing on the new values.
N.B. The master must read the Index 0x400E at least every 10 seconds or the controller will automatically exit the autotuning procedure.

7.6 Automatic/Manual regulation for % output control

This function allows to select automatic functioning or manual command of the output percentage. With parameter 25 ($AU.MA.$ Index 0x3000 Sub-Index 25), you can select two methods.

1. The first selection (value 1 on Index 0x3000 Sub-Index 25) allows to modify, through the Index 0x400F, the functioning mode: after writing 1 it is possible to change the output percentage on Index 0x4004 (range 0-10000).
   To return to automatic mode, write 0 on Index 0x400F.
2. The second selection (value 2 on Index 0x3000 Sub-Index 25) enables the same functioning, but with two important variants:

- If there is a temporary lack of voltage or after switch-off, the manual functioning will be maintained as well as the previously set output percentage value.
- If the sensor breaks during automatic functioning, the controller moves to manual mode while maintaining the output percentage command unchanged as generated by the P.I.D. immediately before breakage.

7.7 Heater Break Alarm on CT (Current Transformer)

This function allows to measure load current to manage an alarm during a malfunctioning with power in short circuit, always open or partial break of the charge.
To enable this function set 1 (50 Hz) or 2 (60 Hz) on paramater 90 c.t. (Index 0x3000 Sub-Index 90). Set the value of the connected transfomer on parameter 91 c.t. u. (Index 0x3000 Sub-Index 91).

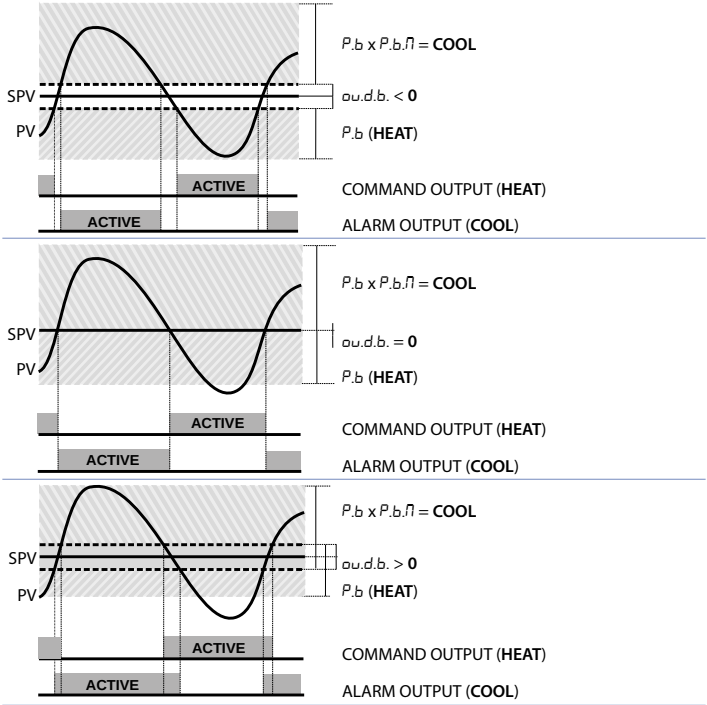
- Select on H.b.A.t. (Index 0x3000 Sub-Index 92) the Heater Break Alarm intervention threshold in Ampere. Otherwise it is possible to select this value in automatic mode pressing ● for more than 3 seconds.
- Select on H.b.A.d. (Index 0x3000 Sub-Index 94) the delay time in seconds for the Heater Break Alarm intervention.
- It is possible to associate the alarm to the output OUT2, selecting 10 on par. AL. 1. or par. AL. 2. (Index 0x3000 Sub-Index 56 or sub-Index 68).

It is possible also to enable an overcurrent control, setting on parameter ocu.t. (Index 0x3000 Sub-Index 93) the intervention threshold in Ampere.

7.8 Dual Action Heating-Cooling

DRR460 is suitable also for systems requiring a combined heating-cooling action. The command output has to be configured as PID for Heating (par. P.b. - Index 0x3000 Sub-Index 33 -greater than 0), while the alarm 1 and 2 has to be configured as Cooling (value 9 on par. AL. 1 - Index 0x3000 Sub-Index 56 o par. AL. 2 - Index 0x3000 Sub-Index 68). The command output must be connected to the actuator responsible for heating, while the alarm will control cooling action.
Parameters to be configured for the heating PID are:
P.b. (Index 0x3000 Sub-Index 33): Heating proportional band
t.i. (Index 0x3000 Sub-Index 34): Integral time of heating and cooling
t.d. (Index 0x3000 Sub-Index 35): Derivative time of heating and cooling
t.c. (Index 0x3000 Sub-Index 40): Heating time cycle
Parameters to be configured for the cooling PID are:
AL. 1 (Index 0x3000 Sub-Index 56) or AL. 2 (Index 0x3000 Sub-Index 68) = cool (value 9) Alarm selection (Cooling)
P.b.M. (Index 0x3000 Sub-Index 42): Proportional band multiplier
ov.d.b. (Index 0x3000 Sub-Index 43): Overlapping / Dead band
co.c.t. (Index 0x3000 Sub-Index 44): Cooling time cycle
Par. P.b.M. (that ranges from 1.00 to 5.00) determines the proportional band of cooling action basing on the formula:
Proportional band for cooling action = P.b. * P.b.M.

This gives a proportional band for cooling which will be the same as heating band if P.b.M. = 1.00, or 5 times greater if P.b.M. = 5.00.
Integral and derivative time are the same for both actions.
The par. ou.d.b. determines the percentage overlapping between the two actions. For systems in which the heating output and cooling output must never be simultaneously active a dead band (ou.d.b. ≤ 0) must be configured, vice versa you can configure an overlapping (ou.d.b. > 0).
The following figure shows an example of dual action P.I.D. (heating-cooling) with t. r. = 0 and t.d. = 0.



The par. co.c.t. has the same meaning as the heating time cycle t.c.
Par. coo.F. (Cooling Fluid – Index 0x3000 Sub-Index 41) pre-selects the proportional band multiplier P.b.M. and the cooling PID cycle time co.c.t. basing on the type of cooling fluid:

coo.F.	Cooling fluid type	P.b.M.	co.c.t.
Air	Air	1.00	10
oil	Oil	1.25	4
H2o	Water	2.50	2

Once selected the parameter coo.F., parameters P.b.M., ou.d.b and co.c.t. can however be modified.

7.9 Soft-Start function

DRR460 is provided with two types of softstart selectables on parameter 80 SS.tY. ("Softstart Type" Index 0x3000 Sub-Index 80).

1 First selection (value 1 of Index 0x3000 Sub-Index 80) enables gradient softstart. At starting the controller reaches setpoint basing on the rising gradient set on parameter SS.Gr. ("Softstart Gradient" on Index 0x3000 Sub-Index 81) in Unit/hour (ex. °C/h). If parameter SS.t1. ("Softstart Time" on Index 0x3000 Sub-Index 84) is different to 0, at starting when the time selected on parameter 84 is elapsed, the controller stops to follow the gradient and reaches setpoint with the maximum power.
2 Second selection (value 2 of Index 0x3000 Sub-Index 80) enables output percentual softstart. On par. SS.tH. ("Softstart Threshold" on Index 0x3000 Sub-Index 83) it is possible to set the threshold under which starts the softstart. On par. SS.PE. ("Softstart Percentage" on Index 0x3000 Sub-Index 82) an output percentage is selectable (0 to 100), which controller keeps until the process exceeds the threshold set on parameter SS.tH. or until the time in minutes set on parameter SS.t1. ("Softstart Time" of Index 0x3000 Sub-Index 84) expires.

7.10 Retransmission function on analogue output

If not used as command, the anaolgue output can be used to retransmit process/ setpoint/ current read by the C.T. input/ output percentage.
Select on parameter rEtr. ("Retransmission" on Index 0x3000 Sub-Index 100) the value to be retransmitted. Select on parameter rE.tY. ("Retransmission Type" on Index 0x3000 Sub-Index 101) the type of output. It is possible also to select on Index 0x3000 Sub-Index 102 and 103 the input value rescale limites.

7.11 LATCH ON Function

For use with input PoE.1 (potentiometer 6 KΩ) and PoE.2 (potentiometer 150 KΩ) and with linear input (0..10 V, 0..60 mV, 0/4..20 mA), it is possible to associate start value of the scale (par. LoL.1. "Lower Linear Input" Index 0x3000 Sub-Index 3) to the minimum position of the sensor and value of the scale end (par. uPL.1. "Upper Linear Input" Index 0x3000 Sub-Index 4) to the maximum position of the sensor (select 1 on parameter LtCh "Latch On" Index 0x3000 Sub-Index 9).
It is also possible to fix the point in which the controller will display 0 (however keeping the scale range between LoL.1. e uPL.1.) using the "virtual zero" option by setting 2 or 3 in par. LtCh.
Setting 2 virtual zero can be modified in each moment while setting 1, Latch-On function ends after 120 seconds.
Then refer to the following table for the calibration procedure:

Index	Sub Index	Display	Do
0x4011	1	Write 1 to enable Latch on. Write 0 to end procedure	Place the sensor on minimum operating value (corresponding to LoL.1)
0x4011	2	Write 1 to fix value on minimum	Place sensor on maximum operating value (corresponding to uPL.1.)
0x4011	3	Write 1 to fix value on maximum	To exit standard procedure write 0 on Index 0x4011 Sub-Index 1 or wait 120 seconds. With "virtual zero" put the sensor on zero point.
0x4011	4	Write 1 to fix zero virtual value. Write 2 to reset zero virtual value.	To exit procedure write 0 on Index 0x4011 Sub-Index 1

7.12 Expansion function

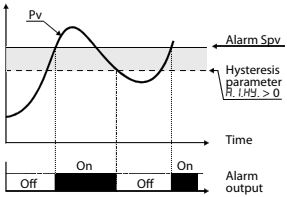
Selecting 1 on par. E.Mod. ("Expansion Module" Index 0x3000 Sub-Index 121) DRR460 works as a expansion module. Controller functions (temperature control, alarms, softstart etc..) are disabled and outputs management must be done by an external master (Es. PLC, HMI panel...).
It is possible to configure output status at starting and in case of error, programming parameters Index 0x3000 Sub-Index 122 - 131 (see par. 9).

8 Serial communication

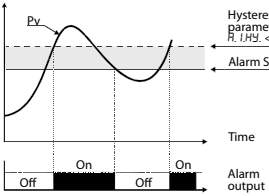
DRR460-12A-CAN is equipped with an USB micro connector which, connected to the PC, allows the communication with the Pixsys configuration program LabSoftView (available on the reserved area of www.pixsys.net).

9 Alarm Intervention Modes

9.a Absolute Alarm or Threshold Alarm active over (Index 0x3000 Sub-Index 56 = 1)

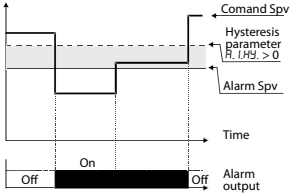


Absolute alarm. Hysteresis value greater than "0" (Par. A. I.HY Index 0x3000 Sub-Index 58 > 0).



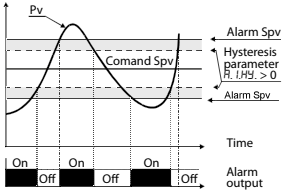
Absolute alarm. Hysteresis value less than "0" (Par. A. I.HY Index 0x3000 Sub-Index 58 < 0).

9.b Absolute alarm or threshold alarm referred to command setpoint active over (Index 0x3000 Sub-Index 56 = 6)

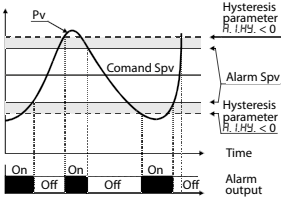


Absolute alarm referred to command setpoint.
Hysteresis value greater than "0" (Par. A.I.HY Index 0x3000 Sub-Index 58 > 0).
Command setpoint can be modified by CANopen (Index 0x4000).

9.c Band alarm (Index 0x3000 Sub-Index 56 = 3)

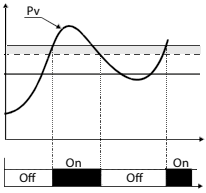


Band alarm hysteresis value greater than "0" (Par. A.I.HY Index 0x3000 Sub-Index 58 > 0).

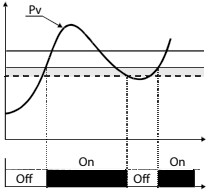


Band alarm hysteresis value less than "0" (Par. A.I.HY Index 0x3000 Sub-Index 58 < 0).

9.d Upper deviation alarm (Index 0x3000 Sub-Index 56 = 4)

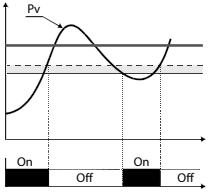


Upper deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (Par. A. i.HY Index 0x3000 Sub-Index 58 > 0).
With hysteresis value less than “0” (A. i.HY. < 0) the dotted line moves under the alarm setpoint.

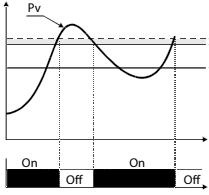


Upper deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (Par. A. i.HY Index 0x3000 Sub-Index 58 > 0).
With hysteresis value less than “0” (A. i.HY. < 0) the dotted line moves under the alarm setpoint.

9.e Lower deviation alarm (Index 0x3000 Sub-Index 56 = 5)



Lower deviation alarm value of alarm setpoint greater than “0” and hysteresis value greater than “0” (Par. A. i.HY Index 0x3000 Sub-Index 58 > 0).
With hysteresis value less than “0” (A. i.HY. < 0) the dotted line moves under the alarm setpoint.



Lower deviation alarm value of alarm setpoint less than “0” and hysteresis value greater than “0” (Par. A. i.HY Index 0x3000 Sub-Index 58 > 0).
With hysteresis value less than “0” (A. i.HY. < 0) the dotted line moves under the alarm setpoint.

10 CANopen

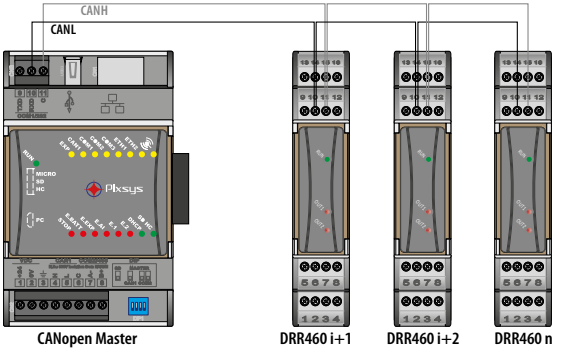
Each LED RUN blinking type indicates a specific CANopen status.

Blinking name LED RUN	Blinking type
Blink_fast	Fast blinking 50msec
Blink_medium	Blinking 200msec
Blink_slow	Blinking 600msec
LED_on	LED always on
Blink_3_on	LED on for 1sec, 3 blink 150msec
Blink_1_off	Slow blink 40msec every 1.2sec
Blink_3_off	LED off for 1sec, 3 blink 150msec

Status	Led RUN blinking
Boot-up	Blink_fast
Pre-Operational	Blink_slow
Operational	LED_on
Stopped	Blink_1_off
Pre-Operational con Emergency	Blink_medium
Operational con Emergency	Blink_3_on
Stopped con Emergency	Blink_3_off

10.1 SET-UP as CANopen slave mode

A CANopen network must have a 120W terminal line resistance. If more devices have to be connected in cascade, that resistance has to be connected to the last DRR460 of network, at the end of the line only.



DRR460 are provided with an end-line resistance: short-circuit pins 9 and 10 to insert it.

10.2 Operation as CANopen slave node

After boot-up, device will be in Pre-Operational status automatically (LED RUN Blink_slow blinking). PDO transmission/reception aren't allowed, SDO transmission/reception are only allowed. To change into Operational status, an NMT[1] messages from a master is needed. It's possible to change into Stopped status from Pre-Operational or Operational status by rounding rotary switch in position 0. Replacing switch in other positions, device will change into Pre-Operational status anyway.

10.3 EDS Files

EDS files of the different models are available on the download area of www.pixsys.net.

11 CANopen in details

CAN (Controller Area Network) is a Multimaster bus system. Messages are sent to the bus with a certain priority, defined by COB ID (Communication Object Identifier). CANopen is a networking concept defined as an application layer by DS 301 CIA specification (CAN in automation). CANopen is built on top of CAL (CAN Application Layer, an high layer communication protocol for CAN-based network). CAL defines 4 application layer service elements:

- **CMS** (CAN-based Message Specification): it defines a set of objects (Variable, Event, Domain) to specify how CAN interface can access to the network node features.
- **NMT** (Network Management): it defines all typical services of a master-slave concept network as initialisation, start and stop node, detection of failures.
- **DBT** (Distributor): it defines a dynamic distribution of CAN identifiers to the nodes of the network, called COB-ID (Communication Object Identifier)
- **LMT** (Layer Management): it offers the possibility to change parameters as NMT address of a node, bit-timing and baud rate of CAN interface.

CMS defines 8 priority levels, 220 **COB-ID** each. Others identifiers are reserved for NMT, DBT and LMT.

CAN Application Layer (CAL)

COB-ID	Descrizione
0	NMT start/stop services
1..220	CMS object priority 0
221..440	CMS object priority 1
441..660	CMS object priority 2
661..880	CMS object priority 3
881..1100	CMS object priority 4
1101..1320	CMS object priority 5
1321..1540	CMS object priority 6
1541..1760	CMS object priority 7
1761..2015	NMT Node Guarding
2016..2031	NMT, LMT, DBT services

[1] *For details on CANopen, see Chapter 11.*

CAL doesn't define contents of the **CMS** objects, it defines how but not what. CANopen provides an implementation of a distributed control system using CAL services and protocols.

11.1 Object Dictionary

The object dictionary is the most important point of a CANopen device where all configuration information and data are stored. It is an ordered group of objects, where each one is addressed using a 16bit index. Organization of dictionary is based on tables and contains three areas of CANopen objects:

Communication Profile Area (addresses 0x1000-0x1FFF): this profile contains all parameters relevant for CANopen communication and it is common for all CANopen devices.

Manufacturer Specific Profile Area (addresses 0x2000-0x5FFF): in this profile, each manufacturer can implement its own company specific objects.

Standardized Device Profile Area (addresses 0x6000-0x9FFF): this profile contains all objects which are assisted by a certain device profile. The bus coupler assists the device profile DS-401 (Device Profile for Generic I/O Modules).

In the object dictionary, a logical addressing scheme is used for the access to communication and device parameters, data and functions.
Each entry into the dictionary is identified by a 16 bit index which indicates the row address of the table. A maximum of 65536 entries are permitted.
If an object is composed of several components, the components are identified by means of an 8 bit sub-index. The sub-index indicates the individual column address of the table allowing a maximum of 256 entries.
If index only consists of simple variables (8bit unsigned, 16bit unsigned, ecc.), sub-index is always zero. For more objects, as array, records, ecc. sub-index 0 indicates the maximum number of the following sub-indexes.

Data is coded in the following sub-indexes:
- object name describing the object function;
- a data type attribute;
- an access attribute: read only, write only or read/write.

CANopen object dictionary structure

Index (Exadecimal)	Object
0x0000	Not used
0x0001- 0x001F	Static data types
0x0020 - 0x003F	Complex data types
0x0040 - 0x005F	Manufacturer specific data types
0x0060 - 0x007F	Profile specific static data types
0x0080 - 0x009F	Profile specific complex data types
0x00A0 - 0x0FFF	Reserved
0x1000 - 0x1FFF	Communication Profile (DS-301)
0x2000 - 0x5FFF	Manufacturer specific parameters
0x6000 - 0x9FFF	Parameters from standardized device profiles
0xA000 - 0xFFFF	Reserved

11.1.1 CANopen communication model

CANopen defines 4 message types:

1 **Administrative message**: layer management, network management and identifier distribution services (initialisation, configuration and supervision network). Services and protocols are according to LMT, NMT and DBT elements.

2 **Service Data Object (SDO)**: it provides client access to objects of object dictionary of the device (server) using index and subindex. A replay is generated for every CAN message: one SDO requires 2 CANidentifiers. SDO request and reply message always contains 8 bytes.

3 **Process Data Object (PDO)**: it provides transfer real-time data. Data transfer is limited from 1 to 8 bytes, and it's content is defined by its CAN-identifier only. Each PDO is described by 2 object in the object dictionary:
   - **PDO Communication Parameter**: it contains COB-ID used, transmission type, inhibit time and time period
   - **PDO Mapping Parameter**: it contains a list of entries of object dictionary mapped in PDO. It's configurable using SDO messages if "variable PDO mapping" is supported by devices.

   There are 2 types of PDO transmission:
   1 **Synchronous**: it's regulated by receipt of a SYNC object (**acyclic**, means not periodically, or cyclic, means that transmission is periodically triggered every 1,2,..,240 by SYNC messages).
   2 **Asynchronous**: transmission is triggered by a remote transmission request from another device, or it's triggered by configuration of an object specific event specified in the device profile (input change of value, or a timer event...)

- **Inhibit time** for a PDO defines minimum time between two consecutive PDO transmission. It's a part of PDO Communication Parameter and it's defined as an unsigned 16bit integer (unit is 100µsec).

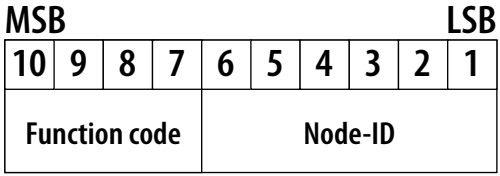
- **Event time period** for a PDO defines where PDO transmission is periodically triggered when a specific time has elapsed. It's defined as an unsigned 16bit integer (unit is millisecond). PDO transmit data without overhead and messages aren't confirmed: one PDO requires one CAN-identifier (no more than 8 bytes can be transferred with 1 PDO).

4 **Predefined Messages or Special Function Objects**. It's a list of predefined and important messages:
   - **Synchronization (SYNC)**: it regulates input/output transmission and update through PDO synchronization. It is in the highest priority COBID and no data bytes are transferred to ensure message as short as possible.
   - **Time Stamp**: It provides application devices a common time frame reference.
   - **Emergency**: the event is triggered by device internal errors.
   - **Node/Life Guarding**: NMT master monitors nodes status (node guarding). Nodes optionally monitor NMT master status (life guarding): it starts on the NMT slave after it has received the first node guarding message from NMT master. It detects errors in the network interfaces of devices: a remote transmission request from NMT master to a particular node triggers a reply containing node status.
   - **Boot-up**: NMT slave send this message when it has transitioned from Initialising to Pre-Operational status.

SDO is typically used for device configuration in a CANopen network, while PDO is used for fast data transfer. All CANopen devices should have at least one PDO, all other communication objects are optional.

11.1.2 CANopen Pre-defined Connection Set

When a device has to reply a master request, a default CAN-identifier scheme is used. It's based on a 11bit frame, where the first 7bit (LSB) are used for **Node-ID** (range 1...127, defined by specific manufacturer configuration), and the last 4bit (MSB) are used for **Function Code**.



Pre-defined connection set defines 4 Rx PDOs, 4 TX PDOs, 1 SDO, 1 Emergency Object and 1 Node-Error-Control Identifier1. It also support broadcasting of non-confirmed NMT Module Control Services, SYNC and Time Stamp objects. Complete CAN-identifier scheme is shown below:

Broadcast objects of CANopen Pre-defined Connection Set

Object	Function Code (bit 7...10)	COB-ID	Communication parameters
NMT Module Control	0000	0x000	-
SYNC	0001	0x080	0x1005, 0x1006, 0x1007
Time Stamp	0010	0x100	0x1012, 0x1013

Peer-to-Peer objects of CANopen Pre-defined Connection Set

Object	Function Code (bit 7...10)	COB-ID	Communication parameters
Emergency	0000	0x81 – 0xFF	0x1024, 0x1015
PDO1 (transmit)	0011	0x181 – 0x1FF	0x1800
PDO1 (receive)	0100	0x201 – 0x27F	0x1400
PDO2 (transmit)	0101	0x281 – 0x2FF	0x1801
PDO2 (receive)	0110	0x301 – 0x37F	0x1401
PDO3 (transmit)	0111	0x381 – 0x3FF	0x1802
PDO3 (receive)	1000	0x401 – 0x47F	0x1402
PDO4 (transmit)	1001	0x481 – 0x4FF	0x1803
PDO4 (receive)	1010	0x501 – 0x57F	0x1403
SDO (transmit/receive)	1011	0x581 – 0x5FF	0x1200
SDO (receive/client)	1100	0x601 – 0x67F	0x1200
NMT Error Control	1110	0x701 – 0x77F	0x1016, 0x1017

All peer-to-peer identifiers are different so only one master device can communicate to each slave node (up to 127 nodes). Two slaves aren't able to communicate because they don't know each other's node-ID, master only knows them.

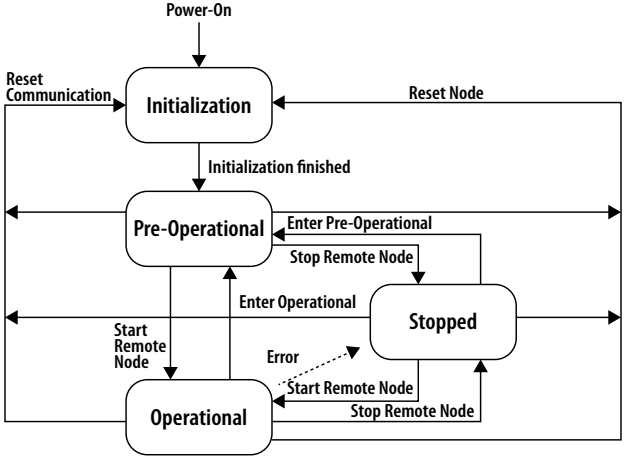
11.1.3 CANopen identifier distribution

COB-ID's allocation can be made in 3 ways:

- **Pre-defined Connection Set:** it's mode shown in the previous section. Allocation is default setting, no others configuration is needed.
- **PDO identifiers (COB-IDs):** can be modified after powering-up device, when it's in Pre-Operational status (see next section). In this status, it's possible to write new values to Object Dictionary allocation by SDO.
- **Using DBT (Distributor, a CAL service):** nodes are initially identified by their configured node-ID. Node-ID of slave nodes may be configured by internal dip-switches or LMT (Layer Management, a CAL service). When network initialises and boots, master provides a connectionì with each connected slave with a 'telegram' (NMT service). Once this connection has been established, DBT provides allocation of CAN identifiers for communication of SDOs and PDOs to the node.

11.1.4 CANopen boot-up process

Networks initialisation supports two boot-up process: Minimum boot-up and Extended boot-up. The first one is a pre-required process for a CANopen device, the second one is optional, but necessary if COB-IDs have to be allocated by DBT services1. State-transition diagram shows a CANopen minimum bootup node.



NMT services allow changing status nodes at any time. NMT message consists of CAN-header (COB-ID = 0) and 2 data bytes. One byte contains the requested service (NMT command specifier) and other byte contains Node-ID (0 for broadcasting mode). A CANopen network can only have one NMT master, which brings NMT messages and controls initialisation process. CANopen device supporting only minimum boot-up enter Pre-Operational status automatically after ending device initialisation. In this status setting device parameters and COB-ID allocation are possible by SDO only.

A distinction is needed between device configuration and CANopen device initialisation (**boot-up**). DRR460-CAN configuration is allowed when device is powered-on with rotary switch in position 0 (Node-ID offset multiplier, baud-rate); DRR460-CAN CANopen initialisation (boot-up) is always provided by itself when it is powered-on (for each position of rotary switch).
DRR460-CAN enter Pre-Operational status after having finished its initialisation. It's possible to force Stopped status by changing rotary switch in 0 position (from Pre-Operational or Operational status).

11.1.5 Communication profile: start

In the most common cases, a default configuration is assigned to Object dictionary, if there aren't other configuration saved by user.

1.Rx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1600	0	Number of objects	5
	1	Command setpoint	0x4000 00 10
	2	Alarm setpoint 1	0x4001 00 10
	3	Alarm setpoint 2	0x4002 00 10
	4	Remote alarm 1 status	0x400C 00 08
	5	Remote alarm 2 status	0x400D 00 08
	6..8	...	...

2.Rx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1601	0	Number of objects	3
	1	Heating command output %	0x4004 00 10
	2	Autotuning status	0x400E 00 08
	3	Automatic/Manual status	0x400F 00 08
	4..8	...	...

1.Tx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1A00	0	Number of objects	2
	1	1st analogue input 16 bit	0x6401 01 10
	2	Real command setpoint	0x4008 00 10
	3	Heating command output %	0x4004 00 10
	4	Cold junction temperature	0x4006 00 10
	5...8	...	...

2.Tx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1A01	0	Number of objects	0
	1	2nd analogue input 16 bit	0x6401 02 10
	2	3rd analogue input 16 bit	0x6401 03 10
	3	4th analogue input 16 bit	0x6401 04 10
	4	5th analogue input 16 bit	0x6401 05 10
	5...8	...	...

3.Tx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1A02	0	Number of objects	0
	1...8	...	...

4.Tx PDO: contains the following values

Index	Sub - index	Description	Default value
0x1A03	0	Number of objects	0
	1...8	...	...

11.2 Communication Profile Area

The following table shows all the supported communication profile objects:

Index	Name	Type	R/W
0x1000	Device type	32bit unsigned	CONST
0x1001	Error register	8bit unsigned	R
0x1003	Pre-defined Error Field	Array 32bit unsigned	R/W
0x1005	COB-ID SYNC message	32bit unsigned	R
0x1006	Communication Cycle Period	32bit unsigned	R/W
0x1008	Manufacturer Device Name	String	CONST
0x1009	Manufacturer Hardware Version	String	CONST
0x100A	Manufacturer Software Version	String	CONST
0x100B	Node ID	8bit unsigned	R
0x100C	Guard Time	16bit unsigned	R/W
0x100D	Life Time Factor	8bit unsigned	R/W
0x1010	Store Parameters	Array 32bit unsigned	R/W
0x1011	Restore default Parameter	Array 32bit unsigned	R/W
0x1014	COB-ID Emergency Object	32bit unsigned	R
0x1015	Inhibit time Emergency Object	16bit unsigned	R/W
0x1017	Producer Heartbeat Time	16bit unsigned	R/W
0x1018	Identity Object	Record 32bit unsigned	R
0x1029	Error Behaviour	Array 8bit unsigned	R/W
0x1400	Receive PDO communication parameter 0	Record 32bit unsigned	R/W
0x1401	Receive PDO communication parameter 1	Record 32bit unsigned	R/W
0x1600	Receive PDO mapping parameter 0	Record 32bit unsigned	R/W
0x1601	Receive PDO mapping parameter 1	Record 32bit unsigned	R/W
0x1800	Transmit PDO communication parameter 0	Record 32bit unsigned	R/W
0x1801	Transmit PDO communication parameter 1	Record 32bit unsigned	R/W
0x1802	Transmit PDO communication parameter 2	Record 32bit unsigned	R/W

0x1803	Transmit PDO communication parameter 3	Record 32bit unsigned	R/W
0x1A00	Transmit PDO mapping parameter 0	Record 32bit unsigned	R/W
0x1A01	Transmit PDO mapping parameter 1	Record 32bit unsigned	R/W
0x1A02	Transmit PDO mapping parameter 2	Record 32bit unsigned	R/W
0x1A03	Transmit PDO mapping parameter 3	Record 32bit unsigned	R/W

11.2.1 Device Type

This object indicates device type profile:

Index	Subindex	Name	Type	Default	R/W
0x1000	0	Device type	32bit unsigned	-	CONST

Structure:

Bit 24…31 MSB	Bit 16…23	Bit 8...15	Bit 0...7 LSB
0x00	0000b_{19} b_{18} b_{17} b_{16}	0x01	0x91

b_{16}	0	If no **digital input** is connected
	1	If at least one **digital input** is connected
b_{17}	0	If no **digital output** is connected
	1	If at least one **digital output** is connected
b_{18}	0	If no **analogue input** is connected
	1	If at least one **analogue input** is connected
b_{19}	0	If no **analogue output** is connected
	1	If at least one **analogue output** is connected

For DRR460 the value is 0x000E0191
Least significant word (LSW) is always 0x0191 = 401_{dec} CAN DS standard.

11.2.2 Error Register

This object contains internal errors and it's a subset of emergency message.

Index	Sub - index	Name	Type	Default	R/W
0x1001	0	Error register	8bit unsigned	-	R

Structure:

Bit number	Meaning
0	General error
1	Current
2	Voltage
3	Temperature

Bit number	Meaning
4	Communication
5	Device profile specific
6	Reserved
7	Manufacturer specific

If an error occurs, bit 0 is always set 1.

11.2.3 Pre-defined Error Field

This object contains information about last 10 errors occurred. New errors will be entered in subindex 1, and error in subindex 10 will be lost.

Index	Subindex	Name	Type	Default	R/W
0x1003	0	Number of error	Array 8bit unsigned	-	R/W
	1	Standard error field (always last error)	Array 32bit unsigned	-	R
	...	...	...	-	...
	10	Standard error field (first error)	Array 32bit unsigned	-	R

Structure:

Bit 16..31 MSW	Bit 0..15 LSW
Additional info	Error code

Additional info are first 2 bytes of additional code of Emergency telegram.
Error code is error code in the Emergency telegram.

11.2.4 COB-ID SYNC message

This object contains COB-ID for synchronization message.

Index	Subindex	Name	Type	Default	R/W
0x1005	0	COB-ID SYNC	32bit unsigned	0x00000080	R

Structure:

Bit 16..31 MSW	Bit 0..15
0 (reserved)	COB-ID

11.2.5 Communication Cycle Period

This object contains maximum time (msec) between 2 SYNC messages (resolution 2msec). If value is 0, no SYNC monitoring is realized.

Index	Subindex	Name	Type	Default	R/W
0x1006	0	Communication Cycle Period	32bit unsigned	0	R/W

11.2.6 Manufacturer Device Name

Index	Subindex	Name	Type	Default	R/W
0x1008	0	Manufacturer Device Name	String	M260	CONST

11.2.7 Manufacturer Hardware Version

Index	Subindex	Name	Type	Default	R/W
0x1009	0	Manufacturer Hardware Version	String	Actual hardware version	CONST

11.2.8 Manufacturer Software Version

Index	Subindex	Name	Type	Default	R/W
0x100A	0	Manufacturer Software Version	String	Actual software version	CONST

11.2.9 Node ID

Index	Subindex	Name	Type	Default	R/W
0x100B	0	Node ID	8bit unsigned	0	R

11.2.10 Guard Time

This object defines Guarding Time (time between 2 interrogation, in msec).

Index	Subindex	Name	Type	Default	R/W
0x100C	0	Guard Time	16bit unsigned	0	R/W

11.2.11 Life Time Factor

This object is a part of Node Guarding Protocol. If it's equal to 0, no monitoring is realized.

Index	Subindex	Name	Type	Default	R/W
0x100D	0	Life Time Factor	8bit unsigned	0	R/W

11.2.12 Store Parameters

This object stores user's setting parameters permanently, if signature "save" (ASCII 0x65766173) is written into subindex 1.

Index	Subindex	Name	Type	Default	R/W
0x1010	0	Number of sub-index	Array 8bit unsigned	1	R
	1	Store all parameters	Array 32bit unsigned	1 (string "save" to store)	R/W

11.2.13 Restore Default Parameters

This object allows to reset user stored parameters and load default values. If signature "load" (ASCII 0x64616F6C) is written on Sub-index 1, standard default parameters are loaded each power on (until next "save" command is written).

Index	Subindex	Name	Type	Default	R/W
0x1011	0	Number of sub-index	Array 8bit unsigned	2	R
	1	Load standard default parameters	Array 32bit unsigned	1 (string "load" for standard default)	R/W

11.2.14 COB-ID Emergency Object

Index	Subindex	Name	Type	Default	R/W
0x1014	0	COB-ID EMCY	32bit unsigned	0x80 + module - ID	R

Structure:

Bit 31	Bit 11...30	Bit 0...10
0(valid) / 1(invalid)	0 Reserved	COB-ID

11.2.15 Inhibit Time Emergency Object

This object indicates time have to be elapsed before sending another Emergency (minutes).

Index	Subindex	Name	Type	Default	R/W
0x1015	0	Inhibit Time EMCY	16bit unsigned	0	R/W

11.2.16 Producer Heartbeat Time

This object contains time between two Heartbeat messages (milliseconds). If it's equal to 0, no Heartbeat is sent.

Index	Subindex	Name	Type	Default	R/W
0x1017	0	Producer Heartbeat Time	16bit unsigned	0	R/W

11.2.17 Identity Object

This object specifies device and manufacturer.

Index	Subindex	Name	Type	Default	R/W
0x1018	0	Number of Sub-index	Record 8bit unsigned	4	R
	1	Manufacturer ID	Record 32bit unsigned	PIX	R
	2	Device description	Record 32bit unsigned	260	R
	3	Revision number	Record 32bit unsigned	-	R
	4	Serial number	Record 32bit unsigned	-	R

11.2.18 Error Behaviour

This object specifies into which states modules changes in case of communication error.

Index	Subindex	Name	Type	Default	R/W
0x1029	0	Number of Sub-index	Array 8bit unsigned	1	R
	1	Communication error	Array 8bit unsigned	0	R/W

Structure:

Communication error	Action
0	Change into status PRE-OPERATIONAL (only if actual status were OPERATIONAL)
1	No status change
2	Change into status STOPPED

11.2.19 Receive PDO Communication Parameter

This object set communication parameters of Rx PDO supported. **Default** COB-ID of PDO is set by DS301 standard.

Index	Subindex	Name	Type	Default	R/W
0x1400 0x1401	0	Number of Sub-index	Record 8bit unsigned	2	R
	1	COB-ID	Record 32bit unsigned	0x1400 0x200 + Module-ID 0x1401 0x300 + Module-ID	R/W
	2	Transmission type	Record 8bit unsigned	255	R/W

COB-ID Structure:

Bit 31	Bit 30	Bit 29...11	Bit 0...10
0(valid) / 1(invalid)	0(RTR allowed) / 1(RTR not allowed)	0 Reserved	COB-ID

Digital and Analogue inputs are transmitted as Change Of Value (COV). Type of transmission depending upon set transmission type and it's explained in the following table (RTR = Remote Transmission Request received):

Transmission Type	PDO transmission					TxPDO (inputs)	RxPDO (outputs)
	cyclic	acyclic	synchronous	asynchronous	only RTR		
0		X	X			If COV is transmitted with each SYNC	Set outputs after each SYNC as requested by last PDO received
1...240	X		X			Transmission with each i SYNC (i = 1...240)	Set outputs after each SYNC as requested by last PDO received
241..251	Reserved						
252			X		X	Data is read again with a SYNC, but not sent, request via RTR	Not supported
253				X	X	Request via RTR	COV
254				X		COV	COV
255				X		COV	COV

11.2.20 Receive PDO Mapping Parameter

This object defines data transmitted by PDO. Subindex 0 contains number of objects valid for PDO.

Index	Subindex	Name	Type	Default	R/W
0x1600 0x1601	0	Number of object	Record 8bit unsigned	-	R/W
	1...8	PDO mapping object	Record 32bit unsigned	-	R/W

Object structure:

Bit 16..31	Bit 8..15	Bit 0..7
Index	Sub-index	Object size

Index: object index to be transmitted
Subindex: object subindex to be transmitted
Object size: object size in bits (no more than 8 bytes can be transmitted in a PDO, so sum of valid object lengths have not to exceed 64.

11.2.21 Transmit PDO Communication Parameter

This object set communication parameters of Tx PDO supported. **Default** COB-ID of PDO is set by DS301 standard.

Index	Subindex	Name	Type	Default	R/W
0x1800 0x1801 0x1802 0x1803	0	Number of Sub-index	Record 8bit unsigned	5	R
	1	COB-ID	Record 32bit unsigned	0x1800 0x180 + Module-ID 0x1801 0x280 + Module-ID 0x1802 0x380 + Module-ID 0x1803 0x480 + Module-ID	R/W
	2	Transmission type	Record 8bit unsigned	255	R/W
	3	Inhibit Time	Record 16bit unsigned	0	R/W
	5	Event Timer	Record 16bit unsigned	0	R/W

COB-ID Structure:

Bit 31	Bit 30	Bit 29...11	Bit 0...10
0(valid) / 1(invalid)	0(RTR allowed) / 1(RTR not allowed)	0 Reserved	COB-ID

Digital and Analogue inputs are transmitted as Change Of Value (COV). Type of transmission depending upon set transmission type and it's explained in the following table:

Transmis-sion Type	PDO transmission					TxPDO (inputs)	RxPDO (outputs)
	cyclic	acyclic	synchro-nous	asynchro-nous	only RTR		
0		X	X			If COV is transmitted with each SYNC	Set outputs after each SYNC as requested by last PDO received

1...240	X		X		Transmissi on with each i SYNC (i = 1...240)	Set outputs after each SYNC as requested by last PDO received
241..251	Reserved					
252			X		X	Data is read again with a SYNC, but not sent, request via RTR	Not supported
253				X	X	Request via RTR	COV
254				X		COV	COV
255				X		COV	COV

Inhibit Time is minimum time between two consecutive PDOs with same COB-ID (unit time 100msec).
Event Timer defines time after the elapsed of a sent PDO, even if no change of data has occured (millisecond). It can be used only for transmission types 254 and 255.

11.2.22 Transmit PDO Mapping

This object defines data transmitted by PDO. Subindex 0 contains number of objects valid for PDO.

Index	Subindex	Name	Type	Default	R/W
0x1A00 0x1A01 0x1A02 0x1A03	0	Number of object	Record 8bit unsigned	-	R/W
	1...8	PDO mapping object	Record 32bit unsigned	-	R/W

Object structure:

Bit 16...31	Bit 8...15	Bit 0...7
Index	Sub-index	Object size

Index: object index to be transmitted
Subindex: object subindex to be transmitted
Object size: object size in bits (no more than 8 bytes can be transmitted in a PDO, so sum of valid object lengths have not to exceed 64.

11.3 Manufacturer Specific Parameter Area

The following table shows all Pixsys specific parameters objects supported:

Index	Name	Type	R/W
0x2000	Device specifications	Array 16bit signed	R/W
0x3000	DRR460 Parameters	Array 16bit signed	R/W
0x4000	Command setpoint	16bit signed	R/W
0x4001	Alarm 1 setpoint	16bit signed	R/W
0x4002	Alarm 2 setpoint	16bit signed	R/W
0x4003	Start/Stop command	8bit unsigned	R/W
0x4004	Heating output %	16bit unsigned	R/W
0x4005	Cold output %	16bit unsigned	R
0x4006	Cold junction temperature	16bit signed	R
0x4007	Error Flags	32bit unsigned	R
0x4008	Real command setpoint	16bit signed	R
0x4009	Digital outputs status	8bit unsigned	R
0x400A	Command output reset	8bit unsigned	R/W
0x400B	Alarms reset	8bit unsigned	R/W
0x400C	Remote alarm 1	8bit unsigned	R/W
0x400D	Remote alarm 2	8bit unsigned	R/W
0x400E	Autotuning status	8bit unsigned	R/W
0x400F	Automatic/Manual command	8bit unsigned	R/W

11.3.1 Device specification

This object defines some DRR460 configuration parameters

Index	Subindex	Name	Type	Default	R/W
0x2000	0	Number of Sub-index	Array 16bit signed	19	R
	1	Baud rate	Array 16bit signed	6	R
	2	Boot-up time	Array 16bit signed	120	R/W
	3	CANopen state after boot-up	Array 16bit signed	0x7F	R/W
	4...19	...	Reserved		R/W

1 Baud rate *(idx 0x2000, s-idx 1)*

Only reading. Can be modified by Index 0x0300 Sub-Index 112.

0 50 kbit/s
1 62.5 kbit/s
2 100 kbit/s
3 125 kbit/s
4 250 kbit/s
5 500 kbit/s
6 1 Mbit/s (**Default**)

2 Boot-up time *(idx 0x2000, s-idx 2)*

Defines boot-up time duration (units of 10 ms)
10..1000 centimes of s (10 = 100ms .. 100 = 1s). (**Default**: 120)

3 CANopen status after boot-up *(idx 0x2000, s-idx 3)*

CANopen standard defines that, once ended boot-up, the device will automatically switch to Pre-Operational status. This is the default configuration (0x7F), but it is possible to switch to other status:

0	Boot-up
4	Stopped
5	Operational
0x7F	Pre-operational (**Default**)

11.3.2 Drr460 Parameters

The object index 0x3000 defines all DRR460 configuration parameters.
The sub-index (1..143) identifies each parameter described below:

Index	Subindex	Name	Type	Default	R/W
0x3000	0	Number of Sub-index	Array 16bit signed	143	R
	1..143	DRR460 parameters	Array 16bit signed	-	R/W

1 SEn. Sensor *(idx 0x3000, s-idx 1)*

Analogue input configuration / sensor selection

0	Tc-K	-260 °C..1360 °C. (**Default**)
1	Tc-S	-40 °C..1760 °C
2	Tc-R	-40 °C..1760 °C
3	Tc-J	-200 °C..1200 °C
4	Tc-T	-260 °C..400 °C
5	Tc-E	-260 °C..980 °C
6	Tc-N	-260 °C..1280 °C
7	Tc-B	100 °C..1820 °C
8	Pt100	-100 °C..600 °C
9	Ni100	-60 °C..180 °C
10	NTC10K	-40 °C..125 °C
11	PTC1K	-50 °C..150 °C
12	Pt500	-100 °C..600 °C
13	Pt1000	-100 °C..600 °C
14	0..10 V	
15	0..20 mA	
16	4..20 mA	
17	0..60 mV	
18	Potenziometer (set the value on parameter 5)	

2 dEGr. **Degree** *(idx 0x3000, s-idx 2)*

0	°C	Centigrade (**Default**)
1	°F	Fahrenheit
2	K	Kelvin

3 Lo.L.i. **Lower Linear Input** *(idx 0x3000, s-idx 3)*

Range lower limit only for linear input. Ex: with input 4..20 mA this parameter takes value associated to 4 mA.
-32767..+32767, **Default**: 0.

4 uP.L.i. **Upper Linear Input** *(idx 0x3000, s-idx 4)*

Range upper limit only for linear input. Ex: with input 4..20 mA this parameter takes value associated to 20 mA.
-32767..+32767. **Default**:10000

5 Pot.u. **Potentiometer Value** *(idx 0x3000, s-idx 5)*

Select potentiometer value
1..150 kohm. **Default**: 10kohm

6 L.i.o.L. **Linear Input over Limits** *(idx 0x3000, s-idx 6)*

If linear input, allows process to go over limits (Par. 3 and 4).

0	Disabled (**Default**)
1	Enabled

7 o.cAL. **Offset Calibration** *(idx 0x3000, s-idx 7)*

Value added / subtracted to the process visualization (usually correcting the value of environmental temperature).
-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 0.

8 G.cAL. **Gain Calibration** *(idx 0x3000, s-idx 8)*

Percentage value that is multiplied for the process value (allows to calibrated the working point). Ex: to correct the range from 0..1000°C showing 0..1010°C, set the par. to -1.0.
-1000 (100.0%)...+1000 (+100.0%), **Default**: 0.0.

9 Ltch **Latch-On** *(idx 0x3000, s-idx 9)*

Automatic setting of limits for linear inputs and potentiometers.

0	Disabled (**Default**)
1	Standard
2	Virtual zero
3	Linear virtual zero

10 FLtr. **Filter** *(idx 0x3000, s-idx 10)*

Analogue input reading filter: increases process stability.
1...50. (**Default**: 1)

11÷15 **Reserved** *(idx 0x3000, s-idx 11..15)*

Reserved parameters

16 c.out **Command Output** *(idx 0x3000, s-idx 16)*

Command output type selection

0 Command Q1; Alarm 1 Q2; Alarm 2 AO (0..20 mA). (**Default**)
1 Command Q1; Alarm 1 Q2; Alarm 2 AO (4..20 mA).
2 Valve command: Q1 (open) - Q2 (close); Alarm 1 AO (0..20 mA)
3 Valve command: Q1 (open) - Q2 (close); Alarm 1 AO (4..20 mA)
4 Command AO (0...20 mA); Alarm 1 Q1; Allarme 2 Q2.
5 Command AO (4...20 mA); Alarm 1 Q1; Allarme 2 Q2.

	Command	Alarm 1	Alarm 2
0	Q1	Q2	AO (0..20 mA)
1	Q1	Q2	AO (4..20 mA)
2	Q1(open),Q2(close)	AO (0..20 mA)	-
3	Q1(open),Q2(close)	AO (4..20 mA)	-
4	AO (0..20 mA)	Q1	Q2
5	AO (4..20 mA)	Q1	Q2

17 in.tS. **Initial State** *(idx 0x3000, s-idx 17)*

Selects controller status at starting.

0 Start (**Default**)
1 Stop
2 Stored. Backs the controller to the Start/Stop status existing before the switching-off.

18 Act.t. **Action type** *(idx 0x3000, s-idx 18)*

0 Heating (N.O.) (**Default**)
1 Cooling (N.C.)

19 c. HY. **Command Hysteresis** *(idx 0x3000, s-idx 19)*

Hysteresis in ON/OFF
-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 2.

20 c. S.E. **Command State Error** *(idx 0x3000, s-idx 20)*

State of contact for command output in case of error.

0 0 mA if command on AO. Open contact if command on Q1. Open valve if valve command. (**Default)**

1 4 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

2 20 mA if command on AO. Open contact if command on Q1. Open valve if valve command.

3 21.5 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

21 c. S.S. **Command State Stop** *(idx 0x3000, s-idx 21)*

State of contact for command output with controller in STOP

0 0 mA if command on AO. Open contact if command on Q1. Open valve if valve command. (**Default)**

1 4 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

2 20 mA if command on AO. Open contact if command on Q1. Open valve if valve command.

3 21.5 mA if command on AO. Closed contact if command on Q1. Closed valve if valve command.

22 c. rE. **Command Reset** *(idx 0x3000, s-idx 22)*

Type of reset for state of command contact (always automatic in P.I.D. functioning)

0 Automatic reset (**Default**)

1 Manual reset (by object idx 0x400A)

2 Manual reset stored (keeps relay status also after an eventual power failure)

23 c. dE. **Command Delay** *(idx 0x3000, s-idx 23)*

Command delay (only in ON / OFF functioning).
-3600..+3600 seconds. **Default**: 0.
Negative: delay in switching off phase.
Positive: delay in activation phase.

24 uAL.t. **Valve Time** *(idx 0x3000, s-idx 24)*

Valve time.
1...300 seconds. **Default**: 60.

25 Au.MA. **Automatic / Manual** *(idx 0x3000, s-idx 25)*

Enable automatic / manual selection.

0 Disabled (**Default**)

1 Enabled

2 Enabled with memory

26÷30 **Reserved** *(idx 0x3000, s-idx 26..30)*

Reserved parameters

31 tunE. **Tune** *(idx 0x3000, s-idx 31)*

Autotuning type selection.

0 Disabled. (**Default**)
1 Automatic. Calculation of P.I.D. parameters at starting and at command setpoint modification.
2 Manual (P.I.D. with automatic parameters calculation by object idx 0x400E)
3 Once (P.I.D. with parameters calculation only once at starting)
4 Synchronized.

32 S.dtu. **Setpoint Deviation Tune** *(idx 0x3000, s-idx 32)*

Selects deviation from command setpoint as threshold used by manual tuning to calculate P.I.D. parameters.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default**: 300.

33 P.b. **Proportional Band** *(idx 0x3000, s-idx 33)*

Process inertia in units
0 ON / OFF if also t.i. is equal to 0. (**Default**)
1...10000 [digit] (degrees.tenths for temperature sensors).

34 i.t. **Integral Time** *(idx 0x3000, s-idx 34)*

Process inertia in seconds.
0 (0.0s)...20000 (2000.0s) tenths of second (0 = Integral action disabled), **Default** 0

35 d.t. **Derivative Time** *(idx 0x3000, s-idx 35)*

Derivative time. Normally ¼ of integral time.
0(0.0s)...10000(1000.0s) tenths of second (0 = Derivative action disabled), **Default** 0

36 d.b. **Dead Band** *(idx 0x3000, s-idx 36)*

Dead Band.
0...10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

37 P.b.c. **Proportional Band Centered** *(idx 0x3000, s-idx 37)*

Defines if the proportional band has to be centered on setpoint. In double loop functioning (heating/cooling) is always disabled.

0 Disabled. Band under (heating) or over (cooling) (**Default**)
1 Centered band

38 o.o.S. **Off Over Setpoint** *(idx 0x3000, s-idx 38)*

In P.I.D. functioning enables the command outoput switching off, when passing a specific threshold (setpoint + Par.37).

0 Disabled. (**Default**)
1 Enabled

39 oF.d.t. **Off Deviation Threshold** *(idx 0x3000, s-idx 39)*

Selects command setpoint deviation to calculate the intervention threshold of "Off Over Setpoint" function.
-10000...+10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 0)

40 c.t. **Cycle Time** *(idx 0x3000, s-idx 40)*

Cycle time (for PID on teleruptor 15s ; for PID on SSR 2s.)
1-300 seconds (**Default**:15s)

41 coo.F **Cooling Fluid** *(idx 0x3000, s-idx 41)*

Type of refrigerant fluid for heating / cooling PID. Enable cooling output on par. AL.1 or AL.2.

0 Air. (**Default**)
1 Oil
2 Water

42 P.b.M. **Proportional Band Multiplier** *(idx 0x3000, s-idx 42)*

Proportional band for cooling action is done by the value of par. 30 multiplied for this value.
100(1.00)...500(5.00). **Default**: 100(1.00)

43 ou.d.b. **Overlap / Dead Band** *(idx 0x3000, s-idx 43)*

Dead band combination for heating / cooling P.I.D.
-200(-20.0%)...500(50.0%)
Negative: dead band.
Positive: overlapping. **Default**: 0(0.0%)

44 co.c.t. **Cooling Cycle Time** *(idx 0x3000, s-idx 44)*

Cycle time for cooling output.
1-300 seconds (**Default**:10s)

45 L.L.o.P. **Lower Limit Output Percentage** *(idx 0x3000, s-idx 45)*

Selects min. value for command output percentage.
0%...100%, **Default**: 0%.

46 u.L.o.P. **Upper Limit Output Percentage** *(idx 0x3000, s-idx 46)*

Selects max. value for command output percentage.
0%...100%, **Default**: 100%.

47 M.G.t.u. **Max Gap Tune** *(idx 0x3000, s-idx 47)*

Selects the max. process-setpoint gap over that the automatic tuning recalculates PID parameters.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 30**

48 M.n.P.b. **Minimum Proportional Band** *(idx 0x3000, s-idx 48)*

Selects the min. proportional band value selectable by the automatic tuning.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 50**

49 M.M.P.b. **Maximum Proportional Band** *(idx 0x3000, s-idx 49)*

Selects the max. proportional band value selectable by the automatic tuning.
0-10000 [digit] (degrees.tenths for temperature sensors). **Default: 500**

50 M.n.i.t. **Minimum Integral Time** *(idx 0x3000, s-idx 50)*

Selects the min. integral time value selectable by the automatic tuning.
0 (0.0s)...10000 (1000.0s) seconds. **Default**: 400 (40.0s).

51÷55 **Reserved** *(idx 0x3000, s-idx 51..55)*

Reserved parameters

56 AL.1 **Alarm 1** *(idx 0x3000, s-idx 56)*

The alarm intervention is related to Alarm 1.

0	Disabled. (**Default**)
1	Absolute alarm (threshold) referred to process active above
2	Absolute alarm (threshold) referred to process active below
3	Band alarm
4	Upper deviation alarm
5	Lower deviation alarm
6	Absolute alarm referred to active setpoint above
7	Absolute alarm referred to active setpoint below
8	Status alarm (active in RUN / START)
9	Cold actuator auxiliary (Cold action in double loop)
10	Heater Break Alarm and Overcurrent Alarm
11	Sensor error. Active alarm in case of broken sensor.
12	Remote. Alarm enabled by object idx 0x400C

57 A1.S.o **Alarm 1 State Output** *(idx 0x3000, s-idx 57)*

Alarm 1 output contact and intervention type.

0	(N.O. Start) Normally open, active at start (**Default**)
1	(N.C. Start) Normally closed, active at start
2	(N.O. Threshold) Normally open, active on reaching alarm[1]
3	(N.C. Threshold) Normally closed, active on reaching alarm[2]

[2] *On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappers, after that it was restored.*

58 A.1HY. **Alarm 1 Hysteresis** *(idx 0x3000, s-idx 58)*

-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 0.5.

59 A.1S.E. **Alarm 1 State Error** *(idx 0x3000, s-idx 59)*

State of contact for alarm 1 output in case of error.

0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.

60 A.1S.S. **Alarm 1 State Stop** *(idx 0x3000, s-idx 60)*

Alarm 1 output contact state with controller in STOP

0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
4 Active alarm in Stop

61 A1rE. **Alarm 1 Reset** *(idx 0x3000, s-idx 61)*

Alarm 1 contact reset type.

0 Automatic reset (**Default**)
1 Manual reset (by object idx 0x400B)
2 Manual reset stored. (keeps relay status also after an eventual power failure)

62 A.1dE. **Alarm 1 Delay** *(idx 0x3000, s-idx 62)*

Alarm 1 Delay. -3600..+3600 seconds. **Default**: 0.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.

63÷67 **Reserved** *(idx 0x3000, s-idx 63..67)*

Reserved parameters

68 AL.2 **Alarm 2** *(idx 0x3000, s-idx 68)*

The alarm intervention is related to Alarm 2.

0 Disabled (**Default**)
1 Absolute alarm (threshold) referred to process active above
2 Absolute alarm (threshold) referred to process active below
3 Band alarm
4 Upper deviation alarm
5 Lower deviation alarm
6 Absolute alarm referred to active setpoint above
7 Absolute alarm referred to active setpoint below
8 Status alarm (active in RUN / START)

9 Cold actuator auxiliary (Cold action in double loop)
10 Heater Break Alarm and Overcurrent Alarm
11 Sensor error. Active alarm in case of broken sensor
12 Remote. Alarm enabled by object idx 0x400D

69 A.25.o **Alarm 2 State Output** *(idx 0x3000, s-idx 69)*

Alarm 2 output contact and intervention type.
0 (N.O. Start) Normally open, active at start (**Default**)
1 (N.C. Start) Normally closed, active at start
2 (N.O. Threshold) Normally open, active on reaching alarm[2]
3 (N.C. Threshold) Normally closed, active on reaching alarm[3]

70 A.2HY. **Alarm 2 Hysteresis** *(idx 0x3000, s-idx 70)*

Alarm 2 Hysteresis
-10000..+10000 [digit] (degrees.tenths for temperature sensors). **Default** 0.5.

71 A.25.E. **Alarm 2 State Error** *(idx 0x3000, s-idx 71)*

Contact status for alarm output 2 in case of error
0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.

72 A.25.S. **Alarm 2 State Stop** *(idx 0x3000, s-idx 72)*

Contact status for alarm output 2 with controller in STOP
0 0 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2. **Default**
1 4 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
2 20 mA if alarm 1 on AO. Open contact if alarm 1 on Q1 or Q2
3 21.5 mA if alarm 1 on AO. Closed contact if alarm 1 on Q1 or Q2.
4 Active alarm in Stop

73 A2.rE. **Alarm 2 Reset** *(idx 0x3000, s-idx 73)*

Alarm 2 contact reset type.
0 Automatic reset (**Default**)
1 Manual reset (by object idx 0x400B)
2 Manual reset stored. (keeps relay status also after an eventual power failure)

74 A.2.dE. **Alarm 2 Delay** *(idx 0x3000, s-idx 74)*

Alarm 2 Delay. -3600..+9360 seconds. **Default**: 0.
Negative: delay in alarm output phase.
Positive: delay in alarm entry phase.

[3] *On activation, the output is inhibited if the controller is in alarm mode. Activates only if alarm condition reappers, after that it was restored.*

75÷79 **Reserved** *(idx 0x3000, s-idx 75..79)*

Reserved parameters

80 SS.tY. **Soft-Start Type** *(idx 0x3000, s-idx 80)*

Enables and selects soft-start type

0 Disabled (**Default**)
1 Gradient
2 Percentage

81 SS.Gr. **Soft-Start gradient** *(idx 0x3000, s-idx 81)*

Rise / fall gradient for soft-start.
1..10000 Digit/hour (tenths of degree/hour if temperature). (**Default**: 1000)

82 SS.PE. **Soft-Start Percentage** *(idx 0x3000, s-idx 82)*

Value of the output percentage during Soft-start.
0..100%. (**Default**: 50%)

83 SS.tH. **Soft-Start Threshold** *(idx 0x3000, s-idx 83)*

Threshold under which the device enables percentage soft-start function, at starting.
-10000...10000 [digit] (degrees.tenths for temperature sensors) (**Default**: 1000)

84 SS.t1. **Soft-Start Time** *(idx 0x3000, s-idx 84)*

Max. softstart duration: if the process doesn't reach the threshold entered on parameter 50 within the selected time, the controller will start to regulate on setpoint value.

0 Disabled
1...1440 minutes. (**Default**: 15 minutes)

85÷89 **Reserved** *(idx 0x3000, s-idx 85..89)*

Reserved parameters

90 C.t. **Current Transformer** *(idx 0x3000, s-idx 90)*

Enables C.T. input and selects the net frequency

0 Disabled (**Default**)
1 50 Hz
2 60 Hz

91 C.t. U. **Current Transformer Value** *(idx 0x3000, s-idx 91)*

Selects amperometric transformer full-scale
1…200 Ampere (**Default**: 50)

92 H.b.A.t. **Heater Break Alarm Threshold** *(idx 0x3000, s-idx 92)*

Heater Break Alarm activation threshold

0 Alarm disabled. (**Default**)

0.1-200.0 Ampere.

93 oCu.t. **Overcurrent Alarm Threshold** *(idx 0x3000, s-idx 93)*

Overcurrent alarm threshold

0 Alarm disabled. (**Default**)

0.1-200.0 Ampere

94 H.b.A.d. **Heater Break Alarm Delay** *(idx 0x3000, s-idx 94)*

Delay for Heater Break Alarm and overcurrent alarm

0...3600 s. (**Default**: 60 s)

95÷99 **Reserved Parameters** *(idx 0x3000, s-idx 95..99)*

Reserved parameters

100 rEtr. **Retransmission** *(idx 0x3000, s-idx 100)*

Retransmission for output 0/4..20 mA. Parameters 98 and 99 define upper/lower limit of operating sequence

0 Disabled (**Default**)

1 Process

2 Command setpoint

3 Alarm 1 setpoint

4 Alarm 2 setpoint

5 Ampere from current transformer

6 Remote value retransmission by object idx 0x4010

101 rE.tY. **Retransmission Type** *(idx 0x3000, s-idx 101)*

Select the type of Retransmission

0 0...20 mA

1 4...20 mA (**Default**)

102 Lo.L.r. **Lower Limit Retransmission** *(idx 0x3000, s-idx 102)*

Linear output lower limit range (value related to 0/4 mA)

-32767..+32767 [digit] (degrees for temperature sensors), **Default**: 0.

103 uP.L.r. **Upper Limit Retransmission** *(idx 0x3000, s-idx 103)*

Linear output upper limit range (value related to 20 mA)

-32767..+32767 [digit] (degrees for temperature sensors), **Default**: 10000.

104 rE.S.E. **Retransmission State Error** *(idx 0x3000, s-idx 104)*

Selects the value of the analogue output in Volt in case of error

0	0 mA (**Default**)
1	4 mA
2	20 mA
3	21.5 mA

105 rE.S.S. **Retransmission State Stop** *(idx 0x3000, s-idx 105)*

Defines the analogue output value with controller in STOP

0	0 mA (**Default**)
1	4 mA
2	20 mA
3	21.5 mA
4	Retransmission active in STOP

106÷110 **Reserved** *(idx 0x3000, s-idx 106..110)*

Reserved parameters

111 SL.Ad. **Slave Address** *(idx 0x3000, s-idx 111)*

Selects slave address for serial communication when all DIP 1 contacts are set on OFF

1...254. **Default**: 247.

112 bd.rt. **Baud Rate** *(idx 0x3000, s-idx 112)*

Selects slave address for serial communication when all DIP 2 contacts are set on OFF

0	4800 bit/s
1	9600 bit/s
2	19200 bit/s (**Default**)
3	28800 bit/s
4	38400 bit/s
5	57600 bit/s
6	115200 bit/s

113 S.P.P. **Serial Port Parameters** *(idx 0x3000, s-idx 113)*

Selects the type of format for the modbus RTU communication

0	8-N-1	8 bit, no parity, 1 stop bit (**Default**)
1	8-E-1	8 bit, even parity, 1 stop bit
2	8-O-1	8 bit, odd parity, 1 stop bit
3	8-N-2	8 bit, no parity, 2 stop bit
4	8-E-2	8 bit, even parity, 2 stop bit
5	8-O-2	8 bit, odd parity, 2 stop bit

114 SE.dE. **Serial Delay** *(idx 0x3000, s-idx 114)*
Selects the serial delay.
0...100 ms. **Default**: 0 ms.

115 oFFL. **Off Line** *(idx 0x3000, s-idx 115)*
Selects the off-line time. If no communication is available within the selected time, the controller will switch-off the command output.
0 Offline disabled (**Default**)
1...6000 tenths of seconds (Es. 100 = 10.0 s)

116÷120 **Reserved Parameters** *(idx 0x3000, s-idx 116..120)*
Reserved parameters

121 EMod. **Expansion Module** *(idx 0x3000, s-idx 121)*
Enables "Expansion module" mode
0 Disabled (**Default**)
1 Enabled

122 i.uA.o. **Initial Value Output** *(idx 0x3000, s-idx 122)*
Selects output state at starting
Bit 0 Q1 (0 = off; 1 = on) **Default**: 0
Bit 1 Q2 (0 = off; 1 = on) **Default**: 0

123 EMo.o. **Error Mode Output** *(idx 0x3000, s-idx 123)*
Defines if the output has to commute into a default state in case of error or off-line. If the error is eliminated, the output keeps the default state.
Bit 0 Q1 (0 = unvaried; 1 = commute) **Default**: 0
Bit 1 Q2 (0 = unvaried; 1 = commute) **Default**: 0

124 E.uA.o. **Error Value Output** *(idx 0x3000, s-idx 124)*
Defines values to be assumed by the outputs in case of error or off-line.
Bit 0 Q1 (0 = off; 1 = on) **Default**: 0
Bit 1 Q2 (0 = off; 1 = on) **Default**: 0

125 A.o.tY. **Analogue Output Type** *(idx 0x3000, s-idx 125)*
Select the type of Analogue Output
0 0...20 mA
1 4...20 mA (**Default**)

126 LLA.o. **Lower Limit Analogue Output** *(idx 0x3000, s-idx 126)*
Analogue output lower limit range (value related to 0/4 mA)
-32767..+32767 [digit] **Default**: 0.

127 uLAo. **Upper Limit Analogue Output** *(idx 0x3000, s-idx 127)*
Analogue output upper limit range (value related to 20 mA)
-32767..+32767 [digit] **Default**: 10000.

128 IuAo. **Initial Value Analogue Output** *(idx 0x3000, s-idx 128)*
Selects analogue output value at starting
-32767..+32767 [digit] **Default**: 0.

129 EMAo. **Error Mode Analogue Output** *(idx 0x3000, s-idx 129)*
Defines if the analogue output has to commute to a default value in case of error or off-line. If the error is eliminated, the output keeps the default value
0 AO unvaried in case of error (**Default**)
1 AO commuted in case of error

130 EuAo. **Error Value Analogue Output** *(idx 0x3000, s-idx 130)*
Defines the value assumed by the output in case of error or off-line
-32767..+32767 [digit] **Default**: 0.

131 CtOu. **Current Transformer Output** *(idx 0x3000, s-idx 131)*
Defines digital output connected to the current transfomer
0 Q1 (**Default**)
1 Q2

132÷136 **Reserved** *(idx 0x3000, s-idx 132..136)*
Reserved parameters

11.3.3 Command setpoint

Command setpoint *(idx 0x4000, s-idx 0)* **16bit signed**
Defines the command setpoint
-32767...32767 [digit] (degree.tenths for temperature sensors)

11.3.4 Alarm 1 setpoint

Alarm 1 setpoint *(idx 0x4001, s-idx 0)* **16bit signed**
Defines alarm 1 setpoint.
-32767...32767 [digit] (degree.tenths for temperature sensors)

11.3.5 Alarm 2 setpoint

Alarm 2 setpoint *(idx 0x4002, s-idx 0)* **16bit signed**
Defines alarm 2 setpoint..
-32767...32767 [digit] (degree.tenths for temperature sensors)

11.3.6 Start / Stop Command

Start / Stop Command *(idx 0x4003, s-idx 0)* **8bit unsigned**

Defines the controller status

0 = STOP
1 = START

11.3.7 Heating output percentage

Heating output percentage *(idx 0x4004, s-idx 0)* **16bit unsigned**

Defines the command output percentage. In case of double loop, defines the heating output command percentage.
0.00...100.00% command output

11.3.8 Cold output percentage

Cold output percentage *(idx 0x4005, s-idx 0)* **16bit unsigned**

Defines the cold output percentage in case of double loop.
0.00...100.00% cold command output.

11.3.9 Cold junction temperature

Cold junction temperature *(idx 0x4006, s-idx 0)* **16bit signed**

Defines the cold junction temperature.
(degree.tenths)

11.3.10 Error Flags

Error Flags *(idx 0x4007, s-idx 0)* **32bit unsigned**

Defines the flags for the DRR460 errors signalisation.

bit 0 Cold junction error
bit 1 Process error (sensor)
bit 2 Error in eeprom writing
bit 3 Error in eeprom reading
bit 4 Error missing calibration
bit 5 Generic error
bit 6 Hardware error
bit 7 Error H.B.A. (SSR in short circuit)
bit 8 Error H.B.A. (SSR/open charge)
bit 9 Error H.B.A. (partial break of the charge)
bit 10 Overcurrent error
bit 11..15 -
bit 16 Error eeprom calibrations
bit 17 Error eeprom calibration constants
bit 18 Error eeprom parameters
bit 19 Error eeprom setpoint
bit 20 Error eeprom service datas A
bit 21 Error eeprom service datas B
bit 22 Error eeprom service datas C

11.3.11 Real command setpoint

Real command setpoint *(idx 0x4008, s-idx 0)* **16bit signed**

Defines the real command setpoint
-32767...32767 [digit] (degree.tenths for temperature sensors)

11.3.12 Digital outputs status

Digital outputs status *(idx 0x4009, s-idx 0)* **8bit unsigned**

Defines the status of digital outputs. The reading is managed in bit.

bit 0 Q1 output status (0 = OFF, 1 = ON)
bit 1 Q2 output status (0 = OFF, 1 = ON)

11.3.13 Command output reset

Command output reset *(idx 0x400A, s-idx 0)* **8bit unsigned**

Defines the manual reset of the command output: write 0 to reset the command output.
In reading 0 = can not be reset, 1 = can be reset

11.3.14 Alarms reset

Alarms reset *(idx 0x400B, s-idx 0)* **8bit unsigned**

This object defines the manual reset of alarm outputs: write 0 to reset the output di comando. The reading is managed in bit.

bit 0 Alarm 1 (0 = can not be reset; 1 = can be reset)
bit 1 Alarm 2 (0 = can not be reset; 1 = can be reset)

11.3.15 Remote Alarm 1

Remote Alarm 1 *(idx 0x400C, s-idx 0)* **8bit unsigned**

Defines the alarm 1 status, if selected as remote alarm. The reading is managed in bit.

bit 0 absent alarm
bit 1 present alarm

11.3.16 Remote Alarm 2

Remote Alarm 2 *(idx 0x400D, s-idx 0)* **8bit unsigned**

Defines the alarm 2 status, if selected as remote alarm. The reading is managed in bit.

bit 0 absent alarm
bit 1 present alarm

11.3.17 Autotuning status

Defines the autotuning status and depends on the setting of Index 0x3000 Sub-Index 5.

Auto tuning *(idx 0x400E, s-idx 0)* **8bit unsigned RO**

If Index 0x3000 Sub-Index 5 = 1

0 Autotuning OFF
1 Autotuning ON

Auto tuning *(idx 0x400E, s-idx 0)* **8bit unsigned R/W**

If Index 0x3000 Sub-Index 5 = 2

0 Autotuning OFF
1 Autotuning ON

Auto tuning *(idx 0x400E, s-idx 0)* **8bit unsigned R/W**

If Index 0x3000 Sub-Index 5 = 3

0 Autotuning OFF
1 Command output OFF (forces the cooling)
2 Command output ON (forces the heating)
3 Autotuning ON
4 Autotuning finished

11.3.18 Automatic/Manual command

Automatic/Manual command *(idx 0x400F, s-idx 0)* **8bit unsigned**

Defines the command status in automatic or manual.

0 Automatic
1 Manual

11.4 Standard Device Profile Area

The table below indicates all supported Pixsys parameters:

Index	Name	Type	R/W
0x6200	Digital Output	Array 8bit unsigned	R/W
0x6206	Digital Output Error Mode	Array 8bit unsigned	R/W
0x6207	Digital Output Error Value	Array 8bit unsigned	R/W
0x6401	Read Analogue input 16bit	Array 16bit unsigned	R
0x6411	Write Analogue output 16bit	Array 16bit unsigned	R/W
0x6421	Analogue input Trigger Selection	Array 8bit unsigned	R/W
0x6423	Analogue input Global Interrupt Selection	Boolean	R/W
0x6424	Analogue input Interrupt Upper Limit Integer	Array 16bit unsigned	R/W
0x6425	Analogue input Interrupt Lower Limit Integer	Array 16bit unsigned	R/W

0x6426	Analogue input Interrupt Delta Unsigned	Array 16bit unsigned	R/W
0x6427	Analogue input Negative Delta Unsigned	Array 16bit unsigned	R/W
0x6428	Analogue input Positive Delta Unsigned	Array 16bit unsigned	R/W
0x6443	Analogue Output Error Mode	Array 16bit unsigned	R/W
0x6444	Analogue Output Error Value	Array 16bit unsigned	R/W
0x67FE	Error Behaviour	Array 8bit unsigned	R/W

11.4.1 Digital Output

This object contains data of digital output modules.

Index	Subindex	Name	Type	Default	R/W
0x6200	0	Number of entries	Array 8bit unsigned	-	R
	1	1st output block	Array 8bit unsigned	0	R/W

11.4.2 Error Mode Output 8bit

This object defines if output change to a pre-defined error status in a event of an error or not. If error is eliminated, outputs are maintained in their pre-defined error status.

Index	Subindex	Name	Type	Default	R/W
0x6206	0	Number of entries	Array 8bit unsigned	-	R
	1	1st output block	Array 8bit unsigned	255	R/W

b_i	0	Output channel$_i$ doesn't change in a event of an error
	1	Output channel$_i$ change to a pre-defined error

11.4.3 Error Value Output 8bit

This objects defines values outputs have to change to in a event of an error (corresponding bit in Error Mode Output has to be enabled, 0x6206).

Index	Subindex	Name	Type	Default	R/W
0x6207	0	Number of entries	Array 8bit unsigned	-	R
	1	1st output block	Array 8bit unsigned	0	R/W

b_i	0	Output channel$_i$ change to 0 in case of an error
	1	Output channel$_i$ change to 1 in case of an error

Example:
If 0x6206, Sub-index 0 = 1, Sub-index 1 = 2 = 0x02;
0x62607, Sub-index 0 = 1, Sub-index 1 = 0 = 0x00
It means that the output 2 is selected to 0, while the output 1 is not switched off in case of error.

11.4.4 Analogue Input 16bit

This object contains process data of Analogue input channels.

Index	Subindex	Name	Type	Default	R/W
0x6401	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	1st input	Array 16bit unsigned	-	R
	2	2nd input	Array 16bit unsigned	-	R
	3	3rd input	Array 16bit unsigned	-	R
	4	4th input	Array 16bit unsigned	-	R
	5	5th input	Array 16bit unsigned	-	R

11.4.5 Analogue Output 16bit

This object contains the value of Analogue 16 bit output channels

Index	Subindex	Name	Type	Default	R/W
0x6411	0	Number of analogue outputs	Array 8bit unsigned	2	R
	1	1st input	Array 8bit unsigned	0	R/W

11.4.6 Analogue Input Interrupt Trigger Selection

This object defines condition of transmission: when 1 is entered in object 0x6423, then transmission is released.

Index	Subindex	Name	Type	Default	R/W
0x6421	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	Trigger 1st input	Array 8bit unsigned	7	R
	2	Trigger 2nd input	Array 8bit unsigned	7	R
	3	Trigger 3rd input	Array 8bit unsigned	7	R
	4	Trigger 4th input	Array 8bit unsigned	7	R
	5	Trigger 5th input	Array 8bit unsigned	7	R

Sub-index structure:

Bit	Transmission conditions	Index
0	Threshold value exceeded (>)	0x6424
1	Threshold value fallen short (<)	0x6425
2	Change of input value exceeding delta value for last transmission	0x6426
3	Reduction of input value by more than delta value for last transmission	0x6427
4	Increase of input value by more than delta value for last transmission	0x6428
5..7	Reserved	-

11.4.7 Analogue Input Global Interrupt Enable

This object is used to control Analogue input transmission by PDO. If its value is 1, transmission is released and it only depends on object 0x6421 and PDO transmission type. If value is 0, Analogue input transmission is not allowed.

Index	Subindex	Name	Type	Default	R/W
0x6423	0	Global Interrupt Enable Analogue input 16bit	Boolean	0	R/W

11.4.8 Analogue Input Interrupt Upper Limit Integer

This object allows a threshold value monitoring for Analogue input transmission. If it's configured in object 0x6423, transmission will take place if input value is ≥ threshold value when a trigger condition is set.

Index	Subindex	Name	Type	Default	R/W
0x6424	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	1st input upper limit	Array 16bit unsigned	0	R/W
	2	2nd input upper limit	Array 16bit unsigned	0	R/W
	3	3rd input upper limit	Array 16bit unsigned	0	R/W
	4	4th input upper limit	Array 16bit unsigned	0	R/W
	5	5th input upper limit	Array 16bit unsigned	0	R/W

11.4.9 Analogue Input Interrupt Lower Limit Integer

This object allows a threshold value monitoring for Analogue input transmission. If it's configured in object 0x6423, transmission will take place if input value is ≤ threshold value when a trigger condition is set.

Index	Subindex	Name	Type	Default	R/W
0x6425	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	1st input lower limit	Array 16bit unsigned	0	R/W
	2	2nd input lower limit	Array 16bit unsigned	0	R/W
	3	3rd input lower limit	Array 16bit unsigned	0	R/W
	4	4th input lower limit	Array 16bit unsigned	0	R/W
	5	5th input lower limit	Array 16bit unsigned	0	R/W

11.4.10 Analogue Input Interrupt Delta Unsigned

If this object is allowed, it conditions actual Analogue input transmission with previously sent value. New value is transmitted only if it's larger than previously sent value + Delta, or if it's smaller than previously sent value – Delta.

Index	Subindex	Name	Type	Default	R/W
0x6426	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	Delta 1st input	Array 16bit unsigned	0	R/W
	2	Delta 2nd input	Array 16bit unsigned	0	R/W

	3	Delta 3rd input	Array 16bit unsigned	0	R/W
	4	Delta 4th input	Array 16bit unsigned	0	R/W
	5	Delta 5th input	Array 16bit unsigned	0	R/W

11.4.11 Analogue Input Interrupt Negative Delta Unsigned

If this object is allowed, it conditions actual Analogue input transmission with previously sent value. New value is transmitted only it's smaller than previously sent value – Delta.

Index	Subindex	Name	Type	Default	R/W
0x6427	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	Delta 1st input	Array 16bit unsigned	0	R/W
	2	Delta 2nd input	Array 16bit unsigned	0	R/W
	3	Delta 3rd input	Array 16bit unsigned	0	R/W
	4	Delta 4th input	Array 16bit unsigned	0	R/W
	5	Delta 5th input	Array 16bit unsigned	0	R/W

11.4.12 Analogue Input Interrupt Positive Delta Unsigned

If this object is allowed, it conditions actual Analogue input transmission with previously sent value. New value is transmitted only if it's larger than previously sent value + Delta.

Index	Subindex	Name	Type	Default	R/W
0x6428	0	Number of analogue inputs	Array 8bit unsigned	5	R
	1	Delta 1st input	Array 16bit unsigned	0	R/W
	2	Delta 2nd input	Array 16bit unsigned	0	R/W
	3	Delta 3rd input	Array 16bit unsigned	0	R/W
	4	Delta 4th input	Array 16bit unsigned	0	R/W
	5	Delta 5th input	Array 16bit unsigned	0	R/W

11.4.13 Analogue Output Error Mode

This object defines if the output must assume a pre-selected state in case of error (see object 0x6444). If error is solved, the outputs will keep the pre-selected state.

Index	Subindex	Name	Type	Default	R/W
0x6443	0	Number of analogue output	Array 8bit unsigned	1	R
	1	1st output Error Mode	Array 8bit unsigned	1	R/W

b_i	0	Output state remains unchanged
	1	Output state changes in case of error

11.4.14 Analogue Output Error Value Integer

Value assumed by analog output in case of error. For this purpose the object 0x6443 must be set to 1.

Index	Subindex	Name	Type	Default	R/W
0x6444	0	Number of analogue output	Array 8bit unsigned	1	R
	1	1st output Error Value	Array 16bit signed	0	R/W

11.4.15 Error Behaviour

This object has the same functionality of Error Behaviour 0x1029.

Index	Subindex	Name	Type	Default	R/W
0x67FE	0	Number of Sub-index	Array 8bit unsigned	1	R
	1	Communication error	Array 8bit unsigned	0	R/W

Structure:

Communication error	Azione
0	Change into status PRE-OPERATIONAL (only if actual status was OPERATIONAL)
1	No status change
2	Change into status STOPPED

11.5 PDO Transmission

Data transmission with PDO is only allowed in Operational status. When device changes its status into Operational, TX PDO is transmitted once with transmission type 254 and 255.

In order to prevent CAN bus overflow, default value for object 0x6423 is false, so Analogue changes aren't transmitted. To prevent overflow with 0x6423=true, a long Inhibit Time can be selected, or properly values for Threshold and Delta (0x6421...0x6428) can be set.

11.5.1 PDO Mapping

If stored customer specific configuration isn't used, object dictionary is assigned with default configuration according to standard device profile DS401 (see paragraph 6.1.5).

If device is in Pre-Operational status, its mapping can be modified via SDO.

11.6 SYNC Monitoring

In Operational status, if communication cycle period isn't equal to 0, monitoring is released with the first SYNC message.
If SYNC message isn't received within monitoring time (communication cycle period), a blink code is provided and status doesn't change. An emergency message (Error Code:0x8100, Error Register: 0x81, Additional Code 00 04 00 00 00) is sent. Failure of SYNC message will be displayed even if master provides a status change.
LEDs return to their normal operating status only after new SYNC message receipt in Operational status, and another emergency message is sent to show SYNC monitoring works correctly again (Error Code:0x0000, Error Register: 0x81, Additional Code 00 04 00 00 00).

11.7 Node Guarding

Node Guarding starts when the first remote transmit request message (RTR) is received on the COB-ID for Node Guarding (0x700+ Module-ID).
If device doesn't receive corresponding message, Node Guarding isn't monitored.
Default configuration provides Node Guarding is deactivated (Guard Time 0x100C=0, Life Time Factor 0x100D=0).
NMT master polls other devices at regular intervals, triggered by Guard Time 0x100C, and reply message contains device internal status.
In a event of an RTR request with Guard Time not set, Node Guarding isn't monitored, anyway device replies with its internal status.

Status codes:

Code	Status
127	Pre-Operational
5	Operational
4	Stopped

If Node Guarding message isn't received within Life Time, a blink code is provided.
An emergency message (Error Code:0x8130, Error Register:
0x11, Additional Code 00 04 00 00 00) is sent and device changes to predefined status according to object 0x67FE.
As soon as Node Guarding is restored, another emergency message is sent (Error Code:0x0000, Error Register: 0x11, Additional Code 00 04 00 00 00), and device status doesn't change.
N.B. It's only possible to use Node Guarding protocol or Heartbeat protocol, not both.

11.8 Heartbeat Monitoring

Heartbeat generator cyclically provides a message (triggered by object 0x1017). During this time it transmits device status. Monitoring start when the first Heartbeat message occurs.

If corresponding Heartbeat message isn't received within time configured in object 0x1016, a blink code is provided. An emergency message (Error Code:0x8130, Error Register: 0x11, Additional Code 00 05 JJ 00 00, where JJ is the node number which has triggered EMCY) is sent and device changes to pre-defined status according to object 0x67FE.

As soon as Heartbeat protocol is restored, another emergency message is sent (Error Code:0x0000, Error Register: 0x11, Additional Code 00 05 JJ 00 00) to display Heartbeat works correctly again, and device status doesn't change.

Heartbeat protocol is always used if (and only if) producer time is configured (0x1017) (Producer Heartbeat Time).

11.9 Emergency

There are four type of event which provides emergency messages:

- Critical error situation occurred / overcome in the device
- Important information has to be communicated to other devices
- Restore from an error
- Power-on with loaded settings equal to default settings (when setting haven 't yet been saved or when saved settings were discarded by device)

Structure of emergency object are shown in the table below:

Error Code	Error Register	Additional Code	Meaning
0x0000	0x00	00 00 00 00 00	Pre-defined Error Field 0x1003 Subindex0 set to 0 or all error are cleared
0x5000	0x81	00 01 00 00 00	Changed hardware configuration after power-on or reset node / communication
0x5000	0x81	00 02 00 00 00	Flash errors An error has occurred when configuration has been saved in flash memory
0x5000	0x81	00 03 AA BB CC	Programmed configuration doesn't coincide with actual one AA: physical module where error has occurred BB: logic module where error has occurred CC: Cause of error
0x5000	0x81	00 09 00 00 00	Queue overflow for emergency messages
0x8100	0x81	00 04 00 00 00	Time between two SYNC is longer than Communication Cycle Period
0x8110	0x11	00 01 00 00 00	Internal receive buffer overflow Status changes as defined in object 0x67FE

0x8110	0x11	00 02 00 00 00	Internal transmit buffer overflow Status changes as define in object 0x67FE
0x8120	0x11	00 03 00 00 00	CAN Controller in Error Passive Mode
0x8130	0x11	00 04 00 00 00	Time between two Node Guarding telegrams is greater than Guard Time x Life Time Factor
0x8130	0x11	00 05 DD 00 00	Time between two Heartbeat telegrams is greater than configured one DD: node has tripped time overflow
0x8210	0x81	00 05 EE FF GG	PDO was sent with a number of bytes smaller than configured one in communication profile PDO data is discarded EE: configured value FF: actual value, number of bytes sent GG: number of PDO
0x8220	0x81	00 06 HH II JJ	PDO was sent with a number of bytes larger than configured one in communication profile Only the first n data is used (n = total length configured in object dictionary) HH: configured value II: actual value, number of bytes sent JJ: number of PDO
0xFF00	0x81	00 06 KK 00 00	Module bus error Status is changed to Stopped PP: Module position
0xFF00	0x81	LL 07 MM NN PP	Diagnosis message LL: diagnosis byte MM: Module position NN: Error status and channel number PP: Number of actual module error

Notes / Updates

Table of configuration parameters

45	LL.o.P.	Lower Limit Output Percentage (idx 0x3000, s-idx 45)	46
46	uL.o.P.	Upper Limit Output Percentage (idx 0x3000, s-idx 46)	46
47	M.G.tu.	Max Gap Tune (idx 0x3000, s-idx 47)	47
48	Mn.P.b.	Minimum Proportional Band (idx 0x3000, s-idx 48)	47
49	MA.P.b.	Maximum Proportional Band (idx 0x3000, s-idx 49)	47
50	Mn.i.t.	Minimum Integral Time (idx 0x3000, s-idx 50)	47
51÷55		Reserved (idx 0x3000, s-idx 51..55)	47
56	AL.1	Alarm 1 (idx 0x3000, s-idx 56)	47
57	A.1.S.o	Alarm 1 State Output (idx 0x3000, s-idx 57)	47
58	A.1.HY.	Alarm 1 Hysteresis (idx 0x3000, s-idx 58)	48
59	A.1.S.E.	Alarm 1 State Error (idx 0x3000, s-idx 59)	48
60	A.1.S.S.	Alarm 1 State Stop (idx 0x3000, s-idx 60)	48
61	A1.rE.	Alarm 1 Reset (idx 0x3000, s-idx 61)	48
62	A.1.dE.	Alarm 1 Delay (idx 0x3000, s-idx 62)	48
63÷67		Reserved (idx 0x3000, s-idx 63..67)	48
68	AL.2	Alarm 2 (idx 0x3000, s-idx 68)	48
69	A.2S.o	Alarm 2 State Output (idx 0x3000, s-idx 69)	49
70	A.2HY.	Alarm 2 Hysteresis (idx 0x3000, s-idx 70)	49
71	A.2S.E.	Alarm 2 State Error (idx 0x3000, s-idx 71)	49
72	A.2S.S.	Alarm 2 State Stop (idx 0x3000, s-idx 72)	49
73	A2.rE.	Alarm 2 Reset (idx 0x3000, s-idx 73)	49
74	A.2.dE.	Alarm 2 Delay (idx 0x3000, s-idx 74)	49
75÷79		Reserved (idx 0x3000, s-idx 75..79)	50
80	SS.tY.	Soft-Start Type (idx 0x3000, s-idx 80)	50
81	SS.Gr.	Soft-Start gradient (idx 0x3000, s-idx 81)	50
82	SS.PE.	Soft-Start Percentage (idx 0x3000, s-idx 82)	50
83	SS.tH.	Soft-Start Threshold (idx 0x3000, s-idx 83)	50
84	SS.t i.	Soft-Start Time (idx 0x3000, s-idx 84)	50
85÷89		Reserved (idx 0x3000, s-idx 85..89)	50
90	c.t.	Current Transformer (idx 0x3000, s-idx 90)	50
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Read carefully the safety guidelines and programming instructions contained in this manual before using/connecting the device.

Prima di utilizzare il dispositivo leggere con attenzione le informazioni di sicurezza e settaggio contenute in questo manuale.

CE

RoHS Compliant

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