

PKP-2300-SI-FR  
CANOPEN USER MANUAL



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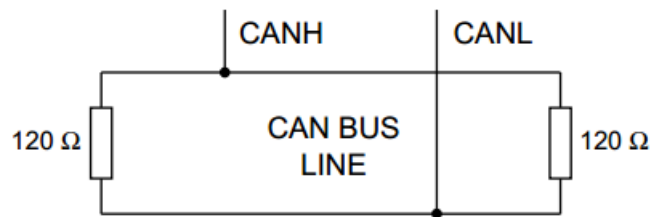
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# 1. How to connect Deutsch 4 pin:



PIN	COLOUR	FUNCTION
1	Blue	CAN L
2	White	CAN H
3	Black	Negative battery
4	Red	Vbatt. (12-24V)

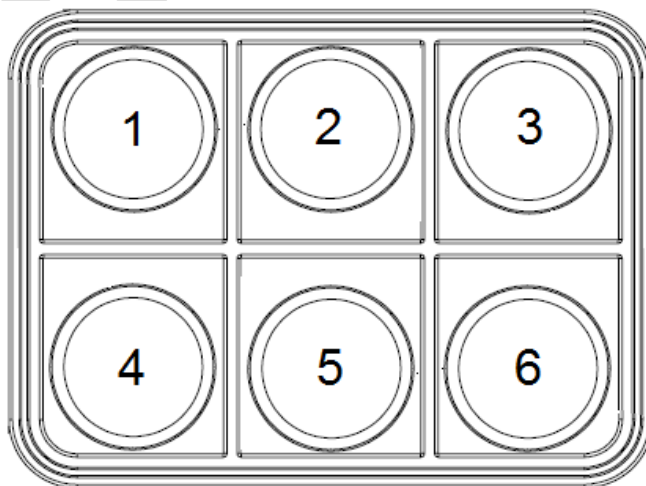


Each end of the CAN bus is terminated with 120Ω resistors in compliance with the standard to minimize signal reflections on the bus. You may need to place a 120Ω resistor between CAN-L and CAN-H.

## 2. Reference

Front view.

**PKP-2300-SI-FR**



### 3. Default settings

Setting	Default state or level	How to change
Baud Rate	125 kbit/s	<a href="#">Object 2010h</a>
CANopen Node ID	15h	<a href="#">Object 2013h</a>
Device active on startup	Not active	<a href="#">Object 2012h</a>
Key Brightness	3Fh (Maximum Brightness)	<a href="#">Object 2003h</a>
Backlight Brightness	00h (OFF)	<a href="#">Object 2003h</a>
Backlight Color	Amber	<a href="#">Object 2003h</a>
Startup LED Light Show	Complete LED Sequence	<a href="#">Object 2014h</a>
Periodic State Transmission	Disable	<a href="#">Object 1800h</a>
DEMO mode	Disable	<a href="#">Object 2100h</a>
Heartbeat Message	Disable	<a href="#">Object 1017h</a>
Boot-up service	Active	<a href="#">Object 2011h</a>

### NMT MESSAGES

The Network Management messages follow a master-slave structure. Through NMT services, CANopen devices are initialized, started, reset or stopped.

NMT messages have CAN-ID always equal to 00h.

### 4. Start CANopen node (keypad activation message)

Identifier	00h	
Byte 0	01h	Start CANopen node
Byte 1	XXh	Keypad CAN ID 00h: start all the keypads 15h: start the keypad with CAN ID = 15h.
Byte 2, 7	00h	Not used

Example:

Direction	Identifier	Format	Message
To Keypad	0	Std	01 15

### 5. Enter pre-operational

Identifier	00h	
Byte 0	80h	Enter pre-operational
Byte 1	XXh	Keypad CAN ID 00h: enter all the keypads 15h: enter the keypad with CAN ID = 15h.
Byte 2, 7	00h	Not used

Example:

Direction	Identifier	Format	Message
To Keypad	0	Std	80 15

## 6. Reset CANopen node

<b>Identifier</b>	00h	
<b>Byte 0</b>	81h	Reset CANopen node
<b>Byte 1</b>	XXh	Keypad CAN ID 00h: reset all the keypads 15h: reset the keypad with CAN ID = 15h.
<b>Byte 2, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message
To Keypad	0	Std	81 15

## 7. Stop CANopen node

<b>Identifier</b>	00h	
<b>Byte 0</b>	XXh	02h: Stop CANopen node 00h: Stop CANopen node (old PKP sw compatibility)
<b>Byte 1</b>	YYh	Keypad CAN ID 00h: stop all the keypads 15h: stop the keypad with CAN ID = 15h.
<b>Byte 2, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message
To Keypad	0	Std	02 15

## 8. Boot-up service

This service is used to signal that a NMT slave has entered the NMT state Pre-operational.

<b>Identifier</b>	700h + current CAN ID	Default 715h
<b>Byte 0</b>	00h	One data byte is transmitted with value 0.

Example:

Direction	Identifier	Format	Message
From Keypad	715h	Std	00h

The keypad with CAN ID 15h has entered the NMT state Pre-operational.

## 9. Heartbeat message

The heartbeat mechanism for a CANopen device is established by cyclically transmitting the heartbeat

message by the heartbeat producer.

Refer to [Object 1017h](#) for more details.

## PDO messages

PDO (Process Data Object) are fast telegram messages that can simply manage most important functions. There are no answers for this kind of messages. Each PDO message has an equivalent Service Data Object message.

## 10. Keys state message

The keypad must be activated, see NMT Start CANopen Node message.

- PKP-2300-SI-FR

<b>Identifier</b>	180 + current CAN ID	Default 195h
<b>Byte 0</b>	Keys from #1 to #4 0 0 K6 K5 - K4 K3 K2 K1	Keys: 1=pressed; 0=released
<b>Byte 1, 3</b>	00h	Not used
<b>Byte 4</b>	XXh	Tick Timer

Examples:

Direction	Identifier	Format	Message	Key state
<b>From Keypad</b>	195	Std	00 00 00 00 XX	No key pressed
<b>From Keypad</b>	195	Std	04 00 00 00 XX	Key #3 pressed
<b>From Keypad</b>	195	Std	20 00 00 00 XX	Key #6 pressed
<b>From Keypad</b>	195	Std	11 00 00 00 XX	Keys #1 and #5 pressed

## 11. Set LED ON message

The keypad must be activated, see NMT Start CANopen Node message.

- PKP-2300-SI-FR

<b>Identifier</b>	200 + current CAN ID	Default 215h
<b>Byte 0</b>	0 0 R6 R5 - R4 R3 R2 R1	Red LED
<b>Byte 1</b>	0 0 G6 G5 - G4 G3 G2 G1	Green LED
<b>Byte 2</b>	0 0 B6 B5 - B4 B3 B2 B1	Blue LED
<b>Byte 2,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	LED
To Keypad	215	Std	00 00 00 00 00 00 00 00	Turn OFF all the LED
To Keypad	215	Std	01 00 00 00 00 00 00 00	Only red LED #1 ON
To Keypad	215	Std	05 00 00 00 00 00 00 00	Red LED #1 and #3 ON, other LED OFF
To Keypad	215	Std	00 20 00 00 00 00 00 00	Only green LED #6 ON
To Keypad	215	Std	00 00 01 00 00 00 00 00	Only blue LED #1 ON
To Keypad	215	Std	00 11 00 00 00 00 00 00	Green LED #1 and #5 ON, other LED OFF



## 12. Set LED Blink message

The keypad must be activated, see NMT Start CANopen Node message.

Note: if the blink message is sent when the LED is already ON, the LED blinks in alternative mode.

- **PKP-2300-SI-FR**

<b>Identifier</b>	300 + current CAN ID	Default 315h
<b>Byte 0</b>	0 0 R6 R5 - R4 R3 R2 R1	Red LED
<b>Byte 1</b>	0 0 G6 G5 - G4 G3 G2 G1	Green LED
<b>Byte 2</b>	0 0 B6 B5 - B4 B3 B2 B1	Blue LED
<b>Byte 2,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	LED
To Keypad	315	Std	00 00 00 00 00 00 00 00	Turn OFF all the LED
To Keypad	315	Std	01 00 00 00 00 00 00 00	Only red LED #1 blinks
To Keypad	315	Std	05 00 00 00 00 00 00 00	Red LED #1 and #3 blink
To Keypad	315	Std	00 20 00 00 00 00 00 00	Only green LED #6 blinks
To Keypad	315	Std	00 00 01 00 00 00 00 00	Only blue LED #1 blinks
To Keypad	315	Std	00 11 00 00 00 00 00 00	Green LED #1 and #5 blink
To Keypad	215	Std	01 00 00 00 00 00 00 00	Only LED #1 blinks red and blue in alternate mode
To Keypad	315	Std	01 00 01 00 00 00 00 00	

## 13. Indicator LEDs brightness level

The keypad must be activated, see NMT Start CANopen Node message.

<b>Identifier</b>	400 + current CAN ID	Default 415h
<b>Byte 0</b>	XXh	Intensity 00h-3Fh → min-100%
<b>Byte 2, 7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	LED
To Keypad	415	Std	08 00 00 00 00 00 00 00	Brightness = 12,5%
To Keypad	415	Std	10 00 00 00 00 00 00 00	Brightness =25%

## 14. Backlight brightness level

The keypad must be activated, see NMT Start CANopen Node message.

<b>Identifier</b>	500 + current CAN ID	Default 515h
<b>Byte 0</b>	XXh	Intensity 00h-3Fh → 0-100%
<b>Byte 2, 7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	LED
To Keypad	515	Std	00 00 00 00 00 00 00 00	Turn off the backlight
To Keypad	515	Std	10 00 00 00 00 00 00 00	Backlight brightness = 25%

## SDO Messages:

A SDO (Service Data Object) is providing direct access to object entries of a CANopen device's object dictionary.

## 15. Object 2000h: Digital input module, keys states

This module contains all the Switch State information.

A one indicates the switch is pressed, a zero indicates the switch is released.

- PKP-2300-SI-FR

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 2000h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	01h	Sub index
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	40 00 20 01 00 00 00 00	
Keypad reply	595	std	4F 00 20 01 00 00 00 00	No key pressed
			4F 00 20 01 01 00 00 00	Key 1 pressed
			4F 00 20 01 02 00 00 00	Key 2 pressed
			4F 00 20 01 04 00 00 00	Key 3 pressed
			4F 00 20 01 08 00 00 00	Key 4 pressed
			4F 00 20 01 10 00 00 00	Key 5 pressed
			4F 00 20 01 20 00 00 00	Key 6 pressed
			4F 00 20 01 03 00 00 00	Key 1 and 2 pressed
			4F 00 20 01 21 00 00 00	Key 1 and 6 pressed
			4F 00 20 01 3F 00 00 00	All keys pressed

## 16. Object 2001h: Digital output module.

This module sets and reads the LED Outputs States.

Each bit position represents the corresponding LED. A one indicates the LED is ON a zero indicates the LED is OFF.

### a) Set LED ON

- **PKP-2300-SI-FR**

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	01h	CAN Object 2001h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	XXh	
<b>Byte 4</b>	YYh	0 0 L6 L5 L4 L3 L2 L1 LED position
<b>Byte 5,7</b>	00h	Not used

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Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 01 20 01 04 00 00 00	Set red LED #3 ON
<b>Keypad Reply</b>	595	Std	60 01 20 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2F 01 20 03 20 00 00 00	Set blue LED #6 ON
<b>Keypad Reply</b>	595	Std	60 01 20 00 00 00 00 00	

### b) Read LED ON

The LED have the same mapping of Set LED ON message

- **PKP-2300-SI-FR**

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	01h	CAN Object 2001h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	XXh	
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 01 20 01 00 00 00 00	Read red LED
<b>Keypad Reply</b>	595	Std	4F 01 20 01 08 00 00 00	Only red LED #4 ON
<b>To Keypad</b>	615	Std	40 01 20 02 00 00 00 00	Read green LED
<b>Keypad Reply</b>	595	Std	4F 01 20 02 01 00 00 00	Only green LED #1 ON
<b>To Keypad</b>	615	Std	40 01 20 03 00 00 00 00	Read blue LED
<b>Keypad Reply</b>	595	Std	4F 01 20 03 20 00 00 00	Only blue LED #6 ON

# 17. Object 2002h: Digital output module.

This module sets and reads the LED Blink States.

Each bit position represents the corresponding LED. A one indicates the LED is blinking a zero indicates the LED is not blinking. If the blink message is sent when the LED is already ON, the LED blinks in alternative mode.

## a) Set LED blink

- **PKP-2300-SI-FR**

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	02h	CAN Object 2002h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	XXh	XX: Sub index 01h: Red Led 02h: Green Led 03h: Blue Led
<b>Byte 4</b>	YYh	0 0 L6 L5 L4 L3 L2 L1 LED position
<b>Byte 5,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 02 20 01 01 00 00 00	Set red LED #1 blink
<b>Keypad Reply</b>	595	Std	60 02 20 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2F 02 20 02 08 00 00 00	Set green LED #4 blink
<b>Keypad Reply</b>	595	Std	60 02 20 00 00 00 00 00	

## b) Read LED blink

- **PKP-2300-SI-FR**

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	02h	CAN Object 2002h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	XXh	XX: Sub index 01h: Red Led 02h: Green Led 03h: Blue Led
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 02 20 01 00 00 00 00	Read red LED blink
<b>Keypad Reply</b>	595	Std	4F 02 20 01 3F 00 00 00	All red LED blink
<b>To Keypad</b>	615	Std	40 02 20 02 00 00 00 00	Read green LED blink
<b>Keypad Reply</b>	595	Std	4F 02 20 02 01 00 00 00	Green LED #1 blinks
<b>To Keypad</b>	615	Std	40 02 20 03 00 00 00 00	Read blue LED blink
<b>Keypad Reply</b>	595	Std	4F 02 20 03 00 00 00 00	No blue LED blink

## 18. Object 2003: Brightness Level

### a) Set Indicator LED brightness level

Identifier	615h (600h + current CAN ID)	
Byte 0	2Fh	Set Device Register
Byte 1	03h	CAN Object 2003h
Byte 2	20h	
Byte 3	01h	Sub index
Byte 4	YYh	Intensity 00h-3Fh → min-100%
Byte 5,7	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	2F 03 20 01 10 00 00 00	Brightness = 25%
Keypad Reply	595	Std	60 03 20 01 00 00 00 00	

### b) Backlight brightness level

Identifier	615h (600h + current CAN ID)	
Byte 0	2Fh	Set Device Register
Byte 1	03h	CAN Object 2003h
Byte 2	20h	
Byte 3	02h	Sub index
Byte 4	XXh	Intensity 00h-3Fh → 0-100%
Byte 5,7	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	2F 03 20 02 10 00 00 00	Brightness = 25%
Keypad Reply	595	Std	60 03 20 02 00 00 00 00	

### c) Backlight color

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	03h	CAN Object 2003h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	03h	Sub index
<b>Byte 4</b>	XXh	Color 01h: red 02h: green 03h: blue 04h: yellow 05h: cyan 06h: violet 07h: white/light blue 08h: amber/orange 09h: yellow/green
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 03 20 03 01 00 00 00	Red Backlight color
<b>Keypad Reply</b>	595	Std	60 03 20 03 00 00 00 00	

### d) Set default backlight color

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	03h	CAN Object 2003h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	04h	Sub index
<b>Byte 4</b>	XXh	Color 01h: red 02h: green 03h: blue 04h: yellow 05h: cyan 06h: violet 07h: white/light blue 08h: amber/orange 09h: yellow/green
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 03 20 04 03 00 00 00	Blue Backlight color
<b>Keypad Reply</b>	595	Std	60 03 20 04 00 00 00 00	

### e) Set startup Indicator LED brightness level

Identifier	615h (600h + current CAN ID)	
Byte 0	2Fh	Set Device Register
Byte 1	03h	CAN Object 2003h
Byte 2	20h	
Byte 3	05h	Sub index
Byte 4	XXh	Intensity 00h-3Fh → min-100%
Byte 5,7	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	2F 03 20 05 10 00 00 00	Brightness = 25%
Keypad Reply	595	Std	60 03 20 05 00 00 00 00	

### f) Set startup backlight brightness level

Identifier	615h (600h + current CAN ID)	
Byte 0	2Fh	Set Device Register
Byte 1	03h	CAN Object 2003h
Byte 2	20h	
Byte 3	06h	Sub index
Byte 4	XXh	Intensity 00h-3Fh → 0-100%
Byte 5,7	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	2F 03 20 06 10 00 00 00	Brightness = 25%
Keypad Reply	595	Std	60 03 20 06 00 00 00 00	

## 19. Object 2010h: Baud rate setting

Identifier	615h (600h + current CAN ID)	
Byte 0	2Fh	Set Device Register
Byte 1	10h	CAN Object 2010h
Byte 2	20h	
Byte 3	00h	Sub index
Byte 4	00h	1000k
	01h	Reserved (force to 125k)
	02h	500k
	03h	250K
	04h	125k (Default)
	05h	Reserved (force to 125k)
	06h	50k
	07h	20k
Byte 5,7	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	2F 10 20 00 03 00 00 00	Baud rate = 250k
Keypad Reply	595	Std	60 10 20 00 00 00 00 00	

## 20. Object 2011h: Set Boot-up service

Object 2011h message enable or disable the boot up message sent by the keypad at power up to the CAN network.

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	11h	CAN Object 2011h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	XXh	00h: Not active 01h: Active
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 11 20 00 00 00 00 00	Boot-up service not active
<b>Keypad Reply</b>	595	Std	60 11 20 00 00 00 00 00	

## 21. Object 2012h: Set device active on startup

If keypad is active on startup don't need the Start CANopen command from host.

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	12h	CAN Object 2012h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	XXh	00h: Not active 01h: Active
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 12 20 00 01 00 00 00	Device active on startup
<b>Keypad Reply</b>	595	Std	60 12 20 00 00 00 00 00	

## 22. Object 2013h: Set CANopen node ID

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	13h	CAN Object 2013h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	XXh	XX: New node id (00h-7Fh), default 15h
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 13 20 00 18 00 00 00	New CANopen node ID 18h
<b>Keypad Reply</b>	598	Std	60 13 20 00 00 00 00 00	



## 23. Object 2014h: Set startup LED show

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	14h	CAN Object 2014h
<b>Byte 2</b>	20h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	XXh	00h: Disable
		01h: Complete LED Show (default)
		02h: Fast Flash
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 14 20 00 00 00 00 00	Disable startup LED show
<b>Keypad Reply</b>	595	Std	60 14 20 00 00 00 00 00	

## 24. Object 2100h: Set DEMO mode

This message enables the Demo mode function. Demo mode is a special feature that consists in different LED states for each button pressing. Refer to the appendix “Demo mode instructions” to try these special features. Disconnect and reconnect the keypad after the enable message to enter this mode. To exit the Demo mode, send the Disable Demo mode command or another command message.

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Fh	Set Device Register
<b>Byte 1</b>	00h	CAN Object 2100
<b>Byte 2</b>	21h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	XXh	00h: Not active
		01h: Active
<b>Byte 5,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2F 00 21 00 01 00 00 00	Set DEMO mode Active
<b>Keypad Reply</b>	595	Std	60 00 21 00 00 00 00 00	

## 25. Object 1017h: Producer heartbeat time

The producer heartbeat time shall indicate the configured cycle time of the heartbeat.

Identifier	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
	2B	Set device register
<b>Byte 1</b>	17h	CAN Object 1017h
<b>Byte 2</b>	10h	
<b>Byte 3</b>	00h	Sub index
<b>Byte 4</b>	YYh	YYh: Heartbeat time in milliseconds MSByte
<b>Byte 5</b>	XXh	XXh: Heartbeat time in milliseconds LSByte
<b>Byte 5, 7</b>	00h	Not used

Heartbeat time: XYYh (from 000Ah to FFEh: 10ms to 65534 ms)

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 17 10 00 00 00 00 00	Read heartbeat time
<b>Keypad Reply</b>	595	Std	4B 17 10 00 64 00 00 00	Heartbeat time = 100ms
<b>To Keypad</b>	615	Std	2B 17 10 00 00 00 00 00	Switch off the heartbeat
<b>Keypad Reply</b>	595	Std	60 17 10 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2B 17 10 00 32 00 00 00	Set heartbeat time = 50ms
<b>Keypad Reply</b>	595	Std	60 17 10 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2B 17 10 00 F4 01 00 00	Set heartbeat time = 500ms
<b>Keypad Reply</b>	595	Std	60 17 10 00 00 00 00 00	

### Heartbeat message

The heartbeat mechanism for a CANopen device is established by cyclically transmitting the heartbeat

message by the heartbeat producer. One or more CANopen devices in the network are aware of this

heartbeat message. If the heartbeat cycle fails for the heartbeat producer the local application on the

heartbeat consumer will be informed about that event.

If a CANopen device starts with a value for the heartbeat producer time unequal to 0 the boot-up message is regarded as first heartbeat message.

Identifier	700h + current CAN ID	Default 715h
<b>Byte 0</b>	XXh	XXh: State of heartbeat producer 00h: Boot-up 04h: Stop 05h: Operational 7Fh: Pre-operational

Example:

Direction	Identifier	Format	Message	Data
<b>From Keypad</b>	715h	Std	00h	Boot up
<b>From Keypad</b>	715h	Std	7Fh	Pre-operational
<b>To keypad</b>	00h	Std	01h 15h	Start keypad with CAN ID 15h
<b>From Keypad</b>	715h	Std	05h	Operational

## 26. Object 1000h: Device Type

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 1000h
<b>Byte 2</b>	10h	
<b>Byte 3, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Data
<b>To Keypad</b>	615	Std	40 00 10 00 00 00 00 00
<b>Keypad Reply</b>	595	Std	43 00 10 00 91 01 0B 00

Device profile number B0191h.

## 27. Object 1001h: Error Register

This object is not yet implemented in the device.

## 28. Object 1008h: Manufacturer Device Name

Identifier	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	08h	CAN Object 1008h
<b>Byte 2</b>	10h	
<b>Byte 3, 7</b>	00h	Not used

1° additional byte

Identifier	600h + current CAN ID	Default 615h
<b>Byte 0</b>	60h	Read Device Register Next Byte
<b>Byte 1, 7</b>	00h	Not used

2° additional byte

Identifier	600h + current CAN ID	Default 615h
<b>Byte 0</b>	70h	Read Device Register Next Byte
<b>Byte 1, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 08 10 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	41 08 10 00 0B 00 00 00	
<b>To Keypad</b>	615	Std	60 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	00 42 6C 69 6E 6B 4D 61	BlinkMa
<b>To Keypad</b>	615	Std	70 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	17 72 69 6E 65 00 00 00	rine

Manufacturer Device Name: BlinkMarine

The first byte of the last data message replied is 17h.

## 29. Object 1009h: Manufacturer Hardware Revision

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	09h	CAN Object 1009h
<b>Byte 2</b>	10h	
<b>Byte 3, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 09 10 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 09 10 00 33 30 5F 56	V_03

Manufacturer Hardware Revision: V\_03

## 30. Object 100Ah: Manufacturer Firmware Revision

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	0Ah	CAN Object 100Ah
<b>Byte 2</b>	10h	
<b>Byte 3, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 0A 10 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 0A 10 00 32 2E 32 56	V2.2

Manufacturer Firmware Revision: V2.2

## 31. Object 100Bh: Model ID

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	0Bh	CAN Object 100Bh
<b>Byte 2</b>	10h	
<b>Byte 3, 7</b>	00h	Not used

1° additional byte

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	60h	Read Device Register second byte
<b>Byte 1, 7</b>	00h	Not used

2° additional byte

<b>Identifier</b>	<b>600h + current CAN ID</b>	<b>Default 615h</b>
<b>Byte 0</b>	70h	Read Device Register third byte
<b>Byte 1, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 0B 10 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	41 0B 10 00 09 00 00 00	
<b>To Keypad</b>	615	Std	60 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	00 50 4B 50 32 33 30 30	PKP2300
<b>To Keypad</b>	615	Std	70 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	1B 53 49 00 00 00 00 00	SI

Model ID: PKP2300

The first byte of the last data message replied is 1Bh.

## 32. Object 1018h: Identity Data

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	18h	CAN Object 1018h
<b>Byte 2</b>	10h	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	Vendor Id
	04h	Serial number
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 18 10 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 18 10 00 04 00 00 00	4
<b>To Keypad</b>	615	Std	40 18 10 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 18 10 01 E2 03 00 00	000003E2h

Blink Marine Vendor Id: 000003E2h

## 33. Object 1400h: Receive PDO Communication Parm 0

Describes the Receive Parameters for the LED state PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 1400h
<b>Byte 2</b>	14h	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	COB Id
	02h	Transmission Type
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 00 14 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 14 00 02 00 00 00	2
<b>To Keypad</b>	615	Std	40 00 14 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 14 01 15 02 00 40	4000 0215h
<b>To Keypad</b>	615	Std	40 00 14 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 14 02 FE 00 00 00	FEh

Receive PDO communication Parm 0:

- Number of mapped objects: 2;
- COB id: 0000 0200h + NODE ID;
- Transmission Type: FEh.

## 34. Object 1401h: Receive PDO communication Parm 1

Describes the Receive Parameters for the LED blink PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	01h	CAN Object 1401h
<b>Byte 2</b>	14h	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	COB Id
	02h	Transmission Type
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 01 14 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 01 14 00 02 00 00 00	2
<b>To Keypad</b>	615	Std	40 01 14 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 01 14 01 15 02 00 40	4000 0315h
<b>To Keypad</b>	615	Std	40 01 14 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 01 14 02 FE 00 00 00	FEh

Receive PDO communication Parm 1:

- Number of mapped objects: 2;
- COB id: 0000 0300h + NODE ID;
- Transmission Type: FEh.

## 35. Object 1402h: Receive PDO communication Parm 2

Describes the Receive Parameters for Indicator LED brightness

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	02h	CAN Object 1402h
<b>Byte 2</b>	14h	
<b>Byte 3</b>	00h	Highest sub-index supported
	01h	COB Id
	02h	Transmission Type
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 02 14 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 02 14 00 02 00 00 00	2
<b>To Keypad</b>	615	Std	40 02 14 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 02 14 01 15 04 00 40	40000 0415h
<b>To Keypad</b>	615	Std	40 02 14 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 02 14 02 FE 00 00 00	FEh

Receive PDO communication Parm 2:

- Number of mapped objects: 2;
- COB id: 400h + NODE ID;
- Transmission Type: FEh.

## 36. Object 1403h: Receive PDO communication Parm 3

Describes the Receive Parameters for backlight LED brightness

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	03h	CAN Object 1403h
<b>Byte 2</b>	14h	
<b>Byte 3</b>	00h	Highest sub-index supported
	01h	COB Id
	02h	Transmission Type
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 03 14 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 03 14 00 02 00 00 00	2
<b>To Keypad</b>	615	Std	40 03 14 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 03 14 01 15 05 00 40	40000 0515h
<b>To Keypad</b>	615	Std	40 03 14 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 03 14 02 FE 00 00 00	FEh

Receive PDO communication Parm 3:

- Number of mapped objects: 2;
- COB id: 500h + NODE ID;
- Transmission Type: FEh.



## 37. Object 1600h: Receive PDO mapping Parameter 0

Describes the mapping of LED state PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 1600h
<b>Byte 2</b>	16h	
<b>Byte 3</b>	00h	
	01h	PDO Mapping Entry 1
	02h	PDO Mapping Entry 2
	03h	PDO Mapping Entry 3
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
To Keypad	615	Std	40 00 16 00 00 00 00 00	
Keypad Reply	595	Std	4F 00 16 00 03 00 00 00	3
To Keypad	615	Std	40 00 16 01 00 00 00 00	
Keypad Reply	595	Std	43 00 16 01 08 01 01 20	2001 01 08
To Keypad	615	Std	40 00 16 02 00 00 00 00	
Keypad Reply	595	Std	43 00 16 01 08 02 01 20	2001 02 08
To Keypad	615	Std	40 00 16 03 00 00 00 00	
Keypad Reply	595	Std	43 00 16 03 08 03 01 20	2001 03 08

Receive PDO mapping Parameter 0:

- Number of mapped objects: 3;
- Set LED red: Object 2001h, Sub index 01h, Length 08h;
- Set LED green: Object 2001h, Sub index 02h, Length 08h;
- Set LED blue: Object 2001h, Sub index 03h, Length 08h;

## 38. Object 1601h: Receive PDO mapping Parameter 1

Describes the mapping of LED blink state PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	01h	CAN Object 1601h
<b>Byte 2</b>	16h	
<b>Byte 3</b>	00h	
	01h	PDO Mapping Entry 1
	02h	PDO Mapping Entry 2
	03h	PDO Mapping Entry 3
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 00 16 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 16 00 03 00 00 00	3
<b>To Keypad</b>	615	Std	40 00 16 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 16 01 08 01 02 20	2002 01 08
<b>To Keypad</b>	615	Std	40 00 16 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 16 01 08 02 02 20	2002 02 08
<b>To Keypad</b>	615	Std	40 00 16 03 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 16 03 08 03 02 20	2002 03 08

Receive PDO mapping Parameter 1:

- Number of mapped objects: 3;
- Set LED red blink: Object 2002h, Sub index 01h, Length 08h;
- Set LED green blink: Object 2002h, Sub index 02h, Length 08h;
- Set LED blue blink: Object 2002h, Sub index 03h, Length 08h;

## 39. Object 1602h: Receive PDO mapping Parameter 2

Describes the mapping of Indicator LED brightness PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	02h	CAN Object Object 1602h
<b>Byte 2</b>	16h	
<b>Byte 3</b>	00h	
	01h	PDO Mapping Entry 1
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 02 16 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 02 16 00 01 00 00 00	1
<b>To Keypad</b>	615	Std	40 02 16 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 02 16 01 08 01 03 20	2003 01 08

Receive PDO mapping Parameter 2:

- Number of mapped objects: 1;
- Set LED red blink: Object 2003h, Sub index 01h, Length 08h;

## 40. Object 1603h: Receive PDO mapping Parameter 3

Describes the mapping of backlight brightness PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	03h	CAN Object 1601h
<b>Byte 2</b>	16h	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	PDO Mapping Entry 1
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 03 16 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 03 16 00 01 00 00 00	1
<b>To Keypad</b>	615	Std	40 03 16 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 03 16 01 08 02 03 20	2003 02 08

Receive PDO mapping Parameter 3:

- Number of mapped objects: 1;
- Set backlight brightness: Object 2003h, Sub index 02h, Length 08h

## 41. Object 1800h:

### a) Transmit PDO Communication Parm 0

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 1800h
<b>Byte 2</b>	18h	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	COB Id
	02h	Transmission Type
	05h	Event Timer
<b>Byte 4,7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 00 18 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 18 00 05 00 00 00	5
<b>To Keypad</b>	615	Std	40 00 18 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 18 01 95 01 00 40	4000 0195h
<b>To Keypad</b>	615	Std	40 00 18 02 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 18 02 FE 00 00 00	FEh
<b>To Keypad</b>	615	Std	40 00 18 05 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4B 00 18 05 00 00 00 00	0 = OFF

Transmit PDO communication Parm 0:

- Number of mapped objects: 5;
- Address base: 195h= 180h+ NODE ID;
- Transmission Type: FEh;
- Event timer: XXYY in milliseconds, 0 = OFF.

## b) Set periodic state transmission

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	2Bh	Set device register
<b>Byte 1</b>	00h	CAN Object 1800h
<b>Byte 2</b>	18h	
<b>Byte 3</b>	05h	Sub index
<b>Byte 4</b>	YYh	YYh: Event timer period in milliseconds
<b>Byte 5</b>	XXh	XXh: Event timer period in milliseconds
<b>Byte 5, 7</b>	00h	Not used

Event timer period: XYYh (from 000Ah to FFEh: 10ms to 65534 milliseconds).

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	2B 00 18 00 00 00 00 00	Switch off the periodic state transmission
<b>Keypad Reply</b>	595	Std	60 00 18 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2B 00 18 00 32 00 00 00	Set period = 50ms
<b>Keypad Reply</b>	595	Std	60 00 18 00 00 00 00 00	
<b>To Keypad</b>	615	Std	2B 00 18 00 F4 01 00 00	Set period = 500ms
<b>Keypad Reply</b>	595	Std	60 00 18 00 00 00 00 00	

## 42. Object 1A00h Transmit PDO Mapping Parameter

Describes the mapping of Key state PDO Message.

<b>Identifier</b>	615h (600h + current CAN ID)	
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 1A00h
<b>Byte 2</b>	1Ah	
<b>Byte 3</b>	00h	Number of mapped objects
	01h	PDO Mapping Entry 1
<b>Byte 4,7</b>	00h	Not used

Examples:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	40 00 1A 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	4F 00 1A 00 01 00 00 00	1
<b>To Keypad</b>	615	Std	40 00 1A 01 00 00 00 00	
<b>Keypad Reply</b>	595	Std	43 00 1A 01 08 01 00 20	2000 01 08

Transmit PDO Mapping Parameter:

- Number of mapped objects: 1;
- Switch state: Object 2000h, Sub index 01h, Length 08h;

## 43. Object 2200h: Serial number string

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	40h	Read Device Register
<b>Byte 1</b>	00h	CAN Object 2200h
<b>Byte 2</b>	22h	
<b>Byte 3,7</b>	00h	Not used

1° additional byte

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	60h	Read Device Register second byte
<b>Byte 1, 7</b>	00h	Not used

2° additional byte

<b>Identifier</b>	600h + current CAN ID	Default 615h
<b>Byte 0</b>	70h	Read Device Register third byte
<b>Byte 1, 7</b>	00h	Not used

Example:

Direction	Identifier	Format	Message	Data
<b>To Keypad</b>	615	Std	41 00 22 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	41 00 22 00 08 00 00 00	
<b>To Keypad</b>	615	Std	60 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	00 46 46 46 46 46 46 46	FFFFFF
<b>To Keypad</b>	615	Std	70 00 00 00 00 00 00 00	
<b>Keypad Reply</b>	595	Std	1D 46 00 00 00 00 00 00	F

Serial number: ascii FFFFFFFF

## 44. Set CAN protocol

This set of messages are used to change to the desired CANbus protocol.

- Change from CANopen to J1939:

Direction	Identifier	Format	Message	Data
<b>To keypad</b>	615h	Std	2B FF 20 01 01	Change to J1939

- Change from J1939 to CANopen:

Direction	Identifier	Format	Message	Data
<b>To keypad</b>	18EF2100h	Ext	04 1B 80 00 FF FF FF FF	Change to CANopen

## APPENDIX: DEMO Mode instructions

In DEMO Mode you can try the following functions by pressing buttons on the PKP2300.

Entering this mode, you turn on backlight red; for the key 1 each time you press the button you can change the color of backlight with this sequence:

1. Red;
2. Green;
3. Blue;
4. Yellow;
5. Cyan;
6. Magenta;
7. White/light blue;
8. Amber;
9. Yellow/green;
10. OFF.

For the key 4, each time that you press the button, there are different steps in this sequence:

1. Complete LED show of all colors;
2. Backlight active with keys on in sequence (it is possible to change the color of LED keys pressing button 1)
3. Alternate blinking of LED keys number 1 with red color; 2 with amber color; 3 with yellow; 4 with green color; 5 with cyan color and 6 with white/light blue color.

## 45. Revision History

Date	Manual Revision	Comment	Related SW version
27/05/2016	1.0	First Release	1.4
25/07/2016	1.1	Updated wrong paragraphs numbering	1.4
21/11/2016	1.2	Added PDO 400h and 500h, added heartbeat state 04: stop.	1.4
29/01/2018	1.3	<ul style="list-style-type: none"><li>• Added objects 1402h,1403h,1602h,1603h</li><li>• Corrected minimum value for Indicator LEDs brightness</li><li>• Corrected limit values for heartbeat and periodic state transmission messages</li><li>• Added APPENDIX: DEMO MODE instructions</li><li>• Corrected command messages in some objects</li></ul>	x.x