white bream

CAN•net

Quad SPDT Relay Module

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Table of Contents

1 Preface

1.1 Disclaimer

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1.5 Technical support

White Bream technicians and engineers are committed to providing the best possible technical support for our customers so that our products can be easily used and implemented. We request that you first visit our website at whitebream.com for the latest documentation, utilities and drivers, which have been made available to assist you. If you still require assistance after visiting our website then contact our technical support department by email at support@whitebream.com.

Warning

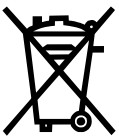
Warning messages in the manual may contain important information against product malfunction or safety information for the (end-)user.

Caution

Notices regarding proper use of the product and to warn the user about how to prevent damage to hardware or loss of data.

Anti-static Precautions

The internals of the product are made of static sensitive components. When disassembling the product, it is strongly recommended to use an anti-static benchmat and wriststrap. If this is not possible, at least make sure you always touch an exposed metal part, such as the shield of an connector, each time before you touch anything else inside.



ROHS - WEEE

White Bream products are manufactured using lead-free components and assembly processes. Please dispose of products according local waste regulations.

2 Description

This CAN•net Quad SPDT Relay module allows for switching of 4 independent double-throw relay outputs capable of switching 2 amp.

The interface module features CANopen® -compatible fieldbus connectivity. That allows for connecting of many (up to 16 x 127 = 2032) sensors with large separation distances using robust and reliable CAN-bus technology (spanning up to 5km at low bit-rate).

2.1 Functionality

- Drive four 2A relay outputs
- CANopen[1] fieldbus, generic I/O module profile CiA 401
- Manual override via control panel
- Configuration via CANopen or using PC application via micro-USB port
- Possibility for custom firmware with specific signal processing functions

2.2 Specifications

- 4× SPDT (single pole / double throw) relay, suitable for 250VAC/2A or 30VDC/2A
- OLED display shows status and allows for local control, CAN-bus configuration and SDO editing
- CANopen® device profile for generic I/O modules (CiA 401)
- Supports LSS node-ID assignment and Fastscan (CiA 305)
- Supports automatic bit-rate detection between 10kbps and 1Mbps (CiA 801)
- Up-to-date EDS file generated by and downloadable from the device using CANopen SDO 0x1021 (STORE-EDS) or via USB-MTP
- Supports power management & monitoring features (CiA 302-9 + custom for monitoring of bus voltage, CPU voltage and CPU temperature)
- Bus powered, operating voltage 10-30VDC, <1W
- 3-pin 3.81mm terminal blocks for relay contacts
- DIN rail enclosure 101×80, width 17.5mm
- T-Bus CAN-bus connection // 5-pin 3.81mm terminal block
- Micro-USB control & bus-powered capability
- ATEX enhanced safety 'ec' (IEC 60079-7)

[1] CANopen is a registered trademark of CAN in Automation (CiA)

2.3 Cautions

IEC 61010-1 requires the installer to check wiring for suitable ratings.

Marking for protective earth connections.

3 Operation

3.1 Indicators

The device features two bi-color LED indicators, both of which are visible through the holes in the cover of the device.

Icon	Function	LED Pattern	Description
♡	Heartbeat / status	Orange or red on Green flashing Orange flashing Orange blinking Orange flickering Red blink ×5	Power fail Okay & powered Okay, running of backup power Bootloader mode Firmware verify or install in progress Firmware about to be installed
🔗	CANopen status / activity Note: Red flash and green flash patterns can be shown simultaneously	Red/green flickering Green blinking Green single flash Green triple flash Green blink Red blinking Red single flash Red double flash Red triple flash Red quadruple flash Red on	Auto bit-rate or LSS in progress State PRE-OPERATIONAL State STOPPED Software download in progress CAN-bus data transmitted Invalid configuration CAN errors exceed warning level Guard or heartbeat event SYNC error Receive PDO event timeout CAN-bus off

3.1.1 Display control

On power on or press of the tool button, the display is activated.

The up/down buttons enable browsing through the various display screens; basic application info, CAN-bus configuration, CANopen configuration, CANopen application configuration, system info.

Additional display screens are shown under specific circumstances:

- After power-on, a logo screen is shown for a couple of seconds.
- When a CANopen warning occurs, the warning is shown (and display activated if needed).
- Pending CANopen emergency errors activate an error screen showing the applicable errors. A medium long press on the tool button clears the error list.

This is done by resetting the error list, so the errors are also gone from the CANopen network!

The buttons can be used in three ways, differentiated by the press duration;

- 'Press' is just that; a normal button press.
- 'Medium press' when the button is held for about 1 second.
- 'Long press' when the button is held for 3 seconds.

When showing a configuration screen, press the tool button to enter the menu.
Now we can use the up/down buttons to browse through the list of SDOs.
If we are on an SDO that must be changed, press the tool button again to enter edit mode of the SDO.

When in SDO edit mode, use up/down press to increase/decrease the SDO value. Use up/down medium press to shift the cursor. Use long press to insert or delete a character (only for string edit). Tool button press exits the edit mode and holds the changed data in memory. A medium tool button press does the same, but also jumps back to the main page of the configuration menu. There it is asked whether or not the changes must be saved.

When the device has a pending emergency error, the display stays active for 30 minutes. If there is a configuration in edit-mode, then the display stays on indefinitely. In other situations, the display turns off after 30 seconds.

4 Specifications

4.1 Electronic

Parameter	Min	Typ	Max	Unit
Nominal input voltage	10	24	30	V
Peak input voltage operating	-36		36	V
Peak input voltage non-operating	-36		36	V
Undervoltage threshold, rising		7.4		V
Undervoltage threshold, falling		7.1		V
Input current (Vin=24V)		35		mA
Power dissipation		1		W
Input fuse		500		mA-T
Input fuse time lag		1.4		A^2s
Backup hold time	1			s
Backup charge time		60		s
Backup energy		2.7		J
Relay channels (61131-2 AC/DC output type 0.25 non-latching)				
Open circuit voltage (AC)		125V	250	V
Switching current (AC/DC)		250		mA
Switching power (AC)			125	VA
Open circuit voltage (DC)		30V	220	V
Switching power (DC)			60	W
Switching delay (no load)		2		ms
Lifespan (no load)		$1x10^7$		ops
Lifespan (50Vdc 100mA)		$1x10^6$		ops
Withstanding voltage to earth (1 minute)		2500		V_{RMS}
Withstanding voltage between open contacts (1 minute)		1500		V_{RMS}

Parameter	Min	Typ	Max	Unit
Impulse voltage to earth (2/10µs)		4000		V
Impulse voltage between contacts (10/160µs)		1000		V
CAN-bus				
Common mode voltage	-7		14	V
Fault protection	-48		48	V
Fault protection (fuse blows)	-300		300	V
Signal fuses (2×)		2		A-T
Signal fuses time lag value		23		A^2s
Recessive bias voltage		2.5		V
Signaling rate CAN	5		1000	kbps
Signaling rate CAN-FD data			8000	kpbs
Surge line-line, 10/700µs 40Ω		6		kV
Surge line-neutral, 10/700µs 40Ω		6		kV
Surge neutral-earth, 1.2/50µs 42Ω		6		kV
Bus termination				
Resistance	96	120	144	Ω
Current (limited by power dissipation)		42		mA

4.2 Connections

4.2.1 Relay connection (4×)

Pluggable 3-pin 3.81mm terminal block.

#	Name	Description	Signal
1	NC	Normally-closed	
2	C	Common contact	
3	NO	Normally-opened	

4.2.2 CAN-bus T-bus connection

5-pin 3.81mm board-edge connector for 5-pin T-bus terminal.

#	Name	Description	Signal
1	EARTH	Earth	PE, 1MΩ//1nF to 0V
2	+V	Bus power supply	10-30VDC
3	-V	Bus ground	0V
4	CAN-H	CAN H-signal	ISO 11898-2
5	CAN-L	CAN L-signal	ISO 11898-2

Additionally, there is a earth clip connection in the DIN connection.

4.2.3 CAN-bus pluggable connections

Pluggable 5-pin 3.81mm terminal block.

#	Name	Description	Signal
1	SHIELD	Shield	1MΩ//1nF to PE
2	+V	Bus power supply	10-30VDC
3	-V	Bus ground	0V
4	CAN-H	CAN H-signal	ISO 11898-2
5	CAN-L	CAN L-signal	ISO 11898-2

4.2.4 Micro-USB connection

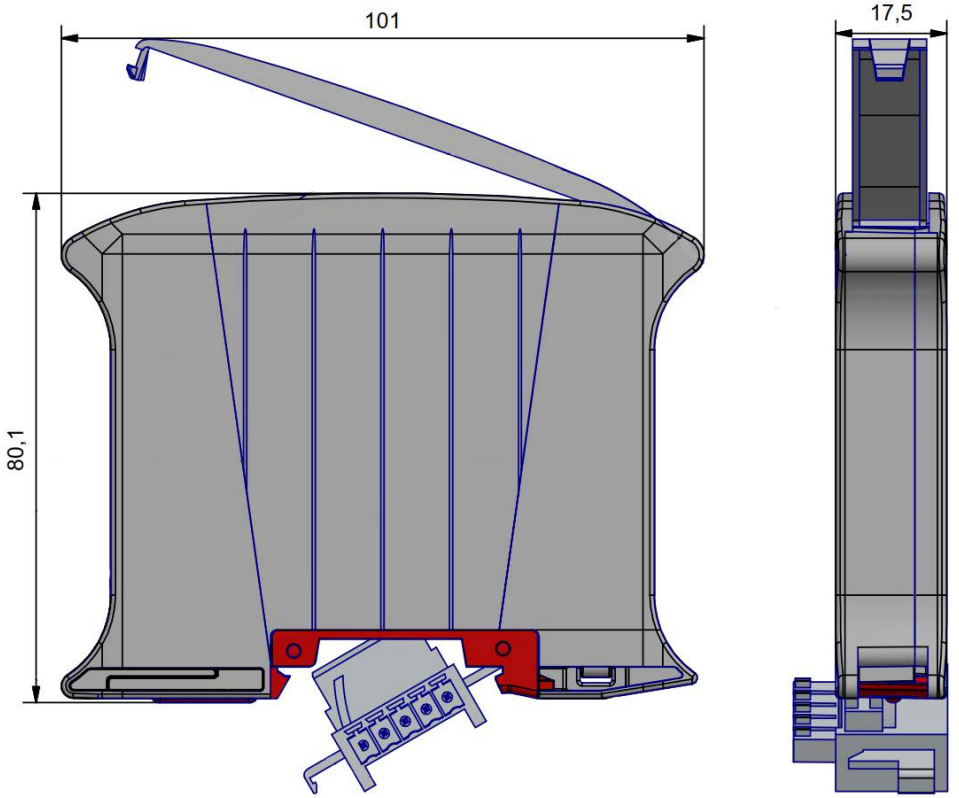
Standard B-type micro-USB connector.

#	Name	Description	Signal
1	VUSB	Bus power	5VDC
2	DP	USB full-speed DP-signal	USB-DP
3	DM	USB full-speed DM-signal	USB-DM
4	ID	Serial debug output	LVTTL
5	GND	Bus ground	0V

4.3 Environmental

Parameter	Min	Max	Unit
Operating temperature range	-30	+60	°C
Non-operating temperature range	-30	+60	°C
Humidity	0	95	%RH
Ingress Protection	IP20		
Conformal coating	Type 2		

4.4 Dimensions



5 Installation

Always follow applicable installation codes over instructions in this manual.
Please get in touch if you encounter a conflict between this manual and any such code.
Contact support if the device must be integrated into systems that are subject to special conditions as referred to in IEC 61010-1 §5.4.6.

Our instructions assume that you have basic knowledge of industrial wiring and electrical installations. As such, we do not provide instructions for basic activities such as stripping of wires.

Many applications of this kind of devices may be subject to additional rules and regulations. Make sure that you account for such situations.

5.1 Mounting

The device is to be mounted on a section of 35mm DIN-rail. If not already available in the system, we can provide short sections of such rail on request.

5.2 Wire selection and preparation

Use wires with outside diameter in less than 2.6mm and with cores within the allowed diameter as given in the specifications; stranded 0.25mm² to 1.0mm² with suitable ferrule or solid 0.5mm² to 1.5mm². Wire should be rated UL 2556 VW-1.
Wires must be stripped for 6.5±0.5mm.

Shielded cables shall be terminated using heat shrink shield-to-wire terminations or an equivalent means of reliably connecting the shield to a terminal connection.

5.3 Wiring

The primary CAN-bus can be connected via the T-bus DIN-rail connection or via the pluggable terminal on the side. Both have identical pinout. It is allowed to use both connections, but no excessive currents (>500mAmp) should be routed through the device.

5.4 Earthing

The module is earthed via the PE pin of the T-bus connection and via the spring clip which presses against the DIN-rail.

5.5 Cable length and sizes

The maximum bit-rate of the CAN-bus is determined by the length of the trunk and by the length of the stubs towards to individual CAN devices. Depending on communication

requirements, it might be necessary to shorten the connection cable of this device to match the signal integrity requirements.

Bit-rate	Trunk length (max)	Spur length (max)	Spur length (total)
1Mbps	25m	1.5m	7.5m
800kbps	tbd	tbd	tbd
500kbps	100m	5.5m	27.5m
250kbps	200m	11m	55m
125kbps	400m	22m	110m
100kbps	500m	27m	137m
50kbps	1km	55m	275m
20kbps	2.5km	135m	680m
10kbps	5km	275m	1375m

Please be aware of cable resistance and associated voltage drop. Once the lengths go into the three-digit figures, these losses can become quite significant, especially with small conductor sizes!

CiA 303-1 recommends the following wire cross-section:

- 0 to 40m » 0.25mm² to 0.34mm²
- 40m to 300m » 0.34mm² to 0.6mm²
- 300m to 600m » 0.5mm² to 0.6mm²
- 600m to 1km » 0.75mm² to 0.8mm²

5.5.1 CAN-bus Termination

Short trunk lengths up to 40m can be terminated with a resistor of ~124Ω at each end of the trunk. For longer lengths (and therefore lower bit-rates), a higher value of termination resistance is more suitable, probably in the range of 150Ω to 300Ω.

The module contains a 120Ω ±20% PTC termination resistor with a switch.

5.6 ATEX Specifics

5.6.1 DO NOT SEPARATE OR (DIS)CONNECT WHEN ENERGIZED

In the context of IEC 60079-7 clause 4.2.4, all connections are considered factory connections. The termination connections on the wall of the Ex enclosure are (pluggable) field connections to which this warning applies.

5.6.2 DO NOT REMOVE OR REPLACE FUSE(S) WHEN ENERGIZED

Per IEC 60079-7 clause 5.9.4, fuses must be impossible to replace when energized, or the device shall this warning. In a typical DIN rail installation, it will be very challenging to replace a fuse in-situ, but the device carries the warning nonetheless.

5.6.3 MUST BE MOUNTED IN SUITABLE 'Ex' ENCLOSURE

The DIN-rail component does not have a protective enclosure such as required by IEC 60079-0.

5.6.4 MAXIMUM RELAY TO GROUND POTENTIAL 160V

The clearance between the relay contacts and earth is only 1.5 mm. Despite being rated for 1500Vac, this qualifies for only 160V according IEC 60079-7 table 2.

6 Maintenance

6.1 Fuses

The device contains a 500mA/1.5A²s fuse in the power input and two 2A/23A²s fuses in the communication lines. These fuses are soldered onto the board and covered by type 2 conformal coating. As such, these are considered not end-user replaceable.

6.2 CAN-bus issues

6.2.1 No communication at all

Check if CAN-bus pair is not swapped. If in doubt, just try reversing to eliminate a possible cause, noting will get damaged. Don't forget to undo the reversal if it does not help!

6.2.2 High error rate

Common causes are too high bit-rate versus cable length, badly placed termination resistors, too many (>2) or too few termination resistors.

7 CANopen interface

CAN is a very reliable and robust fieldbus technology. The protocol is based on messages with up to 8 bytes of data and an 11-bit identifier. Access to the bus is prioritized by identifier by a CAN controller.

A big limitation of classic CAN is the message size that is limited to 8 bytes. That is very limiting for various network activities such as file transfers and firmware updates. This is where CANopen comes into play.

CANopen is a protocol on top of CAN. CANopen provides a standardized method of defining settings and variables in a device and accessing those via so-called service data objects or SDOs. It also allows for configuration of regular CAN messages (ie messages without any CANopen protocol overhead). Other protocol features include power management, file transfer for firmware updates, etc.

7.1 CiA Protocols

The device supports the following CANopen profiles and protocols:

7.1.1 CiA 301 – application layer and communication profile

This specification describes the CANopen application layer. This includes the data types, encoding rules and object dictionary objects as well as the CANopen communication services and protocols. In addition, this specification specifies the CANopen network management services and protocols. This specification specifies the CANopen communication profile, e.g. the physical layer, the predefined communication object identifier connection set, and the content of the Emergency, Timestamp, and Sync communication objects.

7.1.2 CiA 401-1 - device profile for generic I/O modules

This specification describes the device profile for generic I/O modules that provide simple analog or digital inputs and outputs, or a combination thereof.

7.1.3 CiA 305 - LSS node-ID assignment and Fastscan

This specification describes the layer setting services (LSS) and protocols for CANopen. These services and protocols are used to inquire or to change the settings of three parameters of the physical layer, data link layer, and application layer on a CANopen device with LSS slave capability by a CANopen device with LSS master capability via the CAN network. The following parameters may be inquired or changed: Node-ID of the CANopen device, bit timing parameters of the physical layer (bit-rate), LSS address compliant to the identity object (1018h).

7.1.4 CiA 302-3 – configuration and program download

This specification defines objects and file formats for the configuration manager and for program download and control.

7.1.5 Custom features

We have added SDOs for monitoring input voltage, input current, input power, CPU voltage and CPU temperature.

7.1.6 CiA 801 - automatic bit-rate detection between 10kbps and 1Mbps

This technical report describes the recommended practice and gives application hints for implementing automatic bit-rate detection in CANopen devices.

7.2 Service Dictionary Objects

The device provides one SDO server with support for the following SDOs among others. This table only lists those entries that have some practical use. The full list of service objects can be found in the device-specific EDS file.

Note that the default settings implement a manufacturer-specific PDO mapping. This is also indicated in the I/O functionality field of object 0x1000, device type.

Index	Subidx	Description	Default
0x1008	0	Manufacturer device name	
0x1009	0	Manufacturer hardware version	
0x100A	0	Manufacturer software version	
0x1400	0-5	Receive PDO1 communication parameters	5
“	1	COB-ID	0x200+$NODE
“	2	Type	0x00
“	3	Inhibit time	0
“	5	Timer	0
0x1600	0-8	Receive PDO1 mapping parameters	2
“	1	Filter mask output (8bit)	0x6208, 1, 1
“	2	Write output (8bit)	0x6200, 2, 1
“	3-8	Unused entries	0, 0, 0
0x1F80	0	NMT Startup	2

Index	Subidx	Description	Default
0x2F90	0	Device input voltage	UINT16
0x2F91	0	Device CPU voltage	UINT16
0x2FA1	0	Device CPU temperature	INT16
0x6200	0-1	Write output (8bit)	1
“	1	Octet 1	0x00
0x6202	0-1	Change Polarity output (8bit)	1
“	1	Octet 1	0x00
0x6206	0-1	Error mode output (8bit)	1
“	1	Octet 1	0x00
0x6207	0-1	Error value output (8bit)	1
“	1	Octet 1	0x00
0x6208	0-1	Filter mask output (8bit)	1
“	1	Octet 1	0x00
0x6300	0-1	Write output (16bit)	1
“	1	Hextet 1	0x0000
0x6302	0-1	Change Polarity output (16bit)	1
“	1	Hextet 1	0x0000
0x6306	0-1	Error mode output (16bit)	1
“	1	Hextet 1	0x0000
0x6307	0-1	Error value output (16bit)	1
“	1	Hextet 1	0x0000
0x6308	0-1	Filter mask output (16bit)	1
“	1	Hextet 1	0x0000
0x6320	0-1	Write output (32bit)	1
“	1	Quadlet 1	0x00000000
0x6322	0-1	Change Polarity output (32bit)	1
“	1	Quadlet 1	0x00000000

Index	Subidx	Description	Default
0x6326	0-1	Error mode output (32bit)	1
“	1	Quadlet 1	0x00000000
0x6327	0-1	Error value output (32bit)	1
“	1	Quadlet 1	0x00000000
0x6328	0-1	Filter mask output (32bit)	1
“	1	Quadlet 1	0x00000000
0x6220	0-4	Write output	4
“	1	Relay 1	FALSE
“	…	…	“
“	4	Relay 4	FALSE
0x6222	0-4	Change Polarity output	4
“	1	Relay 1	FALSE
“	…	…	“
“	4	Relay 4	FALSE
0x6226	0-4	Error mode output	4
“	1	Relay 1	FALSE
“	…	…	“
“	4	Relay 4	FALSE
0x6227	0-4	Error value output	4
“	1	Relay 1	FALSE
“	…	…	“
“	4	Relay 4	FALSE
0x6228	0-4	Filter mask output	4
“	1	Relay 1	FALSE
“	…	…	“
“	4	Relay 4	FALSE

7.3 Default operation

Out of the box, the device is configured to switch to OPERATIONAL state autonomously. The node-ID is programmed to 44 and one RPDO is configured to receive output updates.

- Node-ID 44
- Automatic switch to NMT state OPERATIONAL
- RPDO1 (CAN-ID 0x200+$NODEID) is mapped to control the four relays

7.3.1 RPDO1

Illustrated below is an example RPDO1 message that could be send to the device. The CAN-ID in this example assumes that the device has node-ID 1.

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x201	2	0x0F	0x0F						

According the mapping of parameters of RPDO1, which can be found in SDO 0x1600, the first byte is mapped to subindex 1 of SDO 0x6208, and the second byte is mapped to subindex 1 of 0x6200.

7.4 Interfacing without CANopen

This device is a CANopen device. CANopen is a fairly complex communication protocol that relies on CAN-bus communication. Unfortunately, easy to use implementations are rather scarce and/or expensive. Luckily, you can get quite far using just raw CAN protocols, especially with no too complex sensor modules such as this device.

7.4.1 Writing outputs

The section on default operation lists the default RPDOs for the device – if any. These are listened for with a CAN-ID relative to the node-ID of the device. Simply send a CAN message with the designated ID, specified length and intended data values.

7.4.2 Receiving sensor data

The section on default operation lists the default TPDOs for the device – if any. These are send with a CAN-ID relative to the node-ID of the device. Each TPDO contains a selection of sensor data, which can be processed without any knowledge about the CANopen protocol. Just listen for the specific message and extract the bits and/or values from the designated positions in the message data.

7.4.3 Changing configuration

The SDO protocol used to communicate with the device to alter settings or to read data that is not part of a default TPDO configuration (if any). Luckily, a raw implementation of the expedited SDO upload and download protocol is not too difficult to grasp and implement.

7.4.4 SDO upload example

This is the message format of an expedited SDO transfer:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x600+$ID	8	Command	Index		Subindex	Value			

The command byte changes according the length of the data (DLC). This length must match with the SDO entry to be written. If the command byte does not match the DLC then the device returns an error!

Write 32-bit value 2 to index 0x1F80, subindex 0 = set NMT Startup mode to 2:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x600+$ID	8	0x23	0x80	0x1F	0x00	0x02	0x00	0x00	0x00

Write 16-bit value 10000 to index 0x1800, subindex 5 = set interval of TPDO 1 to 10 seconds:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x600+$ID	8	0x2B	0x00	0x18	0x05	0x10	0x27	0x00	0x00

Write 8-bit value 0xFF to index 0x1800, subindex 2 = set trigger type of TPDO 1 to 0xFF = interval trigger:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x600+$ID	8	0x2F	0x00	0x18	0x02	0xFF	0x00*	0x00*	0x00*

In response to the three write commands described above, the device will send an acknowledgment with 0x60 in the command byte, same index & subindex as the write request and zero for the value bytes. Unless an error occurred, in which case an error is given as described further on.

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x580+$ID	8	0x60	0x21	0x30	0x01	0x00	0x00	0x00	0x00

7.4.5 SDO download example

Request value of index 0x1F80, subindex 0 = NMT Startup:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x600+$ID	8	0x40	0x80	0x1F	0x00	0x00	0x00	0x00	0x00

In response, the device will return the 32-bit value of the object (0x00000008):

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x580+$ID	8	0x43	0x80	0x1F	0x00	0x08	0x00	0x00	0x00

For 16-bit values the response is changed to the following, 16-bit value 0x2710 (10000 msec) from index 0x1800, subindex 5 (TPDO1 interval time):

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x580+$ID	8	0x4B	0x00	0x18	0x05	0x10	0x27	0x00*	0x00*

* not used

For 8-bit values the response is changed to the following, 8-bit value 0xFF from index 0x1800, subindex 2 (TPDO1 trigger type):

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x580+$ID	8	0x4F	0x00	0x18	0x02	0xFF	0x00*	0x00*	0x00*

* not used

We recommend to perform a minimal response validation by masking and comparing B[0] with 0x43 (B[0] & 0x43 == 0x43). Regardless of the length of the data, you can always perform the same 4 byte to 32 bit conversion, since unused data bytes are always zero.

7.4.6 SDO Error response

If the SDO does not support the expedited transfer, then the device will send an error response. This happens with SDOs that have or can have more than 4 bytes of data. For example after an attempt to read device name using the expedited transfer mode:

CAN-ID	DLC	B[0]	B[1]	B[2]	B[3]	B[4]	B[5]	B[6]	B[7]
0x580+$ID	8	0x80	0x08	0x10	0x00	0x00*	0x12*	0x07*	0x06

* Values denote the applicable error codes. Please refer to the standards or the various online resources describing the CANopen message format.

8 Ordering information

Partno	Description	Revision
82-942-441	CAN•net Quad SPDT Relay module	C, Aug 29, 2023

Mating terminal blocks included, including the T-Bus contact block

8.1 Hardware revision info

Rev	Date	Changes
C	Aug 23, 2023	Initial release version

9 Document revisions

9.1 Rev 1.0 (Sep 17, 2023)

Ref	Description
-	Initial version

Annex A: Declaration of Conformity for ATEX & CE

The manufacturer hereby declares that this product is in accordance with the requirements of annex II of the EEC directive 2014/34/EC regarding ATEX, directive 2014/30/EU regarding electromagnetic compatibility (EMC), directive 2014/35/EU regarding low voltage equipment (LVD), directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and directive 2012/19/EU on waste electrical and electronic equipment (WEEE).

Manufacturer, facility:
White Bream
L.J. Costerstraat 13d
3261LH, Oud-Beijerland
The Netherlands

Product: Quad SPDT Relay Module

Models: 80-942-44X, with X being a number between 0 and 9 – indicating variations of I/O configurations and enclosures.

ATEX Marking:
II 3G Ex ec IIB T5 Gc
Tamb -30° to +60°C
IP20

Um: 10-30V⎓ P: ≤1W

WARNING: DO NOT SEPARATE OR (DIS)CONNECT WHEN ENERGIZED
WARNING: DO NOT REMOVE OR REPLACE FUSE(S) WHEN ENERGIZED
WARNING: MUST BE MOUNTED IN SUITABLE 'Ex' ENCLOSURE
WARNING: MAXIMUM RELAY TO GROUND POTENTIAL 160V

ATEX Certificate: N/A, conformity evaluated according annex VIII of directive 2014/34/EC (internal production control). Our IecEx checklists are available on request.

CE & RoHS Marking:

September 15, 2023
Henk Bliek, White Bream, Owner

This product has been found in conformity with directive 2014/34/EU (ATEX) by testing and verification with the following standards:

- **EN 60079-0:2018+AC:2020** Explosive atmospheres – Part 0: General requirements
- **EN 60079-7:2015+A1:2018** Explosive atmospheres – Part 7: Equipment protection by increased safety "e"

This product has been found in conformity with directive 2014/30/EU (EMC) by testing and verification with the following standards [1]:

- **EN 61000-6-2:2016** Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
- **EN 61000-6-3:2020** Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments
- **EN 61131-2:2017** Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests
- **EN 61326-1:2020** Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

Extended and/or additional EMC immunity testing has been performed to performance criterion B of the following standards:

- **EN 61000-4-16:2016** Electromagnetic compatibility (EMC) – Part 4-16: Testing and measurement techniques – Test for immunity to conducted, common mode disturbances in the frequency range 0 Hz to 150 kHz. Level 3
- **EN 61000-4-17:2002** Electromagnetic Compatibility (EMC) – Part 4-17: Testing and measuring techniques – Ripple on d.c input power port immunity test. Level 4, criterion A
- **EN 61000-4-29:2002** Electromagnetic Compatibility (EMC) – Part 4-29: Testing and measurement techniques; Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests. Criterion A for variations, 70% dips, interruptions ≤10ms and 40% dips at 12V ≤10ms

[1] Some standards might be more recent than the harmonized versions. Blame Brussels.

This product has been found in conformity with directive 2014/35/EU (LVD)
by testing and verification with the following standards:

- **EN 61010-1:2010/C1:2011** Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
- **EN 61010-2-201:2017** Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-201: Particular requirements for control equipment
- **EN 61131-2:2017** Industrial-process measurement and control – Programmable controllers – Part 2: Equipment requirements and tests

This product has been found in conformity with directive 2011/65/EU (RoHS)
by testing and verification with the following standards:

- **EN 63000:2018** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Annex B: Declaration of Conformity for UKCA

The manufacturer hereby declares that this product is in accordance with the requirements of UK SI 2016 No. 1107 "Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016", UK SI 2016 No. 1091 "Electromagnetic Compatibility Regulations 2016", UK SI 2017 No. 1206 "Radio Equipment Regulations 2017", UK SI 2016 No. 1101 "Electrical Equipment (Safety) Regulations 2016", and UK SI 2012 No. 3032 "The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012".

Manufacturer, facility:	White Bream L.J. Costerstraat 13d 3261LH, Oud-Beijerland The Netherlands
Product:	Quad SPDT Relay Module
Models:	80-942-36X, with X being a number between 0 and 9 – indicating variations of I/O configurations and enclosures.
UKCA Marking:	

September 15, 2023
Henk Bliek, White Bream, Owner

Annex C: Declaration of Conformity for FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

CAN•net

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