

CBM 8

FULL MANUAL

Introduction

CAN Button Module is a universal 8- button module with color backlighting and customizable symbols. CBM8 communicates via CAN bus using protocols such as CANopen and J1939.



CBM 8 Overview

Technical data

- Input voltage range 8.5 - 32Vdc power supply
- Designed for use in vehicles and mobile machinery
- Optional X2 8pole connector or 12p M12 cable featuring: 6ch analog inputs 0-5V 12bit. Ground and 5VDC 500mA supply output
- Buttons have RGB color backlighting with millions of colors to choose from
- Built in speaker for enhanced user feedback

Applications

- Custom button user interfaces
- Use the optional analog inputs to interface with a joystick or other analog device

Mechanical data

- Operating ambient temperature -40° to +85°C
- Dimensions: 124x54x18mm
- Can be dash mounted or used as a hand held device with a 2 meter M12 cable
- IP54 protection rating when used as a hand held device

Communication

- Supports CAN 2.0A and 2.0B with bus speeds up to 1Mbit/s
- Software configurable CAN-termination of 120 ohm
- CANopen or J1939 CAN protocol can be selected with a DIP-switch configuration
- Electrum is a member of *CAN in Automation* and supports the CANopen protocol

Test standards

- Immunity conducted interference ISO7637-2, pulse 1, 2a, 2b, 3a, 3b, 4, pulse 5: +123V
- Immunity to interfering fields ISO 11452-2 100V/m
- Current injection ISO 11452-4 100mA
- Transient emission ISO 7637-2
- Interference emission CISPR 25
- ESD ISO 10605

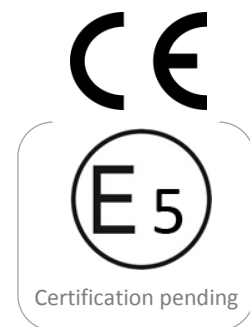


Table of content

CBM 8 Overview	2
1 Electrical characteristics	4
2 Absolute maximum ratings	4
3 Mechanical characteristics	4
4 Mechanical properties.....	5
4.1 Panel mount	5
4.2 Hand held with 2m M12-cable	6
5 Button color and operating mode	7
5.1 Automatic button mode explanation	9
5.2 Manual button mode explanation	9
6 Automatic brightness control.....	10
7 Temperature brightness control	10
8 Speaker sound	11
9 Optional I/O connector	11
10 CANopen object dictionary	12
11 CANopen PDO.....	20
12 Accessories	21
12.1 Power and CAN-cable – 254240	21
12.2 Analog input cable – 254241	21
13 Ordering information	22
14 Document history	23
15 Declaration of conformity	24
16 Contact us.....	25

1 Electrical characteristics

Parameter	Condition	Min.	Typ.	Max.	Units
Operational voltage ⁽¹⁾		8.5		32	V _{DC}
Power consumption ⁽¹⁾	32V < V _{IN} > 9V	2.7	3.3	4	W
Power consumption Idle ⁽²⁾	32V < V _{IN} > 9V	0.20	0.25	0.3	W
CAN termination	CAN _{termination} = On	118	121	132	Ω
Operating temperature		-40		85	°C
Analog Input voltage ⁽³⁾⁽⁴⁾	6 channels on X2 connector	0		5	V _{DC}
Analog voltage input impedance ⁽³⁾	Fixed pull-down		45k		Ω
5V analog output voltage ⁽³⁾	5V output on X2 connector pin 1	4.950	5.000	5.050	V
5V output current ⁽³⁾	5V output on X2 connector			500	mA

Note: 1. Module fully operational. All leds turned on 100%. No analog input/output activity.
2. Module fully operational. All leds disabled. No analog input/output activity.
3. Optional feature.
4. Can withstand up to 32V. Max readable analog value is set to 5V (12bit).

2 Absolute maximum ratings

Parameter	Condition	Min.	Typ.	Max.	Units
Input voltage ⁽¹⁾		-150		150	V _{DC}
Input voltage CAN _L & CAN _H ⁽¹⁾		-36		36V	V _{DC}
Storage temperature ⁽¹⁾		-55		125	°C
Analog Input voltage ⁽¹⁾⁽³⁾	6 channels on X2 connector	-32		32	V _{DC}
Input voltage on 5V output pin ⁽¹⁾⁽²⁾⁽³⁾	5V output on X2 connector	0		32	V _{DC}

Note: 1. Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. 5V output pin is short-circuit protected against GND. However it is not protected against reverse voltage. External reverse voltage applied to this pin **will** cause module malfunction.
3. Optional feature

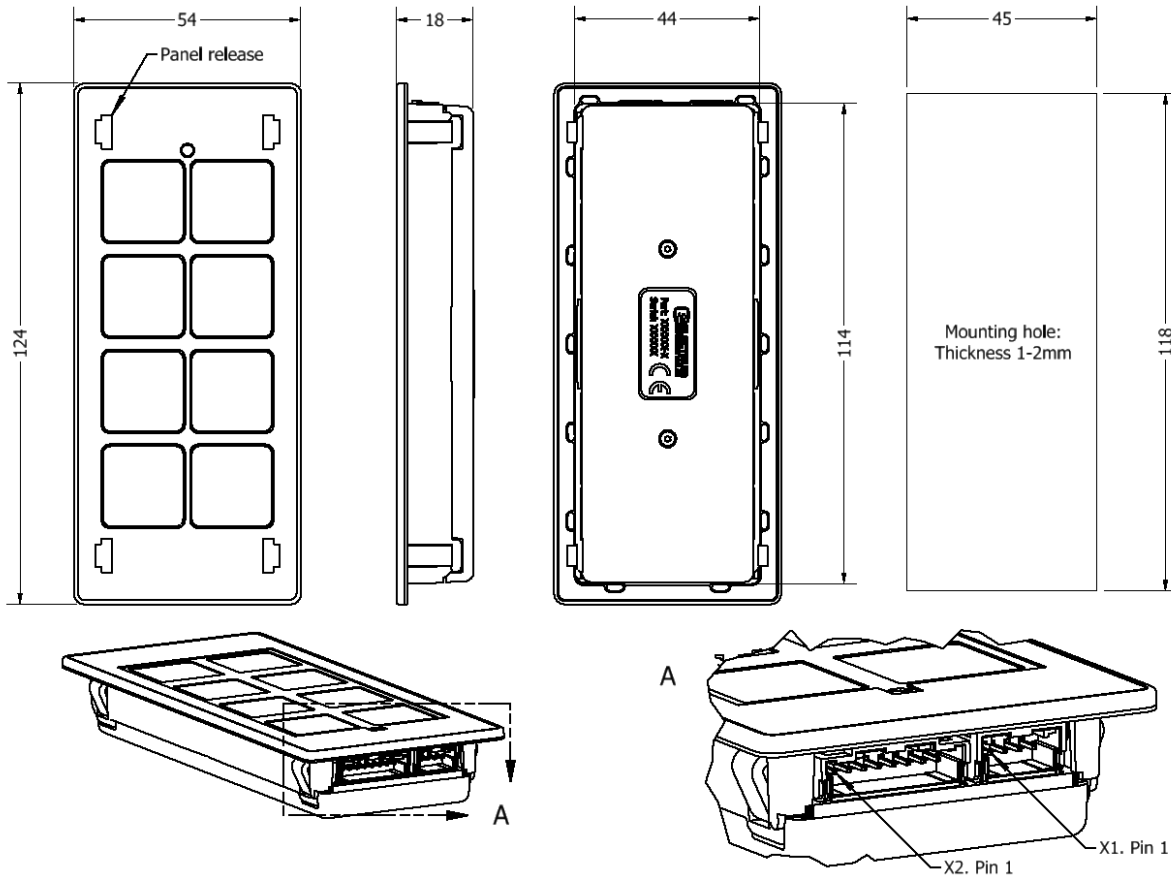
3 Mechanical characteristics

Parameter	Condition	Min.	Typ.	Max.	Units
Button operating lifetime			1 000 000		Operations

4 Mechanical properties

4.1 Panel mounted

The panel mounted version is held in place by four plastic clips. Ideally mounted in a hole where the mounting hole thickness is less than two millimetres. In order for the plastic clips to grip properly we recommend that the mounting hole is cut without rounded edges. Apart from the plastic clips there is an adhesive seal which helps keeping the CBM8 firmly in place.



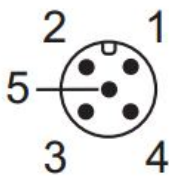
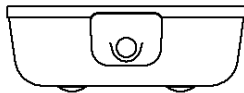
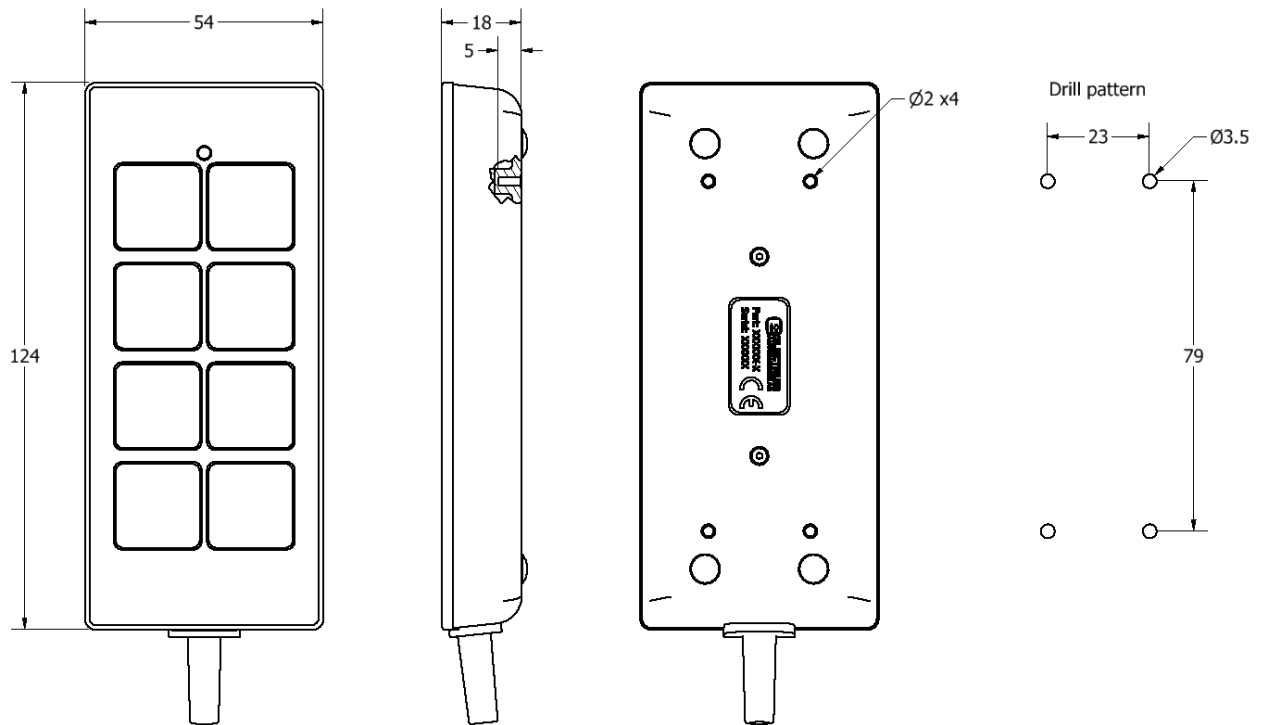
X1: 4 pole Duraclik	
1	8.5V-32V _{dc}
2	GND
3	CAN _H
4	CAN _L

Mating contact	
X1	Molex 502351-0400
X2	Molex 502351-0800
Crimp terminals	Molex 56161-8081

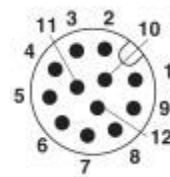
(Optional)	
X2: 8 pole Duraclik	
1	+5V Out
2	GND
3	Analog input 1 (0-5V)
4	Analog input 2 (0-5V)
5	Analog input 3 (0-5V)
6	Analog input 4 (0-5V)
7	Analog input 5 (0-5V)
8	Analog input 6 (0-5V)

4.2 Hand held with a 2 meter M12-cable

The hand held version of the CBM8 is equipped with magnets to make it stick to any metal surface. For permanent mounting against flat surface there are four holes (5mm deep) in the back piece to be used with 3mm thermoplastic screws.



Standard	
5p M12 A-code Male connector	
1	N.C.
2	8.5V-32V _{dc}
3	GND
4	CAN _H
5	CAN _L



(Optional)	
12p M12 A-code Male connector	
1	8.5V-32V _{dc}
2	GND
3	CAN _H
4	CAN _L
5	+5V Out
6	GND
7	Analog input 1 (0-5V)
8	Analog input 2 (0-5V)
9	Analog input 3 (0-5V)
10	Analog input 4 (0-5V)
11	Analog input 5 (0-5V)
12	Analog input 6 (0-5V)

5 Overlay solutions

5.1 Overlay options

When it comes to the overlay on the CBM8 module you have two options, if you are a low volume customer or have the need for a different symbol setup on each of your CBM8 module you should consider going for option 1.

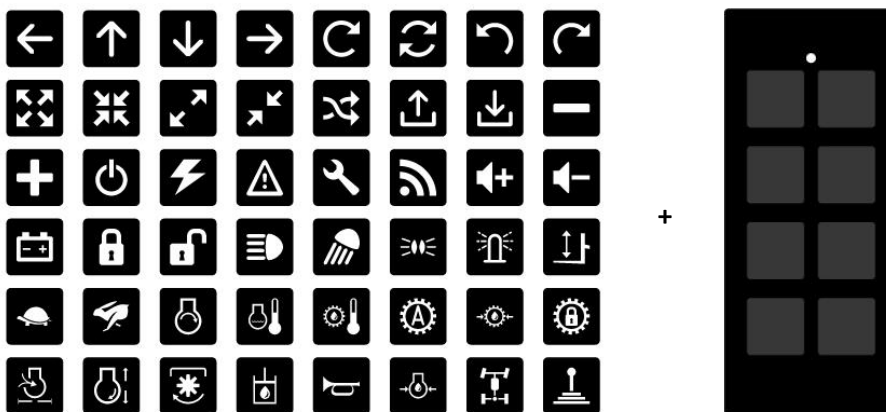
If you are a high volume customer and only use a fixed symbol setup you should consider going for option 2.

The window transparency on both option 1 and 2 are slightly tinted in order for the symbols to “disappear” when the LED is off.

Please note that the symbols in the examples below are only an example of the available symbols. Electrum Automation can help you with the design of optimized symbols according to your needs.

Option 1

A sheet with adhesive button symbols and an adhesive overlay.



Option 2

Adhesive overlay.



5.2 Overlay installation

1. Attach a symbol of your choice on each button. This only applies for label solution option 1.



2. Remove the protective film from the backside of the overlay and apply it on top of the CBM8 keypad (option 1 and 2). Make sure the small rounded window on the overlay is fitted against the light sensor on the keypad, otherwise the ambient light sensor will not function properly.



6 Button color and operating mode

An online configurator is available at <http://cbm8.electrumab.se>. The CBM8 configurator is used to demonstrate the functionality of the CBM8 module as well as a wizard which can help you to setup your module, and automatically generate a .dcf file or CANopen object dictionary table.

The CBM8 is designed to operate as a CANopen slave. The CBM8 can operate in two different modes:

1. **Automatic** (default)
2. **Manual**

6.1 Automatic button mode explanation

For most users it is recommended to use the CBM8 in the “automatic” mode. In this mode, the color of each buttons will switch between three pre-defined, saveable colors, ranging from HEX #000000 to #FFFFFF.

The three different color states for each button are:

- **Inactive color:** This color is the startup color. It is applied to the button when the button is being read as “0”
- **Active color:** This color is applied to the button when the button is being read as “1”
- **Alarm color:** This color is applied to the button if the alarm mode is activated from CANopen PDO.

Each button can be configured as **Momentary** or **Alternating**:

- **Momentary:** means that a button is only active (1) as long as it is being held down
- **Alternating:** means that the button will switch state between active (1) and inactive (0) each time the button is pressed

6.2 Manual button mode explanation

If the user wants to go beyond the three configurable colors, or desires a customized flashing pattern this mode have to be used. Each button will need to be set in the **Manual** operating mode, bypassing the inactive, active and alarm colors. When operating in manual mode, the startup color of each button is set to the corresponding color in the **inactive color** register.

In manual mode the user will have to manually read the current button state from CANopen PDO and determine if the color of each button should be changed. The automatic speaker signal when pressing a button is disabled when operating in manual mode.

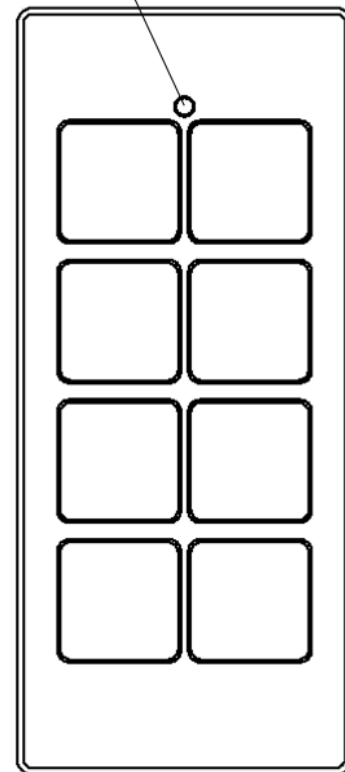
7 Error LED

The CBM8 is equipped with a combined error LED and ambient light sensor. The error LED will flash two times per second in case of a generic error. It is not possible to control the error LED manually, it is entirely controlled from the CBM8 firmware.

One of the following cases will cause the error LED to flash:

Error	Possible causes
CAN error	• Incorrect baud rate • Incorrect bus termination • Bus CRC error
Analog error	• 5V output is below 4.9V • 5V output is above 5.1V
Button error	• A button was held-down during power-up
Voltage error	• The supply voltage is outside the operational voltage

Error LED and ambient light sensor



8 Automatic brightness control

The overall brightness of the buttons is controlled from an ambient light sensor. When operating in dark surroundings the buttons will automatically fade in order to prevent excessive brightness.

This feature can be disabled from CANopen SDO if desired. It is enabled by default.

9 Temperature brightness control

The CBM8 uses high-power LEDs which generates a lot of heat when operating at full strength. I.e all buttons set to color #FFFFFF.

To prevent the CBM8 module from becoming too hot, the inner temperature of the CBM8 module is constantly monitored, if this temperature rises above 50°C the module will start to fade all buttons in order to lower the temperature. This is a safety feature which can **not** be disabled.

10 Speaker sound

The CBM8 has a built in speaker which operates at a fixed frequency. The speaker emits a sound each time a button is pressed by default. This feature can be disabled if desired. The speaker only plays this tune if the button is configured in the automatic mode. The table below describes the different sounds which are pre-programmed in the CBM8 module.

Speaker sound number	Speaker description	Speaker sound illustration
0	Off	
1	Pip	
2	Pip-Pip	
3	Piiiiiiip	

The frequency of the sound, and the sound itself can be changed from CANopen through SDO.

11 Power-up button diagnostics

During power-up of the CBM8 module an automatic control is performed to ensure that no button is affected (no button is held down). If a button is held down during boot, that button will be disabled for the rest of that operating session. If this error is triggered the error LED will flash two times per second, the malfunctioning button will automatically change color to the alarm color if the button is configured in the automatic mode.

This error state is stored in a volatile memory and will not be remembered on the next power-up of the module.

12 Optional I/O connector

As an option, the CBM8 is available with 6 analog inputs which can read the voltage 0-5000mV. It also features an on-board calibrated 5V supply output, the supply can be monitored from CANopen PDO if short-circuit supervision is desired.

13 CANopen object dictionary

Index	S-idx	Name	Type	Default	Description	Saveable
0x1000	0x00	Moduletype	ro u32	0x00003232	Nonstandard description of this module.	
0x1001	0x00	Error register	ro u8	0x00		
0x1005	0x00	COB ID SYNC	rw u32	0x00000080		x
0x1008	0x00	Module name	ro str	Electrum CBM8		
0x1009	0x00	Revision HW	ro str	REV X	Starting at char "A".	
0x100A	0x00	Revision SW	ro str	REV X.X.X	270009 software revision	
0x1010	0x00	Number of save options	ro u8	0x01		
	0x01	Save parameter	rw u32	0x00000002	0x00000000 = No save. 0x00000001 = Store when "save" is written to this index. 0x00000002 = Auto store.	x
0x1011	0x00	Number of restore options	ro u8	0x01		
	0x01	Restore default parameters	rw u32	0x00000001	Restores all parameters to default values if string 'load' is written to this entry. The default values are valid after the device is reset or power cycled.	
0x1014	0x00	COB ID EMCY	rw u32	0x00000080+ Node ID	Module generates EMCY messages (bit 31=0)	x
0x1016	0x00	Number of monitored devices	ro u8	0x01		
	0x01	Consumer heartbeat time	rw u32	0x00000000	Heartbeat monitoring time for node n monitoring only one node is supported. 0x0nnntttt = monitoring time (ms) 0x0nnntttt = node number (If nn or tttt = 0, no monitoring is carried out.)	x
0x1017	0x00	Producer heartbeat time	rw u16	0x00FA	Time interval (ms) where the module generates a producer heartbeat.	x
0x1018	0x00	Number of identity objects	ro u8	0x04		
	0x01	Vendor ID	ro u32	0x00000356		
	0x02	Product code	ro u32	0x00000000		
	0x03	Revision number	ro u32	0x00000000		
	0x04	Unique ID nr	ro u32	0x????????	A unique 32 bit number used to identify the CBM8.	

Index	S-idx	Name	Type		Default	Description	Saveable
0x1400	0x00	Receive PDO 1 Communication Parameter	ro	u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw	u32	0x200 + \$NODEID		x
	0x02	Transmission type	rw	u8	0		x
	0x03	Inhibit time	rw	u16	0		x
	0x05	Event timer	rw	u16	0		x
0x1401	0x00	Receive PDO 2 Communication Parameter	ro	u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw	u32	0x300 + \$NODEID		x
	0x02	Transmission type	rw	u8	0		x
	0x03	Inhibit Time	rw	u16	0		x
	0x05	Event timer	rw	u16	0		x
0x1402	0x00	Receive PDO 3 Communication Parameter	ro	u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw	u32	0x400 + \$NODEID		x
	0x02	Transmission type	rw	u8	0		x
	0x03	Inhibit time	rw	u16	0		x
	0x05	Event timer	rw	u16	0		x
0x1403	0x00	Receive PDO 4 Communication Parameter	ro	u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw	u32	0x500 + \$NODEID		x
	0x02	Transmission type	rw	u8	0		x
	0x03	Inhibit time	rw	u16	0		x
	0x05	Event timer	rw	u16	0		x

Index	S-idx	Name	Type	Default	Description	Saveable
0x1600	0x00	Receive PDO 1 Mapping Parameter	rw u8	0x08	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64140108	Button 1 Red	x
	0x02	PDO Mapping Entry 2	rw u32	0x64140208	Button 1 Green	x
	0x03	PDO Mapping Entry 3	rw u32	0x64140308	Button 1 Blue	x
	0x04	PDO Mapping Entry 4	rw u32	0x64140408	Button 2 Red	x
	0x05	PDO Mapping Entry 5	rw u32	0x64140508	Button 2 Green	x
	0x06	PDO Mapping Entry 6	rw u32	0x64140608	Button 2 Blue	x
	0x07	PDO Mapping Entry 7	rw u32	0x62000108	Speaker	x
	0x08	PDO Mapping Entry 8	rw u32	0x62000208	Button alarm	x
0x1601	0x00	Receive PDO 2 Mapping Parameter	rw u8	0x06	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64140708	Button 3 Red	x
	0x02	PDO Mapping Entry 2	rw u32	0x64140808	Button 3 Green	x
	0x03	PDO Mapping Entry 3	rw u32	0x64140908	Button 3 Blue	x
	0x04	PDO Mapping Entry 4	rw u32	0x64140A08	Button 4 Red	x
	0x05	PDO Mapping Entry 5	rw u32	0x64140B08	Button 4 Green	x
	0x06	PDO Mapping Entry 6	rw u32	0x64140C08	Button 4 Blue	x
	0x07	PDO Mapping Entry 7	rw u32	0x00000000		x
	0x08	PDO Mapping Entry 8	rw u32	0x00000000		x
0x1602	0x00	Receive PDO 3 Mapping Parameter	rw u8	0x06	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64140D08	Button 5 Red	x
	0x02	PDO Mapping Entry 2	rw u32	0x64140E08	Button 5 Green	x
	0x03	PDO Mapping Entry 3	rw u32	0x64140F08	Button 5 Blue	x
	0x04	PDO Mapping Entry 4	rw u32	0x64141008	Button 6 Red	x
	0x05	PDO Mapping Entry 5	rw u32	0x64141108	Button 6 Green	x
	0x06	PDO Mapping Entry 6	rw u32	0x64141208	Button 6 Blue	x
	0x07	PDO Mapping Entry 7	rw u32	0x00000000		x
	0x08	PDO Mapping Entry 8	rw u32	0x00000000		x
0x1603	0x00	Receive PDO 4 Mapping Parameter	rw u8	0x06	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64141308	Button 7 Red	x
	0x02	PDO Mapping Entry 2	rw u32	0x64141408	Button 7 Green	x
	0x03	PDO Mapping Entry 3	rw u32	0x64141508	Button 7 Blue	x
	0x04	PDO Mapping Entry 4	rw u32	0x64141608	Button 8 Red	x
	0x05	PDO Mapping Entry 5	rw u32	0x64141708	Button 8 Green	x
	0x06	PDO Mapping Entry 6	rw u32	0x64141808	Button 8 Blue	x
	0x07	PDO Mapping Entry 7	rw u32	0x00000000		x
	0x08	PDO Mapping Entry 8	rw u32	0x00000000		x

Index	S-idx	Name	Type	Default	Description	Saveable
0x1800	0x00	Transmit PDO 1 Communication Parameter	ro u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw u32	0x180 + \$NODEID		x
	0x02	Transmission type	rw u8	255		x
	0x03	Inhibit Time	rw u16	300		x
	0x05	Event timer	rw u16	100		x
0x1801	0x00	Transmit PDO 2 Communication Parameter	ro u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw u32	0x80000280 + \$NODEID		x
	0x02	Transmission type	rw u8	255		x
	0x03	Inhibit time	rw u16	300		x
	0x05	Event timer	rw u16	100		x
0x1802	0x00	Transmit PDO 3 Communication Parameter	ro u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw u32	0x80000380 + \$NODEID		x
	0x02	Transmission type	rw u8	255		x
	0x03	Inhibit time	rw u16	300		x
	0x05	Event timer	rw u16	100		x
0x1803	0x00	Transmit PDO 4 Communication Parameter	ro u8	0x05	Number of entries	
	0x01	COB-ID used by PDO	rw u32	0x80000480 + \$NODEID		x
	0x02	Transmission type	rw u8	255		x
	0x03	Inhibit time	rw u16	300		x
	0x05	Event timer	rw u16	100		x
0x1A00	0x00	Transmit PDO 1 Mapping Parameter	rw u8	0x02	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x60000108	Buttons	x
	0x01	PDO Mapping Entry 2	rw u32	0x64040908	Light sensor	x
0x1A01	0x00	Transmit PDO 2 Mapping Parameter	rw u8	0x04	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64040110	Analog input 1	x
	0x02	PDO Mapping Entry 2	rw u32	0x64040210	Analog input 2	x
	0x03	PDO Mapping Entry 3	rw u32	0x64040310	Analog input 3	x
	0x04	PDO Mapping Entry 4	rw u32	0x64040410	Analog input 4	x
0x1A02	0x00	Transmit PDO 3 Mapping Parameter	rw u8	0x04	Number of entries	
	0x01	PDO Mapping Entry 1	rw u32	0x64040510	Analog input 5	x
	0x02	PDO Mapping Entry 2	rw u32	0x64040610	Analog input 6	x
	0x03	PDO Mapping Entry 3	rw u32	0x64040710	5V supply	x
	0x04	PDO Mapping Entry 4	rw u32	0x64040810	B+	x
0x1A03	0x00	Transmit PDO 4 Mapping Parameter	rw u8	0x00	Number of entries	

Index	S-idx	Name	Type	Default	Description	Saveable
0x20F2	0x00	CAN baudrate	rw u16	250	Supported baudrates: 50 = 50kbit/s 125 = 125kbit/s 250 = 250kbit/s 500 = 500kbit/s 1000 = 1Mbit/s	x
0x20F3	0x00	CAN baudrate	rw u16	250	Baudrate must be written to index 20F2 first, and then written to this index.	X
0x2200	0x00	Number of buttons	ro u8	0x08		x
	0x01	Button1 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x02	Button2 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x03	Button3 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x04	Button4 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x05	Button5 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x06	Button6 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x07	Button7 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
	0x08	Button8 Operating mode	rw u8	0x00	0=Auto: Momentary 1=Auto: Alternating (2 states) 2=Manual	x
0x2300	0x00	LED auto brightness	rw u8	0x01	0=Off 1=On Determines if LED intensity should be adjusted in relation to the surrounding ambient light.	X
0x2301	0x00	LED transition time	rw u16	100	LED transition time defined in milliseconds.	X
0x2302	0x00	LED alarm blink rate	rw u16	500	If a button is set in alarm state. It will toggle between alarm color and #000000 at this interval. Only valid for buttons where Operating mode is set to Auto.	X

Index	S-idx	Name	Type		Default	Description	Saveable
0x2400	0x00	LED color inactive	ro	u8	0x08	Color when switch is inactive. 8bit color in hex. (0x00RRGGBB).	
	0x01	RGB1	rw	u32	0x000088FF		x
	0x02	RGB2	rw	u32	0x000088FF		x
	0x03	RGB3	rw	u32	0x000088FF		x
	0x04	RGB4	rw	u32	0x000088FF		x
	0x05	RGB5	rw	u32	0x000088FF		x
	0x06	RGB6	rw	u32	0x000088FF		x
	0x07	RGB7	rw	u32	0x000088FF		x
	0x08	RGB8	rw	u32	0x000088FF		x
0x2401	0x00	LED color active	ro	u8	0x08	Color when switch is active. 8bit color in hex. (0x00RRGGBB).	
	0x01	RGB1	rw	u32	0x0088FF00		x
	0x02	RGB2	rw	u32	0x0088FF00		x
	0x03	RGB3	rw	u32	0x0088FF00		x
	0x04	RGB4	rw	u32	0x0088FF00		x
	0x05	RGB5	rw	u32	0x0088FF00		x
	0x06	RGB6	rw	u32	0x0088FF00		x
	0x07	RGB7	rw	u32	0x0088FF00		x
	0x08	RGB8	rw	u32	0x0088FF00		x
0x2402	0x00	LED alarm color	ro	u8	0x08	Color when switch alarm is set to active. 8bit color in hex. (0x00RRGGBB).	
	0x01	RGB1	rw	u32	0x00FF0000		x
	0x02	RGB2	rw	u32	0x00FF0000		x
	0x03	RGB3	rw	u32	0x00FF0000		x
	0x04	RGB4	rw	u32	0x00FF0000		x
	0x05	RGB5	rw	u32	0x00FF0000		x
	0x06	RGB6	rw	u32	0x00FF0000		x
	0x07	RGB7	rw	u32	0x00FF0000		x
	0x08	RGB8	rw	u32	0x00FF0000		x

Index	S-idx	Name	Type	Default	Description	Saveable
0x2500	0x00	Speaker sound	rw u8	0x01	For description see table "Speaker sound".	X
0x2501	0x00	Speaker frequency	rw u16	4000	20-20000 in Hz	x
0x2600	0x00	X2 connector mounted	ro u8	-	0x00 = X2 connector is not mounted 0x01 = X2 connector is mounted	
0x3000	0x00	Number of parameters	ro u8	0x02		
	0x01	CAN termination	rw u8	0x00	0x00 = Termination off. 0x01 = Termination on.	X
	0x02	Node ID	rw u8	0x7F	1-127	x
0x6000	0x00	Read Button state	ro u8	0x02	Number of entries	
	0x01	Buttons	ro u8	-	Mappable	
	0x02	Button affected during boot	ro u8	-	Mappable. (Available in firmware 1.0.14 and forward)	

Index	S-idx	Name	Type		Default	Description	Saveable
0x6200	0x00	Miscellaneous commands	ro	u8	0x02	Number of entries	
	0x01	Speaker	wo	u8	-	Mappable	
	0x02	Button alarm	wo	u8	-	Mappable	
0x6404	0x00	Manufacturer-specific Analog input	ro	u8	0x0A	Number of entries	
	0x01	5V analog input 1	ro	u16	-	Mappable	
	0x02	5V analog input 2	ro	u16	-	Mappable	
	0x03	5V analog input 3	ro	u16	-	Mappable	
	0x04	5V analog input 4	ro	u16	-	Mappable	
	0x05	5V analog input 5	ro	u16	-	Mappable	
	0x06	5V analog input 6	ro	u16	-	Mappable	
	0x07	5V supply	ro	u16	-	Mappable	
	0x08	B+	ro	u16	-	Mappable	
	0x09	Light sensor	ro	u8	-	Mappable	
	0x0A	CBM8 inner temperature	ro	s16	-	Mappable (Available in firmware 1.0.15 and forward)	
0x6414	0x00	LED commands	ro	u8	0x18	Number of entries	
	0x01	(Manual) Button 1 Red	wo	u8	-	Mappable	
	0x02	(Manual) Button 1 Green	wo	u8	-	Mappable	
	0x03	(Manual) Button 1 Blue	wo	u8	-	Mappable	
	0x04	(Manual) Button 2 Red	wo	u8	-	Mappable	
	0x05	(Manual) Button 2 Green	wo	u8	-	Mappable	
	0x06	(Manual) Button 2 Blue	wo	u8	-	Mappable	
	0x07	(Manual) Button 3 Red	wo	u8	-	Mappable	
	0x08	(Manual) Button 3 Green	wo	u8	-	Mappable	
	0x09	(Manual) Button 3 Blue	wo	u8	-	Mappable	
	0x0A	(Manual) Button 4 Red	wo	u8	-	Mappable	
	0x0B	(Manual) Button 4 Green	wo	u8	-	Mappable	
	0x0C	(Manual) Button 4 Blue	wo	u8	-	Mappable	
	0x0D	(Manual) Button 5 Red	wo	u8	-	Mappable	
	0x0E	(Manual) Button 5 Green	wo	u8	-	Mappable	
	0x0F	(Manual) Button 5 Blue	wo	u8	-	Mappable	
	0x10	(Manual) Button 6 Red	wo	u8	-	Mappable	
	0x11	(Manual) Button 6 Green	wo	u8	-	Mappable	
	0x12	(Manual) Button 6 Blue	wo	u8	-	Mappable	
	0x13	(Manual) Button 7 Red	wo	u8	-	Mappable	
	0x14	(Manual) Button 7 Green	wo	u8	-	Mappable	
	0x15	(Manual) Button 7 Blue	wo	u8	-	Mappable	
	0x16	(Manual) Button 8 Red	wo	u8	-	Mappable	
	0x17	(Manual) Button 8 Green	wo	u8	-	Mappable	
	0x18	(Manual) Button 8 Blue	wo	u8	-	Mappable	

14 CANopen PDO

TX	ID	Data							
		0	1	2	3	4	5	6	7
PDO1	180+Node ID	Buttons	Light sensor	-	-	-	-	-	-
PDO2 ⁽¹⁾	280+Node ID	Ain[0] Low byte	Ain[0] High byte	Ain[1] Low byte	Ain[1] High byte	Ain[2] Low byte	Ain[2] High byte	Ain[3] Low byte	Ain[3] High byte
PDO3 ⁽¹⁾	380+Node ID	Ain[4] Low byte	Ain[4] High byte	Ain[5] Low byte	Ain[5] High byte	5V supply Low byte	5V supply High byte	B+ Low byte	B+ High byte

(1) TX PDO 2 and 3 are disabled by default. To enable them remove the highest bit in COB-ID under communication parameters for the corresponding PDO entry.

Buttons can be read as a bit pattern where the least significant bit is button 1 (0b00000001).

- 0 = button off
- 1 = button on.

Ain[0-5] is available if X2 connector is mounted. Analog input value will range from 0 to 5000mV.

5V supply is the supply voltage output from the X2 connector. Value can range from 0 to 5500mV. This value shouldn't differ from 5000mV more than the accuracy specified under Electrical Characteristics.

B+ is the supply voltage to the CBM module. Value can range from 0 to 65535mV.

Light sensor is the ambient light in percent.

- 0 = Complete darkness
- 100 = Direct sunlight

RX	ID	Data							
		0	1	2	3	4	5	6	7
PDO1	200+Node ID	RGB 1 RED byte	RGB 1 GREEN byte	RGB 1 BLUE byte	RGB 2 RED byte	RGB 2 GREEN byte	RGB 2 BLUE byte	Manual speaker	Button- Alarm
PDO2	300+Node ID	RGB 3 RED byte	RGB 3 GREEN byte	RGB 3 BLUE byte	RGB 4 RED byte	RGB 4 GREEN byte	RGB 4 BLUE byte	-	-
PDO3	400+Node ID	RGB 5 RED byte	RGB 5 GREEN byte	RGB 5 BLUE byte	RGB 6 RED byte	RGB 6 GREEN byte	RGB 6 BLUE byte	-	-
PDO4	500+Node ID	RGB 7 RED byte	RGB 7 GREEN byte	RGB 7 BLUE byte	RGB 8 RED byte	RGB 8 GREEN byte	RGB 8 BLUE byte	-	-

RGB ranges from 0x000000 to 0xFFFFFF

- 0x000000 = off
- 0xFFFFFF = white

Enables you to manually choose a color for a button, RGB 1 controls the color for Button 1 and so on. Only valid if Operating mode for the corresponding button is set to manual.

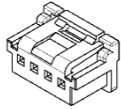
Manual speaker enables you to manually play a sound. This is achieved by writing a 1 to this entry. The sound will continue to play until a 0 is written. Should be set to 0 for normal operation.

Button-Alarm is set as a bit pattern which activates the alarm mode for the corresponding button. (ex: 0b00000001 activates the alarm color for button 1). Only valid if Operating Mode for the corresponding button is set to auto. Should be set to 0 for normal operation.

15 Accessories

15.1 Power and CAN-cable – 254240

Preassembled 4p Duraclik with 2 meter cable

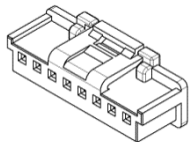


Mates with connector X1		
1	White	8.5V-32V _{dc}
2	Brown	GND
3	Green	CAN _H
4	Yellow	CAN _L

Cable information	
Insulation type	PVC
Insulation thickness	0.4mm
Cross sectional area	AWG22/0.34mm ²
Length	2m

15.2 Analog input cable – 254241

Preassembled 8p Duraclik with 2 meter cable



Mates with connector X2		
1	White	+5V Out
2	Brown	GND
3	Green	Analog input 1
4	Yellow	Analog input 2
5	Grey	Analog input 3
6	Pink	Analog input 4
7	Blue	Analog input 5
8	Red	Analog input 6

Cable information	
Sheath material	PVC
Sheath Color	Grey
Cross sectional area	AWG24/0.25mm ²
Outer diameter	6.2mm
No. of conductors	8
Length	2m

16 Ordering information

Description	Part no:
CBM8 – Handheld with 2m 5p M12 cable	254144
CBM8 – Handheld with 2m 12p M12 cable	254278
CBM8 – Panel mounted without cable (without analog inputs)	254145
CBM8 – Panel mounted without cable (with analog inputs)	254021
Cable accessories	
4p Duraclik connector with 2m cable	254240
8p Duraclik connector with 2m cable	254241
Overlay accessories	
Generic overlay (open tinted windows)	253952
Symbol sheet generic (48 generic symbols)	253955
Symbol sheet (max 48 symbols)	Available on req.
Customized overlay (with customized symbols)	Available on req.

17 Document history

Document revision	Description	Release date
A	Initial release	2014-10-23
B	- Removed index 0x3100 Error history - Added pin-out description to Mechanical properties - Changed index 0x20F2 and 0x20F3 to u16 - Changed document layout	2014-11-19
C	- Corrected condition in Electrical characteristics table (5V analog output voltage) - Changed description of index 0x6200 from "Sound commands" to "Miscellaneous commands" - Changed description of index 0x2400 from "LED Color 1" to "LED color inactive" - Changed description of index 0x2401 from "LED Color 2" to "LED color active" - Added some more information regarding RX PDO - Added information regarding TX PDO 2 and 3 communication parameters. These COB-ID are now disabled by default.	2015-02-13
D	- Added dimensional drawings - Added M12 pin-out description on hand held device. - Added information on accessories - Added ordering information - Added further explanation regarding CBM8 operating behaviour - Added declaration of conformity	2015-04-13
E	- Added protection rating - Added overlay section - Revised information on accessories - Fixed description in index 0x3000 sub-index 0x01	2015-08-20
F	- Added ordering information on Overlay accessories - Added further information regarding panel mounting	2015-12-17
G	- Changed description regarding manual button operation mode. - Changed default value of TX PDO 4 COBID. This COBID is now disabled since firmware 1.0.12	2016-01-20
H	- Added information regarding the error LED - Added information regarding the power-up button diagnostics. - Added part number for CBM8 panel mounted with analog inputs	2016-01-22
I	- Added index 0x6000 sub-index 0x02. Button affected during boot register. - Added index 0x6404 sub-index 0x0A. CBM8 inner temperature - New picture on the front page	2017-10-06

For latest revision of this document please visit www.electrumab.se

18 Declaration of conformity



Product name	CBM8
Product description	Generic CAN based, 8 buttons with RGB backlight keypad
Manufacturer	Electrum Automation AB
Address	Industrivägen 8, 901 30 Umeå, Sweden

The undersigned hereby declares on behalf of Electrum Automation AB, that the above reference product, to which this declaration relates, complies with the essential requirements of the following applicable **European Directives**, and carries the CE marking accordingly:

UN ECE R10.05	Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility
2004/108/EC	Electromagnetic Compatibility (EMC)

And conforms with the following **Product Standards**:

ISO 13766:2006	Earth-moving machinery - Electromagnetic compatibility
ISO 14982:1998	Agricultural and forestry machinery - Electromagnetic compatibility - Test methods and acceptance criteria
EN 13309:2010	Construction machinery - Electromagnetic compatibility of machines with internal power supply
CISPR25	RF Emissions
ISO11452-2	RF Immunity
ISO11452-4	Bulk Current Injection
ISO7637-2	Transients
ISO10605	ESD

Person authorized to compile the technical file:

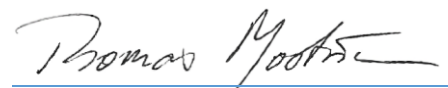
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2015-03-26

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Location



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