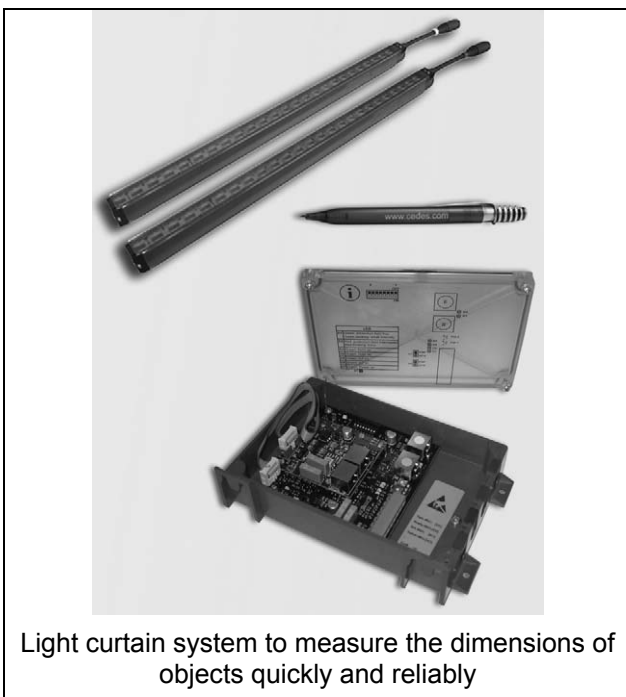


**ObjectC 100 I/O
ObjectC 100 CAN
ObjectC 100 RS485
Measurement System**



English
Deutsch
Français
Italiano
Español



manufactured under ISO 9001: 2000

IMPORTANT NOTICE

FOLLOW THE INSTRUCTIONS GIVEN IN THIS MANUAL CAREFULLY. FAILURE TO DO SO MAY CAUSE CUSTOMER COMPLAINTS AND SERIOUS CALL BACKS. KEEP INSTRUCTION MANUAL ON SITE.

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Abbreviation	Description
CAN	Controller Area Network
ccw	Counter clockwise
cw	Clockwise
DIP	Dual In-line Package
EMC	Electro-Magnetic Compatibility
fb_offset	First beam offset
GND	Ground
In	Input
lb_offset	Last beam offset
LED	Light-Emitting Diode
mm	Millimeter
oh	Overheight
Out	Output
PCB	Printed Circuit Board
PG	Programmer's Guide
PLC	Programmable Logic Controller
Pot.	Potentiometer
Rx	Receiver light curtain
Tx	Emitter light curtain
VDC	Voltage Direct Current
zc	Carrier zone

1. CE – Conformity and Standards

CEDES products are developed and manufactured according to state of the art technology and in compliance with total quality management system ISO 9001: 2000.

The CE-conformity declaration is printed in chapter 12.1. Upon request this is also available at your nearest CEDES dealer or on our homepage at www.cedes.com.

Warning

ObjectC 100 / Object100 systems are not safety systems! This means that any use for the protection of people is forbidden.

ObjectC 100 / Object100 systems can only achieve their function, if the instructions given in this manual, and the referenced documents are exactly followed, as well as consulting the valid laws and regulations at the time of installation. Should these instructions not be followed or only partially, this may lead to a premature malfunction of the system. The installer or system integrator will be fully responsible for the results in such a situation.

This manual is part of the ObjectC 100 / Object100 system. It must be kept accessible together with the other machine documentation during its entire life cycle for all personnel responsible for assembly, installation, operation and maintenance.

2. Introduction

The CEDES measuring light curtain system Object100 / ObjectC 100 is intended to detect an object and measure its dimensions reliably and quickly. A typical application is presented in Figure 1. The system consists of the Object100 emitter and receiver light curtains and the electronic control unit ObjectC 100. The control unit has many application features and is available with various interfaces for communication with a higher level PLC.

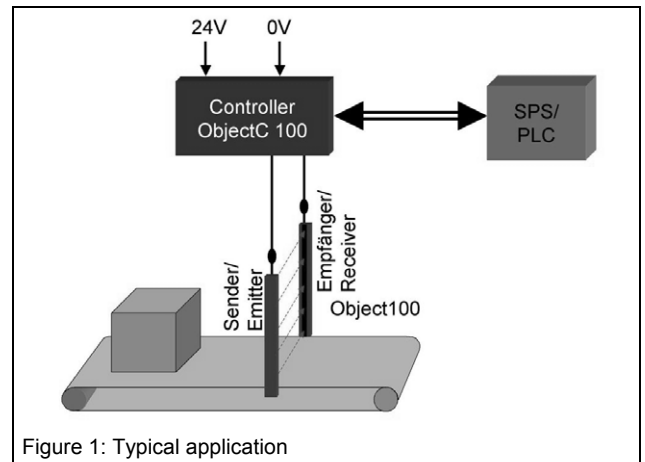


Figure 1: Typical application

The control unit ObjectC 100 is available with the following interfaces:

Table 1: ObjectC 100 controller versions

Part number	Part name	Description
104 920	ObjectC 100 I/O	2 digital inputs, 6 digital outputs
104 901	ObjectC 100 CAN	2 digital inputs, 2 digital outputs, and CAN interface
104 913	ObjectC 100 RS485	2 digital inputs, 2 digital outputs, and RS485 interface

All controller types are equipped with two digital outputs, indicating light curtain state or overheight (i.e. object is too tall) and overhang. The ObjectC 100 I/O controller offers four additional outputs to monitor single beams or groups of beams (zones). The CAN and RS485 controllers communicate the state of each beam to a PLC.

This manual describes the different controller types as well as their commissioning and settings. Advanced features and further properties of the Object100 light curtain systems are described in the programmer's guide (CEDES part no 105 828).

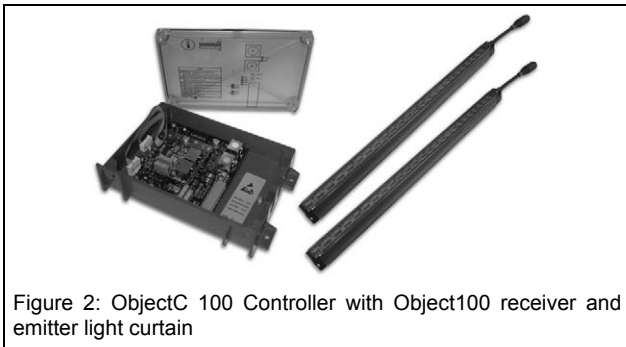


Figure 2: ObjectC 100 Controller with Object100 receiver and emitter light curtain

2.1. Features

The outstanding characteristics of the ObjectC 100 / Object100 system are:

- Very compact light curtain
- Light curtain length: $n \times 50$ mm
- Up to 254 beams
- Cascaded systems possible
- Light curtains available with various pitches
- Special optic to reduce mirrored reflections
- Special aperture assures the detection of slim objects
- Large operating range
- Integrated diagnostic LED in the light curtain
- Robust construction
- RS485 / CAN interface
- Digital inputs and outputs
- Controller IP54 rated (depending on mounting)
- "Stand-alone" solution (controller does not need to be in a control cabinet)
- Controller DIN rail mounting bracket removable for wall mounting
- Optical interface for fast software configuration
- Modern technology

3. Applications

3.1. Typical applications

ObjectC 100 / Object100 measuring light curtain system is designed for applications in:

- Conveyor transport systems
- Storage systems
- Sorting systems
- Painting systems
- Pick-by-light systems
- Part counting

Typical application areas are:

- Wood measuring
- Quality control
- Transport systems
- Automatic and manual storage systems

and any application where counting or height measurement must be quickly and precisely measured.

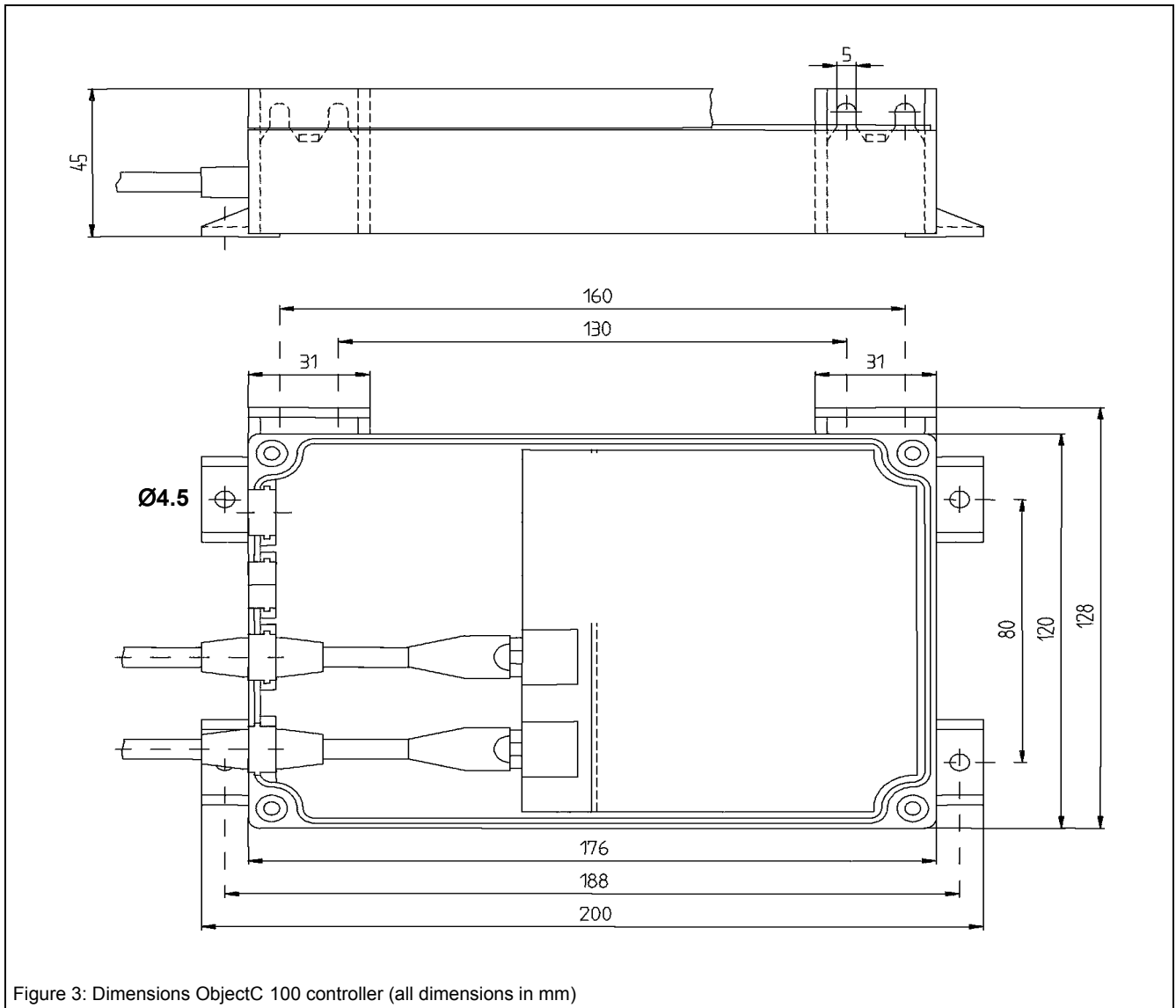
3.2. Application restrictions

ObjectC 100 / Object100 measuring systems are not intended for applications in explosive (EX) or in radioactive environments.

4. ObjectC 100 Control Unit

4.1. Housing and mounting

The control unit is prepared for multifarious mounting. For mounting on a DIN rail, the controller housing is equipped with mounting brackets on the underside. Alternately, the control unit can be mounted using four screws on either the underside or side of the housing.



The controller consists of a main printed circuit board (PCB) and an extension PCB (Figure 4). The main board controls the light curtain electronics and the extension board contains the interface logic. The following controller versions are available:

- **ObjectC 100 I/O** (chapter 5)
Four additional outputs are available and can be used for zone allocation of the light curtain beams.
- **ObjectC 100 CAN** (chapter 6)
A CAN interface allows for communication of beam information with a master controller.
- **ObjectC 100 RS485** (chapter 7)
An RS485 interface allows for communication of beam information with a master controller.

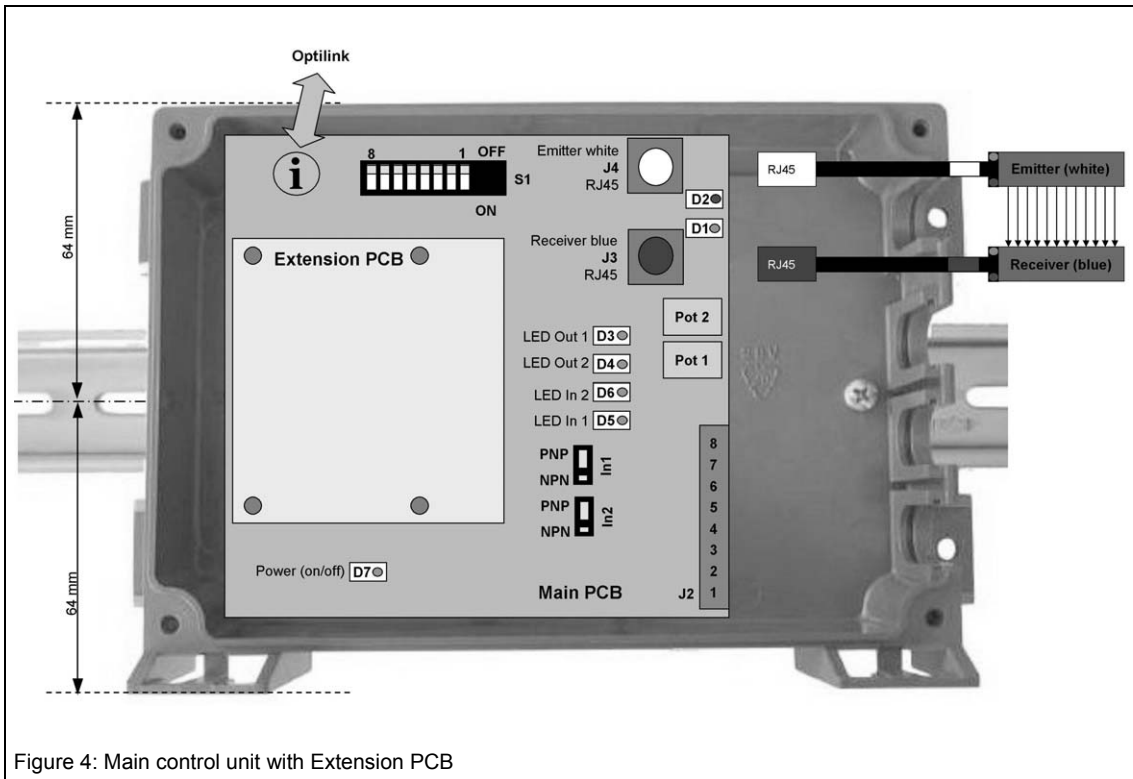


Figure 4: Main control unit with Extension PCB

4.2. Connection terminals

Figure 4 shows the terminals for the power supply and interfaces (J2), as well as the emitter (J4 - white) and receiver (J3 - blue) light curtains. For important information regarding the earth connection, see chapter 8.2.

The main board offers 2 digital input and 2 digital output signals on terminal strip J2. The pin allocation depends on the controller type. All the relevant details are listed in the corresponding chapter for the individual controller versions.

Table 2: Terminal strip J2 pin allocation

Pin	Signal	0 V	24 V
1	0 VDC	Power	
2	+24 VDC	Power	
3	Earth	Earth (see important notice chapter 8.2)	
4	-	-	
5	In 2	I/O: Chapter 5.2 CAN: Chapter 6.2 RS485: Chapter 7.2	
6	In 1		
7	Out 2		
8	Out 1		

4.2.1. Input logic

The input signals can be used as PNP or NPN logic signals. The default setting is PNP and can be changed by the jumper In1 and In2.

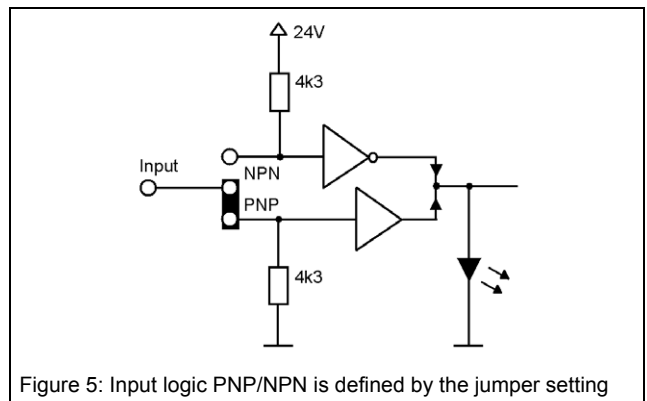


Figure 5: Input logic PNP/NPN is defined by the jumper setting

4.2.2. Output logic

ObjectC 100 push-pull output drives either a positive or a negative current into a load. In addition the output logic can be inverted by parameter 24 for ObjectC 100 CAN and RS485 (see chapter 2.2.5.9 in Programmer's Guide).

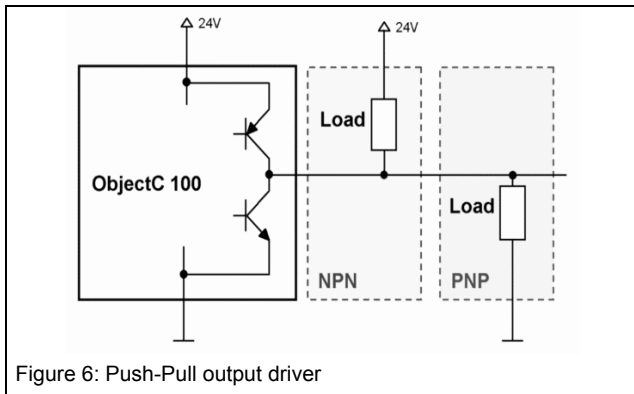


Figure 6: Push-Pull output driver

4.3. Indicator diodes

LED indicator elements can be found on the controller main board and on the controller extension board. Refer to the appropriate chapter for the description of the different LEDs. This chapter describes the LEDs of the control unit main PCB.

The positions of LED D1 to D7 on the controller main PCB are shown in Figure 4. Table 3 explains the meanings of these LEDs:

Table 3: LED indicators on main board

LED	Description	Color	Meaning
D1	Light curtain ok	Off	Light curtain interrupted
		Green	Light curtain not interrupted
		Green blinking	Intensity inadequate
D2	Light curtain interrupted	Off	Light curtain not interrupted
		Red	Light curtain interrupted
		Red blinking	Height measurement failure
D3	Out 1	Off	Output 1 inactive
		Green	Output 1 active
D4	Out 2	Off	Output 2 inactive
		Green	Output 2 active
D5	In 1	Off	Input 1 inactive ¹⁾
		Green	Input 1 active ¹⁾
D6	In 2	Off	Input 2 inactive ¹⁾
		Green	Input 2 active ¹⁾
D7	Power	Off	Power off
		Green	Power on

¹⁾ Signal can be defined as active "Low" or active "High"! (see chapter 4.5)

4.4. DIP switch settings

ObjectC 100 I/O: Chapter 5.4
 ObjectC 100 CAN: Chapter 6.4
 ObjectC 100 RS485: Chapter 7.4

4.5. Jumper settings

The main PCB is equipped with two jumpers (In1 and In2). The jumpers define the logic (PNP or NPN) of the inputs In1 and In2 (see Figure 5).

Table 4: Jumper settings

Jumper	PNP (default)	NPN
In1	Input 'In 1' active "Low" (0 V)	Input 'In 1' active "High" (+24 V)
In2	Input 'In 2' active "Low" (0 V)	Input 'In 2' active "High" (+24 V)

4.6. Potentiometer settings

The output signals Out 1 and Out 2 may be modified with the use of potentiometers. The times which may be adjusted are shown in Table 5.

ObjectC 100 CAN and RS485 offer a function whereby the potentiometer adjustments may be replaced by the use of a command. This is the command "28 Set parameter" according to chapter 2.2.5.11 in Programmer's Guide (Parameter 63-65). When this command is used the potentiometers have no function.

Table 5: Potentiometer adjustments

Pot	Description	Position	Value
Pot 1	Allowed overhang duration	ccw	t _{ot} = 0 s
		cw	t _{ot} = 3.3 s
Pot 2	Minimum output duration	ccw	t _{out} = 0 s
		cw	t _{out} = 3.3 s

(cw: clockwise, ccw: counterclockwise)

4.6.1. Allowed Overhang duration (Pot 1)

Pot 1 adjusts the allowed time duration for overhang monitoring (t_{ot}) according to chapter 4.10.1 in Programmer's Guide. The adjusted value is the time duration allowed between when the first beam of the material zone is interrupted until one of the carrier zone beams is interrupted. As long as this time duration is not exceeded, the overhang output will remain inactive. The physical length of an overhang depends on the transport velocity.

4.6.2. Minimum Output duration (Pot 2)

The duration of the output signals Out 1, Out 2 and Out 3 - Out 6 (only ObjectC 100 I/O) are adjusted with Pot 2. A longer active output signal may be useful in applications where a higher level PLC inquires as to the ObjectC 100 output, at relatively large time intervals.

4.7. Parameter settings (ObjectC 100 CAN/RS485)

Different parameters can be set with communication commands. Chapters 3 and 5 in the Programmer's Guide give a functional description and chapter 2.2.5.11 in the Programmer's Guide a parameter overview.

ObjectC 100 default settings

When the ObjectC 100 controllers are shipped, they contain various default settings. A list of the default settings is shown below. For more detailed information see the corresponding chapters.

Table 6: ObjectC 100 DIP switch default settings

DIP Switch S1	Remarks
0 = OFF (DIP 1-8)	ObjectC 100 I/O: Chapter 5.4 ObjectC 100 CAN: Chapter 6.4 ObjectC 100 RS485: Chapter 7.4

Table 7: ObjectC 100 Jumper default settings

Jumper In1, In2	Remarks
PNP	All controller types: Chapter 4.5

Table 8: ObjectC 100 Potentiometer default settings

Pot 1, Pot 2	Remarks
ccw.	All controller types: Chapter 4.6

Table 9: ObjectC 100 Parameter default settings

Parameter	Remarks
	ObjectC 100 I/O: Chapter 5.6 ObjectC 100 CAN: Table 19 in PG* ObjectC 100 RS485: Table 19 in PG*

* PG = Programmer's Guide manual

4.8. Simple object detection

When an object interrupts one or more beams of the Object100 light curtain, an ObjectC 100 output switches. Even very fast moving objects can be detected reliably with this simple function.

ObjectC 100 offers this function as shown in Figure 7. Out 2 is normally used for the signal "Overheight" (see Table 10). In the default configuration however, the overheight beam "oh" is set to the first beam, and therefore Out 2 may be used to signal a light curtain interruption.

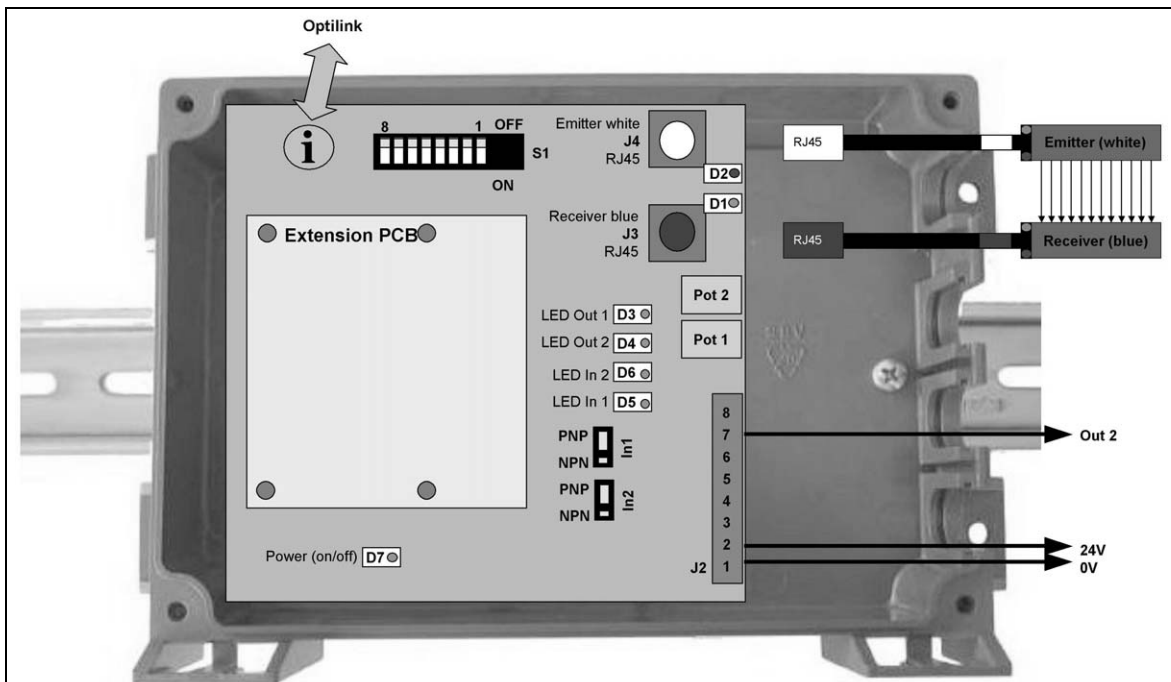


Figure 7: Wiring for a simple object detection application: DIP switch = OFF, Jumper In2 = PNP

5. ObjectC 100 I/O

5.1. ObjectC 100 I/O overview

The extension PCB of the ObjectC 100 I/O offers four additional output signals and a *teach-in* function. The outputs can be allocated to certain zones or single beams of the light curtain.

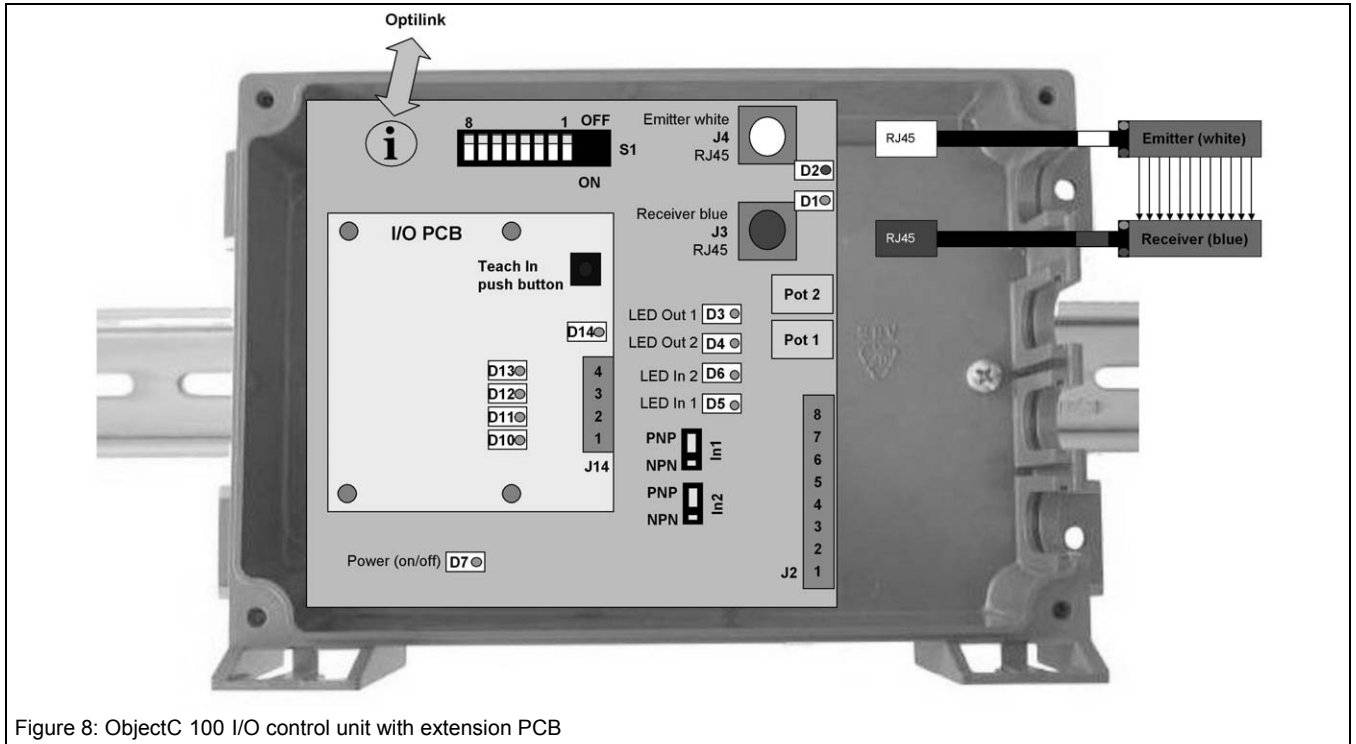


Figure 8: ObjectC 100 I/O control unit with extension PCB

5.2. ObjectC 100 I/O connection terminal

The allocation of the main connector J2, is described in the table below.

Table 10: Connector J2

Pin	Signal	Description	Remarks
1	0 VDC	Power	
2	+24 VDC	Power	
3	Earth	Earth (see important notice chapter 8.2)	
4	-	-	
5	In 2	Trigger and Hold	DIP switch S1 (7) = 0 See chapter 5.11 PG*
		Overhang back sensor 2)	DIP switch S1 (7) = 1
6	In 1	Not used	DIP switch S1 (7) = 0
		Overhang front sensor 2)	DIP switch S1 (7) = 1
7	Out 2	Overheight	0V = overheight
8	Out 1	Overhang	0V = overhang

* PG = Programmer's Guide manual (CEDES part no. 105 828)

Note:

- 1) When the overheight beam "oh" is configured to 1 (as it is in the default configuration), the output signal Out 2 (Overheight) may be used to signal a light curtain interruption.
- 2) Overhang function see chapter 4.10 in Programmer's Guide.

Table 11: Connector J14

Pin	Signal	0 V	24 V	Remarks
1	Out 3	Zone Z1 interrupted	Zone Z1 not interrupted	
2	Out 4	Zone Z2 interrupted	Zone Z2 not interrupted	
3	Out 5	Zone Z3 interrupted	Zone Z3 not interrupted	
4	Out 6	Zone Z4 interrupted	Zone Z4 not interrupted	

5.3. ObjectC 100 I/O LED indicators

LED indicators can be found on the controller main PCB, the controller extension PCB and in the light curtains. This chapter describes the LEDs on the control unit extension PCB.

The locations of the LEDs are shown in Figure 8. LEDs D10 to D14 have the following meanings.

Table 12: LED indicators on I/O extension board



LED	Description	Color	Meaning
D10	Zone 1	Off	Out 3 = OFF (0 V)
		Green	Out 3 = ON (24 V)
D11	Zone 2	Off	Out 4 = OFF (0 V)
		Green	Out 4 = ON (24 V)
D12	Zone 3	Off	Out 5 = OFF (0 V)
		Green	Out 5 = ON (24 V)
D13	Zone 4	Off	Out 6 = OFF (0 V)
		Green	Out 6 = ON (24 V)
D14	Teachin	Off	Teach-in inactive
		Flashing	Teach-in active
		Orange	Last teach-in step

Note: Depending on the configuration the output logic may be inverted. The default delivery condition is shown in Table 12.

5.5. ObjectC 100 I/O teach-in

The *teach-in* function is a very helpful tool to configure the parameters for overhang, overheight, zone monitoring, and blanked beams (see figure 10 in Programmer’s Guide). This allows the user to easily configure the ObjectC 100 I/O system for various functions, as described in chapter 4 of the Programmer’s Guide. This process can only be performed with the ObjectC 100 I/O controller using the *teach-in* button on the extension module (see Figure 8). The LEDs on the extension board show the state of progress and Figure 10 guides you through the *teach-in* procedure.

Legend

 Press and hold *teach-in* button (approx. 5 s)
  LED off




 Press and release *teach-in* button briefly
  LED on
  LED flashes twice

Figure 9: Legend for *teach-in* procedure (see also Figure 10)

The following steps explain the individual *teach-in* steps shown in Figure 10.

Step 1 Teach-in start

Press the *teach-in* button until LED D14 indicates that the *teach-in* mode is active (flashing once approx. every 3 s). Continue to step 2.

5.4. ObjectC 100 I/O DIP switch

The DIP switches on the main board (S1) have many functions. DIP switches S1 1-6, are used for special applications. Therefore if no information is otherwise provided, make sure that these DIP switches remain OFF. DIP switch 7 is used to configure the overhang mode (see chapter 4.10 in Programmer’s Guide) and DIP switch 8 is used to reset the default configuration (see chapter 8.4.2). Once changed, DIP switch settings will only be acknowledged after a power-up.

Table 13: DIP switch S1 settings

Function	DIP switch S1 (0: OFF, 1: ON, X: not relevant)							
	8	7	6	5	4	3	2	1
Default setting	0	0	0	0	0	0	0	0
Standard beam counting direction ¹⁾	0	X	0	X	0	0	0	0
Reverse beam counting direction ¹⁾	0	X	1	X	0	0	0	0
Overhang monitoring with time delay ²⁾	0	0	X	X	0	0	0	0
Overhang monitoring with trigger sensor ³⁾	0	1	X	X	0	0	0	0
Set default	1	X	X	X	X	X	X	X

- 1) See chapter 4.2 in Programmer’s Guide manual
- 2) See chapter 4.10.1 in Programmer’s Guide manual
- 3) See chapter 4.10.2 in Programmer’s Guide manual

Step 2 Blanked beams

Make sure that the light curtain is mounted as it will be used in the application. This is necessary because any blocked beams (only the first and/or last beams) will be detected in this step. At the end of this step one active light curtain area will be defined.

Briefly press the *teach-in* button again. The LED D14 now flashes twice approx. every 3 seconds, indicating that any interrupted beams have now been recognized.

It is important to know if an object interrupts beam 1, the highest interrupted beam by this object is set as the "fb_offset" (first beam offset).

The next (or first) interrupted beam is set as "lb_offset" (last beam offset).

In the operation, beam 1 to "fb_offset" and the beams from "lb_offset" to the last beam will be ignored (blanked). Continue to step 3.

Step 3 Carrier zone

Place the carrier (e.g. pallet) in the light curtain. Briefly press the *teach-in* button again. The LED D14 now flashes 3 times approximately every 3 seconds, indicating that all beams interrupted by the carrier have now been recognized. The highest of these beams is set as the "zc" beam (top beam carrier zone). At the conclusion of this *teach-in* process all beams between the "fb_offset" and the "zc" beam (inclusive) will be defined as the carrier zone. See figure 10 in Programmer's Guide. Continue to step 4.

Step 4 Overheight

Place the highest object allowed in the light curtain. Then briefly press the *teach-in* button again. The LED D14 now remains on, indicating that the highest allowed object beam has now been set. The next not interrupted beam will be set as the "oh" beam. At the conclusion of this *teach-in* process if any beam starting with "oh" and higher is interrupted, the overheight output (see Table 10) will be activated. Continue to step 5.

Step 5 Branching

At this step a decision must be made, will 4 zones also be taught-in, or is the *teach-in* process finished? If the user is interested in setting the four zones, then press the *teach-in* button briefly, and go to step 7. If no further settings are desired go to step 6.

Step 6 Quitting teach-in mode

Press the *teach-in* button until LED D14 extinguishes (approx. 5 s). This will indicate that the *teach-in* mode is finished. The previously taught-in parameters will be stored permanently in the ObjectC 100 memory.

Step 7 Zone 1

LED D10 and D14 blink, indicating that zone 1 is ready to be taught-in. Place an object, which represents the size for zone 1, into the light curtain. When you now press the *teach-in* button the highest and lowest interrupted beams, which define zone 1, will be recognized. Continue to step 8.

Step 8 Zone 2

LED D11 and D14 blink, indicating that zone 2 may now be taught-in. Similar to step 7, place an object into the light curtain which represents the size for zone 2, and press the *teach-in* button again. Continue to step 9.

Step 9 Zone 3

LED D12 and D14 blink, indicating that zone 3 may now be taught-in. Similar to step 7, place an object into the light curtain which represents the size for zone 3, and press the *teach-in* button again. Continue to step 10.

Step 10 Zone 4

LED D13 and D14 blink, indicating that zone 4 may now be taught-in. Similar to step 7, place an object into the light curtain which represents the size for zone 4, and press the *teach-in* button again. The LED D14 now remains on, acknowledging that all zone parameter information has been temporarily stored in memory. Continue to step 11.

Step 11 End

To save all of the above teach-in parameters press the *teach-in* button until LED D14 extinguishes (approx. 5 s). If it is desired to stop the *teach-in* process without saving the above taught-in parameters (thereby keeping the previously stored values), press briefly the *teach-in* button. In any case when the LED D14 is extinguished the *teach-in* procedure is finished. Test your application.

- Hint**
- Instead of actually putting objects into the light curtain monitoring area, the corresponding light beams may be interrupted by other means (e.g. metal flag).
 - Turning the power off / on at any time during the *teach-in* process, cancels the *teach-in* process. The previously stored values remain valid.
 - By pressing shortly the *teach-in* button repeatedly until the *teach-in* end is reached, the previous stored values remain valid.
 - Default parameters can be reset with DIP switch S1 (8). See chapter 8.4.2, and 5.6.

- Note**
- As measuring tolerance, the pitch and the aperture width has to be considered (see chapter 4.5 in Programmer's Guide)
 - Applications like measuring of transport goods heights on pallets requires non-overlapping zones (e.g. zone 1 = beam 1-20, zone 2 = beam 21-40 etc.).

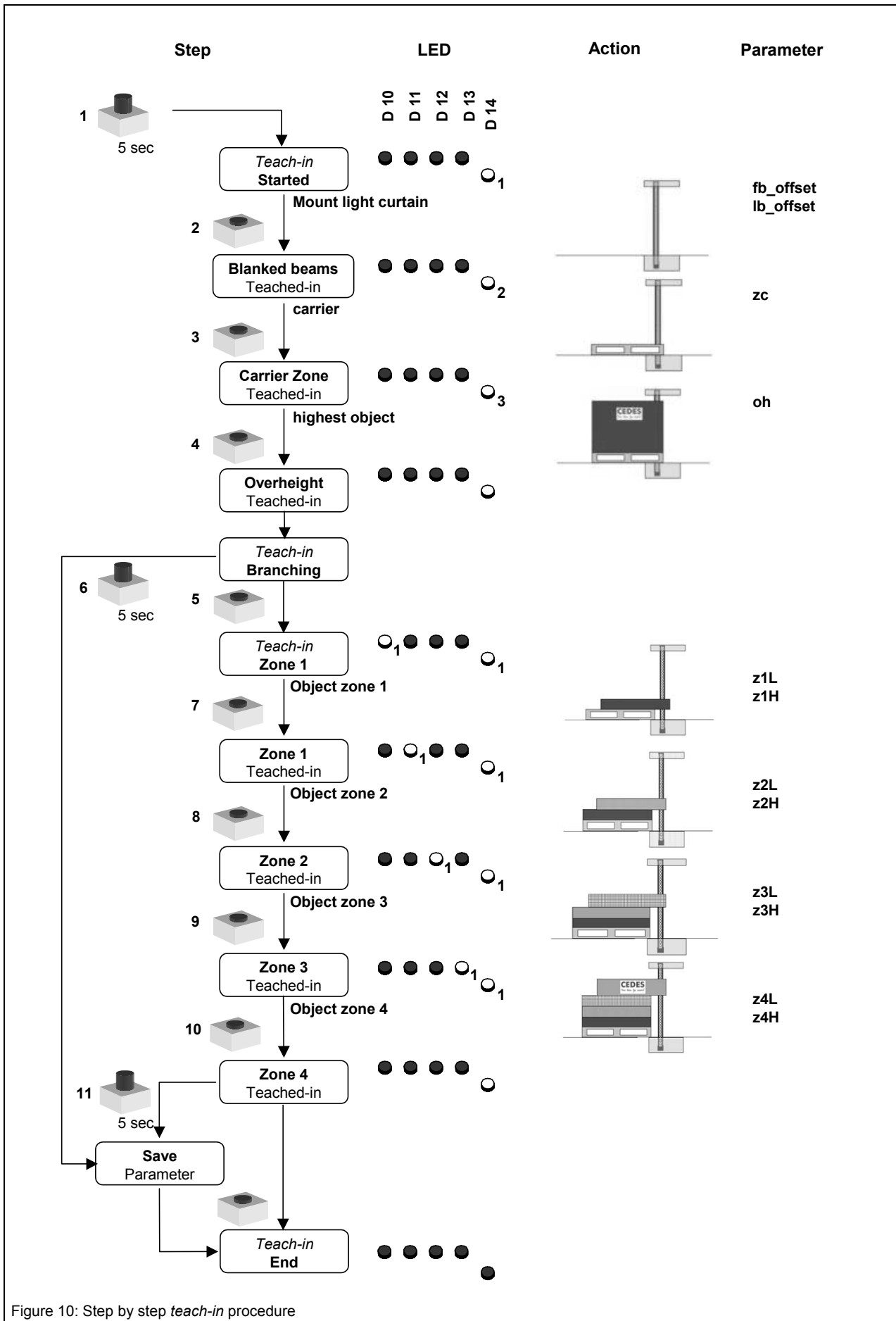


Figure 10: Step by step teach-in procedure

5.6. ObjectC 100 I/O default values

When shipped the ObjectC 100 contains the default parameter values shown in Table 14. When using the *teach-in* procedure, these parameter values will be changed to suit the respective application. At any time the original default values may be reset with DIP switch S1 (8). See chapter 8.4.2.

Table 14: ObjectC 100 default parameters

Parameter		Default value (beam no.)
zc	Carrier zone	1
oh	Overheight	1
z1L	Zone 1 Lowest beam	1
z1H	Zone 1 Highest beam	$n/4$
z2L	Zone 2 Lowest beam	$z1H+1$
z2H	Zone 2 Highest beam	$2n/4$
z3L	Zone 3 Lowest beam	$z2H+1$
z3H	Zone 3 Highest beam	$3n/4$
z4L	Zone 4 Lowest beam	$z3H+1$
z4H	Zone 4 Highest beam	n

n = total number of elements of the light curtain

6. ObjectC 100 CAN

6.1. ObjectC 100 CAN overview

The control unit is equipped with a CAN interface. The terminals, LEDs and the DIP switches are shown in Figure 11.

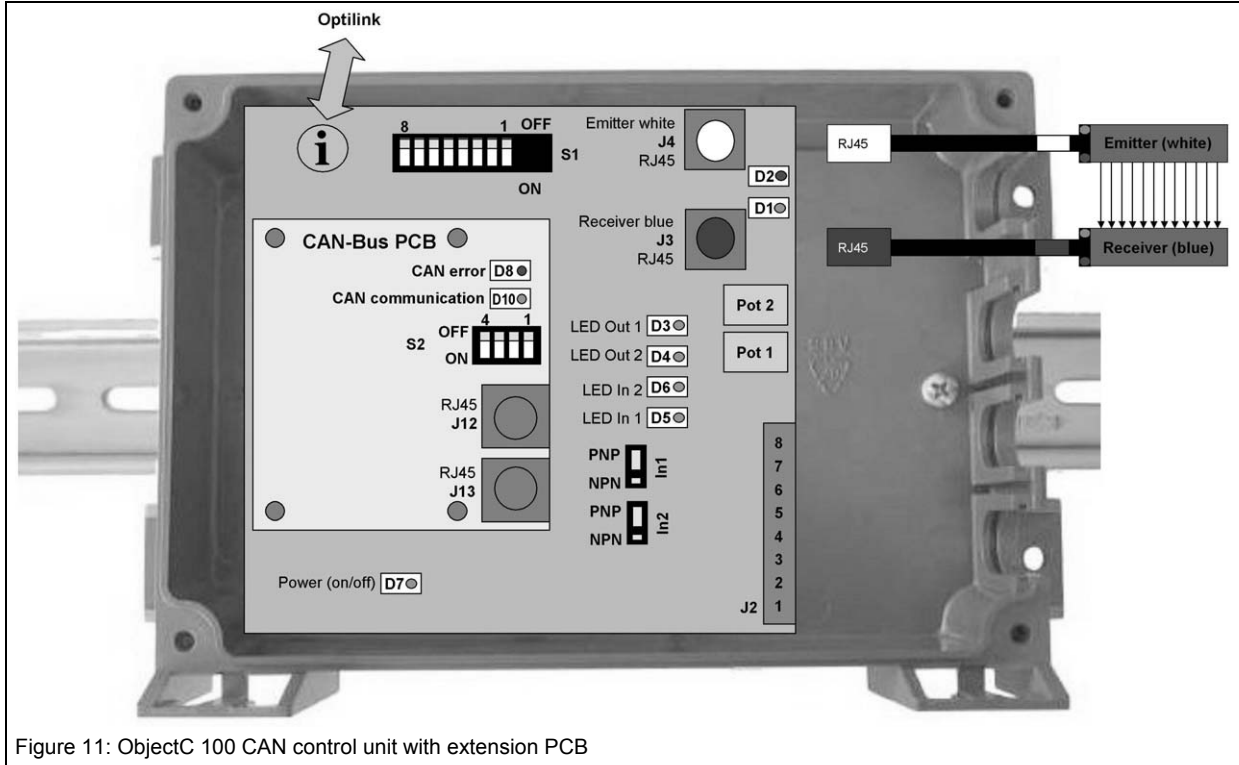


Figure 11: ObjectC 100 CAN control unit with extension PCB

6.2. ObjectC 100 CAN connection terminal

The extension board is equipped with two RJ45 connectors J12 and J13 for the CAN interface. Table 16 shows the pin assignment.

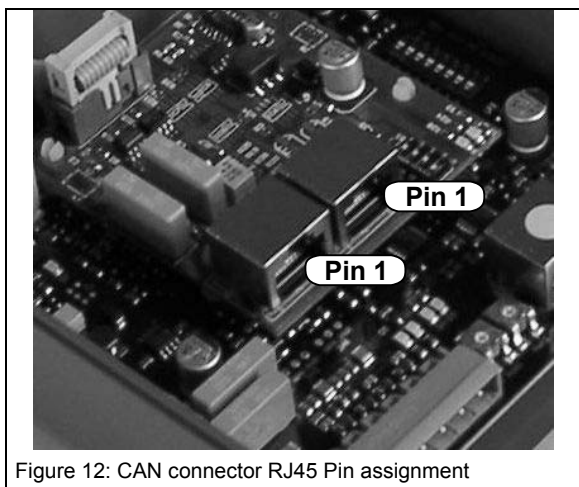


Figure 12: CAN connector RJ45 Pin assignment

Table 15: Connector J2

Pin	Signal	Description	Remarks
1	0 VDC	Power	
2	+24 VDC	Power	
3	Earth	Earth (see important notice chapter 8.2)	
4	-	-	
5	In 2	Trigger and Hold	See chapter 5.11 PG*
6	In 1	Not used	
7	Out 2	Overheight	0V = overheight
8	Out 1	Overhang	0V = overhang

*PG = Programmer's Guide manual

Table 16: CAN Standard RJ45 Connection J12 and J13

Pin	Signal
1	CAN H
2	CAN L
3	0V (GND)
4	Not used
5	Not used
6	Shield
7	0 V (GND)
8	CAN V+

To connect the CAN controllers in a network ObjectC 100 CAN offers two connectors (J12 and J13). The individual pins from J12 and J13 are connected to each other in series (see Figure 13) and are absolutely identical. Two CAN cables can be connected to the two plugs separately, or connected to just one plug, the result would be the same.

The CAN module is powered internally. The CAN power supply (connector J12 and 13, Pin 7 and 8) is not used, but connected in series (Figure 13).

Note: Use twisted pair and shielded cables for CAN connections!

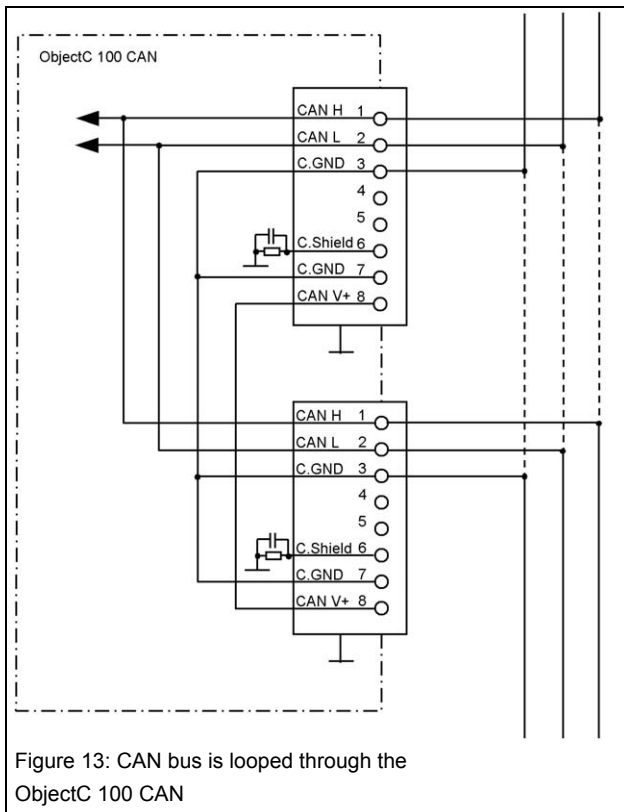


Figure 13: CAN bus is looped through the ObjectC 100 CAN

6.3. ObjectC 100 CAN LED

LED elements can be found on the controller main PCB, the controller extension PCB and in the light curtains. Refer to chapter 4.3 for LEDs on the main PCB. Table 17 describes the meanings of LEDs D8 and D10 on the CAN extension PCB.

Table 17: CAN module LEDs

LED	Description	Color	Meaning
D8	CAN error	Off	No CAN error
		Red	CAN error - invalid message
D10	CAN communication	Off	No communication
		Green flashing	ObjectC 100 is sending

6.4. ObjectC 100 CAN DIP switch settings

The following tables show the settings for the DIP switches for the CAN application.

DIP Switch S2 (1-4) sets the address offset. It effects all basic addresses from the CAN standard mode and extended CAN mode.

⚠ Important notice:

A change of the DIP switch settings is only acknowledged after a power-up.

Table 18: DIP switch S1 setting

Function	DIP switch S1	8	7	6	5	4	3	2	1
		Default	D	0	0	0	0	0	0
Offset to address: 0 (00 Hex)	D	0	X	X	X	0	0	0	0
Offset to address: 1 (01 Hex)		0	X	X	X	0	0	0	1
Offset to address: 2 (02 Hex)		0	X	X	X	0	0	1	0
Offset to address: 3 (03 Hex)		0	X	X	X	0	0	1	1
Offset to address: 4 (04 Hex)		0	X	X	X	0	1	0	0
Offset to address: 5 (05 Hex)		0	X	X	X	0	1	0	1
Offset to address: 6 (06 Hex)		0	X	X	X	0	1	1	0
Offset to address: 7 (07 Hex)		0	X	X	X	0	1	1	1
Offset to address: 8 (08 Hex)		0	X	X	X	1	0	0	0
Offset to address: 9 (09 Hex)		0	X	X	X	1	0	0	1
Offset to address: 10 (0A Hex)		0	X	X	X	1	0	1	0
Offset to address: 11 (0B Hex)		0	X	X	X	1	0	1	1
Offset to address: 12 (0C Hex)		0	X	X	X	1	1	0	0
Offset to address: 13 (0D Hex)		0	X	X	X	1	1	0	1
Offset to address: 14 (0E Hex)		0	X	X	X	1	1	1	0
Offset to address: 15 (0F Hex)		0	X	X	X	1	1	1	1
Baud rate CAN: 125k	D	0	X	0	0	X	X	X	X
Baud rate CAN: 250k		0	X	0	1	X	X	X	X
Baud rate CAN: 500k		0	X	1	0	X	X	X	X
Baud rate CAN: 1M		0	X	1	1	X	X	X	X
Standard CAN mode	D	0	0	X	X	X	X	X	X
Extended CAN mode		0	1	X	X	X	X	X	X
Set default configuration		1	X	X	X	X	X	X	X

(0: OFF, 1: ON, X: not relevant)

Table 19: DIP switch S2 settings (extension board)

Function	DIP switch S2			
	4	3	2	1
Default	0	0	0	0
Terminating resistor (135 Ω) OFF	X	X	X	0
Terminating resistor (135 Ω) ON	X	X	X	1

(0: OFF, 1: ON, X: not relevant), DIP 2-4 not used

7. ObjectC 100 RS485

7.1. ObjectC 100 RS485 overview

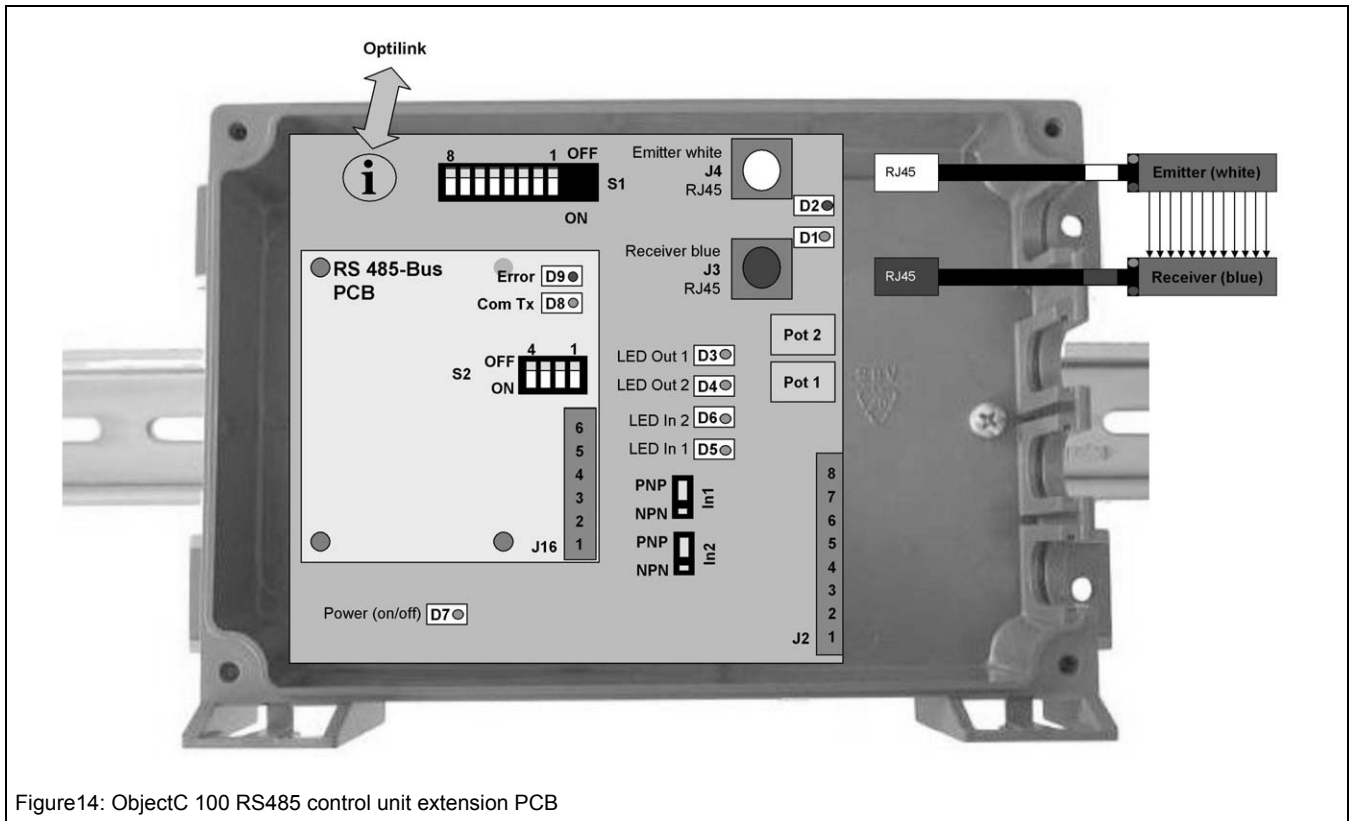


Figure14: ObjectC 100 RS485 control unit extension PCB

7.2. ObjectC 100 RS485 connection terminal

Table 20: Connector J2

Pin	Signal	Description	Remarks
1	0 VDC	Power	
2	+24 VDC	Power	
3	Earth	Earth (see important notice chapter 8.2)	
4	-	-	
5	In 2	Trigger and Hold	See chapter 5.11 PG*
6	In 1	Not used	
7	Out 2	Overheight (0 V)	
8	Out 1	Overhang (0 V)	

*PG = Programmer's Guide

The RS485 communication is done over the connector J16, located on the extension PCB.

Note: Use twisted pair and shielded cables for RS485 connections!

Table 21: RS485 Connector J16

Pin	2-wire	4-wire
1	0 V	0 V
2	-	Rx+
3	Shielding	Shielding
4	-	Rx-
5	B	Tx+
6	A	Tx-

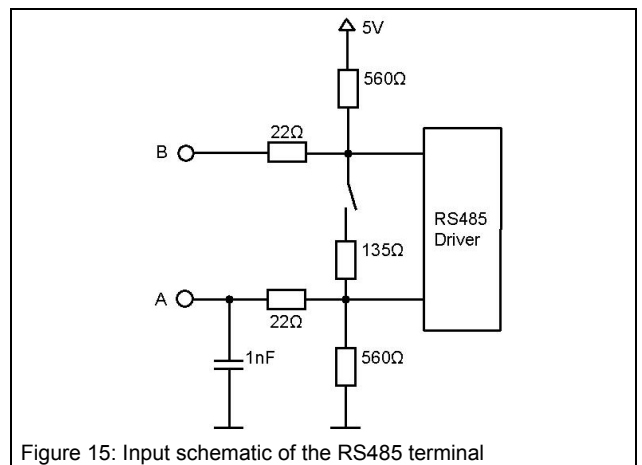


Figure 15: Input schematic of the RS485 terminal

7.3. ObjectC 100 RS485 LED indicators

LED indicators can be found on the controller main PCB, the controller extension PCB and in the light curtains. Refer to chapter 4.3 for the meanings of the LEDs.

The locations of LEDs D1 to D7 on the controller main PCB are shown in Figure 4. The LEDs D8 and D9 on the extension PCB, have the following meaning:

Table 22: LED indicators on RS485 extension PCB

LED	Description	Color	Meaning
D8	Data Communication	Off	No data communication
		Green flashing	Communication active
D9	RS485 error	Off	No RS485 error
		Red	RS485 error

7.4. ObjectC 100 RS485 DIP switch settings

The settings are acknowledged after power-up.

Table 23: DIP switch S1 settings on the ObjectC 100 main PCB

Function		DIP switch S1 (0: OFF, 1: ON, X: not relevant)							
		8	7	6	5	4	3	2	1
Default	D	0	0	0	0	0	0	0	0
Offset to address: 0 (00 Hex)	D	X	X	X	X	0	0	0	0
Offset to address: 1 (01 Hex)		X	X	X	X	0	0	0	1
Offset to address: 2 (02 Hex)		X	X	X	X	0	0	1	0
Offset to address: 3 (03 Hex)		X	X	X	X	0	0	1	1
Offset to address: 4 (04 Hex)		X	X	X	X	0	1	0	0
Offset to address: 5 (05 Hex)		X	X	X	X	0	1	0	1
Offset to address: 6 (06 Hex)		X	X	X	X	0	1	1	0
Offset to address: 7 (07 Hex)		X	X	X	X	0	1	1	1
Offset to address: 8 (08 Hex)		X	X	X	X	1	0	0	0
Offset to address: 9 (09 Hex)		X	X	X	X	1	0	0	1
Offset to address: 10 (0A Hex)		X	X	X	X	1	0	1	0
Offset to address: 11 (0B Hex)		X	X	X	X	1	0	1	1
Offset to address: 12 (0C Hex)		X	X	X	X	1	1	0	0
Offset to address: 13 (0D Hex)		X	X	X	X	1	1	0	1
Offset to address: 14 (0E Hex)		X	X	X	X	1	1	1	0
Offset to address: 15 (0F Hex)		X	X	X	X	1	1	1	1
Baud rate 19'200 Baud	D	X	X	0	0	X	X	X	X
Baud rate 2'400 Baud		X	X	0	1	X	X	X	X
Baud rate 9'600 Baud		X	X	1	0	X	X	X	X
Baud rate 57'600 Baud		X	X	1	1	X	X	X	X
Set default		1	X	X	X	X	X	X	X

D = Default setting

Table 24: DIP switch S2 settings for 2-wire (Default) / 4-wire communication

Function	DIP switch S2			
	4	3	2	1
Default	0	1	0	0
Terminating resistor (135 Ω) OFF	X	X	X	0
Terminating resistor (135 Ω) ON	X	X	X	1
Terminating resistor 4-wire OFF	X	X	0	0
Terminating resistor 4-wire ON	X	X	1	1
Rx 2-wire	0	1	0	X
Rx 4-wire	1	0	X	X

(0: OFF, 1: ON, X: not relevant)

8. Installation and Commissioning

⚠ Protect control unit from ESD

with proper grounding or shunting and the use of static control packaging and materials handling products.

Dissipate and neutralize by grounding, ionization, and the use of conductive and dissipative static control materials.

8.1. Mounting

A reliable operation is possible in any mounting orientation. During the initial operation of all controller types the following points must be adhered to:

- Mount the controller on a DIN rail or use screws with the mounting holes on the underside or side of the housing.
- In order to reduce the influences of electromagnetic disturbances, care should also be taken to ensure that the connecting cables, and the light curtain cables, are not lying next to the high power or high frequency circuit cables.

Quick and user-friendly connection is performed with the plug-in terminal blocks. A simple connection of the individual wires is also possible.

8.2. Earth protection

The ground connection of the ObjectC 100 / Object100 systems can be made either over the light curtains themselves or the controller. If the system is grounded at both the light curtain and the controller, there is a danger of ground loops! For this reason we recommend not making the ground connection on the controller at first. If the light curtain is not grounded, then a ground connection to the controller is strongly recommended.

In individual cases, grounding the controller (connecting to earth) can ultimately reduce disturbances in the system caused by EMC.

8.3. Connecting

The connection of the light curtains to the controller is only possible with the RJ45 Mini-DIN cable (2, 3, 5 or 8 meter) supplied by CEDES. For longer lengths, CEDES supplies 1 and 3 m extension cables. The cable lengths for the emitter (white marking) respectively receiver (blue marking) may be 10 m maximum. Different cable lengths for the emitter and receiver portions have no negative influence on the function of this system.

The cables have to be mounted using the grommet to obtain the IP54 protection class.

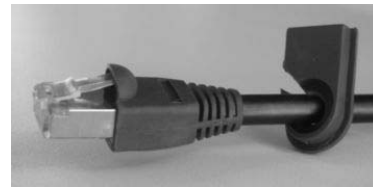


Figure 16: Grommet fixed to the cable

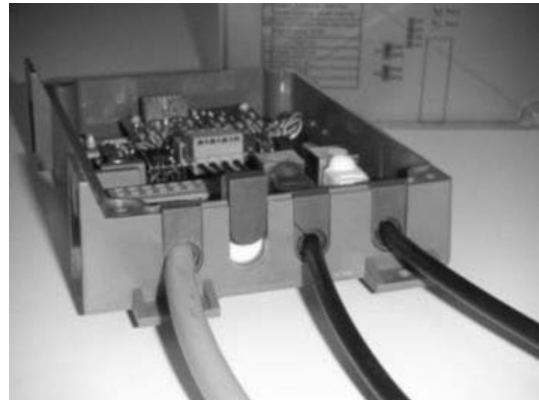


Figure 17: Grommets used on cables as they enter the ObjectC 100 housing

The light curtains may be connected after the controller has been powered-up without anything becoming damaged. However in such a case the controller must be powered-up again, in order for the communication to be transmitted properly.

- Connect the Object100 emitter to J4 (RJ45 - white)
- Connect the Object100 receiver to J3 (RJ45 - blue)
- Select the cable lengths to the light curtain, not longer than 10 m
- Do not pinch or mechanically stress the cables
- Connect earth protection to J2 (see note chapter 8.2)
- Connect the necessary control signals to In 1, and In 2, Out 1, Out 2 on the main PCB (connector J2)
- Connect the necessary signals to the extension PCB:
 - I/O: Connector J14 (chapter 5.2)
 - CAN: Connector J12 and J13 (chapter 6.2)
 - RS485: Connector J16 (chapter 7.2)
- Connect supply voltage +24 VDC to connector J2.

8.4. Parameter Settings

The procedure below guides you through the setting up of all the parameters. Included are DIP switch, jumper and potentiometer settings. The functionality is described in the preceding chapters.

8.4.1. Jumper settings

Table 25: Input settings

Index	Parameter	Setting	Default	See
1	Input Logic	Jumper In1 and In2	PNP	Chapter 4.5

8.4.2. Default parameter settings

All controllers are shipped with default parameter values. With the *teach-in* function it is possible to change these values in the ObjectC 100 I/O controller. Via software it is possible to change the parameter values in the ObjectC 100 CAN and ObjectC 100 RS485 controllers. The default values may be reset at anytime with the following procedure:

- Set DIP switch S1 (8) to "ON"
- Switch power off and on
- Set DIP switch S1 (8) to "OFF"

8.4.2.1 ObjectC 100 I/O settings

Table 26: Parameter settings

Index	Parameter	Setting	Default	See
1	Beam counting mode	Configuration Tool (Available > 03/2007)	0 = First beam cable side	Chapter 5.2 PG*
2	Pitch factor		Factor 1	(Only for special applications)
3	Overhang trigger type	DIP switch S1 (7)	0 = Time delay mode	Chapter 5.10 PG*
4	Blanked Beams	<i>Teach-in</i> procedure	No blanked beams	Chapter 5.7 PG*
5	Overheight	<i>Teach-in</i> procedure	1	Chapter 5.9 PG*
6	Overhang carrier zone	<i>Teach-in</i> procedure	1	Figure 11 PG*
7	Zones*	<i>Teach-in</i> procedure	¼ length per zone	Chapter 5.8 PG*

Teach-in procedure, see chapter 5.5

*Typical: One zone \triangleq ¼ length of the light curtain

8.4.2.2 ObjectC 100 CAN settings

Set the termination resistor according to the CAN network architecture. The resistor can be switched on with the DIP switch S2 (1) (see chapter 6.4)

Select baud rate and address offset with DIP switch S1. The parameters listed in Table 27 only have to be set when they differ from default values.

Table 27: Parameter settings

Index	Parameter	Setting	Default	See
1	Beam counting mode	Command 1C (Hex), Par 46	0 = First beam cable side	Chapter 5.2 PG*
2	Pitch factor	Command 1C (Hex), Par 45	1	(Only for special applications)
3	Blanked Beams	Command 1C (Hex), Par 43 and 44	0	Chapter 5.7 PG*
4	Output logic overhang	Command 1C (Hex), Par 24	0 = Active "Low"	
5	Overheight	Command 1C (Hex), Par 25	1	Chapter 5.9 PG*
6	Output logic overheight	Command 1C (Hex), Par 26	0 = Active "Low"	
7	Overhang carrier zone	Command 1C (Hex), Par 23	1	Figure 11 PG*
8	Overhang trigger mode	Command 1C (Hex), Par 49	0 = time delay mode	Chapter 5.10 PG*
9	Delay times	Command 1C (Hex), Par 63, 64 and 65	0	Table 19 PG*

Command 1C (Hex) see chapter 2.3.1.11 PG*

*PG = Programmer's Guide manual

8.4.2.3 ObjectC 100 RS485 settings

Select a 2-wire communication or 4-wire communication according to your network architecture and select baud rate and address offset with DIP switch S1. The termination resistor can be switched on with the DIP switch S2 (1) (see Table 24). The parameters listed in Table 27 only have to be set when they differ from the default values.

8.4.3. Potentiometer settings

For the ObjectC 100 CAN or RS485 controllers the following time duration parameters may be adjusted by potentiometer 1 and 2, however only when parameter 63 is set to '0' (default value).

- Pot 1: Overhang tolerance time Chapter 4.6.1
This parameter is used only in time delay mode.
- Pot 2: Output duration Chapter 4.6.2

9. Accessories

The following replacement parts and services are available:

Table 28: Object 100 / ObjectC 100 and accessories part list

Part No.	Description
104 901	Controller ObjectC 100 CAN
104 913	Controller ObjectC 100 RS485
104 920	Controller ObjectC 100 I/O
104 159 0000	Object100 light curtain, length and pitch according to specification (use Configuration Tool program)
103 510	Connection cable receiver 2 m (blue)
103 511	Connection cable emitter 2 m (white)
103 512	Connection cable receiver 3 m (blue)
103 513	Connection cable emitter 3 m (white)
103 514	Connection cable receiver 5 m (blue)
103 515	Connection cable emitter 5 m (white)
104 967	Connection cable emitter 8 m (white)
104 968	Connection cable receiver 8 m (blue)
103 379	Cable clip for Mini-DIN connection
102 792	1 m extension cable (for emitter or receiver)
102 793	3 m extension cable (for emitter or receiver)
105 828	ObjectC100 Programmer's Guide manual
104 878	Object100 light curtain manual

10. Inspection and Service

The ObjectC 100 controller is built electronically and does not need preventive maintenance.

10.1. Trouble shooting

Table 29

Problem	Reason	Solution
No function, no LED indicators active on controller	No supply voltage	Check the power supply
No LED indicators active on emitter or receiver light curtains	No cable connection to emitter resp. receiver	Control the cable connection to emitter resp. receiver, Possibly replace cables
LED in the light curtain is constantly red although the light curtain is not interrupted	Emitter and receiver misaligned by 180°	Rotate emitter or receiver 180°
	System insufficiently aligned	Correct alignment
	Lens blocked or dirty	Clear or clean optical path
	Defective emitter and/or receiver elements	First remove the emitter and receiver light curtain from the machine and position them face to face with each other. If the LED in the emitter and receiver remain red, then a misalignment can be ruled out. If this is the case replace emitter and/or receiver light curtain. If necessary replace cables.
	Defective controller	Reset values (default), replace controller
LED D2 blinks red (system disturbance)	Emitter and / or receiver light curtain not correctly connected	Are the red LEDs on the emitter and receiver light curtains also blinking? If no, test the light curtain connection. If yes, then it is possible that the emitter and receiver light curtains have been mixed-up.
	Defective emitter or receiver light curtain	First replace the emitter light curtain. If the problem is still present replace the receiver light curtain. If necessary replace cables.
	Defective cable	Check wiring, otherwise replace cable
	Defective controller	Reset values (default), replace controller
LED D1 blinks green (intensity)	Emitter and receiver are poorly aligned	Correct the alignment and repower-up the controller
Incorrect values are transmitted	DIP switch setting does not correspond to the desired pitch	Correct the DIP switch setting
	Incorrect light curtain pitch	Replace light curtain with correct pitch light curtain
	Light curtain cables longer than 10 m	Shorten the cables
	Poor or no ground connection	Improve the ground connection
	Incorrect jumper setting in controller	Correct the jumper setting
	Defective controller	Reset values (default), replace controller
	EMC influences	Check wiring, power supply and grounding
Object not detected	Reflections (shiny surface parallel to light beam)	Eliminate shiny surface (e.g. paint matte black, or roughen surface)
Spontaneous faulty switching	Foreign light sources or other interfering optical sensors	Cover or eliminate foreign light sources
	Poor or no ground connection	Improve the ground connection
	Loose contact	Replace cable, controller and / or light curtain

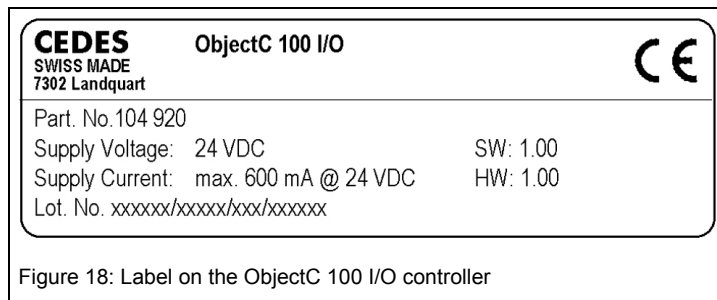
10.2. Decommissioning

The ObjectC 100 controller can be removed when the machine or the equipment is shut down.

If a controller has to be disposed of, it can be simply dismantled. The separated materials can be recycled according to state of the art technology and corresponding regulations of the country it was used in.

11. Technical Data

11.1. Product label



11.2. Measurement speed

When developing the ObjectC 100 / Object100 family of products, special attention was made with regards to a fast measurement speed for the system. The high scan rates ensure that even small objects as well as the height of such objects will be reliably detected.

For example a light curtain with 30 beams will also detect a drill bit with 6 mm diameter, even when it moves through the light curtain with a speed of 1 m/s.

The measurement time (T) can be roughly calculated from the number of beams (n), the scan time per beam (t_s) as well as the analysis time (t_A):

$$T = t_A + n \times t_s$$

For, t_s and t_A the following "rough" values can be assumed:

- n = number of optical beams

Chapter 11.2

	ObjectC 100 IO	ObjectC 100 IO C002 ¹⁾	ObjectC 100 CAN*	ObjectC 100 RS 485*
tA [ms] (± 5 %)	4.8	2.3	3.6	3.6
tS [ms] (± 5 %)	0.255	0.130	0.300	0.300

* Faster response times on request at your nearest CEDES partner.

¹⁾ On request at you nearest CEDES partner

11.3. ObjectC-100 controller data

General data	
Nominal working mode	Continuous
Net weight	400 g
Equipment dimensions	200 x 126 x 48 mm
Mounting position	No restrictions
Temperature range	Operation: 0 ... +55°C (non condensing) Storage / transport: -25 ... +70°C
Enclosure rating according to EN 60629: - Housing - Terminal strip	IP54 IP20
Housing material	ABS (FR) UL94-V0
Conductor connection: 8-pin terminal strip (plug-in)	Wire cross section: 2.5 mm ² (max) 0.08 mm ² (min.) Wire clamped
Quick mounting	DIN rail 35 mm (EN 50022) or mounting holes
Approvals	CE

Weight and packaging	
Dispatch packaging	250 mm x 165 mm x 165 mm
Dispatch weight	Net weight + 250 g

Power supply	
Nominal voltage U _N	24 VDC (EN 60204-1)
with 5 % residual ripple	0.85 ... 1.15 U _N
Current consumption	100 mA typically with 70 beams (semiconductor outputs unloaded), max. 1 A,
Internal fuse	None

Semiconductor outputs	
Voltage	Nominal voltage U _N
Current consumption	Each PNP: max. 150 mA (24 V) Each NPN: max. 150 mA (24 V)
Capacitive load	Max 60 nF
Logic Active "High" Active "Low"	"Low" < 1V, "High" > U _N -1V "Low" = > U _N -1V, "High" < 1V
Minimum output duration (potentiometer Pot 2 or parameter 63 and 64)	t = n x 13.1 ms, n = 0 ... 255 (± 2 % and ± 10 ms)

Semiconductor inputs	
Type	PNP or NPN dependant on jumper J1 and J2 (short circuit proof)
Switching level "Low": - PNP - NPN	0 ... 7 VDC 21 ... 24 VDC
Switching level "High": - PNP - NPN	18 ... 24 VDC 0 ... 20 VDC
Current consumption @24 V: - PNP - NPN	6 mA (24 V) 6 mA (0 V)
Input	Minimal current 3 mA

