

Technical Manual **CSL3**

Feldbus: Modbus RTU

Zur Verwendung mit folgenden Varianten:

CSL3-5, CSL3-24

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1 Introduction

The *CSL3* is a controller for the *closed loop* operation of BLDC motors. *CSL3* supports the velocity and position mode, as well as homing on block.

The operation mode and the target values can be controlled via the four digital inputs, the analog input or the power supply voltage.

There are two variants available, *CSL3-5* und *CSL3-24*, with 5 or 24 V inputs respectively. In addition, the controller is equipped with two digital outputs.

Three Hall sensor inputs are used for recording the motor rotor position feedback and velocity measurement.

The configuration can be done using Modbus RTU with the software *Plug & Drive Studio 3*, via a UART interface with a 3.3 V signal level.

This manual describes the functions of the controller and the available operating modes. It also shows how you can address and program the controller via the communication interface.

You can find further information on the product on us.nanotec.com.

1.1 Version information

Manual version	Date	Changes	Firmware version	Hardware version
1.0.0	06/2021	Edition	v2126	W003
1.1.0	12/2021	New firmware, changes in configuration. See chapter Setting control mode .	v2150	W003

1.2 Copyright, marking and contact

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1.3 Intended use

The *CSL3* serves to control BLDC motors and is used as a component in drive systems in a wide range of industrial applications.

Use the product as intended within the limits defined in the technical data (in particular, see Permissible operating voltage) and the approved Environmental conditions.

Under no circumstances may this Nanotec product be integrated as a safety component in a product or system. All products containing a component manufactured by Nanotec must, upon delivery to the end user, be provided with corresponding warning notices and instructions for safe use and safe operation. All warning notices provided by Nanotec must be passed on directly to the end user.

1.4 Target group and qualification

The product and this documentation are directed towards technically trained specialists staff such as:

- Development engineers
- Plant engineers
- Installers/service personnel
- Application engineers

Only specialists may install, program and commission the product. Specialist staff are persons who

- have appropriate training and experience in working with motors and their control,
- are familiar with and understand the content of this technical manual,
- know the applicable regulations.

1.5 Warranty and disclaimer

Nanotec assumes no liability for damages and malfunctions resulting from installation errors, failure to observe this manual or improper repairs. The selection and use of Nanotec products is the responsibility of the plant engineer or end user. Nanotec accepts no responsibility for the integration of the product in the end system.

Our general terms and conditions at www.nanotec.com apply.



NOTICE

Changes or modifications to the product are not permitted.

1.6 EU directives for product safety

The following EU directives were observed:

- RoHS directive (2011/65/EU, 2015/863/EU)

1.7 Other applicable regulations

In addition to this technical manual, the following regulations are to be observed:

- Accident-prevention regulations
- Local regulations on occupational safety

1.8 Used icons

All notices are in the same format. The degree of the hazard is divided into the following classes.

CAUTION



The CAUTION notice indicates a possibly dangerous situation.

Failure to observe the notice **may** result in moderately severe injuries.

- ▶ Describes how you can avoid the dangerous situation.

NOTICE



Indicates a possible incorrect operation of the product.

Failure to observe the notice may result in damage to this or other products.

► Describes how you can avoid the incorrect operation.



TIP

Shows a tip for the application or task.

1.9 Emphasis in the text

The following conventions are used in the document:

Underlined text indicates cross references and hyperlinks:

- The following bits in object `6041h` (statusword) have a special function:

Text set in *italics* marks named objects:

- Read the *installation manual*.
- Use the *Plug & Drive Studio* software to perform the auto setup.
- For software: You can find the corresponding information in the *Operation* tab.
- For hardware: Use the *ON/OFF* switch to switch the device on.

A text set in `Courier` marks a code section or programming command:

- The line with the `od_write(0x6040, 0x00, 5);` command has no effect.
- The NMT message is structured as follows: `000 | 81 2A`

A text in "quotation marks" marks user input:

- Start the NanoJ program by writing object `2300h`, bit 0 = "1".
- If a holding torque is already needed in this state, the value "1" must be written in `3212h:01h`.

1.10 Numerical values

Numerical values are generally specified in decimal notation. The use of hexadecimal notation is indicated by a subscript *h* at the end of the number.

The objects in the object dictionary are written with index and subindex as follows: `<Index>:<Subindex>`

Both the index as well as the subindex are specified in hexadecimal notation. If no subindex is listed, the subindex is `00h`.

Example: Subindex 5 of object `1003h` is addressed with `1003h:05h`, subindex 00 of object `6040h` with `6040h`.

1.11 Bits

The numbering of individual bits in an object always begins with the LSB (bit number 0). See the following figure, which uses data type `UNSIGNED8` as an example.

	MSB							LSB	
Bit Number	7	6	5	4	3	2	1	0	
Bits	0	1	0	1	0	1	0	1	≙ 55 _{hex} ≙ 85 _{dec}

2 Safety and warning notices

NOTICE



- Damage to the controller.
- Changing the wiring during operation may damage the controller.
- Only change the wiring in a de-energized state. After switching off, wait until the capacitors have discharged.

NOTICE



Fault of the controller due to excitation voltage of the motor!

Voltage peaks during operation may damage the controller.

- ▶ Install suitable circuits (e.g., charging capacitor) that reduce voltage peaks.

NOTICE



Damage to the electronics through improper handling of ESD-sensitive components!

The device contains components that are sensitive to electrostatic discharge. Improper handling can damage the device.

- ▶ Observe the basic principles of ESD protection when handling the device.

NOTICE



- There is no polarity reversal protection.
- Polarity reversal results in a short-circuit between supply voltage and GND (earth) via the power diode.
- Install a line protection device (fuse) in the supply line.

3 Technical details and pin assignment

3.1 Environmental conditions

Environmental condition	Value
Protection class	No IP protection
Ambient temperature (operation)	-10 ... +40°C
Air humidity (non-condensing)	0 ...95 %
Altitude of site above <i>sea level</i> (without drop in performance)	1500 m
Ambient temperature (storage)	-25 ... +85°C

3.2 Overtemperature protection

Above a temperature of approx. 90°C on the power board, the power part of the controller switches off and the error bit is set in the [1001h Error Register](#). After cooling down to approx. 75°C and resetting the error via bit 8 in [6040h Control Word](#) or powering on/off, the controller functions again normally.

The controller was tested and can perform under following conditions:

Temperature	Current	Operation time
40°C	3 A (rated)	continuous
40°C	6 A	5 minutes
40°C	9 A (peak)	5 seconds
50°C	3 A (rated)	continuous
60°C	2 A (derated)	continuous
70°C	1 A (derated)	continuous

NOTICE



Aside from the motor, the exact temperature behavior is also dependent on the flange connection and the heat transfer there as well as on the convection in the application. For this reason, we recommend always performing an endurance test in the actual environment for applications in which current level and ambient temperature pose a problem.

3.3 Dimensioned drawing

All dimensions are in millimeters.

3.4 Electrical properties and technical data

Property	Description / value
Operating voltage	10 ... 30 V DC
Rated current	3 A _{rms}
Peak current	9 A _{rms} for max. 5 seconds
Commutation	BLDC motor closed-loop with Hall sensor
Operating modes	<i>Velocity Mode, Position Mode, Homing on Block</i>
Set value setting	Via the <i>supply voltage</i> , the <i>digital inputs</i> or the <i>analog input</i>
Interfaces	UART 3.3 V
Inputs	<ul style="list-style-type: none"> ■ 4 digital inputs: <ul style="list-style-type: none"> □ 5 V for the CSL3-5 variant □ 24 V for the CSL3-24 variant ■ 1 analog input, 12-bit resolution, 0-10 V
Outputs	2 digital outputs, high-side switch (output voltage corresponds to the supply voltage)
Protection circuit	<p>Overvoltage and undervoltage protection</p> <p>Overtemperature protection (> 90° Celsius on the power board)</p> <p>Polarity reversal protection: no polarity reversal protection, a line protection device (fuse) is therefore necessary in the supply line. The values of the fuse are dependent on the application and must be dimensioned</p> <ul style="list-style-type: none"> ■ greater than the maximum current consumption of the controller ■ less than the maximum current of the voltage supply. <p>If the fuse value is very close to the maximum current consumption of the controller, a medium / slow tripping characteristics should be used.</p>

3.5 Pin assignment

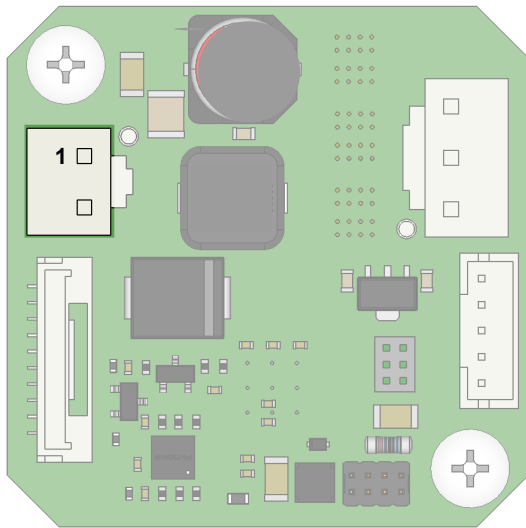
3.5.1 X1 — voltage supply

Connection for the main supply

Type: JST B2P-VH

Suitable Nanotec cable: ZK-VHR-2-500 (not included in the scope of delivery)

In the following figure, pin 1 is marked with a "1".



3.5.1.1 Voltage source

The operating or supply voltage supplies a battery, a transformer with rectification and filtering, or a switching power supply.

NOTICE

EMC: For a DC power supply line longer than 30 m or when using the motor on a DC bus, additional interference-suppression and protection measures are necessary.



- ▶ An EMI filter is to be inserted in the DC supply line as close as possible to the controller/motor.
- ▶ Long data or supply lines are to be routed through ferrites.
- ▶ A capacitor of at least 4700 μF is to be connected to the supply voltage (parallel) as close to the controller as possible.

3.5.1.2 Pin assignment

Pin	Function	Note
1	+Ub	10 ... 30 V DC
2	GND	

3.5.1.3 Permissible operating voltage

The maximum operating voltage is 30 V DC. If the input voltage of the controller exceeds the threshold value set in 2034_h, the motor is switched off and an error triggered.

The minimum operating voltage is 10 V DC. If the input voltage of the controller falls below 8 V, the motor is switched off and an error triggered.

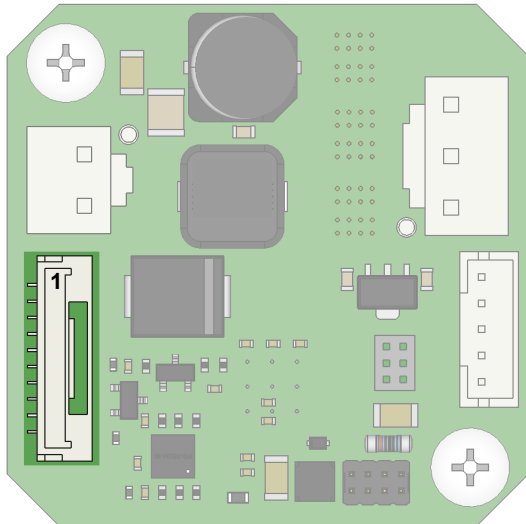
A charging capacitor of at least 4700 μF / 50 V (approx. 1000 μF per ampere rated current) must be connected in parallel to the supply voltage to avoid exceeding the permissible operating voltage (e.g., during braking).

3.5.2 X2 – inputs and outputs, communication

Type: JST BM10B-GHS-TBT

Suitable Nanotec cable: ZK-GHR10-500-S-COM (not included in the scope of delivery), for the converter ZK-RS232-USB-1.

In the following figure, pin 1 is marked with a "1".



Pin	Function	Note
1	Digital input 1	Max. 1 KHz
2	Digital input 2	Max. 1 KHz
3	Digital input 3	Max. 1 KHz
4	Digital input 4	Max. 1 KHz
5	Digital output 1	Positive switching (<i>High-Side-Switch</i>), the output voltage corresponds to the supply voltage Max. 50 mA / 1 KHz
6	Digital output 2	Positive switching (<i>High-Side-Switch</i>), the output voltage corresponds to the supply voltage Max. 50 mA / 1 KHz
7	Analog input 1	12 bit, 0-10 V
8	UART Tx	3.3 V UART
9	UART Rx	3.3 V UART
10	GND	

For the digital inputs of the variant CSL3-5, the following switching thresholds apply:

Max. Voltage	Switching thresholds	
	On	Off
5 V	> 2 V	< 0.8 V

For the digital inputs of the variant CSL3-24, the following switching thresholds apply:

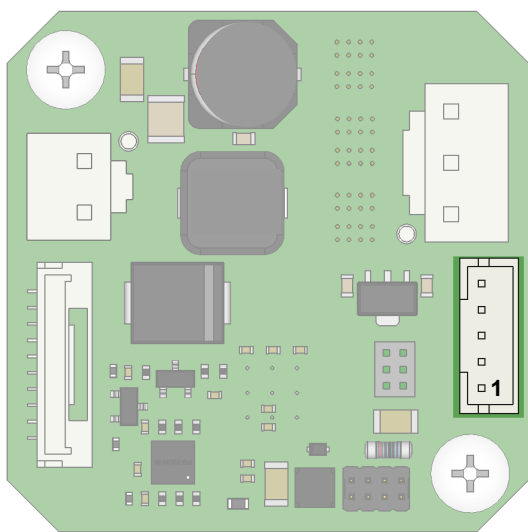
Max. Voltage	Switching thresholds	
	On	Off
30 V	> 9 V	< 3.7 V

3.5.3 X3 – Hall sensor

Type: JST B5B-PH

Suitable Nanotec cable: ZK-PHR-5-500 (not included in the scope of delivery)

In the following figure, pin 1 is marked with a "1".



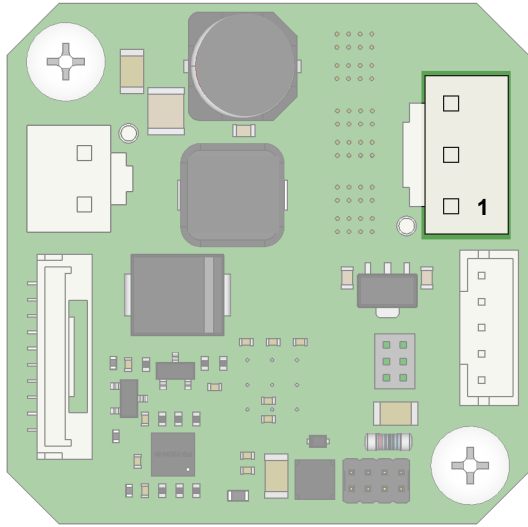
Pin	Function	Note
1	H1	5 V signal
2	H2	5 V signal
3	H3	5 V signal
4	+5 V DC	Supply voltage for hall sensors
5	GND	

3.5.4 X4 – motor connection

Type: JST B3P-VH

Suitable Nanotec cable: ZK-VHR-3-500 (not included in the scope of delivery)

In the following figure, pin 1 is marked with a "1".



Pin	BLDC function
1	U
2	V
3	W

4 Commissioning

Described in this chapter is how you establish communication with the controller and set the necessary parameters to make the motor ready for operation. You can configure the controller via UART.

The *Plug & Drive Studio 3* software offers you an option for performing the configuration and adapting the controller to the connected motor. A project template is included.

Observe the following note:

NOTICE

EMC: Current-carrying cables – particularly around supply and motor cables – produce electromagnetic alternating fields. These can interfere with the motor and other devices.

Suitable measures may be:



- ▶ Use shielded cables and earth the cable shielding on both ends over a short distance.
- ▶ Keep power supply and motor cables as short as possible.
- ▶ Use cables with cores in twisted pairs.
- ▶ Earth motor housing with large contact area over a short distance.
- ▶ Lay supply, motor and control cables separately.

4.1 Configuration via UART

Configure the controller via the UART interface with a 3.3 V signal level and the following settings:

- Baud rate 256000
- 8 data bits
- Parity: even
- 1 stop bit
- No data flow control

For communication between controller and PC, you need a USB-UART converter with 3.3 V signal level (e.g., *ZK-RS232-USB-1* from Nanotec).

4.1.1 Protocol

The controller can be addressed using Modbus RTU with function code 2B_h (CAN encapsulation). Further details can be found in the following documentation:

Modbus references: www.modbus.org.

- *MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3*, Date: 26.04.2014, Version: 1.1b3
- *MODBUS over Serial Line Specification and Implementation Guide V1.02*, Date: 20.12.2006, Version: 1.02
- *CiA 309 Draft Standard Proposal - Access from other networks - Part 2: Modbus/TCP mapping V1.3*, Date: 30.07.2015, Version: 1.3

Function code 2B_h enables simple access to the CANopen object dictionary.

For the data values of the commands, the little-endian format applies. The remainder of the Modbus message is, on the other hand, based on big-endian.

Definition of the request and response:

Name	Length	Value/Description
Slave address	1 byte	5
Function code	1 byte	2B _h (43 _d)
MEI type	1 byte	0D _h (13 _d)

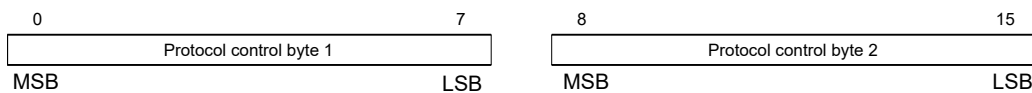
Name	Length	Value/Description
Protocol options Range	2 to 5 bytes	See following table
Address and data range	N bytes	See following table
CRC	2 bytes	CRC16 Modbus

Protocol options Range

Name	Length	Example/number range
Protocol control	1 to 2 bytes	See description
Reserved	1 byte	Always 0
(Optional) Counter byte	1 byte	
(Optional) Network ID	1 byte	
(Optional) Encoded data	1 byte	

Protocol control:

The "Protocol control" field contains the flags that are needed for controlling the message protocols. The bytes of the "Protocol control" field are defined as follows if the "extended" flag was set (the second byte is otherwise omitted):



The most significant bit (MSB) is bit 0 for "protocol control" byte 1 and bit 8 for "protocol control" byte 2. The least significant bit (LSB) is bit 7 for "protocol control" byte 1 and bit 15 for "protocol control" byte 2.

Bit	Name	Description
0	"Extended" flag	This bit is used if the object dictionary data set is larger than would fit in a Modbus command. The data set then spans over multiple Modbus messages; each message contains part of the data set. "0" = No multiple message transaction or the end of the multiple message transaction. "1" = Part of a multiple message transaction.
1	Extended protocol control	Length of the protocol control, the value "0" indicates a length of 1 byte, the value "1" indicates a length of 2 bytes.
2	Counter byte option	This bit is set to "1" to indicate that the "counter byte" field is used in this message. If this bit is set to "0", the "counter byte" field does not exist in this message.
3 and 4	Reserved	0
5	Network ID option	Not supported, must be "0".
6	Encoded data option	Not supported, must be "0".
7	Access flag	This bit indicates the access method of the requested command. "0" = read, "1" = write.
8 to 15	Reserved	0

Address and data range

The address and data range is defined in the following table:

Name	Byte size and byte order	Example / range
Node-ID	1 byte	1
Object index	1 byte, high 1 byte, low	0000 _h to FFFF _h
Object subindex	1 byte	00 _h to FF _h
Start address	1 byte, high 1 byte, low	0000 _h
Number of data values	1 byte, high 1 byte, low	0000 _h to 00FD _h
Write/read data	n bytes	Little-endian format

Example:

Set the maximum current (2031_h) to "03E8_h" (1000 mA):

Request

SA	FC	Data	CRC
05	2B	0D 01 00 01 20 31 00 00 00 00 04 E8 03 00 00	C3 53

Response

SA	FC	Data	CRC
05	2B	0D 01 00 01 20 31 00 00 00 00 00	E5 CC

4.2 Setting the motor data

Prior to commissioning, the motor controller requires a number of values from the motor data sheet.

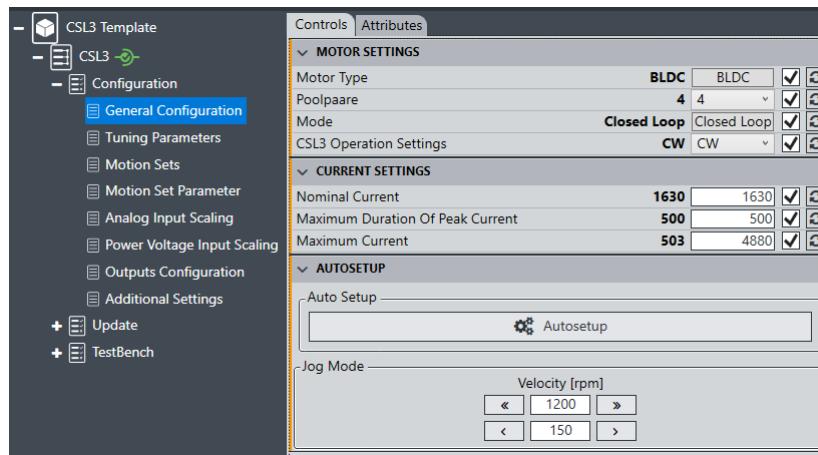
- Number of pole pairs: Object 2030_h:00_h (pole pair count) The number of motor pole pairs is to be entered here. With BLDC motors, the number of pole pairs is specified directly in the motor data sheet.
- Maximum motor speed: Object 2032_h:00_h (Maximum Speed) The maximum motor speed (see motor data sheet) is to be entered here.
- Object 2031_h:00_h: Maximum permissible motor current (rms value) in mA (see motor data sheet)
- Object 203B_h:01_h: Rated current of the motor (rms value) in mA (see motor data sheet), limited by 2031_h
- Object 203B_h:02_h Maximum duration of the maximum current in ms (for initial commissioning, Nanotec recommends a value of 100 ms; this value is to be adapted later to the specific application).

NOTICE



When using the control modes, note that the value of the rate current is set via the digital inputs, to one of the pre-set values in object 2463h Pre-set Current.

The module *General Configuration* of the project template in *Plug & Drive Studio 3* bundles up all relevant parameters:



I^2t Motor overload protection

The controller offers I^2t motor overload protection, the goal of which is to protect the motor from damage and, at the same time, operate it normally up to its thermal limit.

To activate the I^2t functionality mode, you must appropriately specify the three object entries mentioned above ($2031_h:h$, $203B_h:1_h$, $203B_h:2_h$). This means that the maximum current must be greater than the rated current and a time value for the maximum duration of the maximum current must be entered.

From the specification of rated current, maximum current and maximum duration of the maximum current, an I^2t_{Lim} is calculated. The motor can run with maximum current until the calculated I^2t_{Lim} is reached. The current is then immediately reduced to the rated current.

4.3 Auto setup

To determine a number of parameters related to the motor and the connected Hall sensors, you must perform an auto setup.

TIP



As long as the motor connected to the controller or the sensors for feedback (Hall sensors) are not changed, auto setup is only to be performed once during initial commissioning.

NOTICE



Note the following prerequisites for performing the auto setup:

- ▶ The motor must be load-free.
- ▶ The motor must not be touched.
- ▶ The motor must be able to turn freely in any direction.

4.3.1 Execution

The module *General Configuration* of the project template in *Plug & Drive Studio 3* offers a special control to execute the *auto setup*.

1. To preselect the *auto setup* operating mode, enter the value "-2" ("FE_h") in object 6060_h:00_h.
2. Enter the following values in 6040_h Control Word in this sequence: "6", "7", "15".
3. Start *auto setup* by setting bit 4 OMS in object 6040_h:00_h (controlword).

Value 1 in bit 12 OMS in object 6041_h:00_h (statusword) indicates that the auto setup was completely executed and ended.

4.4 Setting control mode

You can use one of the pre-programmed control modes to operate the motor in Profile Velocity or Profile Position mode. The mode selection takes place via the digital inputs.

The controller offers the following control modes:

- Profile Velocity with target speed via digital inputs
- Profile Velocity with Target speed via analog input
- Profile Velocity with Target speed via supply voltage
- Profile Position with target position via digital inputs
- Homing on Block

To activate the use of the control modes, set bit 0 in 2481h CSL3 Operation Settings to "1".

In the object 2472h Digital Inputs Mapping, you define which function the four digital inputs have. Via the inputs you can select the mode and the corresponding sources for the target values.

Each subindex corresponds to one of the combinations of the four inputs, from 0000_b (no input high) to 1111_b (all inputs high). The 16 bits in each subindex have the following meaning:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pos Source				Dec Source		Acc Source		Curr Source		Vel Source			Op Mode		

Op Mode: operation mode

To select the mode, set following bits in the corresponding subindex accordingly:

Bits 0...2 in 2472 _h :0x _h	Operation Mode
000	No operation (to introduce a break between two relative positionings for example)
001	OFF / Clear Error
010	STOP
011	Velocity Mode, positive direction
100	Velocity Mode, negative direction
101	Homing on Block
110	Position, relative
111	Position, absolute

Vel Source: source of velocity

To select the source, set following bits in the corresponding subindex accordingly:

Bits 3..5 in 2472 _h :0x _h	Velocity Source
000	2462 _h :01 _h
001	2462 _h :02 _h
010	2462 _h :03 _h
011	2462 _h :04 _h
100	2462 _h :05 _h
101	Velocity is controlled by analog input, see object 2454 _h
110	Velocity is controlled by supply voltage, see object 2454 _h
111	Last velocity is hold (eg. when analog input should also be used for current setting)

Curr Source: source of motor current

To select the source, set following bits in the corresponding subindex accordingly:

Bits 6..8 in 2472 _h :0x _h	Current Source
000	2463 _h :01 _h
001	2463 _h :02 _h
010	2463 _h :03 _h
011	2463 _h :04 _h
100	2463 _h :05 _h
101	Current is controlled by analog input, see object 2454 _h
110	Current is controlled by supply voltage, see object 2454 _h
111	Last current is hold (eg. when analog input should also be used for velocity setting)

Acc Source: source of acceleration ramp

To select the source, set following bits in the corresponding subindex accordingly:

Bits 9 and 10 n 2472 _h :0x _h	Acceleration Source
00	2464 _h :01 _h
01	2464 _h :02 _h
10	2464 _h :03 _h
11	2464 _h :04 _h

Dec Source: source of deceleration ramp

To select the source, set following bits in the corresponding subindex accordingly:

Bits 11 and 12 in 2472 _h :0x _h	Deceleration Source
00	2465 _h :01 _h
01	2465 _h :02 _h
10	2465 _h :03 _h
11	2465 _h :04 _h

Pos Source: source of target position

To select the source, set following bits in the corresponding subindex accordingly:

Bits 13...15 in 2472 _h :0x _h	Position Source
000	2466 _h :01 _h
001	2466 _h :02 _h
010	2466 _h :03 _h
011	2466 _h :04 _h
100	2466 _h :05 _h
101	2466 _h :06 _h
110	2466 _h :07 _h
111	2466 _h :08 _h

4.5 Configuration example

In this example, the motor is controlled in the mode *Profile Velocity* via inputs 1 and 2.

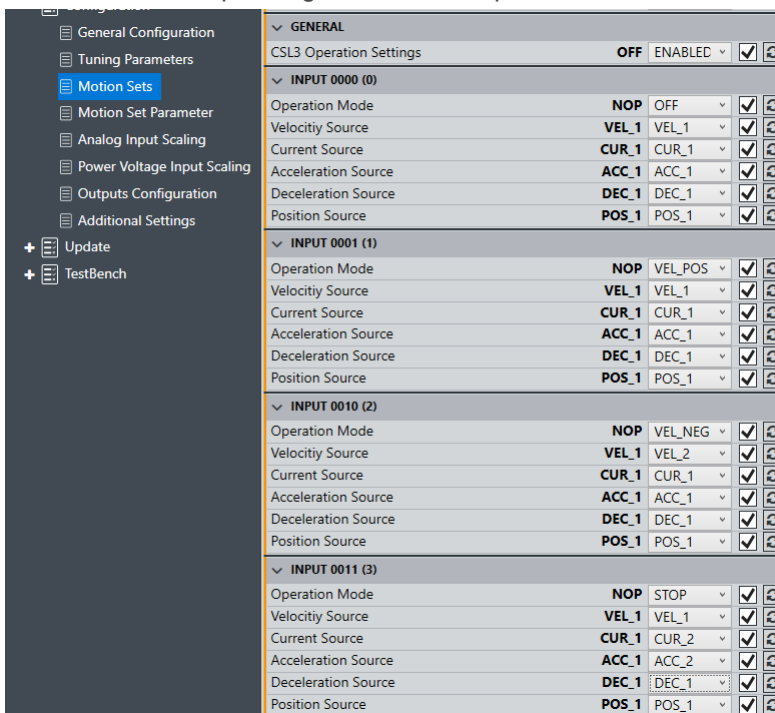
- If both inputs are low, the motor is powered off (OFF). If possible, all occurred errors are reset.
- If only input 1 is high, the motor runs in the positive direction with velocity Vel1 (2462_h:01_h).
- If only input 2 is high, the motor runs in the negative direction with velocity Vel2 (2462_h:02_h).
- If both inputs are high, the motor decelerates with Dec2 (2465_h:02_h) and stays powered on with the holding current Curr2 ((2463_h:02_h).

Inputs		Subindex of 2472 _h	Value in Subindex	Mode
DIn2	DIn1			
0	0	01 _h	1	OFF
0	1	02 _h	3	Velocity Mode CW, Vel1, Curr1, Dec1, Acc1
1	0	03 _h	12	Velocity Mode CCW, Vel2, Curr1, Dec1, Acc1
1	1	04 _h	2114	STOP, Curr2, Dec2

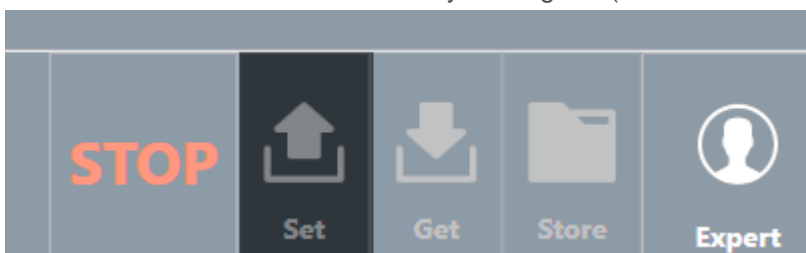
You can save the configuration by writing the value "65766173_h" in 1010_h:01_h or via *Plug & Drive Studio 3*.

In order to carry out this configuration in *Plug & Drive Studio 3* proceed as follows:

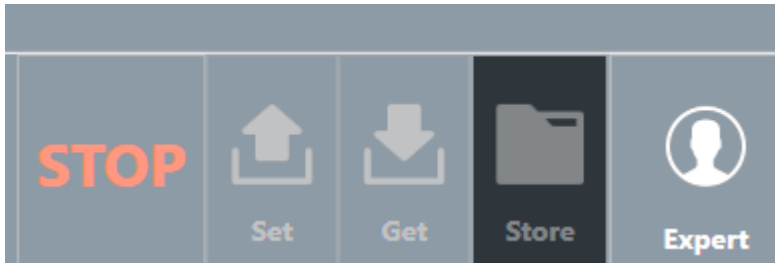
1. Open the module *General Configuration* of the project template
2. Chosse the corresponding mode and the parameters for the first four motion sets as follows:



3. Transfer the values to the controller by clicking *Set* (the check next to each parameter needs to be set):



4. Store the values to the controller by clicking *Store* (the check next to each parameter needs to be set):



5 Operating modes

5.1 Profile Velocity

5.1.1 Description

This mode operates the motor in Velocity Mode.

5.1.2 Activation

To activate the mode, the value "3" must be set in object `6060h` (Modes Of Operation).

After the mode is selected and the *Power State Machine* has been switched to *Operation enabled* (set `6040h` to "6", "7", "15"), the motor is accelerated to the target speed in object `60FFh`. The speed and acceleration values are taken into account here.

Activating via the control modes

With the pre-programmed control modes, the controller offers the possibility to control the target speed and the *Power State Machine* via the input signals of the controller. See chapter [Setting control mode](#).

To activate the use of the control modes, set bit 0 in [2481_h CSL3 Operation Settings](#) to "1".

5.1.3 Object entries

The following objects are necessary for controlling this mode:

- `606Bh` (Velocity Demand Value):
This object contains the output of the ramp generator, which simultaneously serves as the preset value for the velocity controller.
- `606Ch` (Velocity Actual Value):
Indicates the current actual speed.
- `606Dh` (Velocity Window):
This value specifies by how much the actual speed may vary from the set speed for bit 10 (target speed reached; Target Reached) in object `6041h` (statusword) to be set to "1".
- `606Eh` (Velocity Window Time):
This object specifies how long the actual speed and the set speed must be close to one another (see `606Dh` "Velocity Window") for bit 10 "Target speed reached" in object `6041h` (statusword) to be set to "1".
- `6083h` (Profile acceleration):
Sets the value for the acceleration ramp.
- `6084h` (Profile Deceleration):
Sets the value for the deceleration ramp.
- `60FEh` (Target Velocity):
Specifies the target speed that is to be reached.

5.1.3.1 Statusword

The following bits in object `6041h` (statusword) have a special function:

- Bit 10 (target speed reached; Target Reached): This bit indicates whether the target speed is reached and the current speed is within a tolerance window (`606Dh`) for a specified time (`606Eh`).

5.2 Profile Position

5.2.1 Overview

5.2.1.1 Description

Profile Position Mode is used to move to positions relative to the last target position or to an absolute position (last reference position). During the movement, the limit values for the speed, starting acceleration/braking deceleration and jerks are taken into account.

5.2.1.2 Activation

To activate the mode, the value "1" must be set in object 6060_h (Modes Of Operation) and the *Power State Machine* must be switched to *Operation enabled* (set 6040_h to "6", "7", "15").

Activating via the control modes

With the pre-programmed control modes, the controller offers the possibility to control the target position and the *Power State Machine* via the input signals of the controller. See chapter Setting control mode.

To activate the use of the control modes, set bit 0 in 2481_h CSL3 Operation Settings to "1".

5.2.1.3 Controlword

The following bits in object 6040_h (controlword) have a special function:

- Bit 4 starts a travel command. This is carried out on a transition from "0" to "1".
- Bit 6: With "0", the target position (607A_h) is absolute and with "1" the target position is relative.

5.2.1.4 Statusword

The following bits in object 6041_h (statusword) have a special function:

- Bit 10 (Target Reached): This bit is set to "1" if the last target was reached and the motor remains within a tolerance window (6067_h) for a preset time (6068_h).
- Bit 12 (Set-point acknowledge): This bit confirms receipt of a new and valid set point.
- Bit 13 (Following Error): This bit is set in *closed loop* mode if the following error is greater than the set limits (6065_h (Following Error Window) and 6066_h (Following Error Time Out)).

5.2.2 Boundary conditions for a positioning move

5.2.2.1 Object entries

The boundary conditions for the position that has been moved to can be set in the following entries of the object dictionary:

- 607A_h: (Target Position): Planned target position
- 6081_h (Profile Velocity): Maximum speed with which the position is to be approached
- 6083_h (Profile Acceleration): Desired starting acceleration
- 6084_h (Profile Deceleration): Desired braking deceleration

5.2.3 Homing on Block

The purpose of the homing is to align the position zero point of the controller with the position of a mechanical block. The detection of the mechanical block takes place via the actual deviation of the actual position from the demand position.

To carry out a homing:

1. Set the maximum deviation in the object 2493_h Homing Block Following Error, depending on the type of the mechanical block in your application.
2. If needed, reduce the motor current (see Setting the motor data) and the velocity (6081_h) accordingly, to avoid damages.
3. Start a position run in the direction of the block. You can also do this via the digital inputs, see chapter Setting control mode.

If the actual position (in sensor increments) deviates so much from the demand position that the value of the object 2493_h is exceeded, the homing on block is completed. The motor stands still, the current position is registered as the new zero (home) position and the motor current is switched off (the bit 2 in 6041_h Status Word is set to "0").

6 Description of the object dictionary

6.1 Overview

This chapter contains a description of all objects.

You will find information here on:

- Functions
- Object descriptions ("Index")
- Value descriptions ("Subindices")
- Descriptions of bits
- Description of the object

6.2 Structure of the object description

The description of the object entries always has the same structure and usually consists of the following sections:

Function

The function of the object dictionary is briefly described in this section.

Object description

This table provides detailed information on the data type, preset values and similar. An exact description can be found in section "[Object description](#)"

Value description

This table is only available with the "Array" or "Record" data type and provides exact information about the sub-entries. A more exact description of the entries can be found in section "[Value description](#)"

Description

Here, more exact information on the individual bits of an entry is provided or any compositions explained. A more exact description can be found in section "[Description](#)"

6.3 Object description

The object description consists of a table that contains the following entries:

Index

Designates the object index in hexadecimal notation.

Object name

The name of the object.

Object Code

The type of object. This can be one of the following entries:

- VARIABLE: In this case, the object consists of only a variable that is indexed with subindex 0.
- ARRAY: These objects always consists of a subindex 0 – which specifies the number of sub-entries – and the sub-entries themselves, beginning with index 1. The data type within an array never changes, i.e., sub-entry 1 and all subsequent entries are always of the same data type.
- RECORD: These objects always consists of a subindex 0 – which specifies the number of sub-entries – and the sub-entries themselves, beginning with index 1. Unlike an ARRAY, the data type of the sub-entries can vary. This means that, e.g., sub-entry 1 may be of a different data type than sub-entry 2.

- **VISIBLE_STRING**: The object describes a character string coded in ASCII. The length of the string is specified in subindex 0; the individual characters are stored beginning in subindex 1. These character strings are **not** terminated by a null character.

Data type

The size and interpretation of the object is specified here. The following notation is used for the "VARIABLE" object code:

- A distinction is made between entries that are signed; these are designated with the prefix "SIGNED". For entries that are unsigned, the prefix "UNSIGNED" is used.
- The size of the variable in bits is placed before the prefix and can be 8, 16 or 32.

Savable

Described here is whether this object is savable (see [1010h Store Parameters](#)).

Firmware version

The firmware version beginning with which the object is available is entered here.

Change history (ChangeLog)

Any changes to the object are noted here.

There are also the following table entries for the "VARIABLE" data type:

Access

The access restriction is entered here. The following restrictions are available:

- "read/write": The object can both be read as well as written
- "read only": The object can only be read from the object dictionary. It is not possible to set a value.

PDO mapping

only available for compatibility reasons

Allowed values

In some cases, only certain values may be written in the object. If this is the case, these values are listed here. If there are no restrictions, the field is empty.

Preset value

To bring the controller to a secured state when switching on, it is necessary to preset a number of objects with values. The value that is written in the object when the controller is started is noted in this table entry.

6.4 Value description

NOTICE



For the sake of clarity, a number of subindices are grouped together if the entries all have the same name.

Listed in the table with the "Value description" heading are all data for sub-entries with subindex 1 or higher. The table contains the following entries:

Subindex

Number of the currently written sub-entry.

Name

Name of the sub-entry.

Data type

The size and interpretation of the sub-entry is specified here. The following notation always applies here:

- A distinction is made between entries that are signed; these are designated with the prefix "SIGNED". For entries that are unsigned, the prefix "UNSIGNED" is used.
- The size of the variable in bits is placed before the prefix and can be 8, 16 or 32.

Access

The access restriction for the sub-entry is entered here. The following restrictions are available:

- "read/write": The object can both be read as well as written
- "read only": The object can only be read from the object dictionary. It is not possible to set a value.

PDO mapping

Some bus systems, such as CANopen or EtherCAT, support PDO mapping. Described in this table entry is whether the sub-entry can be inserted into a mapping and, if so, into which. The following designations are available here:

- "no": The object may not be entered in a mapping.
- "TX-PDO": The object may be entered in an RX mapping.
- "RX-PDO": The object may be entered in a TX mapping.

Allowed values

In some cases, only certain values may be written in the sub-entry. If this is the case, these values are listed here. If there are no restrictions, the field is empty.

Preset value

To bring the controller to a secured state when switching on, it is necessary to preset a number of sub-entries with values. The value that is written in the sub-entry when the controller is started is noted in this table entry.

6.5 Description

This section may be present if use requires additional information. If individual bits of an object or sub-entry have different meaning, diagrams as shown in the following example are used.

Example: The object is 8 bits in size; bit 0 and bit 1 have different functions. Bits 2 and 3 are grouped into one function; the same applies for bits 4 to 7.

Example [4]

Description of bit 4 up to and including bit 7; these bits are logically related. The 4 in square brackets specifies the number of related bits. A list with possible values and their description is often attached at this point.

Example [2]

Description of bits 3 and 2; these bits are logically related. The 2 in square brackets specifies the number of related bits.

- Value 00_b: The description here applies if bit 2 and bit 3 are "0".
- Value 01_b: The description here applies if bit 2 is "0" and bit 3 is "1".
- Value 10_b: The description here applies if bit 2 is "1" and bit 3 is "0".
- Value 11_b: The description here applies if bit 2 and bit 3 are "1".

B

Description of bit B; no length is specified for a single bit.

A

Description of bit A; bits with a gray background are not used.

1000h Device Type

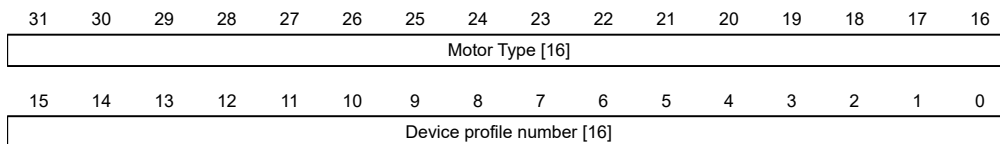
Function

Describes the controller type.

Object description

Index	1000 _h
Object name	Device Type
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00010192 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description



Motor Type[16]

Describes the supported motor type. The following values are possible:

- Bit 23 to bit 16: Value "1": BLDC motor
- Bit 23 to bit 16: Value "2": Stepper motor

Device profile number[16]

Describes the supported standard.

Values:

0192_h or 0402_d (preset value): Based on standard CiA-402.

1001h Error Register

Function

Error register: The corresponding error bit is set in case of an error. If the error no longer exists, it is deleted automatically.

Object description

Index	1001 _h
Object name	Error Register
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

7	6	5	4	3	2	1	0
MAN	RES	PROF	COM	TEMP	VOL	CUR	GEN

GEN

General error

CUR

Current

VOL

Voltage

TEMP

Temperature

COM

Communication

PROF

Relates to the device profile

RES

Reserved, always "0"

MAN

Manufacturer-specific

1003h Pre-defined Error Field

Function

This object contains an error stack with up to eight entries.

Object description

Index	1003 _h
-------	-------------------

Object name	Number Of Errors
Object Code	ARRAY
Data type	UNSIGNED8
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	<p>Firmware version v2150-B151338: entry "Object Name" changed from "Number Of Errors" to "Pre-defined Error Field".</p> <p>Firmware version v2150-B151338: entry "Data type" changed from "UNSIGNED8" to "UNSIGNED32".</p> <p>Firmware version v2150-B151338: entry "Data type" changed from "UNSIGNED32" to "UNSIGNED8".</p> <p>Firmware version v2150-B151338: entry "Name" changed from "Pre-defined Error Field" to "Number Of Errors".</p>

Description

If a new error occurs, it is entered in subindex 1. The already existing entries in subindices 1 to 7 are moved back one position. The error in subindex 7 is thereby removed.

The number of errors that have already occurred can be read from the object with subindex 0. If no error is currently entered in the error stack, it is not possible to read one of the eight subindices 1–8 and an error is sent in response. If a "0" is written in subindex 0, counting starts again from the beginning.

Bits 0 to 15 contain the error code, which can be one of the following:

Error Code	Description
1000 _h	general error
2300 _h	current at the controller output too large
3100 _h	overvoltage/undervoltage at controller input
4200 _h	temperature error within the controller
6010 _h	software reset
6100 _h	internal software error
7121 _h	motor blocked
7305 _h	hall sensor(s) faulty

1008h Manufacturer Device Name

Function

Contains the device name as character string.

Object description

Index	1008 _h
Object name	Manufacturer Device Name

Object Code	VARIABLE
Data type	VISIBLE_STRING
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	<ul style="list-style-type: none"> ■ CSL3-5: CSL3-5 ■ CSL3-24: CSL3-24
Firmware version	CSL3-FIB-v2119-B141418
Change history	

1009h Manufacturer Hardware Version

Function

This object contains the hardware version as character string.

Object description

Index	1009 _h
Object name	Manufacturer Hardware Version
Object Code	VARIABLE
Data type	VISIBLE_STRING
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	0
Firmware version	CSL3-FIB-v2119-B141418
Change history	

100Ah Manufacturer Software Version

Function

This object contains the software version as character string.

Object description

Index	100A _h
Object name	Manufacturer Software Version
Object Code	VARIABLE
Data type	VISIBLE_STRING
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	CSL3-FIB-v2150-B151338

Firmware version	CSL3-FIB-v2119-B141418
Change history	

1010h Store Parameters

Function

This object is used to start the saving of objects.

Object description

Index	1010 _h
Object name	Store Parameters
Object Code	ARRAY
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Save All Parameters To Non-volatile Memory
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000001 _h

Description

To start the save process, value "65766173_h" must be written in the subindex 1. This corresponds to the decimal of 1702257011_d or the ASCII string *save*. As soon as the saving process is completed, the save command is again overwritten with the value "1", since saving is possible again.

1011h Restore Default Parameters

Function

This object can be used to reset the entire object dictionary to the default values.

Object description

Index	1011 _h
Object name	Restore Default Parameters
Object Code	ARRAY
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Restore All Default Parameters
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000001 _h

Description

If the value 64616F6C_h (or 1684107116_d or ASCII `load`) is written in this object, the entire object dictionary is reset to the default values.

1018h Identity Object

Function

This object returns general information on the device, such as manufacturer, product code, revision and serial number.

**TIP**

Have these values ready in the event of service inquiries.

Object description

Index	1018 _h
Object name	Identity Object
Object Code	RECORD
Data type	IDENTITY
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	04 _h

Subindex	01 _h
Name	Vendor-ID
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	0000026C _h

Subindex	02 _h
Name	Product Code
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	<ul style="list-style-type: none"> ■ CSL3-5: 000000FE_h ■ CSL3-24: 000000FF_h

Subindex	03 _h
Name	Revision Number
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	08660000 _h

Subindex	04 _h
Name	Serial Number
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

1F50h Program Data

Function

This object is used to program memory areas of the controller. Each entry stands for a certain memory area.

Object description

Index	1F50 _h
Object name	Program Data
Object Code	ARRAY
Data type	DOMAIN
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Program Data #1
Data type	DOMAIN
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0

1F51h Program Control

Function

This object is used to control the programming of memory areas of the controller. Each entry stands for a certain memory area.

Object description

Index	1F51 _h
Object name	Program Control
Object Code	ARRAY
Data type	UNSIGNED8
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Program Control #1
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h

2030h Pole Pair Count

Function

Contains the number of pole pairs of the connected motor.

Object description

Index	2030 _h
Object name	Pole Pair Count
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000004 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

2031h Maximum Current

Function

Enter the maximum permissible motor current in milliamperes here. All current values are limited by this value.

Within the controller, the entered value is always interpreted as the root mean square.

Object description

Index	2031 _h
Object name	Maximum Current
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000384 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

2032h Maximum Speed

Function

In this object, you enter the maximum permissible motor speed in revolutions per minute.

Object description

Index	2032 _h
Object name	Maximum Speed
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00001388 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

2034h Upper Voltage Warning Level

Function

This object contains the threshold value for the "overvoltage" error in millivolts.

Object description

Index	2034 _h
Object name	Upper Voltage Warning Level
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00007530 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

If the input voltage of the controller exceeds this threshold value, the motor is switched off and an error triggered.

2035h Lower Voltage Warning Level

Function

This object contains the threshold value for the "Undervoltage" error in millivolts.

Object description

Index	2035 _h
Object name	Lower Voltage Warning Level

Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00001F40 _h
Firmware version	CSL3-FIB-v21119-B141418
Change history	

Description

If the input voltage of the controller falls below this threshold value, the motor is switched off and an error triggered.

2039h Motor Currents

Function

This object contains the measured motor currents in mA.

Object description

Index	2039 _h
Object name	Motor Currents
Object Code	ARRAY
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v21119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	04 _h

Subindex	01 _h
Name	I_d

Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	02 _h
Name	I_q
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	03 _h
Name	I_a
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	04 _h
Name	I_b
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Description

- 01_h: Field-forming components of the current
- 02_h: Torque-forming components of the current
- 03_h: Phase current in phase U (BLDC motor)
- 04_h: Phase current in phase W (BLDC motor)

203Bh I2t Parameters

Function

This object contains the parameters for I^2t monitoring.

I^2t monitoring is activated by entering a value greater than 0 in 203B_h:01 and 203B_h:02.

Object description

Index	203B _h
-------	-------------------

Object name	I2t Parameters
Object Code	ARRAY
Data type	UNSIGNED32
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	06 _h

Subindex	01 _h
Name	Nominal Current
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000012C _h

Subindex	02 _h
Name	Maximum Duration Of Peak Current
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00001388 _h

Subindex	03 _h
Name	Threshold
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Subindex	04 _h
Name	CalcValue
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	05 _h
Name	LimitedCurrent
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	06 _h
Name	Status
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Description

The subindices are divided into two groups: subindex 01_h and 02_h contain parameters for the control, subindices 03_h to 06_h are status values. The functions are as follows:

- 01_h: The rated current specified in the motor data sheet is entered here in mA. This must be smaller than the current entered in 2031_h, otherwise monitoring is not activated. The specified value is interpreted as root mean square.
- 02_h: Specifies the maximum duration of the maximum current (2031_h) in ms.
- 03_h: Threshold, specifies the limit in mA that determines whether the maximum current or rated current is switched to.
- 04_h: CalcValue, specifies the calculated value that is compared with the threshold for setting the current.
- 05_h: LimitedCurrent, contains the momentary current as root mean square set by I²t.
- 06_h: Current status. If the sub-entry value is "0", I²t is deactivated; if the value is "1", I²t is activated.

2454h Analog Input / Voltage Control Parameters

Function

This object contains the scaling for the analog value and the supply voltage as control signal. See also [Setting control mode](#).

Object description

Index	2454 _h
-------	-------------------

Object name	Analog Input / Voltage Control Parameters
Object Code	ARRAY
Data type	INTEGER16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	18 _h

Subindex	01 _h
Name	Velocity Target 1 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0064 _h

Subindex	02 _h
Name	Velocity Target 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	1388 _h

Subindex	03 _h
Name	Velocity Offset Value 1 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0258 _h

Subindex	04 _h
Name	Velocity Offset Value 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	2710 _h
Subindex	05 _h
Name	Velocity Dead Zone 1 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
Subindex	06 _h
Name	Velocity Dead Zone 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
Subindex	07 _h
Name	Current Target 1 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00C8 _h
Subindex	08 _h
Name	Current Target 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0BB8 _h
Subindex	09 _h
Name	Current Offset Value 1 (Analog Input)
Data type	INTEGER16

Access	read / write
PDO mapping	no
Allowed values	
Preset value	0064 _h
<hr/>	
Subindex	0A _h
Name	Current Offset Value 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	2710 _h
<hr/>	
Subindex	0B _h
Name	Current Dead Zone 1 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0C _h
Name	Current Dead Zone 2 (Analog Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0D _h
Name	Velocity Target 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	01F4 _h
<hr/>	
Subindex	0E _h
Name	Velocity Target 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	

Preset value	1388 _h
Subindex	0F _h
Name	Velocity Offset Value 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	3A98 _h
Subindex	10 _h
Name	Velocity Offset Value 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	6590 _h
Subindex	11 _h
Name	Velocity Dead Zone 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
Subindex	12 _h
Name	Velocity Dead Zone 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
Subindex	13 _h
Name	Current Target 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	012C _h
Subindex	14 _h

Name	Current Target 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0BB8 _h
<hr/>	
Subindex	15 _h
Name	Current Offset Value 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	3A98 _h
<hr/>	
Subindex	16 _h
Name	Current Offset Value 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	6590 _h
<hr/>	
Subindex	17 _h
Name	Current Dead Zone 1 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	18 _h
Name	Current Dead Zone 2 (Power Voltage Input)
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Description

The subindices have the following functions:

- 01_h: Target velocity in rpm at the (minimum) analog value in subindex 03_h.
- 02_h: Target velocity in rpm at the (maximum) analog value in subindex 04_h.

- 03_h: Here, you enter the minimum analog value for your application in millivolt.
- 04_h: Here, you enter the maximum analog value for your application in millivolt.
- 05_h und 06_h: Define a dead zone in millivolt. If the analog value lies within the dead zone, the motor does not move.
- 07_h: Motor current in milliampere at the (minimum) analog value in subindex 09_h.
- 08_h: Motor current in milliampere at the (maximum) analog value in subindex 0A_h.
- 09_h: Here, you enter the minimum analog value for your application in millivolt.
- 0A_h: Here, you enter the maximum analog value for your application in millivolt.
- 0B_h and 0C_h: Define a dead zone in millivolt. If the analog value lies within the dead zone, the motor does not move.
- 0D_h: Target velocity in rpm at the (minimum) supply voltage in subindex 0F_h.
- 0E_h: Target velocity in rpm at the (maximum) supply voltage in subindex 10_h.
- 0F_h: Here, you enter the minimum value of the supply voltage for your application in millivolt.
- 10_h: Here, you enter the maximum value of the supply voltage for your application in millivolt.
- 11_h und 12_h: Define a dead zone in millivolt. If the supply voltage lies within the dead zone, the motor current is zero.
- 13_h: Motor current in Milliampere at the (minimum) supply voltage in subindex 0F_h.
- 14_h: Motor current in Milliampere at the (maximum) supply voltage in subindex 10_h.
- 15_h: Here, you enter the minimum value of the supply voltage for your application in millivolt.
- 16_h: Here, you enter the maximum value of the supply voltage for your application in millivolt.
- 17_h und 18_h: Define a dead zone in millivolt. If the supply voltage lies within the dead zone, the motor current is zero.

2462h Pre-set Velocity

Function

Contains the five target velocities in rpm, which you can choose with the bits 3 to 5 in object 2472_h:0x_h.

Object description

Index	2462 _h
Object name	Pre-set Velocity
Object Code	ARRAY
Data type	INTEGER16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	

Preset value	05 _h
Subindex	01 _h
Name	Velocity 1
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	012C _h
Subindex	02 _h
Name	Velocity 2
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0258 _h
Subindex	03 _h
Name	Velocity 3
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	04B0 _h
Subindex	04 _h
Name	Velocity 4
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0BB8 _h
Subindex	05 _h
Name	Velocity 5
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0FA0 _h

Description

Bits 3..5 in 2472 _h :0x _h	Velocity Source
000	2462 _h :01 _h
001	2462 _h :02 _h
010	2462 _h :03 _h
011	2462 _h :04 _h
100	2462 _h :05 _h

2463h Pre-set Current

Function

Contains the five motor current values in milliamperere, which you can select with the bits 6 to 8 in object 2472_h:0x_h.

Object description

Index	2463 _h
Object name	Pre-set Current
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	05 _h

Subindex	01 _h
Name	Current 1
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	

Preset value	0384 _h
Subindex	02 _h
Name	Current 2
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0384 _h
Subindex	03 _h
Name	Current 3
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0384 _h
Subindex	04 _h
Name	Current 4
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0384 _h
Subindex	05 _h
Name	Current 5
Data type	INTEGER16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0384 _h

Description

Bits 6..8 in 2472 _h :0x _h	Current Source
000	2463 _h :01 _h
001	2463 _h :02 _h
010	2463 _h :03 _h
011	2463 _h :04 _h
100	2463 _h :05 _h

2464h Pre-set Acceleration

Function

Contains the four acceleration ramps in rpm per second, which you can choose with the bits 9 and 10 in object 2472_h:0x_h.

Object description

Index	2464 _h
Object name	Pre-set Acceleration
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	04 _h

Subindex	01 _h
Name	Acceleration 1
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00C8 _h

Subindex	02 _h
Name	Acceleration 2
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	01F4 _h

Subindex	03 _h
Name	Acceleration 3
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h

Subindex	04 _h
Name	Acceleration 4
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	1388 _h

Description

Bits 9 and 10 in 2472 _h :0x _h	Acceleration Source
00	2464 _h :01 _h
01	2464 _h :02 _h
10	2464 _h :03 _h
11	2464 _h :04 _h

2465h Pre-set Deceleration

Function

Contains the four deceleration ramps in rpm per second, which you can choose with the bits 11 and 12 in object 2472_h:0x_h.

Object description

Index	2465 _h
Object name	Pre-set Deceleration
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	04 _h
Subindex	01 _h
Name	Deceleration 1
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00C8 _h
Subindex	02 _h
Name	Deceleration 2
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	01F4 _h
Subindex	03 _h
Name	Deceleration 3
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h
Subindex	04 _h
Name	Deceleration 4
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	1388 _h

Description

Bits 11 and 12 in 2472 _h :0x _h	Deceleration Source
00	2465 _h :01 _h
01	2465 _h :02 _h
10	2465 _h :03 _h
11	2465 _h :04 _h

2466h Pre-set Position

Function

Contains the eight target positions in hall sensor increments, which you can choose with the bits 13 to 15 in object 2472_h:0x_h.

Object description

Index	2466 _h
Object name	Pre-set Position
Object Code	ARRAY
Data type	INTEGER32
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	08 _h

Subindex	01 _h
Name	Position 1
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Subindex	02 _h
Name	Position 2
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00001388 _h
Subindex	03 _h
Name	Position 3
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00002710 _h
Subindex	04 _h
Name	Position 4
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00004E20 _h
Subindex	05 _h
Name	Position 5
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00007530 _h
Subindex	06 _h
Name	Position 6
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	FFFFFFFFFFFFE78 _h
Subindex	07 _h
Name	Position 7
Data type	INTEGER32

Access	read / write
PDO mapping	no
Allowed values	
Preset value	FFFFFFFFFFFFD8F0 _h

Subindex	08 _h
Name	Position 8
Data type	INTEGER32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	FFFFFFFFFFFFB1E0 _h

Description

Bits 13...15 in 2472 _h :0x _h	Position Source
000	2466 _h :01 _h
001	2466 _h :02 _h
010	2466 _h :03 _h
011	2466 _h :04 _h
100	2466 _h :05 _h
101	2466 _h :06 _h
110	2466 _h :07 _h
111	2466 _h :08 _h

2472h Digital Inputs Mapping

Function

In this object, you define which function the four digital inputs have. Via the inputs you can select the control mode and the corresponding sources for the target values. See also [Setting control mode](#).

Object description

Index	2472 _h
Object name	Digital Inputs Mapping
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	10 _h

Subindex	01 _h
Name	Function Mapping For Input Combination 0000b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Subindex	02 _h
Name	Function Mapping For Input Combination 0001b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Subindex	03 _h
Name	Function Mapping For Input Combination 0010b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Subindex	04 _h
Name	Function Mapping For Input Combination 0011b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Subindex	05 _h
----------	-----------------

Name	Function Mapping For Input Combination 0100b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	06 _h
Name	Function Mapping For Input Combination 0101b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	07 _h
Name	Function Mapping For Input Combination 0110b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	08 _h
Name	Function Mapping For Input Combination 0111b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	09 _h
Name	Function Mapping For Input Combination 1000b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0A _h
Name	Function Mapping For Input Combination 1001b
Data type	UNSIGNED16
Access	read / write

PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0B _h
Name	Function Mapping For Input Combination 1010b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0C _h
Name	Function Mapping For Input Combination 1011b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0D _h
Name	Function Mapping For Input Combination 1100b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0E _h
Name	Function Mapping For Input Combination 1101b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	0F _h
Name	Function Mapping For Input Combination 1110b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	

Subindex	10 _h
Name	Function Mapping For Input Combination 1111b
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Description

Each subindex corresponds to one of the combinations of the four inputs, from 0000_b (no input high) to 1111_b (all inputs high).

The 16 bits in each subindex have the following meaning:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Pos Source		Dec Source		Acc Source		Curr Source		Vel Source			Op Mode				

Bits 0...2	Operation Mode
000	No operation (can be used for relative move step)
001	OFF / Clear Error
010	STOP
011	Velocity Mode, positive direction
100	Velocity Mode, negative direction
101	Homing on Block
110	Position, relative
111	Position, absolute

Bits 3..5	Velocity Source
000	2462 _h :01 _h
001	2462 _h :02 _h
010	2462 _h :03 _h
011	2462 _h :04 _h
100	2462 _h :05 _h
101	Velocity is controlled by analog input, see object 2454 _h
110	Velocity is controlled by supply voltage, see object 2454 _h
111	Last velocity is hold (eg. when analog input should also be used for Current setting)

Bits 6..8	Current Source
000	2463 _h :01 _h
001	2463 _h :02 _h
010	2463 _h :03 _h
011	2463 _h :04 _h
100	2463 _h :05 _h
101	Current is controlled by analog input, see object 2454 _h
110	Current is controlled by supply voltage, see object 2454 _h

Bits 6..8	Current Source
111	Last current is hold (eg. when analog input should also be used for velocity setting)

Bits 9 and 10	Acceleration Source
00	<u>2464</u> _h :01 _h
01	<u>2464</u> _h :02 _h
10	<u>2464</u> _h :03 _h
11	<u>2464</u> _h :04 _h

Bits 11 and 12	Deceleration Source
00	<u>2465</u> _h :01 _h
01	<u>2465</u> _h :02 _h
10	<u>2465</u> _h :03 _h
11	<u>2465</u> _h :04 _h

Bits 13...15	Position Source
000	<u>2466</u> _h :01 _h
001	<u>2466</u> _h :02 _h
010	<u>2466</u> _h :03 _h
011	<u>2466</u> _h :04 _h
100	<u>2466</u> _h :05 _h
101	<u>2466</u> _h :06 _h
110	<u>2466</u> _h :07 _h
111	<u>2466</u> _h :08 _h

247Ah Digital Outputs Function

Function

In this object, you define which function the two digital outputs have.

Object description

Index	247A _h
Object name	Digital Outputs Function
Object Code	ARRAY
Data type	UNSIGNED8
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	02 _h
Subindex	01 _h
Name	Function Configuration For Digital Output 0
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
Subindex	02 _h
Name	Function Configuration For Digital Output 1
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h

Description

Each subindex corresponds to an output. The following functions are available:

Value in Subindex	Function
0	No Mapping: You control the output via bit 16 or 17 resp. in 60FE _h :01 _h .
1	Mapping function, not inverted: You assign the output a signal source via the objects 247C _h , 247D _h and 247E _h .
2	Mapping function, inverted: You assign the output a signal source via the objects 247C _h , 247D _h and 247E _h .

247Ch Digital Output Mapped Index

Function

With this object, together with [247Dh Digital Output Mapped Sub Index](#) and [247Eh Digital Output Mapped Bit](#) you assign an output a signal source. You activate the mapping-function in [247Ah Digital Outputs Function](#).

Object description

Index	247C _h
Object name	Digital Output Mapped Index
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	02 _h

Subindex	01 _h
Name	Mapped OD Index For Digital Output 0
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Subindex	02 _h
Name	Mapped OD Index For Digital Output 1
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h

Description

Example

Output 2 shall reflect the bit 3 (Fault) of 6041_h:00_h (status word). You need to configure the objects as follows:

247C _h :02 _h	= 6041 _h
247D _h :02 _h	= 0
247E _h :02 _h	= 3

247Dh Digital Output Mapped Sub Index

Function

With this object, together with [247Ch Digital Output Mapped Index](#) and [247Eh Digital Output Mapped Bit](#) you assign an output a signal source. You activate the mapping-function in [247Ah Digital Outputs Function](#).

Object description

Index	247D _h
Object name	Digital Output Mapped Sub Index
Object Code	ARRAY
Data type	UNSIGNED8
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	02 _h
Subindex	01 _h
Name	Mapped OD Sub Index For Digital Output 0
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h

Subindex	02 _h
Name	Mapped OD Sub Index For Digital Output 1
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h

Description

Example

Output 2 shall reflect the bit 3 (Fault) of 6041_h:00_h (status word). You need to configure the objects as follows:

247C _h :02 _h	= 6041 _h
247D _h :02 _h	= 0
247E _h :02 _h	= 3

247Eh Digital Output Mapped Bit

Function

With this object, together with [247Ch Digital Output Mapped Index](#) and [247Dh Digital Output Mapped Sub Index](#) you assign an output a signal source. You activate the mapping-function in [247Ah Digital Outputs Function](#).

Object description

Index	247E _h
Object name	Digital Output Mapped Bit
Object Code	ARRAY
Data type	UNSIGNED8
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no

Allowed values	
Preset value	02 _h
<hr/>	
Subindex	01 _h
Name	Mapped OD Bit For Digital Output 0
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
<hr/>	
Subindex	02 _h
Name	Mapped OD Bit For Digital Output 1
Data type	UNSIGNED8
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
<hr/>	

Description

Example

Output 2 shall reflect the bit 3 (Fault) of 6041_h:00_h (status word). You need to configure the objects as follows:

247C _h :02 _h	= 6041 _h
247D _h :02 _h	= 0
247E _h :02 _h	= 3

2481h CSL3 Operation Settings

Function

With this object you activate the control modes and can invert the rotating direction of the motor.

Object description

Index	2481 _h
Object name	CSL3 Operation Settings
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	

Preset value	00 _h
Firmware version	v2143-B28123709
Change history	

Description

■ Bit 0: OFF / ENABLE

- Value = "0": **OFF**
- Value = "1": **ENABLE**

Set this bit to "1" to activate the controll modes. If they are activated, you can no longer carry out various settings manually.

■ Bit 7: Direction

- Value = "0": **Normal**
- Value = "1": **Inverted**

2482h Motion Set Command

Function

With this object you can simulate the control modes configured in 2472h Digital Inputs Mapping without applying a signal on the inputs.

Object description

Index	2482 _h
Object name	Motion Set Command
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	v2145-B15165629
Change history	

Description

Enter in this object the value which corresponds to the input combination that you want to simulate. For example the value "14" to test the function of the combination 1110_b, as configured in 2472_h:0F_h (Function Mapping For Input Combination 1110_b).

2485h CSL3 Virtual Encoder Half Pulse Minimum Length

Function

Here you enter the minimum pulse length for the output signal of the virtual encoder (see 2487h CSL3 Virtual Encoder Signals) in milliseconds. Select a value depending on your hardware and the prescaler (see 2486h CSL3 Virtual Encoder Prescaler).

Object description

Index	2485 _h
Object name	CSL3 Virtual Encoder Half Pulse Minimum Length
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	01 _h
Firmware version	v2143-B28123709
Change history	Firmware version v2145-B15165629: entry "Object Name" changed from "CSL3 Virtual Encoder Half Pulse Minimum Length" to "CSL3 Virtual Encoder Half Pulse Minimum Length".

2486h CSL3 Virtual Encoder Prescaler

Function

Here you enter the value for the frequency divider of the output signal of the virtual encoder (see [2487h CSL3 Virtual Encoder Signals](#)).

Object description

Index	2486 _h
Object name	CSL3 Virtual Encoder Prescaler
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	01 _h
Firmware version	v2143-B28123709
Change history	

Description

Set the value depending on the motor speed in your application and the minimum pulse length in [2485h CSL3 Virtual Encoder Half Pulse Minimum Length](#).

If the value is too small, it can result to pulse length smaller than the value in object 2485_h (minimum = 1 ms). This can lead to a delayed signal. If the value is too big, you lose resolution.

TIP



To receive one pulse per revolution at the pulse output, set the frequency divider to the value of the pole pair of the motor multiplied by 6.

2487h CSL3 Virtual Encoder Signals

Function

This object contains the signals of the virtual encoder.

Object description

Index	2487 _h
Object name	CSL3 Virtual Encoder Signals
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	v2143-B28123709
Change history	

Description

The controller records the actual rotor position via the three hall sensor inputs and converts it in a virtual encoder signal. To adjust the signal frequency to your application's situation, you can also set a frequency divider (see [2486h CSL3 Virtual Encoder Prescaler](#)).

The virtual encoder signal is emitted via the first two bits of this object as a 2-channel signal, similar to the pulses of the output signal of a real incremental encoder.

- Bit 0: Channel B of the virtual encoder
- Bit 1: Channel A of the virtual encoder

To output the virtual encoder signal via the two digital outputs of the controller, you need to assign the two bits to the two outputs:

- Set [247A_h](#):01_h and :02_h to "1", to activate the mapping function of the outputs.
- Set [247C_h](#):01_h and :02_h to "247A_h" (Index of the object).
- Set [247D_h](#):01_h and :02_h to "0" (Subindex of the object).
- Set [247E_h](#):01_h to "0" and :02_h to "1" (bit for channel B and A resp.).

You set the minimum pulse length in the object [2485h CSL3 Virtual Encoder Half Pulse Minimum Length](#).

2488h CSL3 Virtual Encoder Position

Function

The controller records the actual rotor position via the three hall sensor inputs and converts it in a virtual encoder signal (see [2487h CSL3 Virtual Encoder Signals](#)). You can find the resulting position in this object.

Object description

Index	2488 _h
Object name	CSL3 Virtual Encoder Position
Object Code	VARIABLE
Data type	INTEGER32

Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	v2143-B28123709
Change history	

2489h Hall Signals

Function

This object shows the current state of the three hall sensor inputs.

Object description

Index	2489 _h
Object name	Hall Signals
Object Code	VARIABLE
Data type	UNSIGNED8
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	v2143-B28123709
Change history	

Description

If a bit is "1", the corresponding hall sensor input is high.

- Bit 0: Hall 1
- Bit 1: Hall 2
- Bit 2: Hall 3

2490h Zero Velocity Window

Function

Specifies a symmetrical range in rpm relative to zero within which the actual velocity is considered to be zero.

Object description

Index	2490 _h
Object name	Zero Velocity Window
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	yes

Access	read / write
PDO mapping	no
Allowed values	
Preset value	0032 _h
Firmware version	v2143-B28123709
Change history	

Description

If the current speed deviates from zero by less than the value of this object, bit 0 in object [2492h Zero Velocity Flag](#) is set. The condition must be satisfied for longer than the time defined in object [2491h Zero Velocity Window Time_h](#).

2491h Zero Velocity Window Time

Function

The current speed must be within the "Zero Velocity Window" ([2490h Zero Velocity Window](#)) for this time (in milliseconds) for the speed to be considered to be zero.

Object description

Index	2491 _h
Object name	Zero Velocity Window Time
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0064 _h
Firmware version	v2143-B28123709
Change history	

Description

If the current speed deviates from zero by less than the value of the object [2490h Zero Velocity Window](#), bit 0 in object [2492h Zero Velocity Flag](#) is set. The condition must be satisfied for longer than the time defined in object [2491h Zero Velocity Window Time_h](#).

2492h Zero Velocity Flag

Function

Shows whether the current speed is zero.

Object description

Index	2492 _h
Object name	Zero Velocity Flag
Object Code	VARIABLE

Data type	UNSIGNED8
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	v2143-B28123709
Change history	

Description

If the current speed deviates from zero by less than the value of the object [2490h Zero Velocity Window](#), bit 0 in object [2492h Zero Velocity Flag](#) is set. The condition must be satisfied for longer than the time defined in object [2491h Zero Velocity Window Time](#).

2493h Homing Block Following Error

Function

If the actual position (in sensor increments) deviates so much from the demand position that the value of this object is exceeded, the homing on block is completed. The motor stands still and the current position is the new zero (home) position. You can find details in chapter [Homing on Block](#).

Object description

Index	2493 _h
Object name	Homing Block Following Error
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	001E _h
Firmware version	v2143-B28123709
Change history	

2800h Bootloader And Reboot Settings

Function

With this object, a reboot of the firmware can be triggered.

Object description

Index	2800 _h
Object name	Bootloader And Reboot Settings
Object Code	ARRAY
Data type	UNSIGNED32
Savable	no

Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	02 _h

Subindex	01 _h
Name	Reboot Command
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Subindex	02 _h
Name	Reboot Delay Time In Ms
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Description

The subindices have the following function:

- 01_h: If the value "746F6F62_h" is entered here, the firmware is rebooted.
- 02_h: Time in milliseconds: delays the reboot of the firmware by the respective time.

3202h Motor Drive Submode Select

Function

Controls the the changeover between *closed loop* / *open loop* and defines the motor type.

Object description

Index	3202 _h
Object name	Motor Drive Submode Select
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

■ Bit 0: Open Loop / Closed Loop

- Wert = "0": **Open Loop**
- Wert = "1": **Closed Loop**

Changeover between *open loop* and *closed loop* For BLDC motors, *closed loop* is to be used. For an optimal control, an [Auto setup](#) must be performed once.

■ Bit 6: Motor Type

- Wert = "1": **BLDC**

320Eh Closed Loop Controller Parameter

Function

Contains the control parameters for closed loop control.

Object description

Index	320E _h
Object name	Closed Loop Controller Parameter
Object Code	RECORD
Data type	CLOSED_LOOP_CONTROLLER_PARAMETER
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2143-B28123709
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported

Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	0F _h
<hr/>	
Subindex	01 _h
Name	Position Controller Kp [%]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h
<hr/>	
Subindex	02 _h
Name	Position Controller Tn [μs]
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h
<hr/>	
Subindex	03 _h
Name	Velocity Feed Forward [%]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h
<hr/>	
Subindex	04 _h
Name	Max Position Deviation
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000064 _h
<hr/>	
Subindex	05 _h
Name	Max Motor Speed
Data type	UNSIGNED32
Access	read / write
PDO mapping	no

Allowed values	
Preset value	00007FFF _h
<hr/>	
Subindex	06 _h
Name	Velocity Controller Kp [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	1388 _h
<hr/>	
Subindex	07 _h
Name	Velocity Controller Tn [μs]
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00030D40 _h
<hr/>	
Subindex	08 _h
Name	Acceleration Feed Forward [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
<hr/>	
Subindex	09 _h
Name	Max Velocity Deviation
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00007FFF _h
<hr/>	
Subindex	0A _h
Name	Max Current [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0BB8 _h
<hr/>	

Subindex	0B _h
Name	Current Controller Kp [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h
Subindex	0C _h
Name	Current Controller Tn [μs]
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00009C40 _h
Subindex	0D _h
Name	Voltage Feed Forward [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	03E8 _h
Subindex	0E _h
Name	Max Current Deviation [%o]
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0BB8 _h
Subindex	0F _h
Name	Max Voltage [mV]
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	000003E8 _h

Description

- Subindex 00_h: Number of entries
- Subindex 01_h: Gain factor (proportional component) of the position controller in tenths of a percent

- Subindex 02_h: Reset time (integral component) of the position controller in microseconds
- Subindex 03_h: Speed feed forward in tenths of a percent. The only permissible value is 1000 and, thus, a factor of 1.
- Subindex 04_h: Maximum control deviation of the position controller in sensor increments
- Subindex 05_h: Maximum permissible speed of the motor in rpm.
- Subindex 06_h: Gain factor (proportional component) of the velocity controller in tenths of a percent
- Subindex 07_h: Reset time (integral component) of the velocity controller in microseconds
- Subindex 08_h: Not implemented.
- Subindex 09_h: Maximum control deviation of the velocity controller in rpm
- Subindex 0A_h: Maximum current in tenths of a percent of the set rated current ([203Bh I2t Parameters](#))
- Subindex 0B_h: Gain factor (proportional component) of the current controller in tenths of a percent
- Subindex 0C_h: Reset time (integral component) of the current controller in microseconds
- Subindex 0D_h: Not implemented.
- Subindex 0E_h: Maximum control deviation of the current controller in tenths of a percent
- Subindex 0F_h: Not implemented.

3220h Analog Inputs

Function

Displays the instantaneous values of the analog inputs in millivolt.

Object description

Index	3220 _h
Object name	Analog Inputs
Object Code	ARRAY
Data type	INTEGER16
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Analog Input 1
Data type	INTEGER16

Access	read only
PDO mapping	no
Allowed values	
Preset value	0000 _h

3390h Feedback HALL

Function

Contains configuration values for the Hall sensors. The values are determined by the [Auto setup](#).

Object description

Index	3390 _h
Object name	Feedback HALL
Object Code	ARRAY
Data type	UNSIGNED16
Savable	yes
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	v2145-B15165629
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	0C _h

Subindex	01 _h
Name	1st Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	7E93 _h

Subindex	02 _h
Name	2nd Alignment

Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	D3E8 _h
Subindex	03 _h
Name	3rd Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	A93E _h
Subindex	04 _h
Name	4th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	293F _h
Subindex	05 _h
Name	5th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	53E9 _h
Subindex	06 _h
Name	6th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	FE94 _h
Subindex	07 _h
Name	7th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no

Allowed values	
Preset value	A93D _h
<hr/>	
Subindex	08 _h
Name	8th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	FE92 _h
<hr/>	
Subindex	09 _h
Name	9th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	D3E8 _h
<hr/>	
Subindex	0A _h
Name	10th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	53E9 _h
<hr/>	
Subindex	0B _h
Name	11th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	7E93 _h
<hr/>	
Subindex	0C _h
Name	12th Alignment
Data type	UNSIGNED16
Access	read / write
PDO mapping	no
Allowed values	
Preset value	293E _h

4014h Operating Conditions

Function

This object is used to read out the current environment values for the controller.

Object description

Index	4014 _h
Object name	Operating Conditions
Object Code	ARRAY
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	Firmware version v2150-B151338: entry "Name" changed from "Temperature Microcontroller Chip [Celsius * 10]" to "Temperature Microcontroller Chip [Celsius * 10]".

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	05 _h

Subindex	01 _h
Name	Voltage UB Power [mV]
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Subindex	02 _h
Name	Voltage UB Logic [mV]
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	

Preset value	00000000 _h
Subindex	03 _h
Name	Temperature PCB [Celsius * 10]
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Subindex	04 _h
Name	Temperature Motor [Celsius * 10]
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Subindex	05 _h
Name	Temperature Microcontroller Chip [Celsius * 10]
Data type	INTEGER32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Description

The subindices contain:

- 01_h and 02_h: Current voltage supply voltage in [mV]
- 03_h, 04_h and 05_h: Current temperature of the control board in [d°C] (tenths of degree)

4040h Device Serial Number

Function

This object contains the serial number of the controller.

Object description

Index	4040 _h
Object name	Device Serial Number
Object Code	VARIABLE
Data type	VISIBLE_STRING
Savable	no
Access	read only

PDO mapping	no
Allowed values	
Preset value	0
Firmware version	CSL3-FIB-v2119-B141418
Change history	

4041h Device ID

Function

This object contains the ID of the device.

Object description

Index	4041 _h
Object name	Device ID
Object Code	VARIABLE
Data type	OCTET_STRING
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	0
Firmware version	CSL3-FIB-v2119-B141418
Change history	

4042h Bootloader Infos

Object description

Index	4042 _h
Object name	Bootloader Infos
Object Code	ARRAY
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported

Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	03 _h
<hr/>	
Subindex	01 _h
Name	Bootloader Version
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00010000 _h
<hr/>	
Subindex	02 _h
Name	Bootloader Supported Field Buses
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00010004 _h
<hr/>	
Subindex	03 _h
Name	Bootloader HW Group
Data type	UNSIGNED32
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000092 _h

Description

The subindices have the following functions:

- 01_h: Version of the boot loader. The 4 most significant bytes contain the main version number; the 4 least significant bytes contain the minor version number. Example for version 4.2: 00040002_h
- 02_h: Fieldbuses supported by the boot loader. Bit 2 means RS232, bit 16 Modbus RTU.
- 03_h: Bootloader Hardware group.

603Fh Error Code

Function

This object returns the error code of the last error that occurred (see object 1003_h).

Object description

Index	603F _h
-------	-------------------

Object name	Error Code
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	0000 _h
Firmware version	CSL3-FIB-v21119-B141418
Change history	

6040h Control Word

Function

This object controls the *Power State Machine* (based on standard CiA-402). Depending on the control mode, the *Power State Machine* can be controlled via the input signals (see 2481h CSL3 Operation Settings).

Object description

Index	6040 _h
Object name	Control Word
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000 _h
Firmware version	CSL3-FIB-v21119-B141418
Change history	

Description

Parts of the object are, with respect to function, dependent on the currently selected mode.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
						OMS	HALT	FR		OMS [3]		EO	QS	EV	SO

SO (Switched On)

Value = "1": Switches to the "Switched on" state

EV (Enable Voltage)

Value = "1": Switches to the "Enable voltage" state

QS (Quick Stop)

Not implemented

EO (Enable Operation)

Value = "1": Switches to the "Enable operation" state

OMS (Operation Mode Specific)

Not implemented

FR (Fault Reset)

Resets an error (if possible)

HALT

Not implemented

6041h Status Word**Function**

This object returns information about the status.

Object description

Index	6041 _h
Object name	Status Word
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	0000 _h
Firmware version	CSL3-FIB-v21119-B141418
Change history	

Description

Parts of the object are, with respect to function, dependent on the currently selected mode. Refer to the corresponding section in chapter.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
CLA		OMS [2]	ILA	TARG	REM	SYNC	WARN	SOD	QS	VE	FAULT	OE	SO	RTSO	

RTSO (Ready To Switch On)

Value = "1": Controller is in the "Ready to switch on" state

SO (Switched On)

Value = "1": Controller is in the "Switched on" state

OE (Operation Enabled)

Value = "1": Controller is in the "Operation enabled" state

FAULT

Error occurred

VE (Voltage Enabled)

Voltage applied

QS (Quick Stop)

Not implemented

SOD (Switched On Disabled)

Value = "1": Controller is in the "Switched on disabled" state

WARN (Warning)

Not implemented

SYNC (synchronization)

Not implemented

REM (Remote)

Not implemented

TARGTarget reached (see [606Dh Velocity Window](#) or [6067h Position Window](#) depending on operating mode)**ILA (Internal Limit Active)**

Not implemented

OMS (Operation Mode Specific)

Not implemented

CLA (Closed Loop Active)

Not implemented

Listed in the following table are the bit masks that break down the state of the controller.

Statusword (6041 _h)	State
xxxx xxxx x0xx 0000	Not ready to switch on
xxxx xxxx x1xx 0000	Switch on disabled
xxxx xxxx x01x 0001	Ready to switch on
xxxx xxxx x01x 0011	Switched on
xxxx xxxx x01x 0111	Operation enabled
xxxx xxxx x00x 0111	Quick stop active
xxxx xxxx x0xx 1111	Fault reaction active
xxxx xxxx x0xx 1000	Fault

6044h Velocity Actual Value**Function**

Specifies the current actual speed in rpm.

Object description

Index	6044 _h
Object name	Velocity Actual Value
Object Code	VARIABLE
Data type	INTEGER32
Savable	no

Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6060h Modes Of Operation

Function

The desired operating mode is entered in this object.

Object description

Index	6060 _h
Object name	Modes Of Operation
Object Code	VARIABLE
Data type	INTEGER8
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

Mode	Description
-2	Auto setup
1	Profile Position Mode
3	Profile Velocity Mode

6061h Modes Of Operation Display

Function

Indicates the current operating mode. See also [6060h Modes Of Operation](#).

Object description

Index	6061 _h
Object name	Modes Of Operation Display
Object Code	VARIABLE
Data type	INTEGER8
Savable	yes

Access	read only
PDO mapping	no
Allowed values	
Preset value	03 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6062h Position Demand

Function

Indicates the current demand position in sensor increments.

Object description

Index	6062 _h
Object name	Position Demand
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	v2143-B28123709
Change history	

Description

6063h Position Actual Internal Value

Function

Contains the current actual position in hall sensor increments.

Object description

Index	6063 _h
Object name	Position Actual Internal Value
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6064h Position Actual Value

Function

Contains the current actual position.

Object description

Index	6064 _h
Object name	Position Actual Value
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6065h Following Error Window

Function

Defines the maximum allowed following error in sensor increments symmetrically to the demand position.

If the actual position deviates so much from the demand position that the value of this object is exceeded, bit 13 in object 6041_h is set. The deviation must last longer than the time in object 6066_h.

If the value of the "Following Error Window" is set to "FFFFFFF"_h, following error monitoring is switched off.

Object description

Index	6065 _h
Object name	Following Error Window
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000100 _h
Firmware version	v2143-B28123709
Change history	

Description

6066h Following Error Time Out

Function

Time in milliseconds until a larger following error results in an error message.

If the actual position deviates so much from the demand position that the value of object 6065_h is exceeded, bit 13 in object 6041_h is set. The deviation must persist for longer than the time defined in this object.

Object description

Index	6066 _h
Object name	Following Error Time Out
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0064 _h
Firmware version	v2143-B28123709
Change history	

6067h Position Window

Function

Specifies a range symmetrical to the target position within which that target is considered having been met in the Profile Position mode.

If the current position deviates from the target position by less than the value of this object, bit 10 in object 6041_h is set. The condition must be satisfied for longer than the time defined in object 6068_h.

If the value is set to "FFFFFFF"_h, monitoring is switched off.

Object description

Index	6067 _h
Object name	Position Window
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0000000A _h
Firmware version	v2143-B28123709
Change history	

6068h Position Window Time

Function

The current position must be within the "Position Window" (6067_h) for this time in milliseconds for the target position to be considered having been met in the profile position mode.

If the current position deviates from the target position by less than the value of object 6067_h, bit 10 in object 6041_h is set. The condition must be satisfied for longer than the time defined in object 6068_h.

Object description

Index	6068 _h
Object name	Position Window Time
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	0064 _h
Firmware version	v2143-B28123709
Change history	

Description

606Bh Velocity Demand

Function

Speed specification for the velocity controller in rpm.

Object description

Index	606B _h
Object name	Velocity Demand
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

This object contains the output of the ramp generator, which simultaneously serves as the preset value for the velocity controller.

606Ch Velocity Actual Value

Function

Current actual speed in rpm.

Object description

Index	606C _h
Object name	Velocity Actual Value
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

606Dh Velocity Window

Function

Specifies a symmetrical range relative to the target speed within which the target is considered having been met in the *Profile Velocity* mode.

Object description

Index	606D _h
Object name	Velocity Window
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	012C _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

If the current speed deviates from the set speed by less than the value of this object, bit 10 in object 6041_h is set. The condition must be satisfied for longer than the time defined in object 606Eh Velocity Window Time).

606Eh Velocity Window Time

Function

The current speed must be within the "Velocity Window" (606D_h) for this time (in milliseconds) for the target to be considered having been met.

Object description

Index	606E _h
Object name	Velocity Window Time
Object Code	VARIABLE
Data type	UNSIGNED16
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00C8 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

If the current speed deviates from the set speed by less than the value of object 606D_h, bit 10 in object 6041_h is set. The condition must be satisfied for longer than the time defined in the object (see also).

607Ah Target Position

Function

This object specifies the target position in sensor increments for the Profile Position mode.

Object description

Index	607A _h
Object name	Target Position
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	v2143-B28123709
Change history	

6081h Profile Velocity

Function

Specifies the maximum travel speed for the position mode in rpm.

Object description

Index	6081 _h
Object name	Profile Velocity
Object Code	VARIABLE
Data type	INTEGER32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	000001F4 _h
Firmware version	v2143-B28123709
Change history	

Description

6083h Profile Acceleration

Function

Specifies the maximum acceleration in rpm per second.

Object description

Index	6083 _h
Object name	Profile Acceleration
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	000001F4 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6084h Profile Deceleration

Function

Specifies the maximum deceleration (deceleration ramp) in rpm per second.

Object description

Index	6084 _h
Object name	Profile Deceleration
Object Code	VARIABLE
Data type	UNSIGNED32

Savable	yes
Access	read / write
PDO mapping	no
Allowed values	
Preset value	000001F4 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

60F4h Following Error Actual Value

Function

This object contains the current following error in sensor increments.

Object description

Index	60F4 _h
Object name	Following Error Actual Value
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	v2143-B28123709
Change history	

60FDh Digital Inputs

Function

With this object, the digital inputs can be read.

Object description

Index	60FD _h
Object name	Digital Inputs
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

- Bit 0: If the bit is set to "1", input 1 is high.
- Bit 1: If the bit is set to "1", input 2 is high.
- Bit 2: If the bit is set to "1", input 3 is high.
- Bit 3: If the bit is set to "1", input 4 is high.

60FEh Digital Outputs

Function

With this object, the digital outputs can be written. Depending on the function defined in [247Ah Digital Outputs Function](#), the outputs can be controlled automatically by the controller.

Object description

Index	60FE _h
Object name	Digital Outputs
Object Code	ARRAY
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Value description

Subindex	00 _h
Name	Highest Sub-index Supported
Data type	UNSIGNED8
Access	read only
PDO mapping	no
Allowed values	
Preset value	01 _h

Subindex	01 _h
Name	Digital Outputs #1
Data type	UNSIGNED32
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h

Description

The following applies for subindex 1:

- Bit 16: Set the bit to "1" to switch output 1.
- Bit 17: Set the bit to "1" to switch output 2.

60FFh Target Velocity

Function

In this object, the target speed is entered for *Profile Velocity* mode.

Object description

Index	60FF _h
Object name	Target Velocity
Object Code	VARIABLE
Data type	INTEGER32
Savable	no
Access	read / write
PDO mapping	no
Allowed values	
Preset value	00000000 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

6502h Supported Drive Modes

Function

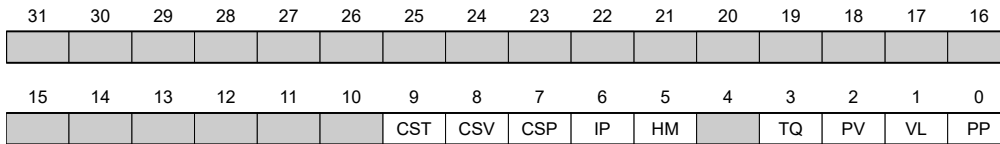
The object describes the supported operating modes in object 6060_h.

Object description

Index	6502 _h
Object name	Supported Drive Modes
Object Code	VARIABLE
Data type	UNSIGNED32
Savable	no
Access	read only
PDO mapping	no
Allowed values	
Preset value	00000005 _h
Firmware version	CSL3-FIB-v2119-B141418
Change history	

Description

The set bit specifies whether the respective mode is supported. If the value of the bit is "0", the mode is not supported.



PP

Profile Position Mode

VL

Velocity Mode

PV

Profile Velocity Mode

TQ

Torque Mode

HM

Homing Mode

IP

Interpolated Position Mode

CSP

Cyclic Synchronous Position Mode

CSV

Cyclic Synchronous Velocity Mode

CST

Cyclic Synchronous Torque Mode

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7.2 AES

FIPS-197 compliant AES implementation

Based on XySSL: Copyright (C) 2006-2008 Christophe Devine

Copyright (C) 2009 Paul Bakker <polarssl_maintainer at polarssl dot org>

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The AES block cipher was designed by Vincent Rijmen and Joan Daemen.

<http://csrc.nist.gov/encryption/aes/rijndael/Rijndael.pdf>

<http://csrc.nist.gov/publications/fips/fips197/fips-197.pdf>

7.3 MD5

MD5C.C - RSA Data Security, Inc., MD5 message-digest algorithm

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