



 Transportation Solutions

LION Configuration Framework (LCF Tool)

Application manual

Part II: Configuration tool for LOGIC

Version 01

Contact

Lütze Transportation GmbH
Bruckwiesenstrasse 17-19
71384 Weinstadt - Großheppach
Germany

Phone: +49/ (0)7151 6053-545

E-Mail: Sales.Transportation@luetze.de

Internet: <https://www.luetze-transportation.com>

Table of Contents

1	Introduction.....	5
1.1	Navigation.....	6
2	General information.....	7
2.1	Symbol description	7
2.1.1	Safety messages	7
2.1.2	Handling notes.....	7
2.2	Copyright	8
2.3	Disclaim of liability	8
2.4	Other applicable documents	8
2.5	QR code – Product information	9
3	Terms and abbreviations	10
3.1	Terminology	10
3.2	Abbreviations	11
4	System planning	14
4.1	General information	14
5	Download and Installation	15
5.1	Options for downloading	15
5.2	Installation.....	15
5.3	Brief description of the LCF Configurator LOGIC	16
6	Introduction to the LCF Tool	17
6.1	Brief description of the LION LCF Tool.....	17
6.2	Brief description of the Configurator HEAD	18
6.3	Brief description of the Configurator LOGIC	18
7	General Settings – Configurator LOGIC	19
7.1	Menu settings	19
7.1.1	Creating a file: File > New.....	19
7.1.2	Open a file: File > Open.....	19
7.1.3	Save a file: File > Save	20
7.1.4	Close a file: File > Close / Close all	21
7.1.5	Exit the file: File > Exit	22
7.2	Toolbar buttons.....	23
7.2.1	Configurator LOGIC.....	23
7.3	Menu item Home (start page).....	24
8	Configurator HEAD – MVB Configurator	25
9	Configurator HEAD – TRDP Slave Configurator.....	26
10	Safe CCU Calculator.....	27
10.1	Creating a new calculator file.....	27
10.1.1	New IODB file via the menu bar or toolbar	27
10.1.2	The predefined rules for configuration	29
10.1.3	Calculating the power consumption	32
10.1.4	Arranging the modules.....	33
10.1.5	Warnings and error handlings.....	45
10.1.6	Zoom in/out of the display size	48
10.1.7	Device Wizard.....	48
10.1.8	Delete modules.....	49
10.1.9	IODB Properties.....	49
10.2	How to create a Safe CCU - Calculator report.....	50
10.3	The power consumption area	51

11	Configurator LOGIC – MVB Configurator	52
11.1	DIOLINE PLC – In Brief	52
11.1.1	Programming and Configuration	53
11.1.2	LION Safe CCU – In Brief	54
11.1.3	Further notes on LION Safe CCU	55
11.1.4	Programming and Configuration	55
11.1.5	Creating a new NSDB configuration file	56
11.1.6	Creating additional NSDB files	57
11.1.7	MVB slave data types of NSDB files	57
11.1.8	Importing existing NSDB files	57
11.1.9	General NSDB Information	58
11.2	General configuration of the ports	60
11.2.1	Creating new reports	60
11.2.2	Port settings	61
11.2.3	Port size	65
11.3	Creating a new source port	66
11.3.1	Functionality of the update button	67
11.3.2	The functionality of the Clear button	68
11.3.3	Create a new port with Clear	68
11.3.4	Activating SDTv2 for the source port	70
11.4	Creating a new Sink Port	71
11.4.1	Activating SDTv2 for the source port	72
11.5	Create signals	73
11.5.1	Offset	74
11.5.2	Data types - type	75
11.5.3	The Check-Variable (CV)	76
11.6	Create a new NSDB report	77
11.7	Create NSDB report with checksum	80
11.8	Notes	81
12	Configurator LOGIC – TRDP Configurator	82
12.1	LION Safe CCU – In Brief	82
12.1.1	Further notes on LION Safe CCU	83
12.1.2	Programming and Configuration	84
12.2	Creating a new TDB configuration file	84
12.2.1	Creating a new configuration file	84
12.2.2	Importing existing TRDP/XML files	85
12.2.3	General TRDP-Information	85
12.3	Create TRDP/XML configurations	88
12.3.1	Creating a data structure for MultiProg®	88
12.4	DataSets	93
12.4.1	Adding a new DataSet	93
12.5	The Elements of the DataSets	94
12.5.1	Creating Elements	94
12.5.2.1	Create a new diagnostic DataSet in the selected DataSet	95
12.5.3	Create a new element in the selected DataSet	96
12.5.4	Data type / Data type (element property)	98
12.5.5	Rearranging the elements	99
12.5.6	ArraySize / Array size (element property)	100
12.5.7	Special representation of nested data	100
12.6	Create a diagnostic data set	102
12.7	Com-Parameter	107
12.8	Bus interfaces	108
12.8.1	TRDP-Process	109
12.8.2	MD-COM-Parameter	110
12.8.3	PD-Com-Parameter	111
12.9	Telegrams	111
12.9.1	Create a new telegram	112

12.9.2	Changing the direction of a telegram	114
12.9.3	Connection between DataSets, telegrams and elements	115
12.9.4	Special case Diagnosis DataSet as telegram	115
12.10	Message data telegrams (MD parameters)	117
12.10.1	MD telegram as source telegram	117
12.10.2	MD telegram as sink telegram	118
12.11	Process data-telegrams (PD-Parameters)	118
12.11.1	PD telegrams as sink telegrams	118
12.11.2	PD telegrams as source telegrams	120
12.12	Creating a new TRDP report	122
12.13	Creating a TRDP report with checksum	125
12.14	Notes	127
13	Troubleshooting - Configurator LOGIC	128
14	Further Information	129
14.1	Current version of the LION LCF Tool	129
14.2	Software versions	129
14.3	EULA LION Configuration Framework	133
14.4	Application manuals	134
15	Service	135
16	Shutdown and disposal	136
16.1	Regulations	136
16.2	Data security	136
17	Revision of the document	137
18	Annexes Configurator LOGIC	138
18.1	DIOLINE PLC - Product family overview	138
18.2	LION Safe CCU - Overview	140

The company Lütze Transportation GmbH reserves the right to make changes to its products in the interest of technical development. These changes are not necessarily documented in each individual case.

This application manual is part of the product family and contains important information on safety and operation. Read this document before use to avoid possible dangers and to ensure proper use.

This application manual and the information contained herein have been compiled with due care. However, the company Lütze Transportation GmbH accepts no liability for printing or other errors or any resulting damage.

The brands and product names mentioned in this system description are trademarks or registered trademarks of their respective titleholders.

For the sole purpose of better readability, gender-specific spelling and multiple designations are not used. All personal designations should nevertheless be regarded as gender-neutral.

© Copyright 2025 by Lütze Transportation GmbH. All rights reserved.

1

Introduction

This document is an integral part of the LION product family.

The document is divided into two main sections:

- **Part 1: LION LCF Tool Configuration HEAD**
Application manual for LION HEADs (Bus coupler)
- **Part 2: LION LCF TOOL Configuration LOGIC**
Application manual for LION LOGIC (DIOLINE PLC und LION Safe CCU)

This document contains important information about the application and security of the LION LÜTZE Configuration Framework (LCF) software.

The LION LCF is a tool for the planning and configuration of a LION system. The tool supports the user in all project phases. Starting with the planning of the I/O stations, via the fieldbus configuration right up to the supporting documentation for the safety verification.

! Important technical information: **Valid for SW version: V2.10.0000 and higher.**



To avoid hazardous situations, these instructions must be read and understood before installing, operating, maintaining or dismantling the device.

NOTICE This applies to every person who is getting in touch with the product. Trained personnel and experts, especially qualified persons who have worked with similar products before, have to read and understand this document as well.

⚠ CAUTION: Risk of injury and damage to equipment caused by failure to read and observe the operating instructions

The instructions contain important information on safety, commissioning, operation, maintenance, and disposal of the corresponding device.

Before installation or use, carefully read these instructions in order to rule out possible dangers and damage and to ensure correct use.



NOTE: Always keep the document available.

This applies until the product is disposed of. In cases of sale, rental or disposal, pass the



✓ **Tip: These instructions and further information are available on the website of the Friedrich Lütze GmbH:**

<https://www.luetze-transportation.com/>

Search for the **article number**, or the product name.

1.1

Navigation

Short summary

An “Advance Organizer” at the beginning of each chapter provides a brief summary of what the chapter is about.

This makes it easier to decide whether the content is relevant. The presentation can vary depending on the topic. For example, it can be a concept map, a diagram, or a short enumeration.

Color coding guides the user through this document along the product life cycle. This can contain different color information depending on the product and document type.

Short route to the destination:

There are three landing pages with hotspots. If you click on them, you will jump automatically to the required chapter.

Small icons at the bottom of the page for quick navigation

◀ Jumps one page backwards

▶ Jumps one page forward

🌐 Jumps to TOC (starting page)

2 General information

Short summary

Here you can find out what the symbols and safety notes mean.


In addition, you receive information on standards and regulations, copyright, label and QR code.


2.1 Symbol description


2.1.1 Safety messages

This document contains safety information, which is characterized by a signal word in combination with a specific color to indicate the warning level. The information highlights possible dangers and gives instructions on how to avoid them.

 **⚠ DANGER** Indicates a dangerous situation that leads to death or serious injuries if not observed.

 **⚠ WARNING** Indicates a dangerous situation that can lead to death or serious injuries if not observed.


 **⚠ CAUTION:** Indicates a dangerous situation that can lead to slight or moderate injuries if not observed.


 **NOTE:** Indicates a situation that could damage the product or the environment. This notice does not apply to personal injuries.

2.1.2 Handling notes

 Important technical information: Indicates technically important information to operate the device safely.

 Tool: Indicates the use of tools.

 Tip: Indicates further information, such as the Lütze Transportation download page.

 Service: Indicates the contact address for getting support or more information.

 Chapter: Points to other chapters to enhance understanding.

2.2**Copyright**

This document is intended for the operator and his staff. It is prohibited to give the content to a third party, to duplicate, exploit or impart it. The Lütze Transportation GmbH has to allow it explicit in writing.

General data, text, images, and drawings are copyrighted and subject to industrial property rights. Contravention will be prosecuted. The named brands and product names in this document are trademarks or registered trademarks owned by the respective titleholder.

2.3**Disclaim of liability**

This document was written in consideration of the applied standards, regulations and the current state of technology.

The correctness of the content has been verified. Discrepancies are not excluded. For these discrepancies, we disclaim liability. Applicable changes and additional information will be in the next version of this document.

The following causes are not covered by the Lütze Transportation GmbH liability policy:

- Nonobservance of this document
- Untrained and unqualified employees
- Non-conventional use
- Non-approved reconstructions and functional modifications of the product
- Using non-original or non-admitted parts or equipment

2.4**Other applicable documents**

When operating the software, also observe all operating instructions supplied with other components of your system.

For clarity's sake, we also want to make it clear that these operating instructions do not cover every potential issue that could arise from using this device. If you require further information or if specific problems arise that are not covered in sufficient detail in these operating instructions, you can request the necessary information from our service department at any time.

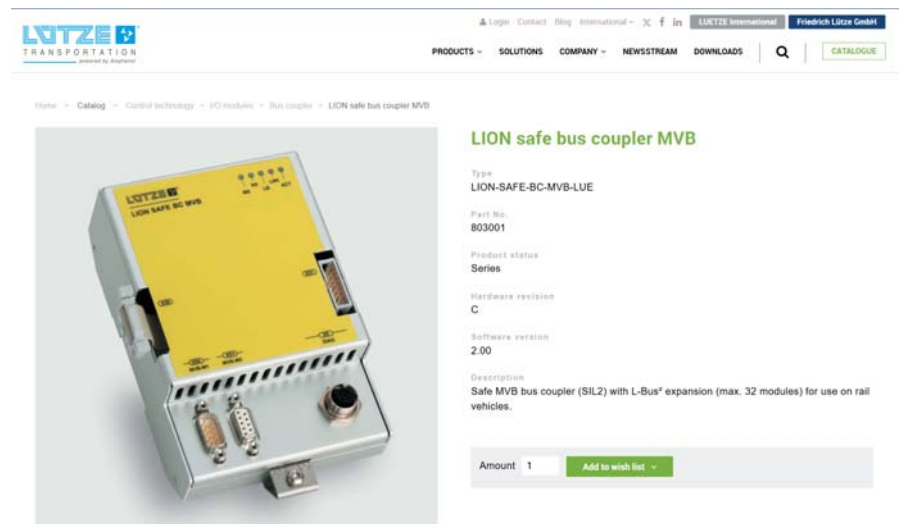
2.5

QR code – Product information

The QR code will lead you to additional product information from the online catalogue on the Lutze Transportation website.

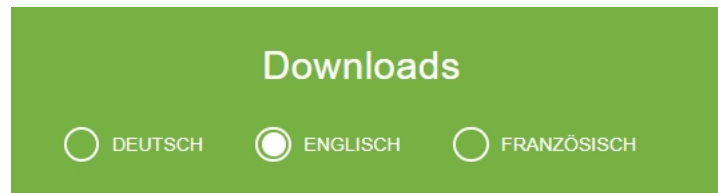
To obtain this information, follow these instructions:

1. Scan the QR code with a smartphone or other device that can read QR codes.
2. The default browser opens with the corresponding page.



3. Choose a language.

4. Seek Downloads to download additional technical documentation.



803001
LION-SAFE-BC-MVB-LUE



803002
LION-SAFE-BC-ETH-LUE

3

Terms and abbreviations

3.1

Terminology

In this document, we use the following terms that are defined exactly below:

Term	Definition
Actor	Synonym for actuator
Bus coupler or Gateway	<p>see HEAD</p> <p>Interface between the vehicle's master computer and the L-Bus² for controlling the I/O modules. The synonym HEAD is used in the customer documents.</p> <p>Bus coupler - requires a configuration file for data mapping between L-Bus² and fieldbus.</p> <p>Gateway - can be configured by the user directly on the device.</p>
DEVICE	A DEVICE is a communication device on the L-Bus ² . It is an I/O module that is addressed by the HEAD within the I/O station at startup and receives or sends data during operation, on request from the HEAD.
Fieldbus	fieldbus is a synonym for any bus system to connect one or more modules that have to exchange data with each other. A fieldbus is used for data communication within a rail vehicle (e.g., MVB, TRDP).
HEAD	<p>The term HEAD refers to the LION subsystem and the internal communication bus L-Bus², respectively.</p> <p>The HEAD is the system master of the I/O station and controls the communication with the I/O modules.</p>
I/O Module	<p>Modules for reading in or outputting digital or analog signals in different variants or for special tasks.</p> <p>Each I/O module has an L-Bus² interface in the slave version for communication with an L-Bus² master (HEAD).</p>
I/O Station	<p>A complete unit with a HEAD and one or more DEVICES is called an I/O station.</p> <p>The I/O station is put together in the LCF after which (all fieldbus data or device configuration settings are configured or assigned to it).</p>
L-Bus	1st generation Lütze bus system for communication between I/O modules and a PLC control system. It is based on RS-485 and is used, for example, in the DIOLINE PLC.
LOGIC	The LOGIC is the data processing component of the train. (Equivalent terms are VCU or PLC.)
Train consist	Central control of the vehicle, which communicates with the bus coupler via an interface (fieldbus).

3.2

Abbreviations

In this document we use the following abbreviations:

Abbreviation	Definition
AC	Alternating current
AI	Analog input
AERR	Application error
AO	Analog output
BC	Bus coupler - the LION Bus coupler. It is also called HEAD in the LION system.
CCU	Compact Control Unit
CH	Channel
CPU	Central Processing Unit
CRC	A cyclic redundancy check is an error detection code commonly used in digital networks and storage devices to detect accidental changes to raw data. It generates a safety checksum.
CON	Configuration error
DC	Direct current
DI	Digital input
DIAG	Diagnostic information
DO	Digital output
EMC	Electromagnetic compatibility
EN	European Standard
ERR	Error (test pulse error)
ESD	Electrostatic discharge
EXTV	External voltage
FR	Failure Rate (formerly HR – Hazard Rate)
GPIO	General Input/Output pin on the controller
GND	Ground
I/O	Input/Output
IEEE	Institute of Electrical and Electronics Engineers

Abbreviation	Definition
IODB	Input/Output Data Base
IP address	An Internet Protocol address is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication. An IP address serves two main functions: host or network interface identification and location addressing.
IP code	ingress protection code (e.g., IP20)
L-Bus²	L-Bus ² is the short form of " Lütze Bus 2 ". Lütze's own communication bus is used by LION, which is based on RS485.
LCF	LION Configuration Framework
LION	Lütze Input/Output Network
LION LCF	LION (Lütze) Configuration Framework, especially for the configuration of the LION system
MTBF	Mean time between failures
MTTR	Mean time to repair
MVB	Multifunction Vehicle Bus
NSDB file	The NSDB file is a configuration file for an I/O station with a SIL2 Bus coupler MVB. The input, output, and diagnostic data of the MVB ports of the I/O station are assigned there. The NSDB file can be used to configure individual modules of the I/O station during commissioning. The NSDB file is created exclusively with the LCF configuration tool and assigned to the bus coupler.
PE	Protective Earth
PLC	A programmable controller is a device that is used to control or regulate a machine or system and is programmed on a digital basis. (See also LOGIC)
PS	Power supply or supply voltage
PST	Process Safety Time
RAMS	Reliability, Availability, Maintainability, and Safety
RO	Relay output
SCC	Switching cycle counter
SDTv2	The Safe Data Transmission Protocol is defined in the standard IEC 61375-2. NOTE: The Safe Data Transmission Protocol (STDv2) is basically explained in the LION System Description chapter "Safety layer SDTv2".
SIL	Safety integrity level

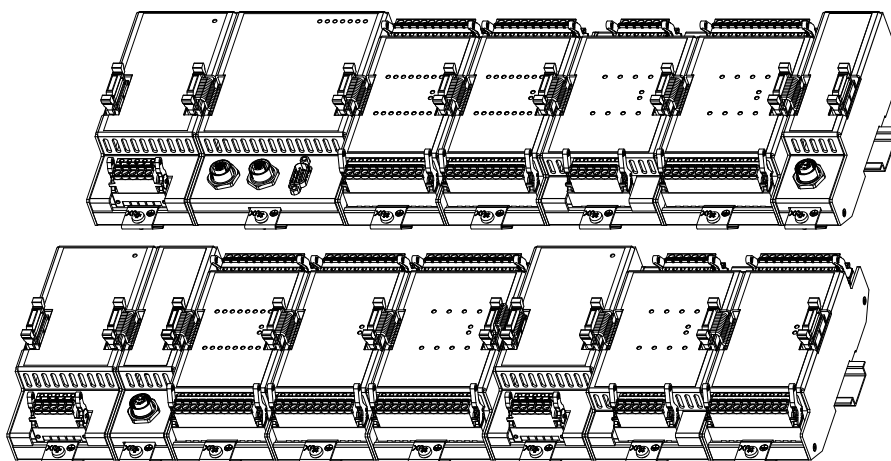
Abbreviation	Definition
OP	Operating system
OS	The Linux Foundation's open-source project Yocto provides tools and processes for embedded and IoT software, regardless of the underlying structure of the hardware architecture, to create a Linux distribution.
SO	Switching output
TCMS	Train Control and Management System
TDB file	The TDB file is a configuration file for an I/O station with a TRDP bus coupler; the input, output, and diagnostic data for the TRDP ports of the I/O station are assigned there. The TDB file can be used to configure individual modules of the I/O station during commissioning. The TDB file is created exclusively with the LCF configuration tool and assigned to the bus coupler.
THR	Tolerable Hazard Rate
TR	Transistor
TRDP	Train Realtime Data Protocol
TH35	The top hat rail (TH35 according to IEC 60715, formerly known as TS 35 according to EN 5002) is a mounting rail with a top hat profile. A mounting rail, also known as a DIN rail, is a universal carrier made of a sheet metal profile in electrical engineering for fastening electrical equipment in distribution boxes, switch cabinets, terminal boxes, etc.
VCU	Vehicle Unit Control (See also LOGIC)
VDP	Vital Data Package (See also SDTV2)

4 System planning

4.1 General information

NOTICE The texts on the images and screenshots in this document, especially on the buttons, may partially appear in the local language due to the browser and system language settings. All texts that we can influence are written in English.

Chapter: The chapter „System planning“ can be found in the corresponding document „LION System description“.



✓ Tip: You can find the LION system description on the Lütze Transportation website: www.luetze-transportation.com.

For example, enter the article number 803002 in the search field or use the QR code on page 135.

Select the product from the displayed search results.

At the bottom of the respective product page, you will find the documents related to the product.

5

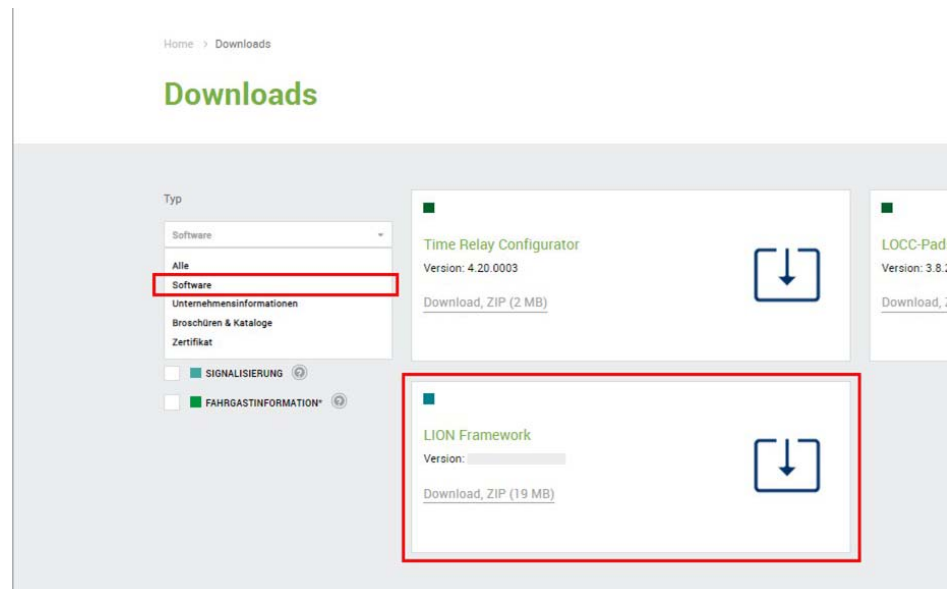
Download and Installation

5.1

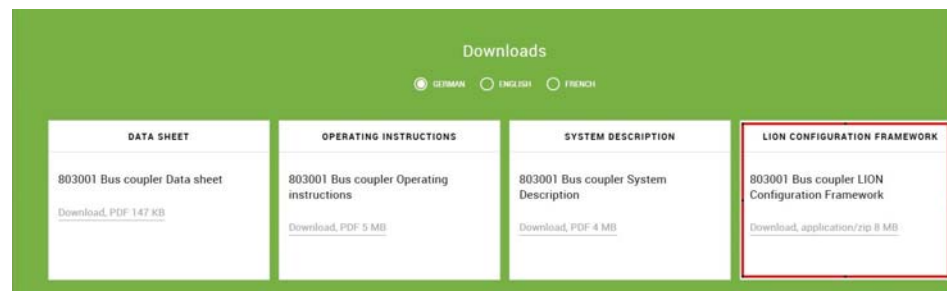
Options for downloading

The software tool LION Configuration Framework (LCF) can be downloaded free of charge from the LÜTZE Transportation website at the following locations:

1. In the general download area of the Lütze Transportation website:



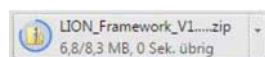
2. In the download area of the product page of a LION bus coupler (HEAD):



5.2

Installation

1. Select a directory on your PC.
2. Unzip the downloaded file.



3. Double-click on the file LION Framework.exe



4. The LION LCF Tool starts.

! Important technical information: **No further installation required.**

Part II: Configurator LOGIC

Definition

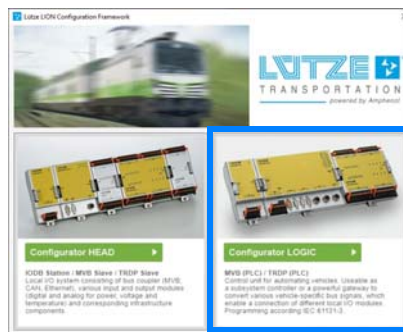
A Logic is the control device for the automatization of vehicles.

The LION LOGIC can be used as a subsystem controller or as a powerful gateway for implementing various vehicle-specific bus signals that enable the connection of various local I/O modules.

The LION LOGIC does NOT refer to the higher-level train system (which is also called LOGIC).

5.3

Brief description of the LCF Configurator LOGIC



The *configuration of the LOGIC* refers to the structure of

Safe CCU Calculator

[chapter 10 on page 27](#)

MVB Configurator LOGIC

[chapter 11 on page 52](#)

TRDP Configurator LOGIC

[chapter 12 on page 82](#)

6

Introduction to the LCF Tool

6.1

Brief description of the LION LCF Tool

The LION Configuration Framework (LION LCF) tool is a tool for creating configurations for a LION bus coupler (HEAD), i.e., for configuring a LION I/O station. Or to create a configuration for the LOGIC of a system with LION PLCs or DIOLINE PLCs.

It supports the user in all project phases. Starting with the planning of an I/O station, through the fieldbus configuration, to the supporting documentation for the safety proof.

After starting the program, you will see this start page. Select whether you want to configure a LION Station (HEAD) or a LION PLC Station (LOGIC) or DIOLINE PLC Station (LOGIC).

**Configurator HEAD****IODB Station / MVB Slave / TRDP Slave**

Local I/O system consisting of bus coupler (MVB, TRDP, CAN, Ethernet), various input and output modules (digital and analog for power, voltage and temperature) and corresponding infrastructure components.

The LCF Configurator HEAD is used to configure the LION bus coupler with the connected I/O modules.

Configurator LOGIC**MVB (PLC) / TRDP (PLC)**

Control unit for automating vehicles. Useable as a subsystem controller or a powerful gateway to convert various vehicle-specific bus signals, which enable the connection of different local I/O modules. Programming according to IEC 61131-3.

The LCF Configurator LOGIC is used to configure the MVB and TRDP protocol of the LOGIC and as a remote station for the LION bus couplers.

NOTE:

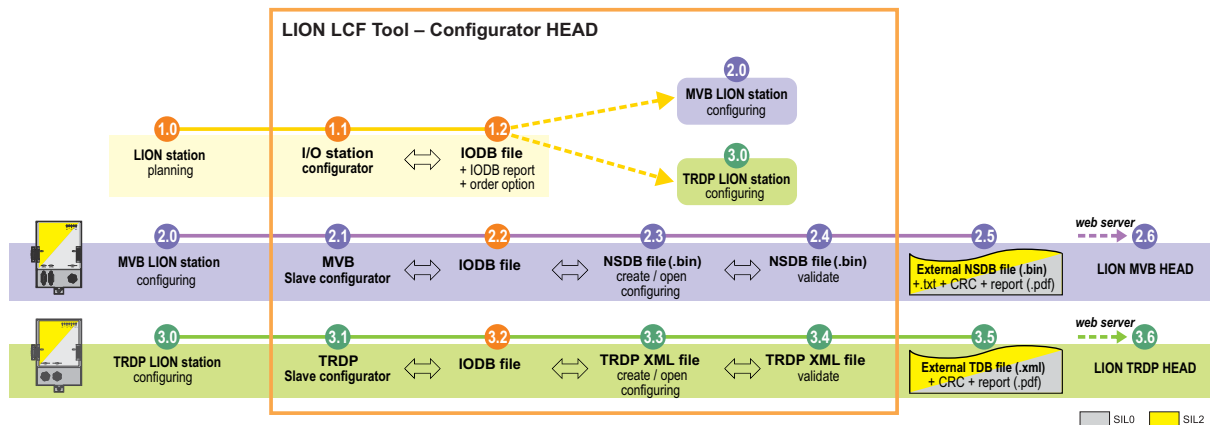
An NSDB file for DIOLINE MVB can only be created for DIOLINE FW 2.09 or higher with the Configurator LOGIC.

6.2

Brief description of the Configurator HEAD



The configuration of the HEAD is the data mapping of a LION I/O station, an MVB slave or a TRDP slave referred to the LOGIC of a train.

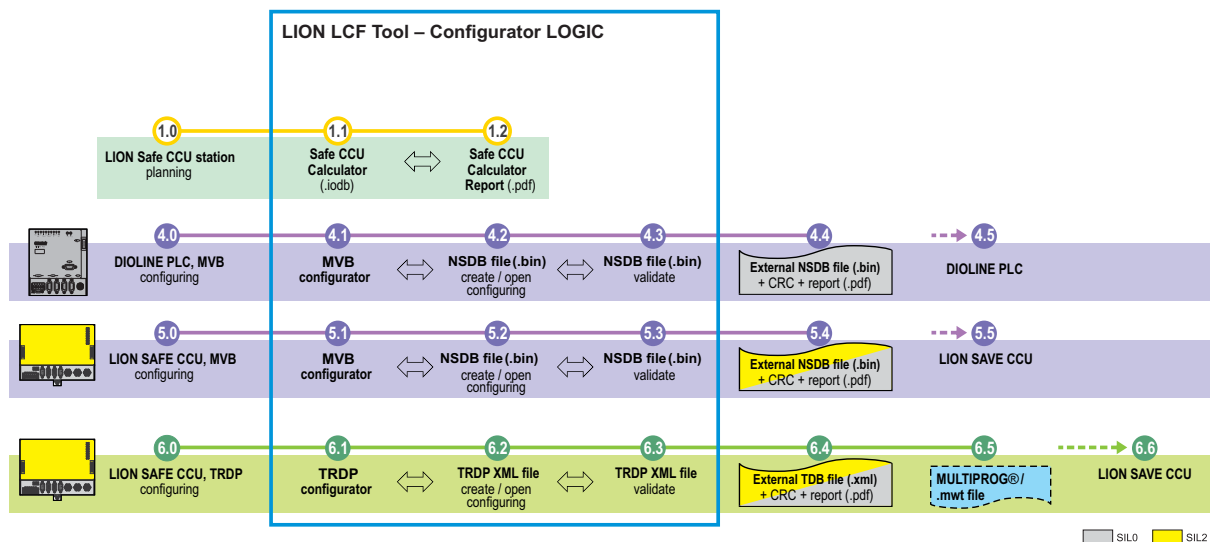


6.3

Brief description of the Configurator LOGIC



The configuration of the LOGIC refers to the structure of an MVB PLC (e.g. LION SAVE CCU, DIOLINE PLC) or a TRDP PLC (e.g. LION SAVE CCU).



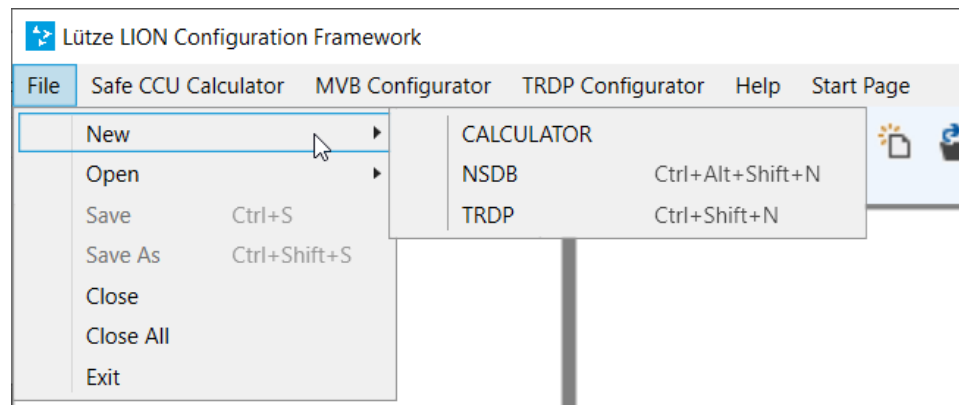
7 General Settings – Configurator LOGIC

7.1 Menu settings

7.1.1 Creating a file: File > New

To generate a new file proceed as follows:

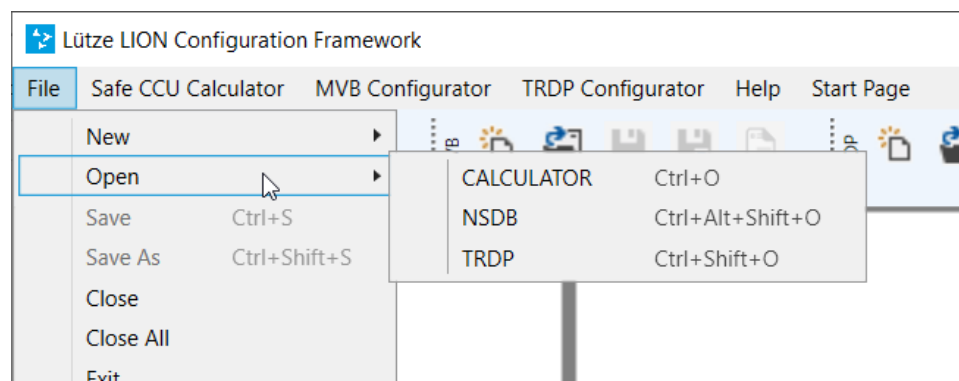
1. Click in the menu on *File*.
2. Select *New*.
3. Select *CALCULATOR*, *NSDB*, or *TRDP* to create a new file.



7.1.2 Open a file: File > Open

To open an existing CALCULATOR, TRDP or NSDB configuration file, proceed as follows:

1. Click on **File** in the menu bar.
2. Select **Open**.

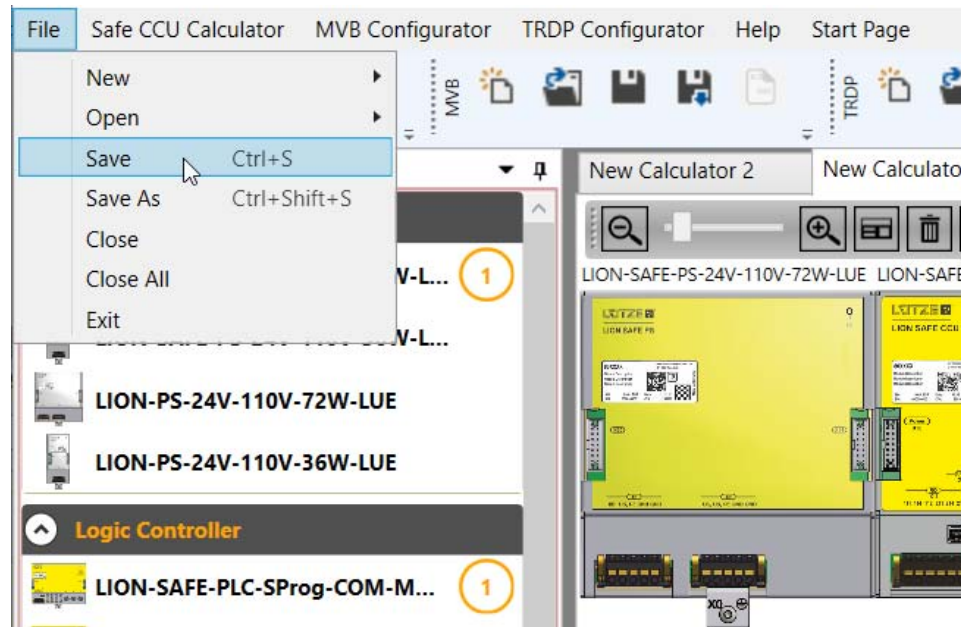


3. Select a file format that you want to open.
4. (A file window of your operating system opens.)
Select the path of the file you wish to open.
5. Click **Open**.

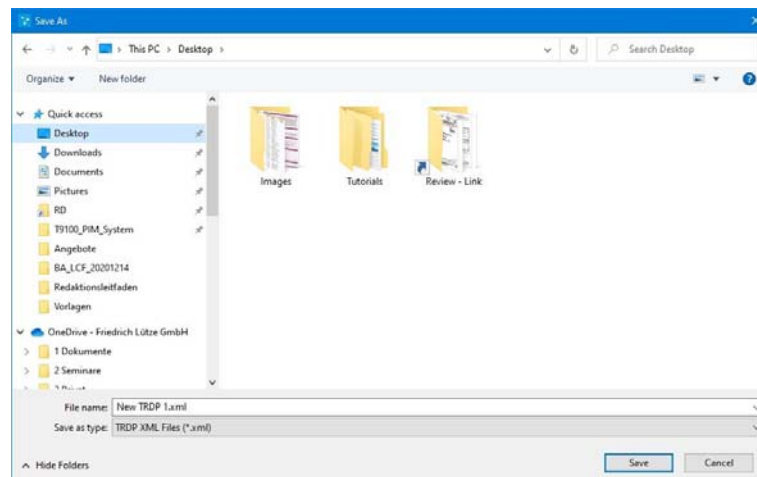
7.1.3 Save a file: File > Save

To save a configuration file, proceed as follows:

1. Click on **File** in the menu bar.
2. Select **Save** or **Save as**.



3. Enter the file name.
4. Select the desired file extension.



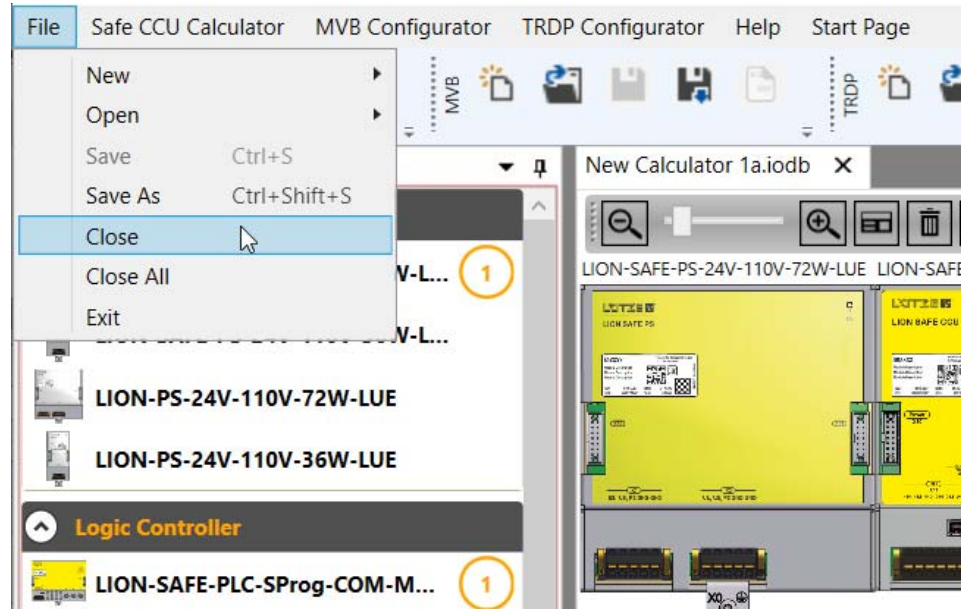
5. Click **Save**.

7.1.4

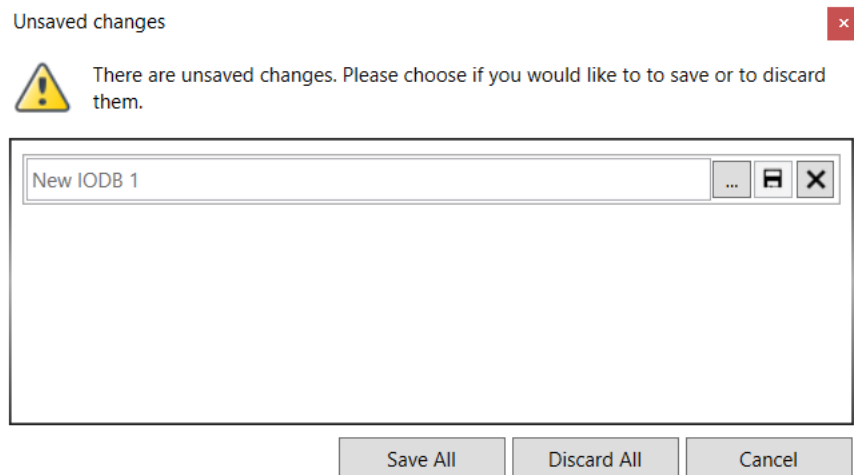
Close a file: File > Close / Close all

It is possible to open different configurations at the same time. To close one or all configurations, proceed as follows:

1. Click on **File** in the menu bar.
2. Select **Close** if you want to close the current file, or select **Close All** if you want to close all open files.



The following warning message appears:



Select whether the configuration should be saved or discarded.

⚠ CAUTION: Do NOT exit via the close button at the top right.
This closes the LCF immediately without saving.

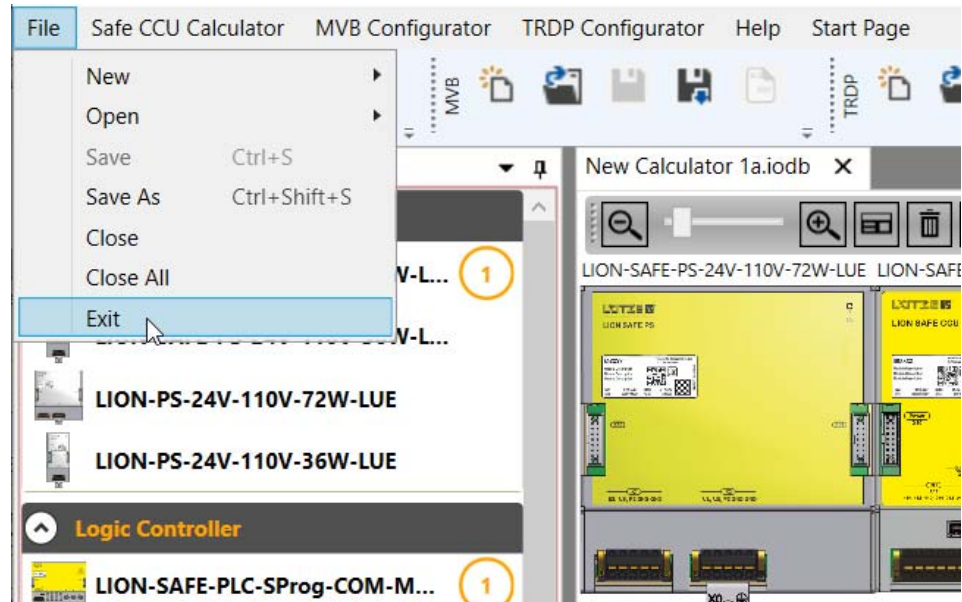


7.1.5

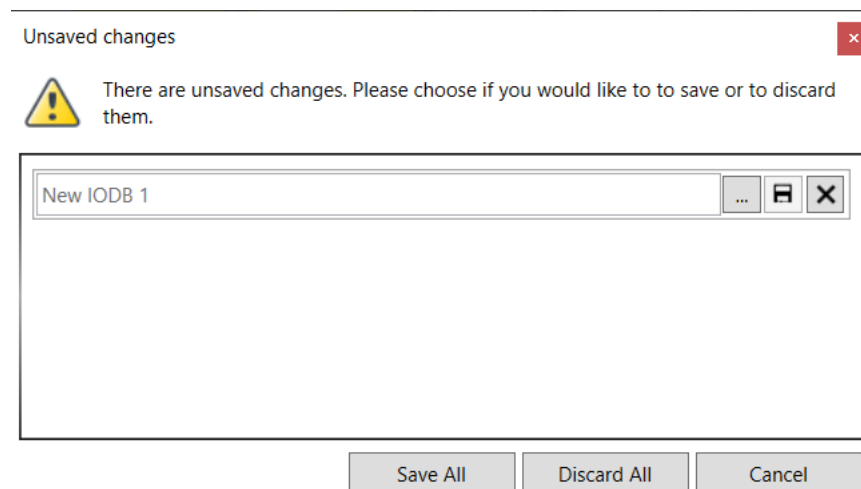
Exit the file: File > Exit

Proceed as follows to exit the LION Configuration Framework tool:

1. Click on **File** in the menu bar.
2. Select **Exit**.

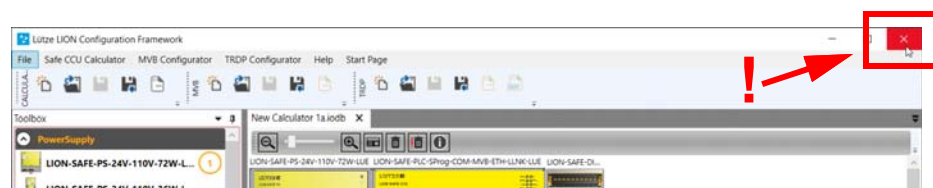


The following warning message appears:



Select whether the configuration should be saved or discarded.

⚠ CAUTION: Do NOT exit via the close button at the top right. This closes the LCF immediately without saving.



7.2 Toolbar buttons

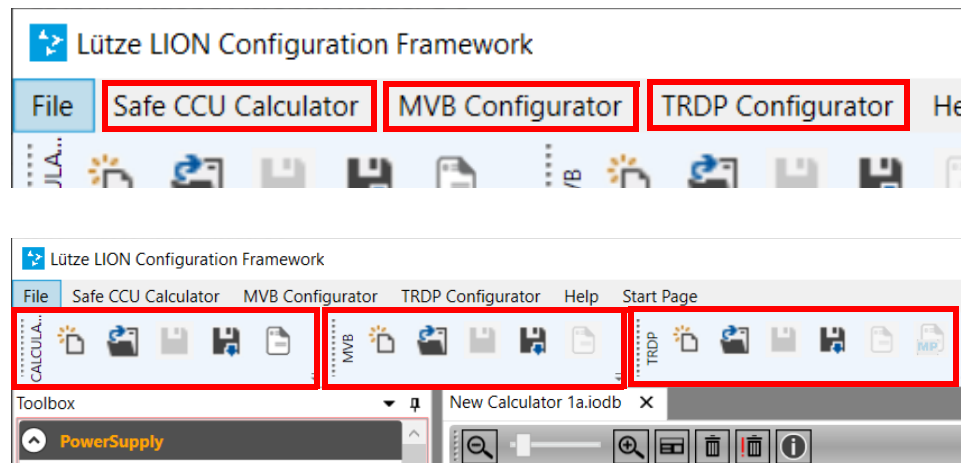
NOTE: The buttons on the toolbar can also be used for all operations instead of the drop-down menus.



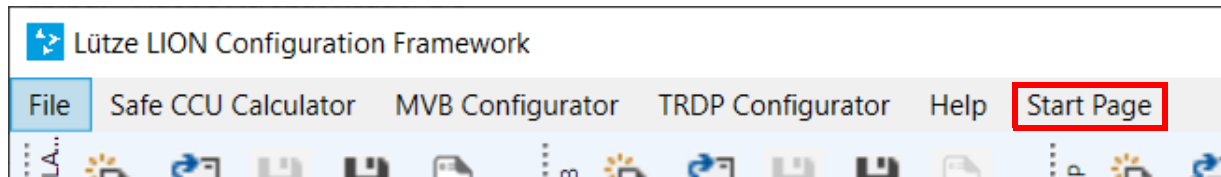
In the two configurators, these are different.

7.2.1 Configurator LOGIC

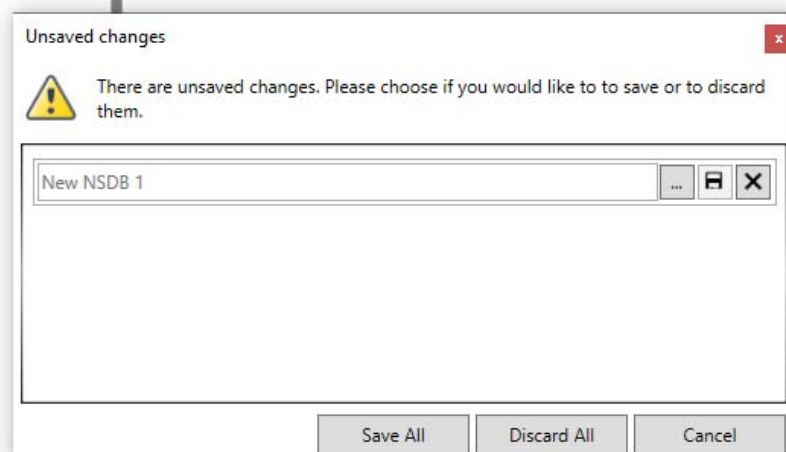
The LION LCF Configurator LOGIC has three sets of buttons with icons for the respective main application.



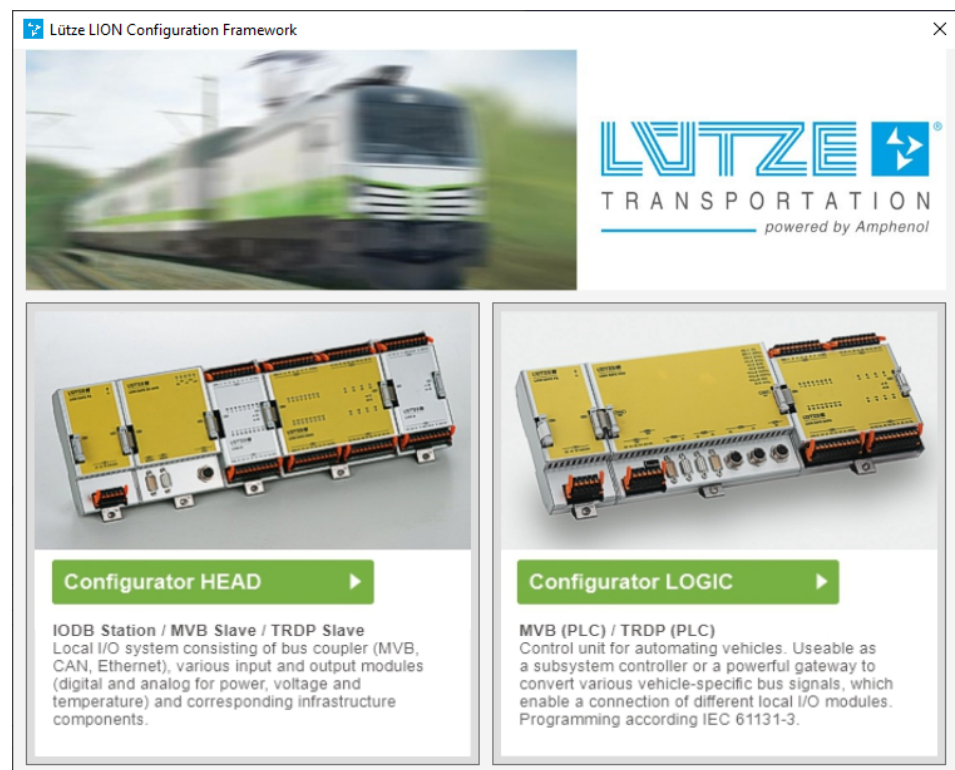
7.3 Menu item Home (start page)



You can exit the current application at any time by clicking on the *Start Page* menu item:



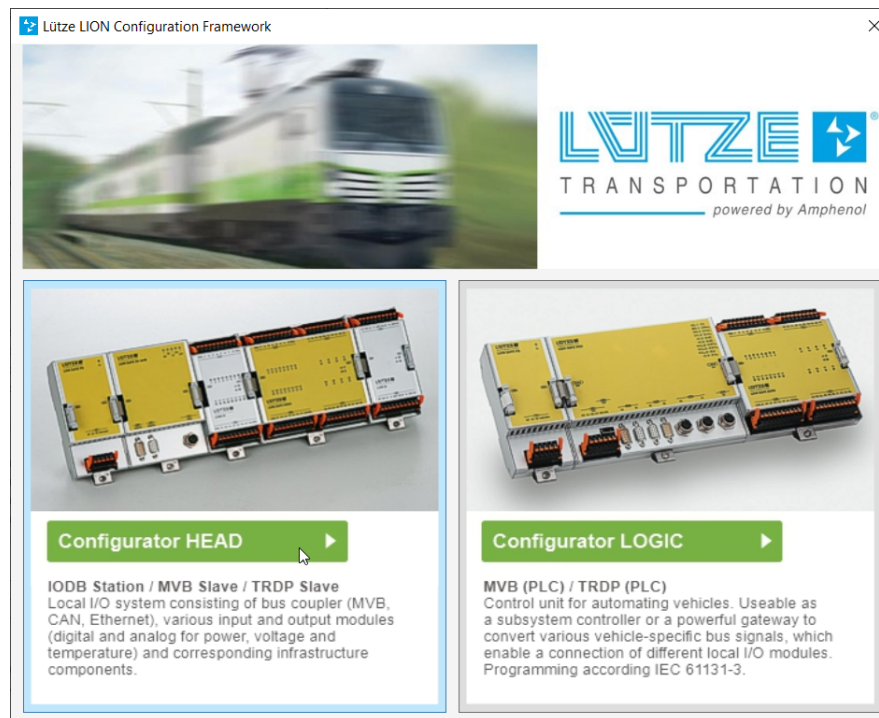
A second click on the *Start Page* menu item takes you back to the start page:



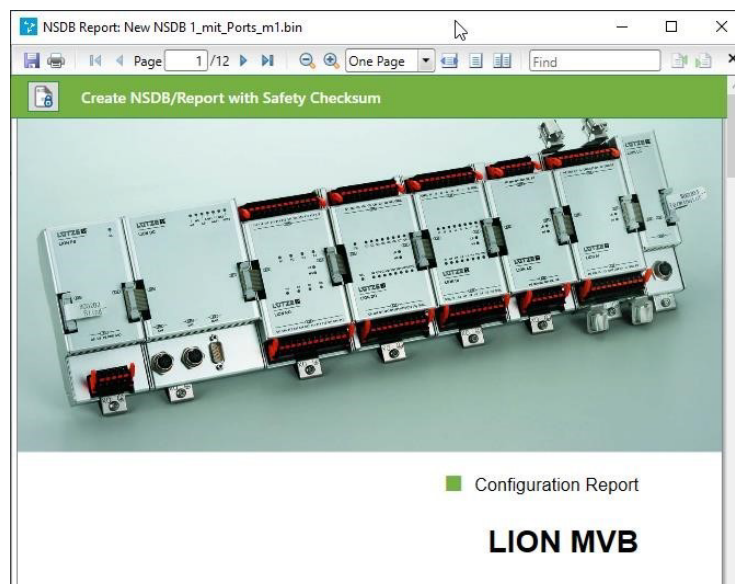
8

Configurator HEAD – MVB Configurator

! Important technical information: The application manual for the Configurator HEAD - MVB Slave Configurator can be found in the first part of the operating instructions “LION LCF Tool - 1. Configurator HEAD”, which is available externally.



This is about creating a configuration file and a LION MVB configuration report for a LION HEAD.

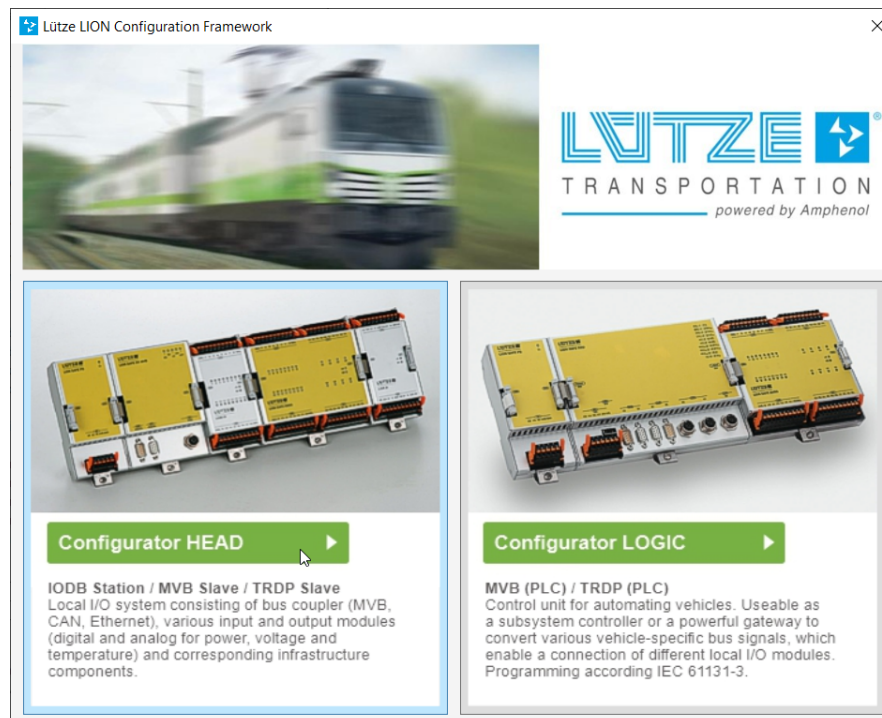


SERVICE: If you get stuck or need any other help, please contact the service department. The contact information is in [chapter 15 on page 135 §](#))

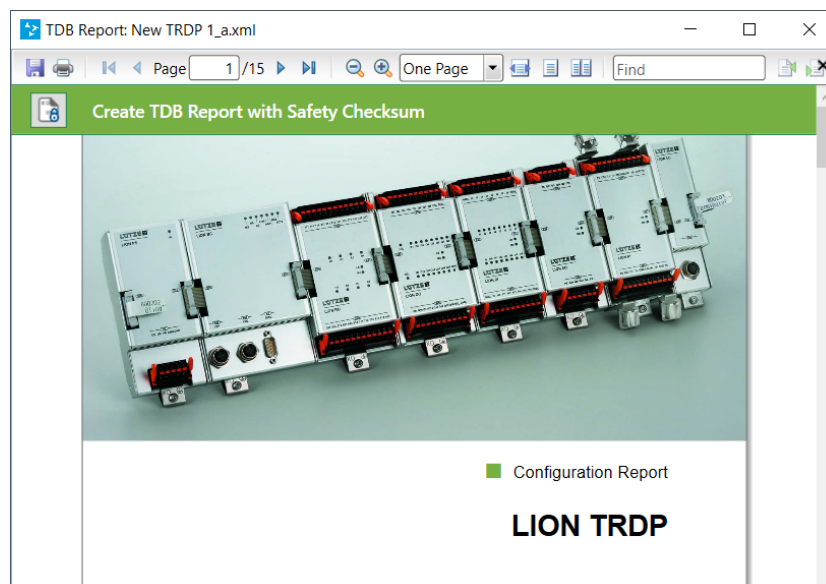
9


Configurator HEAD – TRDP Slave Configurator

! Important technical information: The application manual for the Configurator HEAD - TRDP Slave Configurator can be found in the first part of the operating instructions “LION LCF Tool - 1. Configurator HEAD”, which is available externally.



This is about creating a configuration file and a LION TRDP configuration report for a LION HEAD.



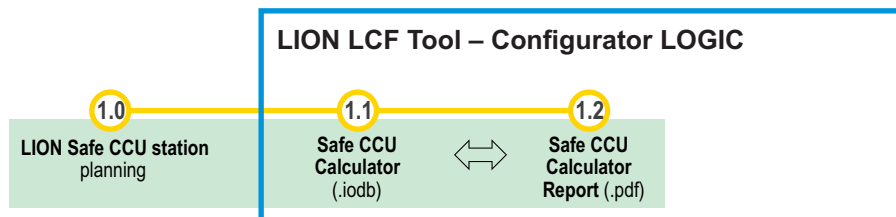
 Service: If you get stuck or need any other help, please contact the service department. The contact information is in [chapter 15 on page 135](#)

10 Safe CCU Calculator

Short summary

The Safe CCU Calculator is used to determine the power consumption of a LION Safe CCU station. Here, the required energy consumption for each individual power source (power supply) in the LION system is calculated and displayed.

In the Safe CCU Calculator (1.1), the LION Safe CCU station is set up virtually and the power consumption is determined dynamically. The lengths and total weight of the station are also calculated. The system setup can be saved in a file. A Safe CCU Calculator Report (1.2) can be generated at any time.



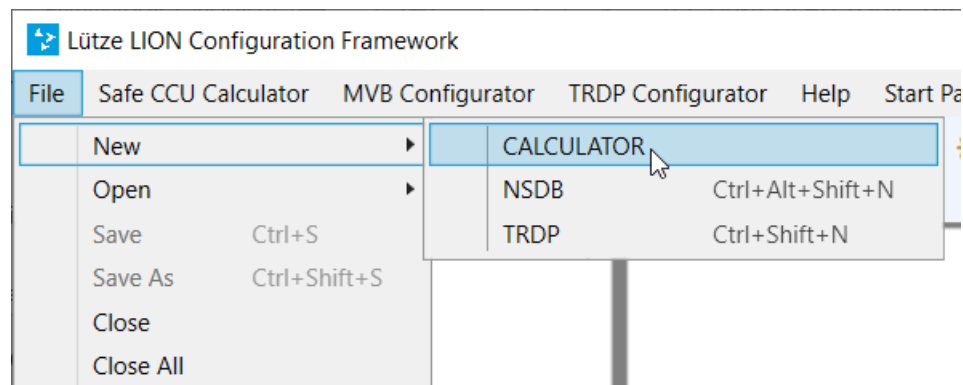
10.1 Creating a new calculator file

This file represents the structure of the LION Safe CCU station.

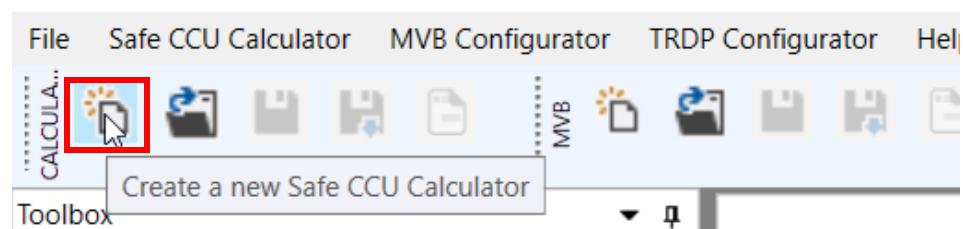
10.1.1 New IODB file via the menu bar or toolbar

To generate a new calculator file proceed as follows:

1. In the menu bar click **File**.
2. Select **New**.
3. Select **CALCULATOR** to create a new file.

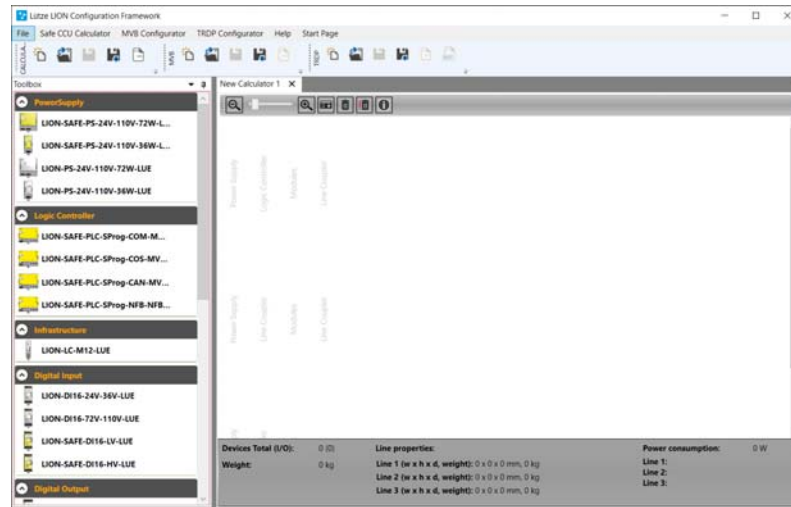


or: Click on the **Create a new Safe CCU Calculator file** icon in the toolbar:



LION LCF Application Manual ▪ Safe CCU Calculator

4. This window will appear:

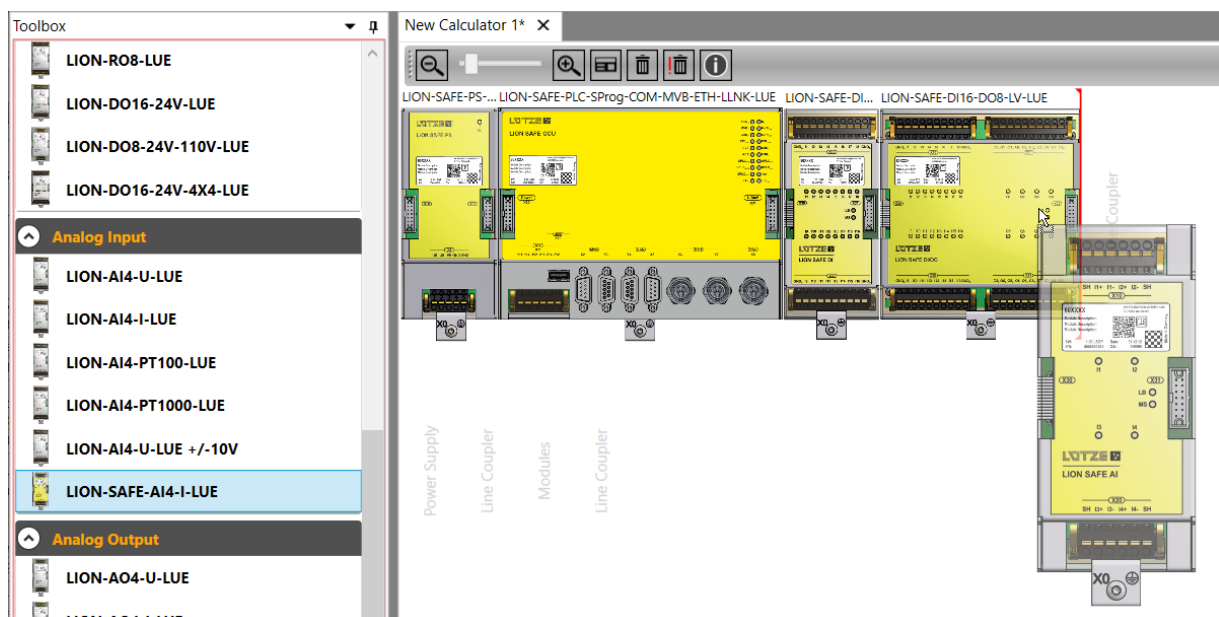


✓ Tip: You can now either arrange the modules manually.

Chapter: See also chapter 10.1.7 on page 48). But first read and understand chapter 8 completely.

5. The toolbox on the left side displays all components which can be used in a LION I/O station. The LION I/O station is built from these modules. **Drag and drop** the modules from the toolbox window to arrange them in IODB window on the right side. The modules are arranged according to predefined rules, you will get direct feedback, whether the combination is possible or not.

NOTE: You must first have read and understood the rules in chapter 10.1.2 on page 29 before you can arrange the modules yourself.



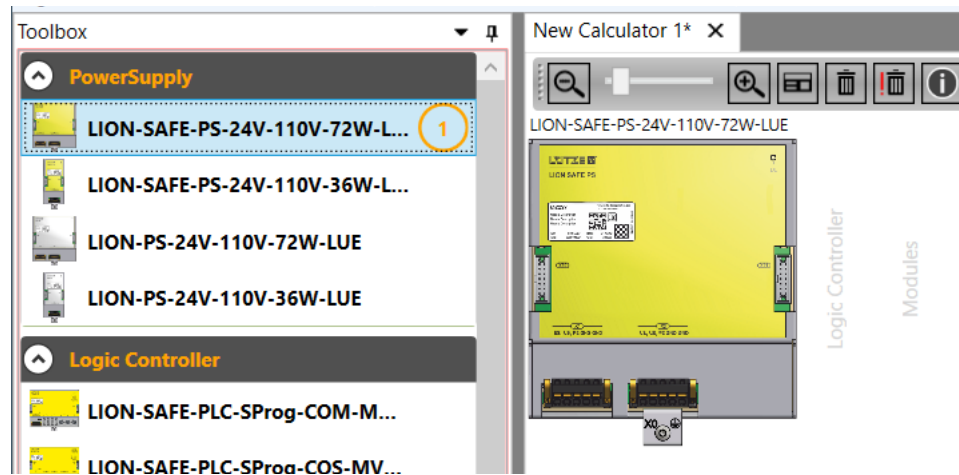
10.1.2

The predefined rules for configuration

The following predefined rules are essential to properly configure the LION system. The error messages in the LCF are programmed according to these rules:

1. **The first component of every line must be a LION Power Supply (PS).**

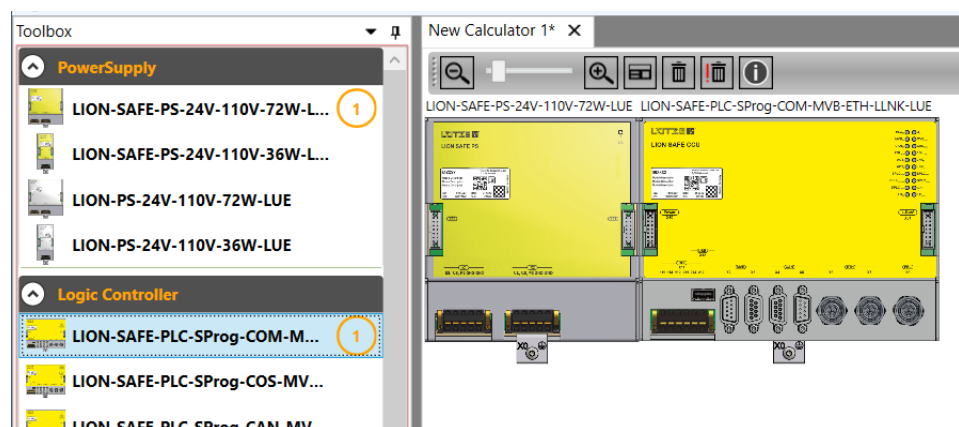
Other LION Power Supplies can follow in the line. Power supplies can be placed either on the text "Power Supply" or between any DEVICE.



2. **The second component of the first line must be a LOGIC** (e.g., LION Safe CCU).

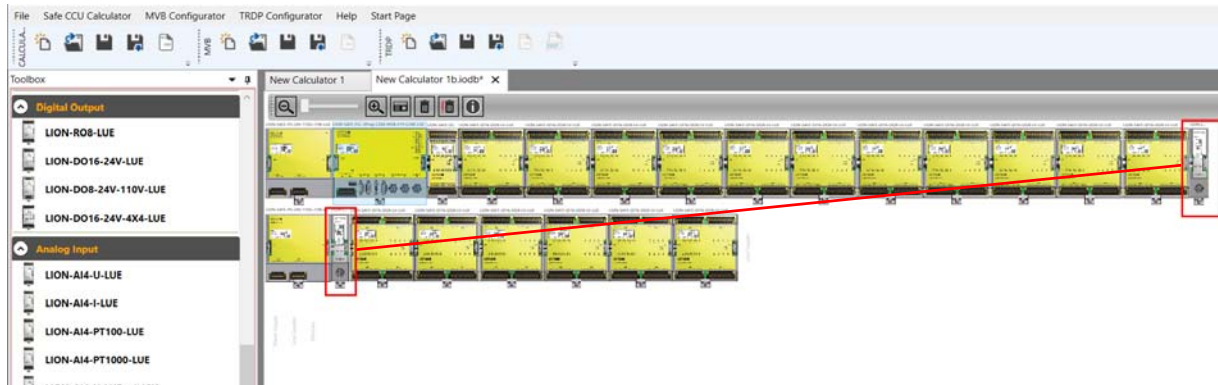
NOTE: This also defines the fieldbus protocol of the system (e.g., MVB, TRDP, etc.)

NOTE: Per LION I/O station only one LOGIC is allowed and must be placed as second component in the first line.

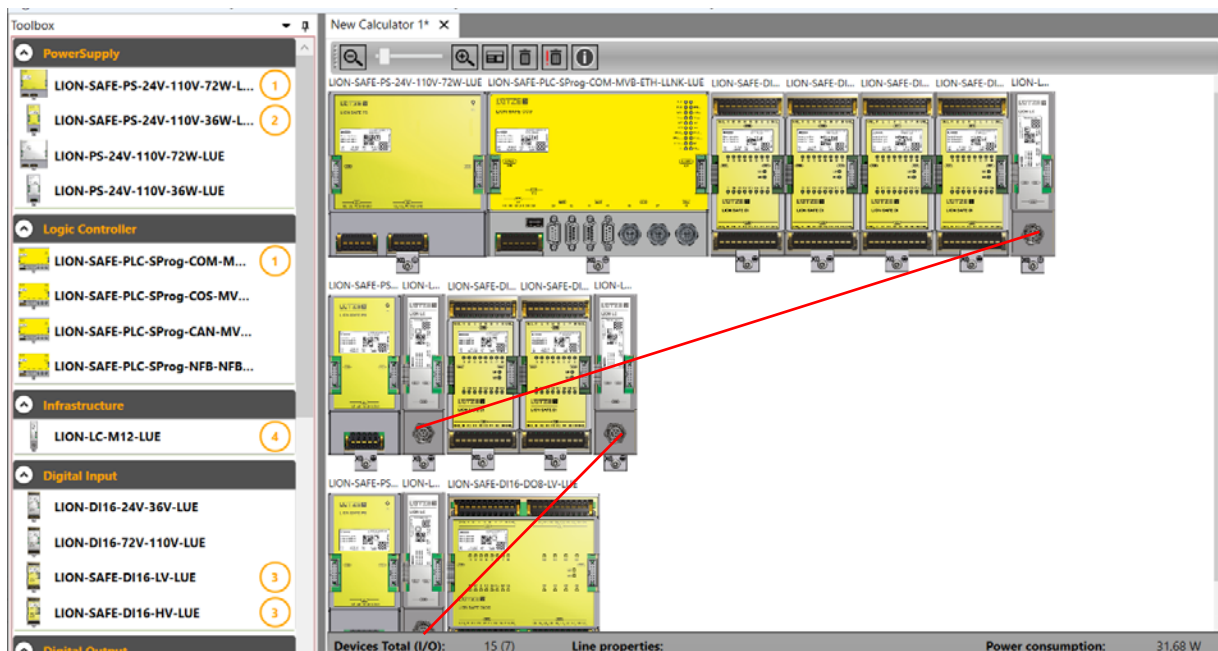


LION LCF Application Manual ▪ Safe CCU Calculator

3. If the system consists of two lines, the last component of the first line and second component of the second line must be a *LION Line Coupler*.

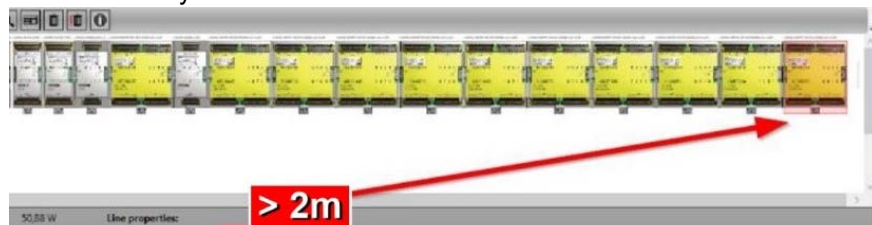


4. If the system consists of three lines (max. 3 lines are possible), the last component of the first and second lines and the second component of the second and third lines must be a *LION Line Coupler*.



5. It is **not allowed to create a line longer than 2000 mm**.

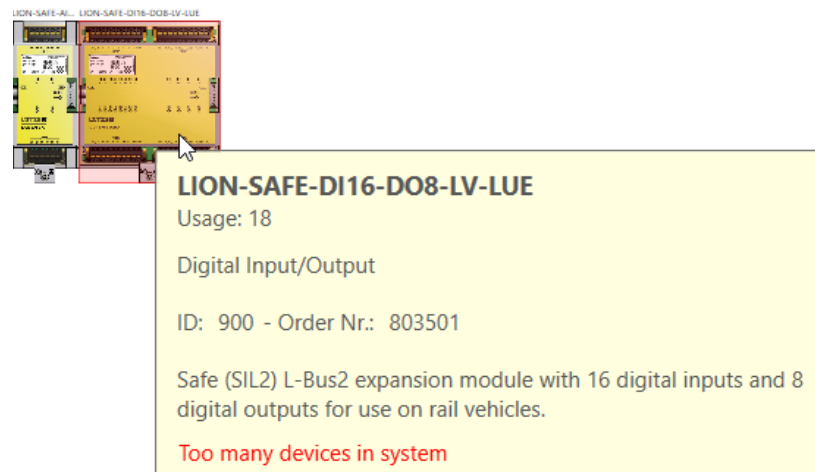
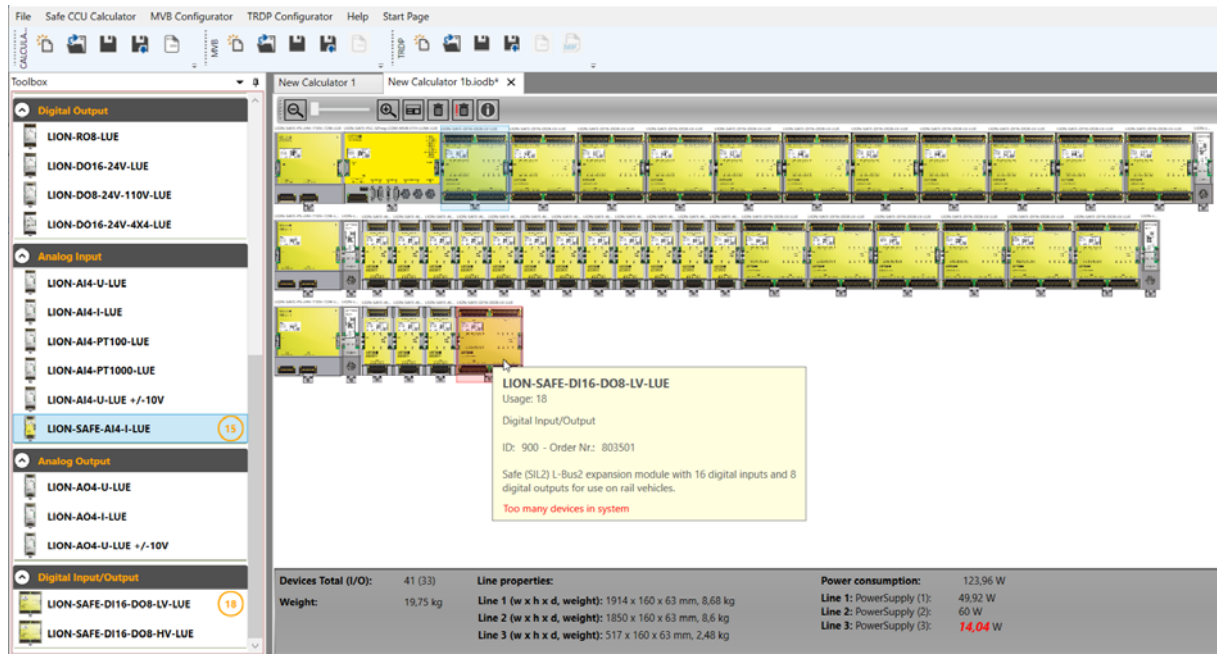
In one line or in several, where one line must not be longer than 2000 mm, the LCF will warn you:



6. The maximum cable length *between two LION Line Couplers* is **not allowed to be more than 10 m**.
7. The LION Safe CCU is the **LOGIC**, the LION DEVICES are the **DEVICES** of the LION Safe CCU system.
8. A **module** is the smallest exchangeable unit in the system.

LION LCF Application Manual ▪ Safe CCU Calculator

9. It is possible to **connect max. 32 DEVICES** to the LION LOGIC.
The LCF will warn you if there are more than 32 DEVICES:



10. **Safe and non-safe modules can be combined** in the system. If the power supply or LOGIC are SIL0, the entire system cannot achieve SIL2.
11. A **power supply unit** is always located at the beginning of a line. If the maximum energy requirement of the modules exceeds the nominal value of the LION power supply unit, the sections must be supplied by an additional LION power supply unit. This is calculated and displayed in the LCF tool.

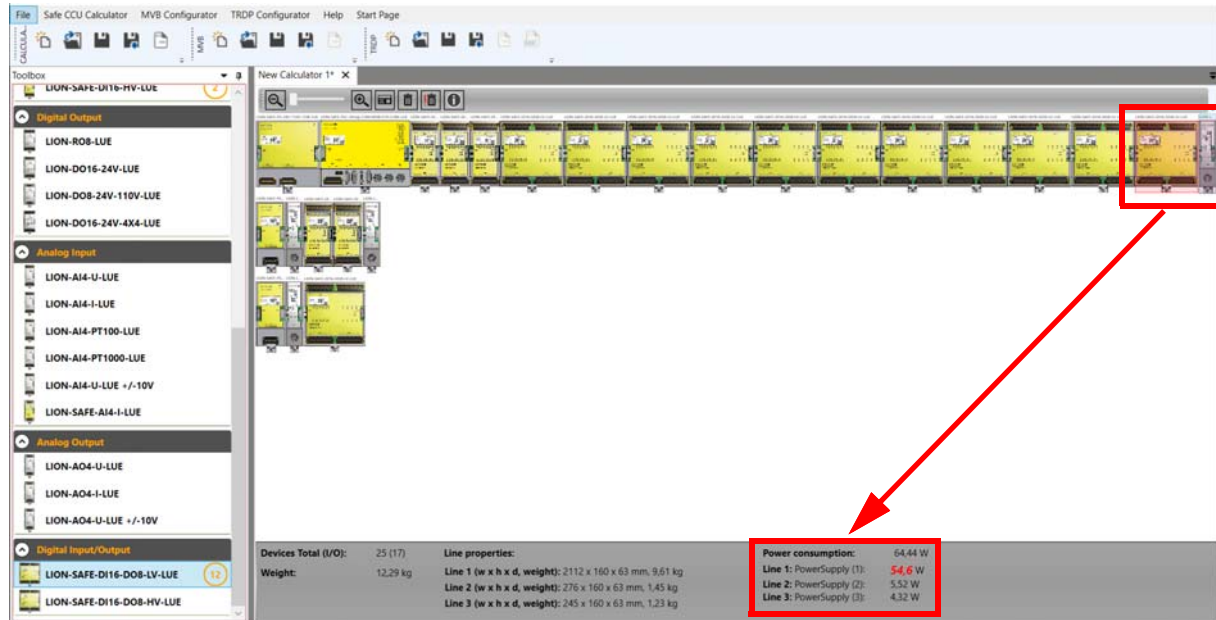
Chapter: **See also the LION System Description, chapter "5.6 System architecture" for more information. Find the QR Code in chapter 15 on page 135.**

10.1.3

Calculating the power consumption

The Safe CCU Calculator helps to calculate and displays the power consumption and displays the weight of the I/O station.

In the event of an error, the affected power supplier data will be marked in red in the overview.

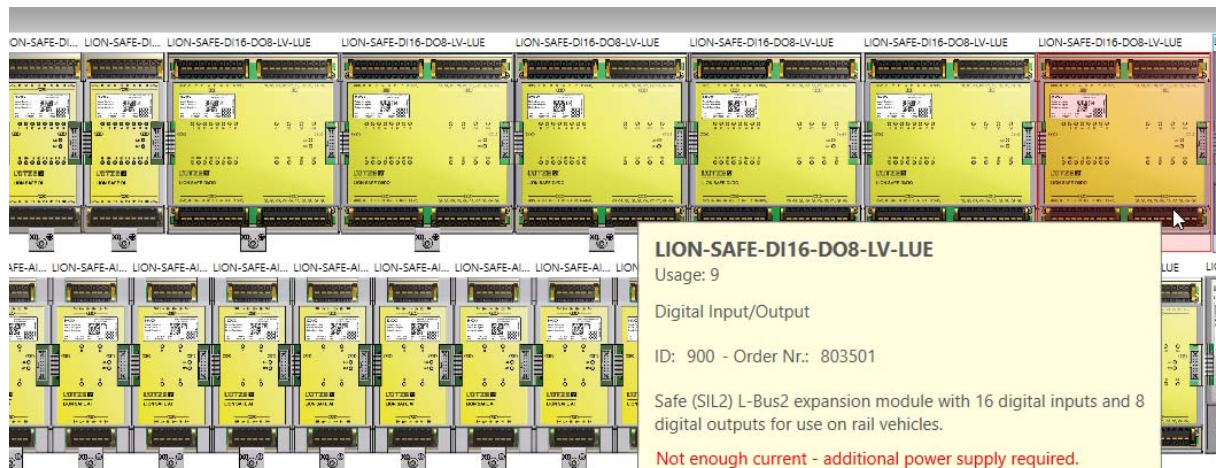


Devices Total (I/O):	25 (17)	Line properties:	Power consumption:	64.44 W
Weight:	12.29 kg	Line 1 (w x h x d, weight):	Line 1: PowerSupply (1):	54.6 W
		Line 2 (w x h x d, weight):	Line 2: PowerSupply (2):	5.52 W
		Line 3 (w x h x d, weight):	Line 3: PowerSupply (3):	4.32 W

NOTE: The power consumption values given here are based on the maximum possible values.

Please refer to the relevant data sheet for the nominal values for power consumption.

Hover your mouse over the image for more information:



10.1.4

Arranging the modules

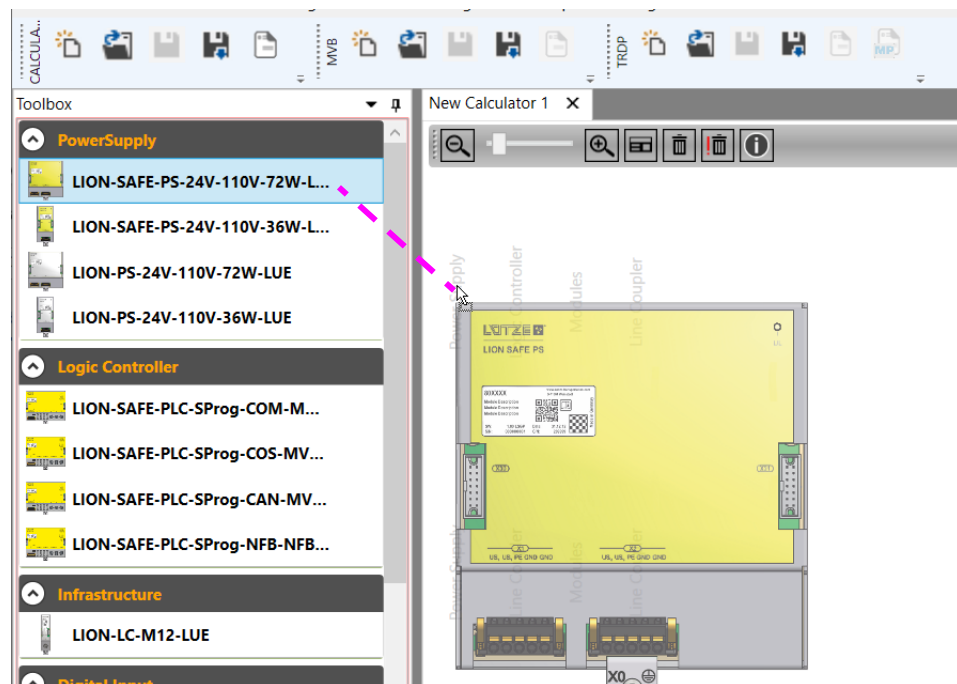
The following section describes the steps to arrange the modules on the LCF.

Step 1: Drag and drop of the modules

Always start with the power supply in the first position:

NOTE: Always start with the LION Power Supply in the first position.

! Important technical information: Use the default grey words in the right window. These indicate the general order of the different module types.



⚠ WARNING Only LION SAFE Power Supplies may be used for a SIL > 0 I/O station.

Positioning of the power supply

- 1 Click on a power supply in the left toolbox window.
- 2 Drag the module now with the mouse button pressed down to the first word "Power Supply" in the first line and drop it, as shown in the screenshot above.

NOTE: Only correct module types can be dropped onto a word. If an incorrect module type is dropped onto a field the LCF will refuse to place it at this position.

Orange circled number of used modules:



LION LCF Application Manual ▪ Safe CCU Calculator

NOTE: The used modules get an orange circled number in the left toolbox window. This indicates the number of modules of this type that are used within the LION I/O station.

The energy consumption is displayed for each individual power source:

PowerSupply

- LION-SAFE-PS-24V-110V-72W-L...
- LION-SAFE-PS-24V-110V-36W-L... **1**
- LION-PS-24V-110V-72W-LUE
- LION-PS-24V-110V-36W-LUE

Logic Controller

- LION-SAFE-PLC-SProg-COM-M... **1**
- LION-SAFE-PLC-SProg-COS-MV...

Devices Total (I/O): 2 (0) **Line properties:**

Weight: 1,38 kg

Line 1 (w x h x d, weight): 261 x 160 x 63 mm, 1,38 kg

Line 2 (w x h x d, weight): 0 x 0 x 0 mm, 0 kg

Line 3 (w x h x d, weight): 0 x 0 x 0 mm, 0 kg

Power consumption: 14,4 W

Line 1: PowerSupply (1): 14,4 W

Line 2:

Line 3:

If multiple power sources are available, they are displayed with their position in the line.

PowerSupply

- LION-SAFE-PS-24V-110V-72W-L...
- LION-SAFE-PS-24V-110V-36W-L... **1**
- LION-PS-24V-110V-72W-LUE
- LION-PS-24V-110V-36W-LUE

Logic Controller

- LION-SAFE-PLC-SProg-COM-M... **1**
- LION-SAFE-PLC-SProg-COS-MV...

Devices Total (I/O): 15 (7) **Line properties:**

Weight: 6,22 kg

Line 1 (w x h x d, weight): 836 x 160 x 63 mm, 4,28 kg

Line 2 (w x h x d, weight): 377 x 160 x 63 mm, 1,94 kg

Line 3 (w x h x d, weight): 0 x 0 x 0 mm, 0 kg

Power consumption: 30,72 W

Line 1: PowerSupply (1): 18,72 W

PowerSupply (2): 1,68 W

PowerSupply (3): 4,32 W

Line 2: PowerSupply (4): 6 W

PowerSupply (5): 0 W

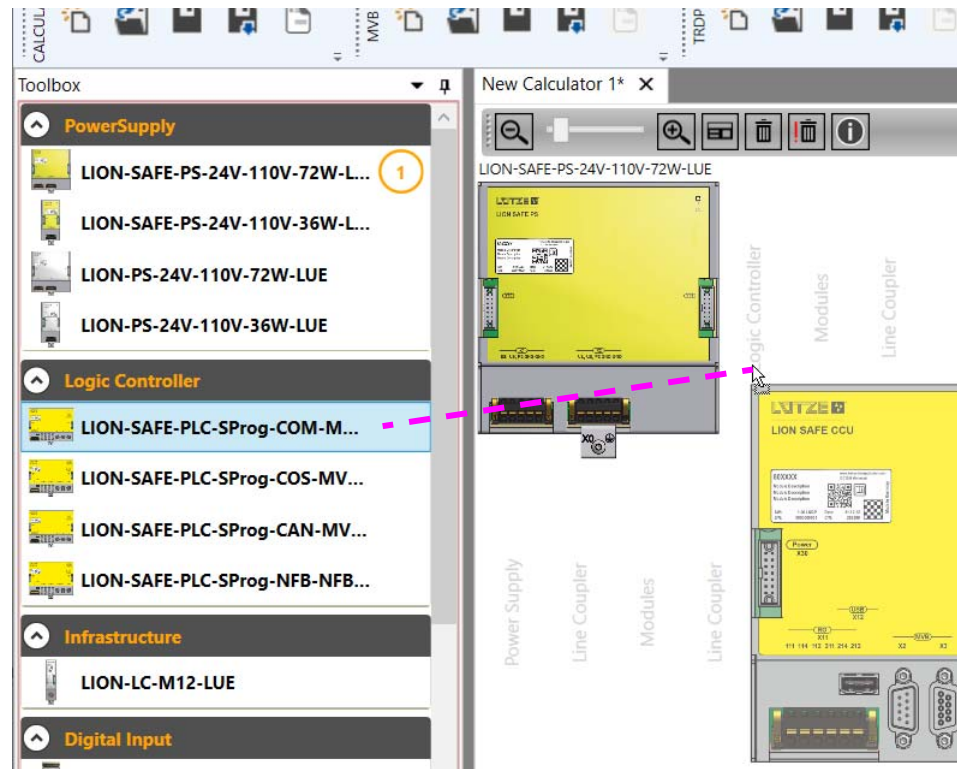
Line 3:

Step 2: Placing the LOGIC in second position

The LOGIC (e.g., the LION Safe CCU) always follows in the second position.

NOTE: The chosen type of LOGIC defines the fieldbus used by the LION I/O station.

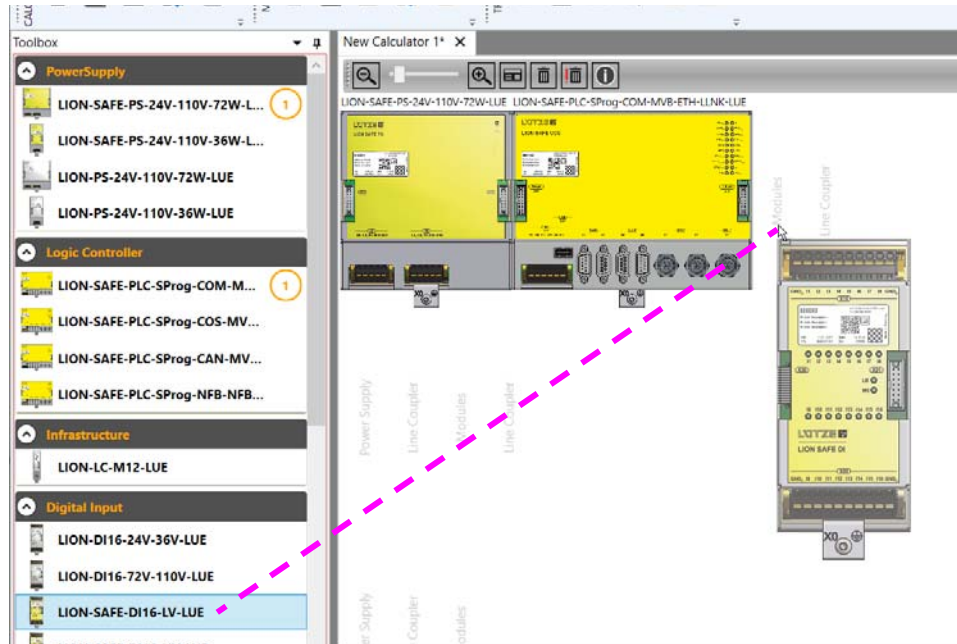
- 1 Click on a LOGIC in the left toolbox window.
- 2 Drag the module now with the mouse button pressed down to the word "Logic Controller" in the first line and drop it, as shown in the screenshot below.



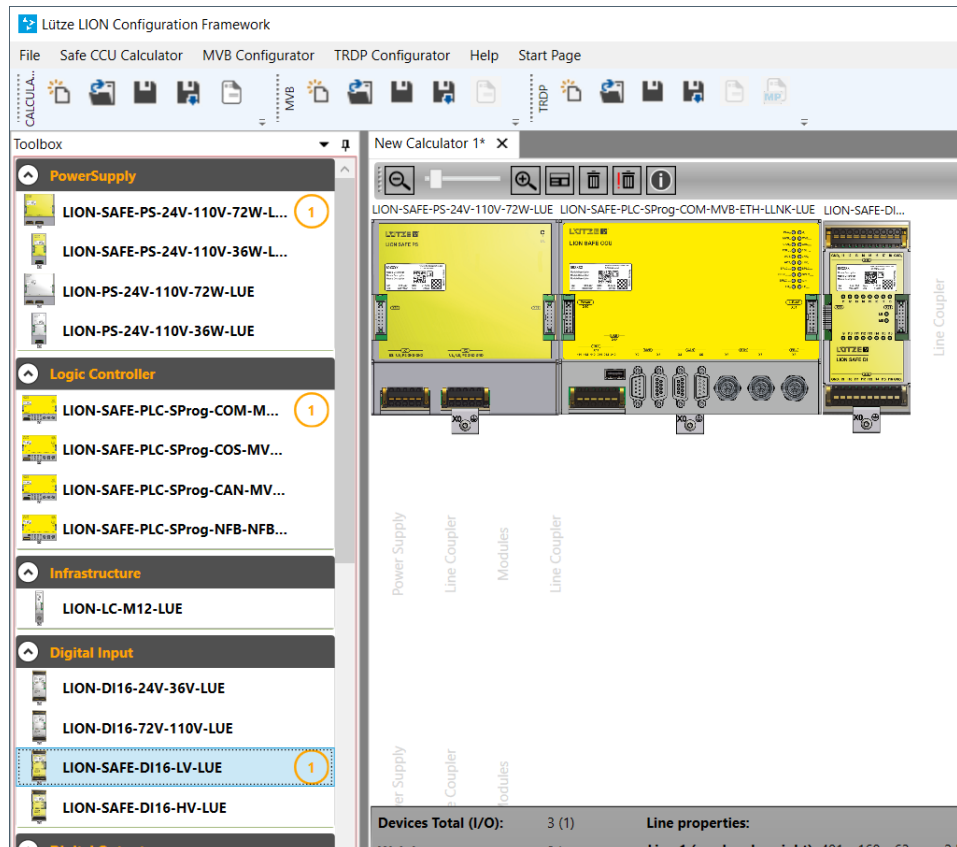
LION LCF Application Manual ▪ Safe CCU Calculator

Step 3: Placing of the first DEVICE of a line

A DEVICE can be placed on the field **Modules**.



- 1 Click on an analog/digital input/output module in the left toolbox window.
- 2 Drag the module now with the mouse button pressed down to the word "Modules" in the first line and drop it, as shown in the screenshot above.
- 3 If done it correctly, you will get this result:

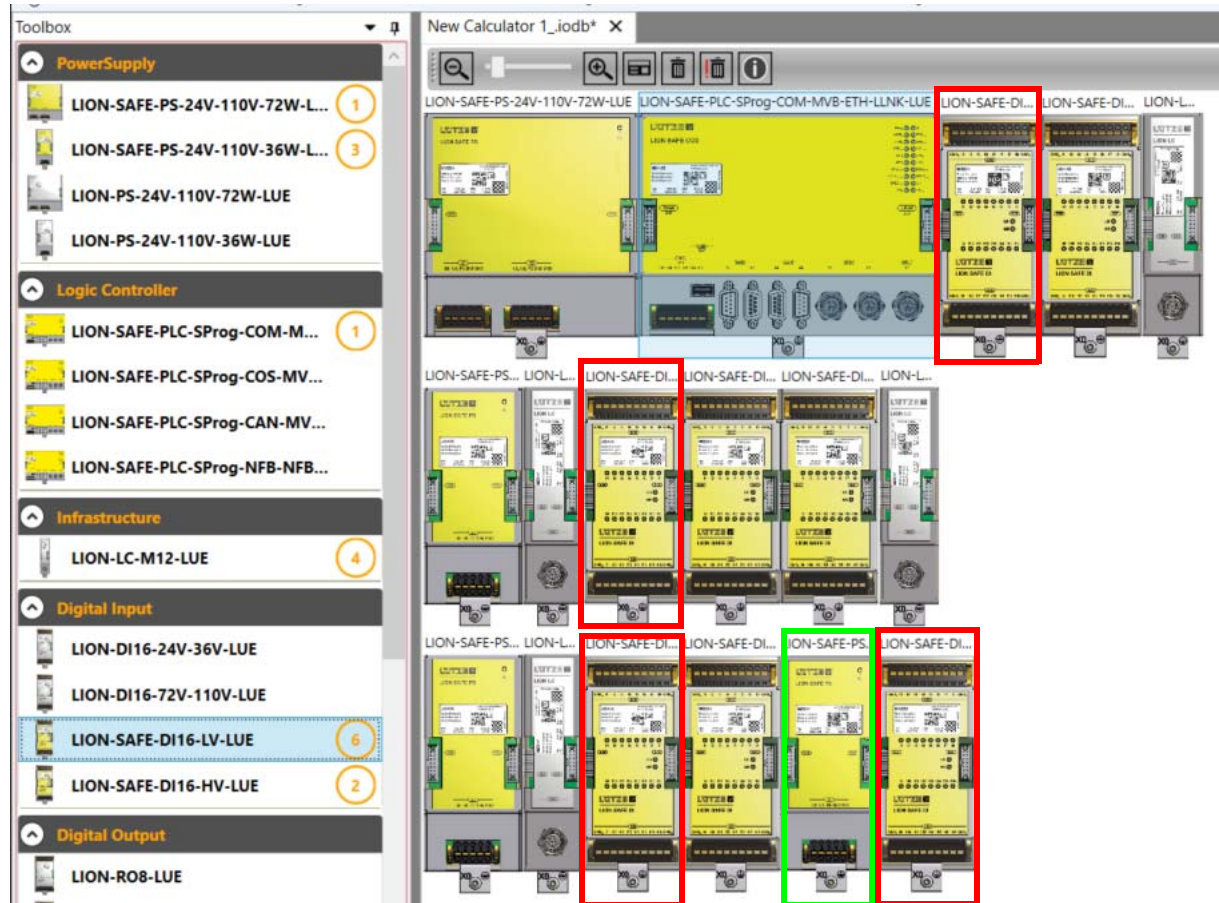


LION LCF Application Manual ▪ Safe CCU Calculator

! Important technical information:

In the first line, the first DEVICE is placed after the LOGIC.

In the second and third line, the first DEVICE can be placed after the first line coupler in the line or an inline power supply (green):



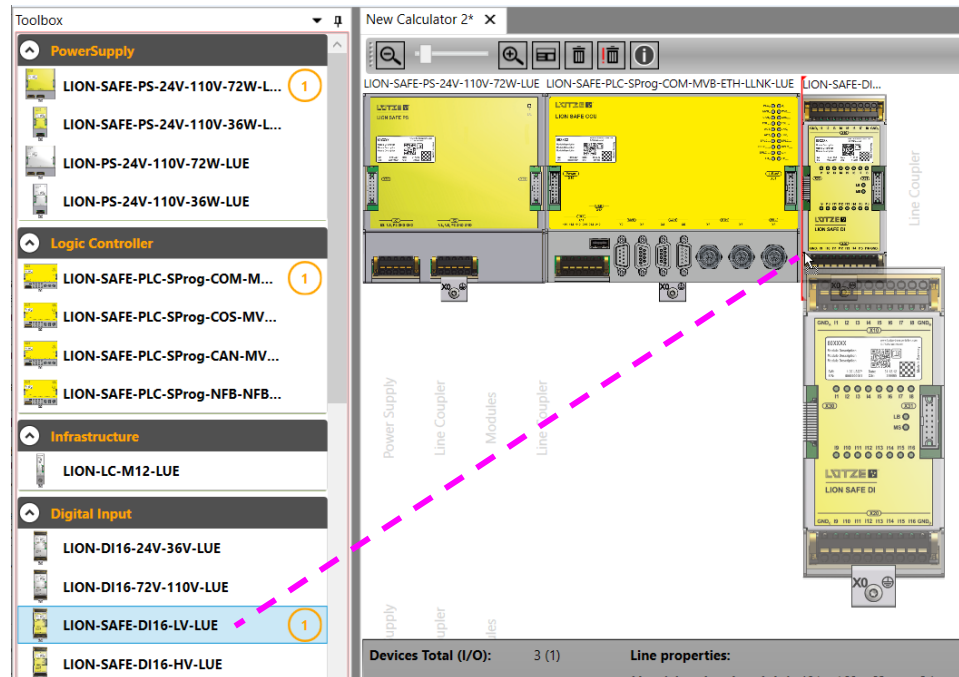
LION LCF Application Manual ▪ Safe CCU Calculator

Step 4: Adding more Devices

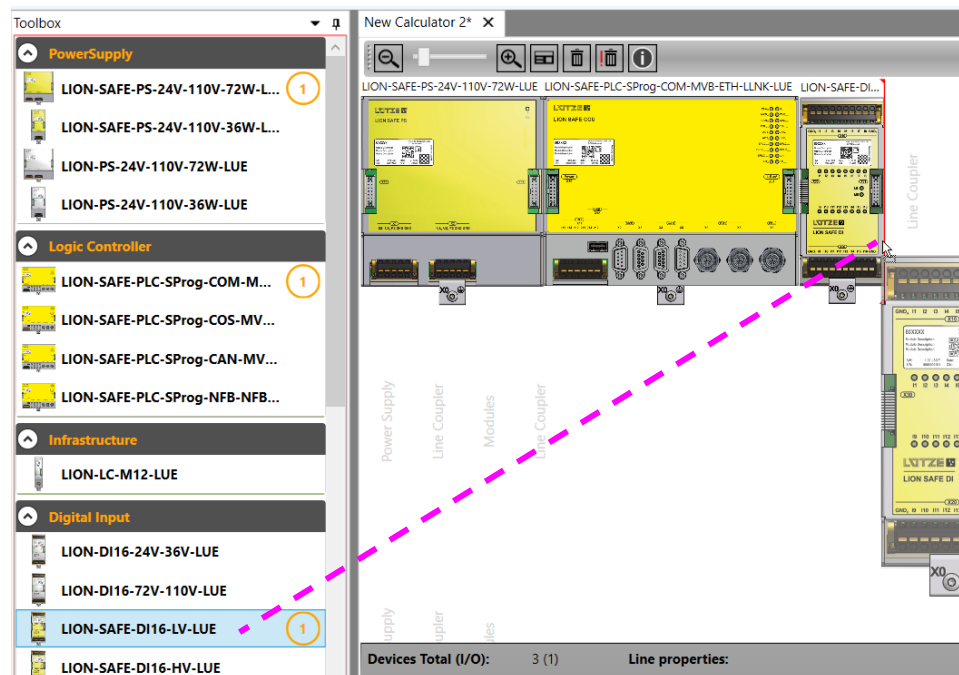
! Important technical information: **A DEVICE can be placed before or after another DEVICE.**

- 1 Drag the DEVICE over an existing DEVICE.
- 2 A red marking line appears (to the left or right of the module, depending on how you move the mouse). Drop the module in the desired position:

- either in front of a placed DEVICE:

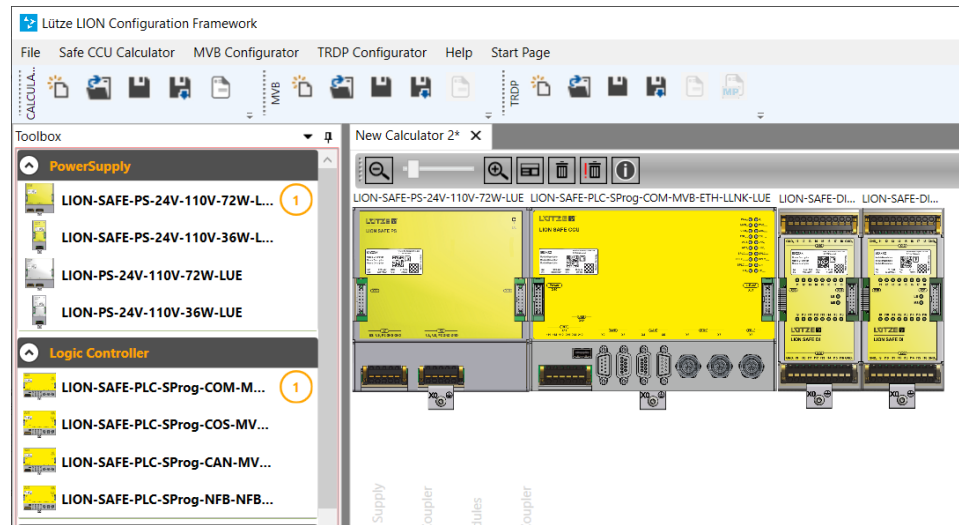


- or behind a placed module:



LION LCF Application Manual ▪ Safe CCU Calculator

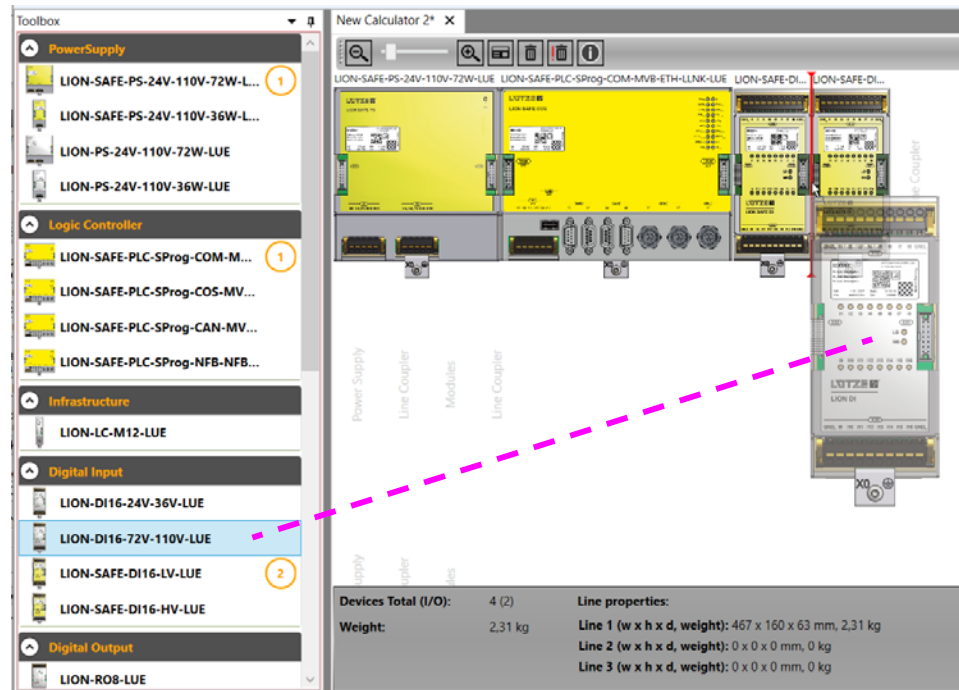
If done correctly, you will get this result:



In the same way, further DEVICES can now be arranged in front of and behind the placed DEVICES.

NOTE:

A DEVICE can be placed between two other DEVICES, but never between Power supply and LOGIC.



Step 5: Inline power supply

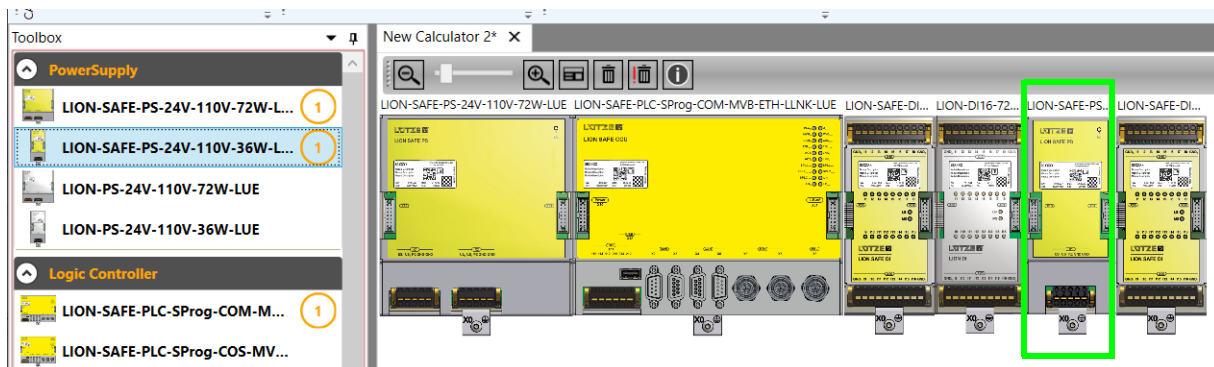
! Important technical information: **A DEVICE can be placed before or after an inline power supply.**

- 1 You can place further (inline) power supply units in a line.

NOTE: If necessary, further power supply units can be connected to the line.

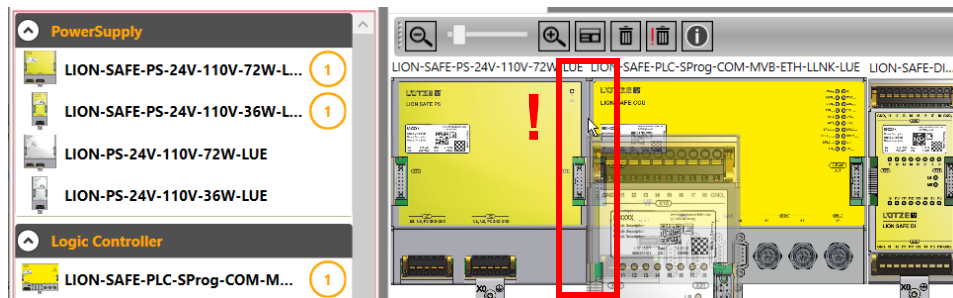
Chapter: See also "Calculating the power consumption" on page 32.

- 2 Placing of a DEVICE between LOGIC and inline power supply

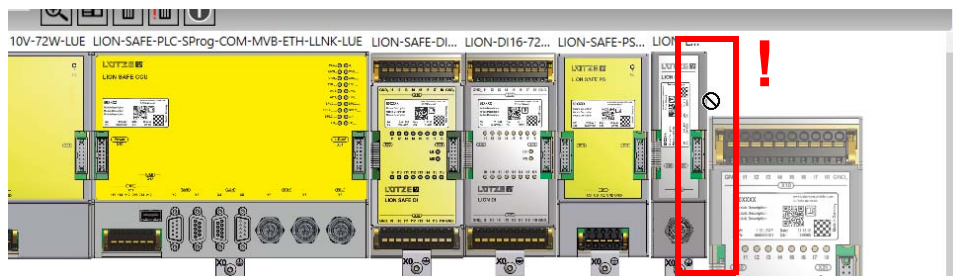


NOTE: A module can be placed anywhere where the red line appears.

NOTE: No placement is possible between the voltage supply at the first position and the LOGIC.



NOTE: Placement after a line coupler is not possible.

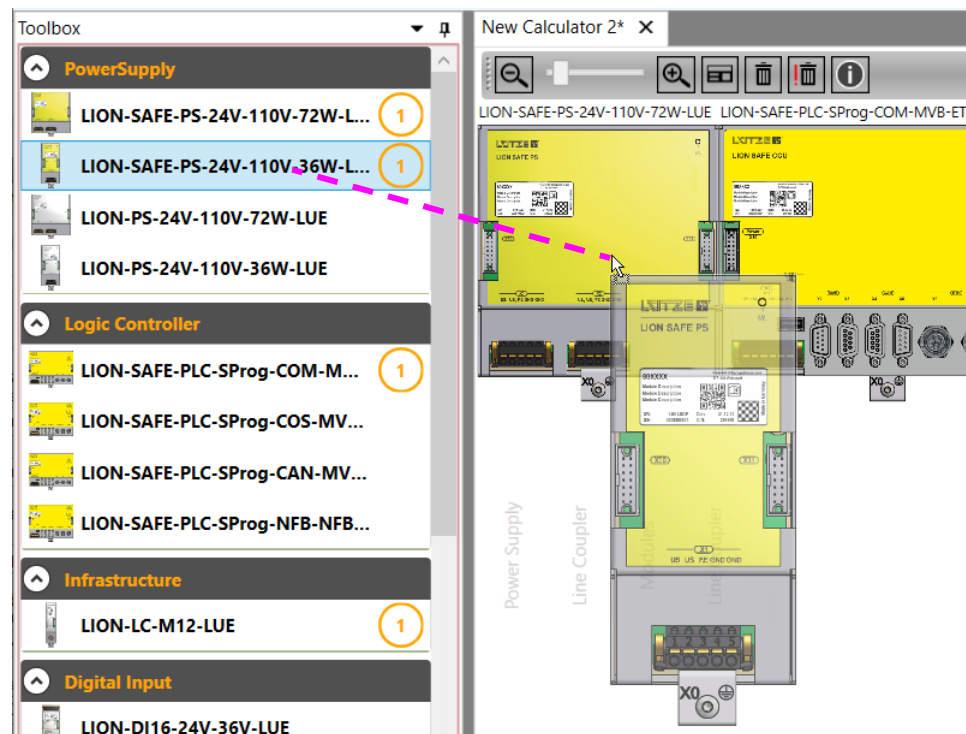


- 3 Replacing the power supply unit or LOGIC directly

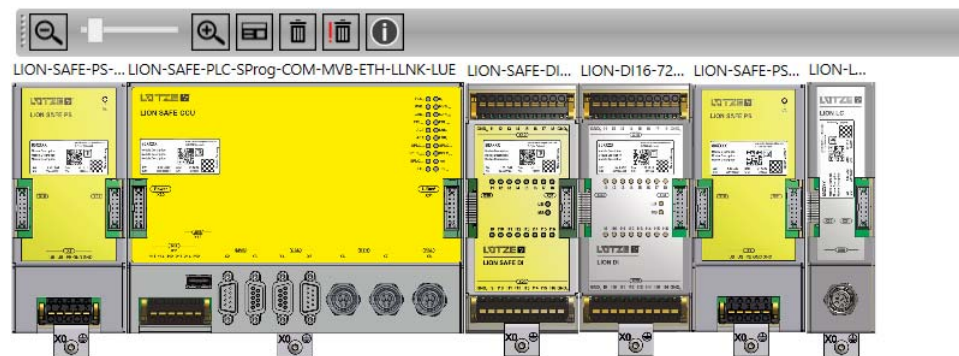
NOTE: This type of replacement only works with PS and LOGIC.

LION LCF Application Manual ▪ Safe CCU Calculator

1. Replace the **power supply** directly by **dragging & dropping** on the icon:



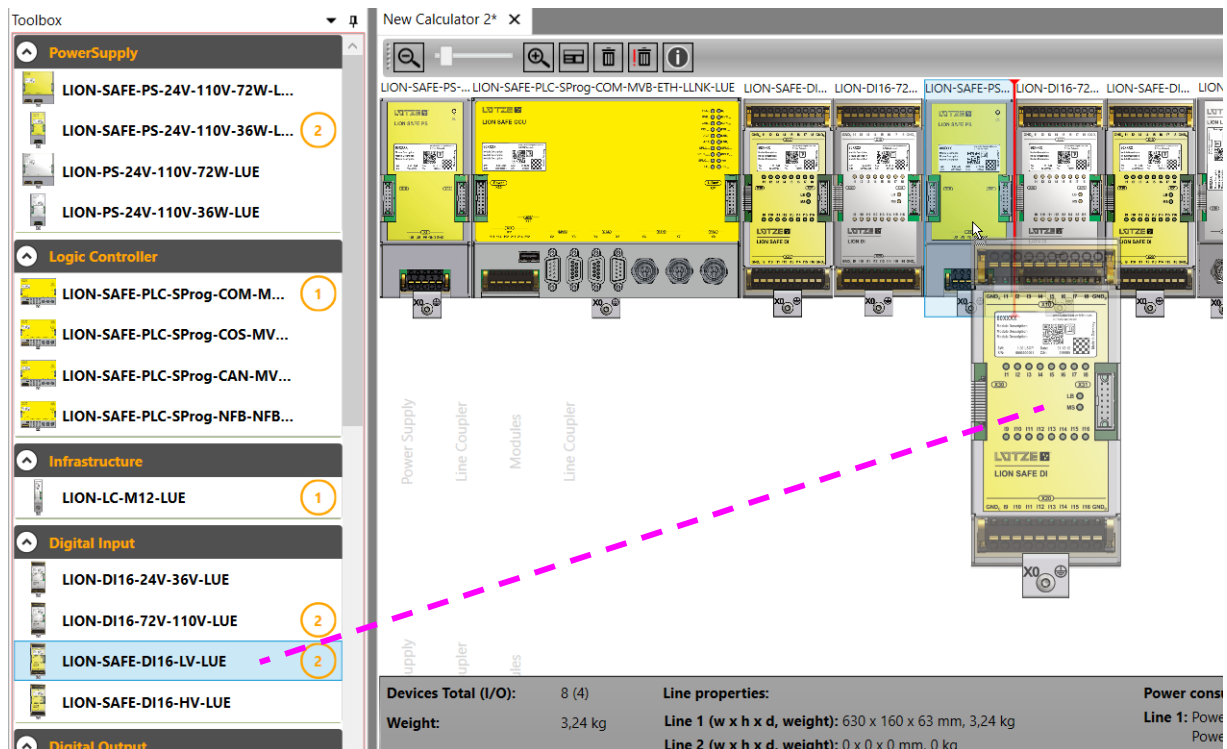
If done it correctly, you will get this result:



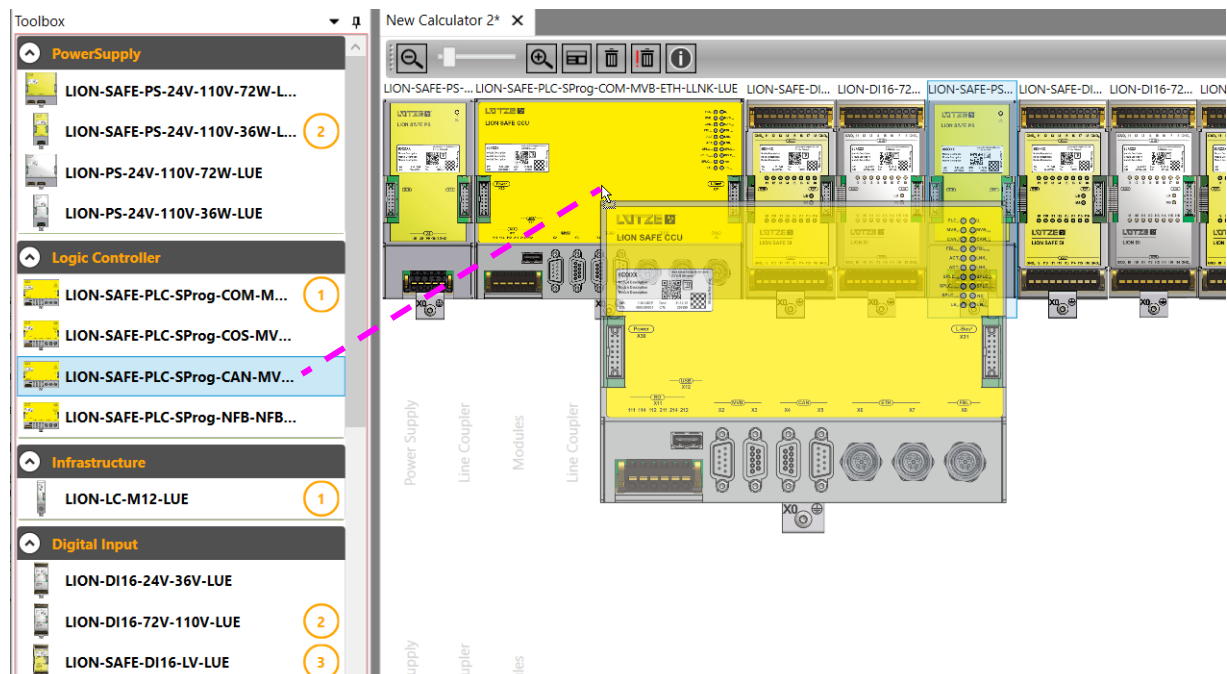
LION LCF Application Manual ▪ Safe CCU Calculator

Exception: Replacement behavior of inline power supplies:

These behave here exactly like the DEVICES, i.e., they are not replaced, and a red line appears to the right or left of them for placing modules.



2. The LOGIC can be replaced directly using drag & drop:

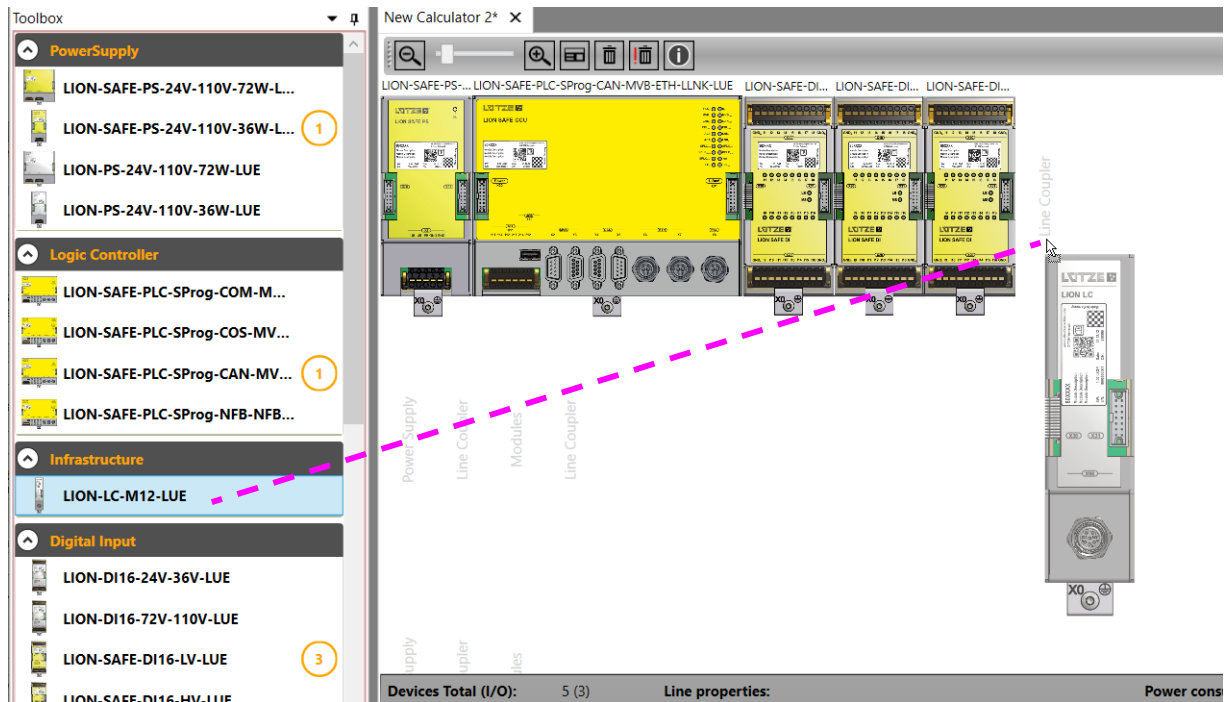


LION LCF Application Manual ▪ Safe CCU Calculator

Step 6: LION line couplers or the last place in the first and second line

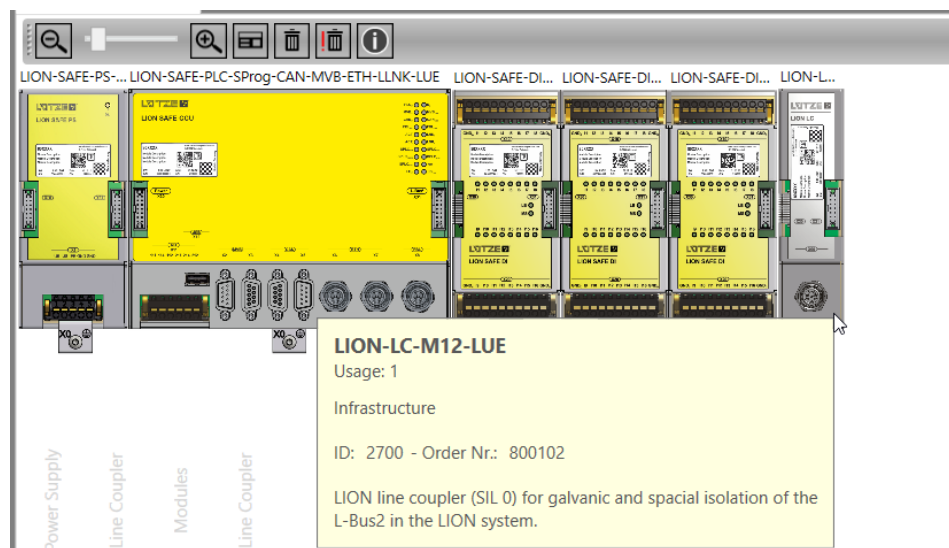
Line couplers can only be placed on the "Line coupler" text area.

NOTE: However, a line coupler is not necessarily required. This is only the case if you want to extend the station over several lines.

**To the text area "Line Coupler"**

NOTE: It is not possible to place additional DEVICES here.

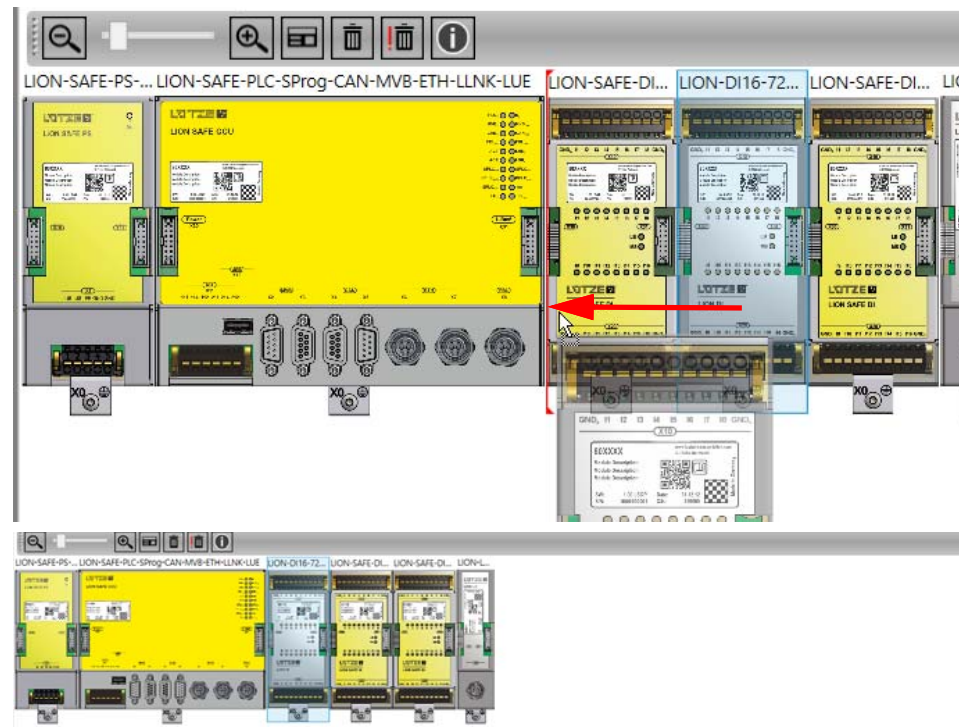
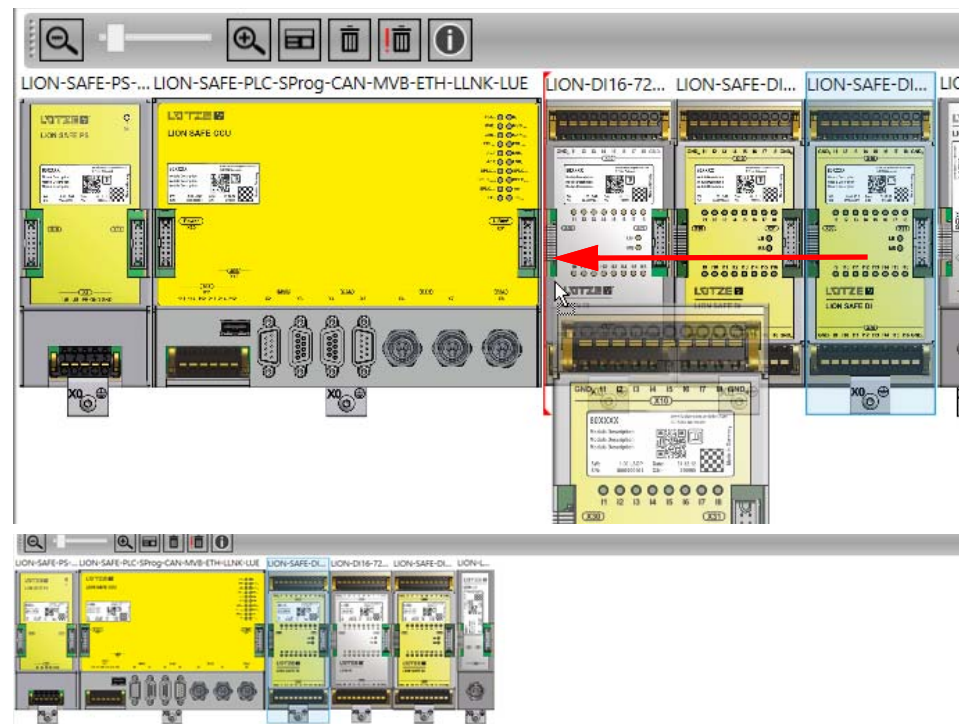
The last module in the first and second line is a "Line Coupler". It is only possible to drag a LION Line Coupler here. If the system runs across three lines, then the last module in the first and the second line is a „Line Coupler“.



Step 7: Changing the order of DEVICES

You can change the order of the modules at any time by following the previously mentioned rules.

1. Drag the DEVICE over an existing DEVICE.
2. A red marking line appears (to the left or right of the module, depending on how you move the mouse). Drop the module in the desired position.

Example1:**Example2:**

10.1.5

Warnings and error handlings

The LCF reacts with warnings if it detects errors in the configuration. For example, if the possible length of one of the three lines is exceeded, or the order of the modules is not correct. It is also displayed if the configured power supplies are sufficient to power the configured DEVICES.

NOTE: All this is constantly recalculated and displayed.

These warnings and their troubleshooting are presented below.

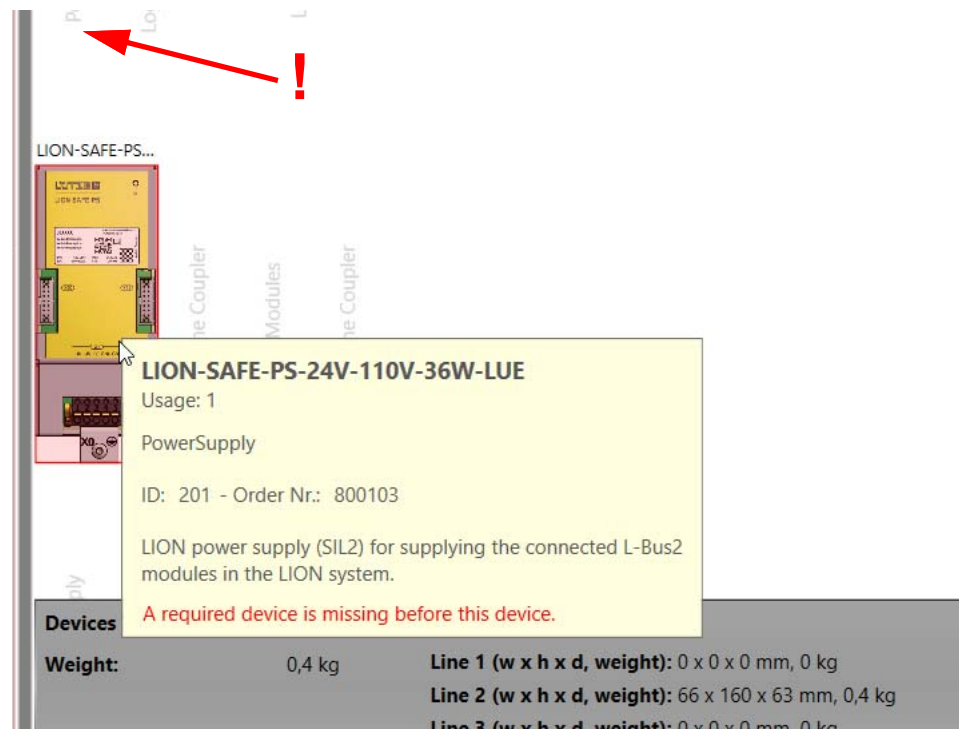
1. Display of incorrectly placed modules

If the placing of a module is not possible, or a module is missing, this is indicated with red areas above the modules. Such a configuration is not valid.

In this example the module is in the wrong line.

NOTE: The first line must not be empty.

Troubleshooting: The configuration always starts at the top of the first line and then continues from left to right without gaps. If a line is longer than 2 m, a new line must be started.



NOTE: Refer to the tooltips to get additional information about a detected configuration error.

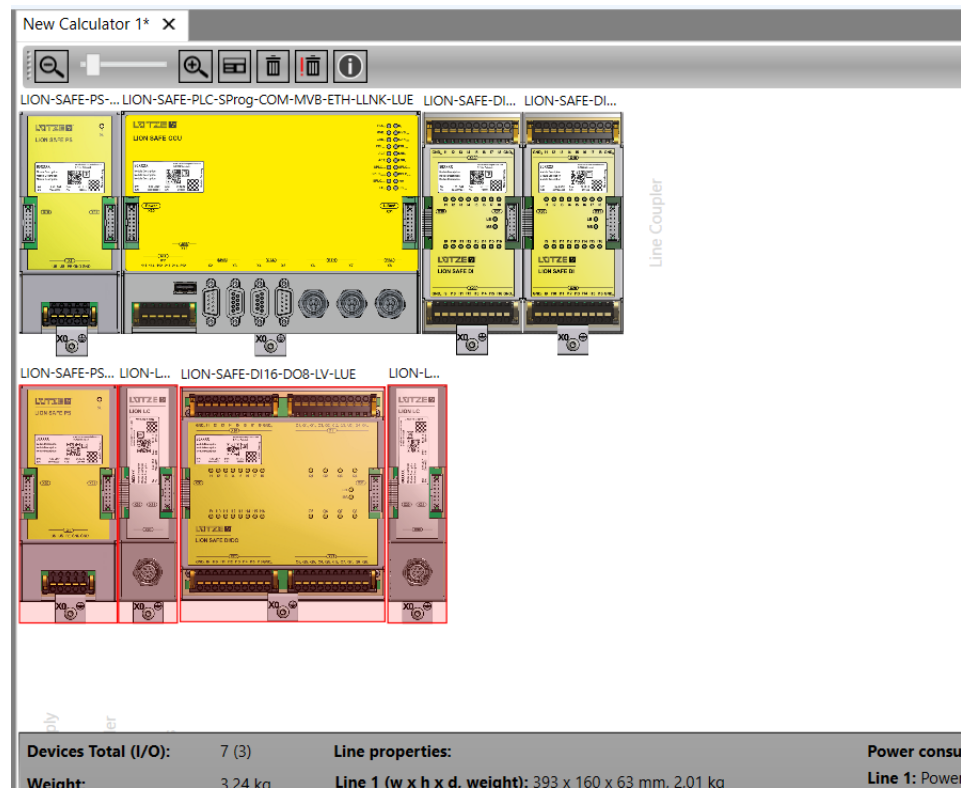
These are displayed as red text.

NOTE: If you release the mouse button after placing and the module is not displayed, either one of the rules was not observed or the marking was not hit exactly.

The module must then be placed again.

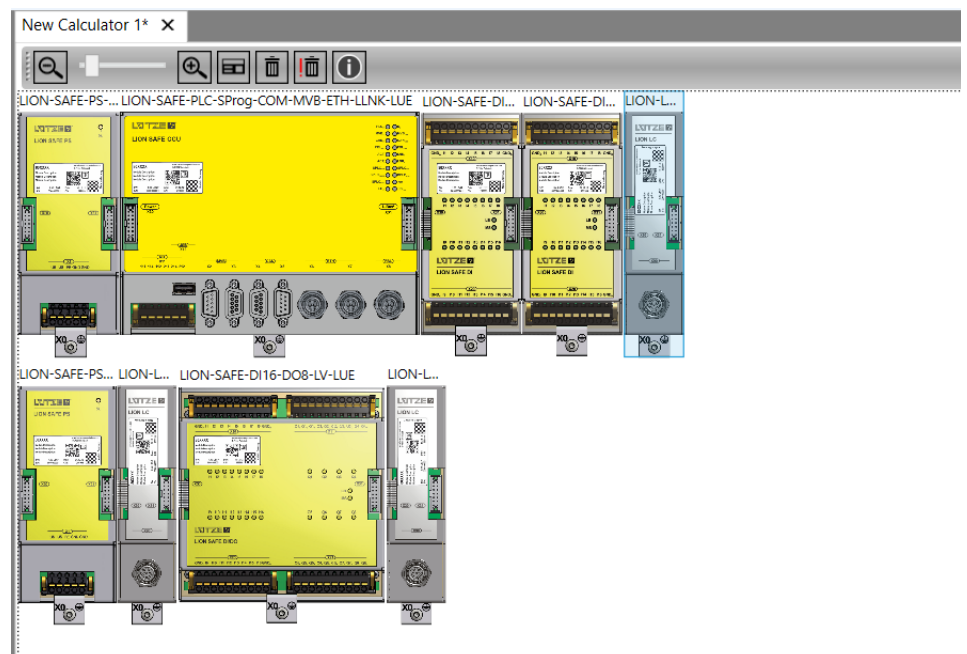
2. Display of incorrect configurations

If the sequence is invalid, all affected modules are highlighted with red areas. In the example below the **LION Line Coupler** at the end of the first line is missing.



This causes all following modules to be displayed in red, because an important module of the chain is missing.

Troubleshooting: To fix the error a **LION Line Coupler** must be added at the end of the first line.



LION LCF Application Manual ▪ Safe CCU Calculator

3. Display of insufficient current

The LCF calculates if the power consumption of the configured modules exceeds the capabilities of the configured power supplies. A red area appears above the modules and the tooltip says, "Not enough current - additional power supply required".

LION-RO8-LUE
Usage: 4
Digital Output
ID: 2400 - Order Nr.: 803201
L-Bus2 relay output module (SIL0) with 8 change-over relays (8 potentials) for use on rail vehicles.
Not enough current - additional power supply required.

Devices Total (I/O):	7 (5)	Line properties:	Power consumption:	39 W
Weight:	3,51 kg	Line 1 (w x h x d, weight):	Line 1: PowerSupply (1):	39 W
		Line 2 (w x h x d, weight):	Line 2:	
		Line 3 (w x h x d, weight):	Line 3:	

Troubleshooting 1: inline power supply

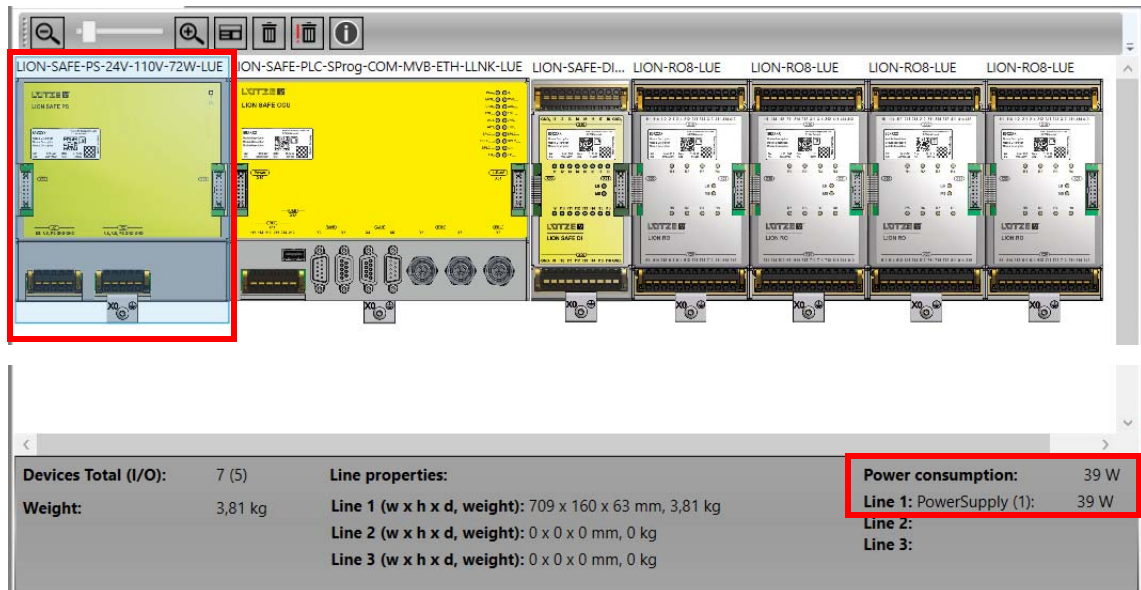
Insert an additional power supply before the first displayed module.

Devices Total (I/O):	8 (5)	Line properties:	Power consumption:	39 W
Weight:	3,9 kg	Line 1 (w x h x d, weight):	Line 1: PowerSupply (1):	33,24 W
		Line 2 (w x h x d, weight):	PowerSupply (2):	5,76 W
		Line 3 (w x h x d, weight):	Line 2:	
			Line 3:	

! Important technical information: It is not necessary to place the additional power supply directly in front of the module shown in the picture above. The power supply can be moved further to the left if it can supply all DEVICES on the right.

LION LCF Application Manual ▪ Safe CCU Calculator

Troubleshooting 2: Insert a stronger power supply in the first place of the line.



10.1.6 Zoom in/out of the display size

At the top of the IODB window is a toolbar, where you can set the zoom level of your configuration.



1. With the **zoom out button (1)** you can reduce the zoom level step by step.
2. The **zoom slider (2)** allows you to increase or decrease the zoom level continuously.
3. With the **zoom in button (3)** you can enlarge the zoom level step by step.
4. Use the **control key + mouse wheel** to increase or decrease the zoom level.

10.1.7 Device Wizard

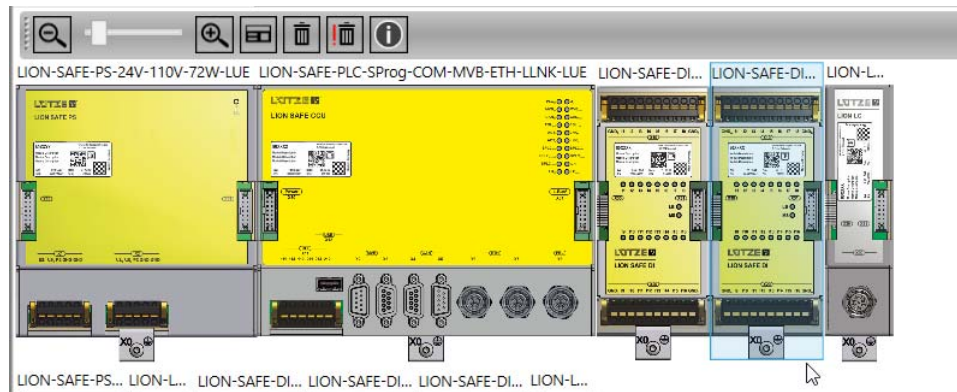


Not implemented in this version.

10.1.8

Delete modules

1. Click on the module you want to delete.



A light blue area appears above the module.

2. Now the marked module can be deleted either with the **"Del"** key on the keyboard.

or:

with the (left) **trash can button**:

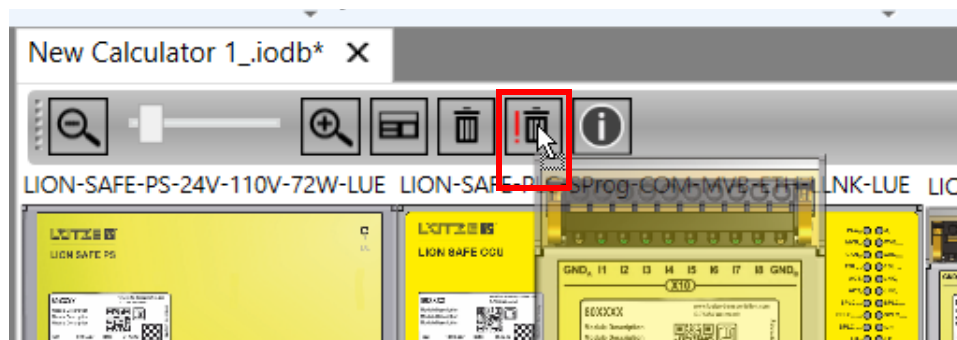


Alternative solutions:

3. Another possibility is to simply drag the module to be deleted onto another module (or grey words e.g., from other lines). But it must not be of the same type, otherwise the module will only change its location.
4. You can also **delete all modules at once** by pressing the **right trash can button**:



A special hint: If you drag a single module onto the **right trash can button**, it will be also deleted. (This do not work on the **left trash can button**!)



10.1.9

IODB Properties



Not implemented in this version.

10.2

How to create a Safe CCU - Calculator report

After creating the LION Safe CCU station, a LION SAFE CCU Calculator Report can be generated.

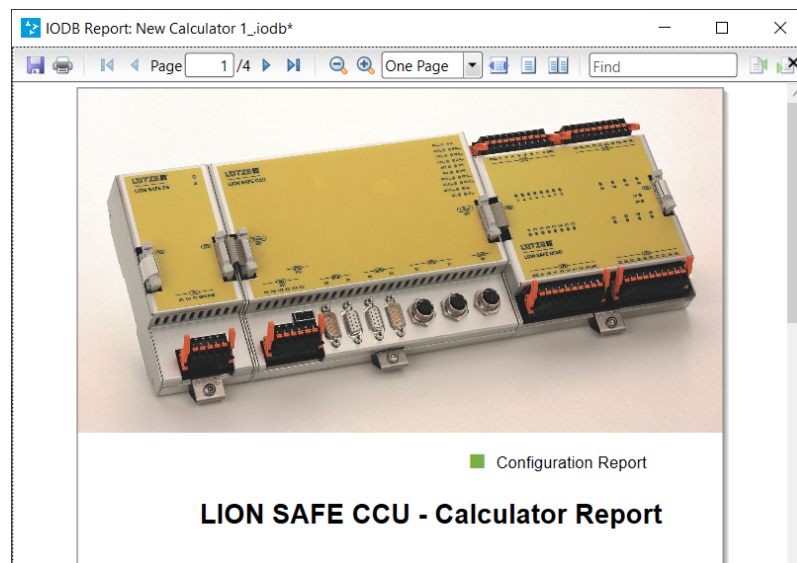
The report contains total power consumption and an overview of the assembled modules, their type, and quantity. It also contains an overview of the composition of the I/O station.

NOTE: The report can be used as a guideline for mounting and installing the I/O station.

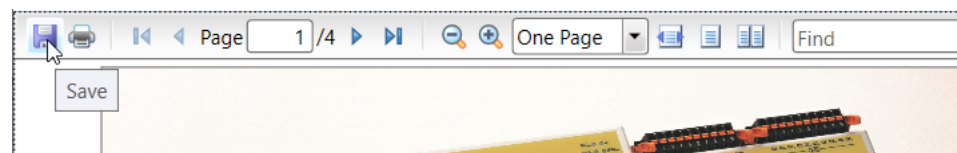
1. Click on the report icon in the toolbar.



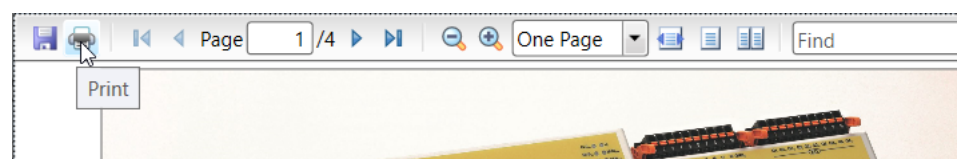
2. The report is created as a .pdf file.



3. It is possible to save the report:



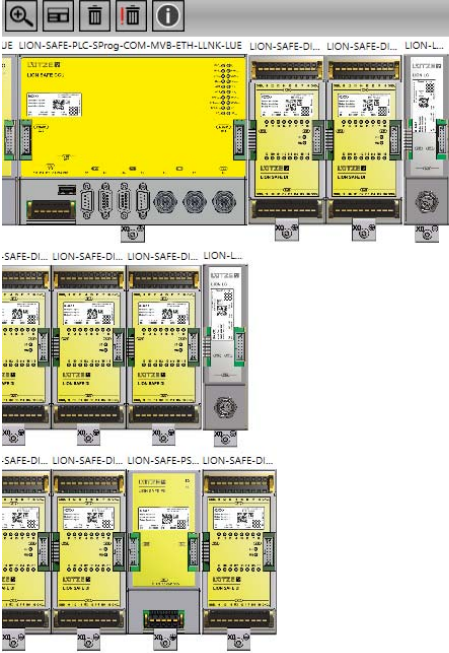
4. It is possible to print the report:



10.3

The power consumption area

The power consumption of individual power suppliers is listed in the report in the “Configuration Information” section.



Line properties:

Line 1 (w x h x d, weight): 506 x 160 x 63 mm, 2,53 kg

Line 2 (w x h x d, weight): 342 x 160 x 63 mm, 1,76 kg

Line 3 (w x h x d, weight): 369 x 160 x 63 mm, 1,95 kg

Power consumption: 31,68 W

Line 1: PowerSupply (1): 18,72 W

Line 2: PowerSupply (2): 7,08 W

Line 3: PowerSupply (3): 4,32 W

PowerSupply (4): 1,56 W

IODB Report: New Calculator 1_iodb*

LCF Version: 3.0.0

LDD Version: 2.9

Version of I/O Configuration:

Configuration Information

Total Power Consumption: 31.68 W

Power consumption details

Device Type	Function	Part Number	Position Number	Power Consumption
PowerSupply	LION-SAFE-PS-24V-110V-72W-LUE	800101	1	18.72 W
PowerSupply	LION-SAFE-PS-24V-110V-36W-LUE	800103	6	7.08 W
PowerSupply	LION-SAFE-PS-24V-110V-36W-LUE	800103	12	4.32 W
PowerSupply	LION-SAFE-PS-24V-110V-36W-LUE	800103	16	1.56 W

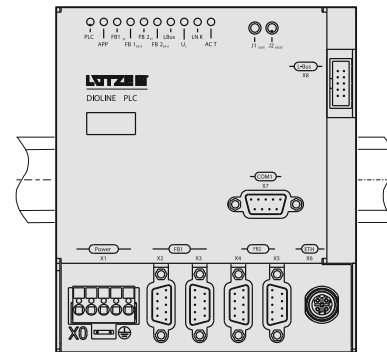
Device Type	Function	Part Number	Quantity
PowerSupply	LION-SAFE-PS-24V-110V-72W-LUE	800101	1
Logic Controller	LION-SAFE-PLC-SProg-COM-MVB-ETH-LLNK-LUE	802108	1
Digital Input	LION-SAFE-DI16-LV-LUE	803103	7
Infrastructure	LION-LC-M12-LUE	800102	4
PowerSupply	LION-SAFE-PS-24V-110V-36W-LUE	800103	3
Digital Input	LION-SAFE-DI16-HV-LUE	803104	1

11

Configurator LOGIC – MVB Configurator

The MVB Configurator is used for configuring an MVB-LOGIC for a sub-system (e.g., with DIOLINE PLC or LION Safe CCU).

11.1

DIOLINE PLC – In Brief**DIOLINE PLC**

The DIOLINE PLC is a flexible, high-performance, compact control system for use in rail vehicles. Freely programmable in the comfortable IEC 61131-3 development environment MULTIPROG®.

Automation of simple vehicles

The DIOLINE PLC can be used for the automation of simple vehicles, as a subsystem controller, or as a powerful gateway for the realization of various vehicle-specific bus signals.

If a DIOLINE PLC (MVB) is used, it is the LOGIC of an MVB. In connection with the higher-level system, the LOGIC, the DIOLINE PLC station (blue frame) and consequently the complete I/O station is likewise an MVB slave.

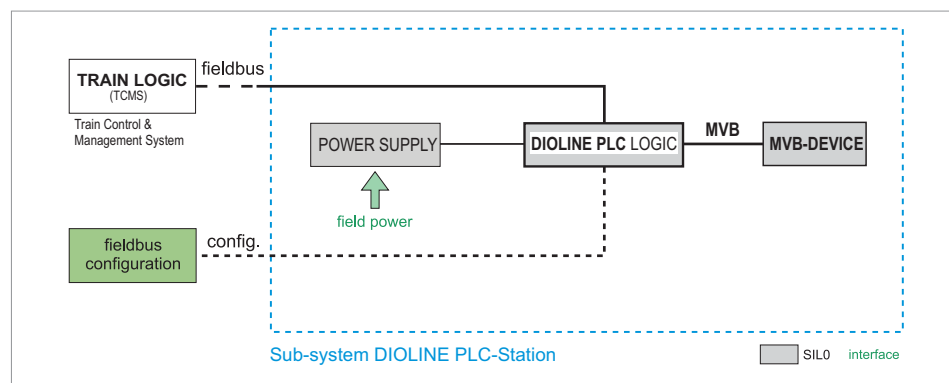


Abb. 1: This smallest possible MVB DIOLINE PLC station illustrates the principle.


A DIOLINE PLC station is a local I/O system consisting of a DIOLINE PLC-LOGIC and MVB-DEVICES. MVB devices can be, for example, LÜTZE products such as *LION bus couplers*. The MVB-DEVICES then control the I/O modules connected there.

The LION LCF Tool is used for configuring the MVB/TRDP protocol of the LOGIC, for example, as a remote station to the LION bus couplers.

The following applies:

1. The DIOLINE PLC is the LOGIC of the DIOLINE PLC station and sends or receives data from the MVB-DEVICES.
2. The DIOLINE PLC communicates with the MVB-DEVICES via the MVB field-bus protocol.

NOTE: The configuration of the DIOLINE PLC must be carried out in the LION LCF Tool - Configurator LOGIC – MVB Configurator.

 Chapter: Further information can also be found in the “Configuration” chapter in the respective operating instructions for the PLCs.

NOTE: DIOLINE PLCs are only available in SIL0 (non-safe) variants. The SDTv2 protocol is therefore not applicable to DIOLINE PLCs. The SDTv2 protocol is only possible from SIL>0 and thus only for LION SAFE CCUs.

The integrated fieldbuses are available in the following designs:

- MVB Slave Class 1.3 as EMD or ESD+
- CANopen Master or CANopen Slave
- CAN2.0 (SAE J1939)
- RS-232 or RS-422/-485
- Ethernet TCP/IP
- TRDP
- Profibus Master or Profibus Slave

11.1.1

Programming and Configuration

Programming is done in MULTIPROG® and SAFEPROG® by Phoenix Contact. The MVB (TRDP) configuration takes place via the LION LCF tool.

MULTIPROG® is capable of handling multi-user projects via network access. When it comes to interfaces and software, there are various options.

In the LION LCF Tool, new NSDB files can be created. Similarly, existing NSDB files can be opened and further edited in the LION LCF Tool.

⚠ CAUTION The project planner is responsible for the configuration. Especially for the configuration of the LOGIC.

NOTE: Only DIOLINE FW 2.09 or higher can accept an NSDB file for DIOLINE MVB created with the Configurator LOGIC.

11.1.2

LION Safe CCU – In Brief



The LION Safe CCU is a compact high-performance PLC with Safety Integrity Level SIL2 for use in rail vehicles. For connecting external assemblies, the control system is equipped with a Lütze Link interface (LLK). Using this for example, an L-BUS2 Gateway can be attached internally to expand the control unit through the addition of safe and non-safe local I/O modules. In addition, devices like an F-Bus Loop Gateway for example, can be connected over the LLK.

A gray, non-safety-related PLC is also integrated in the safety control unit. The deployed controller is used to create the non-safety-related fieldbuses MVB and CAN. The controller is connected to the Safe CPU over a multiplexed data and address bus. MVB and TRDP can be controlled via both controllers.

There is sufficient channel separation on the data interface to exclude mutual interference.

Free programmable in a safe and certified development environment.

High-performance fieldbuses MVB (STDv2), CANOpen Slave and Ethernet, TRDP (SDTv2) with DualHoming.

NOTE: The safe CPU (SIL2) is programmed with the tool **SAFEPROG®**, and the non-safe CPU (SIL0) with the tool **MULTIPROG®**.

The LION Safe CCU offers several types of fieldbus. The LION Safe CCU is the master of a LION Safe CCU station (blue frame). The LION Safe CCU station is also a DEVICE (slave) in relation to the higher-level system, the LOGIC.

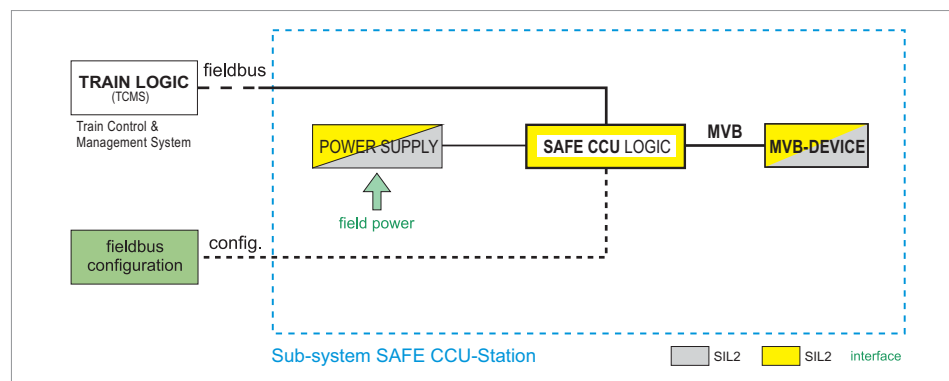


Abb. 2: This smallest possible LION system illustrates the principle.

A LION Safe CCU station is a local I/O system consisting of a LION Safe CCU (MVB, TRDP/Ethernet, etc.) and various MVB devices. MVB devices can be, for example, LÜTZE products such as *LION bus couplers*. The MVB-DEVICES then

control the I/O modules connected there.


The LION LCF Tool is used for configuring the MVB/TRDP protocol of the LOGIC, for example, as a remote station to the LION bus couplers.


The following applies:

1. The LION Safe CCU is the LOGIC of the LION Safe CCU station, and sends or receives data from the MVB-DEVICES.
2. The LION Safe CCU communicates with the MVB-DEVICES via the MVB fieldbus protocol.

A DIOLINE PLC station is a local I/O system consisting of a DIOLINE PLC-LOGIC and MVB-DEVICES. MVB devices can be, for example, LÜTZE products such as *LION bus couplers*. The MVB-DEVICES then control the I/O modules connected there.

NOTE: The configuration of the LION Safe CCU must be carried out in the LION LCF Tool "Configurator LOGIC—MVB Configurator".

 Chapter: Further information can also be found in the "Configuration" chapter of the respective operating manuals for the LION Safe CCU.

 Chapter: The definition of a LOGIC and the DEVICES can be found in [chapter 15 on page 135](#)

11.1.3

Further notes on LION Safe CCU

NOTE: The LION Safe CCU is only available in safe versions. SDTv2 is thus possible for LION Safe CCUs.

11.1.4

Programming and Configuration

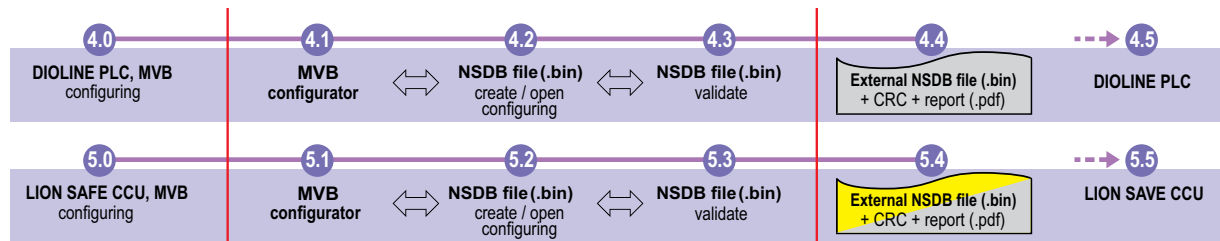
Programming is done in MULTIPROG® and SAFEPROG® by Phoenix Contact. The MVB (TRDP) configuration takes place via the LION LCF tool.

MULTIPROG®, or SAFEPROG®, is capable of handling multi-user projects via network access. When it comes to interfaces and software, there are various options.

In the LION LCF Tool, new NSDB files can be created. Similarly, existing NSDB files can be opened and further edited in the LION LCF Tool.

⚠ CAUTION The project planner is responsible for the configuration. Especially for the configuration of the LOGIC.

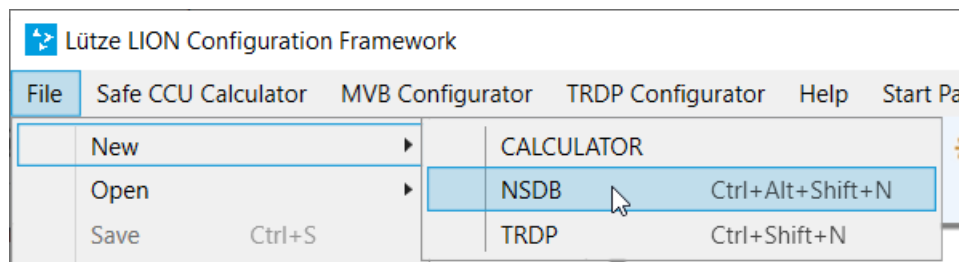
11.1.5 Creating a new NSDB configuration file



- Used for DIOLINE PLC (SIL0) and LION SAFE CCU (SIL0, SIL2)
- An IODB file cannot be used to configure the LOGIC.
- The safety checksum is generated when the MVB report is created.
- Vehicle and I/O station number are editable.
- A “web server version” is not available.

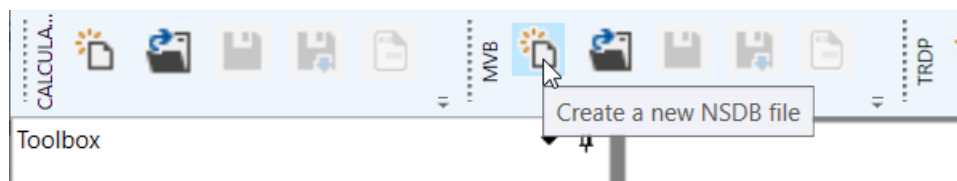
For a new NSDB configuration file and an MVB report in PDF format, with a *safety checksum*, proceed as follows:

1. Click on *File* in the menu bar.
2. Select *New*. Click on NSDB.

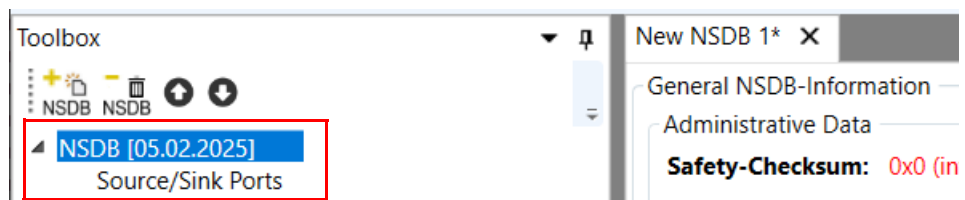


or

Click on the Create new NSDB file icon in the toolbar:

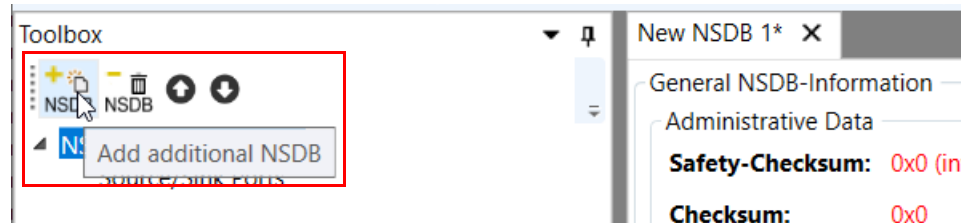


3. The new NSDB file appears in the toolbox.



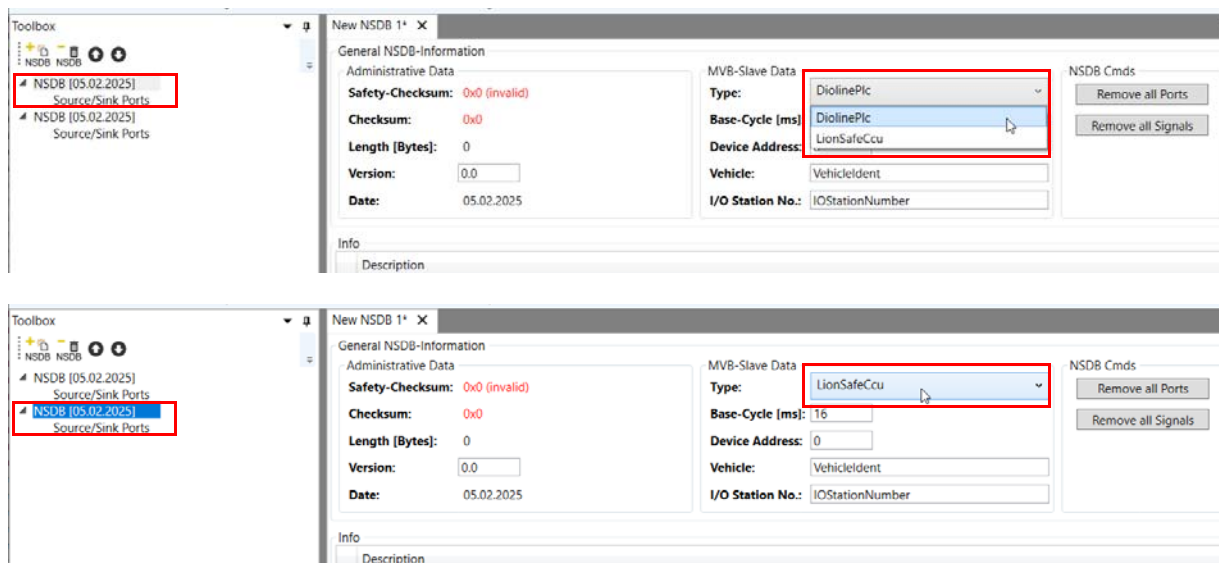
11.1.6 Creating additional NSDB files

Additional NSDB files can be created and managed using the “+NSDB” button in the toolbox window.



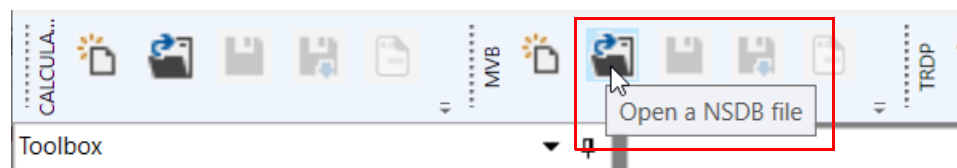
11.1.7 MVB slave data types of NSDB files

A different MVB slave data type can be selected for each NSDB file:



11.1.8 Importing existing NSDB files

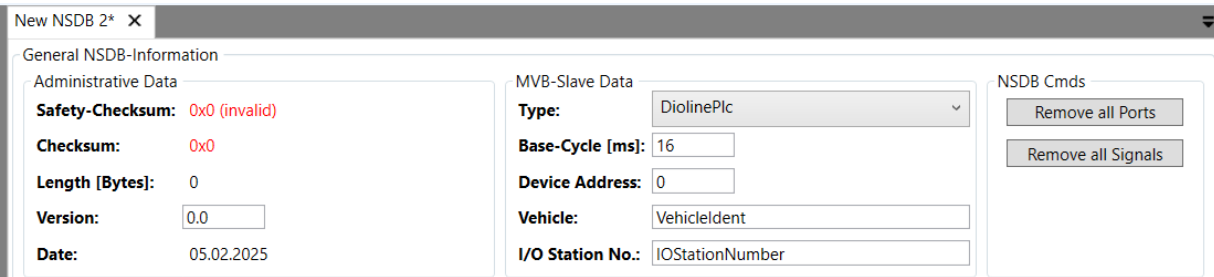
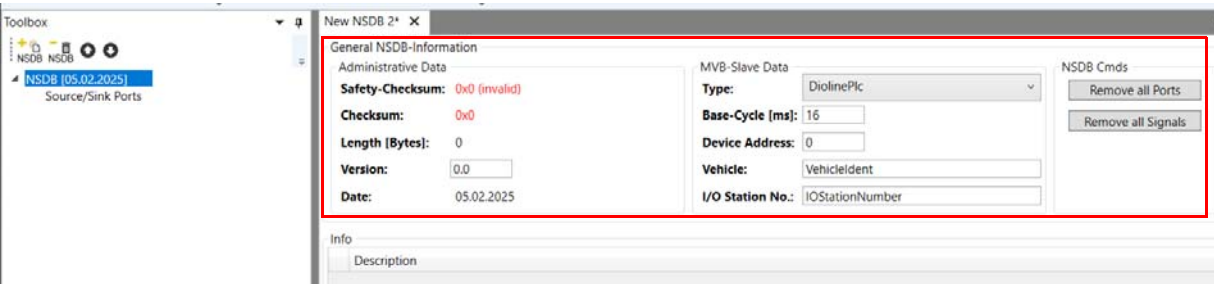
Click on the Create new NSDB file icon in the toolbar:



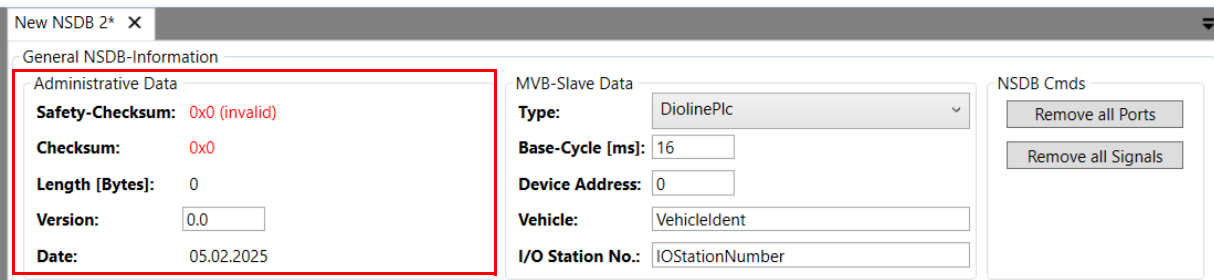
This allows you to import and edit existing NSDB files.

11.1.9 General NSDB Information

The imported data is displayed under the General NSDB information area.



1. Administrative Data (on the left side).



Safety Chesum

This *safety checksum* is generated when you create the report and then click on **Save**. **This is the security process for obtaining a valid NSDB file with the corresponding report.**

Checksum

This *checksum* is generated when saving.

Length [bytes]

Length of the NSDB file [in bytes]

Version

Version of the NSDB file/configuration.

Date

Date of creation

LION LCF Application Manual ▪ Configurator LOGIC – MVB Configurator

2. MVB slave data (on the right-hand side).

The screenshot shows the 'New NSDB 2*' window. On the left, 'General NSDB-Information' includes 'Administrative Data' with fields for Safety-Checksum (0x0 (invalid)), Checksum (0x0), Length [Bytes] (0), Version (0.0), and Date (05.02.2025). On the right, the 'MVB-Slave Data' section is highlighted with a red box. It contains fields for Type (DiolinePlc), Base-Cycle [ms] (16), Device Address (0), Vehicle (VehicleIdent), and I/O Station No. (IOStationNumber). To the right of this section are 'NSDB Cmds' with buttons for 'Remove all Ports' and 'Remove all Signals'.

Type

Specifies the type of LOGIC, and therefore the type for the I/O system is specified. The system can be either a DIOLINE PLC (SIL0) or a LION Safe CCU (SIL2). With a LOGIC, several field bus types are possible, e.g., a LION Safe CCU can be an MVB or a TRDP station.

Base cycle [ms]

Basic cycle of MVB communication.
16ms - 65535ms - must be a multiple of 16.
The actual MVB time is set by the MVB master.
This time is used to calculate the STS timeout.

Device address

MVB device address

Vehicle

The name of the vehicle can be entered

I/O station no.

The number for each I/O system can be entered

2.1. Notes on the safety checksum

- The *safety checksum* is relevant for the application engineer (the developer of the train protection system) to identify the *NSDB file* used in a LION I/O station.
- After uploading an *NSDB file* to an MVB LOGIC, the displayed safety checksum must match the *safety checksum* in the report.
- The *safety checksum* is transmitted via the fieldbus (diagnostic interface) and can be checked by the train protection system to determine whether the connected LION I/O station is using the expected NSDB configuration. If the value of the safety checksum deviates from the expected value, the station is incorrectly configured.

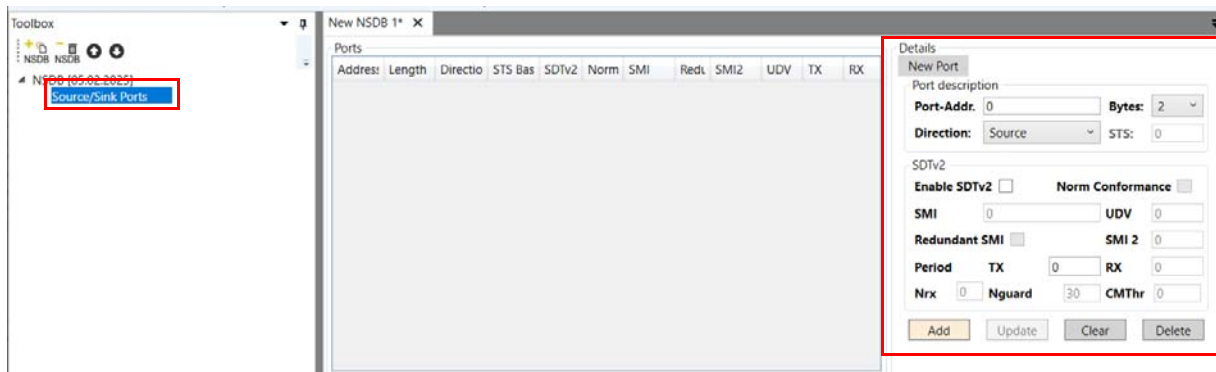
2.2. Notes on the checksum

NOTE:

The checksum is created as soon as the NSDB file is saved.
In contrast to the safety checksum, the checksum is used for additional monitoring for file errors.

11.2 General configuration of the ports

Corresponding ports can be created and edited under Source/Sink Ports.



11.2.1 Creating new reports

For an MVB configuration, we need to create corresponding ports. *Source ports* transmit data from the LION I/O station to the fieldbus, *Sink ports* are received by the LION I/O station and can be used to control the outputs of DEVICES.

NOTE: In the MVB Configurator (LOGIC), no diagnostic data can be configured for the LOGIC. This is only possible in the TRDP Configurator (LOGIC) (SIL0 and SIL2).

Create the desired number of *source ports*, sink ports and a *diagnostic port*. On the right-hand side of the input screen, you can enter the port address, port size and port type under Details:

Details

New Port

Port description

Port-Addr: 0 Bytes: 2

Direction: Source STS: 0

SDTv2

Enable SDTv2 ☐ Norm Conformance ☐

SMI 0 UDV 0

Redundant SMI ☐ SMI 2 0

Period TX 0 RX 0

Nrx 0 Nguard 30 CMThr 0

11.2.2 Port settings

All communication parameters required for the MVB fieldbus can be set in the *Details* area of each port.

Details

New Port

Port description

Port-Addr. 0 1 Bytes: 2 2

Direction: Source 3 STS: 0 4

(1) **Port address** Port address according to MVB specification.

(2) **Bytes** The port size in bytes. The maximum size is 32 bytes.

(3) **Direction** **Source**-port (default) or **Sink**-port

(4) **STS** Sink time monitoring is a monitoring mechanism for sink ports. See also the “*Sink Time Supervision*” chapters in the respective operating instructions.

NOTE: Within the MVB LOGIC, half of the STS value is used for the calculation: $(STS / 2) * MVB \text{ base cycle time}$.

Each port can be saved with the SDTv2 safety protocol.

SDTv2 is activated, additional parameters are required to configure the SDTv2 protocol. See the following input window.

SDTv2

Enable SDTv2 ☐ 5 Norm Conformance ☐ 6

SMI 0 7 UDV 0 8

Redundant SMI ☐ 9 SMI 2 0 10

Period TX 0 11 RX 0 12

Nrx 0 Nguard 30 CMThr 0

Add Update Clear Delete

(5) **Enable SDTv2** Activate the “*Enable SDTv2*” checkbox so that the port can receive or send data via the SDTv2 security layer.

(6) **Conformity with standards** The checkmark next to “*Standard conformity*” switches between the normative and an alternative implementation of the SDTv2 protocol.

(7) **SMI**

NOTE: NOTE: 1-999 is reserved and should not be used. Identification of the security message. Identifies the source of the SDTv2 channel.

(8) UDV

NOTE: Value range 15 (0: invalid)
User data version, user-defined version of the data structure that is transmitted via the SDTV2 channel.

(9) Redundant SMI

Indicates whether a redundant identifier for the security report exists or not.

(10) SMI 2

Safety Message Identifier des VDP - redundant SMI

(11) Period TX

Transmit Cycle Time in ms of the VDP (16, 32, 64, ...)

Cycle time in [ms] used to generate safe data packets at source ports. (At sink ports, this value must match the cycle time with which the port is generated at the source).

(12) Period RX

Receive Cycle Time in ms of the SDSINK (typical: $0\text{ms} < \text{Trx_period} \leq \text{Ttx_period}$)

Cycle time in [ms] used for processing safe data from the network. This can be higher or lower than the **TX period** (over or under sampling).

NOTE: The transmitter only requires the transmission cycle time, the receiver requires both cycle times (as both **oversampling and undersampling** are possible).

NOTE: It is strongly recommended to configure the cycle times as integer multiples of the internal PLC cycle time (8 ms) of the LOGIC; otherwise, they will be rounded off.

NOTE: Comma/point entries are not permitted in this field; decimal numbers cannot be saved here.

(13) nRX

Number of Trx_periods for PST for SDSINK (=Trx_safe; typical: $3 \times \text{Ttx_period} / \text{Trx_period}$) Value range: 1 ... 128 (typically: 3)

Number of RX cycles without new data in which the last received data is still considered safe. **Trx_safe** without having received a valid VDP, the safe state is assumed.

(14) Ngard

Number of Trx_periods für redundancy switch over für SDSINK Number of Trx_periods for redundancy switch for SDNSK (=Tguard; typical $10 \times \text{Nrx_safe}$)

Period	TX	0	RX	0	
Nrx	0	Ngard	30	CMThr	0

(15) CMThr

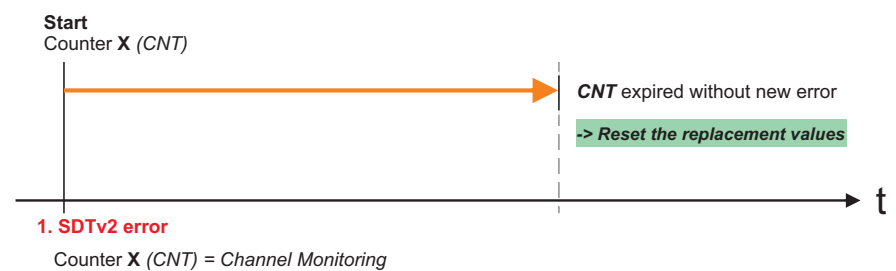
Threshold value for channel monitoring (*Channel monitoring threshold*):

Value range: $\geq 100,000 / Ttx_period$ (Ttx_period in unit [ms]),
Standard/default: **10,000** (e.g. if the Ttx_period is assumed to be 10 ms, therefore $CMThr = 100,000/10 = 10,000$):

SDTv2 channel monitoring aims to detect a sudden increase in the transmission error rate within the SDTv2 channel, which could be due to a hardware or software error in one of the components belonging to the SDTv2 channel. These failures can be permanent, in which case a repair is required, or temporary, in which case the system can recover itself. (A special case here is the inauguration of a train in accordance with IEC 61375).

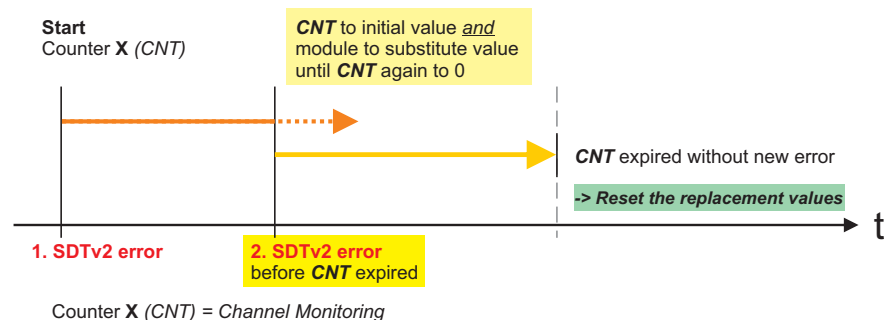
NOTE: However, it is possible to recover from this state, but this also means that there is no jump to *fail-safe mode*.

As long as the communication is considered unsafe, all data is invalidated and defined substitute values ("0") are sent. The replacement values are only set after a second error and only if the counter has not yet expired.

Case 1:

The counter X (corresponds to the value set in CMThr) counts down with each error-free value after a first SDTv2 error is detected. However, the values are not yet set to the safe state. When the counter value of error-free packets has reached "0", the counter is reset to CHThr again.

Once secure communication has been restored, updated data with new values is provided again.

Case 2:

If another SDTv2 error is detected before the counter has expired after the first detected SDTv2 error, the values will be transferred to a safe state. Additionally, the counter is reset to the value set in CMThr. Every SDTv2 error that occurs again causes the counter value to be set to CMThr (this is not visible in the illustration).

After the counter value has expired without an SDTv2 error, the counter is reset to CMThr and the values are transferred to a valid state (i.e., they return from the safe state to normal operation).

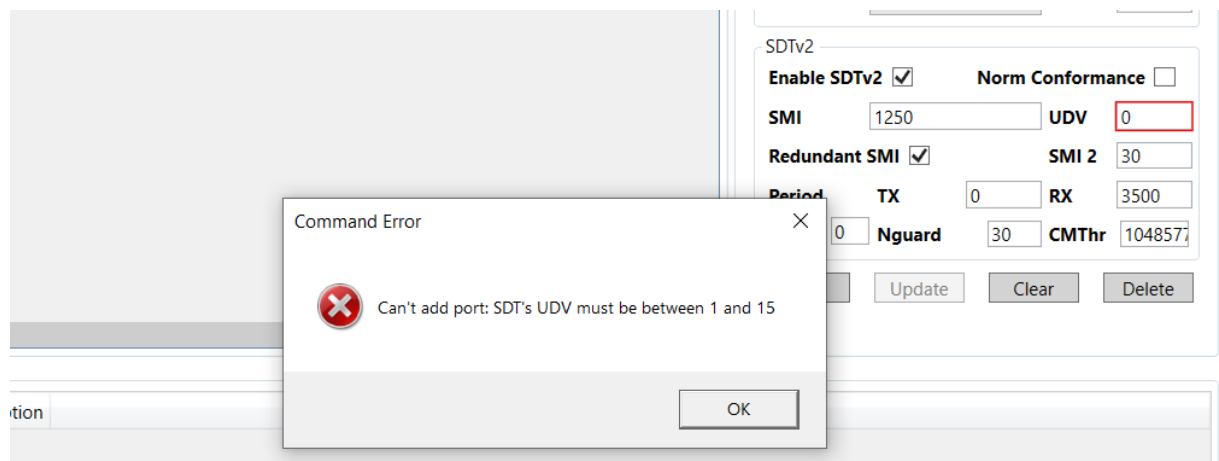
Once secure communication has been restored, updated data with new values is provided again.

NOTE: The IEC 61375-2-3 standard uses a different interpretation. It specifies that the default value of CMThr should be ≤ 43 . VDPs (Vital Data Packets) with a false SC-32 checksum (32-bit security code) per hour.

This means that up to 43 VDPs per hour may have an incorrect SC-32 checksum before the communication is no longer considered secure. *Further information can be found in IEC 61375-2-3, chapter "Channel monitoring".*

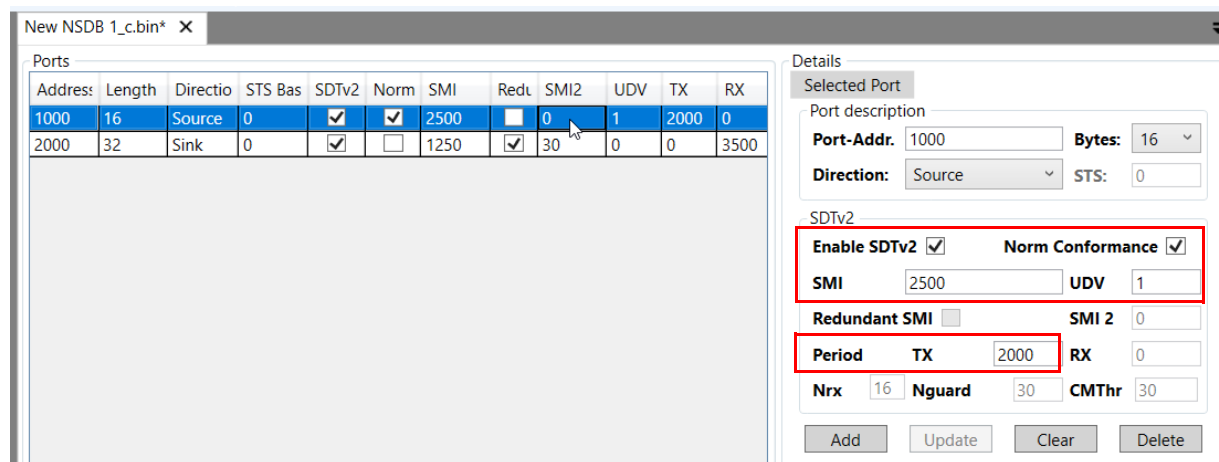
NOTE: Missing or incorrect data is marked with a red frame and notes. No safety CRC can be generated in this case.

Example:



NOTE: For the Source-Port only the following fields are active: "Enable SDTv2" / "Norm Conformance" / "SMI" / "UDV" and "Period Tx".

All other values for "Redundant SMI" (incl. "SMI 2"), "Nrx", "CMThr" and "RX[ms]" are deactivated. However, they are required for the sink port.




11.2.3 Port size

The size of the individual ports can be configured via the Bytes drop-down menu. The available sizes are limited, as can be seen in the following illustration.

Details

New Port

Port description

Port-Addr. Bytes: 

Direction: STS:

SDTv2

Enable SDTv2 ☐ Norm Conforma




SMI UDV

Redundant SMI ☐ SMI 2

2 Bytes

Port-Area




	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15																

 PVName  Signal value  Check value

4 Bytes

Port-Area




	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

 PVName  Signal value  Check value

8 Bytes

Port-Area




	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63

 PVName  Signal value  Check value

16 Bytes

Port-Area




	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0x40	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
0x60	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

 PVName  Signal value  Check value

32 Bytes

Port-Area

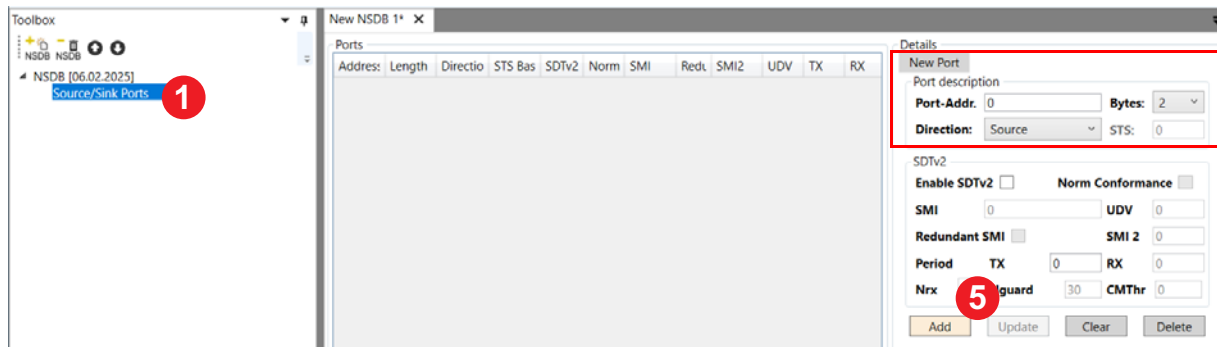
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0x40	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
0x60	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
0x80	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
0xa0	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
0xc0	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
0xe0	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

 PVName  Signal value  Check value

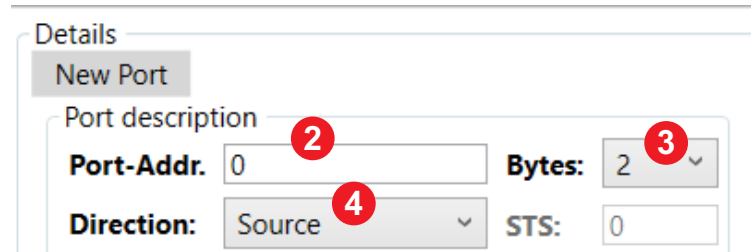
NOTE: SDTv2 ports require a minimum size of 8 bytes (due to the overhead of the safety protocol).

11.3 Creating a new source port

The *source ports* are sent by the LOGIC to transmit data via MVB, e.g., digital outputs, etc.



1. Select **Source/Sink Ports** (1) in the toolbox window.

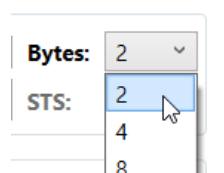


2. Enter a **port address** (2), e.g. ,“1000” (This depends on your numbering concept).

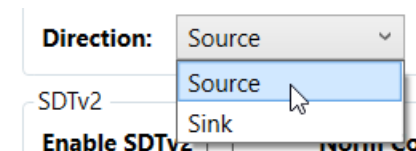
Port-Addr. 1000

NOTE: MVB port addresses are only possible from 0 to 4095.

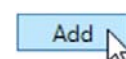
3. Create a **source port** with 2 bytes (3):



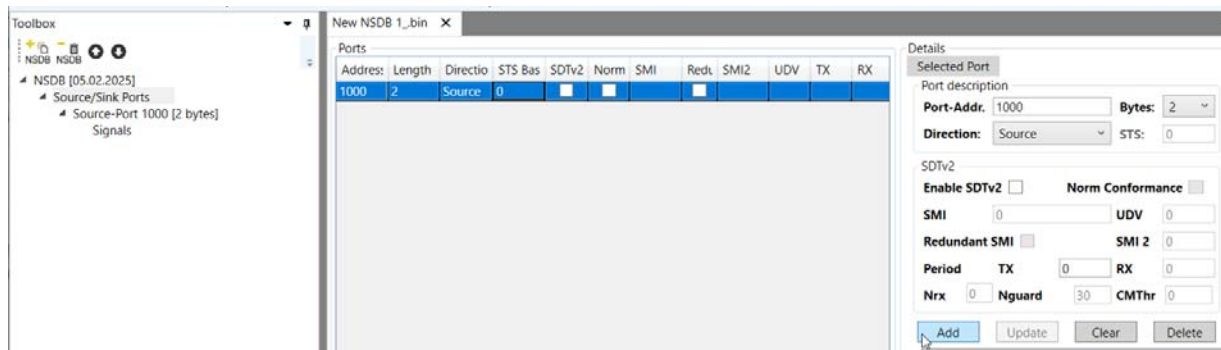
4. Select the direction: Source (*default setting*) (4)::



5. Click **Add** (5) to create the new port.



6. The newly created *source port* is now added to the list of *ports*.



11.3.1

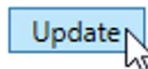
Functionality of the update button

NOTE: You can change the properties at any time and save them using the update button.

If you enter a change to a **SELECTED PORT**, the update button is activated: (The color turns orange.)



Click on the Update button to save the changes.



7. A second *source port* is created for this example: Simply enter another port address in the field:

Port-Addr.

NOTE: As the *port address* did not yet exist, the currently selected *port address* could also be inadvertently updated to a "different number". This is carried out without a warning message.

Therefore, do not change the port address in a selected *port*. Use the *Clear button* to create a new port instead.

11.3.2 The functionality of the Clear button

The button can be found here:



The *Clear button* has two functions:

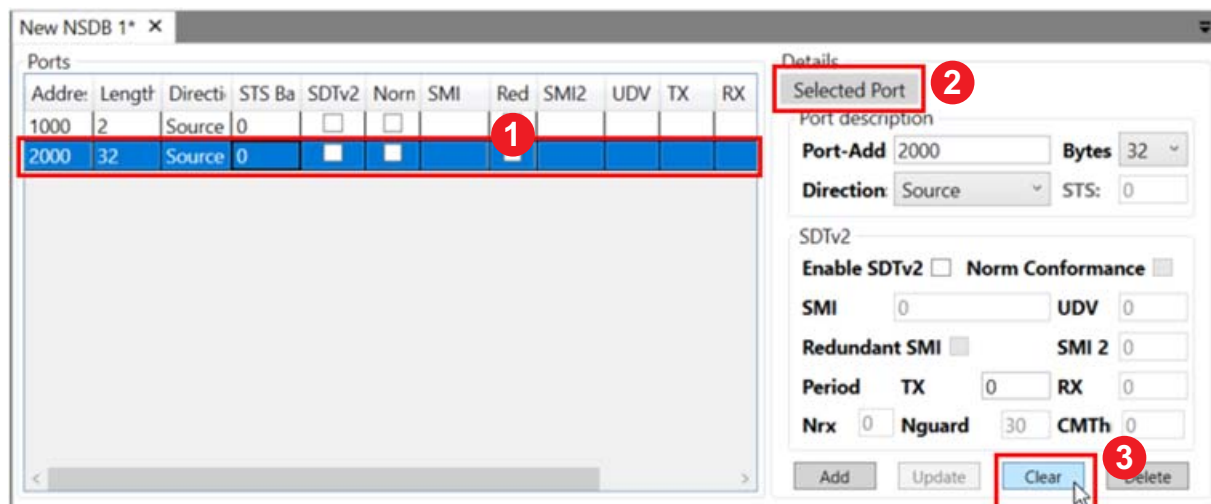
- The first function is to discard the unsaved entries of a *selected port (2)*. Clicking Clear deactivates all ports.
- The second function consists of deactivating a selected port **(1)** and obtaining a *New Port (4)*. The values entered are reset to the default values. The *port address* was set to the value zero.

11.3.3 Create a new port with Clear

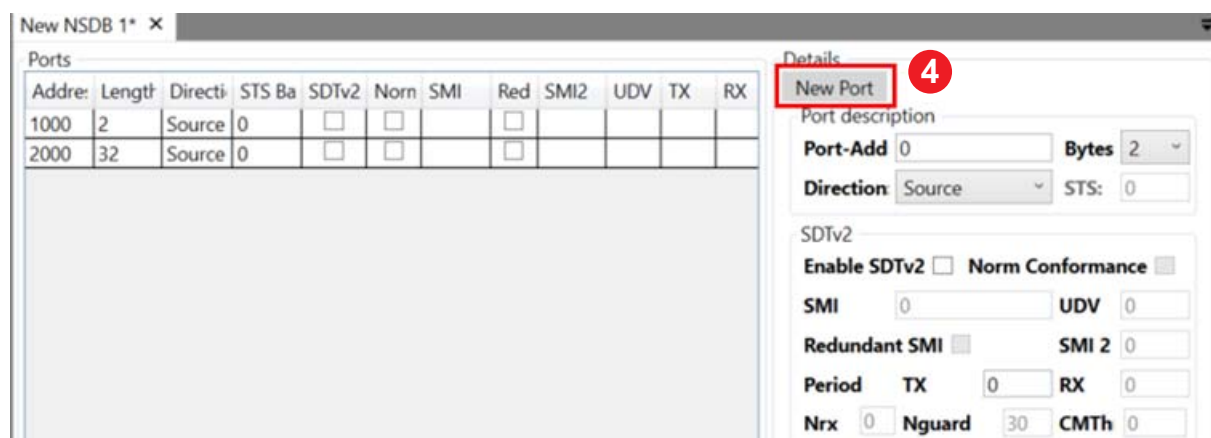
To create new ports, proceed as follows:

1. If a port is already selected, e.g. after editing **(1)**, the heading *Selected Port (2)* appears in the *Details* area because you can see the settings for the selected port.

First click on the *Clear button (3)* to create a *new port (4)*..



2. This will give you the heading *New Port (4)* in the Details area. You can now create a new port without inadvertently overwriting an existing port.



LION LCF Application Manual ▪ Configurator LOGIC – MVB Configurator

Select a port address.

NOTE: Only enter integer values here. A red frame automatically indicates an invalid or missing entry.

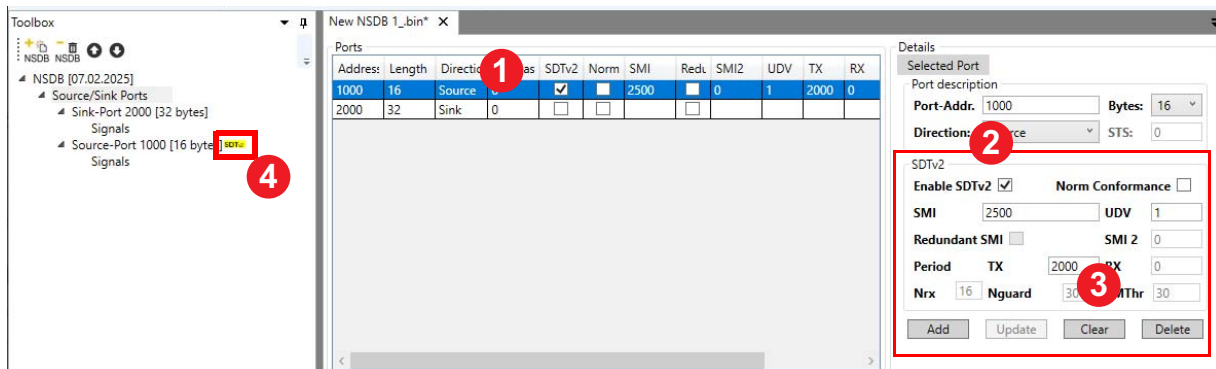
Use **Add** to create the new source or sink port (1).

The ports created are also displayed on the left-hand side of the *toolbox*.

You can navigate through all configuration elements in the toolbox window.

NOTE: Make sure that the **DEVICE** has input data. Source ports can only be mapped to input data from **DEVICES**. This means that when editing a *source port*, only the input data of the **DEVICE** is displayed.

11.3.4 Activating SDTv2 for the source port

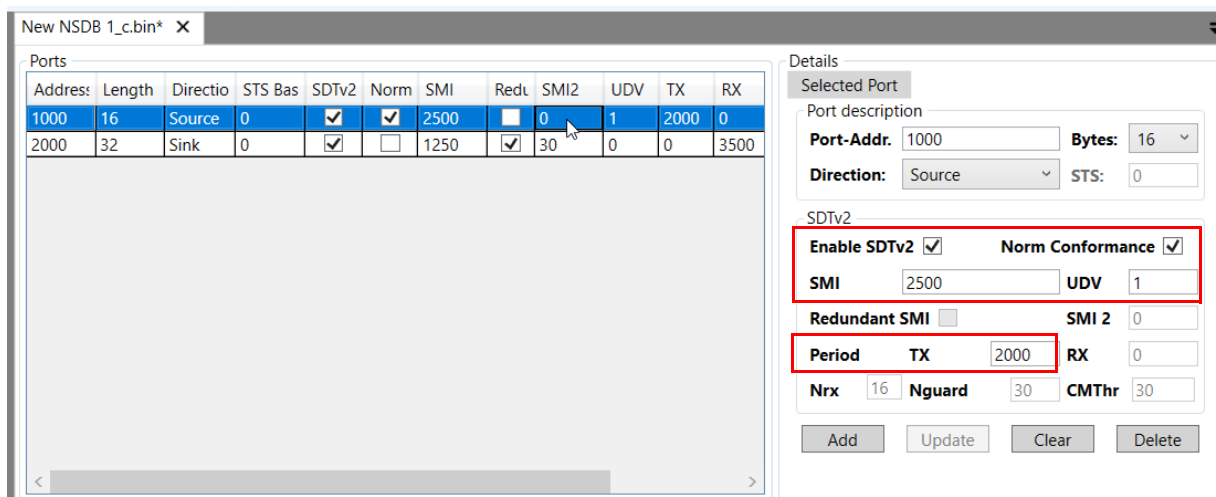


1. Select a port from the *ports list* (1).
2. Click on the checkbox *Enable SDTv2* (2) to activate the SDTv2 area.
3. SDTv2 values can be configured here (3).
4. After clicking on the *Add* or *Update* button, a yellow SDTv2 symbol (4) for the port becomes visible in the Toolbox window.

The *SDTv2* symbol indicates that this port supports the SDTv2 security protocol.

NOTE:

Only the following fields are active for the source port: "Enable SDTv2" / "Norm Conformance" / "SMI" / "UDV" and "Period Tx". All other values for "Redundant SMI" (incl. "SMI 2"), "Nrx", "CMThr" and "RX[ms]" are deactivated. However, they are required for the *Sink Port*. Checking "Redundant SMI" is only possible for sink ports. The "Nguard" field is only activated when "Redundant SMI" is active.

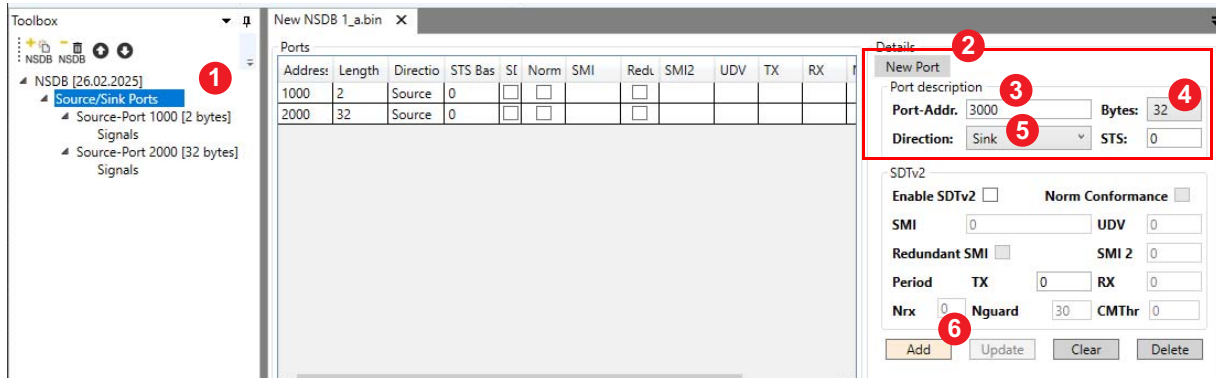


11.4

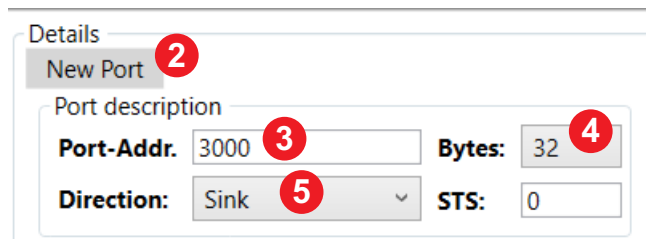
Creating a new Sink Port

Sink ports are received by the LOGIC and can be used to control DEVICES such as digital or analog inputs.

A *sink port* is created in the same way as a source port:



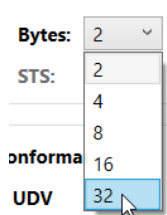
1. Select **Source/Sink Ports** (1) in the toolbox window.
2. When a port is selected, click on *Clear* to obtain a new port (2).



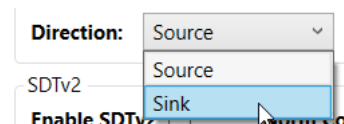
3. Enter a *port address* (3), e.g., “3000” (This depends on your *numbering concept*).

NOTE: MVB port addresses are only possible from 0 to 4095.

4. Select the number of *bytes* (4), e.g., 32 *bytes*:



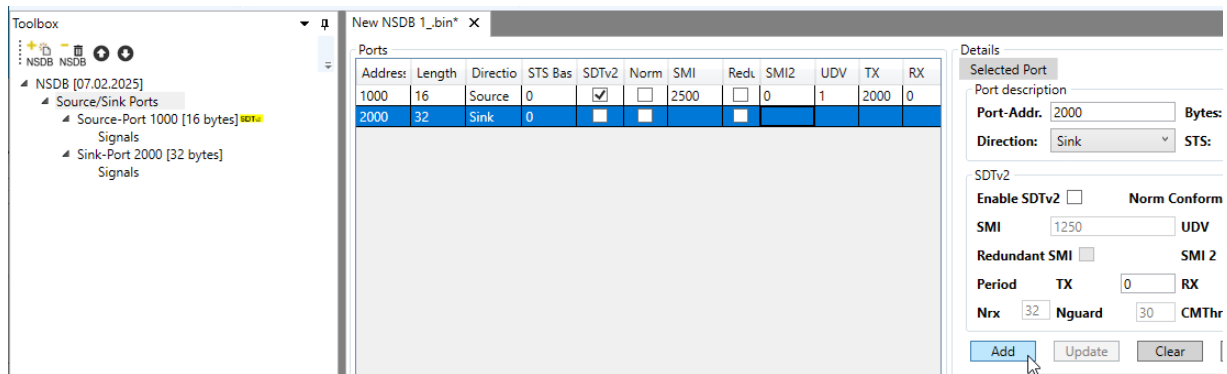
5. Select the direction: **Sink** (5) to create a *sink port*:



6. Click on *Add* (6) to create the new port.



Now the newly created *sink port* is added to the list of *ports*:

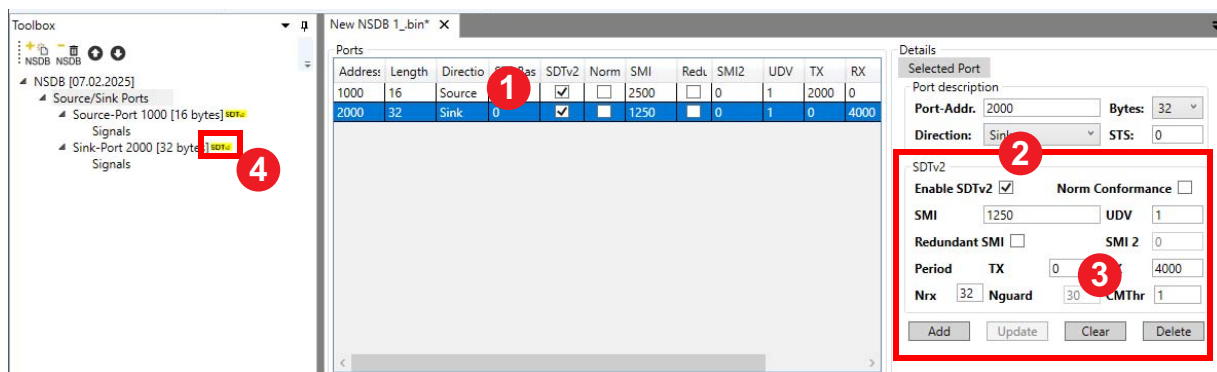


NOTE: You can change the properties at any time and save them with the Update button.

Chapter: See also [chapter 11.3.1](#) on page 67.

11.4.1

Activating SDTv2 for the source port



1. Select a port from the *ports list* (1).
2. Click on the checkbox *Enable SDTv2* (2) to activate the SDTv2 area.
3. SDTv2 values can be configured here (3).
4. After clicking on the *Add* or *Update* button, a yellow SDTv2 symbol (4) for the port becomes visible in the Toolbox window.

The *SDTv2* symbol indicates that this port supports the SDTv2 security protocol.

NOTE: All fields in the SDTv2 area are active for *sink ports*.

Checking “Redundant SMI” is only possible for sink ports. The “Nguard” field is only activated if “Redundant SMI” is activated.

LION LCF Application Manual ▪ Configurator LOGIC – MVB Configurator

New NSDB 1_c.bin* X

Address	Length	Directio	STS Bas	SDTv2	Norm	SMI	Redu	SMI2	UDV	TX	RX
1000	16	Source	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2500	<input type="checkbox"/>	0	1	2000	0
2000	32	Sink	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1250	<input checked="" type="checkbox"/>	30	0	0	3500

Details

Selected Port

Port description

Port-Addr: 2000 Bytes: 32

Direction: Sink STS: 0

SDTv2

Enable SDTv2 ☒ Norm Conformance ☐

SMI 1250 UDV 0

Redundant SMI ☒ SMI 2 30

Period TX 0 RX 3500

Nrx 0 Nguard 30 CMThr 104857

Add Update Clear Delete

11.5 Create signals

In the Toolbox window, there is another menu item under the *source and sink ports*, the so-called signals.

Toolbox

- NSDB NSDB
- NSDB [07.02.2025]
 - Source/Sink Ports
 - Source-Port 1000 [16 bytes]
 - Signals**
 - Sink-Port 2000 [32 bytes]
 - Signals

New NSDB 1_c.bin X

Signals Source-Port 1000 [16 bytes]

Port-Off	Data-Type	Bitlength	Signal-Name	Signal-Group	CV-Offset	Cycle-Ti
----------	-----------	-----------	-------------	--------------	-----------	----------

Details

new Signal

Port

Offset 0 Type Boolean

Signal-Identifier

Sig. Name SignalName

Sig. Group GroupName

Parameters

CV Enable ☐ CV-Offset

Cycle-Time [ms] 0

Add Update Clear

Port-Area

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x20	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0x40	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
0x60	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

Signal value Check value

Info

Production

New signal (properties)

Port	Offset	Double-click on the left in the port area to select the bit offset relative to the port of the signal.
	Type	Data type of the signal
Signal identifier	Signal Name	
	Signal Group	Name of the group containing the signal
Parameters	CV Enable	Activate CV (Check Variable/ Check Value)
	CV Offset	Double-click on the right in the port area to select the bit offset of the CV relative to the port.
	Cycle-Time [in ms]	Cycle-Time of CV

11.5.1

Offset

The following figure shows the 8 data bits of the outputs on port 1000. The 8 bits are represented as BITSET8 and placed at bit position 32 in the source port.

Toolbox

- NSDB [07.02.2025]
 - Source/Sink Ports
 - Source-Port 1000 [16 bytes] **BITSET 8**
 - Signals
 - Sink-Port 2000 [32 bytes] **BITSET 8**
 - Signals

New NSDB 1_bin* X

Signals Source-Port 1000 [16 bytes]

Port-Off	Data-Type	Bitlength	Signal-Name	Signal-Group	CV-Offset	Cycle-Ti
32	BITSET 8	8	SignalName	GroupName	unused	0

Details

selected Signal

Port

Offset 32 Type BITSET 8

Signal-Identifier

Sig. Name SignalName

Sig. Group GroupName

Parameters

CV Enable ☐ CV-Offset

Cycle-Time [ms] 0

Add Update Clear

Port-Area

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0x0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0x0	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0x0	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
0x0	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127

Signal value Check value

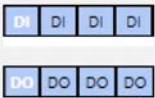
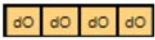
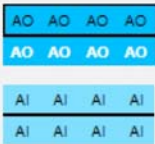
Info

11.5.2 Data types - type

1. Boolean	1 bit	1 bit (e.g., digital output on/off)
2. Antivalent	2 bits	antivalent value
3. BCD/Enum	4 bits	binary coded decimal
4. BITSET 8	8 bits	8 bits (e.g., control 8 digital outputs)
5. BITSET 16	16 bits	16 bits (e.g., control 16 digital outputs)
6. BITSET 32	32 bits	32 bits (e.g., control 32 digital outputs)
7. Unsigned 8	1 byte	unsigned numerical representation 0 255
8. Unsigned 16	2 bytes	unsigned numerical representation 0 65.535
9. Unsigned 32	4 bytes	unsigned numerical representation 0 4,294,967,295
10. Integer 8	1 byte	signed numerical representation -128 ... 127
11. Integer 16	2 bytes	signed numerical representation -32.768 ... 32.767
12. Integer 32	4 bytes	signed numerical representation -2,147,483,648 ... 2,147,483,647

Overview Data types MVB

This is an overview of which data type matches which data, i.e. which data can be mapped with which data type.

	Boolean	Antivalent	BCD/Enum	Bitset	Unsigned	Integer
1. Digital outputs/inputs 	✓	✓	✓	✓	✗	✗
2. Diagnostic inputs 	✓	✓	✓	✓	✗	✗
3. Analog outputs/inputs 	✗	✗	✗	✗	✓	✓

11.5.3 The Check-Variable (CV)

The check variable (CV) can be mapped into the *port* in addition to the actual data. This check variable can be mapped to any free position in the *port*, as the following example shows.

The screenshot displays the MVB Configurator interface. On the left, the 'Toolbox' shows a tree structure with 'NSDB [07.02.2025]' expanded, containing 'Source/Sink Ports' and 'Signals'. The main area is titled 'New NSDB 1_bin* X' and shows 'Signals Source-Port 1000 [16 bytes]'. A table lists signal details:

Port-Off	Data-Type	Bitlength	Signal-Name	Signal-Group	CV-Offset	Cycle-Ti
32	BITSET 8	8	SignalName	GroupName	1	0

Below this table is a large empty box. To the right, the 'Details' panel shows 'selected Signal' and 'Port' settings. The 'Parameters' section is highlighted with a red box, showing 'CV Enable' checked and 'CV-Offset' set to 1. The 'Cycle-Time' is set to 0 ms. Buttons for 'Add', 'Update', and 'Clear' are at the bottom of the details panel.

At the bottom, the 'Port-Area' is shown as a grid of 32 positions (0 to 31). The first 8 positions (0-7) are highlighted in orange, indicating they are reserved for the Check-Variable. The remaining 24 positions (8-31) are green, indicating they are available for signal data. A legend below the grid shows a green square for 'Signal value' and an orange square for 'Check value'.

11.6

Create a new NSDB report

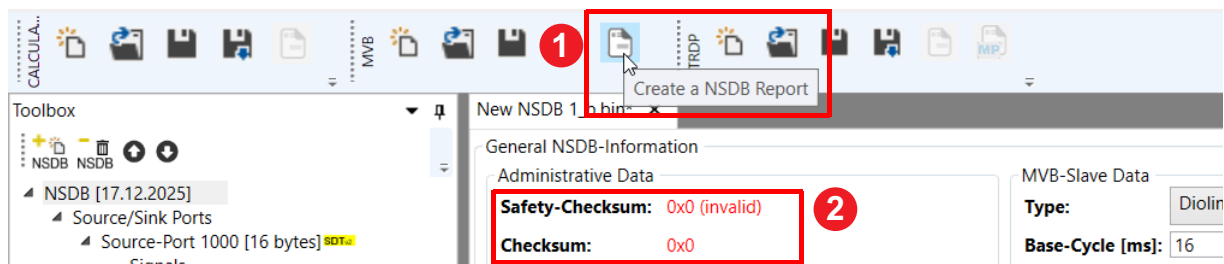
The NSDB report summarizes the settings and configurations of the MVB LOGIC and is used by the validator for verification.

NOTE: When creating the NSDB report, a (first) *checksum* is generated.

NOTE: The actual security checksum is only generated with the created and verified NSDB report. Hence, the NSDB report must always be created first as the basis.

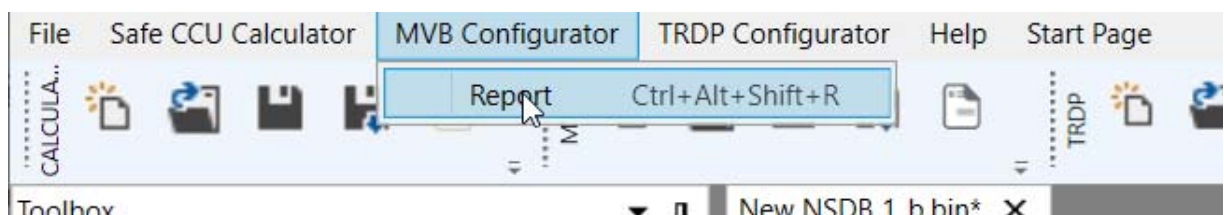
NOTE: Without a safety checksum, the MVB LOGIC does not accept the NSDB file. In this context, it doesn't matter whether safe modules are used in the LION system or not. The safety checksum must always be created. This is the last step before the configuration file can be loaded onto the MVB LOGIC.

1. To create the report and *checksums*, click on the icon *create NSDB-Report* (1).
2. As long as the *NSDB report* has not been created, the *safety checksum* (2) is invalid.

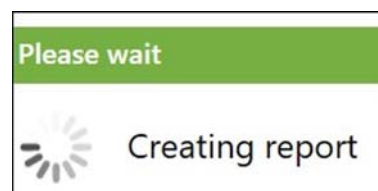


or:

3. Select *MVB Save Configurator / Report* (or the keyboard shortcut Ctrl+Shift+R):



4. This window appears:



NOTE: The larger the configuration, the longer it may take to generate the report.

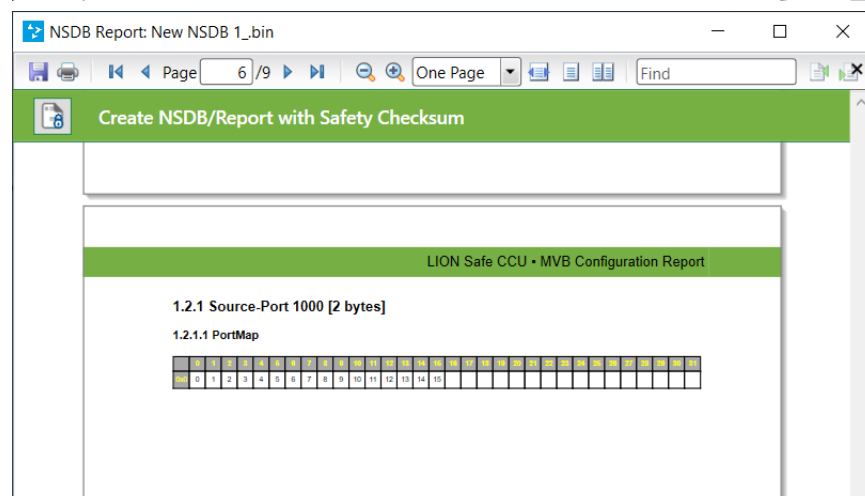
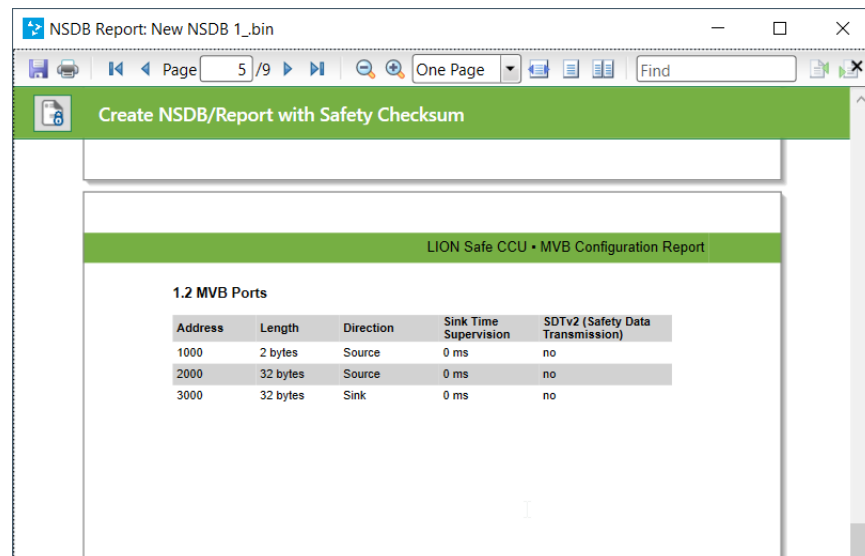
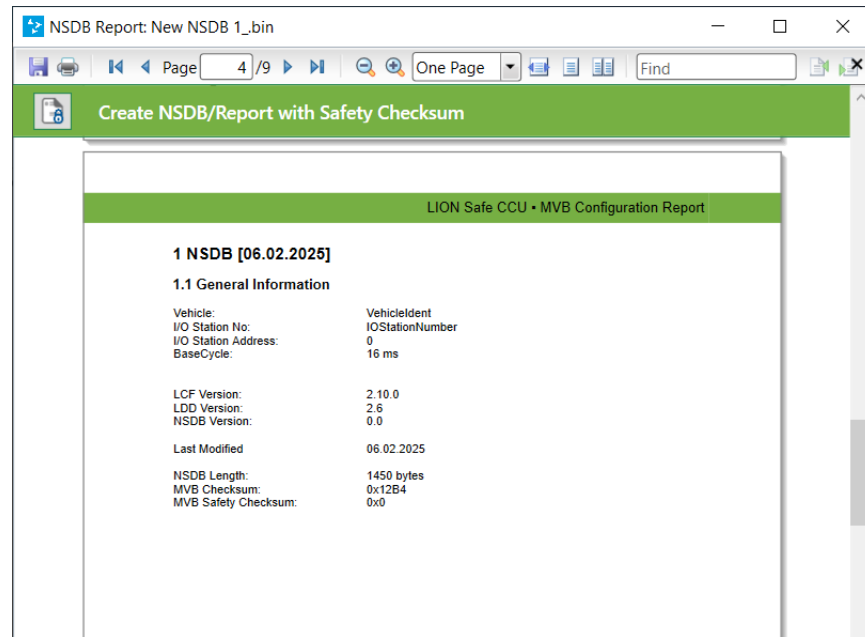
5. A new *NSDB (Configuration) report* has been created:



6. The report is used for the review and validation of the settings. A report PDF is created, and additionally, the actual configuration file, the NSDB file. This file contains the current configuration settings for the MVB LOGIC.

NOTE: Read the report carefully and review the created configuration according to your requirements.



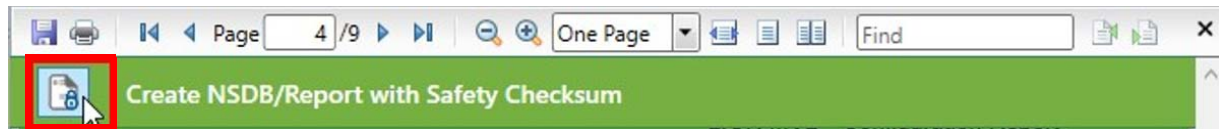


11.7

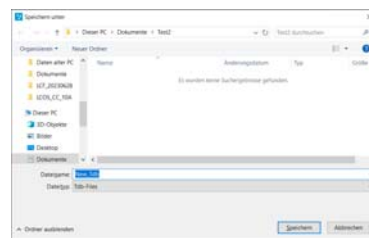
Create NSDB report with checksum

If the report contains no errors and the configuration meets the requirements, the *safety checksum* can be generated.

1. At the top of the NSDB report, select the option labeled "**Create NSDB/Report with Safety Checksum.**"



After that, there is an option to specify the (local) storage location.

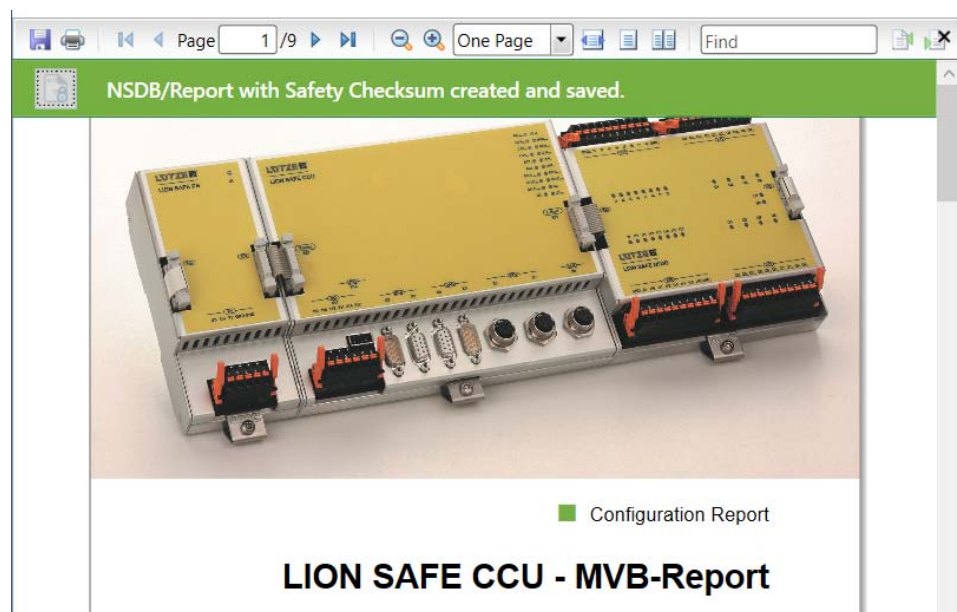


2. This window appears:

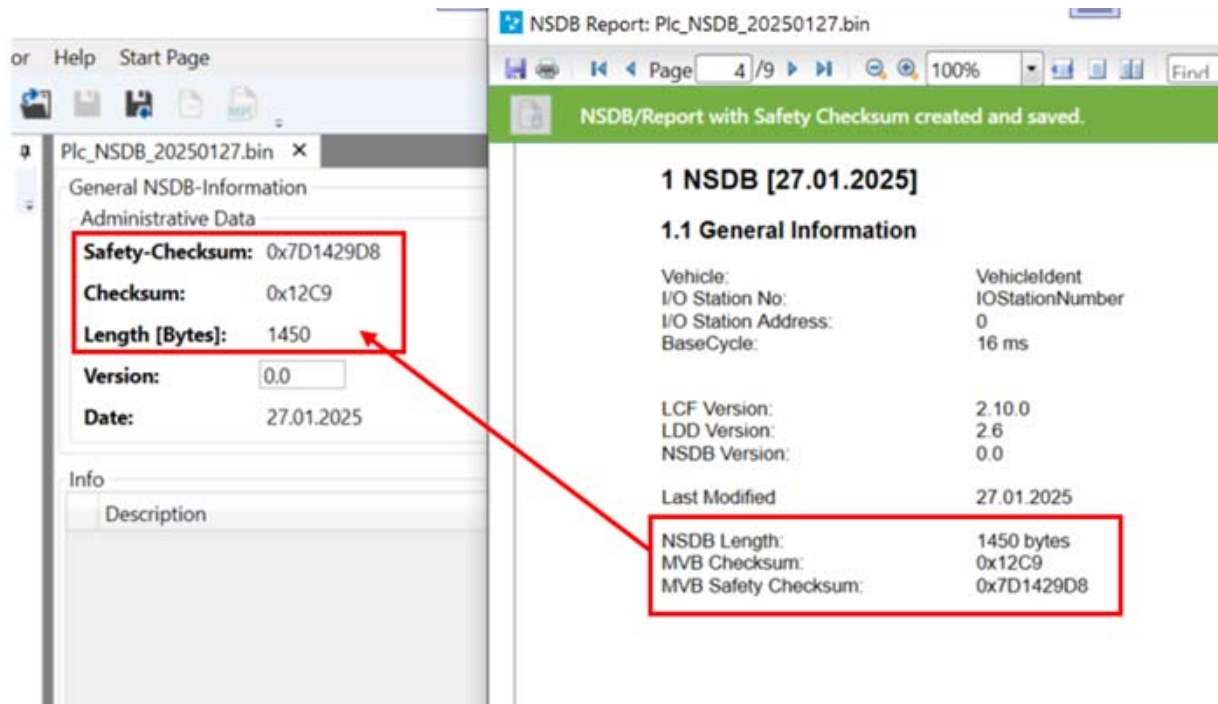


NOTE: The larger the configuration, the longer it may take to generate the report.

3. A signed report is created:



NOTE: The *MVB safety checksum* is automatically stored in the NSDB file and displayed in the *MVB Configurator*.



! Important technical information: A .bin and a PDF file of the NSDB report are generated.

The created *NSDB-file* (*.bin) can be transferred to the LOGIC (e.g.k LION SAFE CCU).

Name	Typ
New NSDB 1.bin	Adobe Acrobat Document
New NSDB 1.bin	BIN-Datei

11.8

Notes

NOTE: These were idealized examples. In real situations, the tasks are more complex and must meet a variety of requirements for the MVB structure.

SERVICE: If you get stuck or need any other help, please contact the service department. The contact information is in [chapter 15 on page 135](#)

12 Configurator LOGIC – TRDP Configurator

The TRDP Configurator is used for configuring a TRDP LOGIC for a sub-system (such as LION Safe CCU). (A DIOLINE PLC cannot be configured with it.)

12.1 LION Safe CCU – In Brief



The LION Safe CCU is a compact high-performance PLC with Safety Integrity Level SIL2 for use in rail vehicles. For connecting external assemblies, the control system is equipped with a Lütze Link interface (LLK). Using this for example, an L-BUS2 Gateway can be attached internally to expand the control unit through the addition of safe and non-safe local I/O modules. In addition, devices like an F-Bus Loop Gateway for example, can be connected over the LLK.

A gray, non-safety-related PLC is also integrated in the safety control unit. The controller used there is for the implementation of non-safety-related functions as well as the connection of field buses MVB, TRDP, and CAN. The controller of the standard control system is connected to the SafeCPU via a multiplexed data and address bus. MVB and TRDP can be controlled via both controllers.

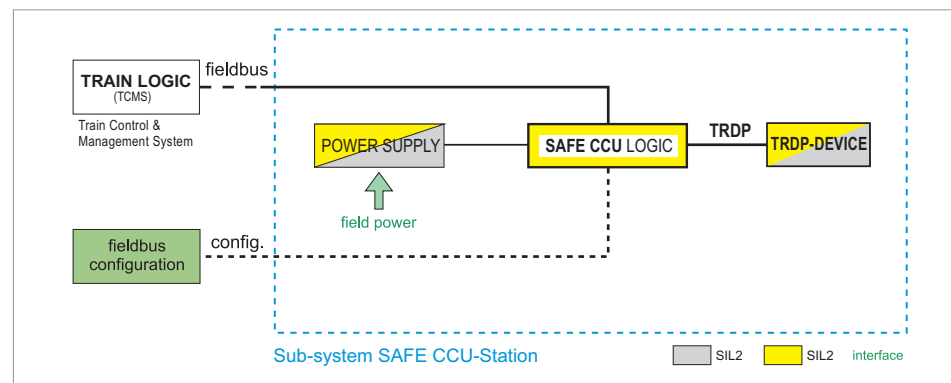
There is sufficient channel separation on the data interface to exclude mutual interference.

Free programmable in a safe and certified development environment.

High-performance field busses MVB (SDTv2), CANOpen Slave and Ethernet, TRDP (SDTv2) with DualHoming.

NOTE: The safe CPU (SIL2) is programmed with the tool **SAFEPROG®**, and the non-safe CPU (SIL0) with the tool **MULTIPROG®**.

The LION Safe CCU offers several types of fieldbus. The LION Safe CCU is the master of a LION Safe CCU station (blue frame). The LION Safe CCU station is also a DEVICE (slave) in relation to the higher-level system, the LOGIC.



This smallest possible LION system illustrates the principle.

A LION Safe CCU station is a local I/O system consisting of a LION Safe CCU (MVB, TRDP/Ethernet, etc.) and various TRDP devices. TRDP devices can be, for example, LÜTZE products such as LION *bus couplers* or a *LOCC-Box Gateway* TRDP. The TRDP devices then control the I/O modules connected there.

The LION LCF Configurator LOGIC is used here for configuring the MVB- / TRDP-protocol of the LOGIC, for example, also as a remote station to the LION *bus couplers* (HEAD). The LION LCF Configurator HEAD is used here for the configuration of the LION bus couplers (HEAD) with the *I/O modules*.

The following applies:

1. The LION Safe CCU is the LOGIC of the LION Safe CCU station and sends or receives data from the TRDP devices.
2. The LION Safe CCU communicates with the TRDP DEVICES via the TRDP fieldbus protocol.

NOTE: The configuration of the LION Safe CCU must be carried out in the LION LCF Tool "Configurator LOGIC—TRDP Configurator".

! Important technical information: Further information can also be found in the "Configuration" chapter of the respective operating manuals for the LION Safe CCU.

! Important technical information: The definition of a LOGIC and the DEVICES can be found in [chapter 3 on page 10](#).

12.1.1

Further notes on LION Safe CCU

NOTE: The LION Safe CCU is only available in safe versions (SDTv2). The SDTv2 protocol is only possible from SIL>0 and thus only for LION SAFE CCUs.

📖 Chapter: An overview of all available variants can be found in [chapter 18.1 on page 138](#).

12.1.2 Programming and Configuration

Programming is done in MULTIPROG® and SAFEPROG® by Phoenix Contact. The TRDP (MVB) configuration takes place via the LION LCF tool.

MULTIPROG®, or SAFEPROG®, is capable of handling multi-user projects via network access. When it comes to interfaces and software, there are various options.

In the LION LCF Tool, new TRDP/XML and TDB files can be created. Similarly, existing TRDP and TDB files can be opened and further edited in the LION LCF Tool.

The project planner is responsible for the configuration. In particular for the configuration for the LOGIC.

12.2 Creating a new TDB configuration file

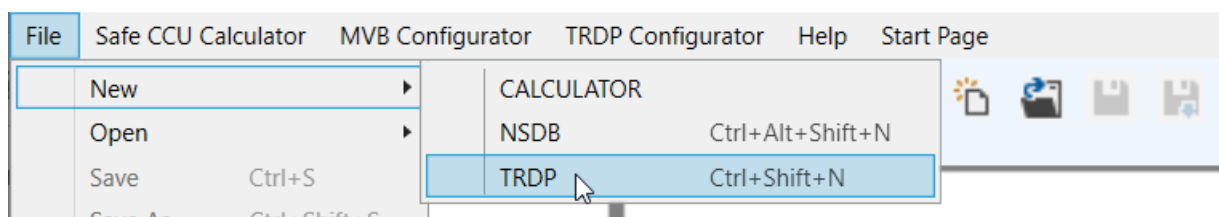
12.2.1 Creating a new configuration file



- Is used exclusively for LION SAFE CCU.
- An IODB file cannot be used to configure the LOGIC.
- The safety checksum is generated when the TRDP report is created.
- A “web server version” is not available.

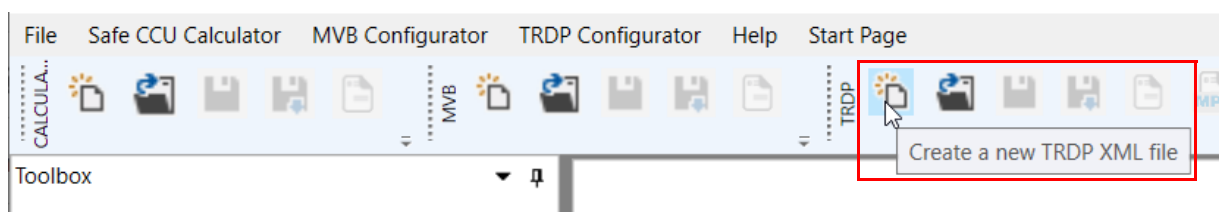
For a new TRDP/XML configuration file as well as a TRDP report in PDF format, with a *safety checksum*, proceed as follows:

1. Click on *File* in the menu bar.
2. Select *New*.
3. Click on **TRDP**.



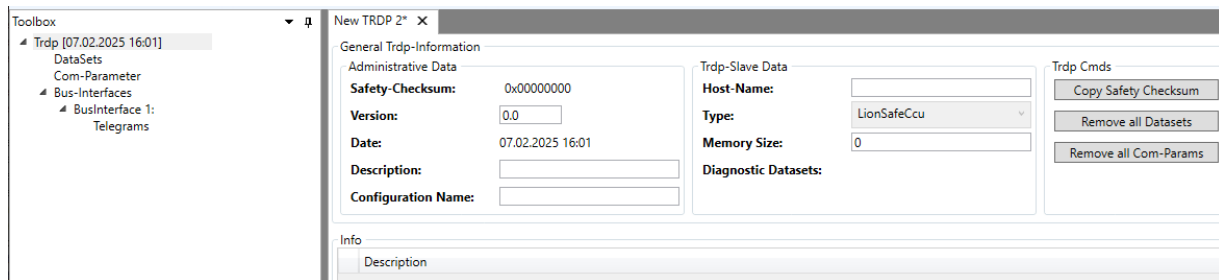
or

4. Click on the “New TRDP file” icon in the toolbar.



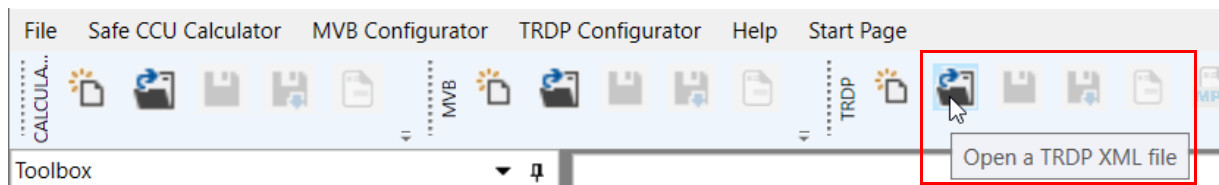
LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

5. The following window appears:



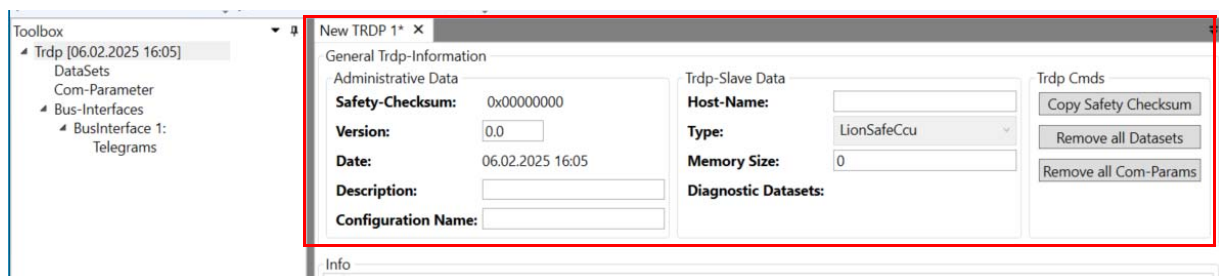
12.2.2 Importing existing TRDP/XML files

1. Click on the "Open a TRDP-XML file" icon in the toolbar.



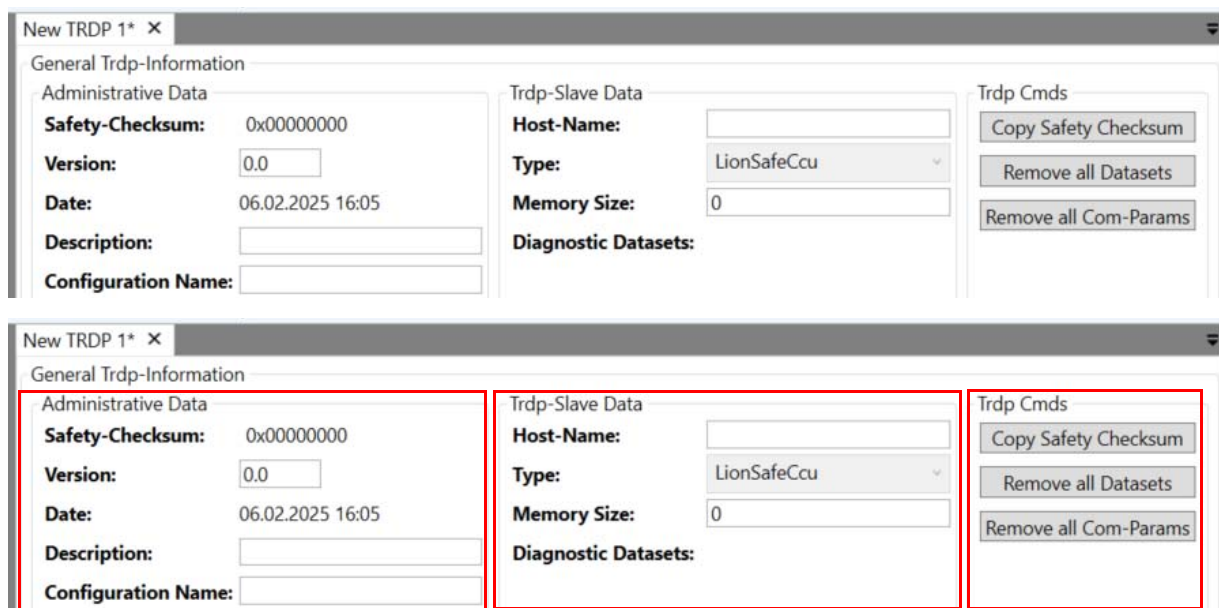
2. This allows you to import and edit existing TRDP/XML files.

3. The following window appears:



12.2.3 General TRDP-Information

The imported data is displayed under the **General TRDP information** area. This area is primarily used for LION SAFE CCU.



LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

1. Administrative Data (on the left side).

Name	Description
Safety Chesum	This <i>safety checksum</i> is generated when you create the report and then click on <i>Save</i> . This is the security process to obtain a valid TRDP file with the corresponding TRDP report.
Version	Version of the TDB file/configuration.
Date	<i>Date</i> of creation
Description	Field for a brief description
Configuration Name	Field for the name of the configuration

1a. Notes on the safety checksum

- The *safety checksum* is relevant for the application engineer (the developer of the train protection system) to identify the *TDB file* used in a LION I/O station.

NOTE: The checksum is created as soon as the TRDP file is saved.

1b. Notes on the checksum

! Important technical information: **In contrast to the safety checksum, the checksum is used for additional monitoring of file errors.**

Chapter: See also [chapter 12.12 on page 122](#).

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

2. TRDP slave data (on the center).

Fill in the general TRDP information fields as required.

Name	Description
Host-Name	The host name should describe the device for which the configuration is intended, in this example "TRDP_Example".
Type	The selection of the I/O station type is displayed here. This depends on the type of LOGIC chosen, in this example LION Safe CCU. (Nothing can be set here.)
Memory Size	TRDP storage size
Diagnostic Dataset:	The valid diagnostic data record is displayed here.

3. TRDP commands (on the right-hand side).

Name	Description
Copy Safety Checksum	Copies the safety checksum to the clipboard for later use. (Otherwise, it cannot be copied from the ad.) A TRDP report with a safety checksum must have been created beforehand. Please check the safety checksum in the cache.
Remove all DataSets	Deletes all existing Datasets
Remove all Com-Params	Deletes all existing Com parameters and telegrams

12.3 Create TRDP/XML configurations

After the general TRDP information has been entered, or an existing TRDP/XML file has been loaded, the actual configuration can be carried out.

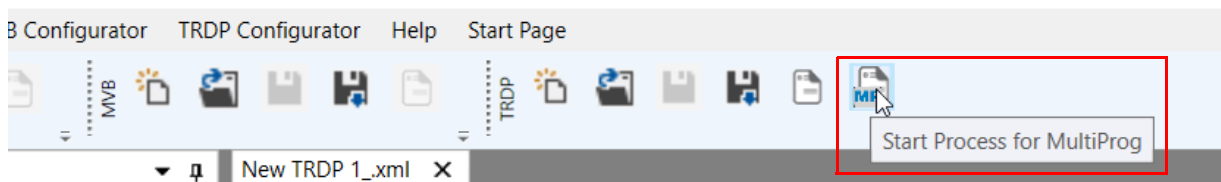
12.3.1 Creating a data structure for MultiProg®

NOTE: This replaced the functionality of the TRDP2PLC® tool from ISH with the LION LCF. The goal is to create a data-specific file (TRDPDataIdType.TYB) for the MULTIPROG® tool. This file will then be used further there.

Process flow

1. By using the MP button, you start the process for MULTIPROG®.

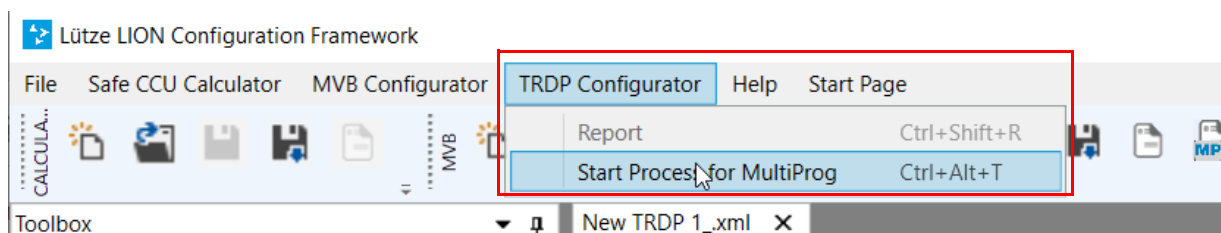
NOTE: The MP button is only active if the TRDP.xml file has been saved beforehand.



or

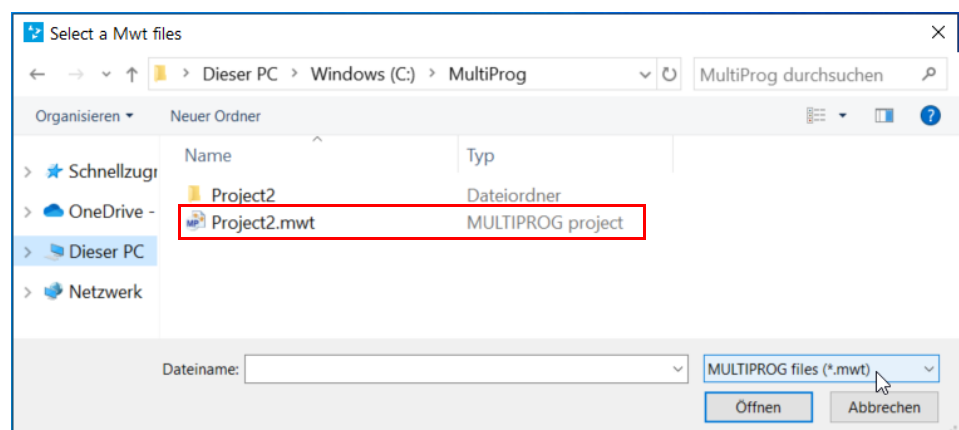
2. You start the process for MULTIPROG® via the selection menu.

NOTE: The start process for the MultiProg menu item is only active if the TRDP.xml file has been saved beforehand.



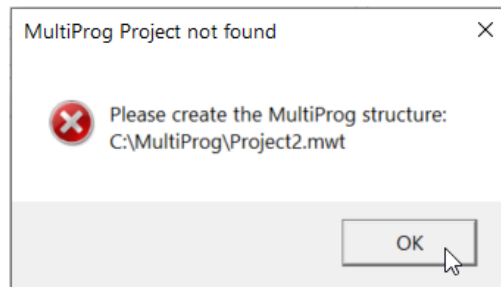
3. After clicking, the following window opens.

4. Now open the MULTIPROG® project file (.mwt) from your system.

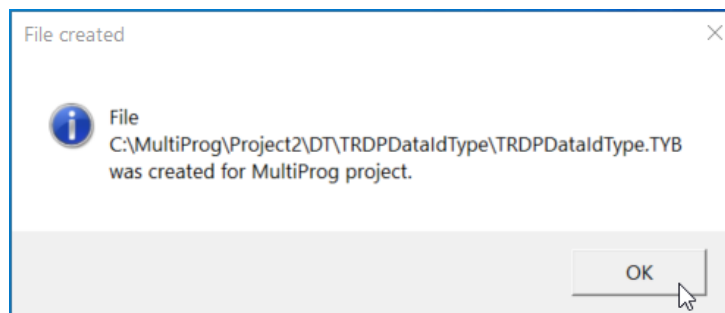


NOTE: A folder structure of the MULTIPROG® project is required for this. That means a project structure created directly by the MULTIPROG® program must be present.

! Important technical information: If the corresponding project structure, or, for example, a *DT folder* or a subfolder *TRDPDataIdType* is not present, a message will appear prompting the user to first create the project structure.



NOTE: To successfully create a *TRDPDataIdType.TYB* file, it is important that the *DT* folder and the *TRDPDataIdType* folder within it exist under the corresponding project folder. If the required MULTIPROG® project structure is correct, the required *TRDPDataIdType.TYB* file with the corresponding data type structure will be created.



LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

Here is a view of the TYP file (example):

```

1  TYPE
2      DataId1001_Type                : (* DataSet 1001 *)
3  STRUCT
4      Bool8Array                    : BYTE;
5  END_STRUCT;
6  END TYPE

7  TYPE
8      DataId2001_Type                : (* DataSet 2001 *)
9  STRUCT
10     END_STRUCT;
11 END TYPE

12 TYPE
13     DataId3000_SubType00            : ARRAY [ 0..1 ] of USINT;
14 END TYPE
15 TYPE
16     DataId3000_SubType01            : ARRAY [ 0..1 ] of USINT;
17 END TYPE
18 TYPE
19     DataId3000_SubType02            : ARRAY [ 0..1 ] of USINT;
20 END TYPE
21 TYPE
22     DataId3000_SubType03            : ARRAY [ 0..31 ] of BYTE;
23 END TYPE
24 TYPE
25     DataId3000_Type                 : (* DataSetDiag Silo *)
26 STRUCT
27     tdbSafetyCrc                    : UDINT;
28     tdbVersion                      : DataId3000_SubType00;
29     swVersionLb                     : DataId3000_SubType01;
30     swVersionFb                     : DataId3000_SubType02;
31     timeout                         : BYTE;
32     lbusFailure                     : BYTE;
33     bcFailure                       : BYTE;
34     lifecount                       : UDINT;
35     safetyError                     : BYTE;
36     tdbError                        : BYTE;
37     temperatureWarning              : BYTE;
38     uptimeLimit                     : BYTE;
39     componentError                  : BYTE;
40     slotStatus                      : DataId3000_SubType03;
41 END_STRUCT;
42 END TYPE
43 TYPE

```

! Important technical information: **The data type structure used by the MULTIPROG® tool corresponds to the datasets configured in the LCF tool:**

1. **Example:** The section in the *TYP* file:

```

10     END_STRUCT;
11 END_TYPE
12 TYPE
13     DataId3000_SubType00          : ARRAY [ 0..1 ] of USINT;
14 END_TYPE
15 TYPE
16     DataId3000_SubType01          : ARRAY [ 0..1 ] of USINT;
17 END_TYPE
18 TYPE
19     DataId3000_SubType02          : ARRAY [ 0..1 ] of USINT;
20 END_TYPE
21 TYPE
22     DataId3000_SubType03          : ARRAY [ 0..31 ] of BYTE;
23 END_TYPE
24 TYPE
25     DataId3000_Type               : (* DataSetDiag Sil0 *)
26 STRUCT
27     tdbSafetyCrc                  : UDINT;
28     tdbVersion                    : DataId3000_SubType00;
29     swVersionLb                   : DataId3000_SubType01;
30     swVersionFb                   : DataId3000_SubType02;
31     timeout                       : BYTE;
32     lbusFailure                   : BYTE;
33     bcFailure                     : BYTE;
34     lifecount                     : UDINT;
35     safetyError                   : BYTE;
36     tdbError                      : BYTE;
37     temperatureWarning            : BYTE;
38     uptimeLimit                   : BYTE;
39     componentError                : BYTE;
40     slotStatus                    : DataId3000_SubType03;
41 END_STRUCT;
42 END_TYPE
43 TYPE
44     DataId3001_SubType00          : ARRAY [ 0..1 ] of USINT;
45 END_TYPE

```

and the equivalent in the LION LCF Tool:

The screenshot shows the LION LCF Tool interface. On the left, the 'Toolbox' pane displays a tree structure under 'Trdp [14.02.2025 10:23]'. The 'DataSets' folder is expanded, showing 'DataSet 1001 (ID: 1001)', 'DataSet 2001 (ID: 2001)', and 'DataSetDiag Sil0 (ID: 3000)'. The 'DataSetDiag Sil0 (ID: 3000)' entry is highlighted with a red box. Below it, the 'Com-Parameter' and 'Bus-Interfaces' sections are visible. On the right, the 'Elements' table is displayed, showing a list of data elements with their indices, names, types, array sizes, units, scales, and offsets. The table is highlighted with a red box.

Index	Name	Type	ArrayS	Unit	Scale	Offset
0	tdbSafetyCrc	UINT32	1		0	0
1	tdbVersion	UINT8	2		0	0
2	swVersionLb	UINT8	2		0	0
3	swVersionFb	UINT8	2		0	0
4	timeout	BOOL8	1		0	0
5	lbusFailure	BOOL8	1		0	0
6	bcFailure	BOOL8	1		0	0
7	lifecount	UINT32	1		0	0
8	safetyError	BOOL8	1		0	0
9	tdbError	BOOL8	1		0	0
10	temperatureWarning	BOOL8	1		0	0
11	uptimeLimit	BOOL8	1		0	0
12	componentError	BOOL8	1		0	0

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

2. **Example:** The section in the TYP file:

```

1 TYPE
2     DataId1001_Type                               : (* DataSet 1001 *)
3 STRUCT
4     Bool8Array                                     : BYTE;
5 END_STRUCT;
6 END TYPE
7 TYPE
8     DataId2001_Type                               : (* DataSet 2001 *)
9 STRUCT
10    END_STRUCT;
11 END_TYPE
12 TYPE
13     DataId3000_SubType00                         : ARRAY [ 0..1 ] of USINT;
14 END TYPE
  
```

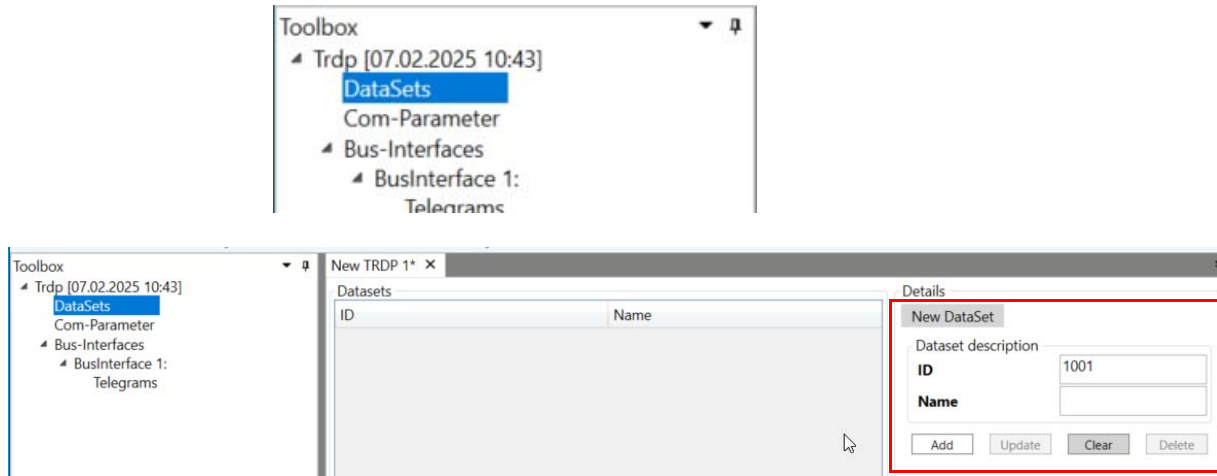
and the equivalent in the LION LCF Tool:

Index	Name	Type	ArraySize	Unit	Scale	Offset
0	Bool8Array	BOOL8	1		0	0

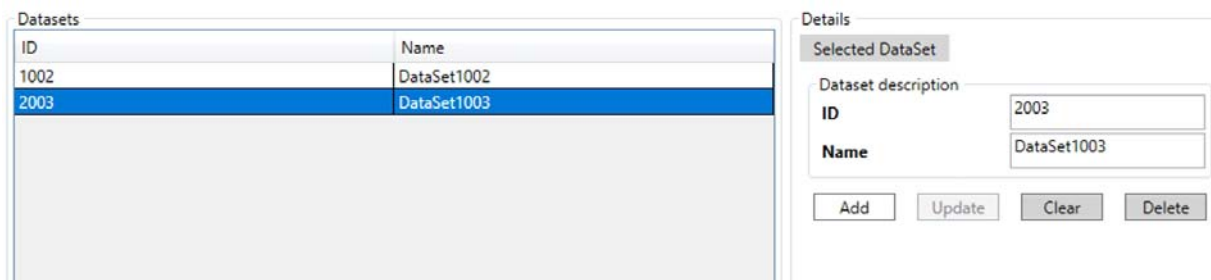
12.4 DataSets

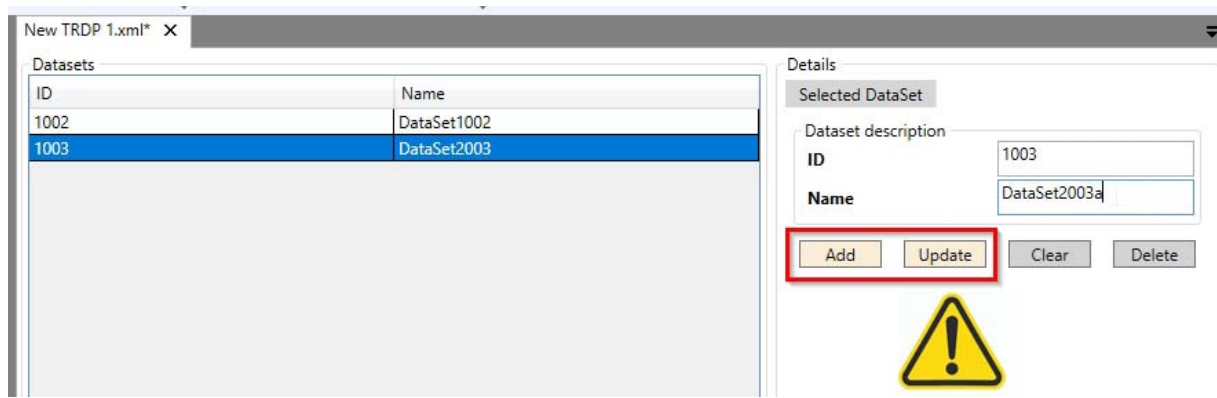
12.4.1 Adding a new DataSet

The data structures that are used with TRDP are created in the Toolbox window under DataSets.



- (1) The DataSet ID must be unique. The *DataSet ID* must be greater than 1000. (for example 1001)
- (2) In addition to the DataSet ID, a name can be assigned to the data structure.
- (3) The *Add* button can be used to add new *DataSet IDs* to the *datasets list*.
- (4) Existing *datasets* can be changed with *Update*. To do this, they must be selected in the *datasets list* and then changed under *Details*.
- (5) A new *DataSet* can be created with *Clear*.
- (6) *Delete* deletes the currently selected *DataSet*.

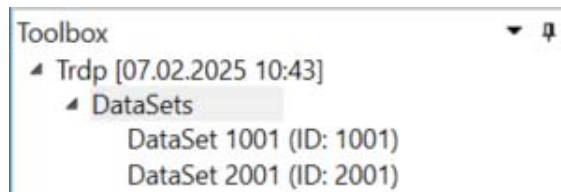




⚠ CAUTION: Make sure that you do not swap the *Add* and *Update* buttons. This swap overwrites an existing entry. If a new data record is to be created, always proceed as follows:

1. Create a new ID
2. Click on Add
3. Change name now

The *DataSet* IDs created are then also displayed in the *Toolbox* window under *DataSet* with the *name* and *ID*:



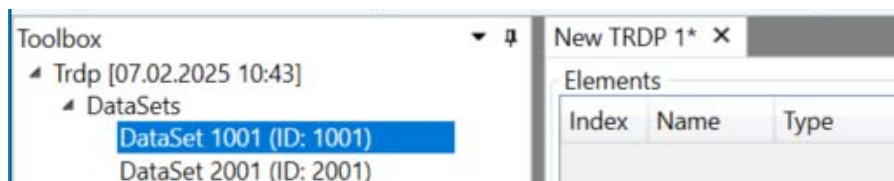
The module data of the *DEVICES* can then be mapped to the *DataSets* or data structures in the further course of the configuration.

12.5 The Elements of the DataSets

12.5.1 Creating Elements

To configure digital/analog inputs/outputs, these can be described as one *element*.

1. To do this, a *DataSet* must be selected in the *Toolbox* window:



2. If no element has yet been created in the selected *DataSet*, this detail window is displayed:



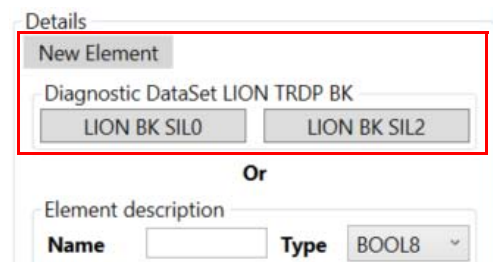
3. You can now either create a new *diagnostic dataset* for LION TRDP BK (Bus Coupler/HEAD, SIL0/SIL2), or *create a new element*.

✓ **Tip: The LION TRDP BK (bus coupler/HEAD) can be used as a remote station for the LOGIC.**

12.5.2

1. Create a new diagnostic DataSet in the selected *DataSet*.

This means that you can turn any *DataSet* into a *diagnostic DataSet*:



NOTE: In the TRDP Configurator (LOGIC), two diagnostic data sets can be created.

Chapter: See also for more details [chapter 12.6 on page 102](#)

NOTE: You can create a maximum of two diagnostic data sets for the LION TRDP bus couplers (HEADs), one for the LION TRDP BK SIL0 and one for the LION TRDP BK SIL2. The LION LCF Tool does not allow you to create two datasets for the same LION TRDP BK.

12.5.3

Create a *new element* in the selected DataSet

NOTE: Once a diagnostic dataset has been created, it is not possible to create any further elements.

Description of the Elements

You create a *new element* when you create the *element description*.

(1) The *name* must be unique. We recommend using the data type or the ArraySize as part of the name, for example. (e.g., „Bool8Array2“)

(2) *Type* specifies the data type of the element. *In this example BOOL8.*

(3) *ArraySize* specifies the number of *data elements* in the corresponding TRDP element. *This example shows the number of BOOL8 elements.*

(4) Optional: *Unit** specifies the physical unit of the element. (e.g., „V“, for Volt)

(5) Optional: *Scale** specifies the scaling factor for the display. *(The size and level of detail of the advertisement depend on the customer's product specifications.)*

(6) Optional: *Offset** specifies the *starting bit* (offset) for displaying an element in the dataset.

Display options, custom settings

(Update(8), Clear(9), Delete(10)) have the same functionality

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

Create a new item in the list.

The screenshot shows the 'New TRDP 1_.xml' window. On the left, the 'Elements' table is empty with columns: Index, Name, Type, ArraySize, Unit, Scale, Offset. On the right, the 'Details' panel is active, showing 'New Element' description. Fields include: Name (1), Type (2), ArraySize (3), Unit (4), Scale (5), and Offset (6). At the bottom, there are buttons: Add (7), Update (8), Clear (9), and Delete (10).

1. Enter the *name* (1) (e.g., "Bool8Array1").
2. Select the (*data*) type (2) (e.g., BOOL8), see also [chapter 12.5.4 on page 98](#).
3. Enter the array size (3) (e.g., 1 = default), see also [chapter 12.5.6 on page 100](#).
4. *Optional (custom)*: Input: Unit (4), Scale (5), Offset (6).
5. When you are done, select *Add* (7).

You will then receive this result:

The screenshot shows the 'New TRDP 1_.xml' window after adding an element. The 'Elements' table now has one row: Index 0, Name Bool8Array1, Type BOOL8, ArraySize 1, Unit, Scale 0, Offset 0. The 'Details' panel shows the same fields as before, with the 'Add' button highlighted.

The order of the elements can be changed with the up/down keys.

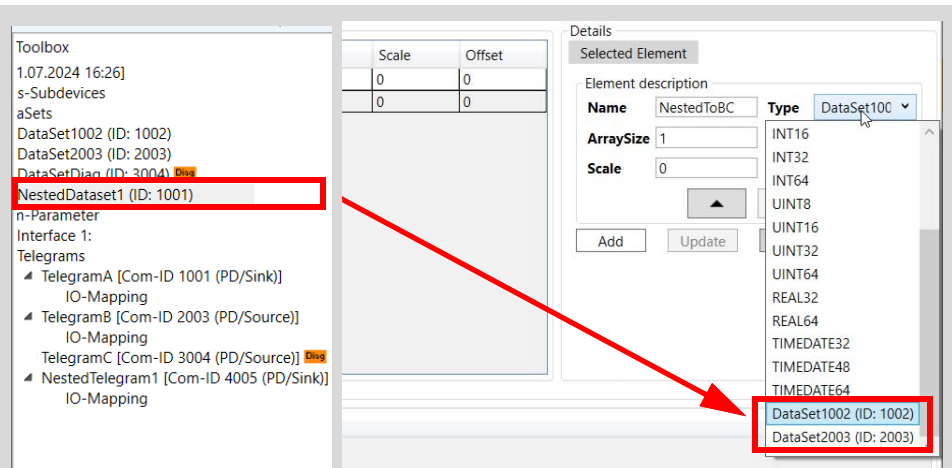
The screenshot shows the 'New TRDP 1_b.xml' window. The 'Elements' table contains multiple rows. The 'Details' panel shows the 'Move Element up' button highlighted.

12.5.4 Data type / Data type (*element property*)

	Data type	Data in the LCF	TRDP Data for communication	Description
1.	BOOL8	1 bit	1 bytes	1 bit relevant (TRUE/FALSE)
2.	BITSET 8	8 bits	1 bytes	control 8 digital outputs
3.	ANTIVALENT8	2 bits	1 bytes	antivalent value
4.	CHAR8	8 Bits	1 bytes	0 ... 255
5.	UTF16	2 bytes	2 bytes	is a variable length encoding for Unicode characters
6.	INT8	1 byte	1 bytes	signed numerical representation -128 ... 127
7.	INT16	2 bytes	2 bytes	signed numerical representation -32.768 ... 32.767
8.	INT32	4 bytes	4 bytes	signed numerical representation -2,147,483,648 ... 2,147,483,647
9.	INT64	8 bytes	8 bytes	signed numerical representation -9,223,372,036,854,775,808 ... 9,223,372,36,854,775,807
10.	UINT8	1 bytes	1 bytes	unsigned numerical representation 0 255
11.	UINT16	2 bytes	2 bytes	unsigned numerical representation 0 65.535
12.	UINT32	4 bytes	4 bytes	unsigned numerical representation 0 4,294,967,295
13.	UINT64	8 bytes	8 bytes	unsigned numerical representation 0 bis 18.446.744.073.709.551.615
14.	REAL32	4 bytes	4 bytes	-3.402823e+38 ... 3.402823e+38 Smallest number by amount: 1.0e-44
15.	REAL64	8 bytes	8 bytes	-1.7976931348623158e+308 ... 1.7976931348623158e+308 Smallest number by amount: 4.94065645841247e-324
16.	TIMEDATE32	4 bytes	4 bytes	32 bit UNIX time
17.	TIMEDATE48	6 bytes	6 bytes	48 bit TCN time
18.	TIMEDATE64	8 bytes	8 bytes	32 bit seconds and 32 bit microseconds

19. DataSet_xyz (ID:XXXX)

All DataSets* created and available in the project will be displayed in the dropdown menu. These are needed for nested records, for example:


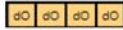
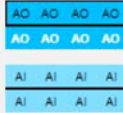


NOTE:

*The own *DataSet* and the *diagnostic DataSet* are not displayed in the pull-down menu. That means this selection looks different for each dataset.

Overview of TRDP Data Types

Here is an overview of which data type corresponds to which data, i.e., which data can be represented (*mapped*) with which data type.

	Boolean	Antivalent	BCD/Enum	Bitset	Unsigned	Integer
1. Digital outputs/inputs 	✓	✓	–	✓	✗	✗
2. Diagnostic inputs 	✓	✓	–	✓	✗	✗
3. Analog outputs/inputs 	✗	✗	–	✗	✓	✓

12.5.5

Rearranging the elements

NOTE:

The elements and their sequence are created and managed in the element list of the associated DataSet.

Chapter: See [chapter 12.5.1 on page 94](#).

NOTE:

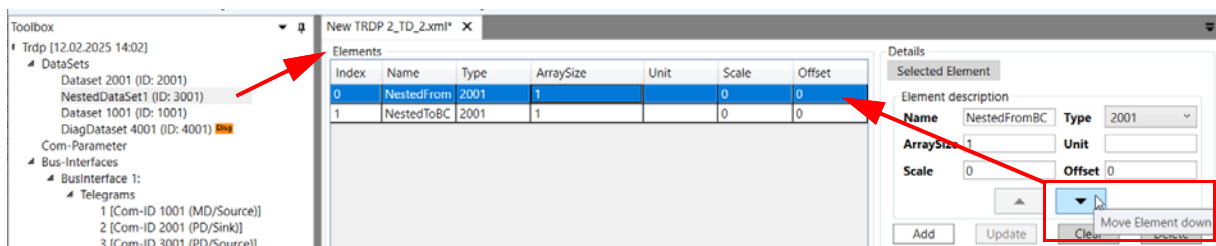
This order of the array groups can be easily changed in the associated DataSet in this state if nothing has been mapped yet.

CAUTION:

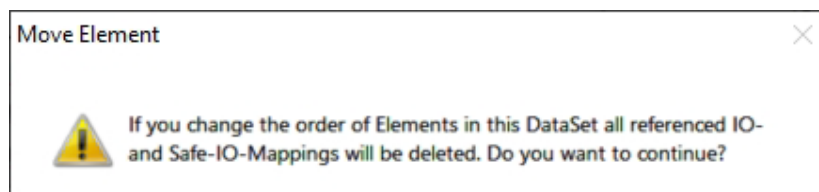
As soon as only one element is mapped, moving elements is no longer straightforwardly possible.

Chapter: See [chapter 12.12 on page 122](#)

This is an example for it:



The following warning message appears:

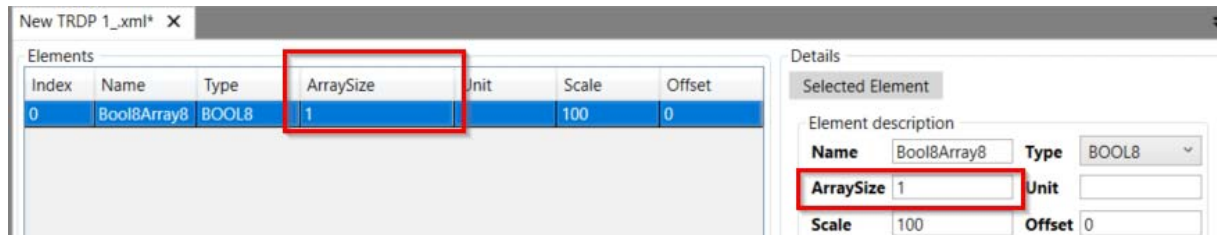


NOTE:

If you choose to proceed now, all *telegrams* will be deleted.

12.5.6 ArraySize / Array size (*element property*)

The *ArraySize* indicates the number of data elements, e.g., the *number of BOOL8 elements*.



12.5.7 Special representation of nested data

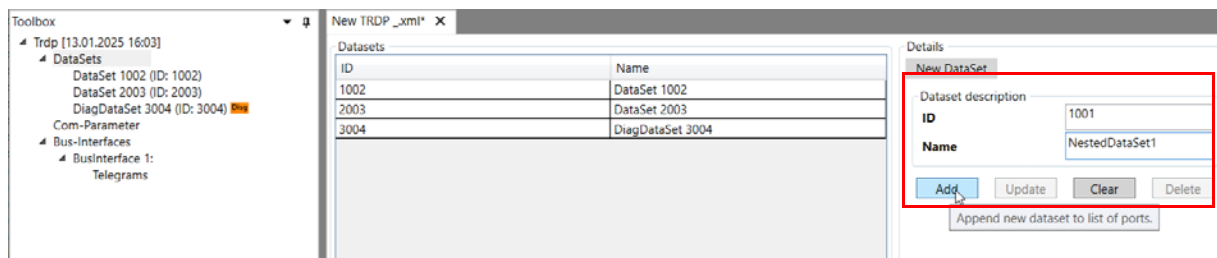
NOTE: The LION SAFE CCU supports the nesting of DataSets up to a depth of 5 levels.

As soon as a dataset exists, it is possible to use it as an *element* in another dataset. This makes it possible to reduce redundant information when the same data structure is needed multiple times.

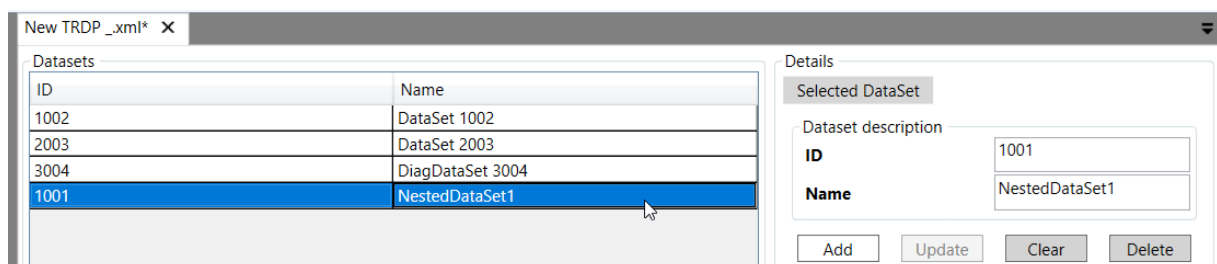
NOTE: Make sure not to add any circular dependencies. These lead to errors in the configuration.

Here you see an example of how you can create nested datasets:

1. First, create a new dataset, in this example "*NestedDataSet1*," and add it to the list of *datasets* using *Add*.

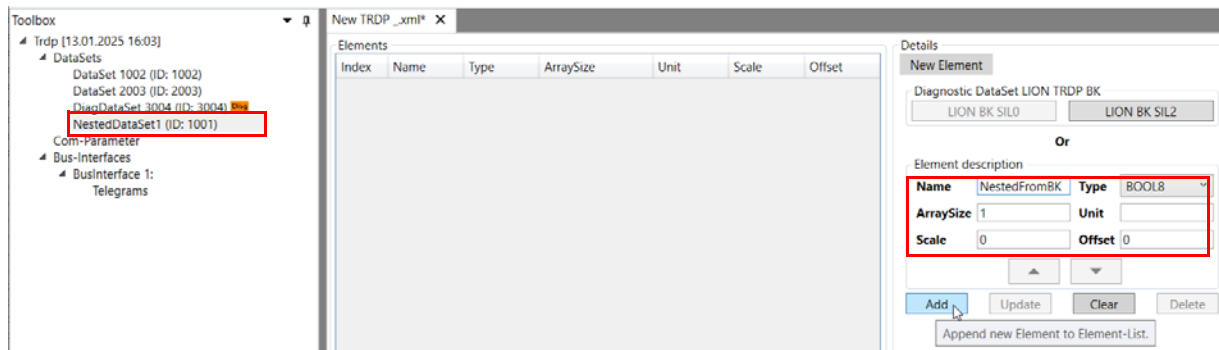


2. This creates a new dataset:

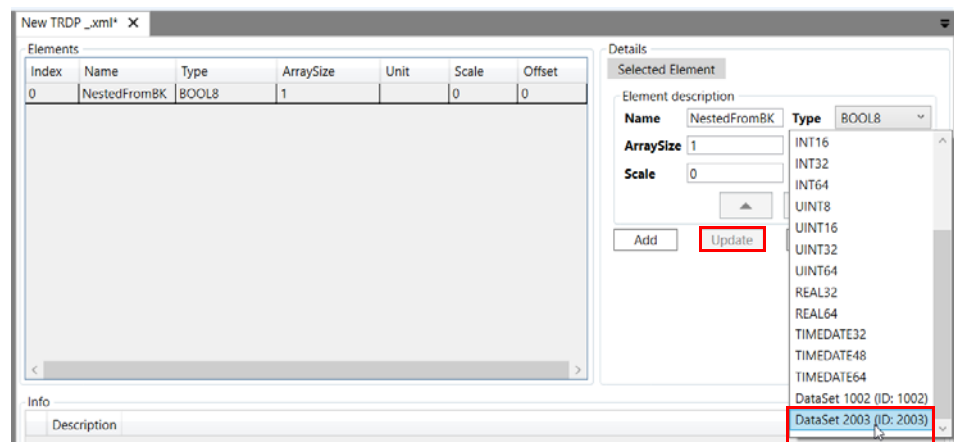


LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

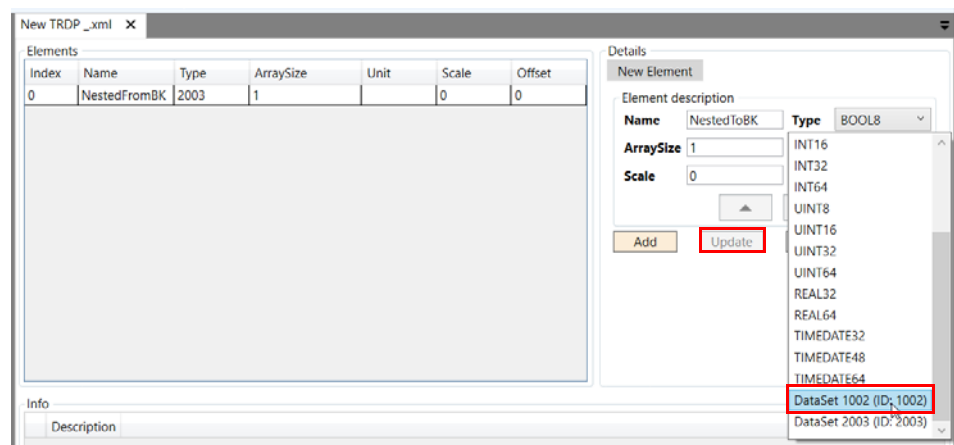
3. This creates a new dataset:



4. First, create an element "NestedFrom BC. To do this, we select the DataSet 2003 and confirm this with Update:



5. Then we create a second element "NestedToBC". For this, we select the DataSet 1002 and confirm it with Update:



6. Now the dataset "*NestedDataSet1*" has two nested *elements* in its list:

The screenshot shows the 'Elements' table with the following data:

Index	Name	Type	ArraySize	Unit	Scale	Offset
0	NestedFromBK	2003	1		0	0
1	NestedToBK	1002	1		0	0

The 'Details' panel on the right shows the 'Selected Element' configuration for 'NestedToBK':

- Name: NestedToBK
- Type: DataSet 100
- ArraySize: 1
- Unit: (empty)
- Scale: 0
- Offset: 0

Buttons: Add, Update, Clear, Delete

7. A nested telegram, for example "*NestedTelegram1*", can now be created under the list of *telegrams* in the menu item *BusInterface/BusInterface 1*:

The screenshot shows the 'Telegrams' table with the following data:

Name	Com-ID	DataSet-ID	Com-Parameter	Data Type	Direction
TelegramA	1001	1002	0	Process Data	Sink
TelegramB	2003	2003	0	Message Data	Source
TelegramC	3004	3004	0	Process Data	Sink
NestedTelegram1	4005	1001	0	Process Data	Sink

The 'Details' panel on the right shows the 'Selected Telegram' configuration for 'NestedTelegram1':

- Name: NestedTelegram1
- Com-ID: 4005
- DataSet-ID: [1001] : NestedDataSet1
- Com-Parameter-ID: 0
- Data Type: Process Data
- Direction: Sink

Buttons: Add, Update, Clear, Delete

Info: Update of Telegram with Name NestedTelegram1 was successful

In Direction, it is now set whether the entire NestedTelegram is a Sink or Source Telegram.

12.6

Create a diagnostic data set

The *diagnostic dataset* is a specific set of defined elements. The elements display various information about the LION system, such as versions or errors.

NOTE: It is recommended to check the diagnostic data cyclically and simultaneously with the process data.

Procedure:

Step 1: Create a diagnostic data set

1. Click on *DataSets*

The screenshot shows the 'Toolbox' with the 'DataSets' menu item highlighted under the 'Trdp [13.02.2025 17:32]' folder.

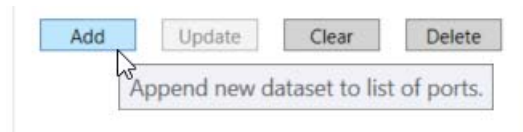
2. Enter an ID and a name for the diagnostic data set.

The screenshot shows the 'Dataset description' form with the following values:

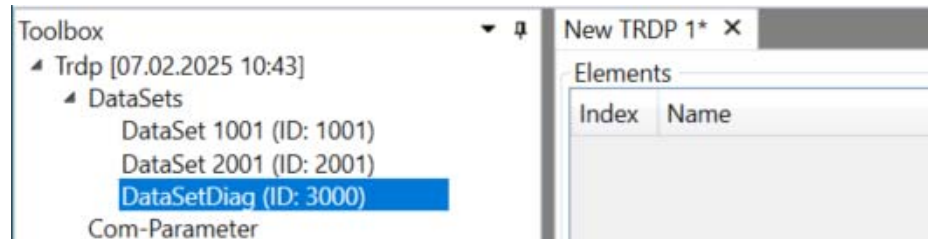
- ID: 3000
- Name: DataSetDiag

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

3. Click on

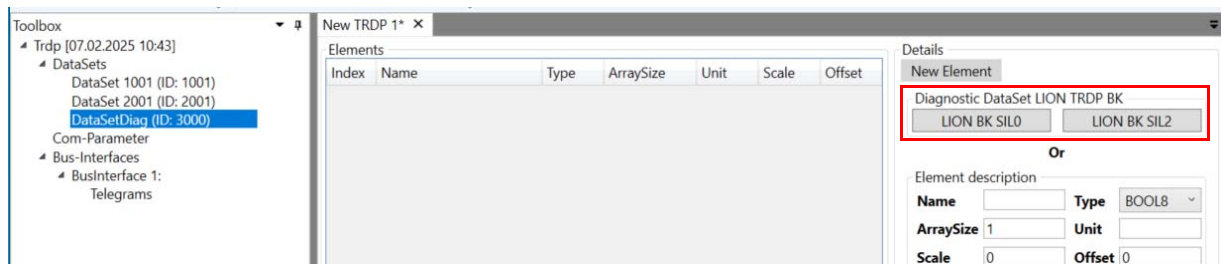


4. This Toolbox window apperas:



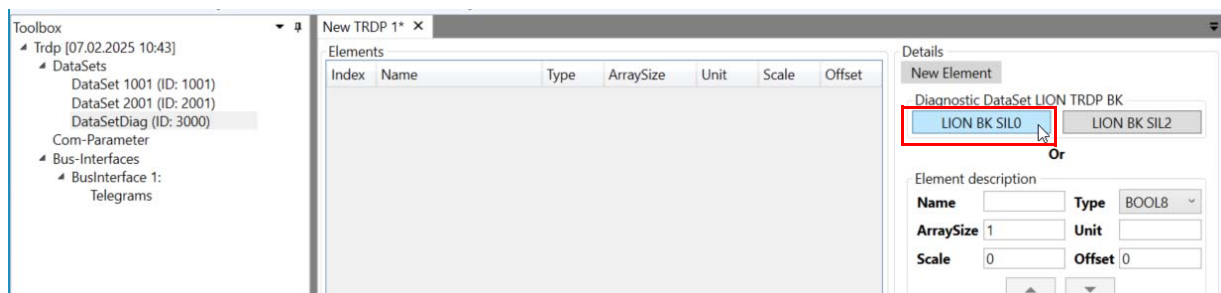
Step 2: Diagnostic ports for LION TRDP BK

It is possible to create a template for a diagnostic port for both TRDP BK SIL0 and TRDP BK SIL2.



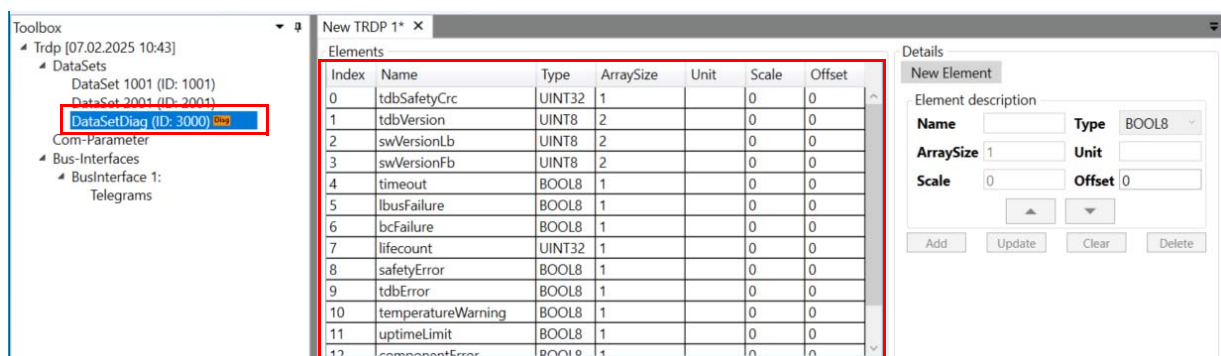
Step 3: Create the *Diag* Data structure automatically

1. Click on the LION BC SIL0 button.



2. The Diag data structure is created automatically by 14 elements in the *Elements list* and the names are assigned to the variables.

3. The data set is marked with the orange *Diag* Symbol.



NOTE: The *Diag* dataset for the LION BC SIL0 consists of 14 elements. Additionally, the two data structures of the two data sets (DataSetDiag SIL0 and DataSetDiag SIL2) are different.

No.	index	Element name	Description
1.	0	<i>tdbSafetyCrc</i>	Safety CRC of the TDB file
2.	1	<i>tdbVersion</i>	Version of the TDB file
3.	2	<i>swVersionLb</i>	Cortex Firmware Version
4.	3	<i>swVersionFb</i>	netX firmware version
5.	4	<i>timeout</i>	Telegram timeout (corresponds to STS for MVB)
6.	5	<i>lbusFailure</i>	L-Bus ² communication disrupted
7.	6	<i>bcFailure</i>	netX or Cortex in failsafe mode
8.	7	<i>lifecount</i>	Lifesign counter of the Cortex MasterApp Task
9.	8	<i>safetyError</i>	At least one safety data record is incorrect
10.	9	<i>tdbError</i>	Incorrect TDB file
11.	10	<i>temperatureWarning</i>	At least one slave reports excess temperature (<i>warning threshold</i> < <i>temperature</i> < <i>switch-off threshold</i>).
12.	11	<i>uptimeLimit</i>	The HEAD has been in operation for 48 hours
13.	12	<i>componentError</i>	Is set if 1. the number of L-Bus ² slaves does not match the TDB. 2. the wrong ID is recognized at the slot. Device does not start completely - no communication possible, therefore no bit can be received.
14.	13	<i>slotStatus</i>	Is set per DEVICE in the event of a communication error. Limited Run Input data of the affected DEVICES is set to 0.

NOTE: If a diag dataset for the LION TRDP BK SIL0 is available, there is no way to create a second diag dataset for a LION TRDP BK SIL0.

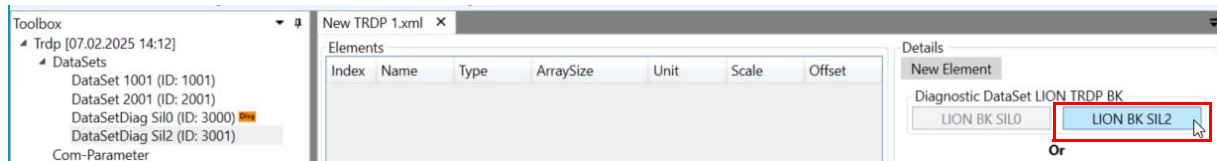
There can only be one Diag-Port for the LION TRDP BK SIL0 and one for the LION TRDP BK SIL2.

4. However, another diag dataset for the LION TRDP BK SIL2 can still be created.



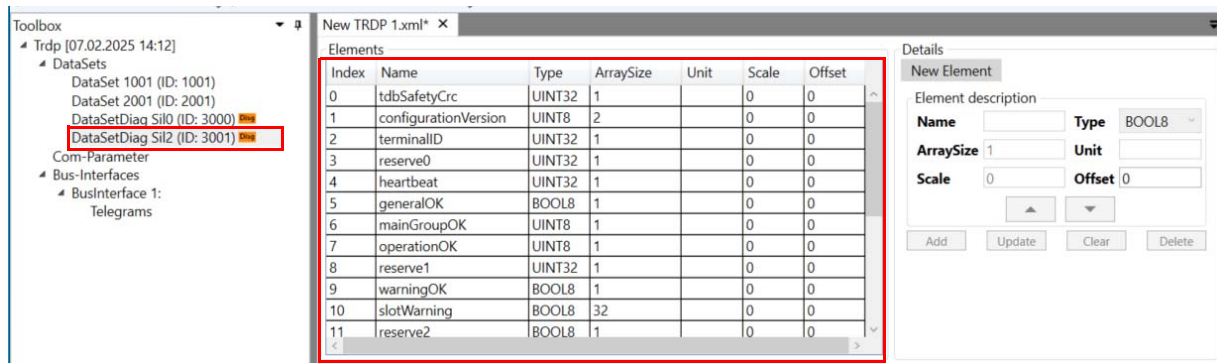
LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

5. Click on the LION BC SIL2 button.



The Diag data structure is created automatically by 21 elements in the *Elements list* and the names are assigned to the variables.

The data set is marked with the orange *Diag* Symbol.



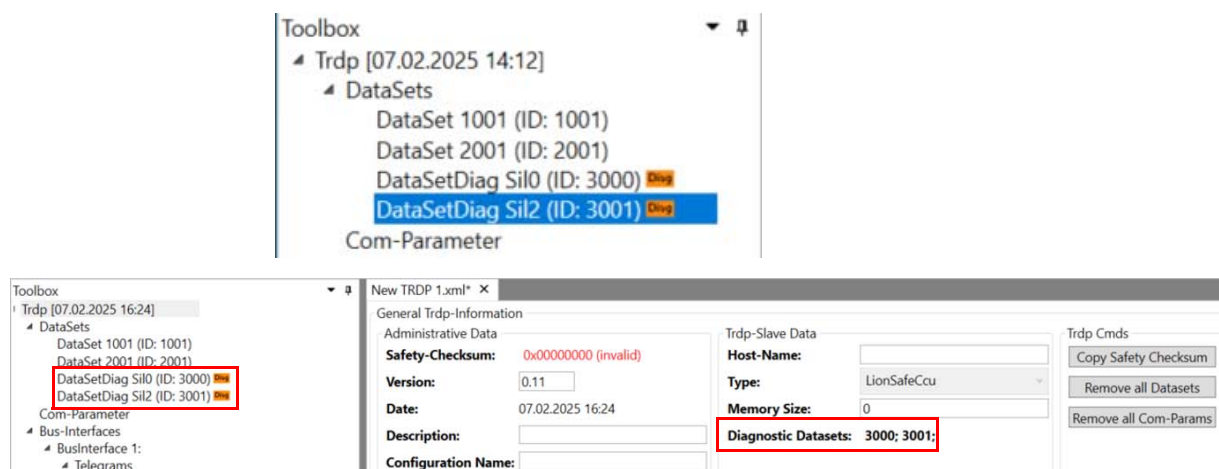
NOTE: The *Diag* dataset for the LION BC SIL2 consists of 21 elements. Additionally, the two data structures of the two data sets (DataSetDiag SIL0 and DataSetDiag SIL2) are different.

No.	index	Element name	Description
1.	0	tdbSafetyCrc	Safety CRC of the TDB file
2.	1	Configuration version	Version of the configuration file (with two decimal places in the configuration tool; values: 0.0 - 255.255)
3.	2	terminalID	Unique identifier for the bus coupler with a checksum (CRC32 with IEEE polynomial) from: <ul style="list-style-type: none"> - Serial number - Hardware revision in the form of a character - Software versions R5F and STM application
4.	3	reserve0	Backup for possible general extensions
5.	4	heartbeat	L-Bus ² Heartbeat, may have gaps Is increased by 1 with every L-Bus ² cycle (10ms). The value can skip meter readings.
6.	5	generalOK	General error message of the I/O station
7.	6	mainGroupOK	Affected main group in the event of an error message from the I/O station.
8.	7	operationOK	An operating error has occurred during cyclical operation of the I/O station.
9.	8	reserve1	Backup for possible error messages
10.	9	warningOK	There is a warning in the I/O station.
11.	10	slotWarning X	Warnings from slot X

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

No.	index	Element name	Description
12.	11	reserve2	Backup for one warning
13.	12	reserve3	Backup for possible warnings
14.	13	slotStatus X	Process data from slot X
15.	14	trdpInfo	If timeout errors occur due to longer transmission cycles than the monitoring time allows, the error is toggled.
16.	15	sdtv2Info	If errors occur due to longer transmission cycles than the monitoring time allows, the error can toggle.
17.	16	trdpErrorCounter	Possible errors from reception are added up cyclically. If no receive data is received within the receive cycle, the error counter is incremented for each COM ID. If these are permanently absent, it is continuously increased.
18.	17	sdtv2ErrorCounter	Possible SDTV2 errors from the COM IDs are added up cyclically. If no COM-ID has been configured for SDTV2, the counter remains at 0. Each error (whether a single error or permanent failure of a COM ID) causes the error counter to increase cyclically. If many COM-IDs are affected, the increase is correspondingly faster than in the case of sporadic errors.
19.	18	sdtv2WarningCounter	Possible SDTV2 warnings from the COM IDs are added up cyclically. (See <i>SDTV2Errorcounter</i>)
20.	19	reserve4	Reserve for possible errors.
21.	20	errorCode	List with the last 10 error messages

NOTE: If a diag dataset for the LION TRDP BK SIL2 is available, there is no way to create a second diag dataset for a LION TRDP BK SIL2. There can only be one Diag-Port for the LION TRDP BK SIL0 and one for the LION TRDP BK SIL2.

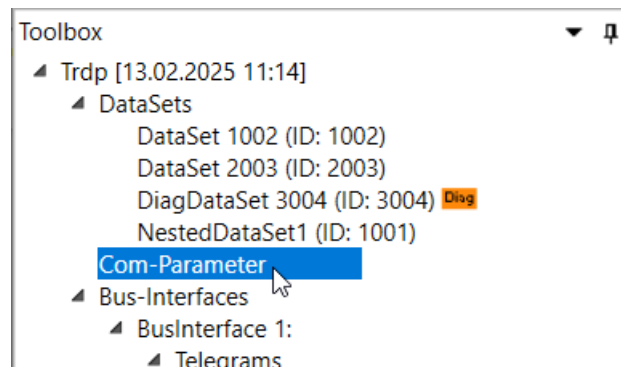


In the next step, the *diagnostic data record* must be assigned to a *telegram*. To do this, the *data record* can be assigned to a *telegram* under the Telegrams menu item in the *Toolbox*.

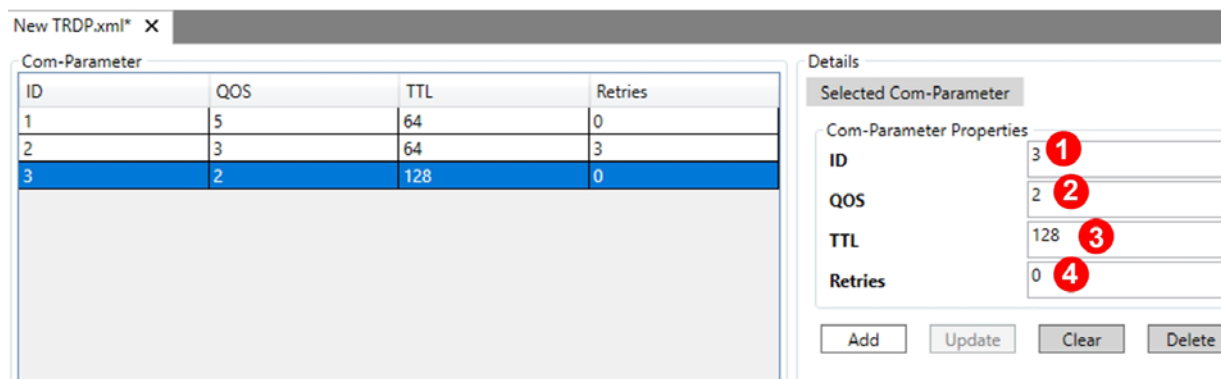
Chapter: see [chapter 12.9 on page 111](#).

12.7 Com-Parameter

The *COM parameters* describe the properties of a *telegram/slot*.



Three properties can be selected and changed for this purpose.

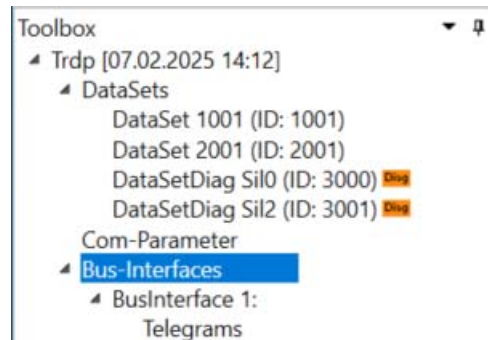


Name	Description
1. ID	ID of the Com-Parameters Used for later assignment
2. QOS	<i>Quality of Service</i> - Method by which <i>telegrams</i> in a network can be influenced, e.g. higher priority and therefore lower <i>jitter</i> and preference for this <i>telegram</i> in the event of high utilization. Possible range 0 to 7
3. TTL	<i>Time-to-Live</i> - Specifies how many hops a package may cover. Possible range 0 to 255. The default value is 64.
4. Retries	NOTICE: Only applicable for message data (MD). Possible retries of a package: 0.5

12.8

Bus interfaces

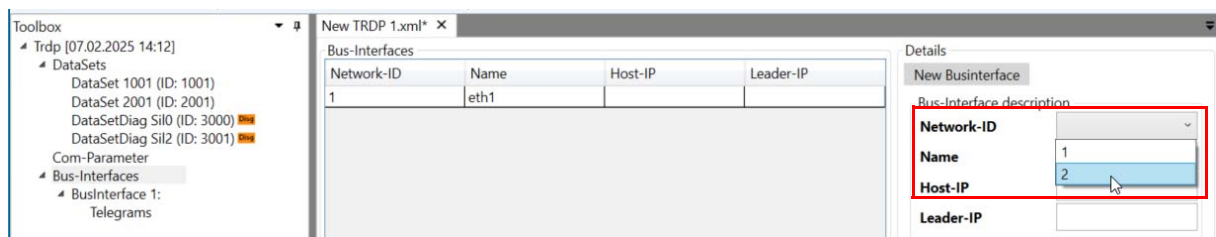
The BusInterfaces are grouped under BusInterfaces .



1. Bus interfaces

Here, all configured interfaces are listed.

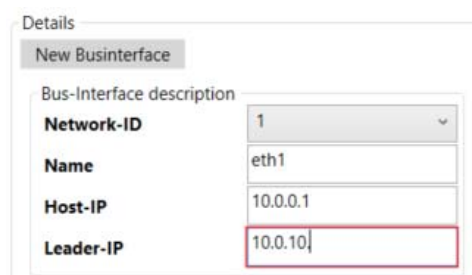
For dual/multi-homing, the second bus interface should be defined with the network ID: 2.



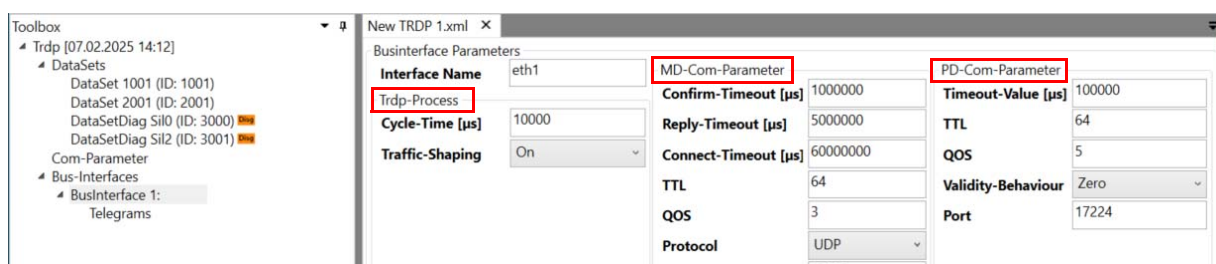
2. Host-IP and Leader-IP

Host-IP and Leader-IP are written in the format of an IP address.

NOTE: Otherwise, the fields will be marked in red as an error:



General configurations are made under *BusInterface*, which can be divided into three areas: *TRDP-Process* (not used here: *MD-COM-Parameters*) and *PD-COM-Parameters* .



LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

NOTE: Some settings are duplicated in the bus interface parameters and in the *COM* parameters, e.g., *TTL* & *QOS*.

If no COM parameter is assigned to a data structure, the default values from the bus interface parameters are used. The COM parameters are assigned to the data structure as shown in *Chapter "12.9" on page .111*.

12.8.1 TRDP-Process

Name	Description	Comment
1. Cycle-Time [µs]	<i>Cycle time</i> - Cycle time of the process data, how often it should be sent.	-
2. shaping	Traffic shaping is a technique for <i>bandwidth management</i> . It delays the data flow of certain types of network packets to ensure network performance for higher priority applications.	-

12.8.2 MD-COM-Parameter

These are the default settings

The screenshot shows the TRDP Configurator interface. The 'MD-Com-Parameter' section is highlighted with a red box and numbered 1 through 10. The parameters and their values are as follows:

Parameter	Value	Number
Confirm-Timeout [μs]	1000000	1
Reply-Timeout [μs]	5000000	2
Connect-Timeout [μs]	60000000	3
TTL	64	4
QOS	3	5
Protocol	UDP	6
UDP-Port	17225	7
TCP-Port	17225	8
Num-Sessions	1000	9
Retries	2	10

The 'PD-Com-Parameter' section also shows the following values:

Parameter	Value
Timeout-Value [μs]	100000
TTL	64
QOS	5
Validity-Behaviour	Zero
Port	17224

Name	Description	Comment
1. Confirm-Timeout [μs]	Standard timeout period [in μs] for receiving an acknowledgment message	-
2. Reply Timeout [μs]	Standard timeout time [in μs] for receiving response messages	-
3. Connect-Timeout [μs]	Standard timeout time [in μs] for closing an unused TCP connection	-
4. TTL	<i>Time-to-Live</i> - Specifies how many hops a package may cover. Possible range 0 to 255. The default value is 64. - <i>Standardzeit zum Leben für MD.</i>	-
5. QOS	Standard quality of service for MD.	-
6. Protocol	The protocol (TCP or UDP)	<i>currently only UDP is supported</i>
7. UDP port	UDP port: Port to be used for UDP-PD communication Port to be used for UDP MD communication	-
8. TCP port	Port to be used for TCP MD communication Port	-
9. Num Sessions	Maximum number of replication sessions to prevent DoS attacks	-
10. Retries	Number of transmission attempts	-

12.8.3 PD-Com-Parameter

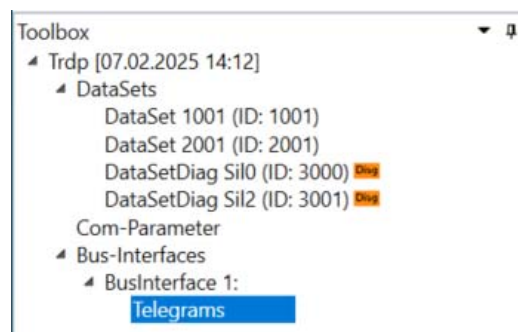
The screenshot shows the 'PD-Com-Parameter' configuration window. The 'PD-Com-Parameter' section is highlighted with a red box and contains the following fields:

- Timeout-Value [µs]**: 100000 (1)
- TTL**: 64 (2)
- QOS**: 5 (3)
- Validity-Behaviour**: Zero (4)
- Port**: 17224 (5)

Name	Description	Comment
1. TimeoutValue [µs]	Cycle time with which process data must arrive for it to be recognized as valid.	Standard-Timeout-Wert in [µs]
2. TTL	Default time to live für PD.	-
3. QOS	Standard quality of service for PD.	-
4. ValidityBehavoiour [Zero], [Keep].	Behavior of the outputs when no more packets are received. Zero = Set data to 0; Keep = Retain last received value	Zero ist preset
5. Port	UDP port: Port to be used for UDP-PD communication	<i>typical: 17224</i>

12.9 Telegrams

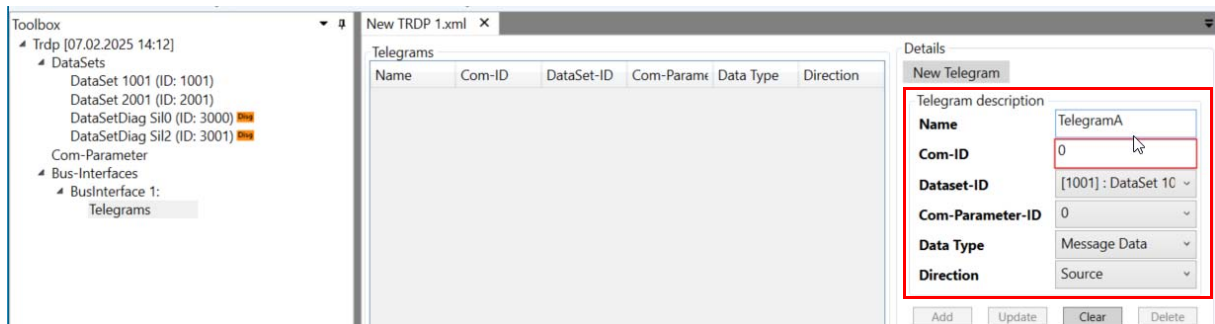
The individual telegrams can now be created under the Telegrams menu item.



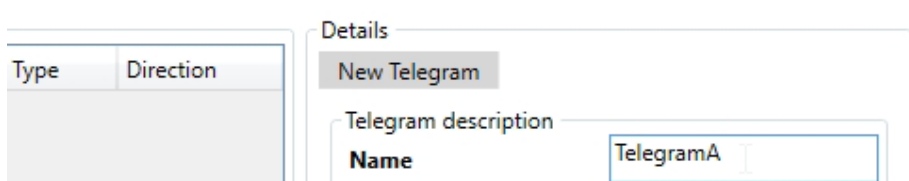
An identifier for the *telegram* can be created as a name.

12.9.1 Create a new telegram

1. In the Details section of the Telegram description, you can make your entries for *Telegram*:

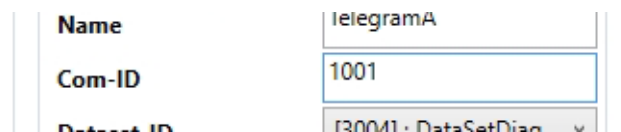


2. To create a telegram, a name must first be entered:



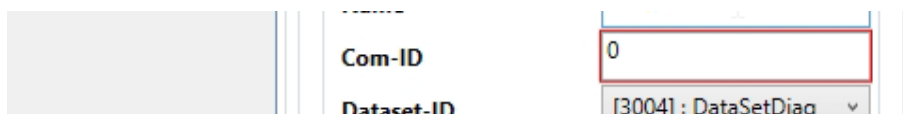
The name must be uniquely assigned.

3. A COM ID must then be assigned to the *telegram*.



NOTE:

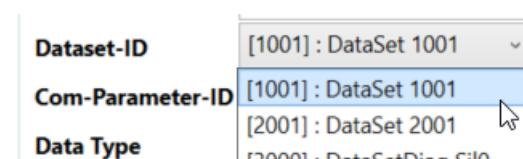
Com-IDs 1-1000 are reserved for special purposes. The Com-ID must be greater than 1000 (e.g., 1001). There are special Com-IDs from this area such as 100, 101, 102, 103, 106, 107, 108, 109, etc., are authorized for LION SAFE CCU. This is indicated by a red (= value too small) or blue (= value correct) colored frame.



NOTE:

The COM-ID must be unique and may only occur once. The COM-ID must be unique and may only occur once.

4. The data structures created as shown in *Chapter "12.4" on page .93* can be selected under *Dataset ID*:



NOTE:

It is important that each DataSet contains at least one element.

Chapter: **See also chapter chapter 12.5.1 on page 94.**

5. Select the COM parameter ID.

NOTE: If the **COM parameter ID = 0** is selected, the default setting created under **BusInterface** is used. Otherwise, the selected setting is used.

6. Define the *Data type*.

The *data type* (= *MessageType*) must then be defined, whether the telegram is *process data* (PD telegram) or *message data* (MD telegram). PD and MD telegrams are available with the LOGIC

7. Define the *direction*.

The "Direction" must then be set.

NOTE: On the subject of direction:

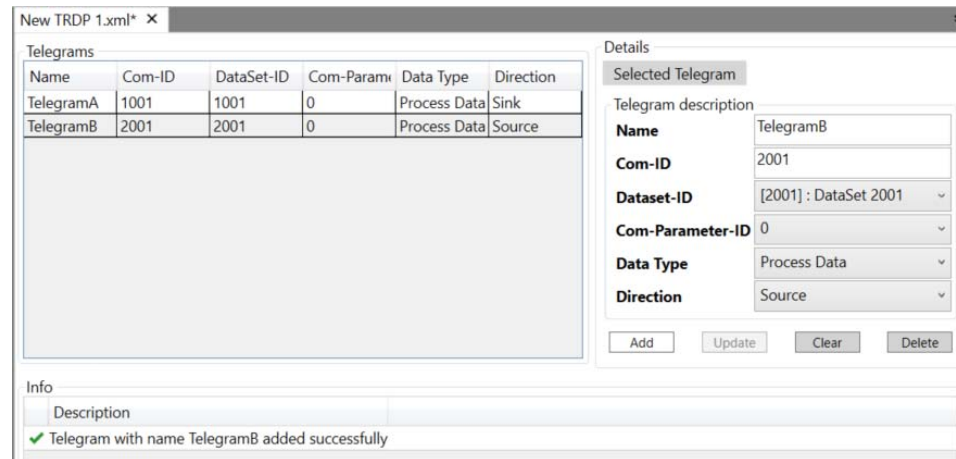
SINK = Incoming data (generated by the DEVICES). The data is received and processed by the LOGIC. SOURCE = Outgoing data (generated by LOGIC).

The data is sent from the LOGIC to the DEVICES.

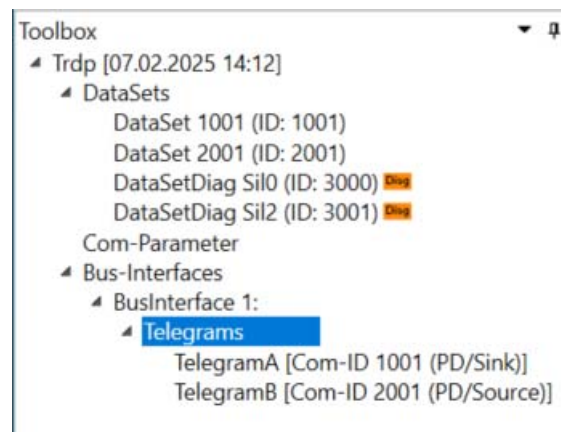
8. Then click on *Add* to create the new *telegram*.

The individual telegrams are created in this way.

The telegrams are clearly displayed in the *telegram list*.

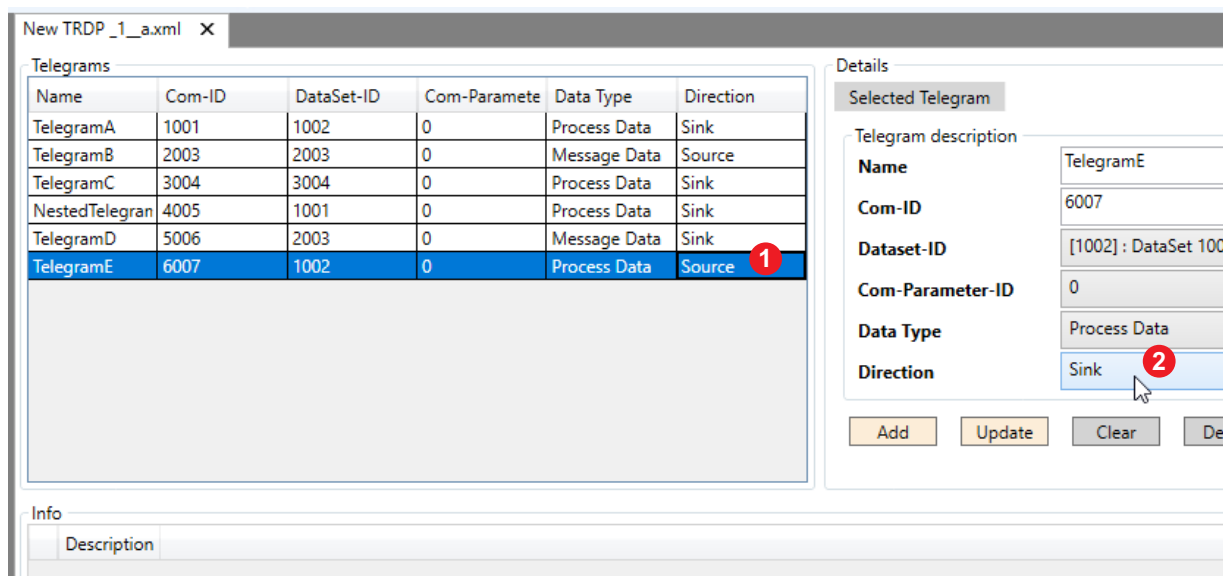


The *telegrams* created are also displayed in the Toolbox.



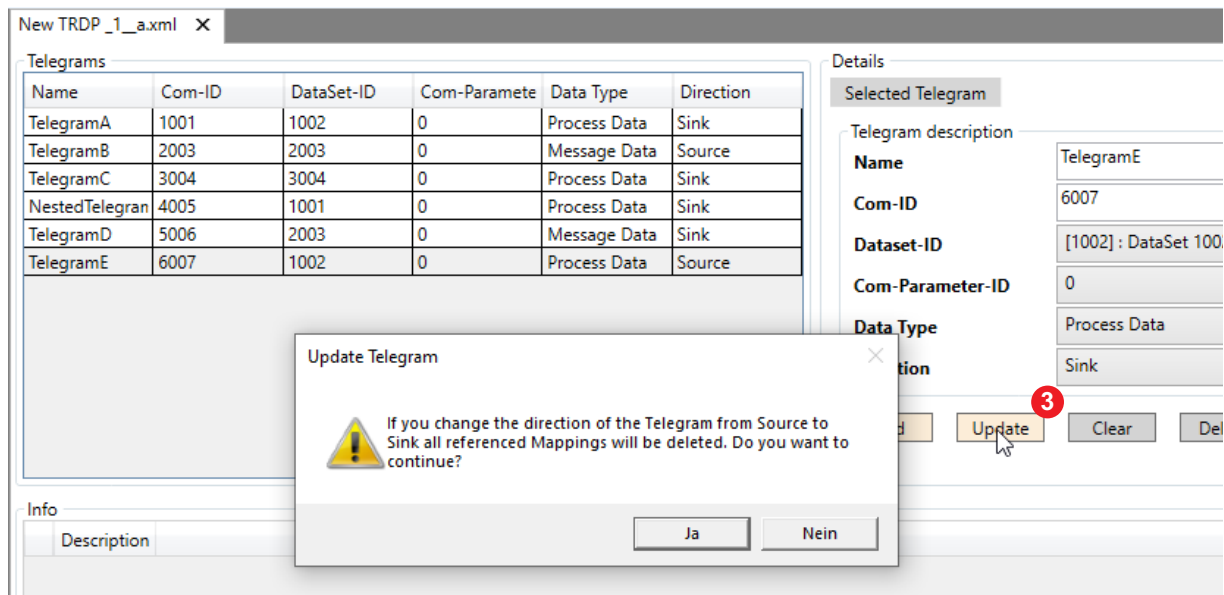
12.9.2 Changing the direction of a telegram

If the original direction (1) of a telegram is to be changed (2)



LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

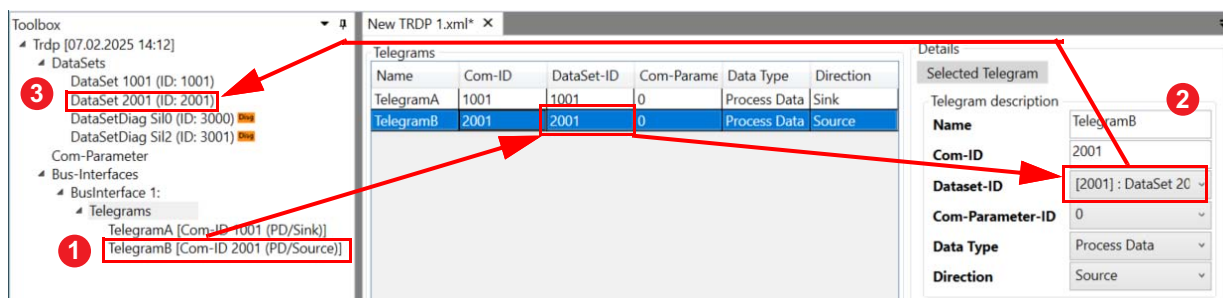
This means that a source telegram becomes a sink telegram, or vice versa. If you receive the following warning when you press the Update button (3):



NOTE: If you change the direction of the telegram, e.g. from Source to Sink, all referenced mappings are deleted. Decide here, whether you really want to continue or not.

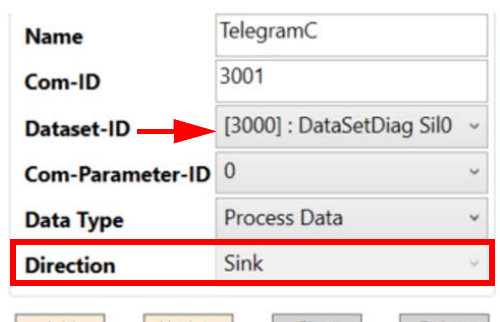
12.9.3 Connection between DataSets, telegrams and elements

This image shows the connection *DataSet-ID* (2) between a *DataSet* (3) and a *telegram* (1):



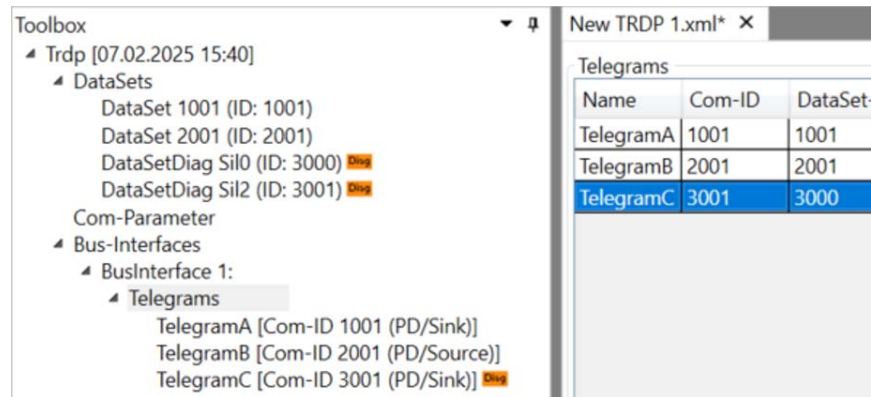
12.9.4 Special case Diagnosis DataSet as telegram

If a diagnostic *DataSet* has already been created, it can be assigned here.



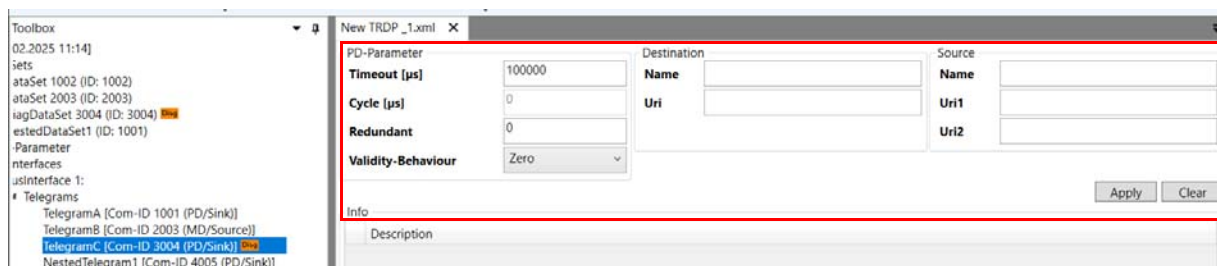
NOTE: The diagnostic data set can only be defined as a sink telegram.

The *telegram* with the diagnostic data is marked with “*Diag*” in the *Toolbox* under *Telegrams*.



The *telegrams* can be clicked on in the Toolbox. A dialog window opens.

The *telegram* can then be configured further.



! Important technical information: **Diagnostic telegrams cannot be transmitted with SDTv2, which is why the entire SDTv2 area is not available.**

! Important technical information: **A distinction is made between *message data telegrams (MD)* and *process data telegrams (PD)*. Depending on the selected data type, when the telegram is created.**

12.10 Message data telegrams (MD parameters)

If no *confirm timeout* or *reply timeout* is entered (= 0), the value from the bus interface is used.

12.10.1 MD telegram as source telegram

The screenshot shows the 'New TRDP_1.xml' window. On the left, the 'Toolbox' lists various components, with 'TelegramB [Com-ID 2003 (MD/Source)]' selected. The main area displays the 'MD-Parameter' configuration for this telegram. The 'Confirm-Timeout [μs]' is set to 1000000, 'Reply-Timeout [μs]' is 5000000, and 'Protocol' is set to 'UDP'. The 'Destination' section has empty fields for 'Name' and 'Uri'. The 'Info' section has a 'Description' field.

NOTE: Only UDP (default) is supported for the Protocol parameter. TCP is not supported.

This screenshot is similar to the previous one, but it shows the 'Protocol' dropdown menu expanded. The options are 'UDP' (selected), 'TCP', and 'UDP'. A red box highlights the dropdown menu.

Destination

3. The sources *Uri1* and *Uri2* can be specified as a destination:

The screenshot shows the 'New TRDP_1_a.xml' window. The 'MD-Parameter' configuration is the same as in the previous screenshots. The 'Destination' section now has 'DesName' in the 'Name' field and '10.0.1.70' in the 'Uri' field. The 'Source' section has empty fields for 'Name', 'Uri1', and 'Uri2'. 'Apply' and 'Clear' buttons are at the bottom right.

12.10.2 MD telegramm as sink telegram

The screenshot shows the 'New TRDP_1.xml*' window. On the left, the 'Toolbox' lists various telegram types, with 'TelegramD [Com-ID 5006 (MD/Sink)]' selected. The main area is divided into 'MD-Parameter' and 'Destination' sections. The 'MD-Parameter' section is highlighted with a red box and contains the following fields:

- Confirm-Timeout [μs]**: 1000000
- Reply-Timeout [μs]**: 5000000
- Protocol**: UDP (dropdown menu)

The 'Destination' section on the right contains fields for 'Name' and 'Uri'. Below these is an 'Info' section with a 'Description' field.

Source / Destination

3. The sources *Uri1* and *Uri2* can be specified as a range:

The screenshot shows the 'New TRDP_1.xml*' window. The 'MD-Parameter' section is on the left, and the 'Destination' and 'Source' sections are on the right. The 'Destination' section is highlighted with a red box and contains the following fields:

- Name**: DesName
- Uri**: 10.0.1.70

The 'Source' section on the right contains the following fields:

- Name**: SourceName
- Uri1**: 10.0.1.80
- Uri2**: 10.0.1.90

Buttons for 'Apply' and 'Clear' are located at the bottom right of the configuration area.

12.11 Process data-telegrams (PD-Parameters)

If no *timeout* or *cycle* is entered (=0), the values from the bus interface are used.

12.11.1 PD telegrams as sink telegrams

The screenshot shows the 'New TRDP_1.xml*' window. On the left, the 'Toolbox' lists various telegram types, with 'TelegramA [Com-ID 1001 (PD/Sink)]' selected. The main area is divided into 'PD-Parameter', 'Destination', and 'Source' sections. The 'PD-Parameter' section is highlighted with a red box and contains the following fields:

- Timeout [μs]**: 0
- Cycle [μs]**: 0
- Redundant**: 0
- Validity-Behaviour**: Zero (dropdown menu)

The 'Destination' section on the right contains the following fields:

- Name**: DesName
- Uri**: 10.0.1.70

The 'Source' section on the right contains the following fields:

- Name**: SourceName
- Uri1**: 10.0.1.80
- Uri2**: 10.0.1.90

Below the 'Source' section is the 'SDTV2' section with various checkboxes and input fields for SMI, Nrx, Nguard, CMThr, TX, and RX. Buttons for 'Apply' and 'Clear' are located at the bottom right of the configuration area.

The Validity-Behavior parameter

The screenshot shows the 'New TRDP_1_a.xml' configuration window. On the left, a 'Toolbox' lists various components like 'aSets', 'DataSet', 'DiagDataSet', 'NestedDataSet', 'n-Parameter', and 'Telegrams'. The 'Validity-Behaviour' parameter is highlighted with a red box and set to 'Zero'. On the right, the 'Destination' section includes fields for 'Name' and 'Uri'. Below that, the 'SDTv2' section has a checked 'Enable SDTv2' checkbox, an 'SMI' field with the value '1111', a checked 'Redundant SMI' checkbox, and 'Nrx' (3) and 'Nguard' (30) fields. A 'Period' section at the bottom has a 'TX Incl' field set to 'n'.

NOTE: Only Zero (*default*) is supported for the *Validity-Behavior* parameter.

Source / Destination

The sources *Uri1* and *Uri2* can be specified as a range:

This screenshot shows the 'New TRDP_1.xml*' configuration window. A red box highlights the 'Destination' and 'Source' sections. The 'Destination' section has 'Name' (DesName) and 'Uri' (10.0.1.70) fields. The 'Source' section has 'Name' (SourceName), 'Uri1' (10.0.1.80), and 'Uri2' (10.0.1.90) fields. Below these, the 'SDTv2' section shows 'Enable SDTv2' as an unchecked checkbox, 'SMI' (0), 'UDV' (0), and 'Redundant SMI' as an unchecked checkbox.

SDTv2 can be activated for the sink telegrams (PD):

A close-up of the 'Enable SDTv2' checkbox in the 'SDTv2' section, which is highlighted with a red box. A mouse cursor is clicking the checkbox. Below the checkbox is a tooltip that reads 'Safe Data Transmission Support'.

Fill out the following input fields:

The input field SMI and input field UDV:

This screenshot shows the 'SDTv2' configuration section with several input fields highlighted by red boxes. The 'Enable SDTv2' checkbox is checked. The 'SMI' field contains the value '0', and the 'UDV' field also contains '0'. Other visible fields include 'Redundant SMI' (unchecked), 'SMI 2' (0), 'Nrx' (3), 'Nguard' (30), 'CMThr' (10), 'Period' (TX [ms] 0), and 'RX [ms] 0'. 'Apply' and 'Clear' buttons are at the bottom right.

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

Redundant SMI is only supported for sink telegrams. Immediately after ticking the checkbox (1), (2) input field SMI 2 becomes active

SDTv2

Enable SDTv2 ☒

SMI 1111 UDV 5

Redundant SMI ☒ **SMI 2 0**

Nrx 3 Ngaurd 30 CMThr 10

Period

TX [ms] 0 RX [ms] 0

Apply Clear

Input field Ngaurd (at the bottom of the SDTv2 area) is only activated if Redundant SMI is active. All visible fields can be filled in.

SDTv2

Enable SDTv2 ☒

SMI 1111 UDV 5

Redundant SMI ☒ SMI 2 1

Nrx 3 **Ngaurd 30** CMThr 10

Period

TX [ms] 0 RX [ms] 0

Apply Clear

12.11.2 PD telegrams as source telegrams

Toolbox

3.02.2025 11:40]

aSets

DataSet 1002 (ID: 1002)

DataSet 2003 (ID: 2003)

DiagDataSet 3004 (ID: 3004) **On**

NestedDataSet1 (ID: 1001)

n-Parameter

-Interfaces

BusInterface 1:

Telegram

New TRDP_1.xml* X

PD-Parameter

Timeout [μs] 0

Cycle [μs] 0

Redundant 0

Validity-Behaviour Zero

Destination

Name

Uri

Source

Name

Uri1

Uri2

SDTv2

Enable SDTv2 ☐

The Validity Behavior parameter

Toolbox

4.02.2025 16:39]

aSets

DataSet 1002 (ID: 1002)

DataSet 2003 (ID: 2003)

DiagDataSet 3004 (ID: 3004) **On**

NestedDataSet1 (ID: 1001)

n-Parameter

-Interfaces

BusInterface 1:

Telegram

TelegramA [Com-ID 1001 (PD/Sink)]

TelegramB [Com-ID 2003 (MD/Source)]

TelegramC [Com-ID 3004 (PD/Sink)] **On**

NestedTelegram1 [Com-ID 4005 (PD/Sink)]

TelegramD [Com-ID 5006 (MD/Sink)]

TelegramE [Com-ID 6007 (PD/Source)]

New TRDP_1_a.xml X

PD-Parameter

Timeout [μs] 0

Cycle [μs] 0

Redundant 0

Validity-Behaviour Zero

Destination

Name DesName

Uri 10.0.1.70

SDTv2

Enable SDTv2 ☒

SMI 2334

Redundant SMI ☐

Nrx 3 Ngaurd

Period

TX [ms] 0

NOTE: Only Zero (default) is supported for the *Validity-Behavior* parameter.

Destination

The sources *Uri1* and *Uri2* can be specified as a destination:

The screenshot shows the 'New TRDP_1_a.xml' window. On the left, the 'PD-Parameter' section has fields for 'Timeout [µs]', 'Cycle [µs]', 'Redundant', and 'Validity-Behaviour' (set to 'Zero'). The main 'Destination' panel is highlighted with a red box and contains 'Name' (DesName) and 'Uri' (10.0.1.70) fields. To the right, the 'Source' section has 'Name', 'Uri1', and 'Uri2' fields. Below the destination panel, the 'SDTv2' section is expanded, showing 'Enable SDTv2' (checked), 'SMI' (2334), 'UDV' (3), 'Redundant SMI' (unchecked), 'SMI 2' (0), 'Nrx' (3), 'Nguard' (30), and 'CMThr' (10).

SDTv2 can be activated for the source telegrams (PD):

This close-up shows the 'SDTv2' section with 'Enable SDTv2' checked. A red box highlights the 'Safe Data Transmission Support' label, which is positioned next to the 'Enable SDTv2' checkbox.

Fill out the following input fields:

Only the SMI (1), UDV (2) and Period TX (3) input fields can be filled in for source telegrams (PD):

This screenshot shows the 'SDTv2' configuration section with three input fields highlighted by red boxes and numbered: (1) SMI, (2) UDV, and (3) TX [ms]. The 'Enable SDTv2' checkbox is checked. Other fields like 'Redundant SMI', 'SMI 2', 'Nrx', 'Nguard', 'CMThr', and 'RX [ms]' are also visible. At the bottom right, there are 'Apply' and 'Clear' buttons.

12.12 Creating a new TRDP report

The TRDP report summarizes the settings and configurations of the TRDP LOGIC and is used by the validator for checking.

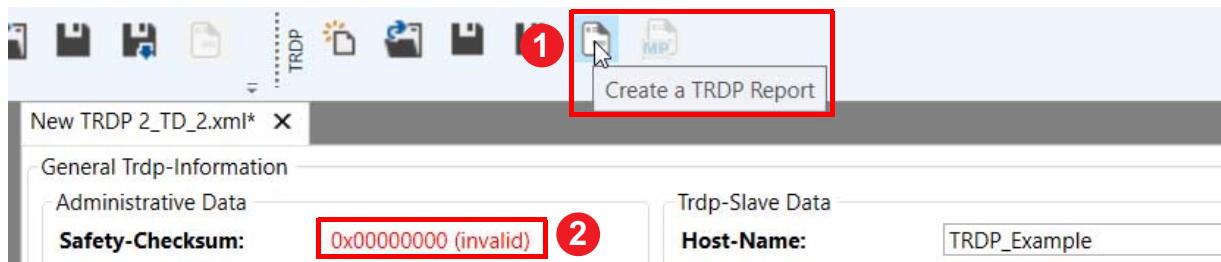
NOTE: A (first) *TRDP checksum* is generated when the TRDP report is created.

NOTE: The actual security checksum is only generated with the created and checked TRDP report.
The TRDP report must therefore always be created first as a basis.

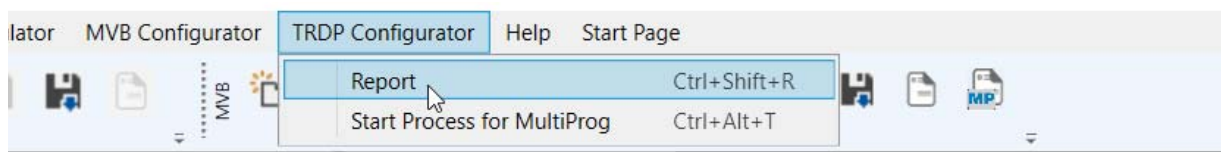
NOTE: The TRDP LOGIC will not accept the TDB file without a security checksum.

In this context, it doesn't matter whether safe modules are used in the LION system or not. The safety checksum must always be created. This is the last step before the configuration file can be loaded onto the TRDP LOGIC.

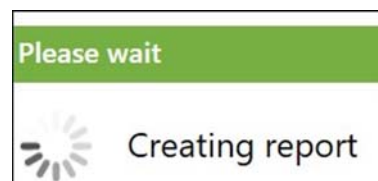
1. To create the report and checksums, click on the TRD Report-create icon (1).
2. as long as the TRDP report has not been created, the safety checksum (2) is invalid (the TRDP.xml must be saved at least once).



- or
3. Select TRDP Save Configurator / Report (or the key combination Ctrl+Shift+R):

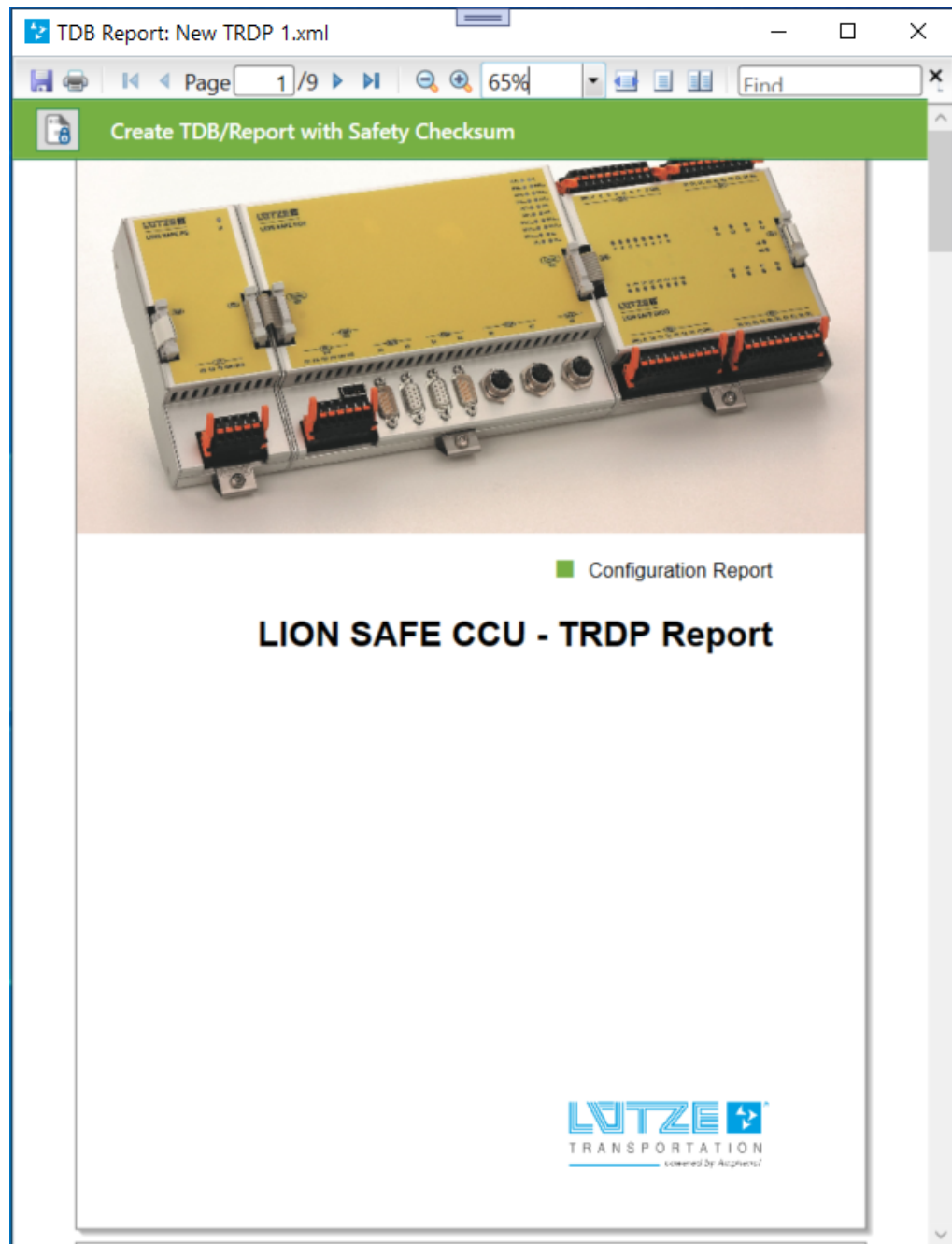


4. This window appears:



NOTE: The larger the configuration, the longer it may take to generate the report.

4. A new TRDP (Configuration) report has been created:

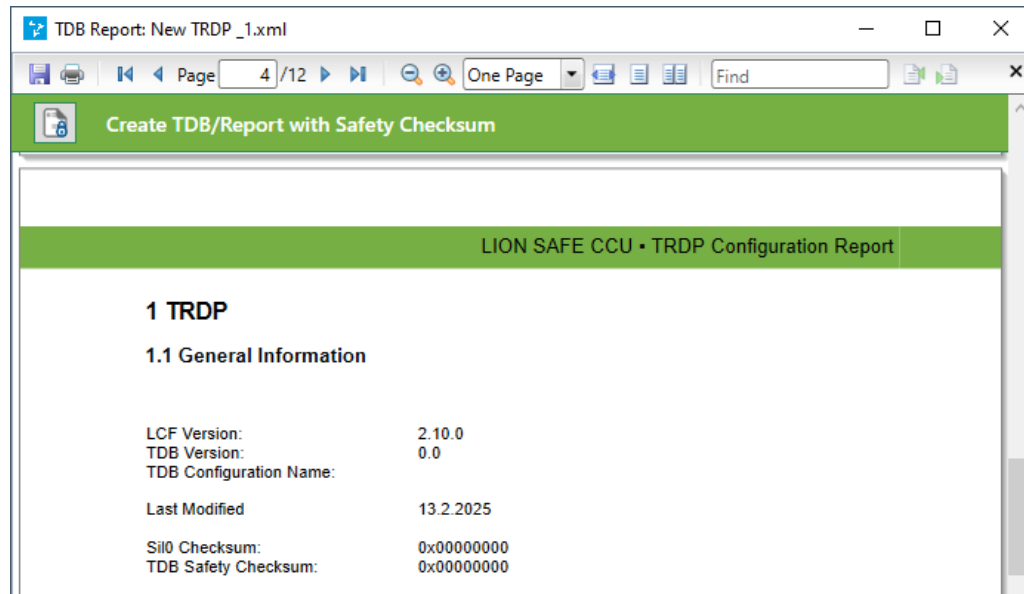


5. The report is used for the review and validation of the settings. The TRDP XML file is a template for the actual configuration file (TDB file). When configuring, the data is first saved in a TRDP XML file and then used to create a TDB file in the report. The TDB file itself is only created after the signed report has been generated. (see P. 13.12). This TDB file contains the current configuration settings for the TRDP LOGIC.

NOTE: Read the report carefully and review the created configuration according to your requirements.

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

The report clearly summarizes all entries once again, here are some examples:

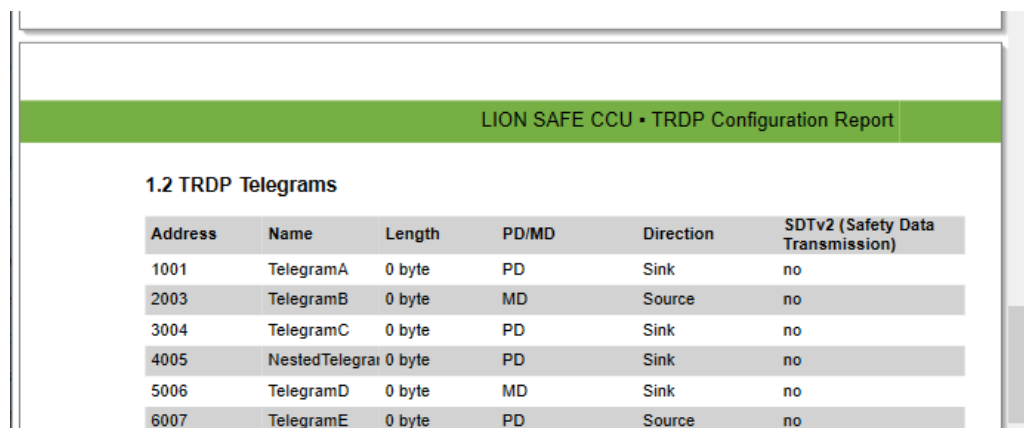


1 TRDP

1.1 General Information

LCF Version: 2.10.0
 TDB Version: 0.0
 TDB Configuration Name:
 Last Modified: 13.2.2025
 Sil0 Checksum: 0x00000000
 TDB Safety Checksum: 0x00000000

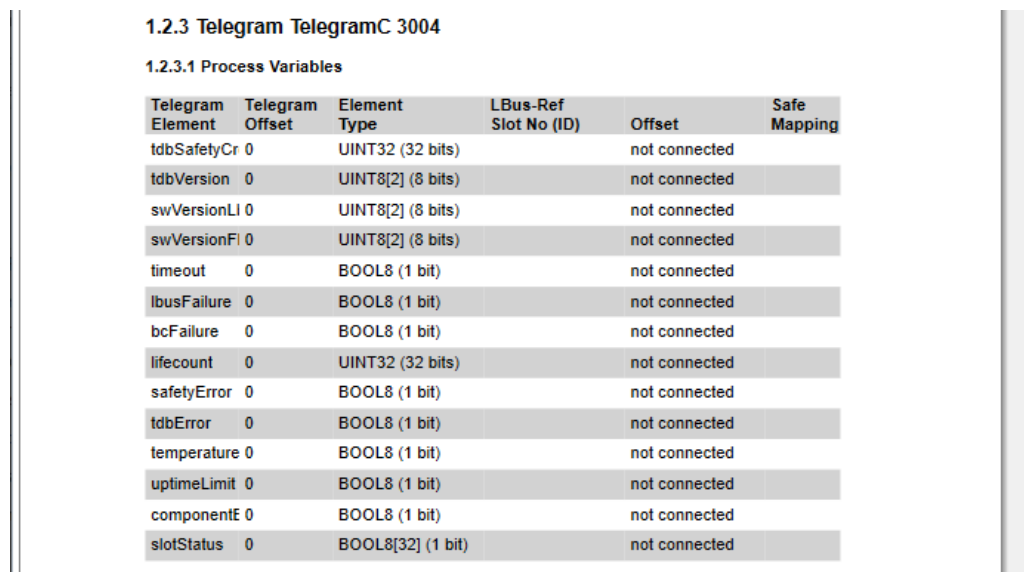
For example, you can see the listed *telegram assignments* that you have created.



1.2 TRDP Telegrams

Address	Name	Length	PD/MD	Direction	SDTv2 (Safety Data Transmission)
1001	TelegramA	0 byte	PD	Sink	no
2003	TelegramB	0 byte	MD	Source	no
3004	TelegramC	0 byte	PD	Sink	no
4005	NestedTelegram	0 byte	PD	Sink	no
5006	TelegramD	0 byte	MD	Sink	no
6007	TelegramE	0 byte	PD	Source	no

Or you can view the listed automatically generated *diagnostic telegrams*:



1.2.3 Telegram TelegramC 3004

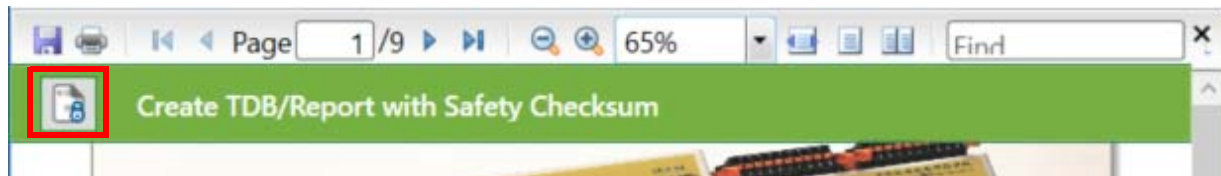
1.2.3.1 Process Variables

Telegram Element	Telegram Offset	Element Type	LBus-Ref Slot No (ID)	Offset	Safe Mapping
tdbSafetyCr	0	UINT32 (32 bits)		not connected	
tdbVersion	0	UINT8[2] (8 bits)		not connected	
swVersionLI	0	UINT8[2] (8 bits)		not connected	
swVersionFI	0	UINT8[2] (8 bits)		not connected	
timeout	0	BOOL8 (1 bit)		not connected	
lbusFailure	0	BOOL8 (1 bit)		not connected	
bcFailure	0	BOOL8 (1 bit)		not connected	
lifecount	0	UINT32 (32 bits)		not connected	
safetyError	0	BOOL8 (1 bit)		not connected	
tdbError	0	BOOL8 (1 bit)		not connected	
temperature	0	BOOL8 (1 bit)		not connected	
uptimeLimit	0	BOOL8 (1 bit)		not connected	
componentE	0	BOOL8 (1 bit)		not connected	
slotStatus	0	BOOL8[32] (1 bit)		not connected	

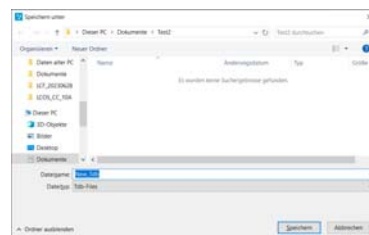
12.13 Creating a TRDP report with checksum

If the report contains no errors and the configuration meets the requirements, the *safety checksum* can be generated.

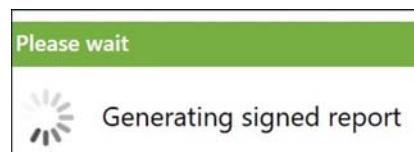
1. Click the **Create TRDP/Report with Safety Checksum** button at the top of the TDB report.



2. After that, there is an option to specify the (local) storage location.

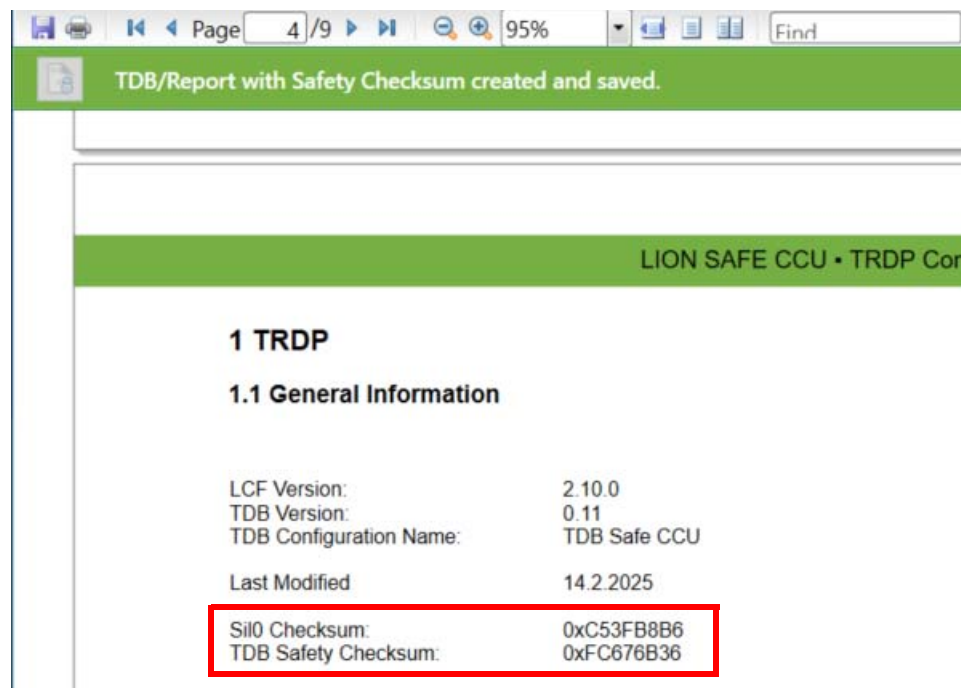


3. This window appears:



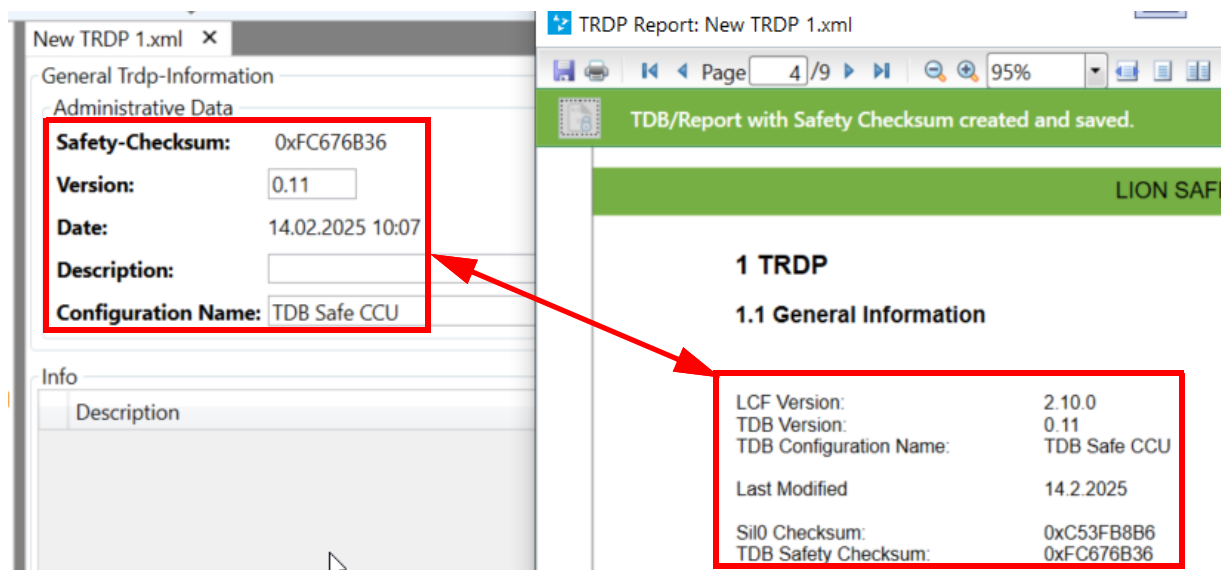
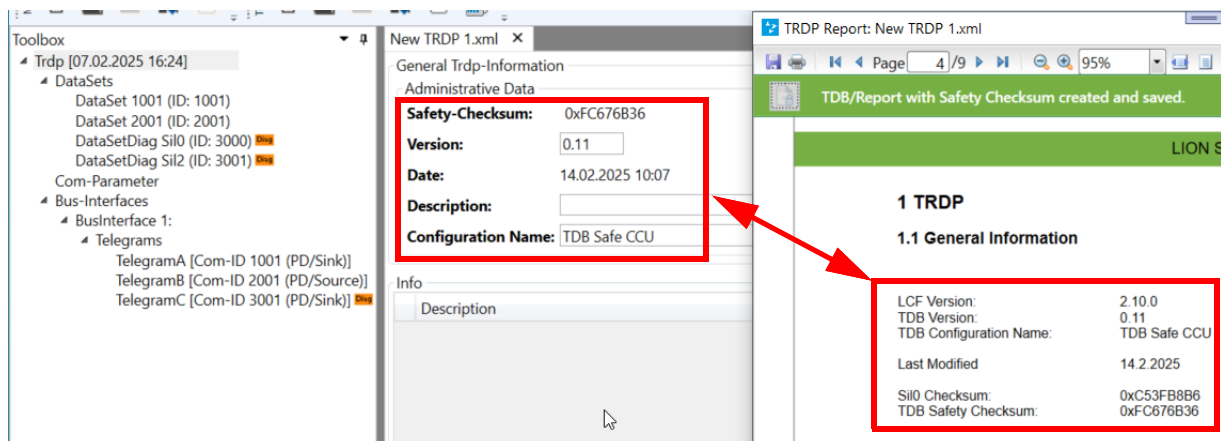
NOTE: The larger the configuration, the longer it may take to generate the report.

4. A signed report is created:






NOTE: The TDB safety checksum is automatically displayed in the TRDP report and saved in the *TRDP Configurator*. The Description field is optional and is only used in the LCF tool.

NOTE: The field *Configuration name* will be displayed on the web server.



The generated TBD file (*.tdb) can be transferred to the TRDP LOGIC via web server.

	New TRDP 1.xml	XML-Dokument
	New TRDP 1.xml.pdf	Adobe Acrobat Docume...
	New_Tdb_1.tdb	TDB-Datei

! Important technical information: **When configuring, the system first saves the data in the XML file. This is used to create the TDB file (configuration file) in the report.**

LION LCF Application Manual ▪ Configurator LOGIC – TRDP Configurator

Example of the content of the text file:

```

1 <?xml version="1.0" encoding="utf-8"?>
2 <device xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema"
3   <target-device-type type="LION-SAFE-CCU" majorversion="0" minorversion="0" />
4   <device-configuration />
5   <bus-interface-list>
6     <bus-interface network-id="1" name="eth1">
7       <trdp-process />
8       <pd-com-parameter />
9       <md-com-parameter />
10      <telegram name="TelegramA" com-id="1001" data-set-id="1001" type="sink" diag="0">
11        <pd-parameter timeout="100000" validity-behavior="zero" cycle="0" redundant="0" marshal
12          <source id="0" />
13          <destination id="0" />
14        </telegram>
15      <telegram name="TelegramB" com-id="2001" data-set-id="2001" type="source" diag="0">
16        <pd-parameter validity-behavior="zero" cycle="0" redundant="0" marshal="on" callback="
17          <destination name="DestName" id="1" uri="10.0.1.70">
18            <sdt-parameter smil="1111" udv="5" rx-period="0" tx-period="10000" lmi="0" />
19          </destination>
20        </telegram>
21      <telegram name="TelegramC" com-id="3001" data-set-id="3000" type="sink" diag="1">
22        <pd-parameter timeout="100000" validity-behavior="zero" cycle="0" redundant="0" marshal
23          <source id="1" />
24          <destination id="2" />
25        </telegram>
26      </bus-interface>
27    </bus-interface-list>
28    <data-set-list>
29      <data-set name="DataSet 1001" id="1001">
30        <element name="Bool8Array" type="BOOL8" />
31      </data-set>
32      <data-set name="DataSet 2001" id="2001" />
33      <data-set name="DataSetDiag Sil0" id="3000">
34        <element name="tdbSafetyCrc" type="UINT32" />
35        <element name="tdbVersion" type="UINT8" array-size="2" />
36        <element name="swVersionLb" type="UINT8" array-size="2" />
37        <element name="swVersionFb" type="UINT8" array-size="2" />
38        <element name="timeout" type="BOOL8" />
39        <element name="lbusFailure" type="BOOL8" />
40        <element name="bcFailure" type="BOOL8" />
41        <element name="lifecount" type="UINT32" />
42        <element name="safetyError" type="BOOL8" />
43        <element name="tdbError" type="BOOL8" />
44        <element name="temperatureWarning" type="BOOL8" />
45        <element name="uptimeLimit" type="BOOL8" />
46        <element name="componentError" type="BOOL8" />
47        <element name="slotStatus" type="BOOL8" array-size="32" />
48      </data-set>
49      <data-set name="DataSetDiag Sil2" id="3001">
50        <element name="tdbSafetyCrc" type="UINT32" />
51        <element name="configurationVersion" type="UINT8" array-size="2" />
52        <element name="terminalID" type="UINT32" />
53        <element name="reserve0" type="UINT32" />
54        <element name="heartbeat" type="UINT32" />
55        <element name="generalOK" type="BOOL8" />
56        <element name="mainGroupOK" type="UINT8" />
57        <element name="operationOK" type="UINT8" />

```

12.14

Notes

NOTE:

These were idealized examples. In real situations, the tasks are more complex and must meet a variety of requirements for the TRDP structure.




SERVICE: If you get stuck or need any other help, please contact the service department. The contact information is in [chapter 15 on page 135](#)

13 Troubleshooting - Configurator LOGIC

This is an overview of possible errors and their solutions.

Error	Possible cause	Methodology
1 LOGIC does not start. (LION SAFE CCU)	Validation/safety checksum not generated.	<i>Create validation/checksum</i> MVB chapter 11.7 on page 80 TRDP : chapter 12.13 on page 125
2 Mapping of data aborts with error message (Data type not supported...)	Incorrect data type selected.	<i>Select the correct data type.</i> <i>NOTICE: Please refer to the operating instructions for the corresponding DEVICE.</i>
3 Required data are not displayed during mapping.	Source ports and sink ports have been mixed up.	<i>Check the entries.</i>
4 Mapping name file not found.	In addition to the *.bin file, an *.xml file with the mapping names is also saved.	<i>Either select the file manually or ignore the error message.</i>
	The file was not found or the *.bin file was created with an older LCF version.	<i>An empty file is created automatically.</i>

 **Service: If you get stuck or need any other help, please contact the service department. The contact information is in [chapter 15 on page 135.](#)**

14 Further Information

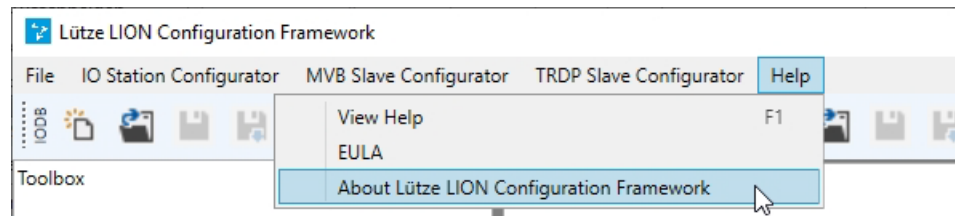
14.1 Current version of the LION LCF Tool

1. LION Configuration Framework (LCF): Version 3.01.0000
2. LION LDD (LION Device Description): Version 2.9

Example screenshot



You can find this information here in the LION LCF tool:



14.2 Software versions

[V3.01.0000 - 2025-11]

1. A new section, Safe CCU Calculator, has been added to calculate and display the required power consumption for each individual power source in the LION system.
2. The display of the SDTv2 range for Dioline has been deactivated, and the images for Dioline have been corrected.
3. Correction of SDTv2 Values for Safe CCU (TRDP)
 - 1 SDTv2 parameters only activated for process data
 - 2 UDV must be allowed up to 255

LDD (devices.ldd) v2.9

[V3.00.0000 - 2025-02]

Due to the volume of content, the application manual had to be split into two parts:

**1. Part: LION LCF Tool - Configurator HEAD,
Application manual for LION HEADs (Bus coupler)**

1. The selection between HEAD (BC) and LOGIC (SAFE CCU) has been added.
2. The entire area for LOGIC (SAFE CCU) has been added.
3. A display of various application manuals has been introduced (HEAD/LOGIC).
4. Added: separate major and minor versions for TRDP BC SII0 and TRD BC SII2
5. Added: a different diagnostic data structure for BC SIL0 and BC SIL2
6. Display and storage of mapping data for DeviceID= 900 and DeviceID=901 corrected (For input data only 9 bytes must be given)
7. The structure of the TDB data itself corresponds to the data format specified in document T1754_T9129_TDB_V13.pdf
8. PDFsharp-MigraDoc libraries (V1.5) have been updated to improve reporting performance.
9. Bugfixing
 - a) GUI and TDB file: SDTv2 parameters
 - b) report (MVB Slave Configurator) => calculation STS (the correct (halved) STS value is displayed) corrected

LDD (devices.ldd) v2.6

**2. Part: LION LCF Tool – Configurator LOGIC,
Application manual for LION LOGIC (SAFE CCU)**

1. The selection between HEAD (BC) and LOGIC (SAFE CCU) has been added
2. Complete area for LOGIC (SAFE CCU) has been added
3. BC 803002 with new diagnostic port
4. The structure of the TDB data itself corresponds to the data format specified in document T1754_T9129_TDB_V13.pdf

LDD (devices.ldd) v2.6**[V2.10.0001 - 2023-06]**

1. Numbering of the pages in this application manual was corrected.

LDD (devices.ldd) v2.5 - unchanged**[V2.10.0000 - 2023-02]**

1. Integrate an output text NSDB file when generating the NSDB report.
2. Adjustments of the validation of the SDTv2 configurations in the GUI and gray out SDTv2 in the NSDB report.
3. Display of process data for selected modules in PopUp (area MVB)
4. Integration of the outage revelation time incl. the number of bytes transferred in one L-Bus² cycle in the reports (IODB, NSDB, TRDP)
5. Integration of an additional field for the WebServer version on the "General NSDB information" (NSDB) incl. display in the NSDB report

6. Design change in the Safety CRC area (it was implemented that the Safety CRC on the GUI remains red and invalid until the CRC is generated)

7. Bugfixing at saving the files.

LDD (devices.ldd) v2.5 - unchanged

[V2.08.0000 - 2022-06]

1. On the "Source/Sink Ports -> Details" view a hint for the "STS" field has been integrated.
2. Corrected the order of the menus.
3. New filter settings in program window: L-Bus² Subdevices > Configuration data.

LDD (devices.ldd) v2.5 with new possibility to specify filter settings via drop-down menus for SIL2 modules. The filters represent the name of the inputs. The name can be max. 19 characters long.

- The unit of measurement for SIL2 modules ID 300 / 301 / 900 / 901 are **[ms]**
- The unit of measurement for SIL2 module ID 500 is **[Hz]**

[V2.06.0000 - 2022-04]

New MVB Bus coupler 803011, LION MVB SIL0 added

LDD (devices.ldd) v2.4

[V2.04.0000 - 2022-01]

Instruction manual adapted to the changes of V2.02.0000

LDD (devices.ldd) v2.3

[V2.02.0000 - 2021-11-10]

Bugfix for the MVB Slave Configurator, corrected calculation of the Safety CRC; Devices. ***LDD (devices.ldd) v2.3 with new modules DI16 SIL2, AI4 SIL2, AI4 +/-10V SILO, AO4 +/-10V SILO***

[v1.3.5.3 - 2019-03-22]

New Features - Stable version of the TRDP Slave Configurator

LDD (devices.ldd) v2.2 with new SILO Power Supplies - naming support in the NSDB Configurator - drag and drop file opening support

[v1.3.4.2 - 2018-11-14]

New Features - Initial Release of TRDP Slave Configurator

LDD (devices.ldd) v2.0 with new BC ETH TRDP

[v1.3.3.1 - 2018-10-24]

New Features - SDTv2 norm conformance + SDTv2 safety trailer visualization + error correction pvName limit of 254 in each direction + mapping of data with endianness only 8-bit aligned

LDD (devices.ldd) v1.5

[v1.2.1.1 - 2018-06-14]

failure correction, changed

LDD (devices.ldd) to v1.5

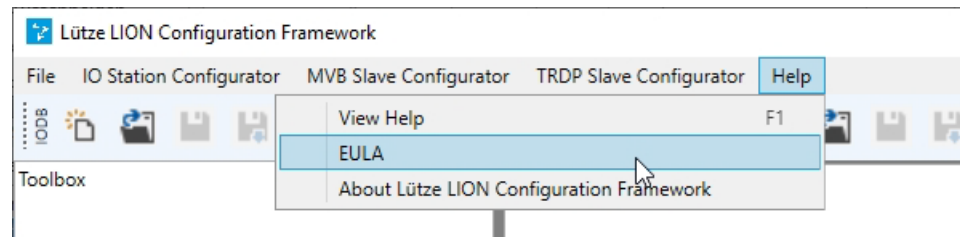
[v1.2.1.0 - 2016-09-14]

*Initial Revision for website
LDD (devices.ldd) to v1.*

14.3

EULA LION Configuration Framework

You can also find this information here in the LION LCF Tool.

**SOFTWARE LICENSE AGREEMENT FOR LÜTZE SOFTWARE****1. License:**

The software is distributed as Freeware. You may use this software on any number of computers for as long as you like. The software is NOT Public Domain software. We allow the free distribution of the software. However, we retain ownership and copyright of the software and its source code in its entirety. You may use and/or distribute the software only subject to the following conditions:

- You may not modify the program or documentation files in any way
- You must include all the files that were in the original distribution
- You may not decompile or otherwise reduce the software to a human perceivable form
- You may not sell the software or charge a distribution fee, except to recover the media costs
- You understand and agree with this license and with the disclaimer of warranty and the limitation of liability printed below

The software may be bundled and distributed together with other software products, but the same conditions apply. You do not need to seek our permission first. But a note telling us about your software and your comment about our software would be nice.

2. Disclaimer of warranty:

The software and related documentation are provided "as is", without warranty of any kind. The Lütze Transportation GmbH disclaims all warranties, express or implied, including, but not limited to, the implied warranties of design, merchantability, fitness for a particular purpose. The Lütze Transportation GmbH does not warrant that the functions contained in the software or documentation will meet your requirements, or that the operation of the software will be uninterrupted, error-free or complete, or that defects in the software or documentation will be corrected.

3. Limitation of liability:

Under no circumstances, including negligence, shall Lütze Transportation GmbH be liable for any lost revenue or profits or any incidental, indirect, special, or consequential damages that result from the use or inability to use the or related products or documentation, even if Lütze Transportation GmbH has been advised of the possibility of such damages. Some states do not allow the limitation or exclusion of liability for incidental or consequential damages so the above limitation or exclusion may not apply to you.. In no event shall Lütze Transportation GmbH total liability to you for all damages, losses, and causes of action, whether in contract, tort (including negligence) or otherwise, exceed the amount paid by you for the software.

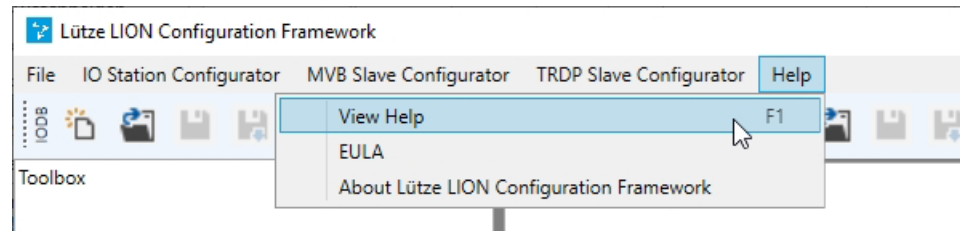
State: as of November 2011

14.4

Application manuals

Under the menu item Help / View Help you will find the LION LCF Tool application manuals.

Depending on whether you are in Configurator HEAD or Configurator LOGIC, you will receive the correct part of the application manual.



Due to the volume of content, the application manual had to be split into two parts:

1. LION LCF Tool - Configurator HEAD,
Application manual for LION HEADs (Bus coupler)
2. LION LCF Tool - Configurator LOGIC, Application manual for LION LOGIC
(LION SafeCCU)

15

Service

For questions about the product or repair requests, please contact:

Lütze Transportation GmbH

Bruckwiesenstrasse 17-19
71384 Weinstadt
Germany

Tel.: +49 (0) 7151 6053-545

E-Mail: Sales.Transportation@luetze.de

Internet: www.luetze-transportation.com

✓ **Tip: You can obtain the technical documents via the search field on the website. Enter the article number 803002, for example, or simply use this QR code.:**



803001
LION-SAFE-BC-
MVB-LUE



803002
LION-SAFE-BC-
ETH-LUE

Select the product in the search result displayed.

At the bottom of the respective product page you will find the documents associated with the product.

16 Shutdown and disposal

16.1 Regulations

Observe the valid environmental regulations of your country for the final shutdown and disposal.

Disassemble the device and completely dismantle it before disposal.

Highly sensitive information

For highly sensitive information, mechanical destruction of the data carrier by shredding is recommended. This is done by companies that also destroy files.

Batteries

Over the next few years, further obligations will come into force with regard to the EU's new battery regulation. For example, further due diligence obligations for economic operators will apply from 18.08.2025 and further regulations will follow for the management of waste batteries.

Dispose of electric parts in line with the regulation for Waste of Electrical and Electronic Equipment (WEEE DE 65543672). You assume the obligation to properly dispose of the delivered goods after termination of use at your own expense in accordance with the statutory provisions and release Friedrich Lütze GmbH from the obligations under § 19 section 3 ElektroG (obligation of manufacturers of electrical and electronic equipment to take back electrical and electronic equipment) and related claims of third parties.

If you have handed over the device to a commercial third party without any contractual agreement for the disposal, you must take it back at your own expense and at the risk of legal liability after its final shutdown.

The claim of Lütze Transportation GmbH for takeover or indemnification by the customer shall not become time-barred before the expiration of two years after the final termination of the use of the equipment.

The two-year period of suspension of expiry shall commence at the earliest upon receipt by Lütze Transportation mbH of a written notification on its part of the termination of use.

16.2 Data security

Protect your data from access by outsiders. The bus coupler contains passwords and configuration data.

NOTE: Reset the bus coupler to factory settings so that your configuration and passwords cannot be accessed during disposal.



17

Revision of the document

Version	Revision	Date
00	Complete revision of the previous English-language document (LION_LCF_AM_EN_V08), and translation into a German version. This version forms the basis for the new English version. New intermediate overviews and flow charts were added for easier understanding. Three new chapters on LCF Configurator LOGIC were also added.	01/28/2025 03/20/2025
01	New chapter on Safe CCU Calculator; the display of the SDTv2 range for Dioline has been disabled, and the images for Dioline have been corrected; correction of SDTv2 values for Safe CCU (TRDP)	12/15/2025

The legally protected term “QR Code” is used in this publication. “QR Code” is a registered trademark of DENSO WAVE INCORPORATED.

18

Annexes Configurator LOGIC




18.1

DIOLINE PLC - Product family overview








Brief description

The DIOLINE PLC is a flexible, high-performance, compact control system for use in rail vehicles. Free programmable in a comfortable IEC 61131-3 development environment. DIOLINE PLC.

You will find an overview in the following table.

DIOLINE PLC	Item no.	ID	Type / Use	Special product features
	746026		DL-PLC-COM-COM-LUE Flexible fieldbus configuration CANopen Master. Local-bus interface for connection of local I/ O modules.	<ul style="list-style-type: none"> ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746027		DL-PLC-COM-CAN-LUE Flexible fieldbus configuration CANopen Slave and CAN2.0. Local-bus interface for connection of local I/O modules.	<ul style="list-style-type: none"> ▪ Compact vehicle control unit ▪ Powerpack control unit ▪ individual driver and software development possible
	746028		DL-PLC-MVB/EMD-CAN-LUE Flexible fieldbus configuration with MVB and CAN. Local-bus interface for connection of local I/ O modules.	<ul style="list-style-type: none"> ▪ MVB CAN Gatew ▪ Powerpack control unit ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746032		DL-PLC-COS-COM-LUE Flexible fieldbus configuration CANopen Master and Slave. L- Bus interface to connect local I/O modules.	<ul style="list-style-type: none"> ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746033		DL-PLC-MVB/EMD-COM-LUE Flexible fieldbus configuration with MVB and CAN. Local input ports for MVB configuration and diagnostics. L-bus interface for connecting modular I/O modules.	<ul style="list-style-type: none"> ▪ MVB CAN Gatew ▪ Genset control unit ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746034		DL-PLC-NFB-NFB-LUE L-Bus interface to connect local I/O modules.	<ul style="list-style-type: none"> ▪ Subsystem control unit, ▪ individual driver and software development possible

LION LCF Application Manual ▪ Annexes Configurator LOGIC

	746036	Subsystem control unit, Flexible fieldbus configuration with MVB and CAN. Local input ports for MVB configuration and diagnostics. L-bus interface for connecting modular I/O modules.	<ul style="list-style-type: none"> ▪ MVB CAN Gatew ▪ Genset control unit ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746038	DL-PLC-MVB-COM-DIO-LUE Flexible fieldbus configuration with MVB and CAN. Local input ports for MVB configuration and diagnostics. L-bus interface for connecting modular I/O modules.	<ul style="list-style-type: none"> ▪ MVB CAN Gatew ▪ Genset control unit ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746039	DL-PLC-CAN-NFB-LUE L-Bus interface to connect local I/O modules.	<ul style="list-style-type: none"> ▪ Compact vehicle control unit ▪ individual driver and software development possible
	746040	LION-SAFE-PLC-SProg-COS- MVB-ETH-LLNK-LUE Flexible fieldbus configuration with MVB and CAN. Local-bus interface for connection of local I/ O modules.	<ul style="list-style-type: none"> ▪ MVB CAN Gatew ▪ Compact vehicle control unit ▪ Powerpack control unit ▪ individual driver and software development possible
	746041	DL-PLC-COS-CAN-LUE Flexible fieldbus configuration CANopen Slave and CAN2.0. Local-bus interface for connection of local I/O modules.	<ul style="list-style-type: none"> ▪ Powerpack control unit ▪ individual driver and software development possible
	746050	DL-PLC-MVB/EMD-PBM-LUE Flexible fieldbus configuration with MVB and CAN. Local-bus interface for connection of local I/ O modules.	<ul style="list-style-type: none"> ▪ MVB PBM Gateway ▪ Compact vehicle control unit ▪ Powerpack control unit ▪ individual driver and software development possible
	746051	DL-PLC-MVB/EMD-PBS-LUE Flexible fieldbus configuration with MVB and CAN. Local-bus interface for connection of local I/ O modules.	<ul style="list-style-type: none"> ▪ MVB PBS Gateway ▪ Compact vehicle control unit ▪ Powerpack control unit ▪ individual driver and software development possible

18.2

LION Safe CCU - Overview**Brief description**

The LION Safe CCU is a compact high-performance PLC with Safety Integrity Level SIL2 for use in rail vehicles. For connecting external assemblies, the control system is equipped with a Lütze Link interface (LLK). Using this for example, an L-BUS2 Gateway can be attached internally to expand the control unit through the addition of safe and non-safe local I/O modules. In addition, devices like an F-Bus Loop Gateway for example, can be connected over the LLK.





A gray, non-safety-related PLC is also integrated in the safety control unit. The controller used there is for the implementation of non-safety-related functions as well as the connection of field busses MVB, TRDP, and CAN. The controller of the standard control system is connected to the SafeCPU via a multiplexed data and address bus. MVB and TRDP can be controlled via both controllers.

There is sufficient channel separation on the data interface to exclude mutual interference.

Free programmable in a safe and certified development environment.

High-performance field busses MVB (SDTv2), CANOpen Slave and Ethernet, TRDP (SDTv2) with DualHoming.

You will find an overview in the following table.

LION Safe CCU	Item no.	ID	Type / Use
	802106		LION-SAFE-PLC-SPROG-NFB-NFB-ETH-LLNK-LUE Compact high-performance PLC with safety integrity level SIL2 for use in rail vehicles. Free programmable in a safe and certified development environment. High-performance field busses Ethernet. Safe and non-safe I/O modules can be connected via the L-Bus ² .
	802107		LION-SAFE-PLC-SPROG-COS-MVB-ETH-LLNK-LUE Compact high-performance PLC with safety integrity level SIL2 for use in rail vehicles. Free programmable in a safe and certified development environment. High-performance field busses MVB, CAN and Ethernet. Safe and non-safe I/O modules can be connected via the L-Bus ² .
	802108		LION-SAFE-PLC-SPROG-COS-MVB-ETH-LLNK-LUE Compact high-performance PLC with safety integrity level SIL2 for use in rail vehicles. Free programmable in a safe and certified development environment. High-performance field busses MVB (STDv2), CANOpen Slave and Ethernet, TRDP (StDv2) with Dual-Homing. Safe and non-safe I/O modules can be connected via the L-Bus ² .
	802109		LION-SAFE-PLC-SPROG-CAN-MVB-ETH-LLNK-LUE Compact high-performance PLC with safety integrity level SIL2 for use in rail vehicles. Free programmable in a safe and certified development environment. High-performance field busses MVB (STDv2), CANOpen Slave and Ethernet, TRDP (StDv2) with Dual-Homing. Safe and non-safe I/O modules can be connected via the L-Bus ² .

