Automation Solutions

User Manual

Profibus-DP-Gateway 716458

Description of Profibus-DP-Gateway in connection with LOCC-Box-Net 716410 and 716411.

Version 1.00

SYSTEMATIC TECHNOLOGY

The user manual is part of the product and contains important information about the handling and the safety. To avoid hazardous situations read the manual before installing the product and using it.
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These alterations need not to be documented in every case.

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Content

1 General Information

1.1 Symbol Description

The manual contains several safety messages. Each safety message contains a defined signal word and a color. The color and the word are referring to an alert level. There are 4 levels. The safety messages point out hazardous situations and give information to avoid those.

DANGER	Indicates a hazardous situation which, if not avoided will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided could result in minor or moderate injury.
NOTICE	Is used to address practices not related to personal injury.

1.2 Copyright

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1.3 Disclaim of Liability

We have verified the contents of this manual regarding to the conformity of the described hardware and software. Nevertheless divergence may be possible and we disclaim warranty for the complete agreement. The information in this manual will be verified periodically and corrections will be in the next issue.
We would appreciate any kind of suggestion and contributions on your part.
All warranty and liability claims shall be excluded by Friedrich Lütze GmbH in case of damages caused by missing or insufficient knowledge of the operating instructions. Therefore the user company is recommended to have a confirmation in writing about the instruction of the employees.
Modifications or functional alternations on the modules are not allowed due to safety reasons. Any modification on the modules not explicitly authorized by the manufacturer will result in loss of any liability claims to Friedrich Lütze GmbH. The same applies if non authorized parts or equipment are used.

1.4 Safety

1.4.1 Content of Manual

Read and follow the manual before using the product the first time.
This applies to every person which is getting in touch with the product. Trained employees and experts especially qualified persons which had worked with similar products before have to read and understand the manual.

1.4.2 Intended Use

The usage as agreed upon includes the operation in accordance with the operating instructions. The LOCC-Box System is allowed to be used according to the described applications within the technical documents only and in combination with the recommended authorized foreign devices and components only.

1.4.3 Operating Employee

Only highly trained employees are allowed to do the following work on the modules:

- Installation
- Commissioning
- Operating
- Maintenance.

Regarding the safety-related notes qualified employees are people who are allowed to operate with the modules, systems and the current circuits and to ground and mark those according to the safety standards. The operating employees have to be instructed and trained.

1.4.4 Maintenance

The modules are maintenance free. Therefore for continuous operation no inspection or maintenance intervals are necessary.

1.4.5 Decommissioning and Deposal

In case of decommissioning and disposal of the modules the user has to observe the valid environmental guidelines of the respective country for user's location.

2 Gateway – Profibus-DP, 716458

The LOCC-Box Gateway is an electronic part which distributes and transforms the data and the messages of the serial LOCC-Box-Net interface (LOCCbus) to 2 further communication interfaces USB or Profinet.

2.1 General Information

2.1.1 Explanation

The serial LOCC-Box-interface is a 1 wire communication interface. This is made according to the LIN specification. The protocol of this interface follows the Multidrop Protocol.

The Gateway supports the following interfaces:

- Full-Speed USB-interface with a max Bit rate of 12 MBit/s according to USB 2.0
- Profinet-IO Interface according to IEC 61158. The physical transmission layer is the Ethernet 100Base/T.

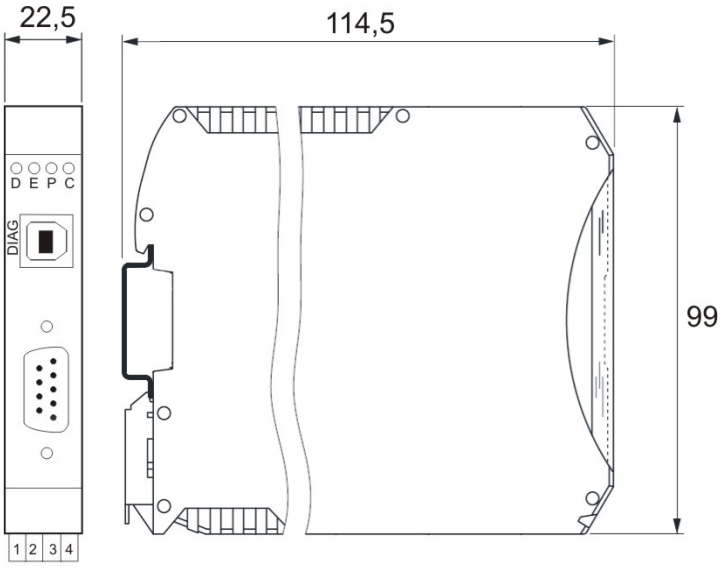
The USB-Interface is used for the connection to a common computer. The USB-interface is recognized under Windows XP [1)] or Windows Vista [1)] as serial COM-Interface. Together with the Software LOCC-Pads the interface is used for the initial operation and configuration of the LOCC-Box-Net.

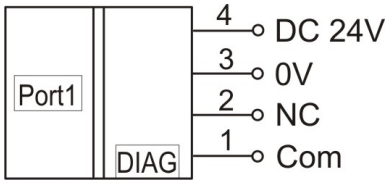
The Profinet interface with 2 ports is suitable for connecting a programmable logic controller (PLC) of different manufacturers, for example.

A simultaneous operation mode of the USB- and Profinet-IO interface is not possible. In this case the communication through the USB interface has always priority.

The LIN-interface, the power supply for the LIN-interface and the power for the Gateway (P and M) is connected via 4 pluggable spring terminals. The USB-interface (form B) and the Profinet RJ-45 port are available at the front of the housing.

2.1.2 Dimensions and Connections





1 Com: 1 wire bus, LOCC-Box-Net
2: NC: not connected
3: 0V: GND
4: DC 24V: DC12/24V

DIAG: USB-Interface
Port1: Profibus-DP

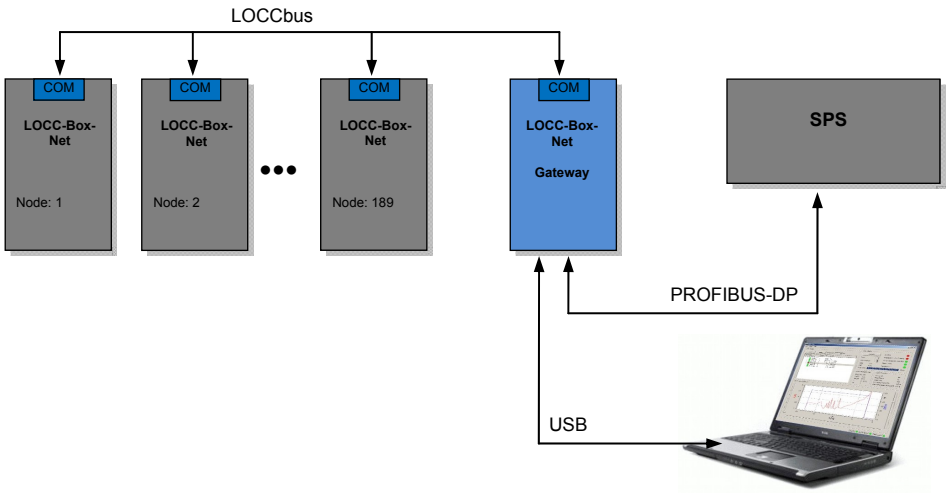
2.1.3 Function and Displays

Function	PIN	Description
Com	1	Communication terminal, 1 wire bus, LOCCbus
NC	2	Not connected
0V	3	0V – terminal for the internal power of the gateway
DC 24V	4	DC 12/24V – terminal for the internal power of the gateway

Connection: spring terminal, pluggable

Displays	Function	Description
LED D, green	PROFIBUS-DP	data exchange
LED E, red	1x short flashing	Bit-rate is searching, the connection to the DP-Master is interrupted, check the Profibus connectivity (wiring error, short circuit, terminator)
	2x short flashing	Bit-rate is supervised, check the selected PROFIBUS-address
	3x short flashing	waiting for telegram or telegram is wrong, diagnosis about SIMATIC-Manager or System-Function SFC13 (DPNRM_DG)
	4x short flashing	waiting for configuration telegram or configuration telegram is wrong, diagnosis about SIMATIC-Manager or System-Function SFC13 (DPNRM_DG)
LED P, green	Power	power supply is connected
LED C, green	LOCCbus	flashing - data traffic with LOCC-Box-Net modules

2.1.4 Topology and Structure



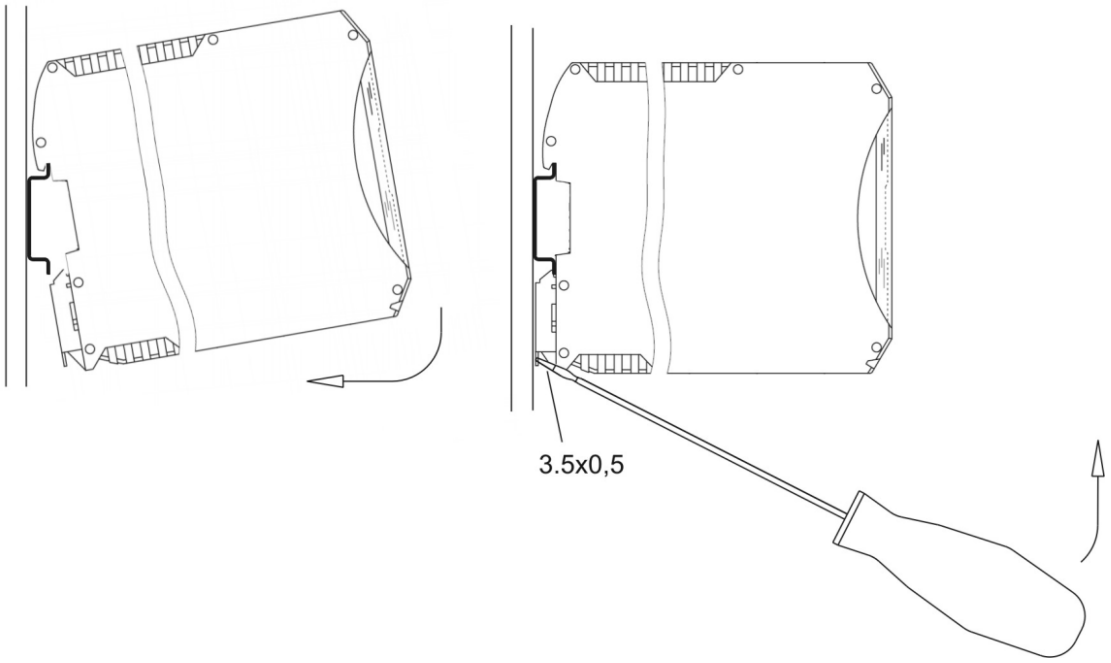
2.1.5 LOCCbus – Interface

Count	1
Interface, controller	UART integrated in CPU
Bitrate	9600 Baud, 9 Bit, No polarity, 1 stop-bit
Physical interface	LIN
Software	In Firmware

2.1.6 Operation system and driver

Program language	ANSI-C
Toolchain	Raisonance Ride7
Update	Over USB-interface
Operating system	FreeRTOS 6.02 or higher
Driver	esd Profibus-DP-Stack
USB-driver	Windows Virtual COM-Port, INF-files in LOCC-Pads.zip

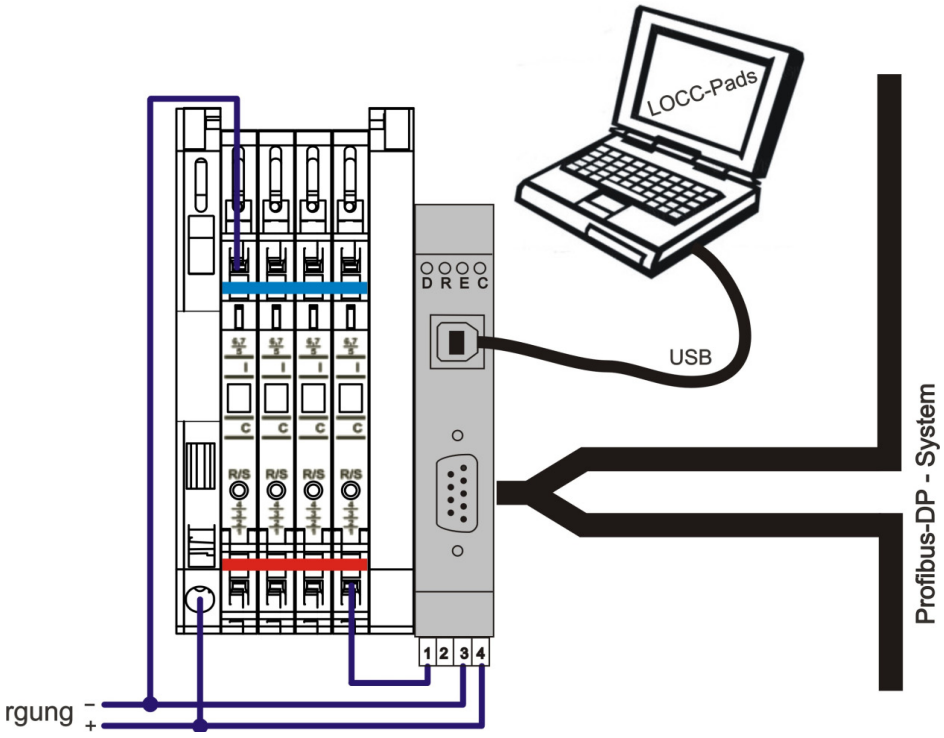
2.1.7 Mounting



2.2 Installation

2.2.1 Structure in principle

1. Provide the gateway and all LOCC-Box-Net modules with power supply DC 12/24V
2. Connect all “COM”-terminals of the modules with “Com”-terminal (1) of the gateway.
   For this the jumper combs, indicated in the accessories, are suitable. Here represented in red. See section 5 accessories.
3. Connect the USB cable to the USB-port of the PC. Use the delivered USB-cable for a communication with the LOCC-Pads software. For a communication via Profibus plug the field bus cable in port 1.
4. For addressing the gateway use the BCD-rotary switch.



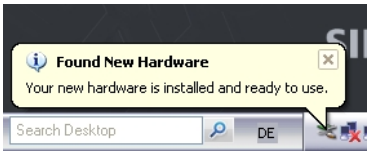
2.2.2 Connection to USB

NOTICE

Please install the current version of LOCC-Pads. The device driver will be copy in the windows system folder.

Connect the Gateway to the computer by using the provided USB cable.
At the initial connection, the Gateway will find a new Hardware ***USB Serial Port*** and the ***Found new Hardware wizard*** will prompt.

Please choose ***Install the software automatically*** and confirm by clicking ***Next***. Follow the instructions of the wizard, which searches and installs the driver.



2.3 Communication via USB

See user manual „LOCC_Box-Net_x.xx_HB_EN“.

2.4 Communication via Profibus-DP

Profibus-DP is a field bus protocol for the industrial process automation. Profibus-DO uses a multiple Master and Slave Structure with a cyclic communication.

2.4.1 Terms and Definitions

Bussegment	Over repeater connected Segments (max. 32 participant per segment)
Check Config	Configuration telegram
DA	Destination Address
Data	Data telegram
DP	Decentral peripherie
DP-Slave	Decentral device with a direct interface to the input- and output signals
DP-V0	cyclic data exchange and diagnosis
DP-V1	acyclic data exchange and diagnosis
DP-V2	isochronous data exchange, Slave-cross traffic and time synchronisation
DSAP	Destination Service Access Point
DU	Data Unit (net data, range 1…244 bytes / telegram)
ED	End Delimiter (16_h)
FCS	Frame Check Sequence
FDL	Field-bus Data Link
GSD	Device-data
HSA	Highest station address
LE	Length of the net dates, (incl. DA, SA, FC, DSAP, SSAP)
LEr	Repetition of the net dates length
Multicast-Telegr.	Telegram for certain participants
PDU	Protocol Data Unit
PNO	PROFIBUS user organisation
Repeater	Signal refreshing by connecting of different Bus-segments
Repeat Request	Repetition of the requirement telegram

Request	Request telegram
Response	Response telegram
SA	Source Address
SAP	Service Access Point
SSAP	Source Service Access Point
SD	Start Delimiter
SDA	Send Data with Acknowledge
SDN	Send Data with No acknowledge
DSAP	Destination Service Access Points
UDINT	unsigned double word integer (4 Byte)
UINT	unsigned integer (2 Byte)
USINT	unsigned short integer (1 Byte)

2.4.2 Description files

The GSD is necessary for a gateway operation. It is included in the free download files LOCC-Pads_xxxx.zip from the Lütze website. Use the version 5.1 or higher.

Description: LOCC0DCD.gsd.

2.4.3 Profibus-DP interface

The connection is done via the 9pole D-Sub-socket at the front side of the gateway. For connection only use commercial Profibus plugs.

On the Profibus-DP the gateway behaves like a modular device with max. 84 slots, up to 84 state or state/mode modules can be connected (module = LOCC-Box-Net).

2.4.4 Overview LOCC-Box-Net Modules

Art.-No.	**Name**	**Type**	**Adjustment** *Current range / Characteristic*	**Parameterization** *Properties*
716410	LOCC-Box-Net	1	Rotary switch	LOCC-Pads
716410.0050	LOCC-Box-Net	1	Rotary switch	LOCC-Pads
716411	LOCC-Box-Net	3	Software	LOCC-Pads, Profibus

2.4.5 Baudrates

All devices in a profibus-dp network work with a consistent baudrate. The baudrate is predefined by the PLC. The gateway recognizes the set baudrate automatically.
The maximum permissible cable length regarding the baudrate must be followed. An extension of the cable is possible by using a repeater.

	Baud rate									
Transfer speed, kBit/s	9,6	19,2	45,45	93,75	187,5	500	1500	3000	6000	12000
Lengths of wire, m	1200	1200	1200	1200	1000	400	200	100	100	100

2.4.6 Profibus-DP-V1 DS_Read (Overview of instructions)

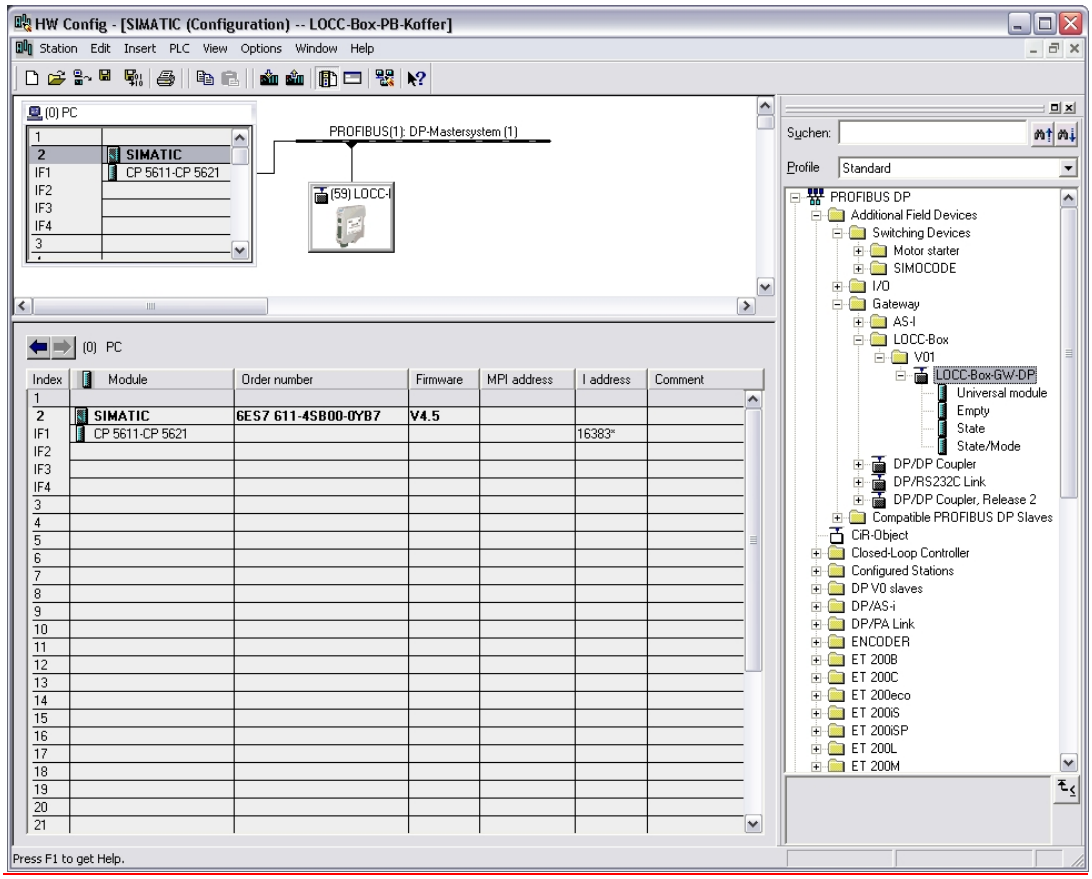
All information which exceed the general module state of each LOCC-Box can be requested via the Profibus-DP-V1-service "DS_Read".
Via the input-address the LOCC-BOX which should be requested can be addressed.
The required data will be represent by an index. See the table below.

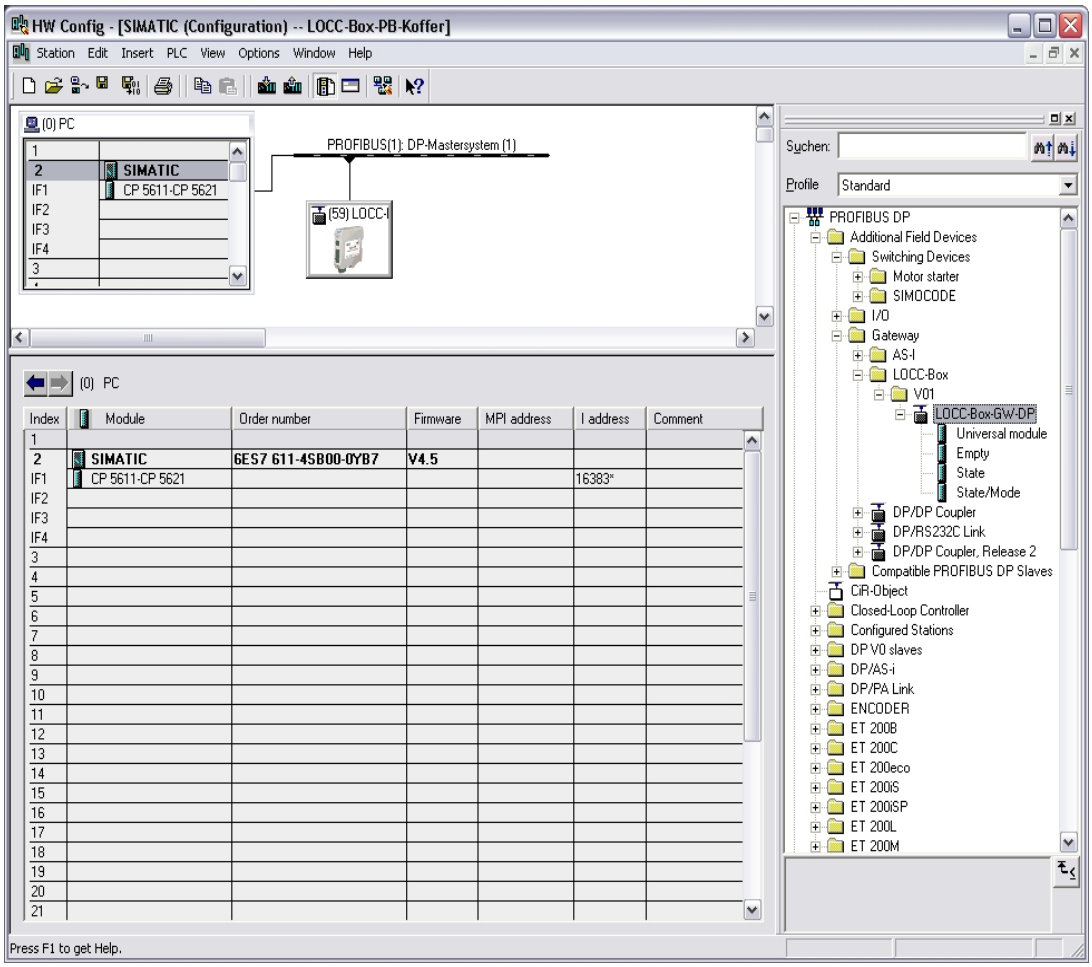
Index	**Name**	**Data type**	**R/W** *Typ 1* *Typ3*		**Example in chapter**
00_h	Module type	USINT	r		2.4.10.1
10_h	Module status	USINT	r		2.4.10.2
11_h	Module configuration	USINT	r		2.4.10.3
20_h	Output voltage	UINT	r		2.4.10.4
21_h	Input voltage	UINT	r		2.4.10.5
24_h	Current measurement	UINT	r		2.4.10.6
$2A_h$	Characteristic adjustment	UINT	r		2.4.10.7
30_h	Software version	UDINT	r		2.4.10.8
31_h	Serial number	UDINT	r		2.4.10.9
32_h	LOCC-Box counter “Operation voltage ON“	UDINT	r		2.4.10.10
33_h	LOCC-Box counter “Operation hour (h)“	UDINT	r		2.4.10.11
34_h	LOCC-Box counter “Operation hour ON (h)“	UDINT	r		2.4.10.12
35_h	LOCC-Box counter “Blown“	UDINT	r		2.4.10.13
36_h	LOCC-Box counter “Switch on“	UDINT	r		2.4.10.14
38_h	LOCC-Box adjustment	USINT	r/w		2.4.10.15
39_h	Adjustment current range	USINT	r	r/w	2.4.10.16
$3A_h$	Adjustment characteristic	USINT	r	r/w	2.4.10.17
80_h	Reset and automatic assigning of node number	USINT	w		2.4.10.18

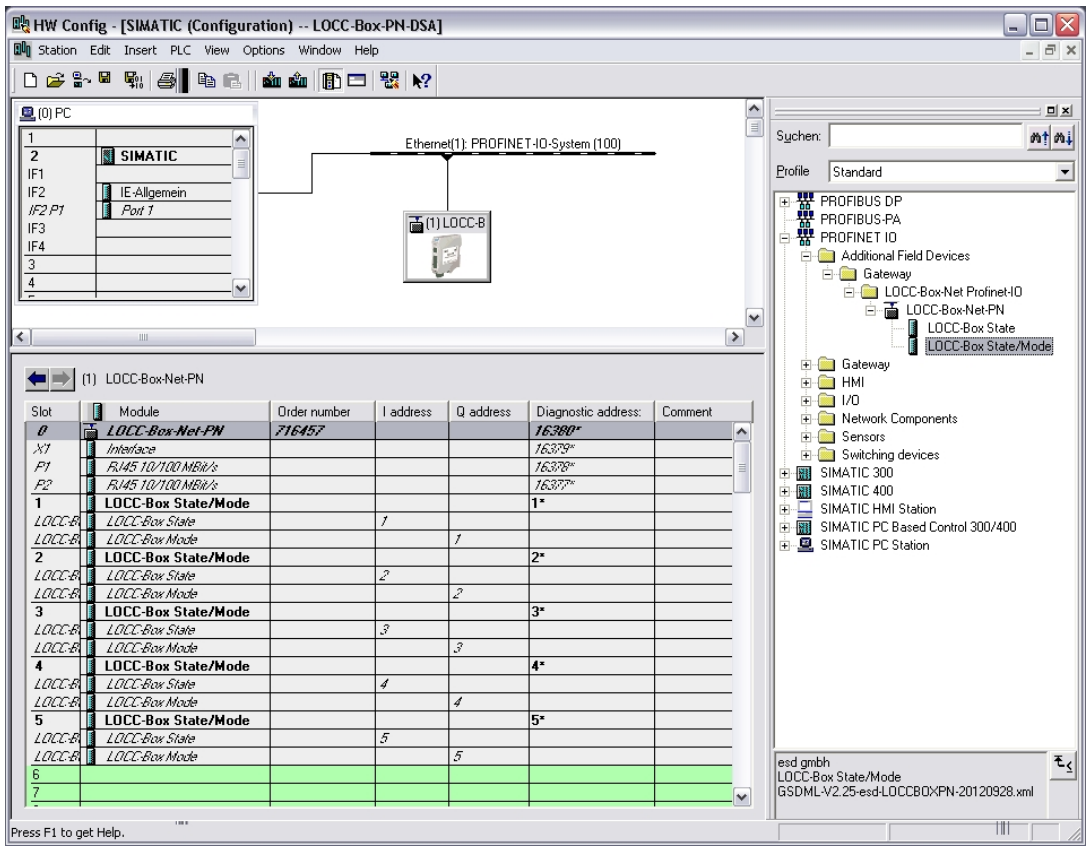
81$_h$	Request „Status node number“	UINT	r	2.4.10.19
82$_h$	Reset und manual assigning of node number	USINT	w	2.4.10.20
88$_h$	*Identification - „Hello-function“*	USINT	w	2.4.10.21

ro = read only

2.4.7 Configuration in step7



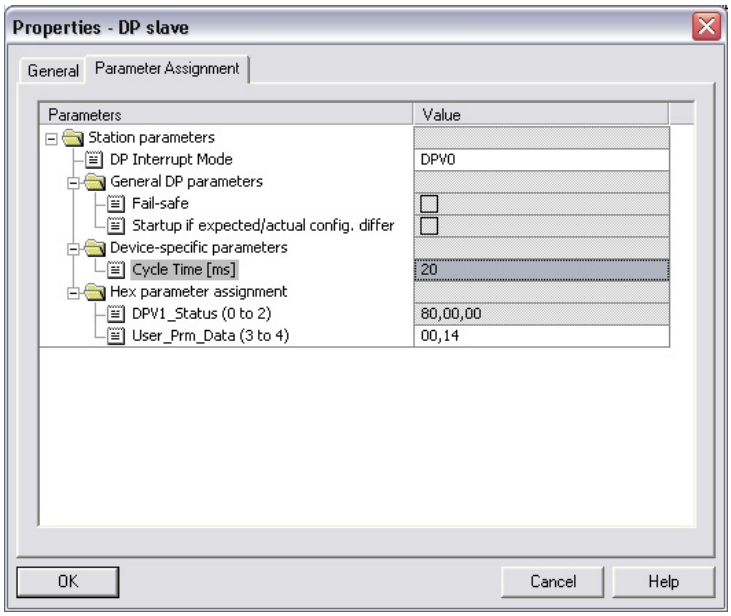

HW Config - [SIMATIC (Configuration) -- LOCC-Box-PB-Koffer]
Station Edit Insert PLC View Options Window Help
(0) PC
SIMATIC
CP 5611-CP 5621
PROFIBUS(1): DP-Mastersystem (1)
(59) LOCC-I
(0) PC
Index Module Order number Firmware MPI address I address Comment
SIMATIC 6ES7 611-4SB00-0YB7 V4.5
CP 5611-CP 5621 16383*
Suchen:
Profile Standard
PROFIBUS DP
Additional Field Devices
Switching Devices
Motor starter
SIMOCODE
I/O
Gateway
AS-I
LOCC-Box
V01
LOCC-Box-GW-DP
Universal module
Empty
State
State/Mode
DP/DP Coupler
DP/RS232C Link
DP/DP Coupler, Release 2
Compatible PROFIBUS DP Slaves
CiR-Object
Closed-Loop Controller
Configured Stations
DP V0 slaves
DP/AS-i
DP/PA Link
ENCODER
ET 200B
ET 200C
ET 200eco
ET 200iS
ET 200iSP
ET 200L
ET 200M
Press F1 to get Help.


HW Config - [SIMATIC (Configuration) -- LOCC-Box-PN-DSA]
Station Edit Insert PLC View Options Window Help
(0) PC
SIMATIC
IE-Allgemein
Port 1
Ethernet(1): PROFINET-IO-System (100)
(1) LOCC-B
(1) LOCC-Box-Net-PN
Slot Module Order number I address Q address Diagnostic address: Comment
0 LOCC-Box-Net-PN 716457 16380*
X1 Interface 16379*
P1 RJ45 10/100 MBit/s 16378*
P2 RJ45 10/100 MBit/s 16377*
1 LOCC-Box State/Mode 1*
2 LOCC-Box State/Mode 2*
3 LOCC-Box State/Mode 3*
4 LOCC-Box State/Mode 4*
5 LOCC-Box State/Mode 5*
Suchen:
Profile Standard
PROFIBUS DP
PROFIBUS-PA
PROFINET IO
Additional Field Devices
Gateway
LOCC-Box-Net Profinet-IO
LOCC-Box-Net-PN
LOCC-Box State
LOCC-Box State/Mode
Gateway
HMI
I/O
Network Components
Sensors
Switching devices
SIMATIC 300
SIMATIC 400
SIMATIC HMI Station
SIMATIC PC Based Control 300/400
SIMATIC PC Station
esd gmbh
LOCC-Box State/Mode
GSDML-V2.25-esd-LOCCBOXPN-20120928.xml
Press F1 to get Help.

This picture shows the implementation of LOCC-Box gateway and LOCC-Box-Net module. The Slot number is the same like the node number of the LOCC-Box. The input- and output address is free selectable.

~~2.4.7~~2.4.8 Parametrization

By double clicking on the gateway the window "Properties DP Slave" appears.
Settings regarding the Profibus interface, identifier and parameter like the cycle time can be made. The cycle time describes the request time of the single LOCC-Boxes. The cycle time can be set from 20 to 65535 ms. In the example below a cycle time of 20 ms is set.



~~2.4.8~~2.4.9 Process Image

The number of the slot corresponds to the node number of the connected LOCC-Box-Net. The number cannot be set separately. For addressing the input and output addresses are used.

For the LOCC_Box Net 4 assemblies are available:

1. State: - has only 1 input byte
   - can only read process data

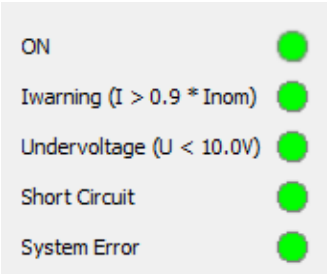
2. State / Mode: - has 1 input and 1 output byte
   - can read and write process data

3. Universal module: - serves as a buffer

4. Empty: - serves as a buffer

~~2.4.8.1~~2.4.9.1 Input-byte

The input byte includes the module state information of the connected LOCC-Box. The module state is according to the information in LOCC-Pads respectively index 0x10 (*see chapter 2.4.10.2*).



7	6	5	4	3	2	1	0
System error	Short-circuit	Undervoltage U<10V	Iwarning (I>0,9 * Inom)	New module on bus	Reserve	Status	

~~2.4.8.2~~2.4.9.2 Output-byte

The output byte supports the 2 last signification bits and is used for switching the LOCC-Box on and off.

Bit 0: = 0: connected LOCC-Box will be switched off
= 1: connected LOCC-Box will be switched on

Bit 1: edge from 0 to 1: The status of bit 0 is transferred in the connected LOCC-Box.

7	6	5	4	3	2	1	0
-	-	-	-	-	-	Rising edge = take over	New status

NOTICE

All data are transferred in Hex-format.
By sending “00” and afterwards “03” the LOCC-Box is switched on.
By sending “00” and afterwards “02” the LOCC-Box is switched off.

~~2.4.9~~2.4.10 Example for the used instructions

~~2.4.9.1~~2.4.10.1 Module type (00_h)

Index	Name	Data type	R/W *type 1* *type 3*	Default
00_h	*Module type*	USINT	r	-

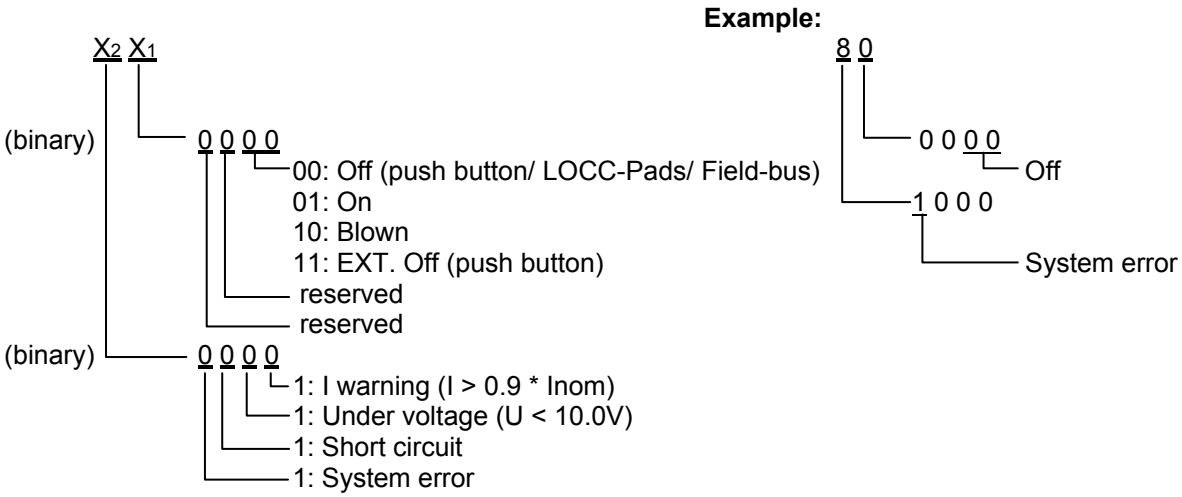
The value of *Module type* interprets the module version: type 1 = 716410
type 3 = 716411

Example: The read out value is converted into a decimal value. 00 00 00 01_h = 1_d → type 1

~~2.4.9.2~~2.4.10.2 Module status (10_h)

Index	Name	Data type	R/W *type 1* *type 3*	Default
10_h	*Module status*	USINT	r	00 – delivery state

The read out value returns the module status and is converted into a binary value.



Result: Module is switched off by the push button, LOCC-Pads or the PLC signalizes a system error.

~~2.4.9.3~~2.4.10.3 Module configuration (11_h)

Index	Name	Data type	R/W *type 1* *type 3*	Default
11_h	*Module configuration*	USINT	r	1,1 - delivery state

The value of the module configuration returns the adjustment of the current range or of the characteristic (rotary-switch).
The read out value from the upper 4-bit and lower 4-bit is converted into a decimal value.

Y2 Y1
Y1 = Decimal value 0-9 = current range 1-10A
Y2 = Decimal value 0-9 = characteristic 1-10

Example:

1 5
5 = decimal = 5 = current range 5A
1 = decimal = 1 = characteristic 1

~~2.4.9.4~~2.4.10.4 Output voltage (20_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
20_h	*Output voltage*	UINT	r	-

The value contains the amount of the applied output voltage.

The read out value is converted into a decimal value. The max measuring value is 1024 and corresponds to 39 V. The following equation results:

$$\text{Output voltage} = \frac{\textit{Decimal value} \times 39V}{1024}$$

Example:

00 00 02 $9C_h$ = decimal = 668

$$\text{Output voltage} = \frac{668 \times 39V}{1024} = 25{,}44V$$

~~2.4.9.5~~2.4.10.5 Input voltage (21_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
21_h	*Input voltage*	UINT	r	-

The value contains the amount of the applied input voltage.

The read out value is converted into a decimal value. The max measuring value is 1024 and corresponds to 39 V. The following equation results:

$$\text{Input voltage} = \frac{\textit{Decimal value}\ 39V}{1024}$$

Example:

00 00 02 98_h = decimal = 664

$$\text{Input voltage} = \frac{664 \times 39V}{1024} = 25{,}29V$$

~~2.4.9.6~~2.4.10.6 Current Measurement (24_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
24_h	*Current measurement*	UINT	r	-

The value contains the amount of the flowing current.

The read out value is converted into a decimal value. The max measuring value is 1024 and corresponds to 32,75A.
The following equation results:

$$\text{Current} = \frac{\textit{Decimal value} \times 32{,}75A}{1024}$$

Example:

00 00 00 $1F_h$ = decimal = 31

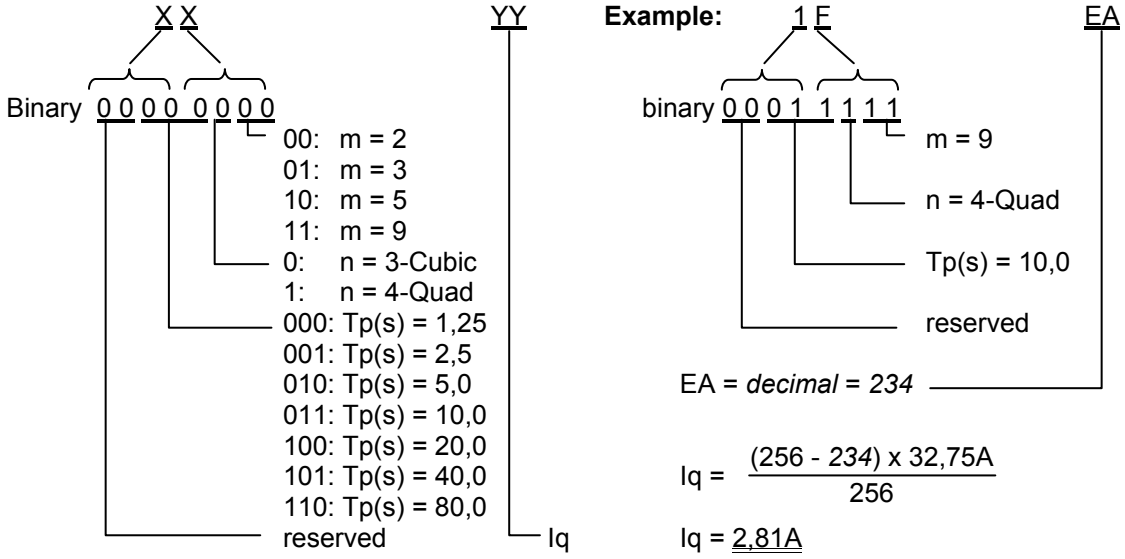
C $\quad \frac{31 \times 32{,}75A}{1024}$

Current = = 0,99A

2.4.9.72.4.10.7 Characteristic adjustment ($2A_h$)

Index	Name	Data type	R/W *type 1 type 3*	Default
$2A_h$	*Characteristic adjustment*	UINT	r	-

This object returns the current parameters of the characteristic adjusted.



Convert into *decimal value.* The max measuring value is 256 and corresponds to 32,75A.
The following rule of three results:

$$Iq = \frac{(256 - \text{Decimal value}) \times 32{,}75A}{256}$$

2.4.9.82.4.10.8 Software Version (30_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
30_h	*Software version*	UDINT	r	-

This object returns the software version of the LOCC-Box.

The read out value is converted into a decimal value.

Example: 00 00 00 15_h = 1.5

2.4.9.92.4.10.9 Serial Number (31_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
31_h	*Serial number*	UDINT	r	-

This object returns the serial number of the LOCC-Box. The read out value is converted into a decimal value.

Example: 00 01 E1 EF_h = decimal = 123375

~~2.4.9.10~~2.4.10.10 LOCC-Box counter “Operating voltage ON“ (32_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
32_h	*LOCC-Box counter “Operating voltage ON“*	UDINT	r	-

This object returns the count how many times the module has been connected to the supply voltage.

The read out value is converted into a decimal value.

Example: 00 00 01 $0C_h$ = decimal = 268

~~2.4.9.11~~2.4.10.11 LOCC-Box Counter “Operating hours (h)” (33_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
33_h	*LOCC-Box Counter “Operating hours (h)”*	UDINT	r	-

This object returns the number of the operating hours in ½ hour cycle, this means how long the LOCC-Box is connected to the supply voltage. The read out value is converted into a decimal value.

Example: 00 00 01 60_h = decimal / 2 = 176h

~~2.4.9.12~~2.4.10.12 LOCC-Box counter “Operating hours ON (h)“ (34_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
34_h	*LOCC-Box counter “Operating hours ON (h)“*	UDINT	r	-

This object returns the number of the operating hours ON in ½ hour cycle, this means how long the LOCC-Box has been switched on and how long it has supplied the load. The read out value is converted into a decimal value.

Example: 00 00 08 FB_h = decimal / 2 = 1149.5h

~~2.4.9.13~~2.4.10.13 LOCC-Box counter “Blown” (35_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
35_h	*LOCC-Box counter “Blown”*	UDINT	r	-

This object returns the information how many times the LOCC-Box has blown because of overload or short circuit. The read out value is converted into a decimal value.

Example: 00 00 00 28_h = decimal = 40

~~2.4.9.14~~2.4.10.14 LOCC-Box Counter “Switch on” (36_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
36_h	*LOCC-Box Counter “Switch on”*	UDINT	r	-

This object returns the information how many times the LOCC-Box has been switched on. The read out value is converted into a decimal value.

Example: 00 00 00 $2C_h$ = decimal = 44

~~2.4.9.15~~2.4.10.15 LOCC-Box adjustment (38_h)

Index	Name	Data type	R/W *type 1 type 3*	Default
38_h	*LOCC-Box adjustment*	USINT	r/w	0000 0001$_b$

NOTICE

Wrong settings can cause incorrect functions of the LOCC-Box-Net.
With the index the parameterization of indication outputs, remote inputs and the - switch on behavior are possible.The same settings can be done with LOCC-Pads.

~~2.4.9.16~~2.4.10.16 Adjustment Current range, (I) (39_h)

Index	Name	Data type	R/W *Typ1*	R/W *Typ3*	Default
39_h	*Adjustment Current range, (I)*	USINT	r	r/w	1 – delivery state

The index is for setting the current range of type 3. The type 3 has no rotary switches and can only be parameterized via the bus and the LOCC-Pads.

Decimal value 1-10 = current range 1-10 A

~~2.4.9.17~~2.4.10.17 Adjustment characteristic, (C) ($3A_h$)

Index	Name	Data type	R/W *Typ1*	R/W *Typ3*	Default
$3A_h$	*Adjustment characteristic, (I)*	USINT	r	r/w	1 – delivery state

The index is for setting the characteristic of type 3. The type 3 has no rotary switches and can only be parameterized via the bus and the LOCC-Pads.

Decimal value 1-10 = characteristic 1-10

~~2.4.9.18~~2.4.10.18 Reset and automatic assigning of node number (80_h)

Index	Name	Datentyp	R/W *Typ1* *Typ3*	Default
80_h	*Reset and automatic assigning of node number*	USINT	w	-

NOTICE

Wrong settings can cause incorrect functions of the LOCC-Box-Net.

The index does a reset of all existing node numbers (>0) which are on the LOCC bus, afterwards the assigning of the node numbers restarts automatically.
During the automatic node number assignment the LOCC-Box modules are blinking. By pushing the device button the chosen module will be assigned with the smallest node number (1). The blinking will stop. The blinking of the other modules continues and the next node number 2 can be assigned. The procedure must be repeated till all modules stop blinking.
The procedure cannot be stopped till all modules have a node number.
The activation is done by writing an integer value >0.

~~2.4.9.19~~2.4.10.19 Request „Status node number“ (81_h)

Index	Name	Data type	R/W *Typ1* *Typ3*	Default
81_h	*Request „Status node number“*	UINT	r	-

For analysing the LOCC bus in conjunction with index 82h. Shows how many modules have a node number >0 after a reset or if any module has the node number 0.
If a LOCC-Box Net is added with the node number 0 for example, with this index the module can be requested.
2 Bytes will be requested which are interpreted as follows:

XX YY

- YY: Number of modules with a valid node number (>0)
- XX: 00: Modules with invalid node number (=0)
  01: All modules gave a valid node number (>0)

Example:

Read bytes: 01 07

- 07: 7 modules on the bus
- 01: Valid node number

~~2.4.9.20~~2.4.10.20 Reset und manual assigning of node number (82_h)

Index	Name	Data type	R/W *Typ1 Typ3*	Default
82_h	*Reset und manual assigning of node number*	USINT	w	-

NOTICE

Wrong settings can cause incorrect functions of the LOCC-Box-Net.

The index is used for a manually assignment of the node number form 1 to 84.

Procedure:

- By writing a "0" all connected LOCC-Box-Net modules are set to the delivery state – node number=0.
  This state can be checked by reading the index 81h. The value is 00 00h in this moment.

- By writing a "1" the node number 1 will be assigned. All modules with the node number "0" are blinking.
  The module which button is pressed will be assigned by the number. The reading of the index 81 will result the value 00 01h for example.

- By writing a "2" the node number 2 will be assigned. All modules with the node number "0" are blinking.
  The module which button is pressed will be assigned by the number. The reading of the index 81 will result the value 00 02h for example.

- By writing a "3" the node number 3 will be assigned. All modules with the node number "0" are blinking.
  The module which button is pressed will be assigned by the number. The reading of the index 81 will result the value 00 03h for example.

...

If all node numbers are assigned the index 81 h result the value 01 07h for example. (01= all modules have a valid node number, 07= 7 modules are existing)

NOTICE

A module can be assigned by two node numbers. If a node number assignment starts, but no button is pressed, the assignment will be canceled after 1 minute or the assignment is overwritten by another command.

~~2.4.9.21~~2.4.10.21 Identification - „Hello-function“ (88_h)

Index	Name	Data type	R/W *Typ1 Typ3*	Default
88_h	*Identification - „Hello-function“*	USINT	w	-

NOTICE During this function the communication via the LOCC-Bus is interrupted. The LOCC-Box Net is still running.

The index visualizes a defined module. After the start the module is blinking for a defined time of approx. 10 s.
This procedure can be canceled by pressing the device button.

By writing an integer value >0 for the corresponding output address the activation is done.

~~2.4.10~~2.4.11 Function Block SFB-52 (read)

Programming example for S7:

```
CALL     "RDREC" , DB2        // SFB52
REQ      :=DB2.DBX0.0         // REQ = 1: Dataset transfer
ID       :=DW#16#0            // Input address of the LOCC-Box
INDEX    :=MW4                // Index
MLEN     :=4                  // maximum length of the reading data (in bytes)
VALID    :=DB2.DBX10.0        // the read data are valid
BUSY     :=DB2.DBX10.1        // the function did not receive any data
ERROR    :=DB2.DBX10.2        // an error occurred
STATUS   :=DB2.DBD12          // error number, in case of an error
LEN      :=DB2.DBW16          // number of read bytes
RECORD   :=P#M 50.0 BYTE 4    // return data
```

~~2.4.11~~2.4.12 Function block SFB-53 (write)

Programming example for S7:

```
CALL     „WRREC“ , DB2        // SFB53
REQ      :=DB3.DBX0.0         // REQ = 1: Dataset transfer
ID       :=DW#16#0            // Output address of the LOCC-Box
INDEX    :=MW4                // Index
LEN      :=1                  // maximum length of the writing data (in bytes)
BUSY     :=DB2.DBX10.1        // BUSY=1,  the writing process is not done
ERROR    :=DB2.DBX10.2        // ERROR=1, an error occurred during the writing process
STATUS   :=DB2.DBD12          // function block status / error information
RECORD   :=P#M 60.0 BYTE1     // data are entered here
```

2.5 Technical Data

General Data

Rated voltage	DC 12/24V
Operation voltage	DC 10 – 32V
Rated current	max. 120mA
Polarity protection	yes
Housing material	PA 6.6 (UL 94 V0)
Mounting	snap on TS 35 (according to EN 50022)
Protection level	IP 20
Mounting position	any
Termination	spring terminal 0,25mm^2 – 2,5mm^2 all types of wire up to 2,5mm² without end sleeve up to 1,5mm² with end sleeve
USB	USB 2.0 Full-Speed (12 Mbit/s)
Profinet	100 Mbit/s
Operation temperature	-20°C to +60°C
Store temperature	-40°C to +85°C
Relative humidity	max. 90%, without condensation
Dimension (WxHxD)	22,5 x 99 x 114,5mm
Weight	0,130 kg
Approval	CE
Standards	EN 60950-1; EN61131-1,2; EN 60947-4-1; EN 50081

LOCC-BUS

Access method	Single-Master - Multiple Slave
Bus technology	line
Physical level	1-wire
Subscriber	typical 40, max. 84
Bus length	typical 10m, max. 40m
Transfer rate	9600 Baud
Data rate	8 Bit + fixed parity
Transmission-protocol	Modified Multidrop

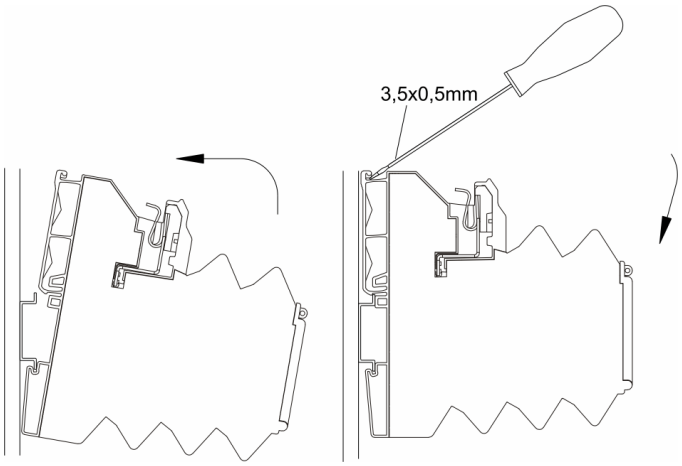
3 Exchanging LOCC-Box-Net without LOCC-Pads

Exchanging the LOCC-Box with an existing configuration is possible without LOCC-Pads.

Requirement:

- It is only possible to change one module at a time.
- The new module has to be in the default setting. It has to have the node number 0.
- Profibus communication must be existing.

1. Start the communication.
2. Remove the jumper combs. Slide back the contact at connection 7.
3. Remove the module as shown in the picture.



4. Set the current value (I) and the characteristic (C) with the rotary switches on the new module.
5. Snap on the module – see picture
6. Close the sliding contact and reinstall the jumper combs.
7. The new LOCC-Box is blinking. Press the on/off switch within one minute; otherwise the module does not get a node number. If missing the time, remove the module and reinstall it again.

   NOTICE During that time, no communication is possible.

8. Switch the LOCC-Box Off and On again, otherwise the current and characteristic settings are not active

4 Firmware update

4.1 Introduction

Because of further developments of the LOCC-Box-Net family updates are possible. The description is valid for the module 716458 (Profibus-DP).

4.2 Download

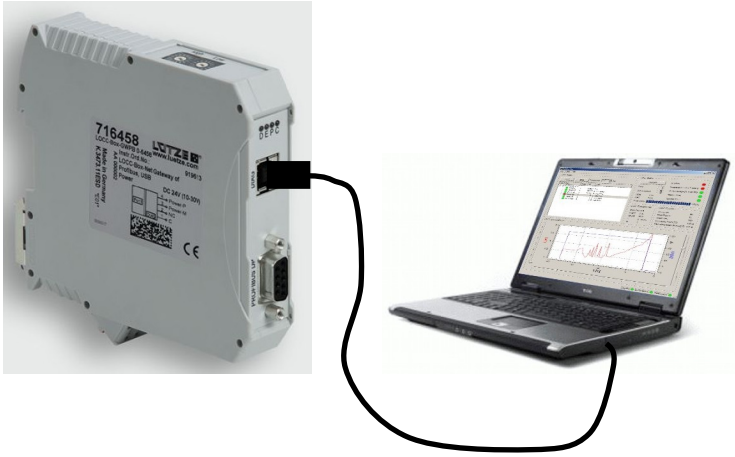
Please use for this update the newest version of the software package “LOCC-Pads”. After registration you can download the update from the Lütze website www.luetze.com/downloads/software-interface

Download the file *LOCC-Pads_x.x.x.x.zip* and save it in any directory and unzip the files.

The folder “Gateway Firmware“ includes~~s~~ all files .

4.3 Installation

1. Connect the “DIAG” terminal from the gateway with your PC. Use the delivered USB-cable.
2. Provide the gateway with DC 12/24V power.
3. The gateway will be detected as new Hardware. An automatic installation will start.
4. If a problem occurs than read chapter 4.5 “New hardware installation”



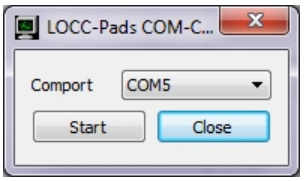
4.4 Update

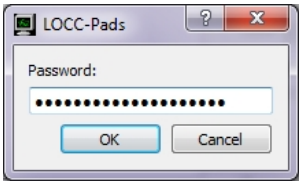
During an update proceed as follows:

1. Double click on the LOCC-Pads symbol on the desktop to start the Software LOCC-Pads. Or start the Software by clicking Start>Programs>LOCC-Pads>LOCC-Pads.
   LOCC-Pads starts in an inactive status.

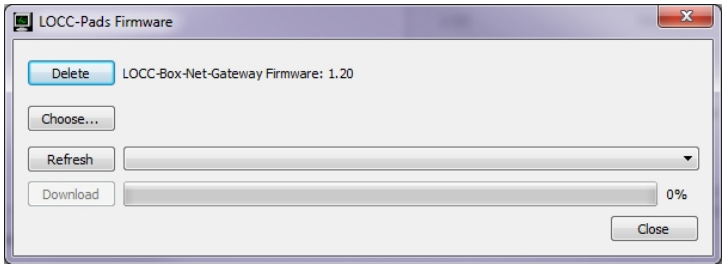
2. Choose the menu Extra>COM Settings and choose the regarding comport.

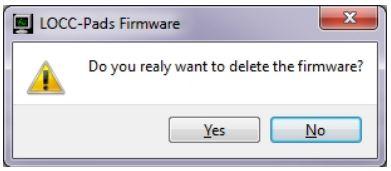
3. Choose the menu Extra > Firmware download. The field for the password appears. Password: "Luetze71384Weinstadt".
   Confirm by clicking “OK“.





4. The window LOCC-Pads Firmware appears. The current version of LOCC-Pads will be displayed. Compare the version to the downloaded version. If both have the same version, close the window by clicking "Close". If the downloaded file has a higher version, choose Delete. An alert window prompts. Confirm by clicking "Yes". The deletion can take about 1 minute.





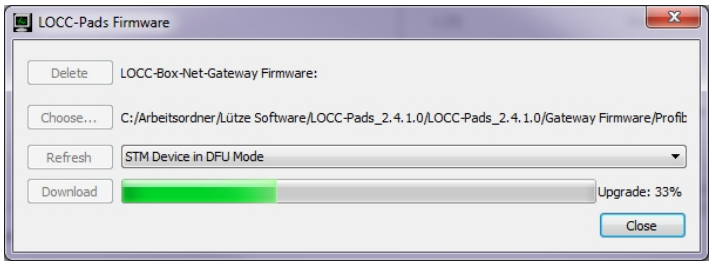
5. Close LOCC Pads interrupt the power supply for about 5 s and disconnect the USB Cable from the gateway.

6. If connecting the gateway again it might be that the gateway will be recognized as new hardware. Read chapter 4.5 "Installing new hardware", otherwise proceed with 7.

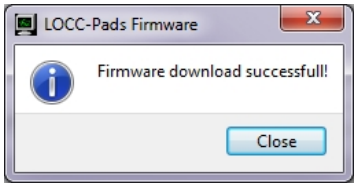
7. Restart LOCC Pads and open the LOCC-Pads Firmware window (see 4.)

8. Click "Choose..." to choose the new firmware file. LOCCDPxxx.dfu
   The firmware can be found in the unzipped LOCC-Pads_x.x.x.x.zip file. Folder: Gateway>Firmware>Profibus

9. Click "Refresh" to get the device driver of the used microcontroller (STM Device in DFU Mode).



10. Click "Download" to start the update. After the download an alert message will prompt.



11. Close LOCC-Pads again and interrupt the supply for 5 s and disconnect the USB Cable from the gateway.

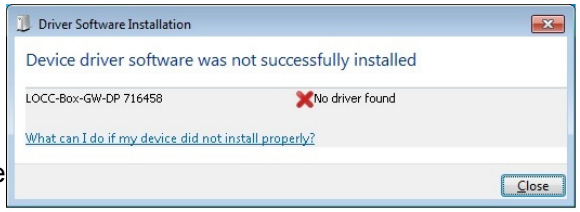
12. The Gateway has the newest firmware version and can be used without limitation.

NOTICE

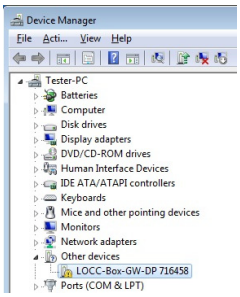
After supplying the gateway and connecting it to the USB cable it will be recognized as "LOCC-Box-GW-DP 716458" but the device driver will not be installed automatically. Read chapter 4.5 "New Hardware".

4.5 New hardware installation

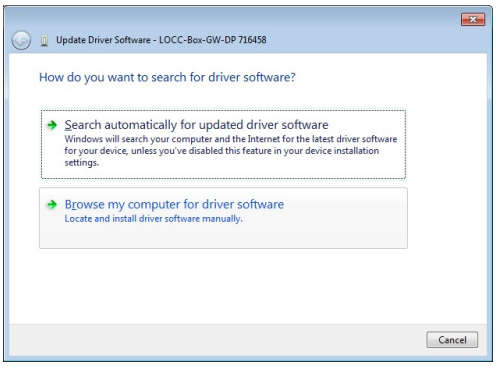
1. After supplying the gateway it will be recognized driver will not be installed automatically.



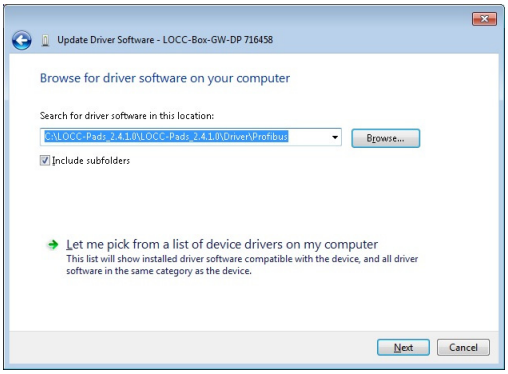
2. The hardware is displayed in the device manage click on "USB Serial Port" and choose "Updating Driver Software".



3. In the following window click " Searching for driver software on the computer".

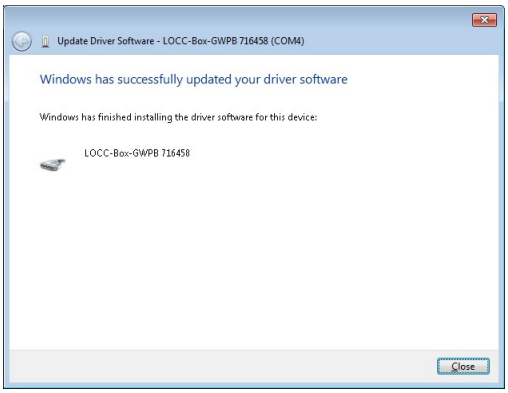


4. Click "Browse" and choose the in the LOCC-Pads zip file the folder Driver>Profinet. Confirm by clicking "Next". Confirm the alert window.



5. Confirm the successful installation by clicking "Close".

   The installation is done.



5 Accessories

For the LOCC-Box-Net we offer a wide range of accessories:

Accessories	Part.-no.	Type	PU
Module			
Supply terminal with cut out of the copper bar for current increase	716421	LOCC-Box-EKL 7-6421	2
Distance terminal without contacts	716422	LOCC-Box-DKL 7-6422	2
LOCC-Box housing without terminals	716424	LOCC-Box-DY 7-6424	2
Supply set (supply- and end terminal)	716425	LOCC-Box-ES 7-6425	1
Gateway (USB, EtherCAT)	716456	LOCC-Box-GW-EC 0-6456	1
Gateway (USB, Profinet)	716457	LOCC-Box-GW-PN 0-6459	1
Gateway (USB, CANopen, RS232)	716459	LOCC-Box-GW 7-6459	1
Jumper combs			
Jumper comb 8pole, 6A, white	716428	LOCC-Box-BKW 7-6428	5
Jumper comb 8pole, 6A, red	716429	LOCC-Box-BKR 7-6429	5
Jumper comb 8pole, 6A, blue	716430	LOCC-Box-BKB 7-6430	5
Jumper comb 16pole, 6A, white	716438	LOCC-Box-BKW 7-6438	5
Jumper comb 16pole, 6A, red	716439	LOCC-Box-BKW 7-6439	5
Jumper comb 16pole, 6A, blue	716440	LOCC-Box-BKW 7-6440	5
Description plates			
Description plates 5x5mm , 200 pieces, white	716431	LOCC-Box-BZW 7-6431	1
Description plates 5x5mm , 200 pieces, red	716432	LOCC-Box-BZR 7-6432	1
Description plates 5x5mm , 200 pieces, blue	716433	LOCC-Box-BZB 7-6433	1
Description plates 5x5mm , 200 pieces, yellow	716434	LOCC-Box-BZG 7-6434	1
Description plates 12x6mm ,160 pieces, white	716441	LOCC-Box-BZW 7-6441	1
Description plates 39,3x8mm, white	716443	LOCC-Box-BZT 7-6443	20
Cover for 716443, transparent	716444	LOCC-Box-BAD 7-6444	20
A4 description sheet for 716443	716445	LOCC-Box-LEB 7-6445	240
Miscellaneous			
Copper bar 1m	716426	LOCC-Box-CU 7-6426	1
Cover for copper bar 1m	716427	LOCC-Box-AD 7-6427	1

Scope of the document

The gateways may include software licensed by 3rd parties. The following third party intellectual property (IP) notices are provided to comply with the terms of such licenses.

Lütze Gateway 716459 Firmware

The firmware of the Gateway uses the FreeRTOSTM operating system which is developed under the terms of the GPL. As a special exception to the GPL, the copyright holder of FreeRTOS gives the permission to link FreeRTOS with independent modules that communicate with FreeRTOS solely through the FreeRTOS API interface, regardless of the license terms of these independent modules, and to copy and distribute the resulting combined work without being obliged to provide the source code of these proprietary modules. See the licensing section of h ttp://www.freeRTOS.org for full details.

1) Windows, Windows 2000, Windows XP und Windows Vista are registered trademarks of the Microsoft Corporation.

2) Program is based in part on the work of the Qwt project (http://qwt.sf.net).