Table of contents chapter 1:

1. Characteristics of the Lumberg e2c-system ................................................................. 2
2. The e2c-components ....................................................................................................... 3
   2.1 The e2c-Backplane .................................................................................................. 3
   2.2 The e2c-PlugBox .................................................................................................... 4
   2.3 The e2c BusHead .................................................................................................... 5
   2.4 The e2c I/O modules .............................................................................................. 6
   2.5 The e2c-accessories .............................................................................................. 8
3. The commissioning of an e2c system (independent of bus) ............................................. 10
   3.1 Self-configuration of the BusHead .......................................................................... 10
   3.1.1 Example of a Profibus projectioning with Siemens Step 7 .................................. 11
   3.2 Configuration of the BusHead by means of the Lumberg CoDi-software ............... 14
1. **Characteristics of the Lumberg e2c-system**

The e2c system is a modular periphery unit for the decentralized application in rough industrial surroundings. It is especially suitable for locations with a high I/O concentration.

The e2c system offers protection class IP 67.

The modular fieldbus station e2c comprises a backplane used as assembly and contact unit. The backplane is offered in various designs: up to 4 I/O modules, up to 6 I/O modules and up to 8 I/O modules. The I/O modules can be combined arbitrarily. Further to that the e2c system comprises a connection module, the so-called plug box, a BusHead in the designs Profibus, Interbus and DeviceNet and the individual I/O modules.

The choice of the relevant fieldbus only depends on the BusHead and the PlugBox; the I/O-modules and the backplane are independent of the bus.
2. The e2c-components

The e2c components include the backplane, the plug box, the BusHead and the I/O modules not depending on a bus.

2.1 The e2c-Backplane

On the one hand the e2c backplane has the function of an assembly plate, on the other that of a contact unit. Being used as an assembly plate the backplane provides for the independence of the contact quality of the system from the location of the system. Further to that the backplane provides for the distribution of potential and communication; when doing so each module taps in parallel from the backplane, i.e. the modules make contact independently of each other.

The backplane is offered in various designs: up to 4, 6 or 8 I/O modules. The bore hole mass for the fastening of one backplane is compatible with the two other ones.

<table>
<thead>
<tr>
<th>Type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backplane 4-port</td>
<td>0941 UNC 010</td>
</tr>
<tr>
<td>Backplane 6-port</td>
<td>0941 UNC 020</td>
</tr>
<tr>
<td>Backplane 8-port</td>
<td>0941 UNC 030</td>
</tr>
</tbody>
</table>
2.2 The e2c-PlugBox

The e2c plug box modules are the electrical connecting units for the power supply and the bus signals. The plug box is also equipped with the status LED for the actor system supply. The PlugBox includes also the protection elements for overvoltage and wrong polarity. The numerous variants of the plug boxes for the different fieldbus systems can be found in the table below.

<table>
<thead>
<tr>
<th>Types for Profibus-DP</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PlugBox bus M23/power M23</td>
<td>0941 PNC 201</td>
</tr>
<tr>
<td>PlugBox bus M12/power 7/8&quot;</td>
<td>0941 PNC 101</td>
</tr>
<tr>
<td>PlugBox bus M12/power M23</td>
<td>0941 PNC 103</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types for interbus remote bus</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PlugBox bus M23/powerM23</td>
<td>0941 INC 201</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types for DeviceNet</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PlugBox bus 7/8&quot;/power 7/8&quot;</td>
<td>0941 DNC 301</td>
</tr>
<tr>
<td>PlugBox bus M12/power 7/8&quot;</td>
<td>0941 DNC 101</td>
</tr>
</tbody>
</table>
2.3 The e2c BusHead

The e2c BusHead – in conjunction with the PlugBox – is the fieldbus-specific element of the e2c system. The BusHead is the communication interface between the I/O modules being independent of the bus and the relevant fieldbus. It monitors and coordinates the communication tasks. The M12 connector, the serial interface of the BusHead, can be used for the configuration, control and diagnosis of the e2c system by means of the Lumberg e2c CoDi software.

<table>
<thead>
<tr>
<th>Type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BusHead Profibus</td>
<td>0940 PSL 001</td>
</tr>
<tr>
<td>BusHead Interbus</td>
<td>0940 ISL 001</td>
</tr>
<tr>
<td>BusHead DeviceNet</td>
<td>0940 DSL 001</td>
</tr>
</tbody>
</table>
2.4 The e2c I/O modules

The I/O modules of the e2c system which are independent of the bus provide for the coupling to the periphery connected. Up to 8 I/O modules can be placed on the backplane in arbitrary combination. Each module is capable of performing a diagnosis and can therefore report periphery errors. An applying diagnosis is indicated visually by the active/error LED found on each I/O module on the top of the face. In addition this diagnostic information is also transmitted via the fieldbus; therefore this diagnosis can also be evaluated by the user via the software. The individual I/O modules are provided with a status LED for each channel indicating the status of both, input and output. Thus it is possible to alter the parameters of the individual I/O modules via the Lumberg e2c CoDi software.
## Digital input modules

<table>
<thead>
<tr>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 I digital type 2, sensor connection M12, general diagnosis</td>
<td>0942 UEM 011</td>
</tr>
<tr>
<td>8 I digital type 2, sensor connection M12, general diagnosis</td>
<td>0942 UEM 012</td>
</tr>
<tr>
<td>8 I digital type 2, M23 interface 12pol., for connection to distribution boxes</td>
<td>0942 UEM 014</td>
</tr>
</tbody>
</table>

## Digital output modules

<table>
<thead>
<tr>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 O digital 2 A, actor connection M12, individual diagnosis</td>
<td>0942 UEM 021</td>
</tr>
<tr>
<td>8 O digital 0.5 A, actor connection M12, individual diagnosis</td>
<td>0942 UEM 022</td>
</tr>
<tr>
<td>8 O digital 0.5 A, M23 interface 12pol., for connection to distribution boxes individual diagnosis</td>
<td>0942 UEM 027</td>
</tr>
</tbody>
</table>

## Option

<table>
<thead>
<tr>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoverBox, used to seal free backplane slots</td>
<td>0941 UNC 100</td>
</tr>
</tbody>
</table>
2.5 The e2c-accessories

The connection cable between the service interface on the BusHead and the COM interface of the PC has a standard M12 connector (e.g. Lumberg type RSC 4/7) on the side to the BusHead and a 9-pin SUB-D socket on the side to the serial interface of the PC. The connecting cable for the parallel interface comprises a flat cable with connectors for the LPT-PC interface and a connector for the BusHead contact.

<table>
<thead>
<tr>
<th>Type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial connecting cable for the service interface of the BusHead</td>
<td>0943 UTL 101</td>
</tr>
<tr>
<td>Parallel connecting cable for the programming of the BusHead</td>
<td>0943 UTL 501</td>
</tr>
<tr>
<td>e2c CoDi software; configuration and diagnosis software for e2c systems</td>
<td>0947 USB 100</td>
</tr>
<tr>
<td>GSD file for an e2c system Profibus Filename: Lum_04DA.gsd</td>
<td>On our Homepage <a href="http://www.lumberg.com">www.lumberg.com</a> (Infopoint → Download) there is a file GSD.zip that includes all Lumberg GSD files.</td>
</tr>
</tbody>
</table>
e2c CoDi software (configuration and diagnosis software)

The e2c CoDi software is used for the projectioning and configuration of an e2c system. Further, the e2c CoDi software can perform an online diagnosis of an e2c system in process by linking the BusHead via the M12 service interface with the PC. In addition, a complete periphery check can be performed as a preliminary check (modular commissioning of machine components) by observing the input and output states; outputs can be controlled. Those functions are independent of the existence of fieldbus connection.
3. The commissioning of an e2c system (independent of bus)

The commissioning of an e2c system is identical for each BusHead, i.e. it is independent of the fieldbus. The e2c system can be performed and set up in two different ways. The first possibility is the self-configuration of the BusHead, i.e. pins 2 and 4 on the service interface (M12 connector) of the BusHead are bridged. However, thus default parameters (see chapter 3) are set for the behaviour of the e2c system and the diagnosis, and such parameters cannot be influenced by this kind of configuration.

The other possibility of putting an e2c system in operation is the projectioning the structure and the parameters of an e2c system by means of the Lumberg CoDi software and then download this project to the BusHead. The advantage of that kind of commissioning is the chance of the user to individually harmonize the e2c module parameters with his needs.

3.1 Self-configuration of the BusHead

During the self-configuration the BusHead automatically enters the number and the type of the I/O modules plugged onto the backplanes when the supply voltage is switched on, and it saves those data as the applicable default configuration.

How to proceed:

Step 1: Set the slave address/MacID desired by you on the Profibus or the DeviceNet BusHead. This is done via the two rotary switches on the back of the BusHead (tens and unit digits are identified).

Step 2: Bridge pins 2 and 4 on the M12 coupling of the BusHead, e.g. by means of a ready-made M12 connector.

Step 3: Mount the plug box, the BusHead and all I/O modules on the backplane with the default configuration being as desired.

Step 4: Connect the power supply and, if required, the bus lines to the relevant plug box. (only mechanical).

Step 5: Switch on the system/sensor supply voltage. When the supply voltage is switched on, the BusHead enters the default configuration and saves it as the final configuration.

Step 6: The configuration operation lasts just a few seconds and has come to an end as soon as all active/error LEDs on the I/O modules are continuously green and the Conf e2c-LED on the BusHead also becomes continuously green. Then remove the bridge connector from the M12 interface of the BusHead and screw a protective cap of the type ZVK on this interface.
3.1.1 Example of a Profibus projection with Siemens Step 7:

The hardware projection of Step 7 comprises the item *Install New GSD* in the menu *Options*. There you can enter your e2c system via the GSD file in the hardware catalog of the Profibus DP units. You will then find the unit under *Profibus DP → Additional Field Devices → I/O → 0970 PSL 001*.

With a Profibus master being projected in the hardware projection of Step 7 the line of the Profibus master system becomes visible. The Profibus slave units are then added per drag and drop from the Profibus DP directory to that line. For further information on how to handle the Step 7 software see the manual on Step 7 or contact the online help service.

**How to proceed:**

**Step 1:** Installation of the GSD file (Lum_04DA.gsd) for the e2c system in the hardware projection of Step 7. Select the item *Install New GSD* in the menu *Options*. Use the following window to specify the directory in which the GSD file to be installed is found. Select the relevant GSD file (Lum_04DA.gsd) and confirm the selection by pressing the button *Open*. Then the Lumberg e2c slave is automatically entered in the hardware catalog of the Step 7 software. Please find below an excerpt of the updated hardware catalog.
**Step 2:** With a Profibus master system being projectioned the hardware projectioning displays a line for the coupling of the slave units. The slave units are added to the line per drag and drop from the hardware catalog.

Identify the e2c directory by means of the mouse cursor and draw the e2c slave to the line of the DP master system with the left mouse key being pressed simultaneously. Do not release the left mouse key before the prohibition sign disappears. Use the window being displayed then to enter the Profibus address for your e2c slave. Pay attention that the address projectioned complies with the address set via the rotary switch on the Profibus BusHead.

After the Profibus e2c slave was added to the master system, the modular design, i.e. the I/O modules, remain to be projectioned.

**Step 3:** Open the directory of the e2c slaves in the hardware catalog. Then all modules of the e2c system are displayed. First identify the e2c BusHead by means of the mouse cursor and with the left mouse key being pressed simultaneously place it at slot 0.

**Attention:** The BusHead must always be placed at slot 0. In contrast to the I/O modules no process addresses are assigned to the I/O modules.

The I/O-modules are placed in the configuration beginning with slot 1.

**Attention:** The I/O-modules have to be placed without gaps even if there are empty places on the Backplane. The „Universal module“ in the module list should not be used.

**Step 4:** The process data address used for the selection of the individual I/O modules in the PLC program can be assigned individually to the I/O modules. As a default a process data address is assigned by the Step 7 software already during the placing of an I/O module; however, you have the chance to alter it. The address can be altered after you clicked the I/O module plugged accordingly twice. The window displayed then is used for the assignment of individual process data address to this I/O module.

The smallest unit if the addresses to be assigned is one byte, i.e. a 4x I/O module occupies one byte in the PLC memory as well. Bits 4 to 7 which are unassigned remain unused, even if a 4x input or 4x output module follows.
View of a projectioned e2c slave in the hardware projectioning of Step 7:

- Modular design of an e2c slave
- Assigned process addresses for the individual I/O modules
- e2c slave at the DP master system
3.2 Configuration of the BusHead by means of the Lumberg CoDi-software

The Lumberg e2c CoDi software permits the parametrizing and commissioning of an e2c system. Further to that you have the chance to individually determine the diagnostic behaviour of your e2c system by parameter settings. After the start of the software you are - as a default - in the so-called <easy parametrizing mode>. In this <easy parametrizing mode> you are only offered to alter the diagnostic parameters for the periphery of the individual modules. As a standard, the order of the addresses of the individual I/O modules is fixed with orientation to the slots and ascending from the left to the right. If it is required to alter this order of addresses in the memory or if you have to alter very specific system parameters individually, then you should change to the extended parametrizing mode. The extended parametrizing mode permits those very specific system settings.

**Attention:** The extended parametrizing mode and especially the changing of the order of addresses requires precise knowledge of the system and should only be exploited after the careful reading of the documentation or by skilled users.

A further feature of this software is the chance for the user of being connected online with your e2c station via the serial interface and viewing all diagnostic data of the I/O modules. In addition, you can view the status of the inputs and outputs independently of the bus coupling. The outputs can also be controlled via that way; however, if that is done, the interface to the fieldbus is isolated electronically from the bus during the duration of the control operation to avoid a conflict during the access. Thus you have the chance of individually testing and - if required - performing a diagnosis of the periphery of the individual e2c stations independently of the entire bus wiring.
How to proceed when creating a new e2c configuration with the CoDi-Software

**Step 1:** After the start of the Lumberg e2c CoDi software open a new project. Following that a window is opened in which you can choose a backplane. With the backplane being selected the latter is placed graphically on the working sheet.
**Step 2:** To place the relevant modules on the backplane proceed as follows: After a double click on the relevant slot of the backplane the system displays a selection window in which you can find modules which can be placed on this slot. The first slot on the left is reserved for the PlugBox, the port for power and bus wiring. Next to the plug box on the right slot 0 is located; that slot is exclusively reserved for the BusHead, and next to the BusHead on the right there are slots for the different I/O modules. A fixed order of slots for the I/O modules does not exist. They can be placed arbitrarily on the individual I/O slots.

![Figure: projectioned e2c system](image-url)
**Step 3:** To set the individual parameters for the individual modules perform a double click on the relevant module and the system displays a window comprising the individual parameters of this module. The list of the individual alterable parameters is different from the Easy Parametriermode and the extended parametrizing mode.
Chapter 1: Components and commissioning

**Step 4:** After the configuration and parametrizing of the modules save your project. There are two possibilities to download your project to the BusHead: You can e.g. download your project to the BusHead via the serial interface. This method, however, requires, that the BusHead is plugged onto the backplane and supplied with voltage. The connection between the serial interface of the PC (SUBD 9-pin connector) and the serial interface of the BusHead (M12 connector 5-pin) can be implemented by means of the serial connecting cable (type 0943 UTL 101). However, this transmission method requires that the e2c system is supplied with voltage.

A further possibility to download your configuration to the BusHead is the transmission of the project data via the parallel interface. On doing so the parallel interface of the PC (LPT port) and the EdgeCard connector (contact unit to the backplane) on the back of the BusHead are connected by means of the parallel connecting cable (type 0943 UTL 501). This download has the advantage that it does not require external voltage supply. The correct pole of the connection can be seen in the following sketch.

**Step 5:** After the download all active/error LEDs on the I/O modules should have the status green continuous light and the Conf e2c LED on the BusHead should also have the status green continuous light. Following that you can unscrew the serial connecting cable from the M12 coupling of the BusHead and plug it with a sealing cap of the type ZVK.

If you performed the download via the parallel interface, you can then mount the BushHead to the relevant backplane. In case of proper projectioning the connection of the power supply should result in the Conf e2c-LED on the BusHead having the status green continuous light. The active/error LEDs on the I/O modules should then also have the status green continuous light. Thus the e2c projectioning has been completed and then you only have to projection the relevant fieldbus.