



**How to configure  
CBX800 and HHR  
to work over  
PROFINET-IO**

Rev. 2.1



## Summary

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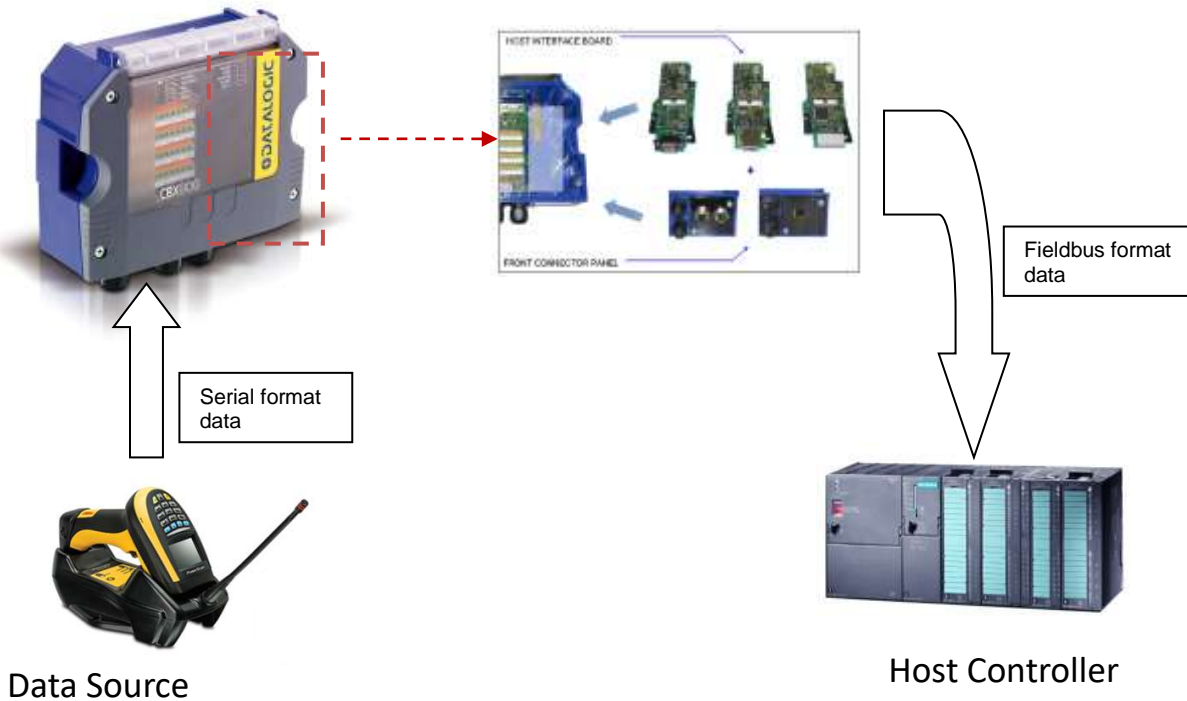
## Master Revision History

| Revision | Date       | Author(s) | Change Description   |
|----------|------------|-----------|--|
| 0        | 12/01/2017 | D. Natati | Preliminary Revision   |
| 1        | 21/04/2017 | D. Natati | 1 <sup>st</sup> Revision   |
| 2        | 03/06/2019 | D. Natati | Added: "Behaviour Basics", "PROFINET-IO Controller configuration (T.I.A.)", Appendix 1. Other minor improvements |
| 2.1      | 15/1/2021  | D. Natati | Added: Appendix 2  |
|          |            |           |  |
|          |            |           |  |

## Overview

CBX800 is a multi-gateway device. It can convert any serial-format data to a fieldbus-format data depending on the specific interface card plugged in the box.

It has a “data-source” section, where it gets the data coming from the source device, and a “fieldbus” section, which outputs the converted data to the Host.



This technical note gives the basic instructions about a popular application involving a HHR device working as data producer and the PROFINET-IO as host protocol. It's just an example, because the CBX800 basics for configuration and behaviour are the same regardless of the connected device and host protocol.

Any device able to output data in serial format, either RS232 and RS485, can be connected to a CBX800 as data producer. This makes a CBX800 a flexible solution allowing to connect general serial devices to a wide range of industrial networks.

**Behaviour Basics**

To properly work CBX800 needs to correctly detect the data coming from the source. Besides it needs to recognize the end of any data packet to be converted.

To achieve these goals CBX800 must be informed about:

- **the serial line parameters** the connected source device uses for sending data → This match is quite necessary!!
- **the termination character(s)** the source device eventually adds to its data→ providing this information is strongly suggested, even not mandatory. <sup>1</sup>

**Warning: CBX800 converts and outputs data ONLY when it detects the data packet end. Until this event has not occurred CBX800 collects data but not forwards any data toward Host.**

There are 3 possible situations:

1. Source device data **do not match** the CBX800 data source port configuration, in data format or speed



No data come into CBX800 nor data come to Host.

2. Source device data **match** the CBX800 data source port configuration (data format or speed) but the data packet end is not detected.



Source device data come into CBX800 but no data reach the Host

3. Data source device **matches** the CBX800 data source port - data format and speed- and terminators too.



Data go from data source device to Host through CBX800.

<sup>1</sup> If the source device does not send any terminator CBX800 can be configured to automatically close the data packet. See Appendix 1.

## Requirements

- Required HW:
  - o CBX 800
  - o BM7x0 PROFINET-IO interface board



- o Hand Held Reader (+ CAB 509/512)



- o PC + RS-232 serial cable

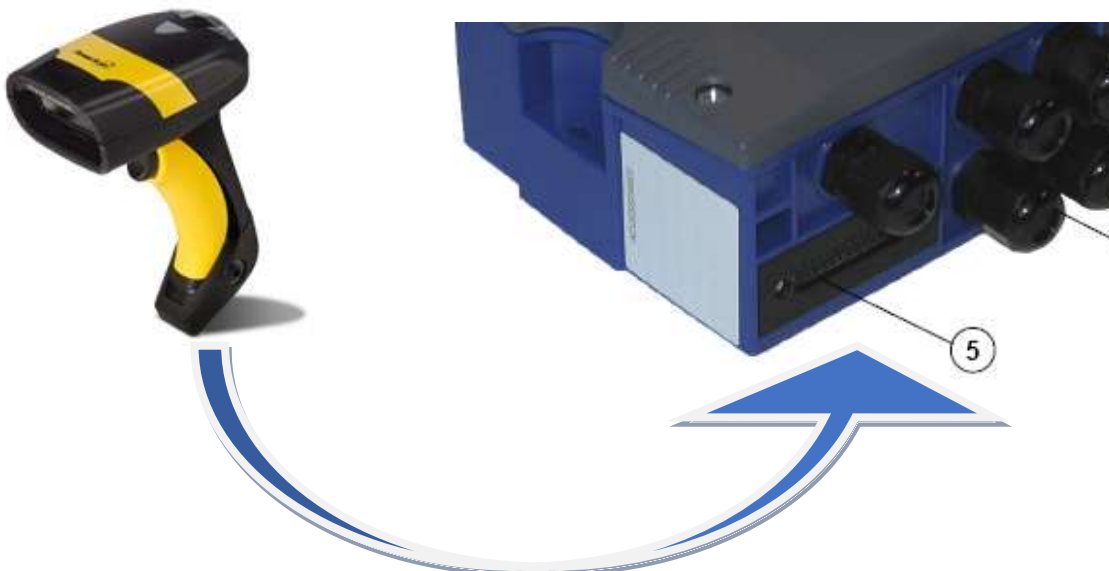


- Required SW: Datalogic "Genius" configuration tool



## HHR Configuration

1. Configure HHR device as RS-232 ONLY INTERFACE device
2. Set the HHR baud rate in the following range:  
9600, 19200, 38400, 57600, 115200 bps
3. Set a termination string (suggested)
4. Connect the HHR to the 25pin connector (n.5) of the CBX800 through the cable CAB 509/512, depending on the power supply level required by the reader



Following are links to download the most popular HHR manuals, where the user can find all the information to set up the readers as data source devices for CBX800:

- PM9100:

[https://www.datalogic.com/Download?path=%2fupload%2fres%2fmanuals%2f820094814\\_a.pdf&iddwnfile=20207&name=820094814+Rev+A](https://www.datalogic.com/Download?path=%2fupload%2fres%2fmanuals%2f820094814_a.pdf&iddwnfile=20207&name=820094814+Rev+A)

- PS9500

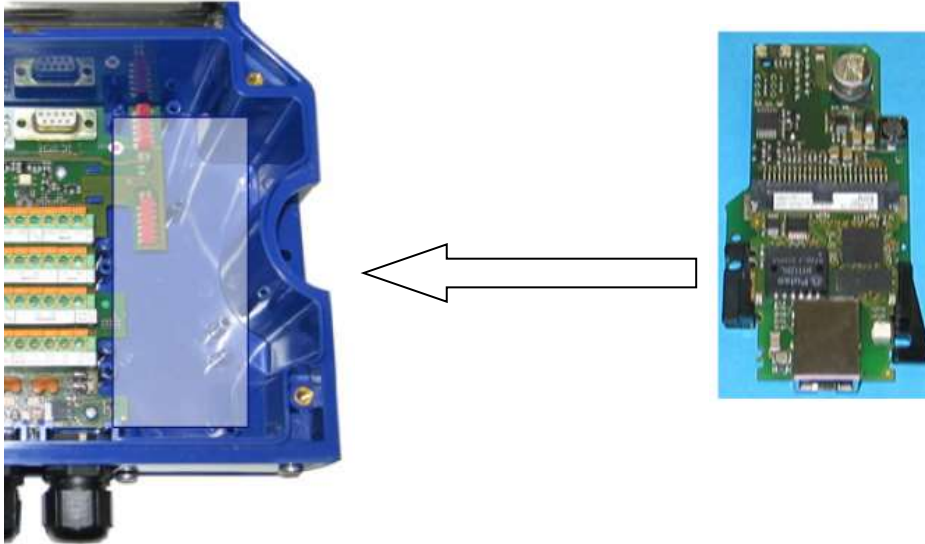
<https://www.datalogic.com/Download?path=%2fupload%2fres%2fmanuals%2fadc%2fpowerscan%2f820053614.pdf&iddwnfile=18460&name=820053614>

- PS9300

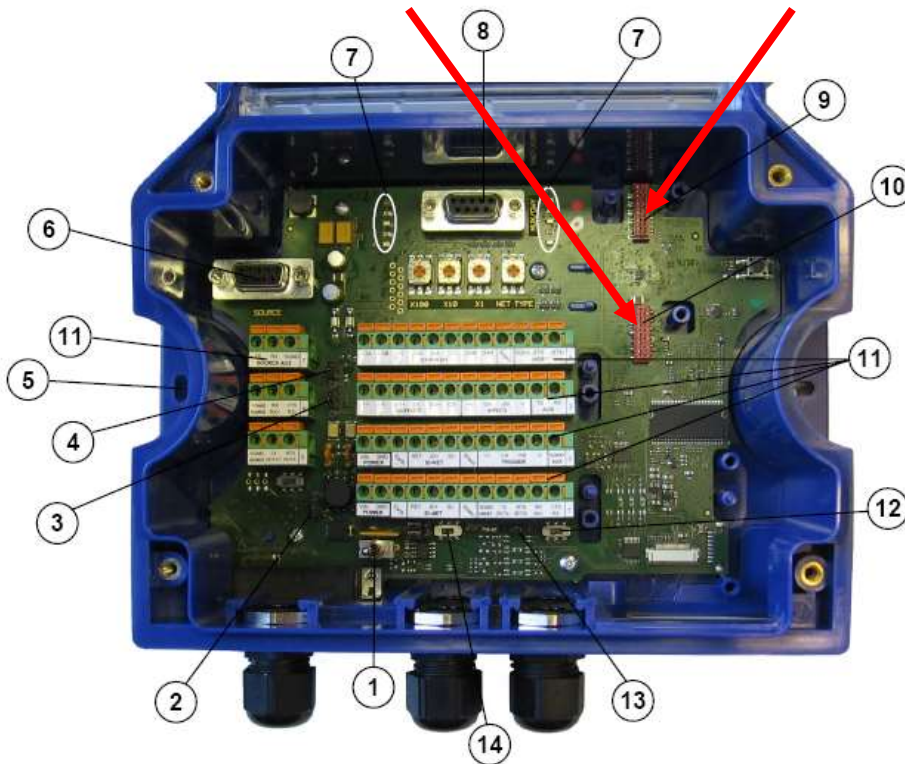
[https://www.datalogic.com/Download?path=%2fupload%2fres%2fmanuals%2fadc%2f820092914\\_b.pdf&iddwnfile=18872&name=820092914+Rev+B](https://www.datalogic.com/Download?path=%2fupload%2fres%2fmanuals%2fadc%2f820092914_b.pdf&iddwnfile=18872&name=820092914+Rev+B)

**CBX800 HW Configuration**

1. Insert the BM7x0 PROFINET-IO interface board into the reserved area (see picture below) on the right side of the CBX800<sup>2</sup>



2. Use the connector n.10 for BM700 standard board or n.9 for BM710 IP65 board



<sup>2</sup> Refer to the [Datalogic Host Interfaces Modules - Instruction Manual](#) for further information

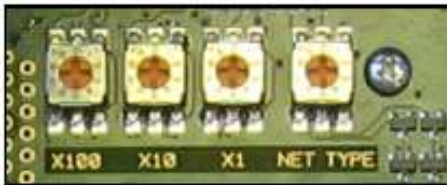
3. Be sure – or move, if needed - the RS485 termination switch is on OFF position



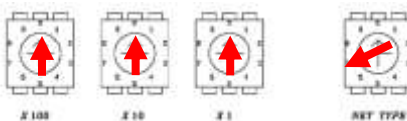
4. **Do NOT connect anything** in the **HOST** spring clamp connectors of row #1 and #4



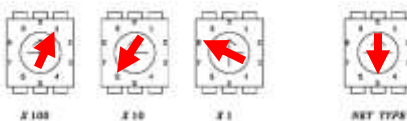
5. Set the CBX rotary switches on one of the following layouts:



- **Software control setup:** the BM7x0 PROFINET-IO interface board configuration depends on the SW configuration only
  - o Net Type = 7 = SW control → other address switches are ignored
  - o Address X100 = 0
  - o Address X 10 = 0
  - o Address X 1 = 0



- **Hardware control setup:** the BM7x0 PROFINET-IO interface board addressing partially<sup>3</sup> depends on the switch positions
  - o Net Type = 5 = PROFINET-IO
  - o Address X100 = ... → hundreds of the last octet
  - o Address X 10 = ... → tens of the last octet
  - o Address X 1 = ... → units of the last octet

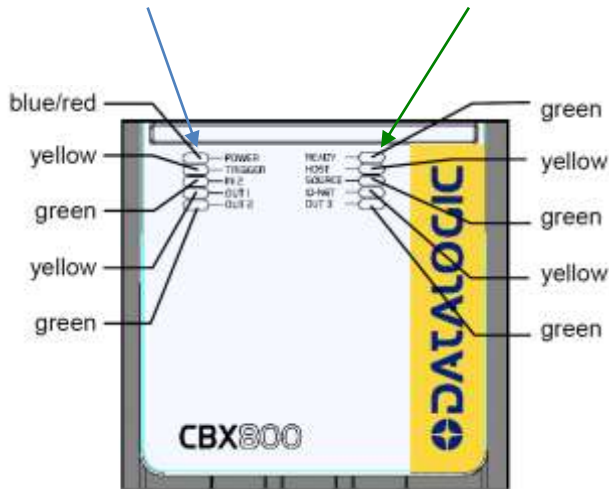


→this example layout sets the interface card as a PROFINET-IO card with IP address = aaa.bbb.ccc.168

<sup>3</sup> The other IP octets depend on the software configuration

## 6. Switch ON the CBX 800

First the "POWER" blue LED then the "READY" green LED go ON in few seconds.

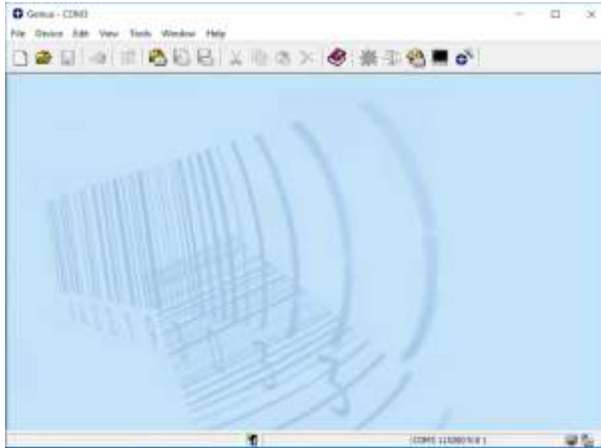


7. Connect your Pc with Genius SW on board to the CBX800 **AUX connector (n.8)** through a RS232 serial cable

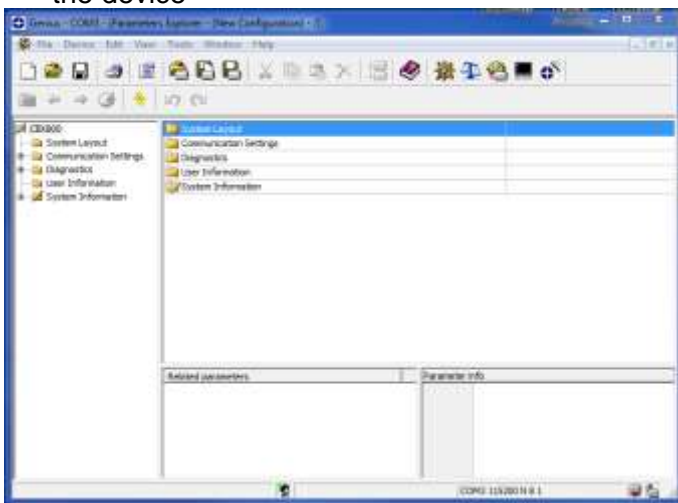


## CBX800 SW Configuration

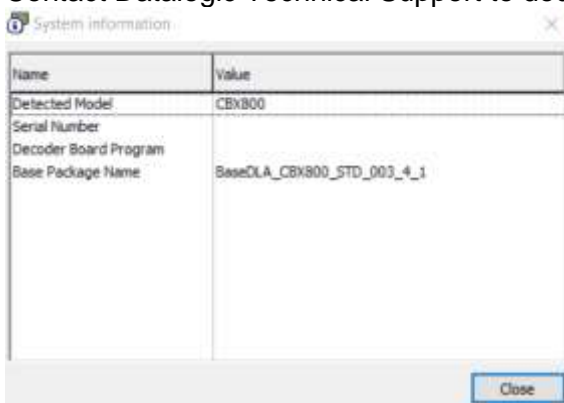
1. Launch the “Genius” SW tool



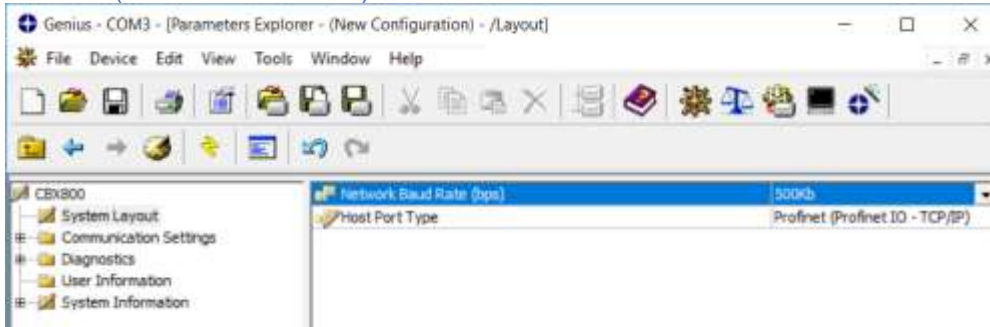
2. Click the main bar on “Device - Get...” to upload the CBX800 software configuration from the device



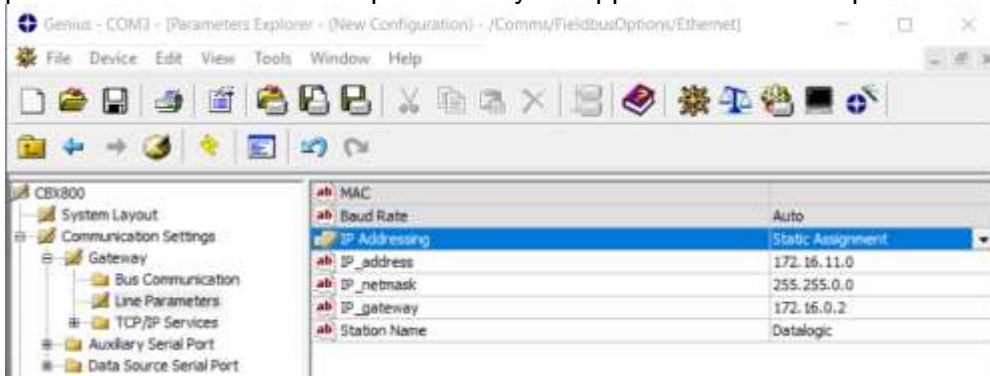
3. Check the “View-System Info” tab (see below) to verify if the installed software release on CBX800 is the latest available one. It is showed on the “Base Package Name” field. Contact Datalogic Technical Support to double check it if needed.



- Open the “System Layout” folder to check the “Host Port Type” parameter. It must be equal to “Profinet (Profinet-IO - TCP/IP)”



- Open the “Communication Settings / Gateway / Line Parameters” folder to check the addressing parameters. Set them as requested on your application. An example is below.



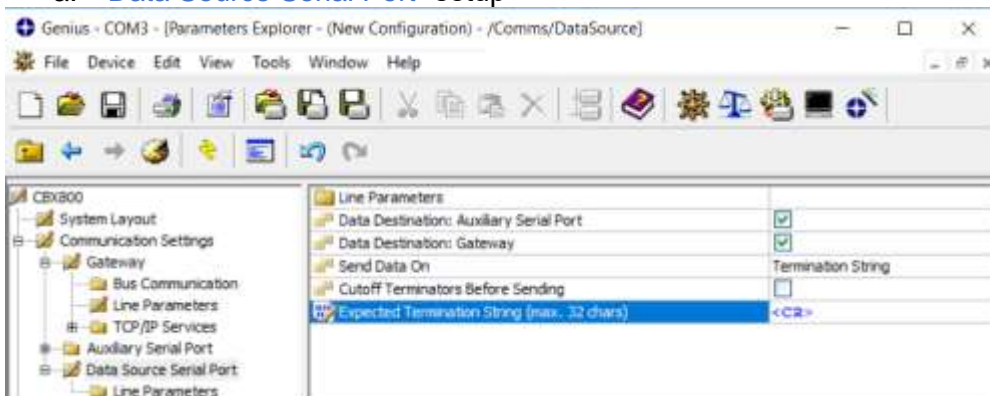
**Take care:**

- do NOT set the parameter “IP addressing” to “DHCP” option on PROFINET-IO networks.
- set the “IP Gateway” parameter to a network compatible address even no gateway device is working on the network. NEVER set it to “0.0.0.0”

- Open the “Communication Settings / Data Source Serial Port” folder to check/set the match with the HHR device. Set them as requested on your application.

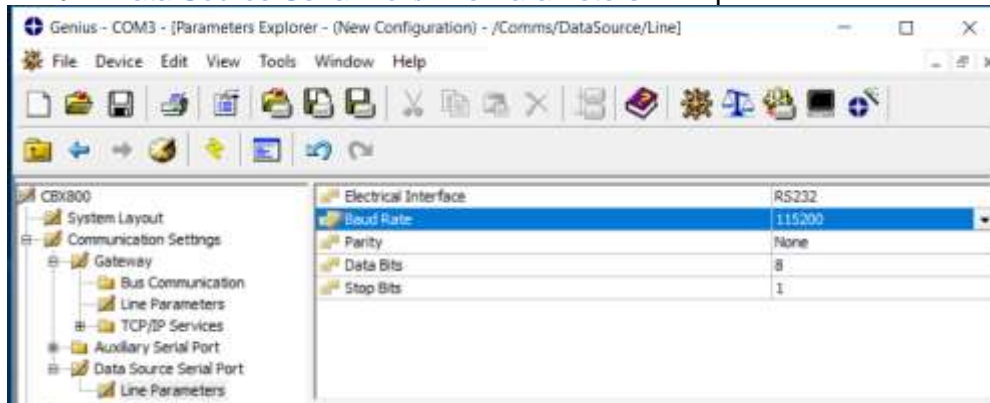
An example is below:

a. “Data Source Serial Port” setup



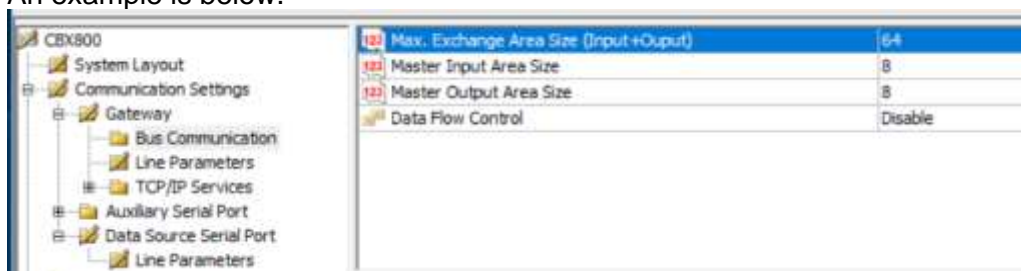
The showed setup matches a connected device sending strings closed with the <CR> character. Most of HHR devices have such a default configuration

### b. "Data Source Serial Port/Line Parameters" setup




The showed setup matches a connected device communicating via RS232 at 115200, None, 8 data bits, 1 stop bit. Most of HHR devices have such a default configuration.

- Open the "Communication Settings / Gateway / Bus Communication" folder to set the I/O areas. Set them as requested on your application. An example is below.



**Note that:**

- The **INPUT** direction refers to the communication **TO the Controller**. In other words, **the Input Area gets the data coming from the reader**. Therefore, set the size value -at least- to the maximum length of the string coming from the HHR device, headers and terminators included
- The **OUTPUT** direction refers to the communication **FROM the Controller**. In other words, the Output Area gets the commands/data outgoing from the Controller to the reader

|   |   |                       |
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|---|---|-----------------------|

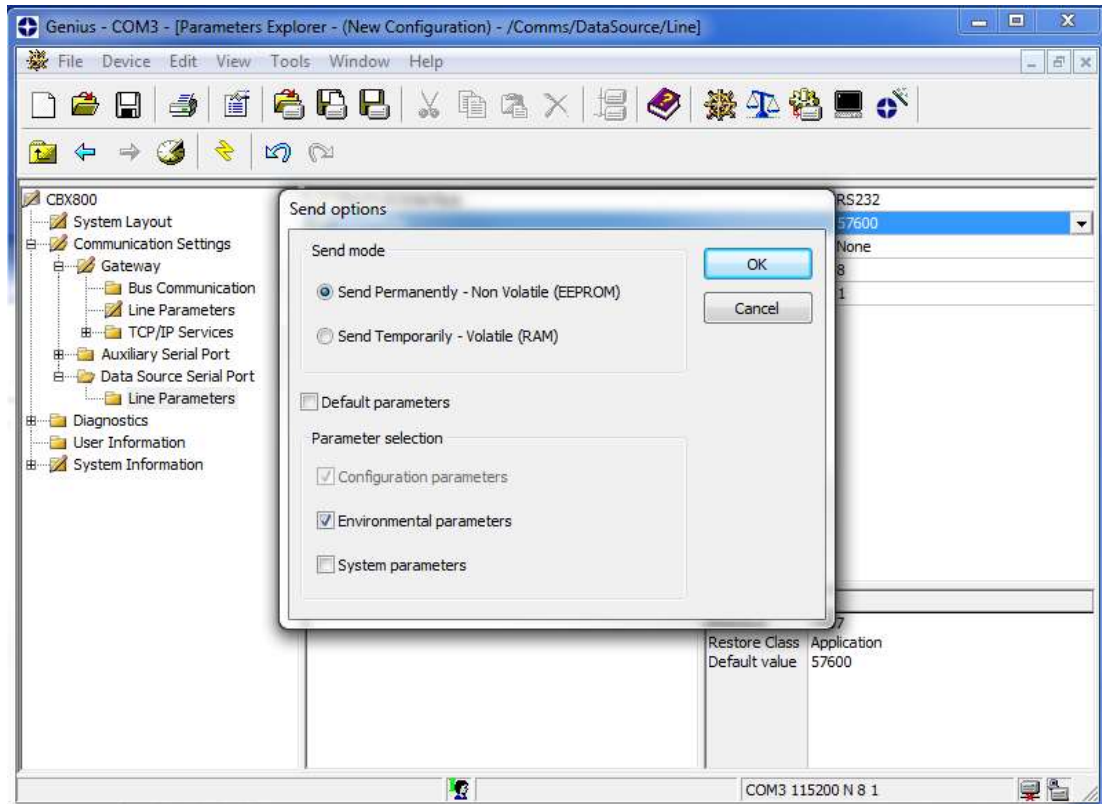
The table below<sup>4</sup> summarizes the needed CBX800 setup.

| CBX800 Parameters   | Value                          | Note  |
|---|--------------------------------|---|
| System Layout /<br>Host Port Type   | Profinet(Profinet-IO - TCP/IP) |   |
| Communication Settings / Gateway /<br>Bus Communication / Master Input<br>Area Size | 8..56                          | <i>Set the value equal -at least- to the maximum length of the string coming from the HHR device</i>  |
| Communication Settings / Gateway /<br>Line Parameters /<br>IP Addressing            | Static Assignment              | <i>Strongly suggested</i>   |
| Communication Settings / Gateway /<br>Line Parameters /<br>IP_address               | xxx.xxx.xxx.xxx                | <i>Set the same address like in the PROFINET-IO Controller project set</i>  |
| Communication Settings / Gateway /<br>Line Parameters /<br>Station Name             | profinet-device-name           | <i>Set the same name like in the PROFINET-IO Controller project set</i>   |
| Communication Settings / Data Source<br>Serial Port / Termination String            | <HHR termination string>       | <i>It must be like in the HHR device configuration. I.e. if the HHR device data terminator is the character &lt;CR&gt;, the same character must be set for CBX800</i> |
| Communication Settings / Data Source<br>Serial Port / Line Parameters/<br>Baud Rate | <HHR baud rate>                | <i>It must be like in the HHR device configuration. I.e. if the HHR device BAUD RATE is 9600, the same value must be set for CBX800</i>                               |
| Communication Settings / Data Source<br>Serial Port / Line Parameters/<br>Parity    | <HHR parity>                   | <i>It must be like in the HHR device configuration. I.e. if the HHR device PARITY is NONE, the same value must be set for CBX800</i>                                  |
| Communication Settings / Data Source<br>Serial Port / Line Parameters/<br>Data Bits | <HHR data bits>                | <i>As in the HHR device configuration. I.e. if the HHR device DATA BITS is 8, the same value must be set for CBX800</i>   |
| Communication Settings / Data Source<br>Serial Port / Line Parameters/<br>Stop Bits | <HHR stop bits>                | <i>It must be like in the HHR device configuration. I.e. if the HHR device STOP BITS is 1, the same value must be set for CBX800</i>                                  |

**Note:** all the other parameters can retain the default values, unless application specific requirements

<sup>4</sup> The table refers to the CBX800 software release "DLA\_CBX800\_STD\_003\_4\_1"

8. To download the configuration to the CBX800, choose “Device - Send with options” with the following options:
  - a. “Send Permanently”
  - b. “Environmental parameters”



Click on OK to confirm then be waiting for the successful downloading.

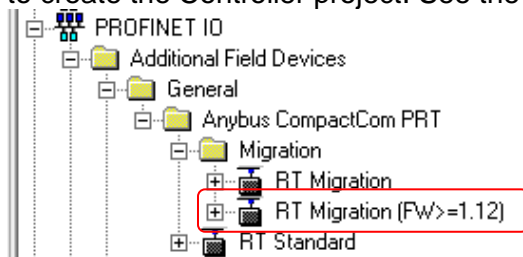


*After the download, by switching off/on CBX800 then uploading again the configuration allows to double check the correct setup saving.*

**PROFINET-IO Controller configuration (SIMATIC)**

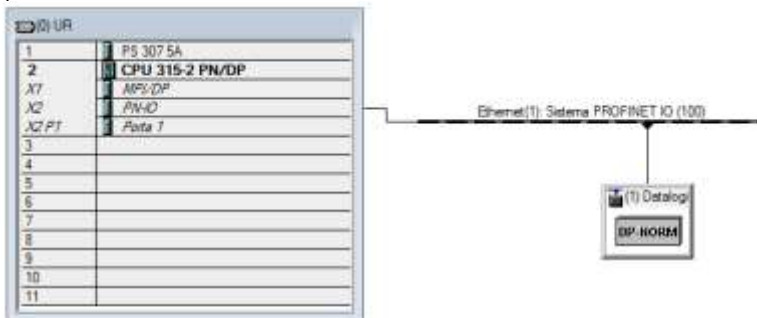
This chapter shows the basic steps to get a PROFINET-IO Controller configured with a BM700 card. The reference configuration tool is Siemens SIMATIC v.5.5

1. Install the provided GSDML file<sup>5</sup> related to the BM700 interface board
2. Use the new node showed on the PLC catalogue at the path: **PROFINET-IO/Additional Field Devices/General/Anybus CompactCom PRT/ Migration/RT Migration (FW>=1.12)** to create the Controller project. See the picture below



3. Set the node name like in CBX800 “**Communication Settings / Gateway / Line Parameters / Station Name**”
4. Set the I/O size configuration like in CBX800 “**Communication Settings / Gateway / Bus Communication**”

Here below an example of a HW configuration including a PNIO node “Datalogic” named and configured with 8 bytes Input and 8 bytes Output

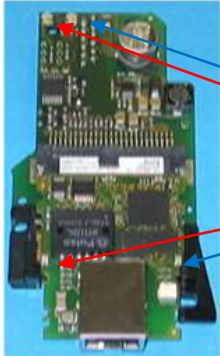


| Slot | Module        | Order number | I address | Q address | Diagnostic address | Comment |
|------|---------------|--------------|-----------|-----------|--------------------|---------|
| 1    | Output 1 byte | ABCC-PRT     |           | 128       |                    |         |
| 2    | Output 1 byte | ABCC-PRT     |           | 129       |                    |         |
| 3    | Output 1 byte | ABCC-PRT     |           | 130       |                    |         |
| 4    | Output 1 byte | ABCC-PRT     |           | 131       |                    |         |
| 5    | Output 1 byte | ABCC-PRT     |           | 132       |                    |         |
| 6    | Output 1 byte | ABCC-PRT     |           | 133       |                    |         |
| 7    | Output 1 byte | ABCC-PRT     |           | 134       |                    |         |
| 8    | Output 1 byte | ABCC-PRT     |           | 135       |                    |         |
| 9    | Input 1 byte  | ABCC-PRT     | 200       |           |                    |         |
| 10   | Input 1 byte  | ABCC-PRT     | 201       |           |                    |         |
| 11   | Input 1 byte  | ABCC-PRT     | 202       |           |                    |         |
| 12   | Input 1 byte  | ABCC-PRT     | 203       |           |                    |         |
| 13   | Input 1 byte  | ABCC-PRT     | 204       |           |                    |         |
| 14   | Input 1 byte  | ABCC-PRT     | 205       |           |                    |         |
| 15   | Input 1 byte  | ABCC-PRT     | 206       |           |                    |         |
| 16   | Input 1 byte  | ABCC-PRT     | 207       |           |                    |         |

Data from the HHR reader come to the INPUT area, starting from the 1st byte

<sup>5</sup> The latest available GSDML file is “GSDML-V2.3-HMS-ABCC-PRT-20131216”

5. Download the project to the Controller
6. The PROFINET-IO connection between Controller and BM700 will be established and the 4 board LEDs go GREEN.



Note that:

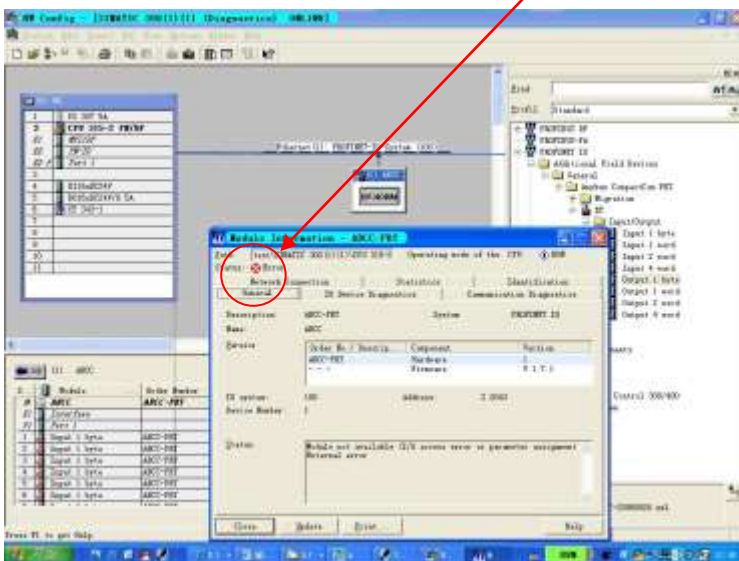
- 2 LEDs on the **RIGHT** side (blue arrows) refer to the internal communication between CBX800 and interface card
- 2 LEDs on the **LEFT** side (red arrows) refer to the external communication to the PROFINET-IO Controller

### I/O Configuration Rules

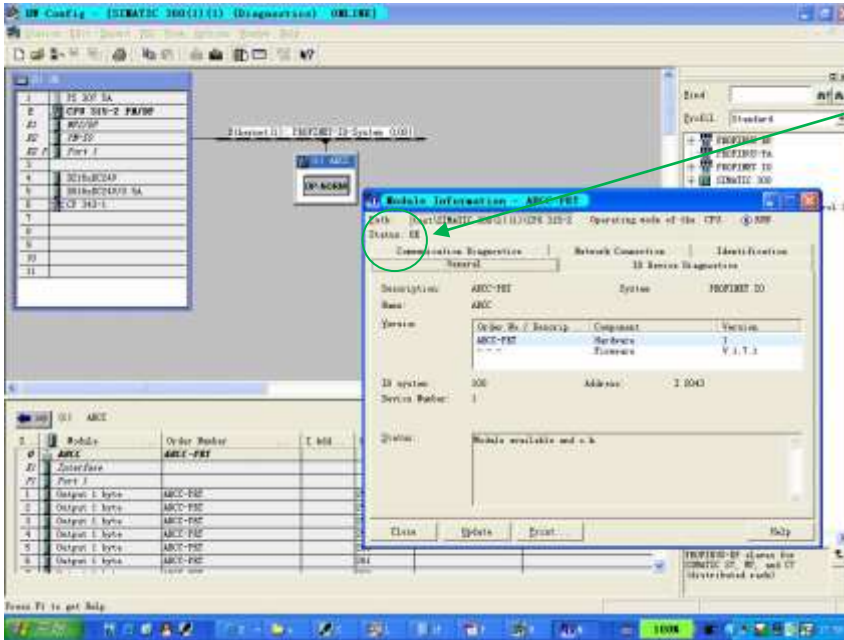
The PLC I/O configuration **MUST** respect the following 4 configuration rules:

1. **Format:** **1-Byte** module format only
2. **Sorting:** list **before** the **OUTPUT** modules **after** the **INPUT** ones
3. **Max Size:** **64 bytes** I/O size for Input + Output
4. **Min Size:** **8 bytes** both for Input area and Output area

Example: the picture below shows a PLC error condition due to the Input modules listed before the Output ones.



# How to configure CBX800 and HHR to work over PROFINET-IO

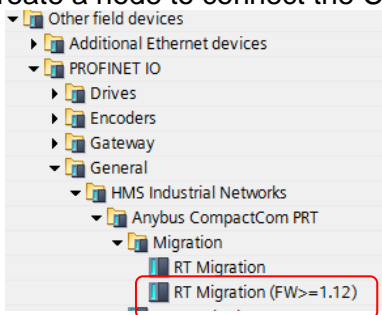


- this picture shows the **right I/O sorting**, it means the **OUTPUT** modules listed before the **INPUT** ones, therefore the PLC confirms the good connection.

**PROFINET-IO Controller configuration (T.I.A.)**

This chapter shows the basic steps to get a PROFINET-IO Controller configured with a BM700 card. The reference configuration tool is Siemens T.I.A. v14

1. Install the provided GSDML file related to the BM700 interface board
2. Use the new node created on the PLC catalogue at the position:  
Additional Field Devices/ PROFINET-IO/General/HMS Industrial Networks/Anybus CompactCom PRT/ Migration/RT Migration (FW>=1.12)  
to create a node to connect the Controller. See the picture below:



3. Set the node name like in CBX800 “Communication Settings / Gateway / Line Parameters /Station Name”
4. Set the I/O size configuration like in CBX800 “Communication Settings / Gateway / Bus Communication”

Here below an example of a HW configuration including a PNIO node “ABCC-PRT” named and configured with 8 bytes Input and 8 bytes Output

| Module          | Rack | Slot | I address | Q address | Type              |
|-----------------|------|------|-----------|-----------|-------------------|
| ABCC-PRT        | 0    | 0    |           |           | RT Migration (FW= |
| Interface       | 0    | 0 X1 |           |           | ABCC-PRT          |
| Output 1 byte_1 | 0    | 1    |           | 4         | Output 1 byte     |
| Output 1 byte_2 | 0    | 2    |           | 5         | Output 1 byte     |
| Output 1 byte_3 | 0    | 3    |           | 6         | Output 1 byte     |
| Output 1 byte_4 | 0    | 4    |           | 7         | Output 1 byte     |
| Output 1 byte_5 | 0    | 5    |           | 8         | Output 1 byte     |
| Output 1 byte_6 | 0    | 6    |           | 9         | Output 1 byte     |
| Output 1 byte_7 | 0    | 7    |           | 10        | Output 1 byte     |
| Output 1 byte_8 | 0    | 8    |           | 11        | Output 1 byte     |
| Input 1 byte_1  | 0    | 9    | 4         |           | Input 1 byte      |
| Input 1 byte_2  | 0    | 10   | 5         |           | Input 1 byte      |
| Input 1 byte_3  | 0    | 11   | 6         |           | Input 1 byte      |
| Input 1 byte_4  | 0    | 12   | 7         |           | Input 1 byte      |
| Input 1 byte_5  | 0    | 13   | 8         |           | Input 1 byte      |
| Input 1 byte_6  | 0    | 14   | 9         |           | Input 1 byte      |
| Input 1 byte_7  | 0    | 15   | 10        |           | Input 1 byte      |
| Input 1 byte_8  | 0    | 16   | 11        |           | Input 1 byte      |
|                 | 0    | 17   |           |           |                   |

Data from the HHR reader come to the INPUT area, starting from the 1st byte

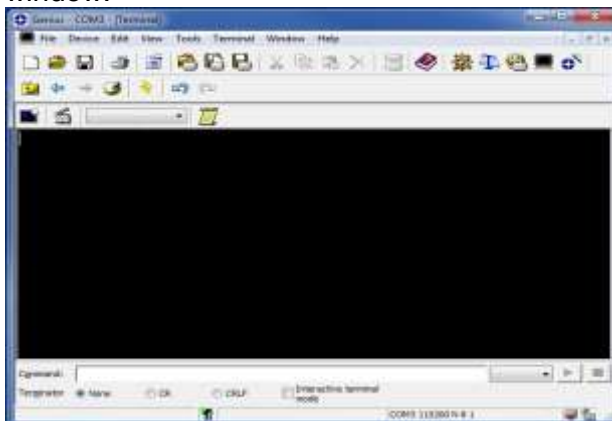
About the needed I/O Configuration Rules, please refer to the same concept explained on the previous section.

## Test, Tips and Troubleshooting

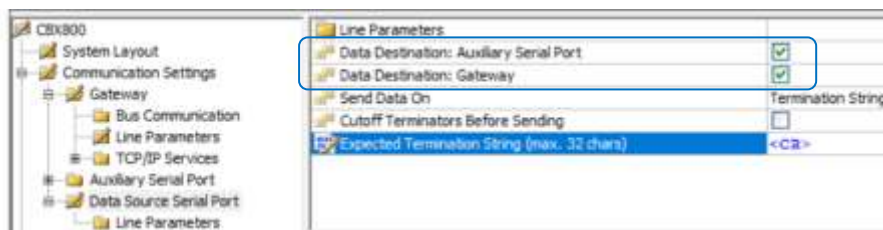
Now it's time to start working and seeing data coming from the HHR device to the Controller. The data strings can reach the Controller just bar code data are available or after the permission of a handshake control<sup>6</sup>.

To check the correct behaviour of the "HHR+CBX800+BM700" system the following steps are strongly suggested:

1. Connect the pc to the CBX800 AUX connector, launch Genius and open its "Terminal" window.



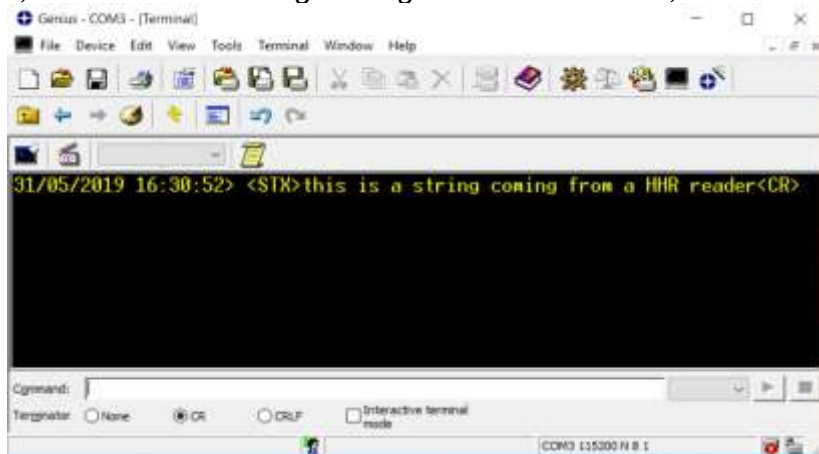
2. Be sure that:
  - a. "Communication Settings / Data Source Serial Port/Data Destination: Auxiliary Serial Port" is checked
  - b. "Communication Settings / Data Source Serial Port/Data Destination: Gateway" is checked



3. Trigger the HHR device
  - a. If the bar code string appears on the Terminal window AND on the PROFINET-IO Controller INPUT area → 😊, the system has been properly configured and works.

<sup>6</sup> Refer to the "DAD-DPD Driver" manual to find out how to implement the Datalogic data flow control

Here below it's an example screen showing a string which CBX800 properly got.  
Header=<STX>, Data = this is a string coming from a HHR reader, Terminator= <CR>



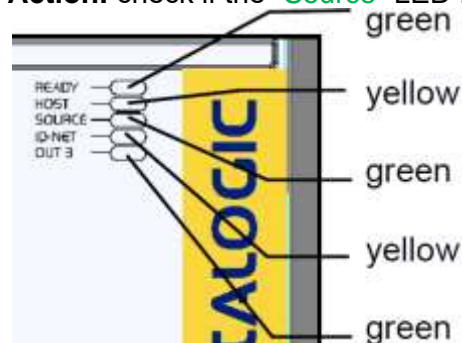
**Action:** just work, enjoy it!

- b. if the barcode result appears on the Terminal window BUT nothing is on the PROFINET-IO Controller INPUT area → 😞, HHR and CBX800 are properly configured but the Controller configuration does not match the BM700 setup.

**Action:** check the Controller configuration and/or its connection with BM700

- c. if the barcode result does NOT appear on the Terminal window → 😡!

- i. **Action:** check if the "Source" LED flashes when the HHR reads



- 1. if YES, data strings are coming from HHR and recognized by CBX800 but the box does not output them.

**Action:** check the "Data Source Serial Port" setup match.

- 2. if NO, no HHR string reaches or is recognized by CBX800.

**Action:** check the HW connections and the "Data Source Serial Port / Line Parameters" setup match

## Appendix 1: Data Termination ways

“Behaviour basics” chapter begins underlining that CBX800 needs to correctly detect the data coming from the source and recognize the end of any data packet to be converted.

**CBX800 has 3 ways to detect the packet end, by configuring the “Communication Settings / Data Source Serial Port/Send Data On” parameter:**

**1. option = Termination String (default)**

CBX800 gets the incoming characters until it detects the terminator(s), then it converts and outputs the collected string. This the recommended option, to enable if the data source device always sends a termination character(s).

**2. option = Timeout**

this option allows CBX800 to “see” the data end just it detects an adequate pause of the incoming data flow. That pause size changes automatically depending on the configured baud rate for the Data Source Serial Port. This is the right option if the source device does not send a terminator character for sure.

**3. option = Header String**

CBX800 starts to collect the data to convert only when it detects the configured “Header String”, then it keeps on getting characters until the configured “Collected Data Size” has reached.

## Appendix 2: connecting any serial device as a data source device

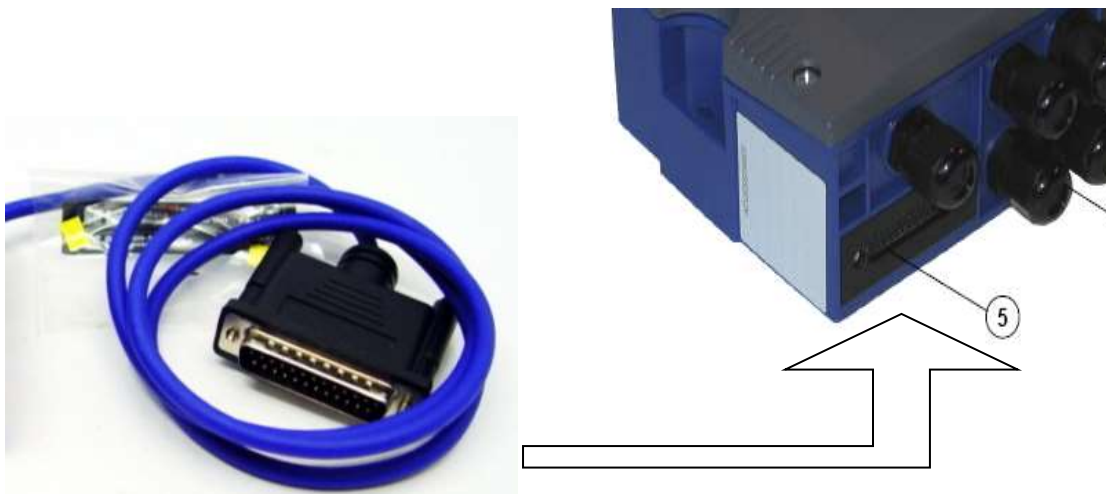
CBX800 has been designed to get data from an external serial source device then forward/convert its data to a Host.

There are 2 ways to connect a data source device to CBX800, depending on the source device kind:

1. the data source device is a **Datalogic reader** equipped with a 25-pin blue cable, such as a serial Hand Held reader or a 2KN laser scanner or a Matrix reader.

This is a very simple case:

the 25-pin blue cable of the data source device must be connected to the 25pin port of CBX800.

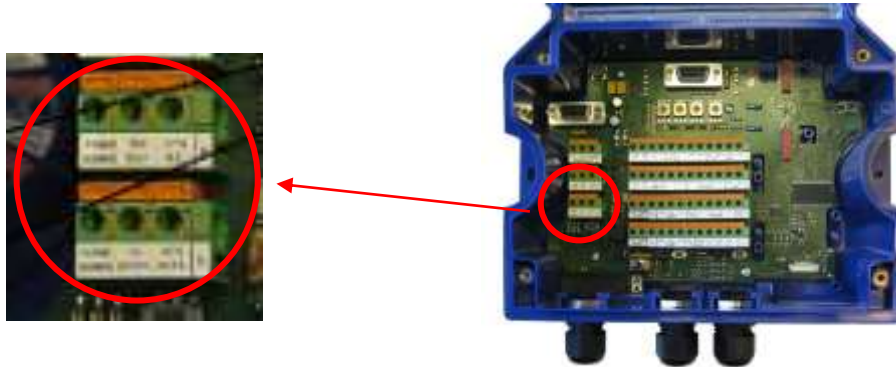


This action internally connects the MAIN serial channel of the external reader to the MAIN serial channel of the CBX800, it's the channel designed to forward data to the CBX800 conversion section then to the Host.

That's all.

2. the data source device is a **generic reader** (Datalogic reader too) equipped with a serial channel to output data.

This case requires the user takes the serial TX, RX and GND wires of the data source device, connecting them to the spring clamp connectors of **row#5 and #6** of the Data Source RS232 interface. It must be done as follows<sup>7</sup>:



- external device TX line → pin RX CBX800 (row# 6)
- external device RX line → pin TX CBX800 (row# 5)
- external device GND → pin SGND CBX800 (row# 5)

**Data Source RS232 Interface**

The following pins are used for RS232 interface connections:

| Pinout | Function        |
|--------|-----------------|
| TX     | Transmit Data   |
| RX     | Receive Data    |
| RTS    | Request To Send |
| CTS    | Clear To Send   |
| SGND   | Signal Ground   |

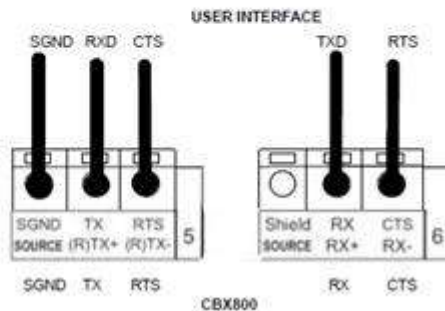


Figure 22 – RS232 Data Source Interface Connections

<sup>7</sup> This connection layout refers to the most popular case of a generic reader equipped with a RS232 serial channel. A RS485 serial channel must be connected to all the pins of rows #5 and #6

**Take care:** do NOT use the Data Source Auxiliary interface (DB9 connector or row #7 connectors) to bring data from an external source device to a CBX800.

As explained on the CBX800 installation manual, pag. 21, “The Data Source Auxiliary Interface available on the 9-pin connector below is used **for configuring the external reading device** parameters.”

### DATA SOURCE AUXILIARY INTERFACE

The Data Source Auxiliary Interface available on the 9-pin connector below is used for configuring the external reading device parameters.



Figure 25 - 9-pin D-Sub Female Connector:

With reference to the 9-pin connector of Figure 25, the following pins are used to connect the Data Source Auxiliary Interface:

| Pin              | Name | Function                                |
|------------------|------|---|
| 2                | TX   | Data Source Aux Interface Receive Data  |
| 3                | RX   | Data Source Aux Interface Transmit Data |
| 5                | SGND | Signal Ground                           |
| 1, 4, 6, 7, 8, 9 |      | N.C.                                    |

### USER INTERFACE

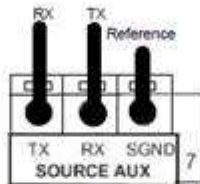


Figure 26 - Data Source Auxiliary Interface Connections

The row #7 connector pins allow to connect the AUX serial channel (if available) of an external Datalogic reading device and easily configure it, but they do NOT allow to pass bar code data to CBX800 for any external conversion.