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Gateway LBX_01

Softwareversion LBX_1.0

Hardwareversion LBX_01

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1. Introduction

The industry 4.0 gateway LBX can be used to record, process and exchange data from a machine to a connected network.

It could be used to determine the machine utilization, for preventive or remote maintenance, for data logging or to transmit data for the production process.

The data collection is handled by several digital and analogue inputs, via the integrated RS232 interface or the optional RS485 interface.

The analogue inputs can process +/-10V, 0-10V, differential signals or 4-20mA.

The input signals can be customized on demand.

An operator surface is provided to visualize transmitted data and can easily be customized by the user itself.

Mathematical functions or linearization tables are provided to convert the measured data into their physical values and can be shows as numerical values, bar charts or as a graph.

Names, graphical symbols in different shapes and colors can be assigned to the digital inputs.

The integrated data logger can be individually set to the demands.

With the optional real time clock it is also possible to use the unit as a standalone device.

The function of the module can be expanded with expansion cards in the near future.

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2. Safety

This operating guide contains instructions for ensuring safe and proper installation and operation. If you have any difficulties which cannot be resolved by consulting this guide, please consult the machine manufacturer or vendor for additional information.

HEJM GmbH is not liable for any personal injury or equipment damage resulting from improper commissioning, incorrect operation, misunderstandings or errors contained in this guide or on the display.

HEJM GmbH reserves the right to make technical changes to the equipment or operating guide without prior notice. This means that errors in agreement between the equipment and the guide cannot be precluded.

Pay particular attention to hazard notices in this operating guide.

This equipment description should be read carefully in full before commissioning.

Use of the operating guide presumes that the user is technically qualified.

2.1 Personnel Qualifications

Commissioning, installation and operation are to be performed only by qualified personnel. The personnel must have qualifications which are appropriate to their function and activity, e.g.

- Instruction and obligation to observe all application-related, regional and in-house regulations and requirements.
- Training in accordance with the standards of safety technology in the use and care of commensurate safety and work protection equipment.
- Courses in first aid, etc.

2.2 Proper use

This position controller has been developed solely for use on industrial machinery.

Any further use is considered improper. The manufacturer assumes no liability for damages resulting from such misuse. This risk is assumed solely by the user.

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2.3 Safety Notes

In the description of the device, the following symbols are used to denote hazards and other important notes:

The **Hazard** symbol warns of errors and hazards in commissioning and operation of the controller. This warning notice signifies a directly threatening hazard to the health of persons and contains special specifications and instructions as well as imperatives and prohibitions to prevent personal injury and damage to equipment.

The **Attention** symbol denotes a possible hazardous situation and contains special specifications and instructions as well as imperatives and prohibitions to prevent personal injury and damage to equipment.

The **Note** symbol indicates important and useful information and provides application tips.

2.4 Safety Precautions

The device must be secured in accordance with the relevant regulations.

The device may not be opened and no screws removed from the housing!

The device should be mounted to a din rail on the back.

Though the device is supplied wit 24V DC, the digital inputs can be connected to voltages up to 230V. Then the regulations for touch protection must be observed.

2.5 Warranty and Delivery Terms

We deliver exclusively under the general conditions for the supply of products and services of the electrical and electronics industry.

Hejm GmbH, warrants this product for a period of twenty-four (24) months from the date of shipment.

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2.6 Technical data

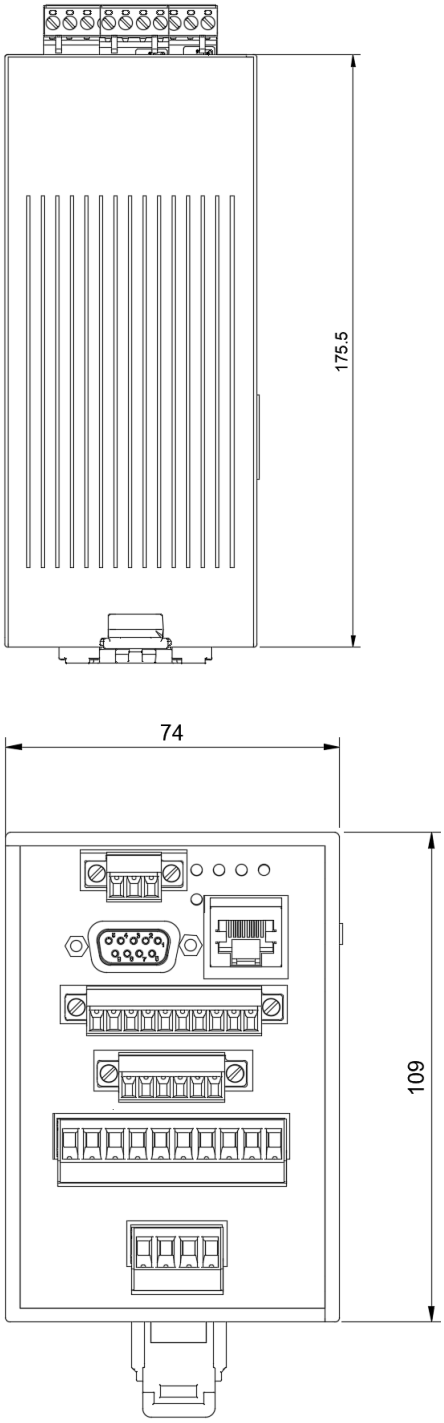

Abb. 1 Dimension (Illustration reduced)

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Supply voltage	24 V DC ± 10 %
Current consumption	Max.200 mA without any external load
Chipset	ARM Cortex-A53 Quad 4x1,2GHz
RAM	1024 MB
Memory	Standard 16GB, expandable up to 64GB 8GB reserved for server applications
Operating system	Rabian GNU/Linux 9 (modifiziert)
Kernel version	4.14.52-v7+
Input signals	12 inputs, AC/DC Standard assembling 0 – 18 V active low 18 – 230 V active high Rise time: 1ms Fall time: 50ms Optional the inputs can be assembled as single 24V inputs with lower switching time.
Analogue inputs	8 analogue inputs 12 bit Standard assembling 2 x +/-10V, accuracy < 0,15% 2x 0-20mA, bzw. 4 – 20mA, accuracy < 0,15% 4x 0-10V, accuracy < 0,1% Optional other assembly variants are possible.
Digital outputs	4 transistor outputs, 12V – 30V max. 700mA each 12 – 30V aktiv high Tri-state aktiv low
Interfaces	RS232, RS485 optional
Operating temperature	0 – 50 °C

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Storage temperature	-20 - + 65 °C
Humidity	max. 90 %
Installation orientation	any
Enclosure rating	IP 00
Dimension	74 x 109 x 175,5 mm^3 (W x H x D)

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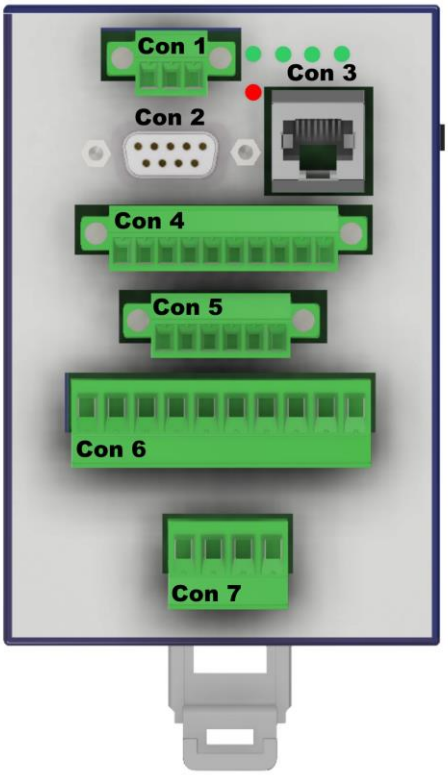

Abb. 2 Connection diagram

Connector and pinouts

Before connecting, please refer to the type plate

CON1	Supply voltage
	Terminal strip 3 pin
Pin 1	GND
Pin 2	+24V DC max. 200 mA
Pin 3	GND

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CON2	RS232 interface
	Sub-D female 9 pin
Pin 1	Nc, not connected
Pin 2	RxD
Pin 3	TxD
Pin 4	Nc, not connected
Pin 5	GND
Pin 6	Nc, not connected
Pin 7	Nc not connected
Pin 8	Signal A, when optional RS485 is used
Pin 9	Signal B, when optional RS485 is used

CON3	LAN interface
	RJ45 connector

CON4	Analogue inputs
	Terminal strip 10 pin
Pin 1	Analogue GND
Pin 2	+5V output for sensor supply (max. 100 mA)
Pin 3	+/- 10V input 1, or 0 – 10V input 11 Bit
Pin 4	+/- 10V input 2, or 0 – 10V input 11 Bit
Pin 5	0 – 20mA, or 4 – 20mA input 1
Pin 6	0 – 20mA, bzw. 4 – 20mA input 2
Pin 7	0 – 10V input 1, optional differential input +
Pin 8	0 – 10V input 2, optional differential input -
Pin 9	0 – 10V input 3, optional differential input +
Pin 10	0 – 10V input 4, optional differential input -

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CON5	Digital outputs
	Terminal strip 6 pin
Pin 1	GND
Pin 2	12-30V transistor supply
Pin 3	Output 1
Pin 4	Output 2
Pin 5	Output 3
Pin 6	Output 4

CON6	Digital inputs 1
	Terminal strip 10 pin
Pin 1	External GND for 24V DC signals, or N for 24 - 230V AC signals.
Pin 2	Input 1
Pin 3	Input 2
Pin 4	Input 3
Pin 5	Input 4
Pin 6	Input 5
Pin 7	Input 6
Pin 8	Input 7
Pin 9	Input 8
Pin10	Input 9

CON7	Digital inputs 2
	Terminal strip 4 pin
Pin 1	External GND for 24V DC signals, or N for 24 - 230V AC signals.
Pin 2	Input 10
Pin 3	Input 11
Pin 4	Input 12

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3. Functions

3.1.1 Resolution and accuracy of the analogue inputs

The device uses 8, 12 bit analogue inputs. This corresponds to 4096 steps over the whole measuring range.

Before the device is shipped the analogue offsets are digital adjusted. This can cause a loss of some increments. However more than 4000 steps will still remain for the analogue measurements.

The linear failure of the analogue to digital converter can be up to 2 increments.

When we are using 4000 increments over the whole measuring range the following resolution and accuracy results.

Analogue input	Resolution	Max. error of the analogue converter
0 – 10V	10V : 4000 = 2,5mV	+/- 5 mV
+/-10V	20V : 4000 = 5 mV	+/- 10 mV
0 – 20mA/ 4 – 20mA	20mA : 4000 = 5 uA	+/- 10uA

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3.1.2 Output format of the analogue values

The device can convert the measured analogue values in different formats before sending them to a connected computer or network.

Format	Result
Binary value	0 – 4095, which is the maximum resolution of the DA converter.
Physical value	The binary value can be converter by a multiplication into its physical value.
Linearised value	The physical value can be converted by a free programmable linearization table when the physical values are not linear.

Example 1:

A pressure sensor with a 0 – 10V output is connected. The voltage range corresponds to a pressure of 0 – 300 bar. The factor to calculate the physical value is then 300 bar : 4095 bit = 0,073260 bar/bit.

Example 2:

A level sensor should be used to show the remaining liquid in a tank.

The output of the sensor is 0 – 10V. To increase the resolution the value is converted in mV. The resolution will be

10000mV : 4095 bit = 2,442 mV/Bit.

When the voltage values are known, that correspond to their filling quantity, these values can now be set into the linearization table.

It doesn’t matter if the filling quantity is linear to the voltage values or not.

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3.1.3 Data transmission via LAN

The data transmission must be initialiced by the client.

This means that a higher level computer will request data from the LBX.

The minimal cycle time depends on the length of the requested data string and the capacity of the connected network. Nevertheless 20 ms should not be a problem.

A cost free, free configurable operator surface is shipped with the device, to show the transmitted data in numerical values or converted to graphical bar charts or curve diagrams.

When the data should be analysed by an own software, a DLL can be used to manage the communication part.

A closer description of the operator surface and the DLL is part of a separate manual.

3.1.4 Data logger

The data logger can be configured, using the provided software. Here the maximum size of the logging files or the time grid of the data can be adjusted. The minimal logging time is 1ms and the maximum memory in the standard version is 20GB. Different times or memories can be implemented on demand.

When the size of the logging file set, the .csv file is stored after reaching the size. Incoming data will still be logged in an additional file during this time.

At the end of the data logging, all .csv files can be uploaded by a host computer.

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3.1.5 Event Manager

The device can be configured to react on events inside a machine. For example minimal or maximal values can be set to the analogue inputs.

When these values are reached, up to 4 outputs can be set to give an optical or acoustical feedback to the user.

The digital inputs can also be connected to the outputs.

3.1.6 RS232 Interface

In most cases serial data protocols used are not standardized. To extract user data out of the whole string, the editor of the operator surface can be used. The user data will then be separated from the overhead automatically.

3.1.7 Real time clock

When the device is integrated into a network, the system time is used to set the device time. When the device should be used as standalone data logger the optional real time clock can be used.

The resolution of the real time clock is 10ms.

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Abbildungsverzeichnis: