

Serial data evaluation

Liebherr Temperature Monitoring
Serial Interface

Components supplied in the retrofitting kit 9590 557-01:

RS485 converter

1x



Resistor 120 Ohm 0.33 W

2x



Screw terminals for bus cables

1x



Data evaluation software CD

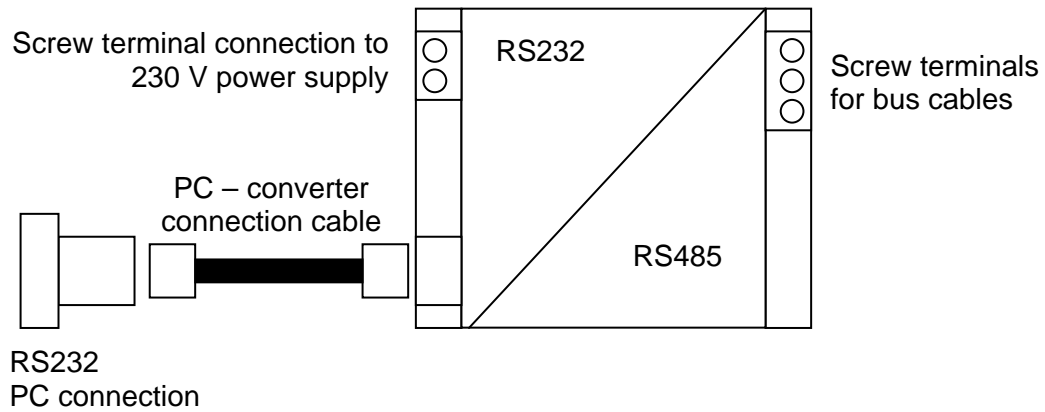
1x



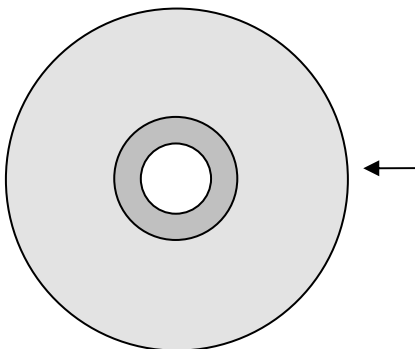
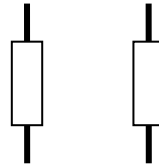
The Liebherr Temperature Monitoring software is continually being further developed and optimized. The respective most recent version is available for download from the Liebherr website www.liebherr.com.

Description of the components:

RS232 to RS485 Modbus converter

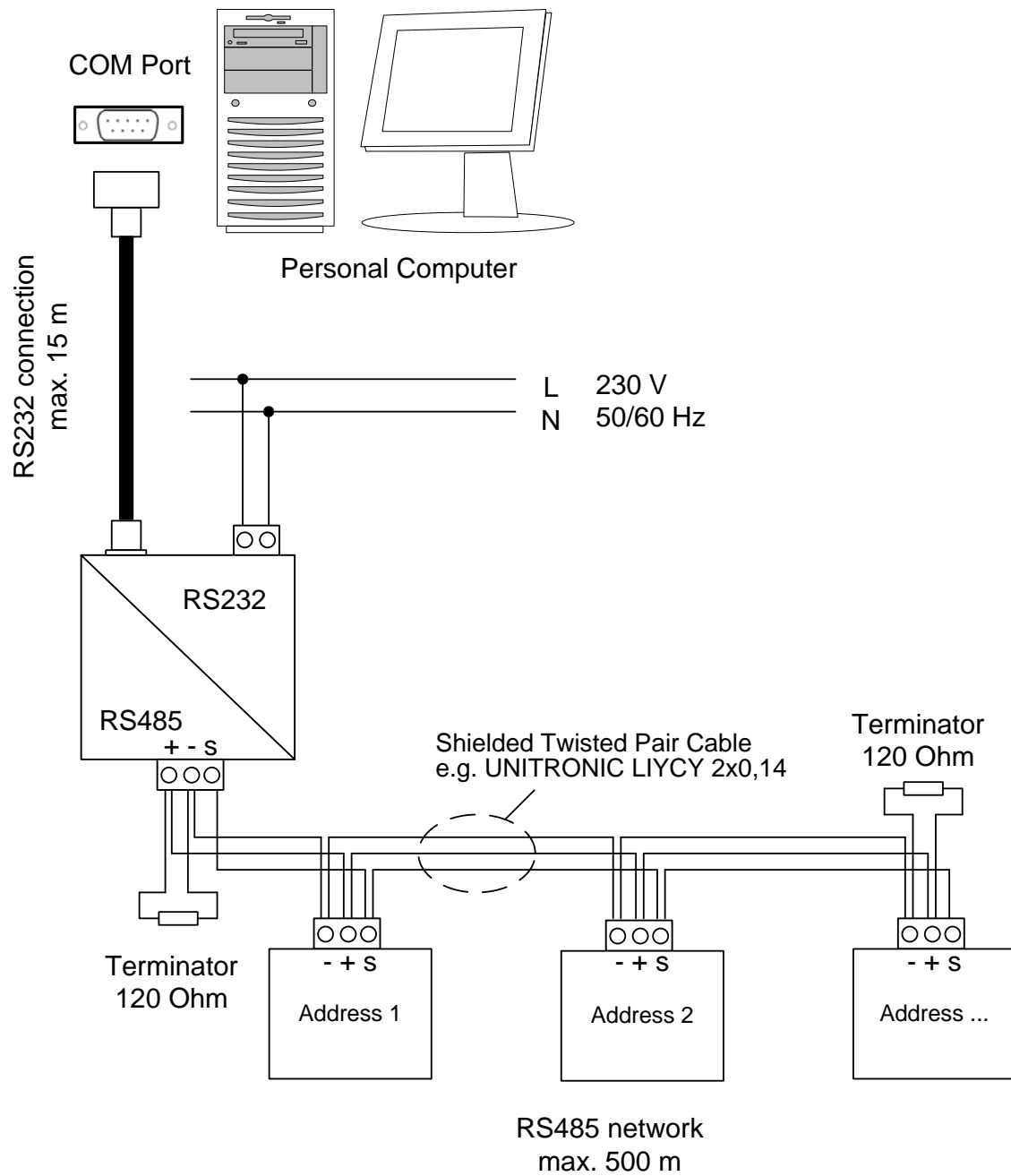


Terminating resistors 120 Ω termination



CD-ROM
Contains:
+ Software for serial connection
+ Software for infrared key
+ User manuals

Hardware installation diagram



General description of bus cabling

RS485 bus interface for extremely reliable serial data transfer over long distances.

- High bidirectional transfer rates
- Bus system with up to 20 stations
- Maximum cable length 500 m
- Monitoring of the devices
- High process reliability

This industrial bus interface only requires two cores plus a shield cable. The main advantage of this 2-wire equipment is that in principle every station can exchange data with every other station. The RS485 bus specifies a maximum cable length of 500 m as long as the recommended cables are used. As a result of this long transfer length, a large potential differential may be created between the operating earth of the data transmitter and that of the receiver. The interface is galvanically isolated from the rest of the circuit (by fast data optocouplers) to ensure that potential differentials cannot exert any effect on the circuits or terminal devices. There is no standard assignment of the connection cables.

Physical transfer process

The serial data are transferred with no earth reference as a voltage differential between two corresponding cables. A pair of cores, consisting of an inverted and a non-inverted signal cable, exists for each signal being transferred. The inverted cable is identified by the index "A" or "+" while the non-inverted one has the index "B" or "-". The receiver only evaluates the differential between the two cables so that synchronous interference on the transfer cable does not result in any falsification of the useful signal. RS485 transmitters supply output levels of ± 2 V between the two outputs under load; the receiver modules will recognise levels of ± 200 mV as valid signals.

Maximum cable length

The use of a symmetrical transfer process combined with low capacity and low attenuation twisted pair cables means that extremely reliable connections can be established over a distance of up to 500 m while still maintaining high transfer rates. The use of high quality TP cables on the one hand prevents feedthrough between the transferred signals and on the other it reduces the sensitivity of the transfer equipment to interference signals in addition to the effect of the shield.

RS485 2-wire bus

The RS485 2-wire bus comprises the actual bus cable with a maximum length of 500 m. The stations can be connected to this cable using a spur cable with a maximum length of 4 m. In principle the 2-wire bus only has a semi-duplex capacity, which means that only one transfer channel is available so that only one station can send data at any one time. Only after the data have been sent can other stations respond, etc.

Installation instructions

During the installation work it must be ensured that the core pairs have the correct polarity since polarity reversal will result in the data signals being inverted. All troubleshooting work, particularly if it relates to problems with the installation of new terminal devices, should start with checking the bus polarity.

Bus cable

A (shielded) twisted pair cable with at least two cores and the shield should be used for the creation of the bus topology.

Termination

Terminating the cable with termination networks is generally required for RS485 connections to force the open-circuit level on the bus during times where no data transmitters are active.

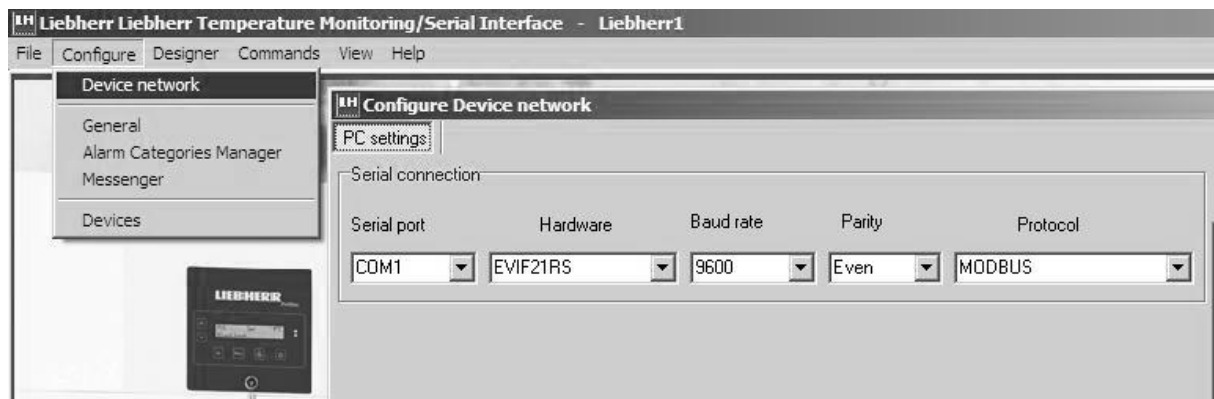
Settings for connected devices

To allow data transfer within the bus, the communication settings of the various devices must be identical. The same transfer speed (baud rate) and the same parity must be set on all the connected devices.

PC software

The following settings must be checked to ensure that the program can communicate with the bus:

To get to the network settings, the *Device network* function must be selected in the *Configure* pull-down menu.



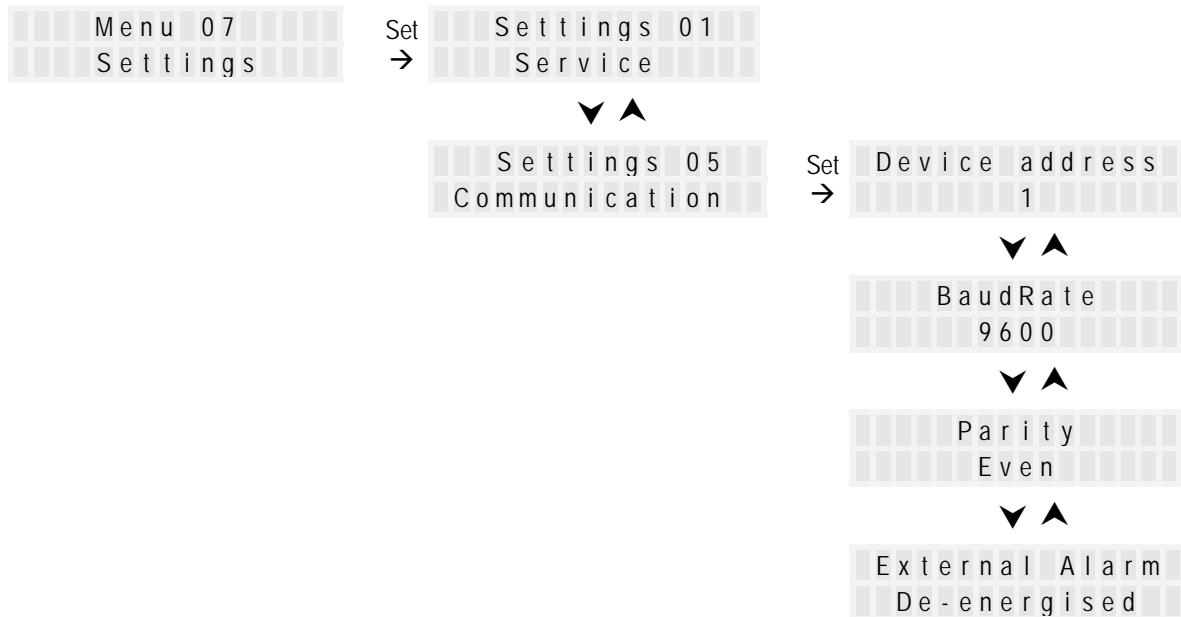
Serial port (COM)

The COM port must be selected to which the converter is connected.

Up to 20 devices can be managed by the program.

Device settings (LKPv / LGPv)

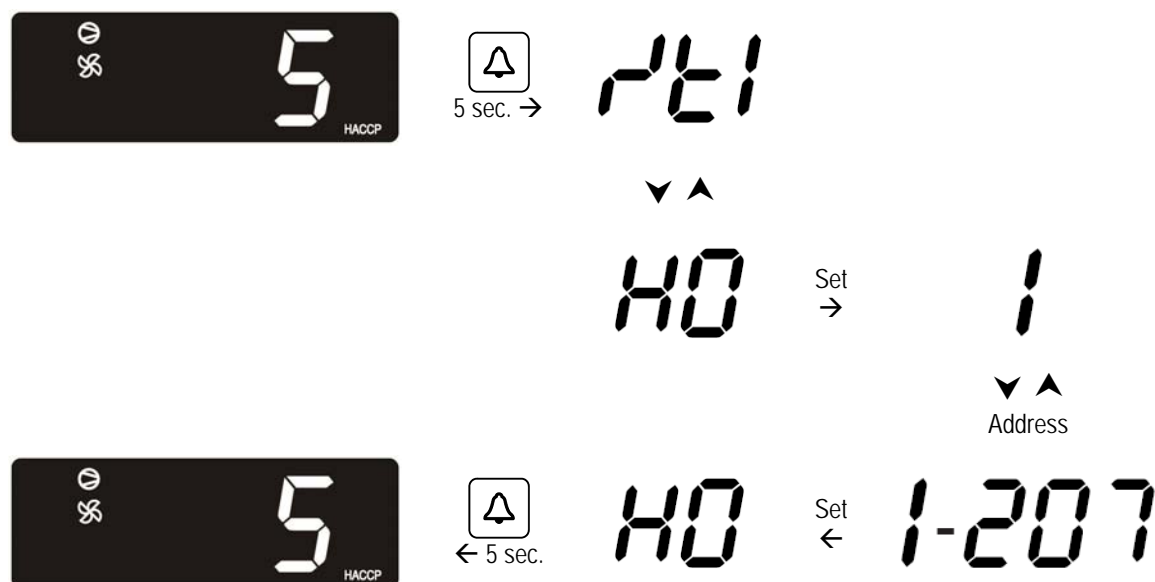
The refrigerator or freezer can be configured as follows using the electronics menu:



“Menu” button → Menu 07/Set up → “Set” button → Set up 05/Communication → “Set” button

Device settings (LKv / LKuv / LKexv / LKuexv / LGex / LGuex / LCv)

The refrigerator or freezer can be configured as follows using the electronics menu:



Baud rate

The baud rate values that can be set on the converter using the PC software are the following:

1200 bit/s
2400 bit/s
4800 bit/s
9600 bit/s
19200 bit/s

The baud rate values that can be set on the (refrigerator/freezer) device using the electronic control system are the following:

2400 bit/s
4800 bit/s
9600 bit/s

It must be ensured that the same baud rate is used for all the devices connected to the bus.

Parity

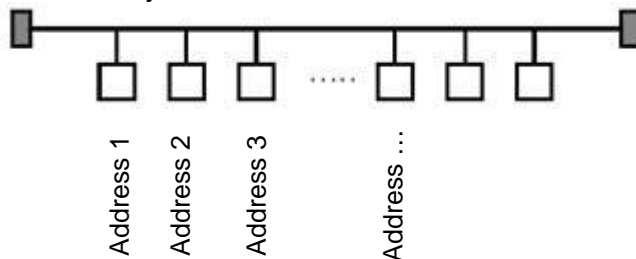
The parity bit is used to identify transfer errors. The parity bit ensures that if the parity is even ("EVEN") an even number of "1" bits is transferred and if it is odd ("ODD") an odd number of "1" bits is transferred. This means that the following are possible:

None → No parity bit
Odd → Odd parity
Even → Even parity

It must be ensured that the same parity is used for all the devices connected to the bus.

Address

Every station on the bus system must have its own address. Therefore the address must be set on every device that is connected to bus cabling. For example:



If no other information is declared, the device has address 1, even parity and a baud rate of 9600 bit/s when it is delivered.