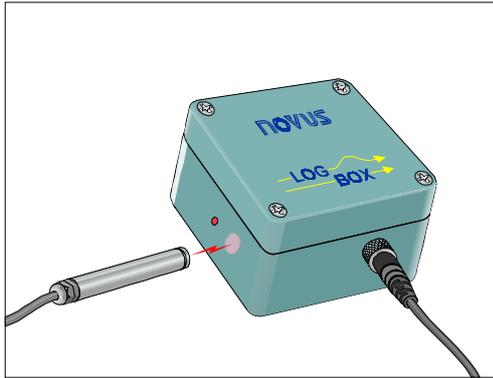# LOGBOX
Operation Manual

1. INSTALLATION

1.1 Connecting sensors to LogBox

Open up the LogBox cover to get access to the connection terminals (figure 1). In two channel models, jumper J2 is factory set for usage with thermocouples, Pt100 and 0-50mV. If you want to use channel 2 with 4-20mA input, you must change the strap position to the one indicated. Channel 1 is automatically software selected.
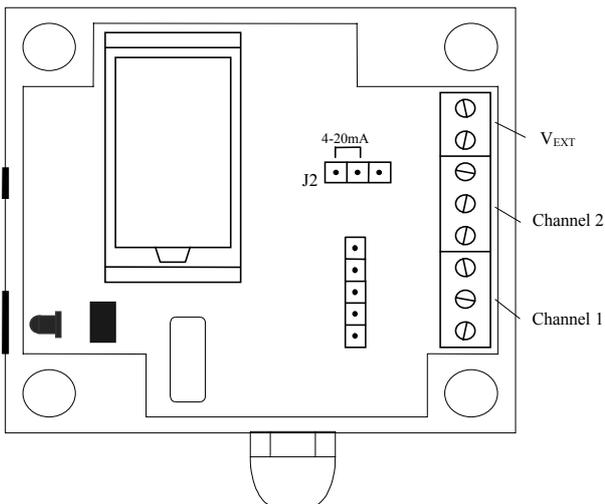

Figure 1 - Internal Connectors and Jumper Localization

Sensor cables must pass through cable grand to get into the device. They must be connected like it is shown in the diagram fixed on the inside face of the device cover (figure 2).
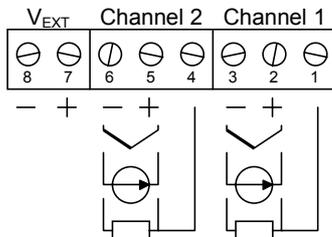

Figure 2 - Diagram Connection (Standard Model)

1.2 LogChart

LogChart is the software used to configure and offload data from the LogBox. It is Windows® 95, 98 and NT compatible.
Install and start LogChart software. At the very first time, you must select the computer serial port that shall communicate with LogBox, entering the "Port" menu and selecting one.
Important: Be sure your Windows date separator is configured as a slash (ex, dd/mm/aa ou dd/mm/aaaa).

2. CONFIGURATION

2.1 What to configure

Besides being the offloading software, *LogChart* is also the tool used to set it up. There is a *Parameters Configuration* window in LogChart that lets you configure the following parameters:
- Input type for each one of the channels
- Indication range for 4-20mA and 0-50mV input types
- Interval between channel readings
- Identification of the application (title) and measuring point (tag)
- How many loggings to be made

All Parameters Configuration data (example in figure 3) are transferred to LogBox for logging process to begin.
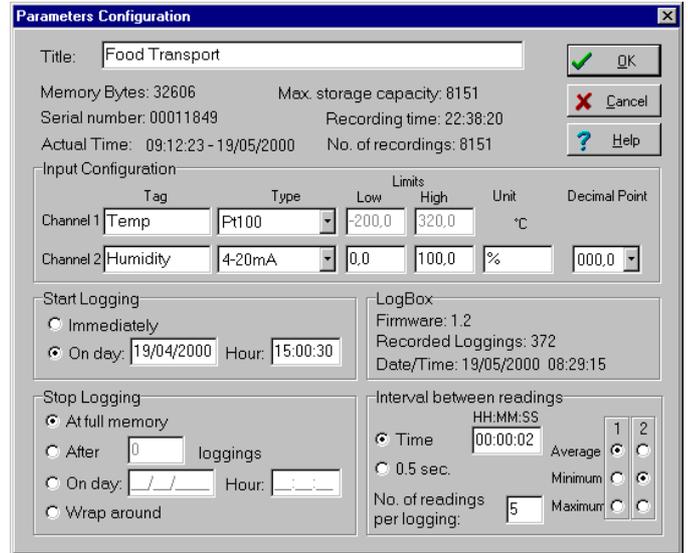

Figure 3 - LogBox configuration window

2.2 How to configure

Plug the IR-Link cable connector to the PC serial connector and place the infrared wand face to face with the LogBox comm window. Make sure the comm port of the PC is correctly selected.
Before starting logging you must configure several parameters.
Clicking in "Configure" on the "LogBox" menu or on the "GO" icon, the previous parameters will be read and displayed on the configuration window. These parameters can now be changed accordingly. By clicking "OK" the new parameters will be sent to the LogBox.

Configuration Options:

Title: Name of the application (up to 30 characters).
Tag: Alphanumeric code which identifies the sensor or the zone where it is placed (up to 10 characters).
Type: Sensor type being used.
Low Limit: Minimum value of the sensor range. This is fixed for thermocouples and Pt100 but can be changed for 4-20mA or 0-50mV signals. The minimum low limit is -1999.
High Limit: Maximum value of the sensor range. This is fixed for thermocouples and Pt100 but can be changed for 4-20mA or 0-50mV signals. The maximum low limit is 9999.
Unit: Engineering unit used for the sensor. For thermocouples and Pt100 it is °C. For 4-20mA or 0-50mV signal sensors the unit can be user configured.
Decimal Point: It defines the decimal point position for units measured through 4-20mA or 0-50mV signals.
Interval between readings: It sets LogBox channels reading rate, shown in the HH:MM:SS format. The seconds can be set for 0.5 second interval.
Number of readings per logging: It defines how many readings there must be to generate one memory record. If it is set to one (1), the instant value is recorded. It is usually used with "Average, Minimum, Maximum" parameter.
Average, Minimum, Maximum: This parameter defines what kind of processing must be done with the readings before the respective recording is made. It just makes sense if a value bigger than one is set to "Number of readings per logging" parameter. For example, if it was set to make 5 readings per logging in an interval between readings of 2 seconds and the average choice is enabled, after 10 seconds the average value of the 5 readings will be recorded as one logging.

Start Logging: Two modes can be selected.
→ Immediately: LogBox will start logging as soon as configuration is finished.
→ On day __/__/__ hour __:__:__ : LogBox will start logging on the day and time defined by the user.
Stop Logging: Four modes can be selected.
→At Full Memory: LogBox will stop logging when its available memory is full.
→After __ readings: LogBox will stop logging after the number of readings here defined.
→On day __/__/__ hour __:__:__ : LogBox will stop logging on the day and time defined by the user.
→Wrap around: LogBox will keep on recording the readings and when the memory is full it will overwrite the oldest logging in a circular (FIFO) or wrap around manner. The time stamped is kept updated accordingly.

Input Type	Range
None	-
Thermocouple J	-50 to 760°C
Thermocouple K	-90 to 1370°C
Thermocouple T	-100 to 400°C
Thermocouple E	-40 to 720°C
Thermocouple N	-90 to 1300°C
Thermocouple R	0 to 1760°C
Thermocouple S	0 to 1760°C
Thermocouple B	150 to 1820°C
Pt100	-200.0 to 320.0^{o}C
4-20mA	Programmable linear indication from -2000 to 9999
0-50mV	Programmable linear indication from -2000 to 9999

Figure 4 - Available Input Types Table

3. OFFLOADING DATA

Acquired data can be transferred to a PC with LogChart and be viewed in a chart and a table way. After data are offloaded, they can be saved in files for future analysis.
For data offloading, click on the corresponding icon or select the appropriate item of the *LogBox* menu. The infrared wand must be face to face with LogBox communication window. While in offloading process, a progress bar will be displayed. The offloading time is proportional to the amount of data logged.
Important: When you offload data, recordings are stopped. To restart the logging process, you must re-enter in the Parameters Configuration window.

4. SOME OTHER FEATURES

An external LED is used to indicate the device operating status. It usually blinks once each four seconds. When it starts to record (enters logging time), the LED blink is doubled. After loggings are finished, it again blinks a single time in a period of four seconds.
There is in LogBox a battery consumption projection **for 0,95Ah batteries**. This projection is available in *LogBox* menu (*Battery* option) and it requires communication with the device. Each time you get the battery out of the device (as in a battery change), this consumption indicator will consider that the new battery is full-charge. This feature was not created to try to use a battery untill it is almost empty. **Novus will not be responsible for data losses because of earlier battery discharge.**
There is an option for little calibration corrections to be made in LogBox. You can individually adjust the offset of the channels entering *LogBox* menu and then *Offset Adjust*. It is a good practice to check it out if the adjust was well succeeded by monitoring the input signals in the monitoring window. Important: every time you change the input type of one channel the offset of that channel will be reset to zero.
It is recommended to take a good look at LogChart's on-line help to see how to operate all the software features.

5. ADDITIONAL INFORMATION

If you have any doubt about this or other NOVUS products, you can e-mail us at info@novus.com.br or check out our home page: www.novus.com.br

6. LOGBOX TUTORIAL

1. Connect the sensors to LogBox. If no sensors are connected to the logger any recorded value will have no meaning at all.

2. Connect the IR Link wand to the PC serial port, approach the tip to the IR window and click "GO" in the tool bar menu. A message "Trying Communication" will appear in the lower left corner of the screen. If necessary try turning the wand to help IR communication. (Notice that the apparently weak IR signal is meant to be so in order to extend battery life)

3. After a few seconds the configuration window will be active. To start configuration follow the steps below:

3.1. Select input type for channel 1. By selecting "none" you will exclude this channel. For the "Temp" and "RHT" loggers the input type is fixed and cannot be changed. If this is your case go to item 3.3.

3.2. For 4-20mA or 0-50mV input types, the fields Low Limit and Upper Limit, Measuring Unit and Decimal Point can be edited. Choose the measuring range to be displayed. Example: If channel 1 is connected to a pressure sensor in the 0 to 30 bar range with 4 to 20mA output you can have the logger record directly in pressure scale unit by configuring:

· Decimal Point: 00,00
· Lower Limit: 0
· Upper Limit: 30,00
· Unit: bar

For all other input types (thermocouple, Pt100, ...), the limits and the scale unit is fixed (°C) and the decimal point option is not available.

3.3. Each channel can have a tag name which will be displayed on the graph identifying the channel.

3.4. A title for the application can be written which will describe the application or location.

3.5. Select the interval between readings. Choose a sampling time fast enough to have a good graph resolution but be ware that memory space is scarce. A compromise between logging interval and total logging time must be considered.

Two parameters must be configured: "Interval between readings" which defines the time between measurements, and Number of readings per logging which defines how many readings will generate one logging. The latter can be selected to record the average, the maximum or the minimum value measured within so many readings.

3.6. At last, configure the start logging time and stop logging time. Immediately will make the logger start logging right after sending the instructions. Start logging On day...and hour... will make the logger do so on that day and hour.

The field "Stop Logging " has the following options:

· At Full Memory: The logger will only stop when the memory is full.

· After __ loggings: the logger wil stop when completing that many loggings. This is helpful when the user knows the application and wants to save battery.

· On day: __/__/__ Hour: __:__:__ : The user can select the exact date and time for the logger to start working.

· Wrap Around (circular memory): The logger will keep on working indefinitely by overwriting the older recordings (first in, first out) thus keeping the data recorded for the full memory capacity.

3.7. Steps 3.1 to 3.3 must be applied to channel 2 when available. Channel 2 will have the same logging interval selected for channel 1, as well as start and stop time.

4. After all options selected click "OK" and send the new configuration to LogBox by pointing the IR Link to the IR Window. Confirm that you want to "Replace configuration of LogBox".

5. It is highly recommended that you perform some recordings after a new configuration to make sure that all sensors are well connected. To do so, point the IR Link to the IR Window and click on the LogBox menu and then on the Monitor option (or click on the "On-Line Monitor".

6. Data download can be performed at any time but this will stop the recording procedure. The data in memory can be downloaded as many times as necessary and they will not be erased. After doing a new configuration all data kept in memory from a previous logging will be erased.

7. SPECIFICATIONS

Signal input	Universal input that allows direct sensor measuring: thermocouples J, K, T, N, E, R, S and B, Pt100 RTDs, besides adjustable indication range 0-50mV voltage and 4-20mA current.
Resolution	12 bits (4096 levels)
Accuracy	• Thermocouples J, K, T e N: 0,25% of full scale $\pm$ 1°C • Thermocouples E, R, S e B: 0,25% of full scale $\pm$ 3°C • Pt100: 0,15% of full scale • Linear current or voltage: 0,15% of full scale
Pt100 excitation current	250µA
Input impedance	• 100Ω for 4-20mA inputs • 10MΩ for thermocouples and milivolts.
Storage capacity	• Usual : 8.111 readings • Optional: 16.303 readings
Data offloading time	8 seconds for 8.000 bytes
Computer interface	Infrared wand
Interval between readings	0,5s to 30 days
Loggings start	• Immediately • In a user programmed time (start can be delayed up to 30 days)
Recording mode	• Instant value • Average of up to 250 readings for each recording • Minimum or maximum value of up to 250 readings for each recording
Loggings end	• At full memory • After a preset record number • Never stops: overwrite oldest records
Software platform	• LOGCHART, Windows 95, Windows 98 and Windows NT compatible • It configures, reads and displays data on screen in many ways (list, graph, text files to be exported to other softwares) • It accepts plots overlay
Power	• 3,6V lithium battery (1/2 AA) • Optional external 4 to 5V_{CC} source (when external source is connected, internal battery is automatically cut off)
Estimated autonomy **(based on nominal charge values of a 950mAh battery)**	• 1245 days (interval between readings: 30s) • 1110 days (interval: 20s) • 840 days (interval: 10s) • 700 days (interval: 7s) • 560 days (interval: 5s) • 390 days (interval: 3s) • 280 days (interval: 2s) • 150 days (interval: 1s) • 80 days (interval: 0,5s)
Battery usage indication	Battery working life estimation info (0-100%)
Working temperature	From -40°C to 70°C (thermocouple cold junction compensation is made between 0°C and 70°C)
Dimensions	58x64x35mm