

IntesisBox[®] ASCII Server LON

User's Manual

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Gateway for monitoring and control LON systems using simple text messages through serial line RS232 or TCP.

Two models are available for this gateway, with the following **Order Codes**:

IBOX-ASCII-LON-A

Basic model supporting communication with up to 64 LON devices, and with 500 internal data points.

IBOX-ASCII-LON-B

Extended model supporting communication with up to 128 LON devices, and with 4000 internal data points.

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1. Description

1.1 Introduction

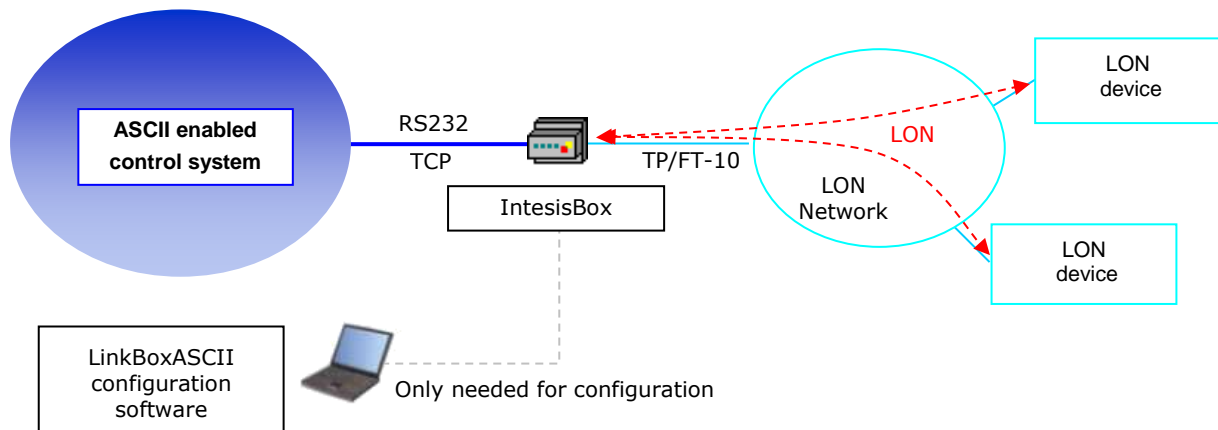
This document describes the integration of LON compatible devices or systems with *ASCII enabled control systems*¹ using the gateway *IntesisBox ASCII Server - LON*.

This document assumes that the user is familiar with LonWorks[®] technology and technical terms.

From now on, and with the aim of easy the read of this document, just the word "IntesisBox" will be used instead of the full gateway model description "IntesisBox ASCII Server - LON".

The aim of this integration is to make accessible signals and resources of any LON based system (HVAC Control, Air Conditioning, etc.) from any system capable to be programmed to read and write simple text messages through RS232 serial port or TCP connection (for example AMX, Creston or LiteTouch controllers, PC software, etc.).

For this, IntesisBox acts as a LON device in its LON interface, reading/writing points of other LON devices of the LON system, and offering this point's values through its ASCII interface using simple text messages. The readings into the LON device(s) performed by IntesisBox are by continuous polling.



Monitoring and control of LON systems from ASCII enabled control systems using *IntesisBox ASCII Server - LON* gateway

¹ The term "ASCII enabled control systems" will be used along this document to refer to supervision/control/automation systems allowing to be programmed to read and write simple text messages through RS232 serial port or Ethernet TCP port.

1.2 Functionality

The integration operation is as follow:

From the LON system point of view, after the start up process, IntesisBox reads continuously the points configured to be read, by polling, into the LON devices defined. The values received are immediately updated in memory and become available to be read by the ASCII enabled control system in any moment.

IntesisBox is a LON client device, this means that no LON points of IntesisBox can be accessed from other LON devices connected to the LON network (no bindings are allowed by IntesisBox), IntesisBox just offer in its ASCII interface a mirror of those remote LON device's points declared into it, allowing also writings of these LON device's points from the ASCII interface.

Each LON basic data type of a network variable in LON devices can be mapped into an individual internal point in IntesisBox, up to 4000 internal points can be defined.

When a write message is received in the ASCII interface, of a valid internal point, the corresponding LON telegram is sent immediately to the LON device to perform the corresponding action.

As for the ASCII side, after the start up process, IntesisBox waits for any query (ASCII message requesting reading of a point, or ASCII message requesting writing of a point), and acts accordingly with the message received. Any point into IntesisBox can be also configured to notify to the ASCII side any change of value received from LON, by means of a spontaneous text message sent through the ASCII interface. See ASCII interface section for details about different ASCII messages used and their format.

1.3 Capacity of IntesisBox

Element	Max. (Basic version)	Max. (Extended version)	Notes
Type of LON devices			Those supporting Twisted Pair - Free Topology channel (TP/FT-10)
ASCII devices	1	1	Only one ASCII device, either through RS232 or TCP, can be connected at a time. Both connections can't be enabled simulatenously.
Number of LON network variable fields	500	4000	Maximum number of points that can be defined into IntesisBox. Each of them can be associated to an individual field of a LON network variable.
Number of LON devices	64	128	Maximum number of different LON devices that can be defined into IntesisBox (to read/write points into them).

There are two different models of *IntesisBox® ASCII Server - LON* with different capacity each one.

- Basic version with capacity of 500 points and 64 LON devices.
Ref.: IBOX-ASCII-LON-A
- Extended version with capacity of 4000 points and 128 LON devices.
Ref.: IBOX-ASCII-LON-B

2. The ASCII interface of IntesisBox

In this section, a common description for all IntesisBox ASCII Server series gateways is given.

2.1 Description

Any *ASCII enabled control system* can communicate with IntesisBox through standard RS232 serial line (IntesisBox ASCII port is an RS232 DB9 connector, DTE) or through a standard TCP connection, and read/write through this serial line the internal datapoints of IntesisBox using simple text messages.

IntesisBox, on receiving a write message in its ASCII interface, sends the corresponding write telegram to the associated network variable of the LON device.

In the continuous polling process of LON devices, when a new value for a point is received, the corresponding text message indicating the new value will be sent through the ASCII interface, but only if the point is configured for sending this "spontaneous message", if it is not configured to do so, then the new value will be available to be polled in any moment from the *ASCII enabled control system* connected to the ASCII interface. This behaviour, of sending or not through the ASCII interface the new values received from LON, is configurable individually per point into IntesisBox.

2.2 Communication parameters and ASCII messages

The communication parameters of the ASCII interface are the following:

Baud rate: configurable (1200 bps ... 57600 bps).

Data bits: configurable (7, 8).

Parity: configurable (None, Even, Odd, 2stop).

Stop bits: 1 (except if parity is configured to 2stop).

The ASCII messages used to read/write points into the gateway through this interface are:

Message to read a point's value:

>Daaaa?\r

Where:

aaaa is a 4 digits number indicating the point's address inside the gateway (see point addresses details below in this document).

\r means *carriage return*, character (HEX 0D, DEC 13).

Examples:

>D0001?\r

>D0097?\r

Message to write a point's value:

>Daaaa=vv\r

Where:

aaaa is a 4 digits number indicating the point's address inside the gateway (see point addresses details below in this document).

vv is the desired value for the point (it can be just integer or fractional, decimal point is used to separate integer and fractional parts if the number is fractional).

\r means *carriage return* character (HEX 0D, DEC 13).

Examples:

>D0001=1\r

>D0097=22.5\r

Message informing about a point's value (sent spontaneously by IntesisBox when receiving a change from LON or sent by IntesisBox in response to a previous read message for the point):

>Daaaa=vv\r

Where:

aaaa is a 4 digits number indicating the point's address inside the gateway (see point addresses details below in this document).

vv is the actual value of the point (it can be just integer or fractional, decimal point is used to separate integer and fractional parts if the number is fractional).

\r means *carriage return* character (HEX 0D, DEC 13).

Examples:

>D0001=1\r

>D0097=22.5\r

Messages to indicate erroneous actions:

>**E01**\r Is returned by IntesisBox when you try to read a point not existing.

>**E02**\r Is returned by IntesisBox when you try to write a point not permitted to be written.

2.3 Points definition

Every point defined in IntesisBox has the following ASCII features associated to it, which can be configured:

Feature	Description
Address	Datapoint address. Used in the ASCII telegram to read/write the datapoint.
Spontaneous	Determines if any change of value for the point received from LON will generate a spontaneous ASCII message to be sent through the ASCII interface informing about the new value.
Active	If activated, means that the point is active inside IntesisBox, if not activated is like point not defined. It allows you to deactivate points without the need of delete them (useful for future use of these points).

3. The LON interface of IntesisBox

This section describes the LON part of the IntesisBox configuration and functionality. This section assumes the user is familiar with LON technology and technical terms.

3.1 Description

The LON systems are composed of devices connected to a network, the media and topology of the bus used to interconnect the different devices in the network can be of some different types, even devices connected to different media can coexist and communicate between them in the same LON network by the use of media converters (switches, routers...).

IntesisBox LON interface is compatible with *twisted pair free topology channel* (TP/FT-10) media, nowadays the most widely used media due to its robustness and the different topologies that can be used and mixed together.

All LON devices offer their internal datapoints (of input and output type) in the form of standardized data objects called *Standard Network Variable Types* (SNVTs), which assures total interoperability between LON devices. More specific data types used basically for configuration purposes of the LON devices are also defined by the standard (SCPTs), and even user defined data types (UNVT) can be implemented and used by any manufacturer in a LON device.

All the mentioned data types are also supported by IntesisBox.

Standard Network Variable Types (SNVTs) are named by convention with a prefix that indicates if it is an input variable (prefix *nvi*) or an output variable (prefix *nvo*).

A SNVT can be composed of one or more data fields, for example, one of the most used SNVTs is the type *switching*, this SNVT has two data fields: *value*, and *state*.

Many devices use this SNVT *switching* for basic ON/OFF operations, and for the device to accept a given operation (ON or OFF) you must write specific values in the field *state* but also in the field *value* at the same time. For example, when communicating with the Daikin LON interface DMS504B51, to switch ON the AC indoor unit number 1, you have to use the variable *nviOnOff_01* (of type *switching*), and the values to write in both fields can be the following:

Operation	Value	State
ON	1 - 255	1
OFF	0	1
OFF	Any (0 - 255)	0

Note that you must write into both fields of the variable to accomplish both operations, ON and OFF.

To allow the *ASCII enabled control system* to interactuate with more than one SNVT field at the same time by using just a single point of IntesisBox, special SNVT with filters have been incorporated to IntesisBox, using these special SNVTs with filters you can write into more than one field of the LON variable when you write just a single point's value from ASCII. See below an example of use of a special SNVT with filter called *SNVT_switch_filter_0_1* linked to the mentioned above variable *nviOnOff_01* of Daikin.

ASCII controller

IntesisBox

Daikin

<i>Operation</i>	<i>ASCII</i>	<i>SNVT_switch_filter_0_1</i>	<i>nviOnOff_0_1 Value</i>	<i>nviOnOff_0_1 State</i>
OFF	0	0	0	0
ON	1	1	100	1

This way you only have to choose the right special SNVT with filter into the IntesisBox configuration table for this kind of LON variable and associate it to an individual ASCII address.

See below the list of special SNVTs with filters available in IntesisBox.

3.2 Points definition

Every point defined in IntesisBox has the following LON features associated to it:

Feature	Description
Device	LON device to which belongs the point, from a list of LON devices that can be defined into IntesisBox (up to 128). For each LON device defined, a virtual signal is created automatically in IntesisBox to inform about the communication with the LON device, this signal is available also from the ASCII interface like the rest of the points.
SNVT	SNVT number according to EIA-709 standard.
SNVT Name	SNVT Name, selectable from the list of all available SNVTs defined by EIA-709 standard, and also special SNVTs with filters explained above.
Idx	Index of the network variable inside the LON device.
RW	Indicates if the variable is of type input (W), output (R), or input/output (RW). <i>Note that an output variable in the LON device must be defined as R, to be read by the IntesisBox. And an input variable as W, to be written by the IntesisBox.</i>

4. LinkBoxASCII. Configuration & monitoring tool for IntesisBox ASCII series

4.1 Introduction

LinkBoxASCII is a windows™ compatible software tool developed specifically to monitor and configure IntesisBox LON series. It is possible to configure all external protocols available for IntesisBox LON and to maintain different customer's configurations based on a LinkBoxASCII project for every different installation. Maintaining always on hard disk a copy of the last configuration files for every external protocol and customer, that is to say for every project.

From LinkBoxASCII, as well as configure the integration signals list and connection parameters for every external protocol, it is permitted also to select the serial port to use to connect to IntesisBox and the use of some tools for monitoring and debugging de device. Some of these tools will be explained in this document but only some of them, the rest of available debugging tools and commands will not be explained here because they are for exclusive use under the recommendations of Intesis Software technical support.

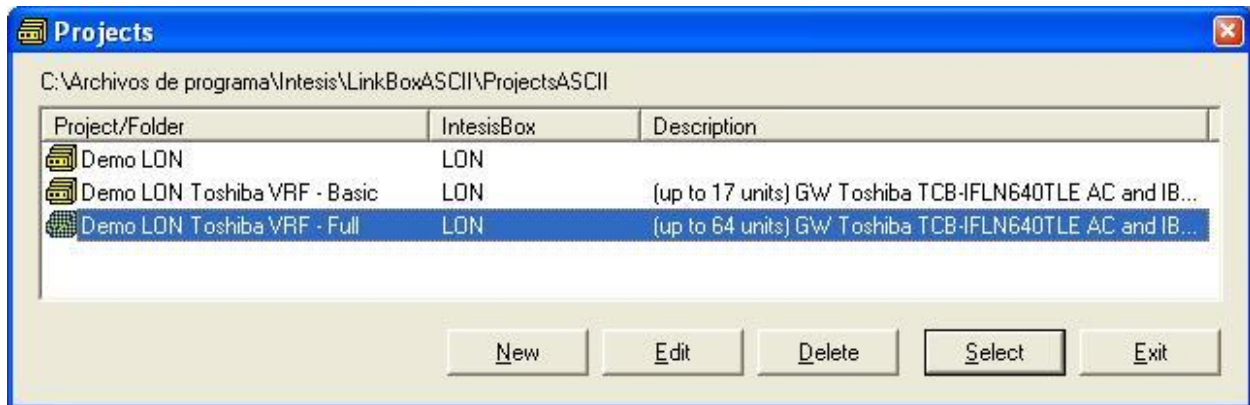
LinkBoxASCII allows configuring all IntesisBox LON series independently of the external system or protocol used. For every external system, LinkBoxASCII has a specific configuration window. Periodically, new free versions of LinkBoxASCII are released incorporating the latest developed integrations for external systems.

4.2 Project definition

For a new installation, the first step to do in LinkBoxASCII is to create the installation's project giving a descriptive name to it. When you create a project, a new folder is created with the name of the project containing the configuration files needed depending on the external protocol selected for the project. It is strongly recommended that you create a new project for every installation, if not, overwriting of configuration files of previous installations using the same external protocol may occur, loosing the configuration data for those previous installations. The projects folder is located in AppFolder\ProjectsASCII, where AppFolder is the installation folder of LinkBoxASCII (by default C:\Program Files\Intesis\LinkBoxASCII). Inside the projects folder, a new folder will be created for every project defined in LinkBoxASCII with the files needed for the project.

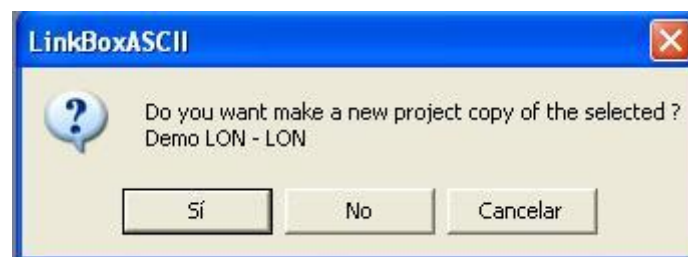
When you open LinkBoxASCII, the project selection window will appear inviting you to select a project or to create a new one. A demo project for every external protocol supported is provided with the standard installation of LinkBoxASCII.

You can create a brand new project, which will create a blank project (only basic parameters will be already configured), or you can select a demo project based on the external protocol desired and create a new project based on this demo project selected (all the configuration of the demo project will be copied into the new project created).



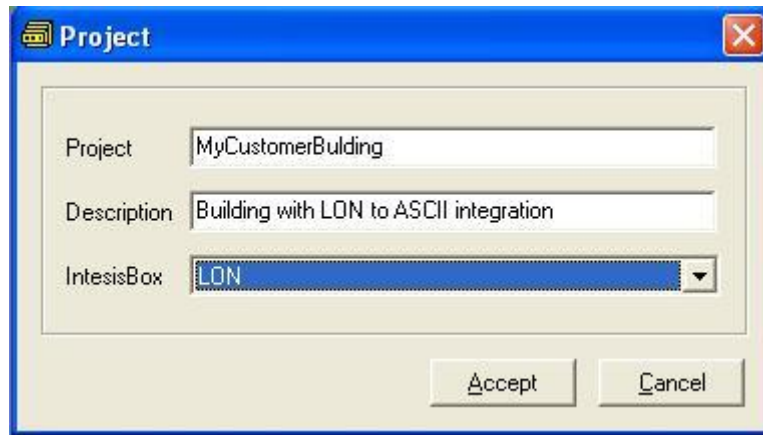
Project selection window

To create a new project, select a project using the same external protocol you want to use in the new project and push *New* button. You will be prompted to create a copy of the selected project (useful for similar installations) or create a brand new one.



If you select *Yes*, you will be prompted to specify a name and a description for the new project that will contain a copy of the configuration of the selected one.

If you select *No*, you can specify a name, a description and an external protocol to use from the list of available external protocols. This will create a brand new project based in the external protocol specified.



On *Accept*, a new folder will be created inside the projects folder with the name given to the project, this folder will contain the template configuration files if the project is a brand new one, or a copy of the configuration files if it is a copy of a selected one.

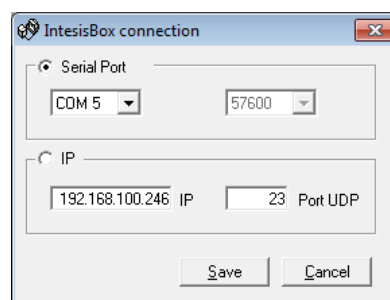
A description of the files created for an ASCII protocol based project can be found in section *Files* below in this document.

From all the possibilities of LinkBoxASCII, only changes in configuration for the integration and configuration file generation can be performed while disconnected from IntesisBox (working off-line), allowing you to do these tasks in the office more comfortably. Before any monitoring or downloading action to IntesisBox can be performed, the connection between IntesisBox and the PC running LinkBoxASCII must be established (working on-line). To do so follow these steps:

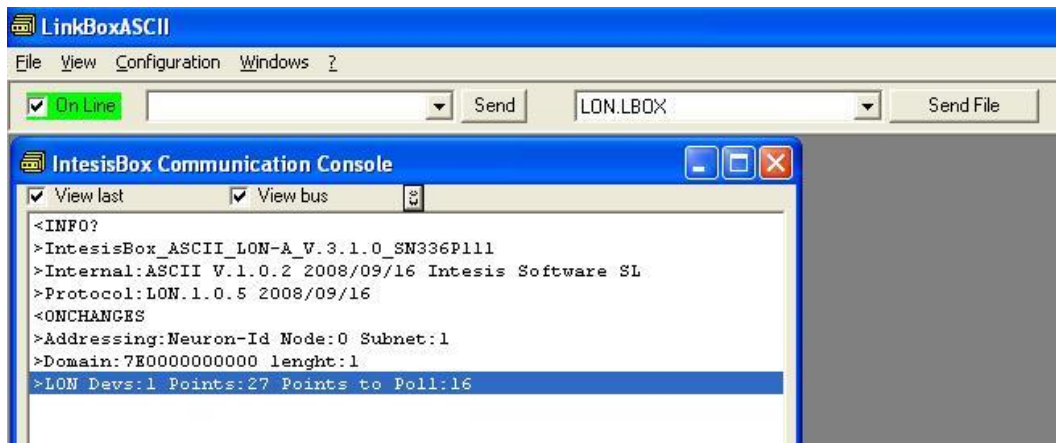
1. Make sure IntesisBox is powered-up and correctly connected to the LON system via the TP-FT/10 bus and to the ASCII system via the RS232 connection or TCP connection (consult details for connection and pin assignments in section *Connections* of this document).
2. If using the serial connection, connect a free PC serial port to IntesisBox's serial port marked as **PC Console**. (Use the standard serial cable supplied with IntesisBox or makes your own cable following the pin assignments specified in section *Connections* in this document).

If using the Ethernet connection, connect an Ethernet cable between the **ETH** port of the IntesisBox and the PC or the corresponding Ethernet interface (Check *Connections* section in this document for more information).

3. If using the **PC Console** (Serial) port, select in LinkBoxASCII the PC serial port used for the connection to IntesisBox. Use menu Configuration -> Connection.
If using the **ETH** (IP) port, select in LinkBoxASCII the IP option with the corresponding IP.

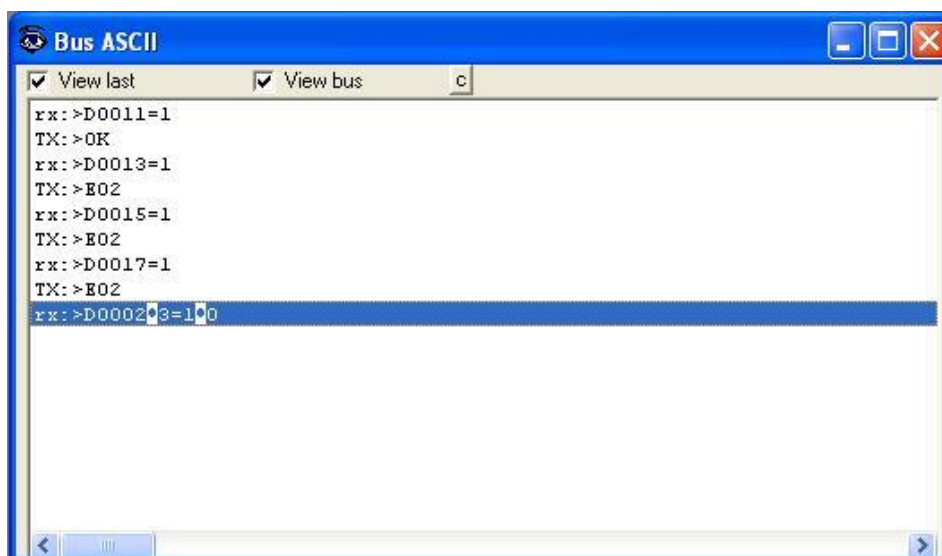


4. Check the checkbox *off-line* under the menu bar (it will change automatically to *on-line*) and LinkBoxASCII will ask for INFO about the IntesisBox connected to it via the serial connection, if the connection is ok then IntesisBox will respond with its identification (this can be monitored in the *IntesisBox Communication Console* window, as showed below).

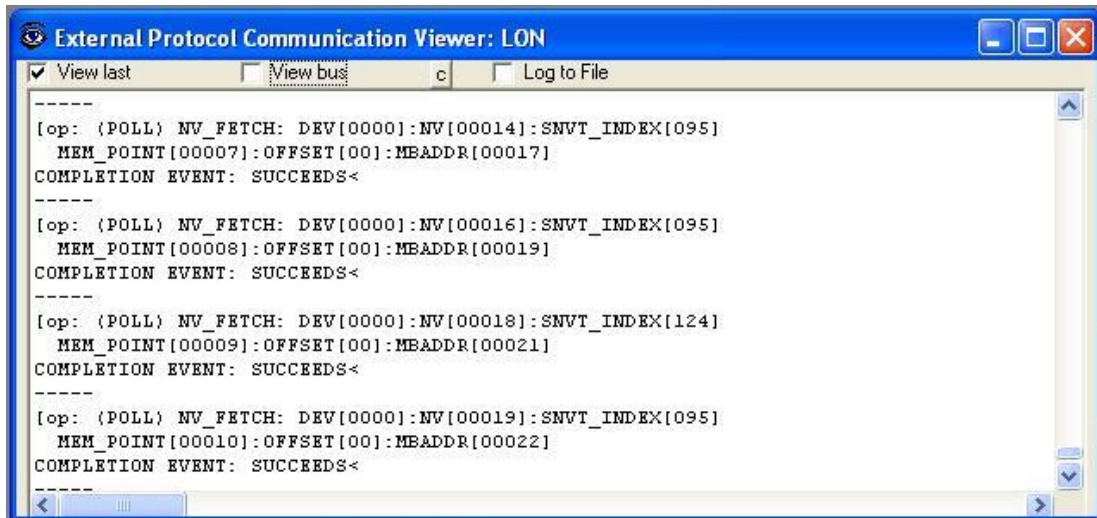


Once connected to the IntesisBox, all the options of LinkBoxASCII are fully operative.

To monitor the communication between IntesisBox and the ASCII system, select the menu *View -> Bus -> ASCII*. The ASCII *communication Viewer* window will be opened. This window shows in real time all the communication frames between IntesisBox and the LON system as well as debugging messages referent to the internal protocol (ASCII) sent by IntesisBox.



To monitor the communication between IntesisBox and the external system (*LON* in this case), select the menu *View -> Bus -> External system*. The *External protocol communication viewer* window will be opened. This window shows in real time all the communication frames between IntesisBox and the LON devices as well as debugging messages referent to external protocol (LON) sent by IntesisBox.



```
External Protocol Communication Viewer: LON
View last View bus Log to File
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00014]:SNVT_INDEX[095]
  MEM_POINT[00007]:OFFSET[00]:MBADDR[00017]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00016]:SNVT_INDEX[095]
  MEM_POINT[00008]:OFFSET[00]:MBADDR[00019]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00018]:SNVT_INDEX[124]
  MEM_POINT[00009]:OFFSET[00]:MBADDR[00021]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00019]:SNVT_INDEX[095]
  MEM_POINT[00010]:OFFSET[00]:MBADDR[00022]
COMPLETION EVENT: SUCCEEDS<
-----
```

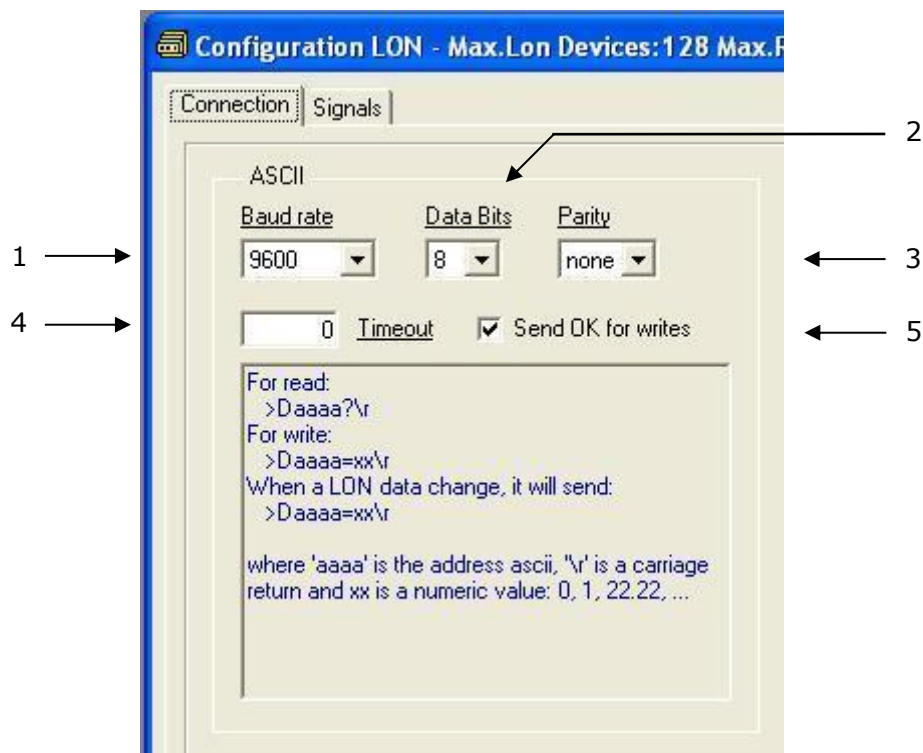
To configure the integration connection parameters, and the points list, select menu *Configuration -> IntesisBox*. The *LON Configuration* window will be opened.

4.3 Connection configuration

Select the *Connection* tab to configure the connection parameters.

Two kinds of information are configured using this window, the connection parameters of the ASCII interface, and the connection parameters of the LON interface.

ASCII interface configuration parameters:



The ASCII configuration parameters.

1. Enter the baud rate to use.
2. Enter the data bits to use.
3. Enter de parity to use.
4. Enter the timeout (in milliseconds) to wait between consecutive sendings of spontaneous frames.
5. Check this if you want IntesisBox to respond with **>OK\\r** after receiving a successful write message in the ASCII side.

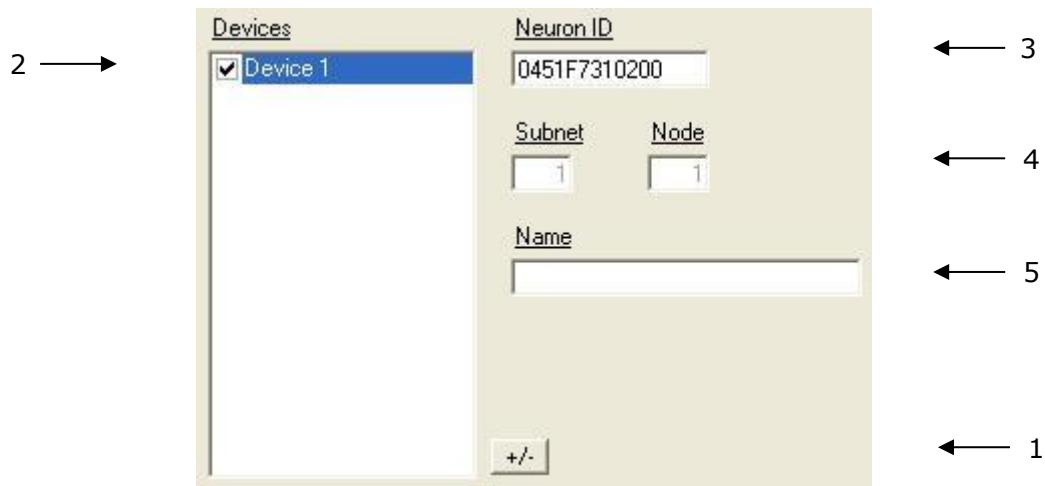
LON interface configuration parameters:

The screenshot shows a configuration window titled "LON". It contains several input fields and options:

- 1 → Domain: A text box containing "7e".
- 2 → Length Domain: A dropdown menu showing "1".
- 3 → Subnet: A text box containing "1".
- 4 → Node: A text box containing "0".
- 5 → Addressing: Two radio buttons, "Neuron ID" (selected) and "Subnet/Node".
- 6 → Poll period: A text box containing "50".

The LON configuration parameters.

1. Enter the Domain number for IntesisBox into the LON network.
2. Enter the length in bytes of the Domain field.
3. Enter the Subnet number for IntesisBox into the LON network.
4. Enter the Node number for IntesisBox into the LON network.
5. Enter the type of addressing to use by IntesisBox to access the LON devices: Neuron Id or Subnet/Node. If the devices are in an already commissioned LON network, then choose Subnet/Node here and enter the correct Subnet and Node numbers of the devices (this must be supplied by the LON integrator that has commissioned the network). If the devices are not commissioned, then choose Neuron Id here and enter the correct Neuron Id numbers of the devices. IntesisBox has embedded tools to scan and detect Neuron Id numbers of the LON devices connected to the network, and also to declare the devices as commissioned, avoiding this way the need of a commissioning tool like LonMaker. See details of use of these embedded tools below in this document.
6. Device's polling cycle time period.



1. Use this button to define the number of LON devices to integrate. Remember the limitations: just 64 devices in IntesisBox basic model, and 128 devices in IntesisBox extended model. Once entered here the number of LON devices to integrate, they will appear in the list of devices (2).
2. List of LON devices to integrate. Check the devices you want to activate. Select a device to configure its properties.

For every LON device defined, these are the properties that must be entered:

3. Enter the Neuron Id, or
4. Enter the Subnet and Node number of the LON device.
5. Enter the device name (optional, just for identification purposes).

IntesisBox version configuration parameters:



1. Select the version of IntesisBox used.

Remember you can identify the version of your IntesisBox by the order code printed in the front label:

- IBOX-ASCII-LON-A.** Basic model supporting up to 64 LON devices and 500 points.
- IBOX-ASCII-LON-B.** Extended model supporting up to 128 LON devices and 4000 points.

You can identify also the model of IntesisBox by its identification given in response to an INFO command, it is something like this:

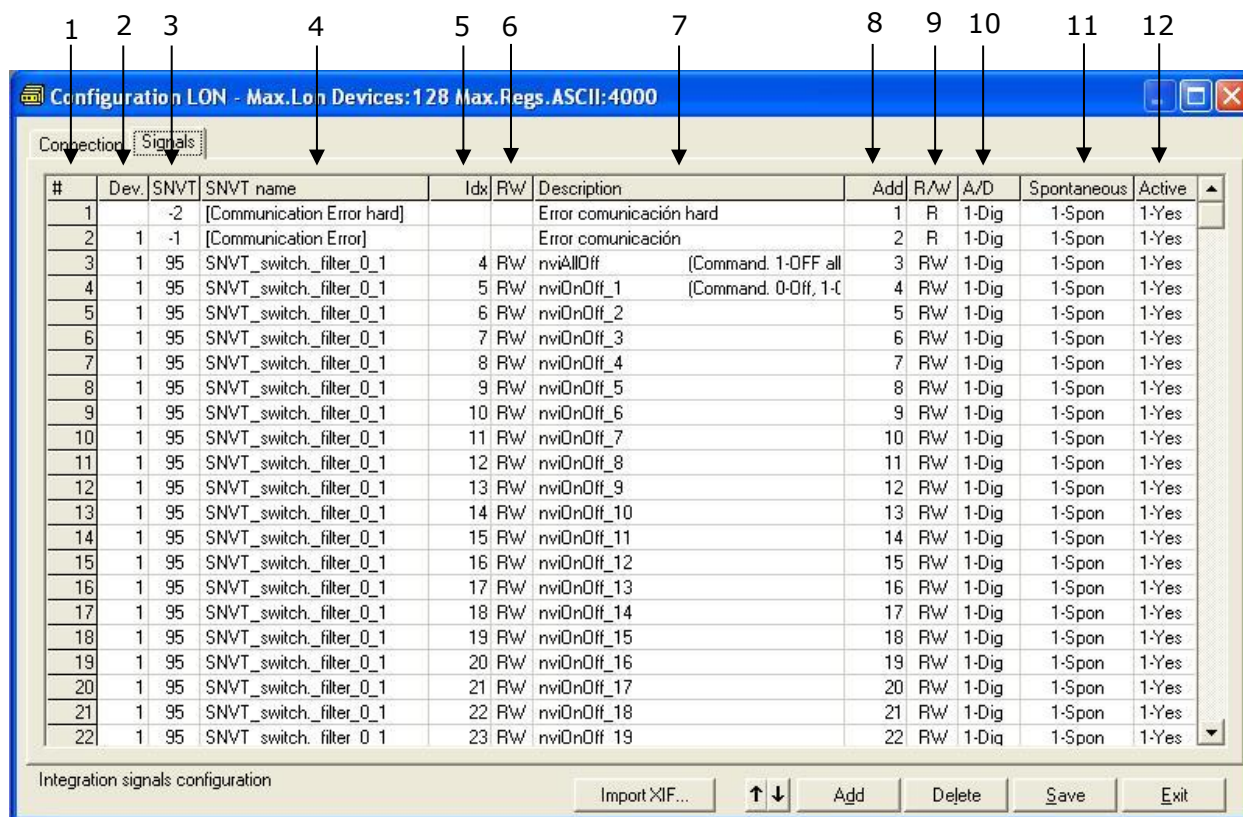
IntesisBox_ASCII_LON-**A**... -> this is the basic model.
IntesisBox_ASCII_LON-**B**... -> this is the extended model.

2. Select the current firmware version your IntesisBox has.
You can identify also the current firmware version of IntesisBox by its identification given in response to an INFO command, it is something like this:

IntesisBox_ASCII_LON-A_V**43.1.x**....
IntesisBox_ASCII_LON-B_V**43.1.x**...

4.4 Points configuration

Select the *Signals* tab to configure the points list (the IntesisBox's internal datapoints).



13 Signals list

14

1. #. Point number (edit not permitted). Every row in the grid corresponds to a point. Points (rows in the grid) can be added or deleted selecting the desired row and clicking *Add* or *Delete* buttons. Deletion action can be executed for a single row or even for some consecutive rows, all the rows selected will be deleted. This column is used only to enumerate the rows in the grid (points).
2. *Dev.* device number to which belongs the point. Referenced to the list of devices defined in *Connection Tab*. Note that this is the order number of the device (from top to bottom) in the devices list.
3. *SNVT*. SNVT Id number according to EIA-709 standard. Edit not permitted.
The *Communication error* virtual signals have always a predefined special SNVT Id numbers -1 and -2.
4. *SNVT Name*. This is the SNVT to select for the point. Select the SNVT desired from a list of all standard SNVTs defined by LonMark International and a few special SNVTs with filter (their use explained in section 3.1), open this list by clicking the mouse right button over the column. Consult the documentation of the LON devices to integrate for details of which SNVT is used for every point into the device.
5. *Idx*. This is the index of the variable inside the LON device. Consult the device's documentation to obtain it.

6. *RW*. Indicates if the variable is of type input (W), output (R), or input/output (RW).
Note that an output variable in the LON device must be defined as R, to be read by the IntesisBox. And an input variable as W, to be written by the IntesisBox.
7. *Description*. Point's description. Just for identification purposes.
8. *Add*. Point's address. To be used by the ASCII messages sent and received through the ASCII interface to refer to the point. For example if the point has address 1, then all the ASCII messages related to this point will contain **0001** in the address field (i.e. **>D0001?\r** to request the current value of the point).
9. *R/W*. Indicates if the point can be Read, Written or Both, always from the ASCII system point of view. This value is fixed depending on the LON object type selected for the point. Edit not permitted.
10. *A/D*. Indicates the type of point, analog or digital, always from the ASCII system point of view. Analog points will accept any value included decimal point, while digital ones will only accept values 1 or 0.
11. *Spontaneous*. Indicates if IntesisBox will send or not a spontaneous message through the ASCII interface indicating the new value whenever the point's value changes. Possible values: 0-NoSpon, 1-Spon. Edit using the mouse right-button-click menu available on the column.
12. *Active*. Indicates if the point is active or not for IntesisBox. Possible values: 0-No, 1-Yes. Edit using the mouse right-button-click menu available on the column.
13. *Import XIF*. Press this button in order to launch the embedded import tool of XIF files. With this tool, any XIF file of a LON device can be imported, and you will be able to select those variables to integrate, among all the available in the LON device, and import them into the datapoints table with an automatic fulfilment of the needed LON parameters of each datapoint. *Note that an automatic assignment of the most suitable SNVT or filter for each SNVT to import will be done by the tool, but in some cases it requires a manual fine tune after this automatic assignment of filter.*
14. Buttons to move the selected row (or rows) up or down inside the grid. To move up or down inside the grid a single row or a group of consecutive rows, just select the row or rows using the left button of the mouse and push the desired up or down button. (This can be done also using the key combinations *ALT+arrow up* or *ALT+arrow down* instead of up or down buttons).

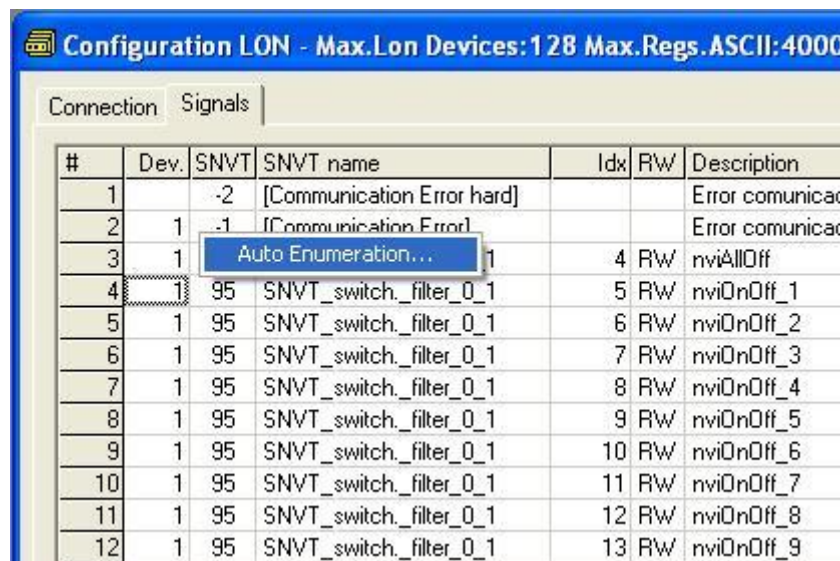
Useful tips for a more quick and comfortable use and configuration of the points table:

The columns *SNVT Name*, *RW*, *A/D*, *Spontaneous* and *Active*, can be modified selecting one or just more than one consecutive cells in the same column and using the contextual menu appearing with mouse right button click over the cells selected.

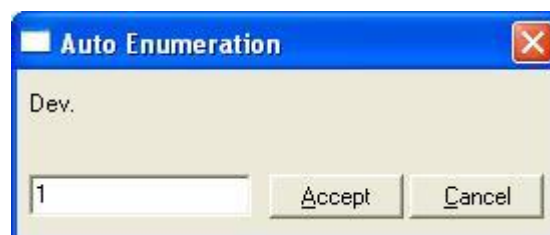
The *Dev*, *Idx*, *Description* and *Add* columns can be modified using mouse-left-button double-click over the desired cell and entering the desired value by the keyboard.

In the *Dev* and *Add* columns you can enter the desired value individually per cell or you can auto enumerate some consecutive cells, for this last follow these steps:

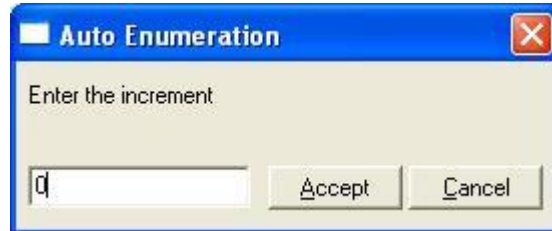
1. Select using the left mouse button (clicking and dragging) the *Dev* or *Add* field of all the rows in the list to which you want to automatically assign addresses (must be consecutive rows).
2. Click right mouse button over the selected fields and select *Auto Enumeration* option from the pop-up menu that will appear.



3. Enter the first value to assign.

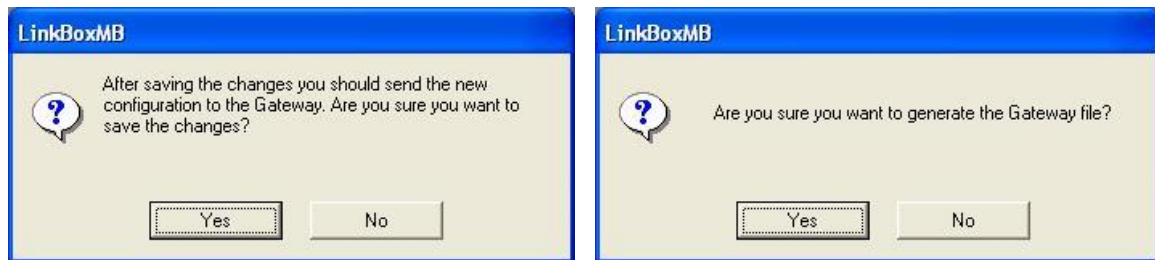


4. Enter the increment between consecutive assignments. For example selecting 1 for the first value and an increment of 1, the values generated will be 1,2,3,4,5... and so on (useful to assign consecutive addresses). Selecting 1 for the first value and an increment of 0, the values generated will be always 1 (useful to assign the same device number to many points).



4.5 Saving the configuration and Sending it to IntesisBox

When the configuration is finished, click on button *Save* to save it to the project folder on hard disk. You will be prompted to generate the configuration file to send to IntesisBox, if you select *Yes*, the binary file containing the configuration for IntesisBox will be generated and saved also into the project folder.



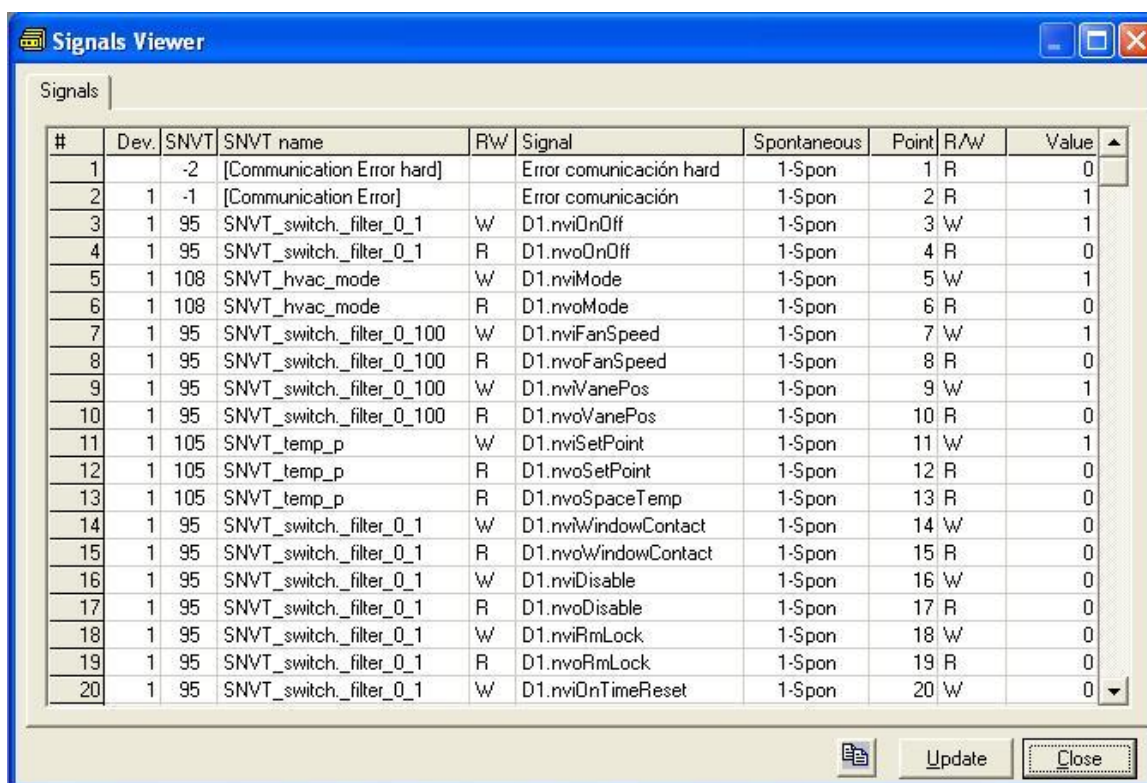
To save the configuration

After this, to send the configuration file to IntesisBox click on the button **Send File**. The process of file transmission can be monitored in the *IntesisBox Communication Console* window. If the file transmission is ok, IntesisBox will reboot automatically with the new configuration loaded.

Remember that saving the configuration and generating the IntesisBox file only saves to the hard disk on the PC the configuration files. **Do not forget to send the configuration file to the IntesisBox using button *Send File*.**

4.6 Signals viewer

Once IntesisBox is running with the correct configuration, to supervise the status of the configured signals, select menu *View -> Signals*. The Signals Viewer window will be opened. This window shows all the active IntesisBox's points with its main configuration parameters and its real time value in the column Value. After a reset of IntesisBox or after sending a configuration file to the IntesisBox, all the point's values will be updated automatically in the signals viewer, in case you connect to the IntesisBox when it is already running, you should press the *Update* button to get updated values, press just once the button to update all the signal values, from this moment the point's values will be maintained updated until the connection is closed.



#	Dev.	SNVT	SNVT name	R/W	Signal	Spontaneous	Point	R/W	Value
1		-2	[Communication Error hard]		Error comunicaci3n hard	1-Spon	1	R	0
2	1	-1	[Communication Error]		Error comunicaci3n	1-Spon	2	R	1
3	1	95	SNVT_switch_filter_0_1	W	D1.nviOnOff	1-Spon	3	W	1
4	1	95	SNVT_switch_filter_0_1	R	D1.nvoOnOff	1-Spon	4	R	0
5	1	108	SNVT_hvac_mode	W	D1.nviMode	1-Spon	5	W	1
6	1	108	SNVT_hvac_mode	R	D1.nvoMode	1-Spon	6	R	0
7	1	95	SNVT_switch_filter_0_100	W	D1.nviFanSpeed	1-Spon	7	W	1
8	1	95	SNVT_switch_filter_0_100	R	D1.nvoFanSpeed	1-Spon	8	R	0
9	1	95	SNVT_switch_filter_0_100	W	D1.nviVanePos	1-Spon	9	W	1
10	1	95	SNVT_switch_filter_0_100	R	D1.nvoVanePos	1-Spon	10	R	0
11	1	105	SNVT_temp_p	W	D1.nviSetPoint	1-Spon	11	W	1
12	1	105	SNVT_temp_p	R	D1.nvoSetPoint	1-Spon	12	R	0
13	1	105	SNVT_temp_p	R	D1.nvoSpaceTemp	1-Spon	13	R	0
14	1	95	SNVT_switch_filter_0_1	W	D1.nviWindowContact	1-Spon	14	W	0
15	1	95	SNVT_switch_filter_0_1	R	D1.nvoWindowContact	1-Spon	15	R	0
16	1	95	SNVT_switch_filter_0_1	W	D1.nviDisable	1-Spon	16	W	0
17	1	95	SNVT_switch_filter_0_1	R	D1.nvoDisable	1-Spon	17	R	0
18	1	95	SNVT_switch_filter_0_1	W	D1.nviRmLock	1-Spon	18	W	0
19	1	95	SNVT_switch_filter_0_1	R	D1.nvoRmLock	1-Spon	19	R	0
20	1	95	SNVT_switch_filter_0_1	W	D1.nviOnTimeReset	1-Spon	20	W	0

The signals viewer can be used although only one system is connected to the IntesisBox, *ASCII* or *LON*, and is very useful for supervision and test.

It is possible to force a specific value to any point for test purposes, to do so just double click on the row and select the desired value and Accept in the Data Test window. If the point is of type R or RW, its value will be updated and a telegram will be sent to the ASCII system indicating the new value, the same way as if it has been received from the *LON* device. If the point is of type W or RW, the new value entered will be sent to the external system, *LON* in this case, the same way as if it has been received from *ASCII* system.

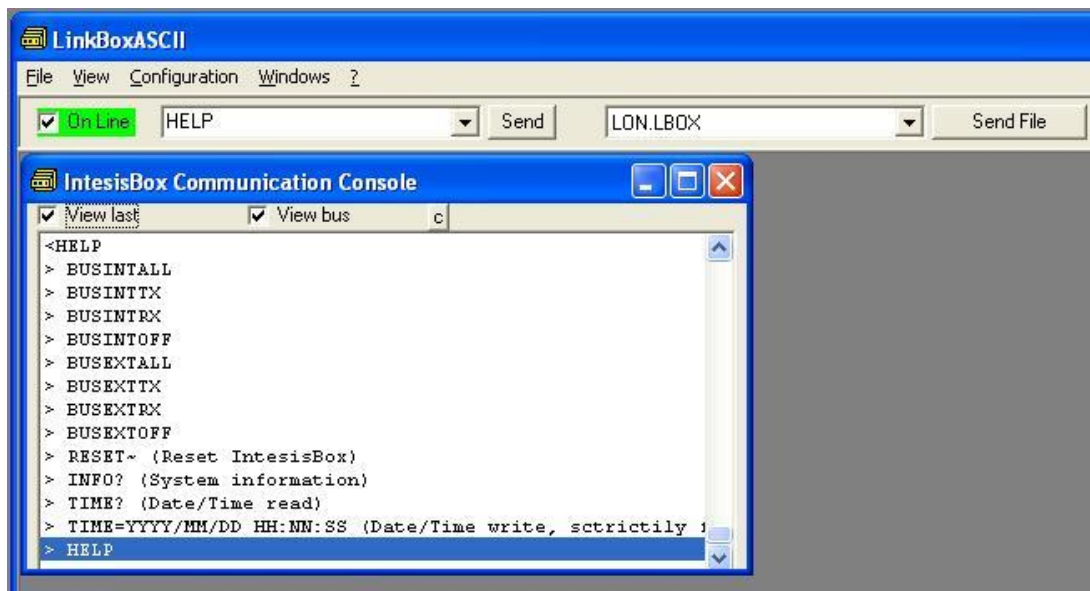


This tool is very useful to test any of the systems connected to the IntesisBox, ASCII and LON without the need to actuate on the real signals.

The signals viewer window has a button to copy to the Windows Clipboard all the contents of the window (in tab separated text format).

4.7 System commands

LinkBoxASCII includes an option to send to IntesisBox a set of system commands for debugging and control purposes; this list is available in the commands list as shown in the figure below. To send a command to IntesisBox just select it from the list, or type it with the correct format, and press *Enter* or click on button *Send*. IntesisBox will act accordingly with the command received; the process can be monitored in the IntesisBox Communication Console window. The use of some of these commands can be critical for IntesisBox normal operation, having this in mind use only these commands following the recommendations of Intesis Software technical support. A list of the more commonly used commands and the way to use them will be returned by IntesisBox after sending the HELP command.



4.8 Files

For a given project, *LinkBoxASCII* creates a set of files in a separate folder that contain the configuration data.

You can directly access these files with Windows (file) Explorer. The location of project files is:

```
C:\Program Files\Intesis\LinkBoxBacnet\Projects\ProjectsBacnet\<<your_project_name>>
```

Where <<your_project_name>> stands for the name you have given to the project at the time of creating it

In this folder, you will find following files:

PROJECT.INI	.ini file containing general information referent to the project
LON.INI	.ini file containing the information referent to the connection window and other special adjustments
LON.DAT	Text file (tab separated values) with the point's information (points list). This file can be edited (with Excel for example) to change the configuration quicker and easier. Later on, when selecting <i>Configuration - > IntesisBox</i> in <i>LinkBoxASCII</i> , if the changes have been made respecting the correct format, all the changes in the configuration done from Excel can be seen in the points list.
LON.SNVT	File containing the SNVTs used in the project, the standard and the specific ones.
LON.LBOX	Binary file created from the information in the files described above. This is the file uploaded to the IntesisBox.

It is strongly recommended to back up the project folder containing these files, in external media, once the installation process is finished. This way you will be able to do future configuration changes in case of reinstallation of *LinkBoxASCII* due, for example, to a failure of the hard disk in the PC where *LinkBoxASCII* was previously installed.

The configuration cannot be sent from IntesisBox to LinkBoxASCII, only from LinkBoxASCII to IntesisBox; the file LON.LBOX sent does not contain all the integration information, as for example the point's description.

4.9 *Functionality considerations*

IntesisBox returns some useful information about internal parameters in response to an INFO command:

Referent to IntesisBox:

- Firmware version and serial number.
- Protocols versions.

Referent to LON:

- Addressing format used.
- Domain used.
- Number of LON devices.
- Number of Points.

* See *Release notes* of the latest firmware version for up to date information on IntesisBox ASCII Server - LON gateway and LinkBoxASCII functionality.

5. Setup process and troubleshooting

5.1 Pre-requisites

It is necessary to have the ASCII enabled device operative and ready to be connected to the ASCII interface of IntesisBox. The ASCII messages to use to communicate with the IntesisBox (see format above in this document) should be configured in the ASCII enabled device.

It is necessary to have the LON device or network operative and ready to be connected to the LON port of IntesisBox.

Connectors, connection cables, PC for LinkBoxASCII, and other auxiliary material, if needed, are not supplied by Intesis Software for this standard integration. The items supplied by Intesis Software for this integration are:

- IntesisBox ASCII Server gateway with ASCII protocol and LON protocol firmware loaded.
- Console cable. Standard DB9F-DB9M cable 1.8 meters long.
- LinkBoxASCII software to configure IntesisBox.
- Product documentation.

If requested, Intesis Software also can supply:

- Standard power supply 220Vac/50Hz to power IntesisBox (European plug type).

5.2 Setup procedure

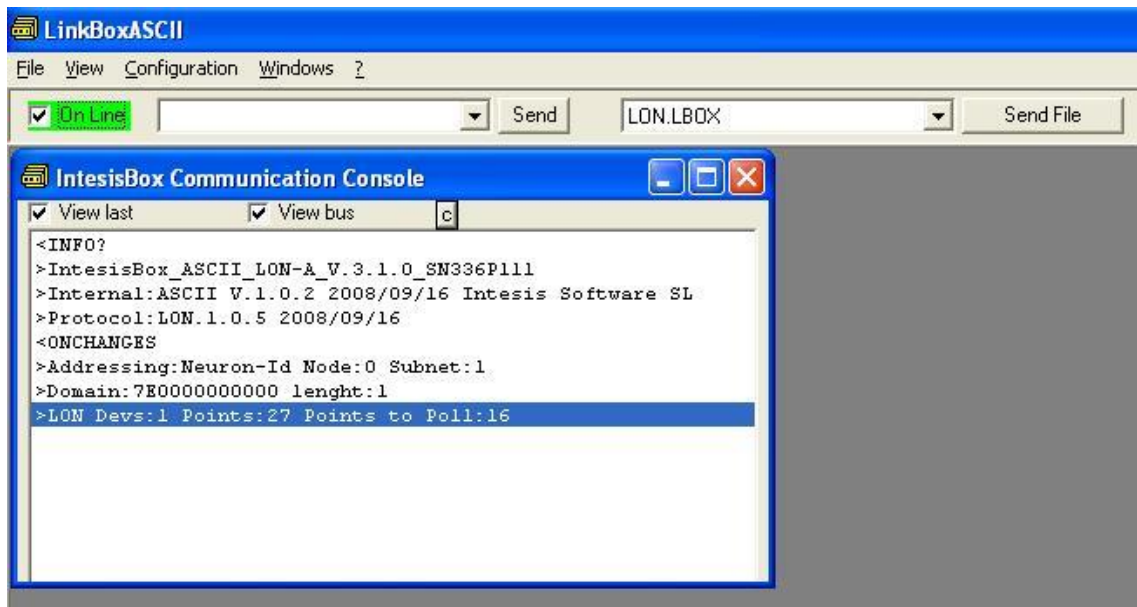
1. Install LinkBoxASCII on your laptop.
2. Install IntesisBox in the desired installation site. The mounting can be on DIN rail or on a stable not vibrating surface (DIN rail mounting inside a metallic industrial cabinet connected to ground is recommended).
3. Connect the RS232 cable coming from the ASCII enabled device to the port marked as **ASCII RS232 or Ethernet** of IntesisBox (See details for this bus cable in section *Connections* of this document).
4. Connect the LON bus cable coming from the LON network to the port marked as **LON** of IntesisBox. (See details for this communication cable in section *Connections* of this document).
5. Power up IntesisBox.

WARNING! In order to avoid earth loops that can damage IntesisBox and/or any other equipment connected to it, we strongly recommend:

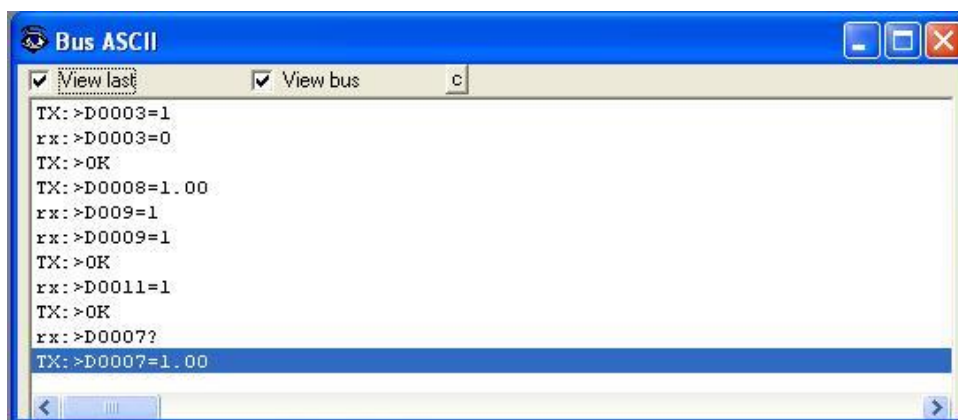
- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth.**
 - The use AC power supplies only if they are floating and not powering any other device.
6. Connect the communication cable coming from the serial port of your laptop PC to the port marked as **PC Console** of IntesisBox. If you prefer using the Ethernet

connection, connect the PC to the **ETH** port of the IntesisBox(See details for this communication cable in section *Connections* of this document).

- Open LinkBoxASCII, create a new project selecting a copy of the one named **DEMO LON** and give it the name desired, select the serial port used or the IP address² to connect to the IntesisBox (menu Configuration -> Connection) and switch working mode to *on-line* (checkbox *off-line/on-line*). The IntesisBox identification must appear in the *IntesisBox communication console* window as showed below.

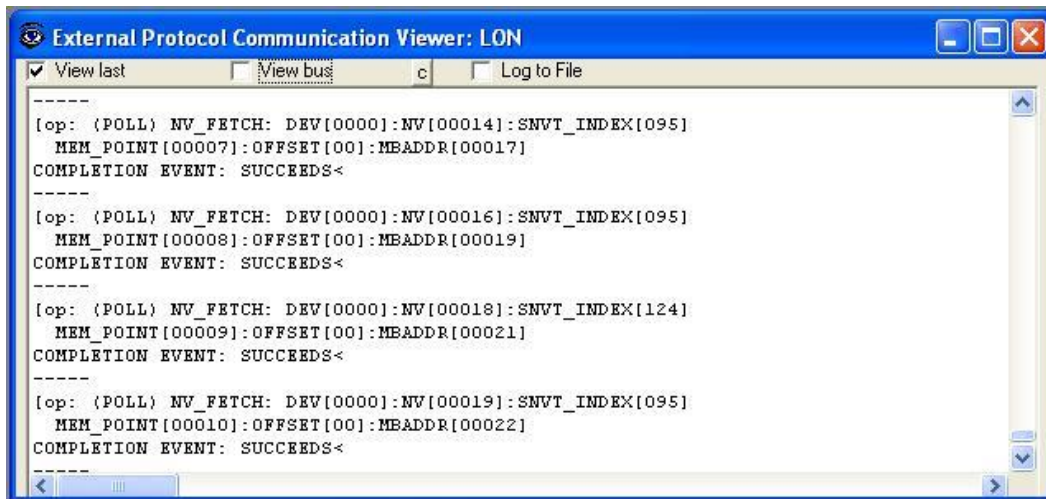


- Modify the configuration as desired, save it and download the configuration file to IntesisBox as explained in previous chapters.
- Open the *ASCII Communication Viewer* window (menu View -> Bus -> ASCII), force some point's polling from the ASCII device connected to IntesisBox, and check that there is communication activity, some TX frames and some other RX frames. This means that the communication with the ASCII device is ok. In case there is no communication activity between IntesisBox and the ASCII device check that ASCII device is operative and well connected to the IntesisBox.



² By default, IntesisBox comes with 192.168.100.246 address

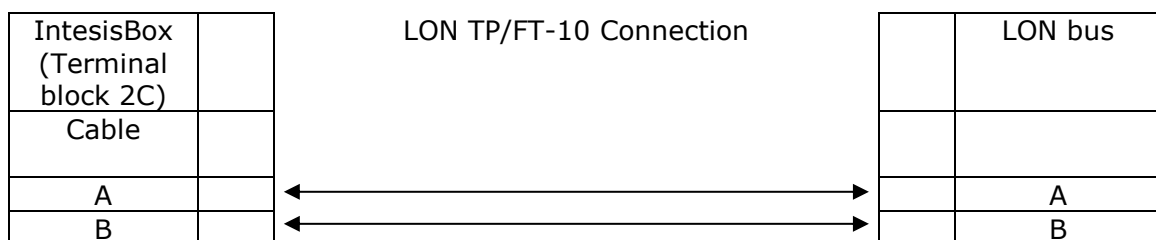
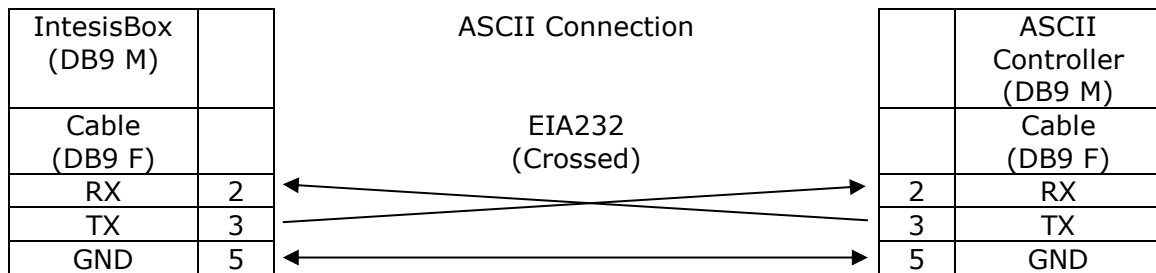
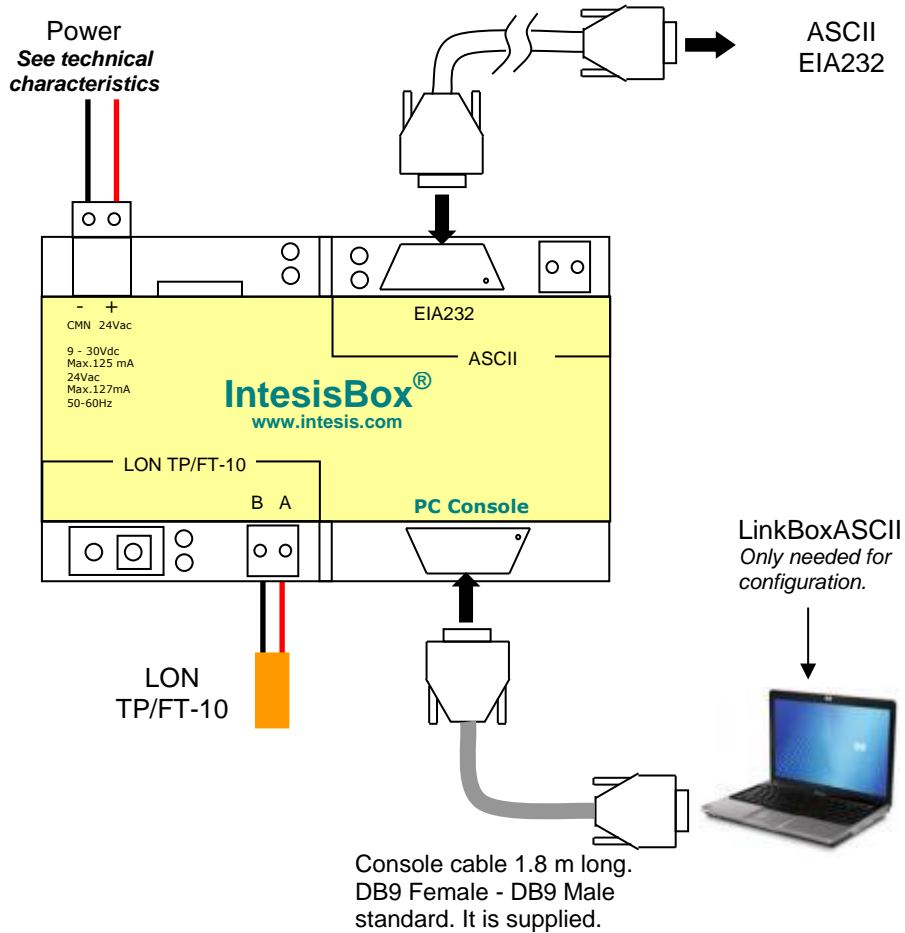
10. Open the *External Protocol Communication Viewer* window (menu View -> Bus -> LON) and check that there is communication activity, some frames as showed in the figure below. This means that the communication with the LON devices is ok.

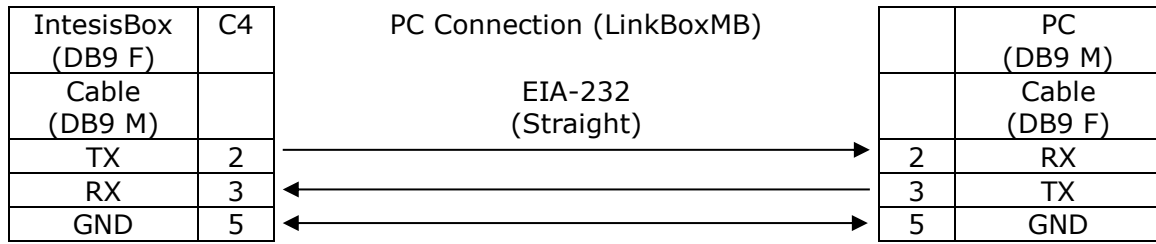


```
External Protocol Communication Viewer: LON
View last View bus Log to File
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00014]:SNVT_INDEX[095]
MEM_POINT[00007]:OFFSET[00]:MBADDR[00017]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00016]:SNVT_INDEX[095]
MEM_POINT[00008]:OFFSET[00]:MBADDR[00019]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00018]:SNVT_INDEX[124]
MEM_POINT[00009]:OFFSET[00]:MBADDR[00021]
COMPLETION EVENT: SUCCEEDS<
-----
[op: (POLL) NV_FETCH: DEV[0000]:NV[00019]:SNVT_INDEX[095]
MEM_POINT[00010]:OFFSET[00]:MBADDR[00022]
COMPLETION EVENT: SUCCEEDS<
-----
```

In case there is no response from the LON devices to the frames sent by IntesisBox check that they are operative and reachable from the network connection used by IntesisBox, check the IntesisBox LON interface. See details for the communication cable between IntesisBox and LON system in section *Connections* of this document.

6. Connections





7. LON interface specifications

LON supported channel: Free Topology (FT-10)

Configurable addressing options (on a 'per device' basis):

- Subnet / node
- Neuron-Id

Network variable sample rate:

- Below 60ms per network variable (each network variable may contain several fields, which will be mapped to different internal variables, if needed).

Supported network variable types:

- All standard network variable types published by LonMark International are directly supported by configuration tool, *LinkBoxASCII*.
- Support for user-defined network variable types can be added in each case, by entering their definition in *LinkBoxASCII*. In this case, following information needs to be provided:
 - Scale factors: *a*, *b* and *c*
 - Number of fields
 - Basic LON data type of each field

Supported basic LON data types

Basic LON data type	Description
Signed short	8-bit signed data
Unsigned short	8-bit unsigned data
Enum	8-bit unsigned data
Signed long	16-bit signed data
Unsigned long	16-bit unsigned data
Signed quad	32-bit signed data
Unsigned quad	32-bit unsigned data
Float	32-bit IEEE float
Bitfield	1 to 8-bit length unsigned bit field

8. Mechanical & Electrical characteristics



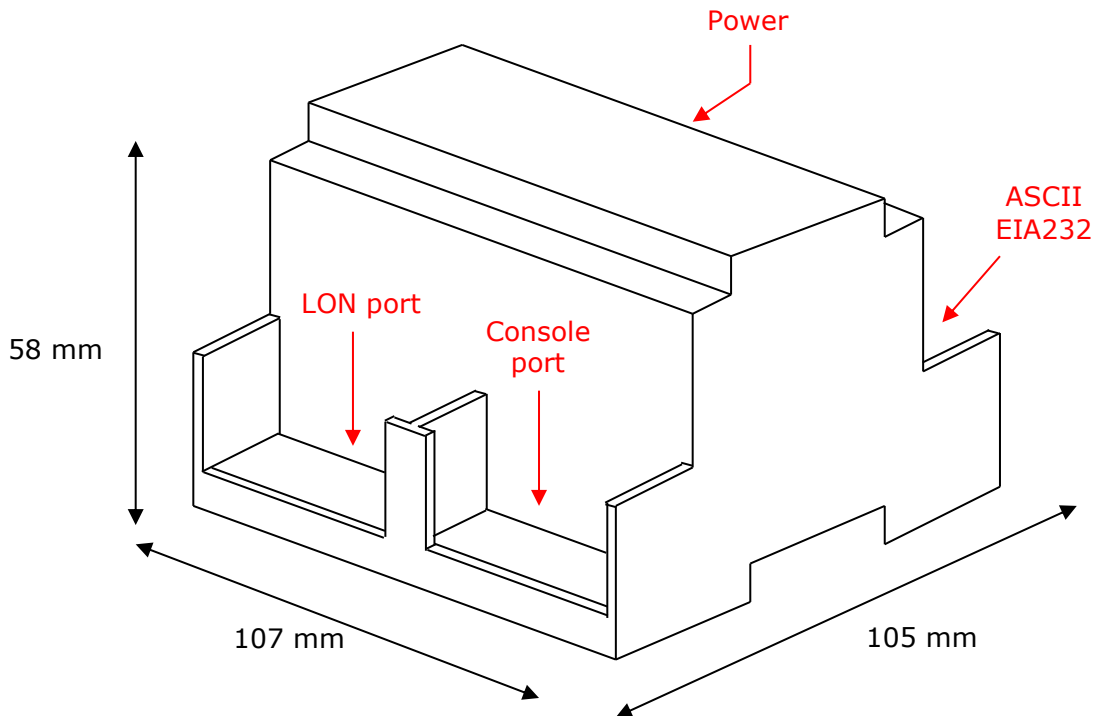
Enclosure	Plastic, type PC (UL 94 V-0). Dimensions: 107mm x 105mm x 58mm.
Colour	Light Grey. RAL 7035.
Power	9 to 30Vdc +/-10%, Max.: 125mA. 24Vac +/-10% 50-60Hz, Max.: 127mA Must use a NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Plug-in terminal block for power connection (2 poles).
Terminal wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm ² ... 2.5mm ² 2 cores: 0.5mm ² ... 1.5mm ² 3 cores: not permitted
Mounting	Wall. DIN rail EN60715 TH35.
ASCII port	1 x Serial EIA232 (DB9 male DTE). SELV
LON port	1 x LON (TP-FT/10) (plug-in terminal block 2 poles). TNV-1
LED indicators	1 x Power. 2 x Serial port (ASCII) activity (Tx, Rx). 2 x LON port activity (Tx, Rx). 1 x LON service. ¹
Push buttons	1 x LON service. ¹
Console port	EIA232. DB9 female (DCE). SELV
Configuration	Via console port. ²
Firmware	Allows upgrades via console port.
Operational temperature	0°C to +70°C
Operational humidity	5% to 95%, non condensing
Protection	IP20 (IEC60529).
RoHS conformity	Compliant with RoHS directive (2002/95/CE).
Norms and standards	CE conformity to EMC directive (2004/108/EC) and Low-voltage directive (2006/95/EC) EN 61000-6-2 EN 61000-6-3 EN 60950-1 EN 50491-3

¹ Not used for the moment. Reserved for future use.

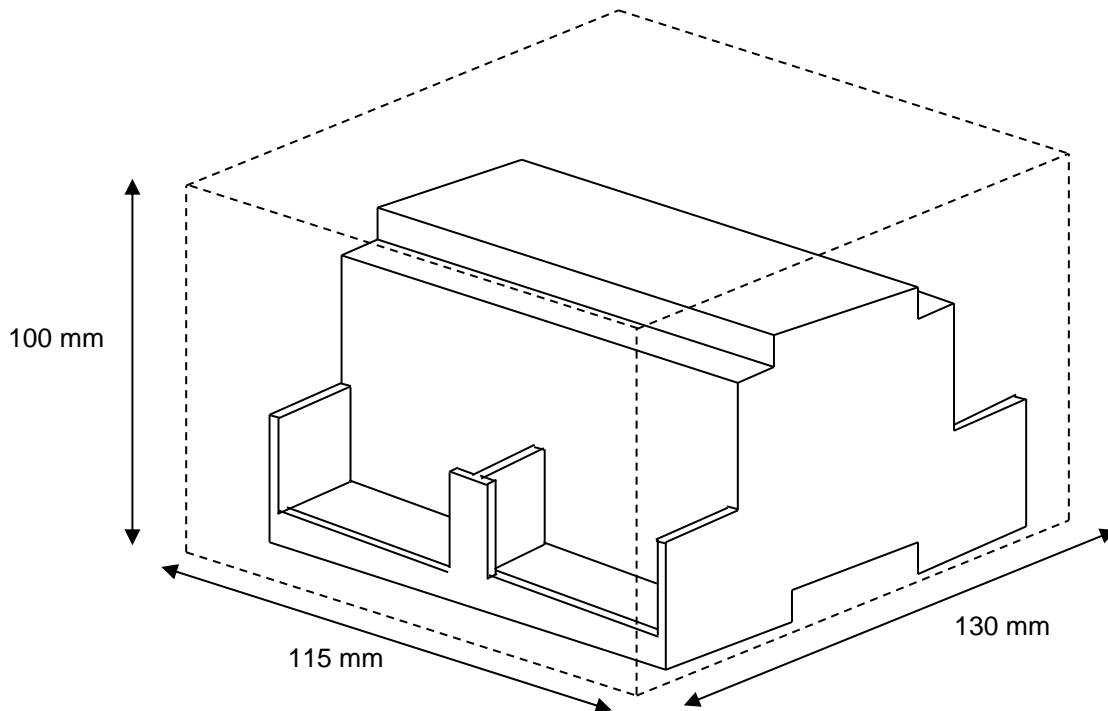
² Standard cable DB9male-DB9female 1,8 meters long is supplied with the device for connection to a PC COM port for configuring and monitoring the device. The configuration software, compatible with Windows® operating systems, is also supplied.

9. Dimensions

External dimensions.



Free space recommended to install the device, with spacing enough for external connections.

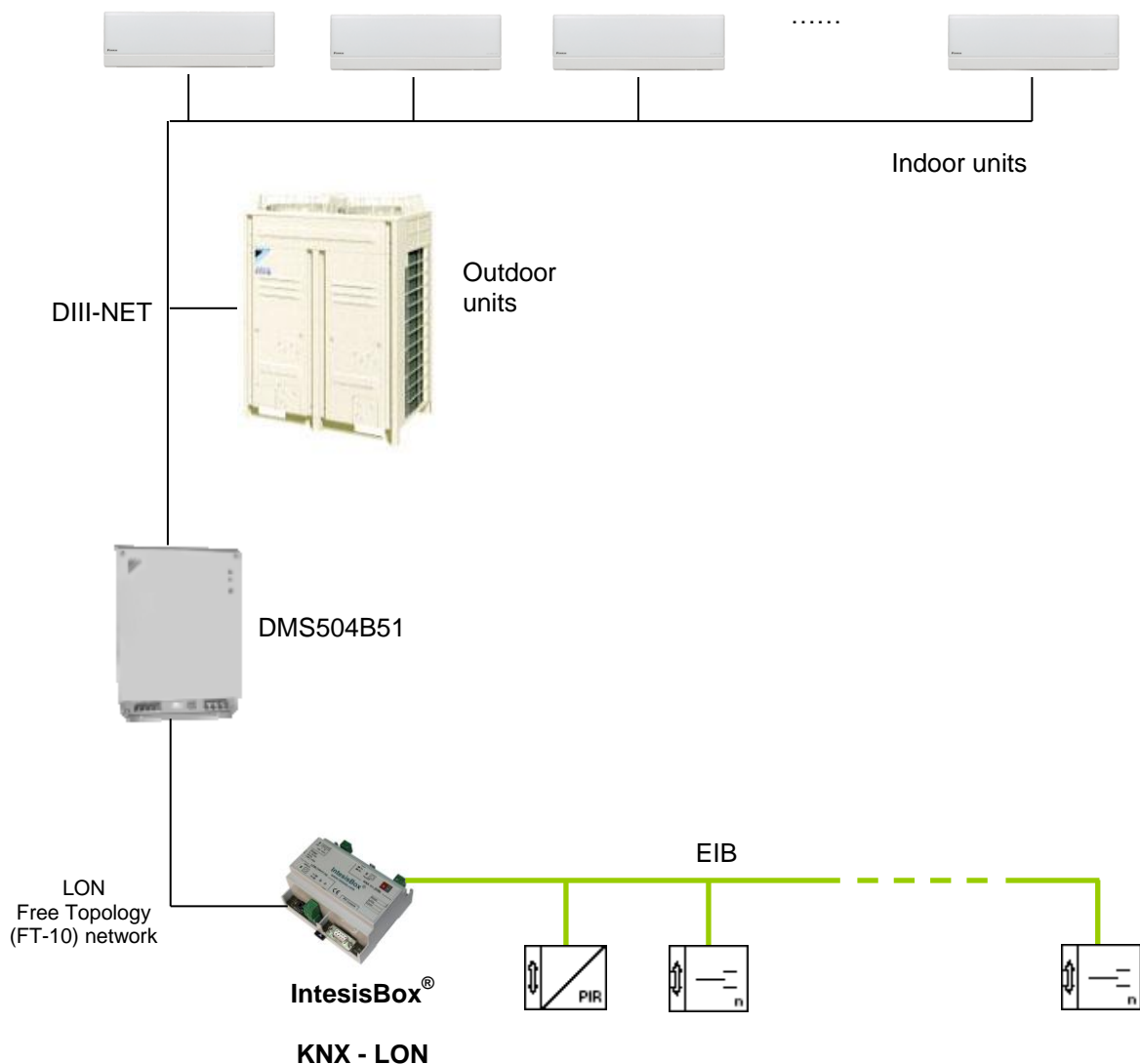


10. Annexes

10.1 Integration of DAIKIN VRV air conditioning systems with KNX

One of the main applications of *IntesisBox KNX - LON* is the integration of Daikin VRV air conditioning systems with KNX building control systems.

For this application, Daikin VRV Air Conditioning system must be equipped with Daikin LON gateway (model DMS504B51), this Daikin gateway is normally commissioned by Daikin technical personnel, contact your nearest Daikin distributor for details.



10.1.1 Using LinkBoxEIB to configure and setup the integration

The DMS504B51 LON gateway from Daikin allows to monitor / control up to 64 VRV indoor units. It is important to consult Daikin documentation to configure successfully the integration.

With LinkBoxEIB, it comes an example project called **DEMO LON Daikin** which contains the definition of all available variables to integrate the full capacity of the DMS504B51 (64 indoor units).

Using this Demo project as template, it will only be necessary to activate those signals needed for your integration and enter for them the corresponding KNX parameters according to your KNX installation, this makes the engineering needed to set up this integration very easy and quick.

The signals available in this Demo project for this integration and their possible values from KNX are showed below.

DAIKIN		KNX					
Individual Monitoring/Control variables per air conditioner (suffix "_xx" indicates the aircon unit number, 01 to 64)							
Variable Name	Description	Monitoring / Control	Possible values	EIS	R	W	T
nvoOnOff_xx	Monitors ON/OFF status of the air conditioner	Monitoring	0-Off, 1-On	1 - Switching (1 bit)	R		T
nvoHeatCool_xx	Monitors operation mode status (heating/cooling/ventilation) of the air conditioner	Monitoring	1-Heat, 2-Cool, 3-Vent	14 - Counter (8 bit)	R		T
nvoSetpoint_xx	Monitors the set room temperature	Monitoring	20..35°C Cool, 15..30°C Heat	5 - Float (16 bit)	R		T
nvoSpaceTemp_xx	Monitors the room temperature	Monitoring	-10..50°C	5 - Float (16 bit)	R		T
nvoFanSpeed_xx	Monitors the set airflow rate	Monitoring	0-Weak, 1-Strong	1 - Switching (1 bit)	R		T
nvoFiltersign_xx	Checks limits of filter use and monitors if it has reached the limit	Monitoring	0-Ok, 1-Filter sign	1 - Switching (1 bit)	R		T
nvoFailure_xx	Monitors error status of the air conditioner	Monitoring	0-Ok, 1-Fail	1 - Switching (1 bit)	R		T
nvoErrStatus_xx	Displays the manufacturer-specified error code if any error occurs	Monitoring	0-No error,1..23114-Error Code	10 - Counter (16 bit)	R		T
nvoThermo_xx	Monitors whether the air conditioner's thermostat is working	Monitoring	0-Off, 1-On	1 - Switching (1 bit)	R		T
nvoWattmeter_xx	Monitors the Wattmeter of the air conditioner	Monitoring	kwh	9 - Float IEEE (32 bit)	R		T
nvoRejOnOff_xx	Monitors the status if the air conditioner is permitting/prohibiting remote ON/OFF control with a hand-held controller	Monitoring	0-Permitted, 1-Prohibited	1 - Switching (1 bit)	R		T
nvoRejMode_xx	Monitors the status if the air conditioner is permitting/prohibiting remote control operation mode with a hand-held controller	Monitoring	0-Permitted, 1-Prohibited	1 - Switching (1 bit)	R		T
nvoRejSetpoint_xx	Monitors the status if the air conditioner is permitting/prohibiting remote control temperature setting with a hand-held controller	Monitoring	0-Permitted, 1-Prohibited	1 - Switching (1 bit)	R		T
nvoHvacExist_xx	Monitors the communication status (No Occupancy / Communication normal / Communication error) of the air conditioner	Monitoring	0-No connection, 1-Ok, 2-Error communication	14 - Counter (8 bit)	R		T
nvoThermoOff_xx	Monitors the forced thermostat OFF status	Monitoring	0-Reset, 1-Set	1 - Switching (1 bit)	R		T
nviOnOff_xx	Starts/stops air conditioner operation	Control	0-Off, 1-On	1 - Switching (1 bit)		W	
nviHeatCool_xx	Sets operation mode	Control	0-Auto, 1-Heat, 2-Cool, 3-Vent	14 - Counter (8 bit)		W	
nviSetpoint_xx	Sets room temperature	Control	20..35°C Cool, 15..30°C Heat	5 - Float (16 bit)		W	

nviFanSpeed_xx	Sets airflow rate	Control	0-Weak, 1-Strong	1 - Switching (1 bit)		W	
nviFSReset_xx	Resets filter sign	Control	From 0 to 1 => Reset Filter Sign	1 - Switching (1 bit)		W	
nviRejOnOff_xx	Sets whether permit/prohibit ON/OFF control rejection of the air conditioner with a hand-held remoter controller	Control	0-Permitted, 1-Prohibited	1 - Switching (1 bit)		W	
nviRejMode_xx	Sets whether permit/prohibit operation mode control rejection of the air conditioner with a hand-held remote controller	Control	0-Permitted, 1-Prohibited	1 - Switching (1 bit)		W	
nviRejSetpoint_xx	Sets whether permit/prohibit room temperature setting control rejection of the air conditioner with a hand-held remote controller	Control	0-Permitted, 1-Prohibited	1 - Switching (1 bit)		W	
nviThermoOff_xx	Sets forced thermostat OFF	Control	0-Reset, 1-Set	1 - Switching (1 bit)		W	

General Monitoring/Control variables

Variable Name	Description	Monitoring / Control	Possible values	EIS	R	W	T
Communication Error hard	Monitors IBOX internal communication handler	Monitoring	0-Ok, 1-Error	1 - Switching (1 bit)	R		T
Communication Error	Monitors the communication between IBOX and DMS-IF	Monitoring	0-Ok, 1-Error	1 - Switching (1 bit)	R		T
nvoSystemOff	Monitors the status of the forced OFF setting of the air conditioners connected to the DIII-NET	Monitoring	0-Normal, 1-ForcedOFF	1 - Switching (1 bit)	R		T
nvoRejLC	Monitors whether the operation of centralized devices on the DIII-NET is permitted/prohibited	Monitoring	0-Permitted, 1-Prohibited	1 - Switching (1 bit)	R		T
nviSystemOff	Forcibly stops the air conditioners connected to the DIII-NET / Resets the Forced OFF setting	Control	0-Reset, 1-ForcedOFF	1 - Switching (1 bit)		W	
nviRejLC	Controls whether the operation of centralized devices on the DIII-NET is permitted/prohibited	Control	0-Permitted, 1-Prohibited	1 - Switching (1 bit)		W	

R = Datapoint can be read from KNX

W = Datapoint can be written from KNX

T = New value received is transmitted automatically to KNX

* Monitoring/Control of the same Daikin variable (i.e. nvoOnOff/nviOnOff) can be done through a single KNX group address using "listening addresses" in IntesisBox

Note: In the Daikin system configuration, sometimes the VRVs are configured as masters and sometimes as slaves, the ones configured as slaves do not accept commands because they work in parallel with their masters.

Also available sample projects for other Air Conditioning brands (Mitsubishi Electric, Mitsubishi Heavy Industries, Toshiba, LG, Sanyo...), ask us for details.

10.2 How to setup LonWorks' device address in IntesisBox and how to declare LonWorks devices as commissioned using LinkBoxEIB

LonWorks devices, as is the case of the DMS504B51 LON gateway for Daikin VRV systems, have a unique identifier called Neuron ID that is normally specified somewhere in the case or in the circuit board of the device, if you do not have the Neuron ID of your LonWorks device then you can get it using LinkBoxEIB.

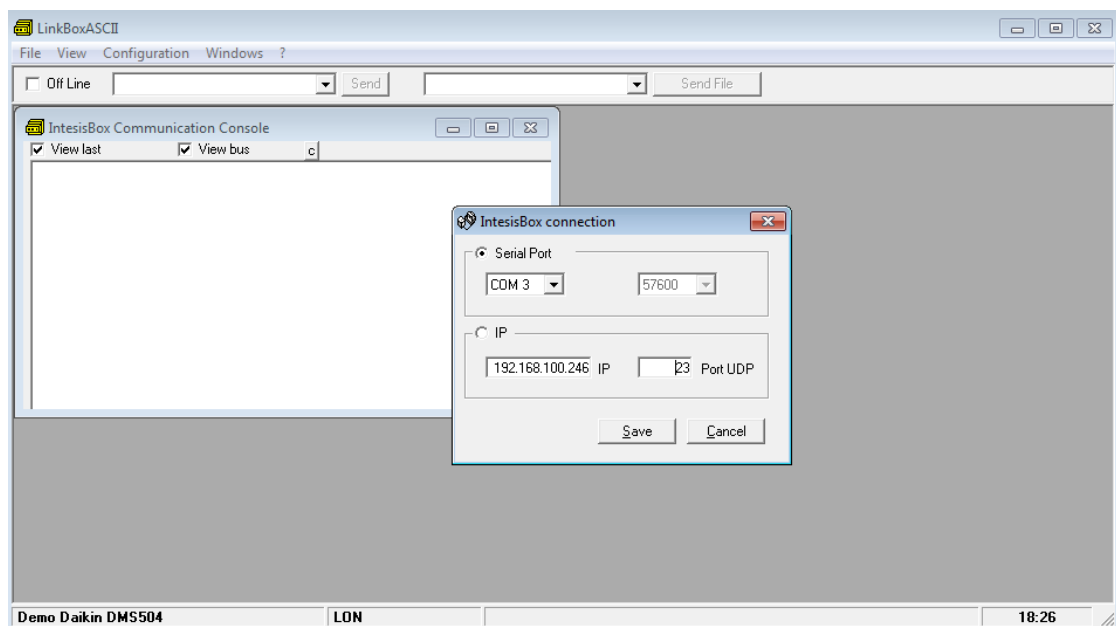
Additionally, any LonWorks device must be commissioned to start working, this is normally done using any LonWorks standard commissioning tool such as LonMaker. In case your LonWorks device is not commissioned and you do not have any LonWorks standard commissioning tool to do it, then you can use also LinkBoxEIB and IntesisBox to do it in a single step, see the instructions below for details of both procedures.

Ensure following setup:

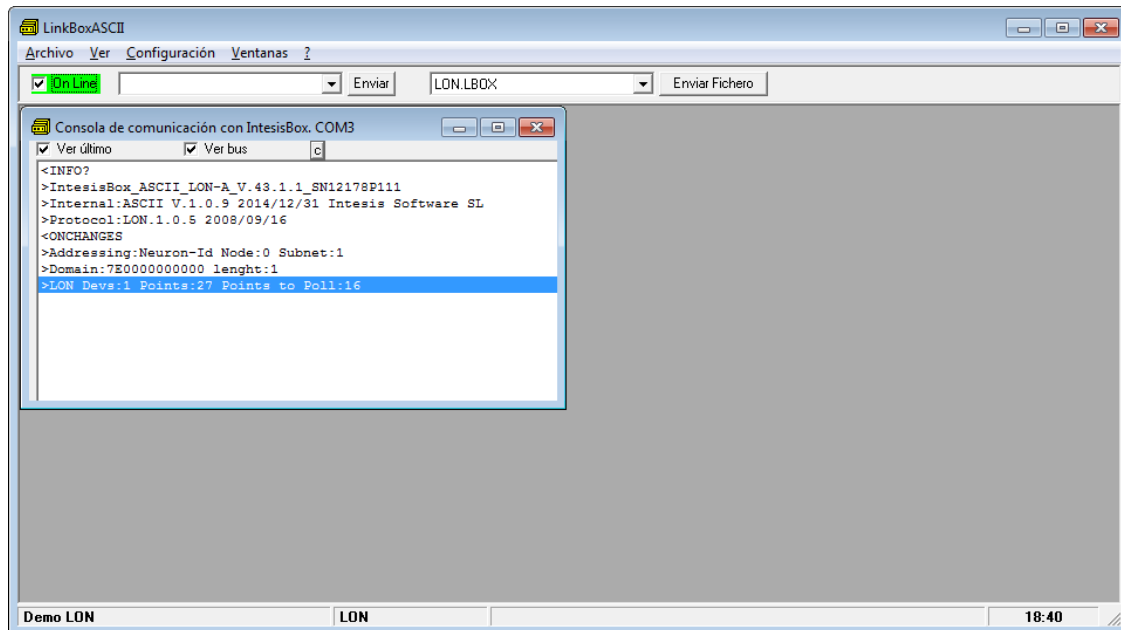
- Connect the IntesisBox at LonWorks TP/FT-10 bus
- Connect the IntesisBox PC console RS232 port or the Ethernet port to your PC
- Power-on IntesisBox

Now follow these steps:

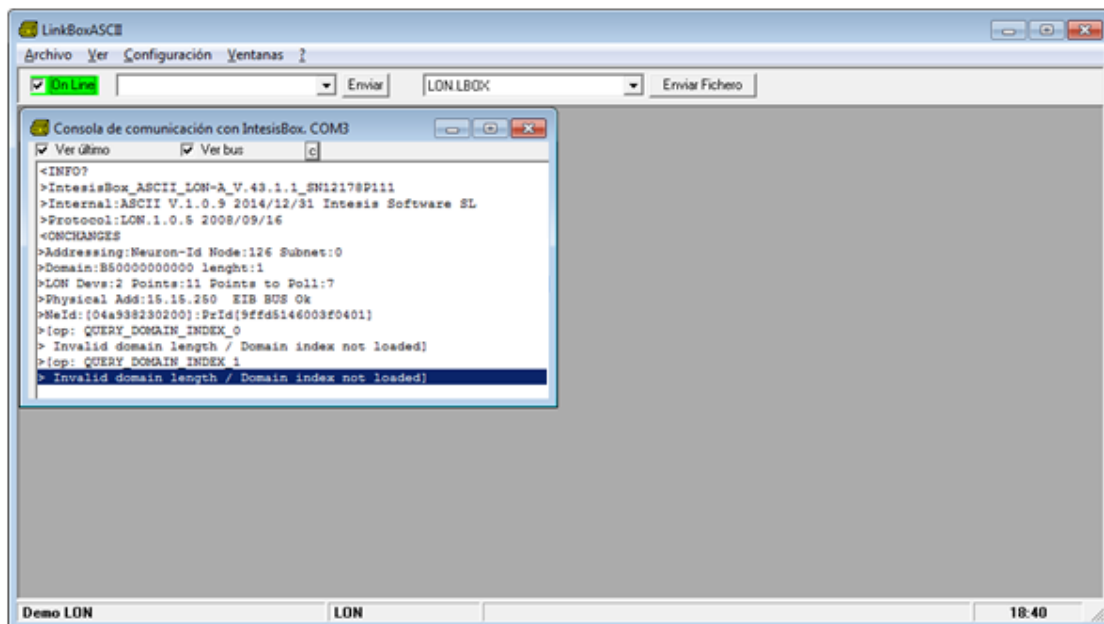
1. Start LinkBox application in your PC, and select suitable project
2. Go to menu *Configuration->Connection...* to select suitable COM port for PC console or the right IP, and save it



3. Click the checkbox next to *Offline* word below LinkBox Menu. It should change to *Online*, and some output must appear at *IntesisBox Communication Console* window.

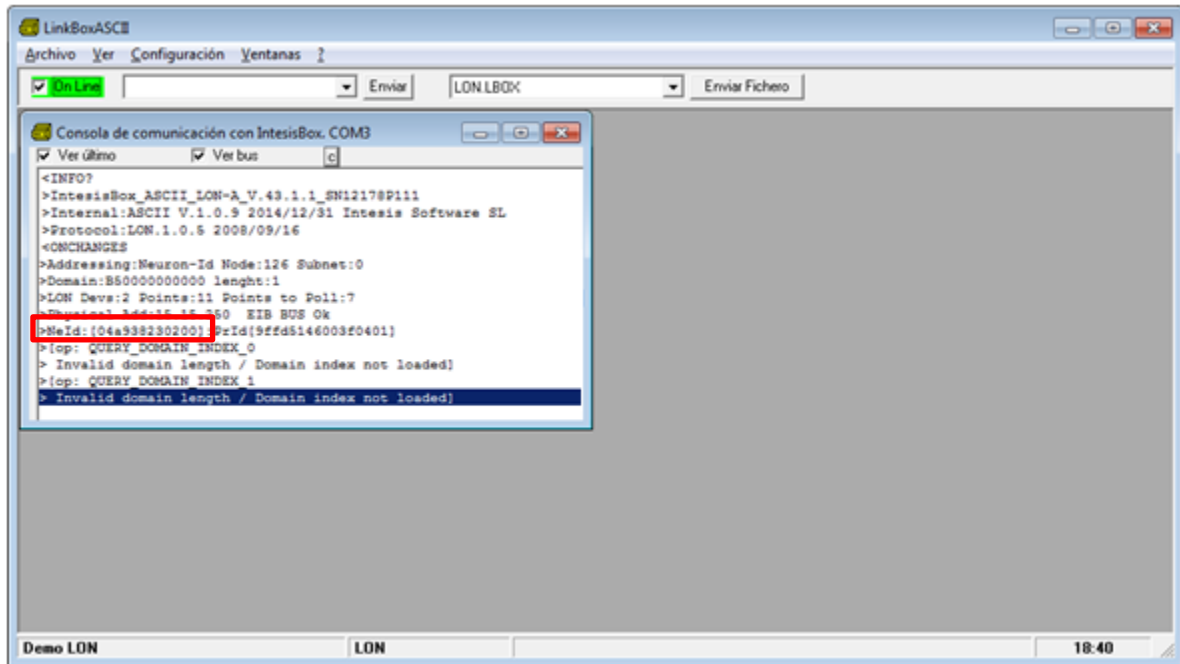


- The LonWorks device you are to connect should have a so-called "Service Pin Button" accessible. Press it. This will send a device identification message (*Service Pin Message*) to IntesisBox, which will be shown in IntesisBox Communication Console:



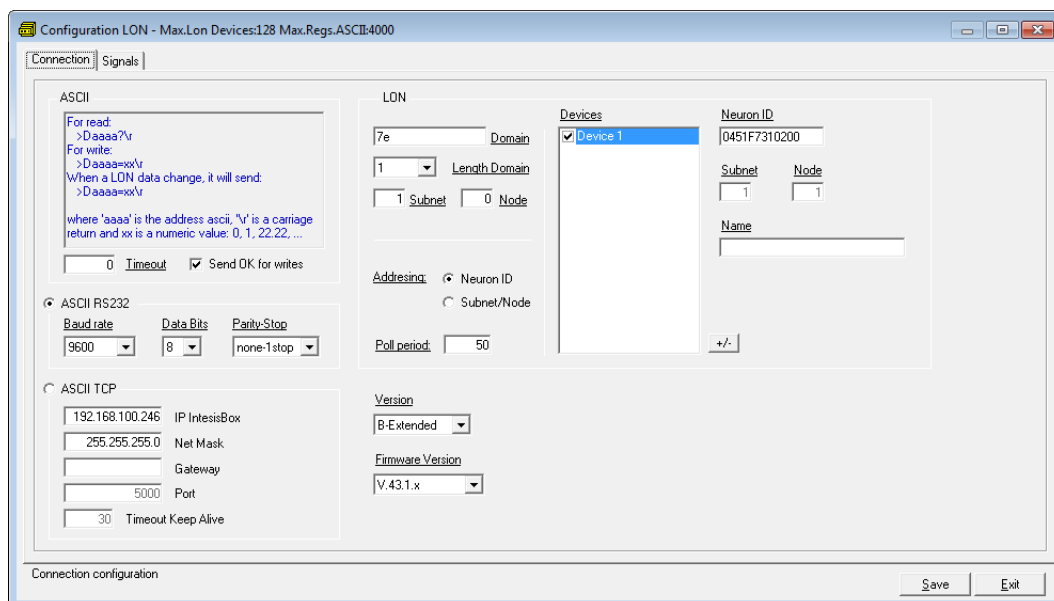
Output might differ depending on the configuration of the LonWorks device (i.e., if it has a configured domain or not).

- In this message, the tag *NeId:[xxxxxxxx]* poses as a unique identifier, in hexadecimal format (*Neuron Id*) for the LonWorks device we want to integrate. Note down this number, since we will need it in the configuration.



In the example above, Neuron Id is *04a938230200*

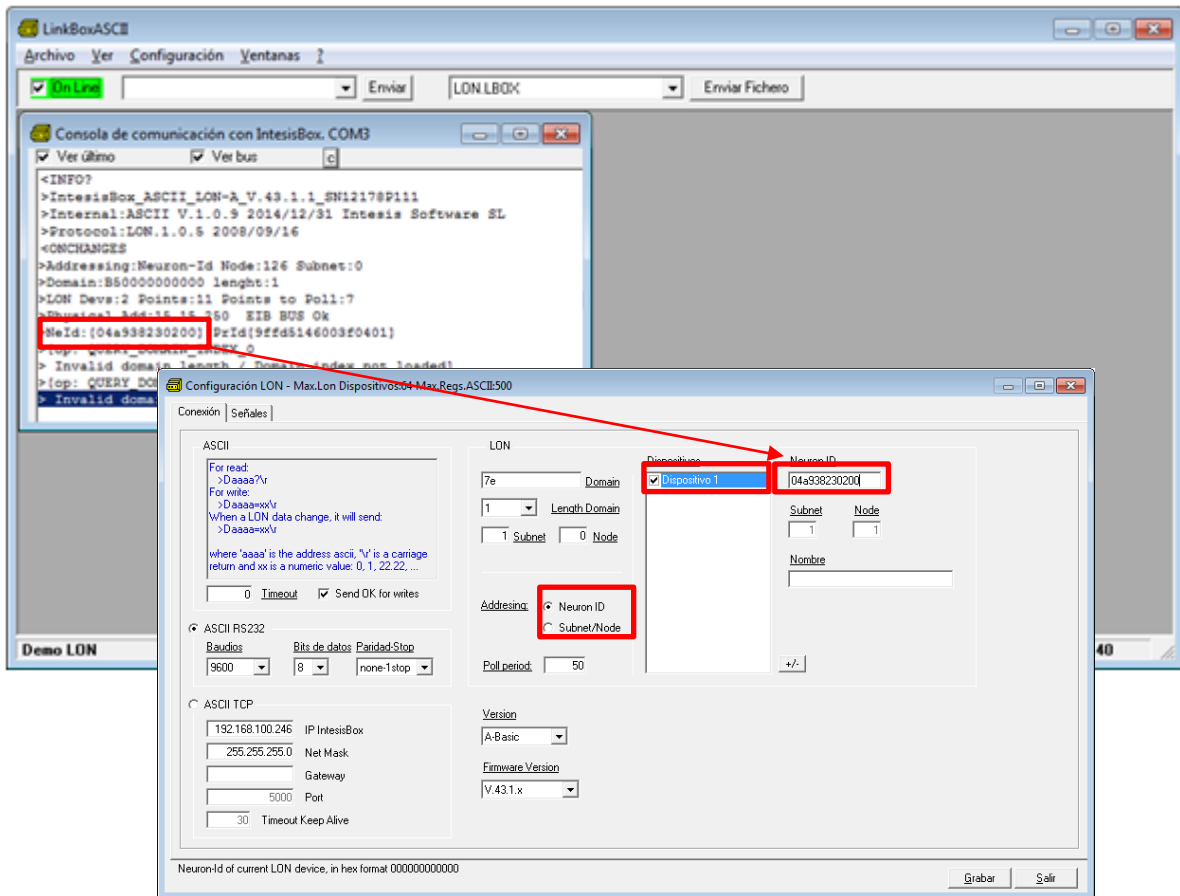
In order to load now this Neuron Id in project configuration, click *Configuration->IntesisBox..*



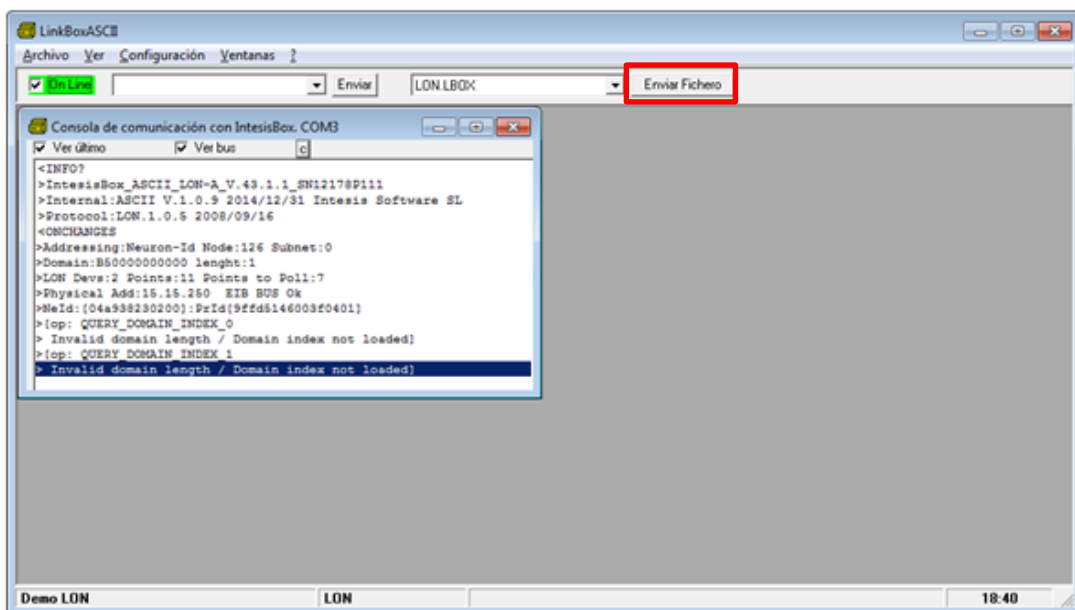
6. In it, ensure following settings for LonWorks:

- IntesisBox LON:
 - Domain: Any value is fine for this case. B5 is the factory value
 - Length domain: 1 is fine
 - Subnet: 0 is fine
 - Node: 126 is fine
- LON:
 - Select at the bottom of the square *Neuron-Id* as Addressing mode (default factory value)
 - Select Device 1 as the device for which the Neuron-Id is to be set.

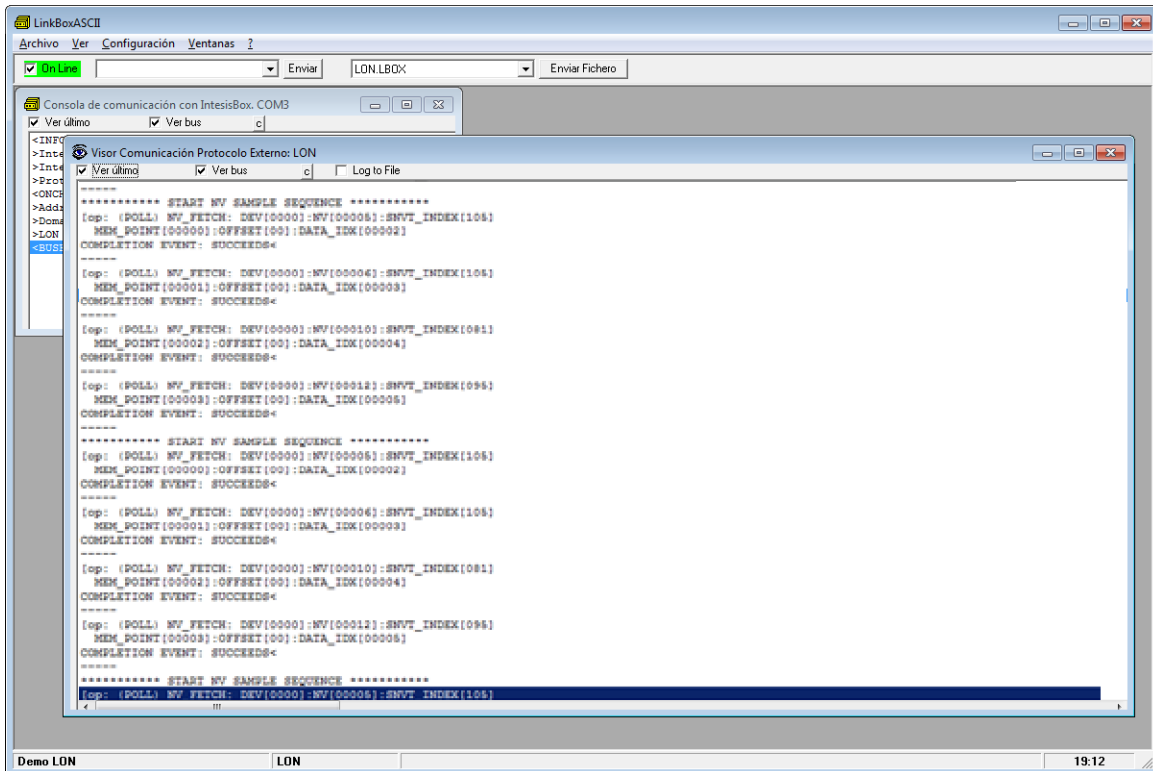
- Insert the Neuron-Id of the device, just as you noted it down



7. Click button Save and select Yes when asked if you want to save changes.
8. Once gateway configuration file is generated, click Send File in LinkBox main window



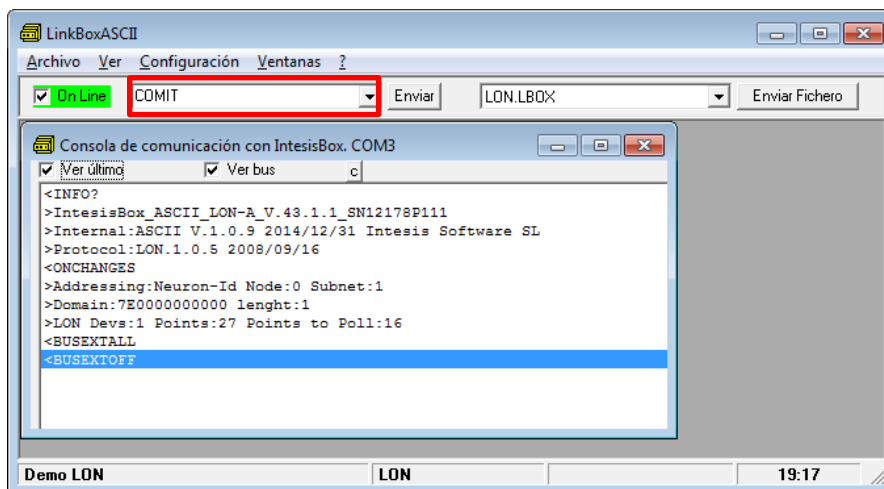
- Once downloaded, we will check if communication at LonWorks side is properly working. Go to menu View->Bus->Lon. Something similar to this will appear:



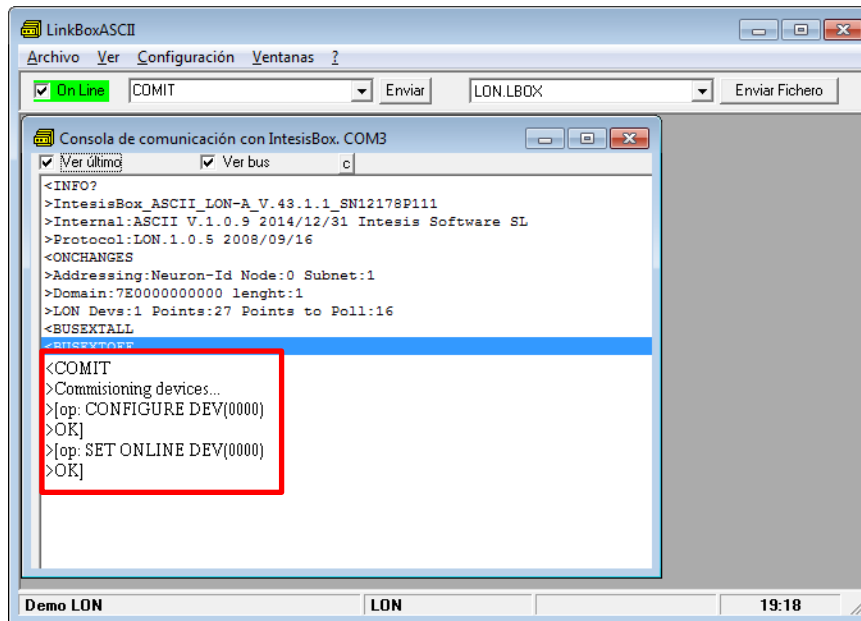
These pose as the query commands the IntesisBox is triggering to the LonWorks device being integrated.

Note that for each request (NV_FETCH request) there is a response from the device, represented by the COMPLETION EVENT: SUCCEEDS< keywords.

- Finally, and solely in the case that your LonWorks device is placed in stand-alone (i.e. directly communicating with intesisBox and not integrated within a LonWorks network), you should declare the LonWorks device as commissioned. In order to do that, go to the textbox next to text "Online" below LinkBox menu, and type the command COMIT and press Send.



This will result in some text at IntesisBox Communication Console, similar to the one below:



If all this process worked, now you are ready to communicate with your LonWorks device.