User Manual

ESC713 Serial Ethernet Converter

HI Tecnologia

| PST7130110 | Version 1.03 | Abr-06 |

Presentation

This manual was developed by HI Tecnologia Indústria e Comércio Ltda., with the purpose of present the documentation about ESC713 Serial Ethernet Converter

Any questions about the system features or for more details about the information presented at this document can be provided by our Client Support department, using the mail address suporte@hitecnologia.com.br. Please mention the following information in order to identify the data related to this project.

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Project:	ESC713 Serial Ethernet Converter
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ESC713 Serial Ethernet Converter

Reference: PST7130110	**Revision:**	3
File: PST71300110.doc	**Updated in:**	04/11/2006

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1. Introduction

Considering all the automation market tendencies, HI Tecnologia has been searched for communication solutions that are able to transcend the limitations of serial RS232 (or 485) connections. The access to Ethernet networks using TCP/IP protocols transpose these limitations, but creates the problem of using devices that communicate each other using only serial lines. ESC713 converter, from HI tecnologia, represents a bridge between these two access tecnologies, with low price and high security.

ESC713 converter is a complete serial converter for external use. Its hardware includes an Ethernet 10BaseT port and one RS232 (or RS485) serial port which allows the direct access to serial devices using an Ethernet network. The following picture presents the strategy used by it, considering the traditional connection configuration and the new one (using ESC713 converter).
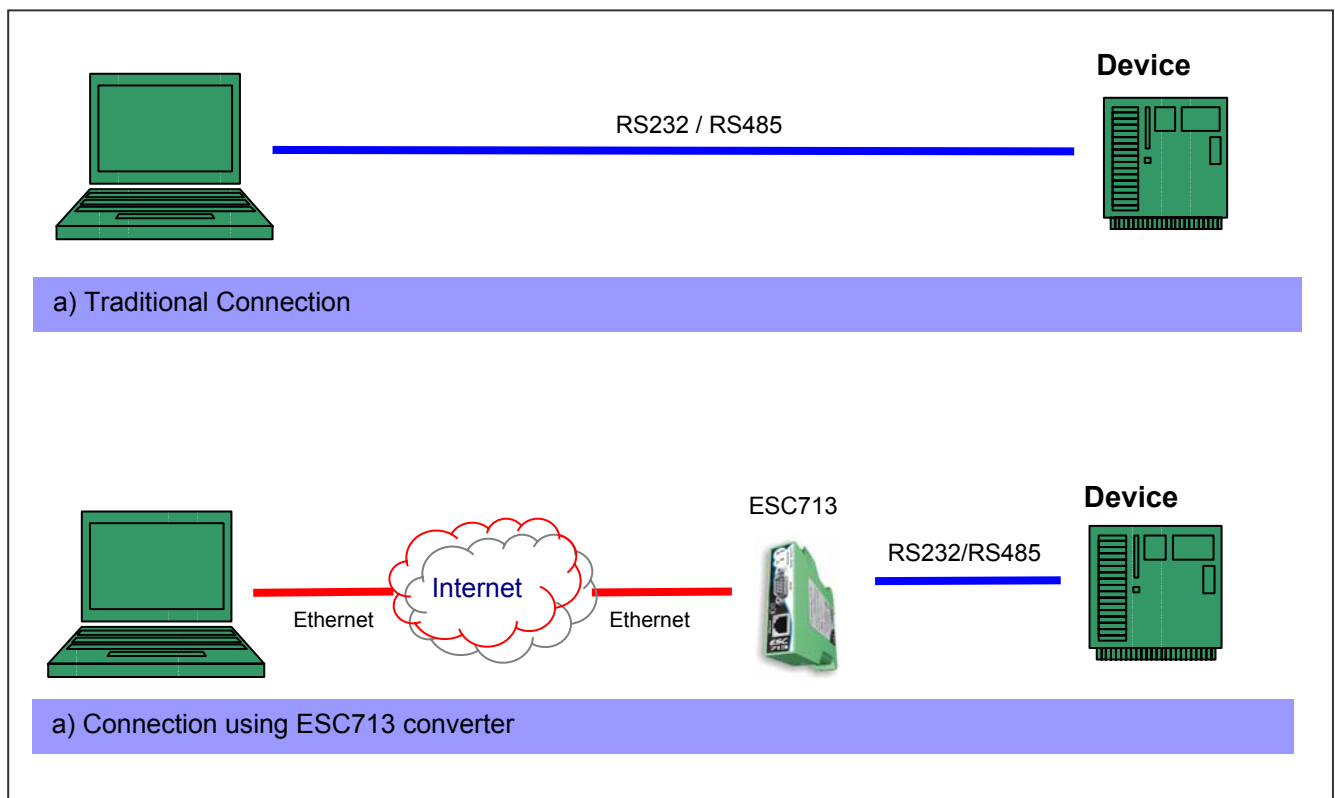
This manual has the following sections:

- Configuration of the Serial Driver at the PC: Presents the Serial Driver configuration that allows Access to TCP/IP network as it was a Windows serial port.
- Configuration of ESC713 Converter: Describes how to program ESC713 converter to establish the communication with TCP/IP network and HI Tecnologia's controller.
- Communication cables details: Defines RS232 and RS485 cables especification used at the system creation.

2. Installing Tibbo Device Server Toolkit (DST)

The core of ESC713 converter is based on the module EM100, provided by Tibbo Technology. This way, all ESC713 programming process uses the software package "*Device Server Toolkit (DST) software for Windows*", present at ESC713 installing CD or obtained at the website: http://www.tibbo.com

For installing DST, follow the instructions:
- Copy the .exe file from CD to a local folder.
- Activate DST installer at the local file especified at the previous step
- Reply to the requests of the installer selecting the install file and the folders of access to the tools of DST package.
- Follow the final requests of the installer, restart your computer.

Once done the install process at Windows *98*, *Me*, *NT(SP4)*, *2000*, *XP*, *2003* operation systems, it's possible to access the following applications:

- **Device Server Manager (DS Manager):** used to find and program ESC713 converters accessible by Ethernet networks.

- **Virtual Serial Port Manager (VSP Manager):** used to dispose, remove and configure VSP drivers. This driver allows that applications developed to access devices through serial connections be able to keep on operating normaly, ignoring ESC713 presence. This situation is possible using virtual COM ports at Windows.

- **Virtual Serial Port Driver (VSPD):** enables Windows applications to access ESC713 as an standard COM port. In fact, VSP driver is routing the application data to ESC13 converter.

- **Port Monitor:** allows to follow VSP driver activity in order to guarantee the debug of eventual connection problems. (Not used at our applications).

- **Connection Wizard:** helps to install VSP driver and also ESC713 converter configuration. (Not used at our applications).

3. Serial Driver Configuration

To minimize the impact of the access to an Ethernet network at the applications, all the access can be done through virtual PC serial ports. This way, if the client already has some application installed, the communication process using an Ethernet network becomes clear, limiting itself only to the selection of a new serial port to the application.

To implement this strategy is necessary to install ESC713 access driver at all PC plataforms that need communication with the devices. Using the tool *VSP Manager* (available at ESC713 install CD) is possible to install the driver.

"*VSP Manager*" main purpose it to associate COM port numbers with ESC713 converters IP addresses. The following steps will describe this process, considering, separetely, the IP static address and DHCP IP address.
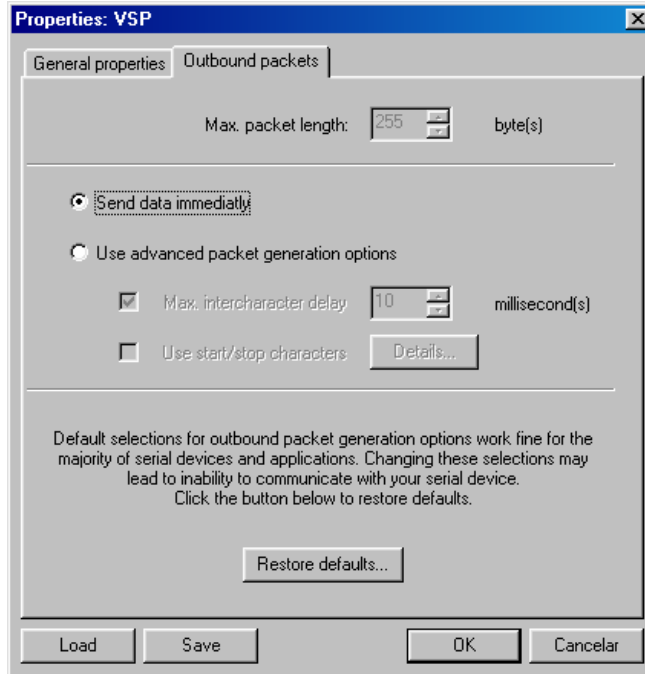
3.1 Configuration with static IP address

1. Activate the application "*VSP Manager*" using the sequence executed at the Windows command bar: **Start -> Programs-> Tibbo -> VSP Manager**

2. Activate the button "Add" to add a new COM port which will be associated to ESC713 converter.

3. Define the device associated to the COM port considering the IP address obtained with the responsible for the network. Notice that this address won't change while ESC713 is being used. At the example showed below, the IP address was 192.168.0.34.

    This way, using the IP address obtained, fill in the tab "*General properties*" as presented at the picture below. Notice that it's been considered that the port used will be COM2. The tool in most cases use the first port available at its system.
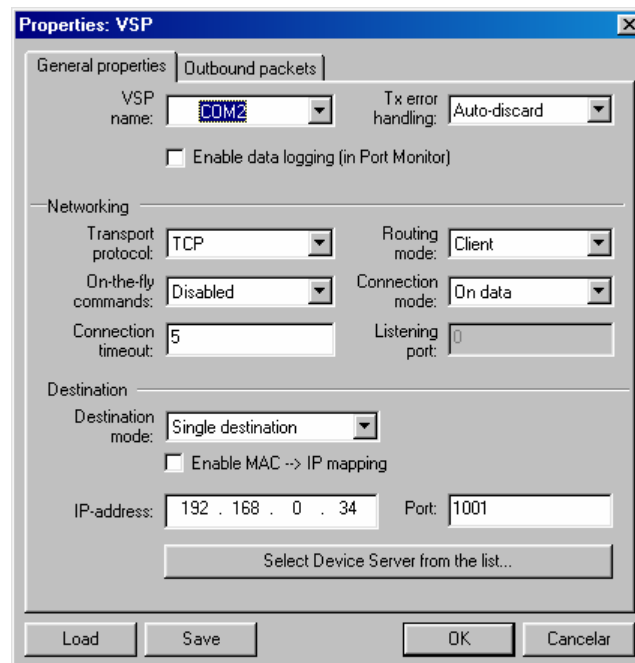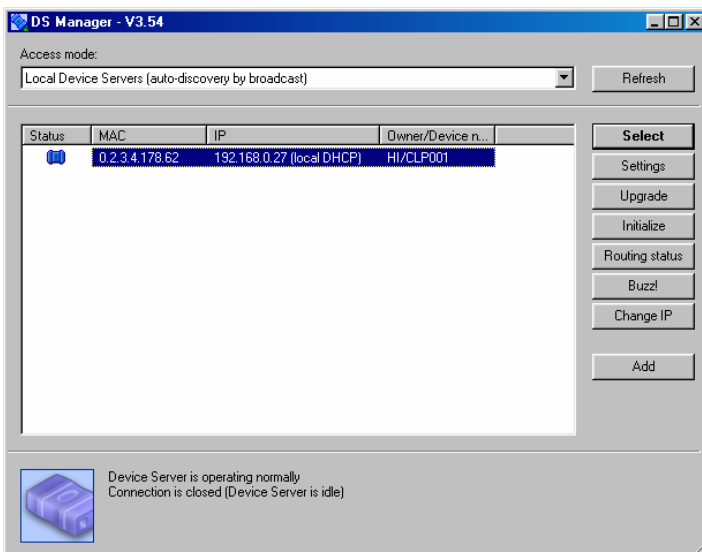
4. Fill in the tab "*Outbound packages*", as presented at the picture below:

5. Finish the port installation by using the button OK

6. Close *VSP Manager* tool

3.2 Configuration with Dynamic IP address (DHCP)

When the available network has the service DHCP is possible to configure the device to get the IP address directly from the DHCP server.

To enable the DHCP mode, the same steps presented at the previous item (3.1) must be done, changing only the step 3 to execute the activities presented at the next steps:

- Activate the button *"Select Device Server from the list"*. It will activate a similar window of the tool *DS Manager.* At this window, select the ESC713 and push the button "*Select*"

- After this selection, the tool wil automaticaly select the converter, considering the MAC address, once the IP is dynamic and can be changed through distinct modes of operation.

4. ESC713 Converter Configuration

At this topic will be presented the operation sequence necessary to configure ESC713 converter. This configuration can be classified in two classes:

- Static IP: In this mode, user can determine an IP address that keeps allocated at the whole CLP using process.
- IP obtained from DHCP: At this strategy, the converter "negociates" the IP address with the server DHCP present at the system. Notice that on this context, the IP address can be changed from one session to another.

Both configuration uses the application **Tibbo Device Server Toolkit** (DST) for *Windows*, which programs ESC713 converter working parameters. At this context, first will be described the installation of a *toolkit* for later detailing the configuration of ESC713.

4.1 Configuration with static IP address

Before continuing with configuration, get a free IP address from the administrator of the network, which will be associated to ESC713 converter. At our example, let's consider the IP address 192.168.0.34.

1. Physically connect ESC713 and its Ethernet network using RJ45 connector. Notice that converters used after routers may not be detected, because UDP datagrams, used at the search, can be detained by routers. This way, verify with the administrator of the network if the converter can be accessilbe localy.

2. Acivate the application "*DS Manager*" using the sequence executed at the Windows command bar: **Start -> Programs-> Tibbo -> DS Manager**

3. Select at Box "*Access mode*" the option "*Local Device Servers (auto-discovery by broadcast)*" and activate the button "*Refresh*". At this moment, all ESC713 converters accessible by the plataform will be presented at DS Manager window.
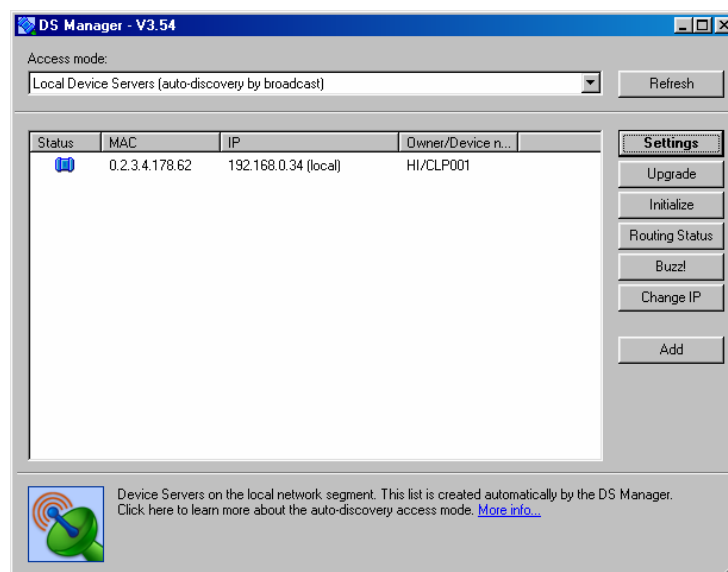
4. Eventually, is possible to have several ESC713 converters on a sub network. At this context, select the converter using one click at the associated line. If you are not sure about which of them is the converter in configuration, use the button "*Buzz!*". This will create the following sequence at the leds present at the selected ESC713 converter:

5. Once the converter line is selected, activate the button "Settings" to conduct the configuration.

6. When at the parameters configuration table, access the tab "Network Settings" and repeat the configuration presented at the table below:

Network Settings Parameter	Value
Owner name	Identifies the owner of the device.
Device name	Identifies the name of the device
MAC-address	DO NOT CHANGE THIS PARAMETER
DHCP	0-Disabled
IP-Address	Network address provided by the administrator of the network
Port	1001
Transport protocol	1 – TCP
Inband commands	0 – Disabled
Data login	0 – Disabled
Connection timeout (min)	5
Routing Mode	0 – Server (Slave)
Link Server login	0 – Disabled
Notification Destination	0 – Last Port

7. Access the tab "Serial Settings" and repeat the configuration presented at the table below:

Serial Settings Parameter	Value
Serial Interface	1 - Half Duplex (for RS485) and 2 - Automatic (for RS232)
RTS/CTS flow control	0 - Disabled or remote
DTR mode	0 - Idle or remote
Baud rate	Select the device baud rate
Parity	Selecione the parity of the device
Data bits	Select the size (bits) of the device
Soft entry into Serial programming	0 - Disabled
On-the-Fly commands	0 - Disabled
Notification bitmask	0

8. Access the tab "Outbounds Packages" and repeat the configuration presented at the table below:

Outbounds Packages Parameter	Value
Max packet length	255
Max intercharacter delay	1
Start on any caracter	1- Yes
Use start-caracter	0 - No
Start character (ASCII code)	Not used
Use stop-character	0 - No
Stop character (ASCII code)	Not used
Number of post-characters	0

9. Finally activate the button OK to send the new configuration of parameters to ESC713 converter. After this operation was concluded successfully, ESC713 conveter will be ready to operate at the access of the device.

10. Close "*DS Manager"* ending the ESC713 conifiguration process. Before using the device, make sure that the configuration of the *driver* at the PC was concluded (item 3).

4.2   Configuration with Dynamic IP address (DHCP)

ESC713 also works with DHCP (Dynamic Host Configuration Protocol). DHCP is destined to identify, automatically, the IP address associated to the converter. To execute this feature is necessary the presence of a DHCP server at the network where ESC713 is connected.

The enabling of DHCP is provided through the same steps presented at the item 2.2, changing only the tab configuration "*NetWork Settings*" as presented at the table below:

NetWork Settings Parameter	Value
Owner name	Identifies the owner of the device.
Device name	Identifies the name of the device
MAC-address	NEVER CHANGE THIS PARAMETER
DHCP	**1-Enabled**
IP-Address	Not used
Port	1001
Transport protocol	1 – TCP
Inband commands	0 – Disabled
Data login	0 – Disabled
Connection timeout (min)	5
Routing Mode	0 – Server (Slave)
Link Server login	0 – Disabled

Notice that the IP address is presented in red, indicating selection through DHCP. When configured this way, ESC713 immediately after the startup, uses DHCP protocol to get the IP address. Naturally, the converter cannot start its operation until this process be concluded. To represent this status, bits will assume the following configuration:

IP address not obtained: this standard will be shown by the status leds whein the IP address has been obtained from DHCP server.

5. ESC713 Module

5.1 Product Part Number

ESC713 is available in two models, as shows the table below:

Part Number	Identification	Note
300.713.001.000	ESC713-232	Serial connections using RS232C protocol;
300.713.001.100	ESC713-232/485	Serial connections using RS232C or RS485 protocols;

5.2 Power Supply

To identify the model of the product will be used the product part number (view item 5.1).

The table below shows details of ESC713 module power supply:
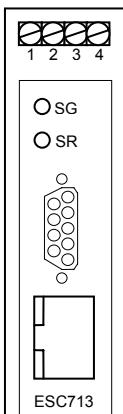
Terminal	Power Supply
1	Vdc (10 .. 30 Vdc)
2	0 V
3	0 V
4	GROUND

5.3 Ethernet Connection

ESC713 converter Ethernet connection is 10BaseT. This converter is compatible with all the hubs 10BaseT and also with 99% of hubs 100BaseT. This happens because the majority of hubs hubs 100BaseT are, in fact, 100/10 devices that, automatically detect the appropriated connection type.

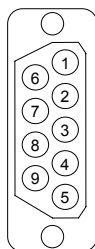The connector used is RJ405 and its pin will be presented at the following picture:

Frontal view
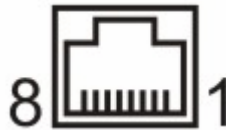
Pin	Function
#1	TX+
#2	TX-
#3	RX+
#4	
#5	
#6	RX-
#7	
#8	

5.4 Serial Connection

The following table presents the DB-9 connector pins used on models ESC713-232 and ESC713-232/485.

DB9	RS232-C	RS485
1		-DT
2	RX	
3	TX	
4	DTR (*1)	
5	GND	
6	DSR (*1)	
7	RTS	
8	CTS	
9		+DT

Note: (*1) – Pins 4 and 6 are only connected internally

For the model ESC713-232/485, it must be defined with the physical way (RS 232C or RS 485) and the status of polarization and termination resistors avaialable at the converter when used the configuration RS485. The following pictures show position of dip switches and the avaialable configurations:

Dip Switch (SW1) localization
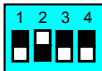
Title

1 ON

1 OFF
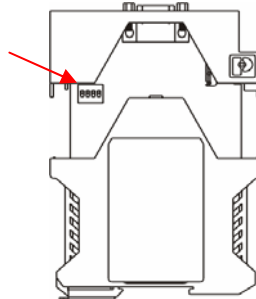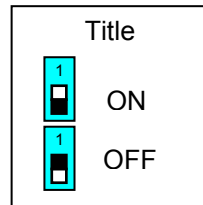
Configure the keys using one of the following conditions:

- RS232-C Configuration
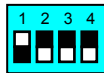
- RS485 configuration without polarization and line termination

- RS485 configuration with polarization and line termination

Notice that, when configured as RS485 line it must be used twisted-pair (26 AWG) and it's also recomended to use a cable with ground shield.

5.5   Status Leds

ESC713 has two status leds localized at the converter top. These leds behavior reflects several conditions, as it is shown at the table below:

 Power up: This standard is presented one time when ESC713 is energized

Buzz: Both leds blink quickly when the converter receives one Buzz(B). Normally, this command will be used to identify a particular converter on a network with several converters

Serial programming mode: Indicates that device programming is happening at the serial lines

Error: Indicates error

Ethernet Fail: Indicates that the Ethernet port isn't communicating correctly and that the communication with the converter isn't avaialable

IP address not obtained: It means that ESC713 converter wasn't able to get the DHCP server IP address

Data connection is closed: Indicates that there's no data connection established (TCP or UDP).

Sending ARP: Indicates that the converter is sending ARP requests to determine the MAC address of the host which the converter is establishing the communication.

Opening TCP connection: Indicates that a TCP connection has been established. This condition isn't possible with UDP connections, because they don't have a connection establishment phase.

Established data connection: Indicates that one data connection was established and when it happens, the following conditions can also be presented:

Data routing: This standard will be presented when a data connection was established and data are being sent through ESC713 converter.

Buffer overrun without data routing: This Standard will be presented when a data connection was established and one buffer overrun was detected and associated to this connection.

Buffer overrun without data routing: data routing and overrun buffer can be presented at the same time.

Reset of TCP connection by the host: Indicates that the TCP connection was reseted by the host (through a RST package).

6. Cables Specification

Part Number	Name	Description
302.713.100.000	CB-ESC-PLC/DB09 (RS232)	ESC713(DB9) - PLC(DB9) RS232 Cable
302.713.100.010	CB-ESC-PLC/DB09(RS485)	ESC713(DB9) - PLC(DB9) RS485 Cable
302.713.100.020	CB-DB09PC- DB09ESC	ESC713(DB9) - PLC(DB9) RS485 Cable

Document Control

General remarks

1. This is a dynamic document, being subject to revisions, comments and suggestions. Every suggestion for its improvement must be directed to **HI Tecnologia** support department.

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Document Responsibility

Activity	Date	Responsible	
Development	09/21/2004	Hélio Azevedo	
Revision	04/10/2006	Heber A. Scachetti	*Mídia revised*
Approval	04/11/2006	Helio J. Almeida Jr.	*Mídia approved*

Review History

Date	Rev	Description
04/11/2006	3	Inserted notes about the non avaialability of DTR and DSR signals at the module
12/12/2005	2	Power supply range corrected (item 5.2)
10/03/2005	1	Added the cables specification item
09/21/2004	0	Original document