Technical Support
Bulletin Nr. 6 – Connectivity

Contents

- *Introduction*
- *Connectivity- RS485 networks*
- *Compatible Televis devices, BusAdapter & EWRS 485*
- *Televis Compact*
- *Televis 150/200*
- *Compatibility of interfaces with Televis150/200 versions*
- *Televis Net*
- *Comparison between Televis 150/200 and TelevisNet*
- *Serial PCInterface interfaces*
- *Integration of ModBus devices in TelevisNet*
- *Software and hardware compatibility*
- *ParamManager*
- *ModBus*
- *Energy XT Pro - ModBus master*
- *SoftGate*

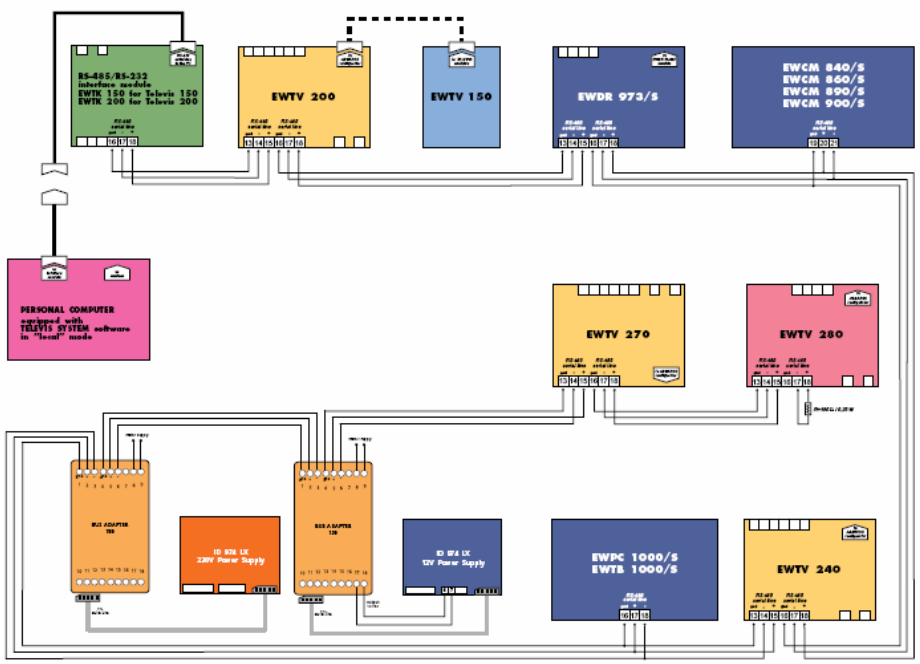
Introduction

This document illustrates some solutions developed by Eliwell for the connection of supervision systems and provides some guidelines to troubleshoot connectivity problems.

Connectivity- RS485 network

Eliwell devices can be connected to supervision systems using the RS2485 standard, which specifies the requirements for the connection of network cables (communication bus) and their use. Networks are physically constituted of a 3-way lead with positive ("+"), negative ("-") and ground wires. These types of networks are described in standard as TIA\EIA 485 A and are called half-duplex, because transmission is carried out using the voltage difference between the positive and negative poles on two leads only, both in transmission and reception mode. However, this also means that transmission is managed by one device at a time only. All transmitters/receivers must have a common reference voltage, which is provided by the ground (GND) lead. The maximum length of cables for devices using a baud rate of 9600bps (typically used by all Eliwell devices) is 1,200 meters.

Devices are cascaded in parallel as shown in the figure.



Network devices are all slaves because they can only respond to the commands sent by masters, which in this case is the PC.

Compatible Televis devices, BusAdapter & EWRS 485

Compatible Televis devices include:
EWPC/S: all with built-in RS485 serial port
EWPX: all models of EWPX require the installation of a serial adapter between the TTL and RS485, except for model EWPX 173\S.
IC – ID – IWP – EWDR: all models with LX suffix.
All LX models use the Televis protocol, unless otherwise specified on the label. There are also LX models that use the ModBus protocol. All LX models require the installation of a signal converter between TTL and Rs485.
Eliwell offers the following types of TTL/RS485 converters:

EWRS485:standard converter installed between TTL and RS485. 2000V insulation between TTL and RS485

BusAdapter 130: converter between TTL and RS485, which also includes an auxiliary 12 VAC output used to supply the controller. 2000V insulation.

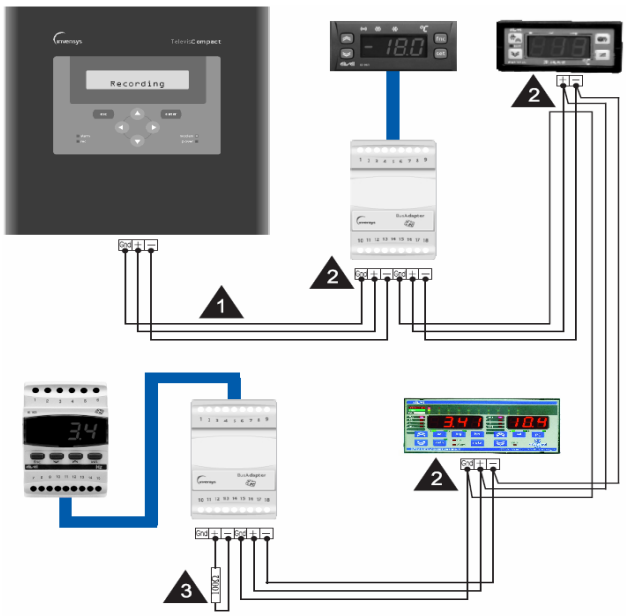
BusAdapter 150: converter between TTL/RS485 with reinforced insulation suitable to be used with IE (LX) electric measuring instrumentation. 3750V insulation.

BusAdapter 350: low consumption converter between TTL and RS485. This device requires less power on the TTL side (supplied by the controller) and can therefore be connected to EM 300 LX controllers with V-I or FanCoil inputs.

Models 130,150 and EWRS485 are interchangeable.

Televis compact

Compact monitoring and supervision unit



The simplest and most effective solution consists of using a Televis compact, which is designed for small installations with a maximum of 50 detection points/units.
The network in the figure comprises only Eliwell Televis compatible devices, as described in the previous chapter.
The serial line used for communication purposes is a RS485 line, which in this case is connected directly to Televis Compact without additional devices.
Televis Compact has: 1 female RS232 serial connector for the direct connection of the device to the PC; 1 male RS232 serial connector for the connection of the GSM or analog modem; 1 parallel LPT1 connector for the connection of an MS-DOS compatible local printer; 2 relays for the connection of the telephone/modem reset and alarm controller.
The device is able to operate in standalone mode without a PC. Data can be reviewed directly on the device or on any PC running Televis Interactive, in local or remote mode.
This compact device enables you record the temperature and alarm data generated by each single device. The device stores all the received data in the NON volatile memory, giving up to a maximum of one year's recordings. This controller can manage a maximum of 35 standard devices. Model Televis compact 60 can instead manage up to a maximum of 50 devices. If connected to external devices, like analog or GSM modems, it can independently forward alarm warnings to user-specified recipients (up to a maximum of 8), at specific times of the day or days of the week.

MODELS:

Televis Compact 20



- Televis compact 20
- Display and keys
- Acquisition of data and alarms
- Manages a max. of 35 devices
- Forwards alarms via modem
- Connects to the PC with an RS232 serial connection

Televis Compact 40



- Televis compact 40
- No display and keys
- Acquisition of data and alarms
- Manages a max. of 35 devices
- Forwards alarms via modem
- Connects to the PC with an RS232 serial connection
- Remote connection to the PC through the telephone line

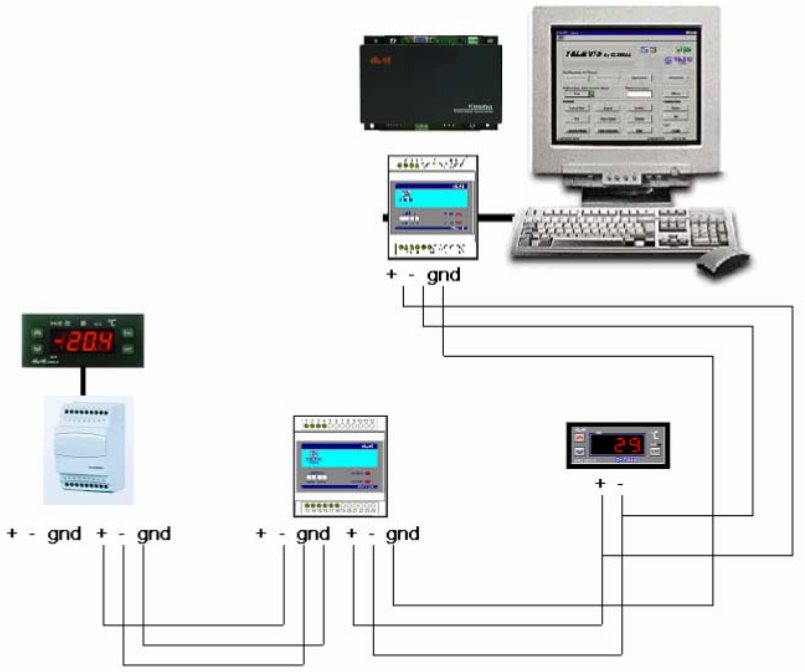
Televis Compact 60



- Televis compact 60
- Display and keys
- Acquisition of data and alarms
- Manages a max. of 35 devices
- Forwards alarms via modem
- Connects to the PC with an RS232 serial connection
- Remote connection to the PC through the telephone line

As shown in the diagram above, all models generally offer the following features: data recording, alarm management, and direct or serial connection to the PC for data management.
On models 40 and 60, it is also possible to use the modem to monitor the status of the installation remotely by means of a telephone line.
Model 40, which is equipped with a full set of features but has no local keyboard, is the ideal solution to provide users not only with the installation, but also with a data and alarm management service, which eliminates all possible interferences with the plant.

Televis 150/200
Monitoring and remote management software



This product enables the use of a RS485 bus to connect all ELIWELL devices that use the Micronet (Televis) communication protocol.

This protocol is proprietary and cannot be distributed to third parties, which explains why Televis150/200 cannot be integrated in existing systems or devices used for other purposes.
Alarm events can be forwarded by fax or SMS to service technicians. The system also enables the monitoring of data from remote locations through a telephone line, though it cannot be used for configuration purposes.
Televis 150/200 is the ideal solution for medium-large installations with above 100 detection points/units (220 addressable).
This system requires the use of a PC with the system requirements described below. Along with the software, it is also necessary to provide a serial interface (EWTK or PcInterface) for the connection of the RS485 bus. The system is available in two main versions:
Televis150: enables to automatically acquire a selectable range of temperatures from all the detection points. It is also able to manage alarms and forward them to preset recipients.
Televis200: in addition to the features of model 150, this system can also interact with the individual controllers through the computer. These features enable the user to change parameters, query controllers or send commands, including those related to the enabling of lamps, manual defrost and standby operations, etc.
Both versions are available in several sizes, which vary according to the maximum number of controllers that can be managed.

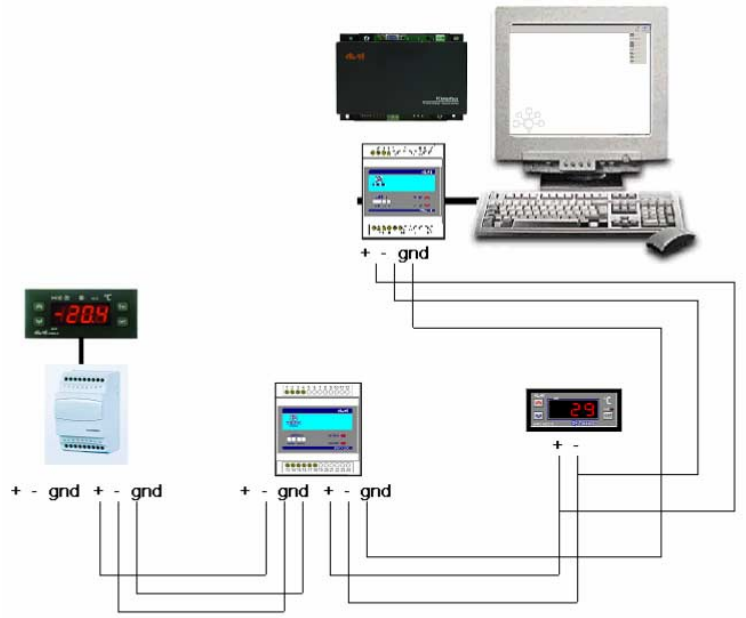
MODELS

Televis 150	224 addressable controllers
Televis 150 R	5 addressable controllers
Televis 200	224 addressable controllers
Televis 200 R	15 addressable controllers
Televis 200 RV	25 addressable controllers

Compatibility of the interfaces with Televis 150/200 versions

Televis version	**EWTK 150/A – 200/A**	**PCInterface + SLU01XX100100 license Or PCInterface SLU02XX100100**	**PCInterface + SLP01XX100100 license Or PCInterface + SLP02XX100100 license**
From 02.05.00 to 02.07.00	Yes	Yes	No
From 05.XX.XX to 06.03.XX	Yes	Yes	No
From 06.04.XX to 06.XX.XX	No	Yes	Yes

Televis Net
Monitoring and remote management software



This software enables the configuration of installations with a greater flexibility, thus offering an advanced solution for the management of users, alarms and recipients. The sections that follow analyze in detail and compare the features of Televis150/200 and Televis Net:

1. Transmission technology is based on a RS485 bus, which requires the connection of at least one serial interface to the PC. For an installation, you would require a PcInterface, 1110 or 1120, and a license.
2. This product is able to manage several serial interfaces, compatibly with hardware and PC resources. It is alternatively possible to use a PcInterface 1120 in order to split the RS485 network into two branches and configure smaller serial lines that are less exposed to electromagnetic noise.

Comparison between Televis 150/200 and Televis Net

Function	Televis 150/200	Televis Net
Network customization	Assigns a description to individually available devices.	Assigns a description to individual devices and resources.
Configuration history	Devices can be added/removed individually and manually. No historical data is available at the time of edit. The removal of a device causes the deletion of the related database.	Configuration needs to be repeated, but the system stores the historical data of the old installation. Therefore, it is sufficient to recall a chart/table to display the data of a device that is no longer present or has been replaced by another equivalent model.
User management	It is possible to specify only one administrator's password and use it to access all the features of the system. The administrator may prevent additional users from accessing some of the screens of the system.	It is possible to create several groups (administrators, users, etc.) and flexibly assign to them different privileges. Therefore, it is possible both to prevent specific users from using some screens, and to specify which features users are authorized to use. Thus, users may have access to all screens, but not be able to use all their features.
Remote access	Connections can be established in dial-up mode only, which means that the remote PC uses an analog/GSM modem to call the local modem, which must also be an analog or GSM modem. If a GSM modem is installed in the local site, the remote number to be dialed is the one for data connection, not for voice calls.	The remote and local sites can establish a connection in several ways. For example, through a dial-up connection using an analog, GSM or ISDN modem. It is also possible to use ADSL or Ethernet (LAN) connections. Data are exchanged using the TCP\IP protocol. Connections based on TCP/P protocol can be used if the recipient is reachable. Incoming and outgoing connections are entirely managed by the operating system. This enables to use all the communication devices recognized by Windows and eliminates compatibility problems.
Forwarding of alarm warnings or periodical reports	With Televis 150/200, alarm warnings are forwarded by fax (analog modem) or SMS (GSM modem). Periodical reports were available by fax. It was possible to define several recipients, which were used by the system in sequence. This meant that the system would contact the first support center of the list, switching to the second one only if the first attempt failed.	In Televis Net, alarm reports are generated in the same manner of Televis 150\200, i.e. through an analog or GSM modem. However, this program also offers additional features based on modern technologies. These technologies enable Televis Net to use ISDN, modems or ADSL connections. Alarm reports can therefore be sent by fax, SMS and even by e-mail. To prevent communication failures with the provider, is however preferable to use ADSL connections. It is therefore possible to receive a warning by SMS, confirm the receipt of the message to the system and reforward the code supplied by the system. Reports are forwarded to recipients in parallel, depending on the availability of support centers, and not in the order of the list of recipients.

Management of Support Centers	It is possible to manage several support centers and specify whether they are available to receive alarms on a weekly or hourly basis. All centers are enabled to receive the same report (SMS, fax).	There can be different support centers divided by receipt method (SMS, Fax, E-mail), while time frames can be customized on an hourly, weekly and annual basis. It is possible, for example, to exclude a support center for the whole of December 25th.
Tables/Charts	Charts can be generated individually for each device. Each page displays data for the temperature control probe, the evaporation probe (if installed) and the third auxiliary probe (if installed). The section related to tables in **Televis 150-200** enables to display up to 4 devices per page along with the three fields related to the probes.	It is possible to display the status of several probes and digital inputs, even of different devices, on the same page to easily compare data. The Net version also enables to salve customized profiles to simplify the review process. The section related to tables enables to customize pages by adding only the desired resources. The page layout can be specified through the printer's settings from the Control Panel of Windows.
Scheduled prints	Enables to schedule the printing of recordings on specific days of the month (for example the first day of every month) or after a specific number of hours, which can be defined by the user. Scheduled prints contain all the recordings stored by the system after the last printout. It is not possible to schedule the printing of charts.	Enables to schedule automatic printing on a daily, weekly or monthly basis. The system prints all the recordings stored after the last print. It is also possible to request the printout of the last recording. Controllers can be organized in groups and configured to automatically generate the printout at different intervals and/or using different printers.

Additional features		The system offers a new feature that enables to be recalled from the system. If you store the number of a Support Center in the phonebook of the local system, you can configure the system to call the preset number.

PCInterface serial interfaces

PCInterface 1110	Female Rs232 serial connector – 1 Rs 485 serial port – Power supplies available on request: 115Vac and 230Vac	Televis Net –Televis 150\200 Param Manager –Soft Gate
PCInterface 1120	Female Rs232 serial connector– 2 Rs 485 serial ports – Power supplies available on request: 115Vac and 230Vac	Televis Net –Televis 150\200 Param Manager –Soft Gate
PCInterface 2150	Female Rs232 serial connector - 1 Rs 485 serial port – TTL port - Power supplies available on request: 115Vac and 230Vac	Televis Net –Televis 150\200 Param Manager –Soft Gate

Integration of ModBus devices with Televis Net

It is possible to integrate controllers that use the ModBus RTU communication protocol in a Televis Net supervision system using a SmartAdapter converter. The user can use the tool supplied with Televis Net to create the customized driver required to manage the ModBus-RTU control on the network.
This feature is available in versions 01.04.02 and later versions.

Software-hardware compatibility table

PRODUCT	VERSION	COMPATIBILITY	MINIMUM HARDWARE REQUIREMENTS	RECOMMENDED HARDWARE REQUIREMENTS	RECOMMENDED DEVICES
Televis 150/200	Release 02.xx	Windows 3.11 - 95 - 98SE	CPU 33Mhz - 16Mb RAM - 200Mb HD - Floppy Disk drive - 2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 640X480 14"	CPU733Mhz - 256Mb RAM - 20Gb -HD - CD-ROM drive -2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 14" 800X600	Analog serial modem US Robotics 5630 - GSM Siemens Tc35i or Audiotel Base modem - ISDN modem ZyXel Elite 28641 Windows printer
Televis 150/200	Release from 05.xx to 06.05	Windows 95 - 98SE - 2000 Pro Service Pack4	CPU 433Mhz - 64MB RAM – 86 GB HD - Floppy Disk drive -2 RS232 ports with standalone IRQ - 1 LPT1 port - Monitor 800 x 600	CPU733Mhz - 256Mb RAM - 20Gb -HD - CD-ROM drive -2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 14" 800X600	Analog serial modem US Robotics 5630 - GSM Siemens Tc35i or Audiotel Base modem - ISDN modem ZyXel Elite 28641 Windows printer
Televis 150/200	Release from 06.06	Windows 98SE - 2000 Pro Service Pack4 - XP Pro Service Pack 1a	CPU 433Mhz - 64MB RAM – 86 GB HD - Floppy Disk drive -2 RS232 ports with standalone IRQ - 1 LPT1 port - Monitor 800 x 600	CPU 733Mhz - 256Mb RAM - 20Gb -HD - CD-ROM drive -2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 14" 800X600	Analog serial modem US Robotics 5630 - GSM Siemens Tc35i or Audiotel Base modem - ISDN modem ZyXel Elite 28641 Windows printer
TelevisNet	All	Windows 2000 pro SP4 - XP Pro Sp1 - XP Home SP1 - Internet Explorer 5.5 - Outlook Express	CPU 733Mhz - 256Mb RAM - 20Gb HD - CD-ROM drive -2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 14" 800X600	CPU 733Mhz - 256Mb RAM - 20Gb -HD - CD-ROM drive -2 RS232 ports with independent IRQ - 1 LPT1 port - Monitor 14" 800X600	All modems suitable to be used with Windows service. All GSM (not GPRS) modems supported by the operating system. All printers compatible with the operating system.
TELEVIS COMPACT	All				US Robotics 5630 serial modem - GSM Siemens Tc35i or Audiotel Base modem – Printer compatible with MS-Dos commands
TELEVIS COMPACT (televis interactive + configuration tool)	Release from 02.01 to 02.06	Windows 95 - 98SE - 2000 Pro Service Pack4	CPU 200 Mhz - 64Mb RAM - 1Gb HD - CD-Rom drive - 1 RS232 port with independent IRQ - 1 LPT1 port or USB - Monitor 14" 800X600 – Use small fonts only.	CPU 800 Mhz - > 10Gb HD - 128Mb RAM - 2 RS232 ports with independent IRQ (max 4 COM) - Cd-Rom driver - 1 LPT1 port - Monitor 14" 800X600 – Use only small fonts.	Analog serial modem US Robotics 5630 - GSM Siemens Tc35i or Audiotel Base modem - ISDN modem ZyXel Elite 28641 Windows printer
TELEVIS COMPACT (televis interactive + configuration tool)	Release from 02.07to 02.10	Windows 98SE - 2000 Pro Service Pack4 - XP Pro Service Pack 1a	CPU 200 Mhz - 64Mb RAM - 1Gb HD - CD-Rom drive - 1 RS232 port with independent IRQ - 1 LPT1 port or USB - Monitor 14" 800X600 – Use small fonts only.	CPU 800 Mhz - > 10Gb HD - 128Mb RAM - 2 RS232 ports with independent IRQ (max 4 COM) - Cd-Rom driver - 1 LPT1 port - Monitor 14" 800X600 – Use only small fonts.	Analog serial modem US Robotics 5630 - GSM Siemens Tc35i or Audiotel Base modem - ISDN modem ZyXel Elite 28641 Windows printer
SOFT GATE	All	Windows 2000 pro SP4 - XP Pro Sp1 - XP Home SP1	CPU 200Mhz - 64Mb RAM - 10Mb HD - 1 Com port for each network, with independent IRQ	CPU 200Mhz - 128Mb RAM - 10Mb HD - 1 Com port for each network, with independent IRQ	

ParamManager

Software for the programming of tables

This application enables the generation of lists of all the device parameters in tabular format.
The table shows the name of the parameter (for example diF), its description (tripping differential), its minimum and maximum values and the current value stored in the controller. The software can be used both to read and write tables.
When you load a map from a file and read the map of the controller, the software automatically detects the parameters that don't match highlighting them in red.
Maps must obviously refer to the same model of controller.
Maps can be created even without a PC connection and saved in a file so that they are available for future use.
There are currently two different types of installation:
Commercial refrigeration: the software is available for all LX version of controllers suitable for commercial refrigeration.
Air conditioning: currently contains all standard controllers, except for model ERT 400 ModBus.
It is generally advisable to contact the Sales Office for information on the compatibility of devices and before upgrading the software.
This product requires the installation of an interface key and a software license. The full package includes a PCInterface 2150 serial key and a Param Manager CR or AC license.
The interface and controller are connected through the TTL port or the RS485 data bus. If the TTL port is used, the controller does not require external power supplies.
The direct connection to the TTL port is not however permitted for Fan Coil controllers.
The latter also require the use of a Bus Adapter 350.

ModBus

Some of the controllers of the Eliwell catalogue are available in LX version, which uses the ModBus RTU instead of the MicroNet protocol.

This protocol is also used by all air conditioning controllers, except for the ERT 400 standard model.

Please contact the Sales Office for a list of controllers that use the ModBus protocol.

These controllers are not able to communicate with ELIWELL software applications, but use a standardized and documented communication protocol called ModBus.

All controllers require the installation of a serial converter between TTL and RS485.

A list of logical addresses related to the allocation of resources and parameters is available for each ModBus controller.

The documentation also contains information on the commands that have been implemented in the controller; for example 03 hex for reading and 10 hex for writing.

The software and the serial converter, to be installed between the RS485 bus and PC, can be chosen by the end-user. The converter must also include an internal control for the transmission enabling, otherwise management must be assigned to the software. Baud rate is set by default to 9600 bit/sec. Parity can be configured in all models for commercial refrigeration, but is set to EVEN in models for air conditioning.

Energy XT Pro –ModBus Master.

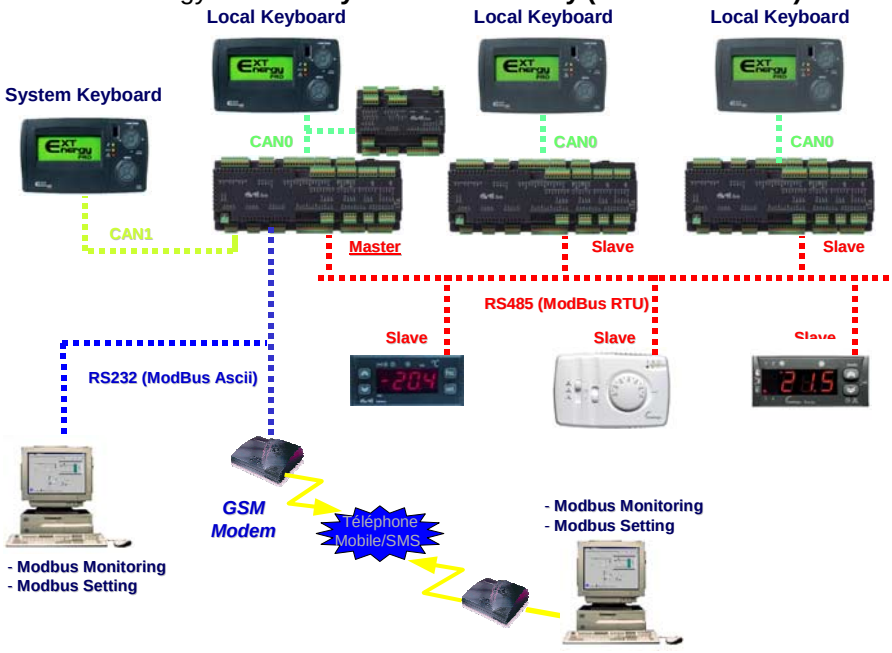
The XT Pro acts both as slave as compared to the ModBus RTU network, but can also be used as master of the network and used to manage all Eliwell ModBus controllers.

This means that it integrates all the ModBus commands of the Eliwell controllers.

To be able to use Energy XT Pro with third party ModBus controllers, it is necessary to verify that they respond to commands 03; 04; 16; 43.

The baud rate is fixed to 9600 bps. Parity can be selected by means of a parameter.

Energy XTPRO: **System connectivity (Modbus master)**



SoftGate

SoftGate is an ActiveX OPC or OCX software component. It offers the ideal solution to connect industrial and office applications (developed for Windows in accordance with Microsoft COM/OLE Automation specifications) with the on-site equipment (controlled by Eliwell air conditioning or commercial refrigeration plants) used for automation purposes.

Main features

• Multiple connections to a high number of controllers
• Automatic detection of the devices connected to the network
• Automatic detection of resources available for all devices
• Automatic acquisition of data (asynchronous reading of data at scheduled intervals)
• Synchronous data access
• Transmission of commands to devices (defrost, lamp enabling, …)
• Parameter reading/writing (to access parameters, it is sufficient to know the parameter label)
• Compatible with a large number of controllers
• Compatible with next generation controllers

The product requires at least a serial interface with the selected license (OCX or OPC). It is possible to use a single PC to manage several interface, depending on its hardware resources.

DISCLAIMER

This document is the exclusive property of Eliwell and may not be reproduced or circulated unless expressly authorized by Eliwell. Although Eliwell has done everything possible to guarantee the accuracy of this document, it declines any responsibility for damage arising from its use. The same applies to any person or company involved in preparing and writing this document.

Eliwell reserves the right to make changes or improvements at any time without notice.

Eliwell & Controlli s.r.l.
Via dell'Industria, 15 Zona Industriale Paludi
32010 Pieve d'Alpago (BL) ITALY
Telephone +39 0437 986111
Facsimile +39 0437 989066
Internet http://www.eliwell.it

Technical Customer Support:
Telephone +39 0437 986300
Email: techsuppeliwell@invensys.com

Invensys Controls Europe
An Invensys Company