

Ethernet - serial interface e-ILPH

Technical documentation

This interface realizes conversion from TCP/IP connection RJ45 connector for 10/100 Base T link to serial RS232 or/and R485 line.

The interface is able to work in slave MODBUS/TCP protocol (server mode), direct connection (tunnel) in server or client mode. It is also able to send mail via SMTP protocol using a simple HAYES command on the serial line.

Isolation: Serial lines (RS232 and RS485) use common potential but are isolated from power supply and network connection. Isolation is 1500V from network connection to power supply and serial lines. The voltage isolation is 750 V from power supply and serial lines.



Security information

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). You shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

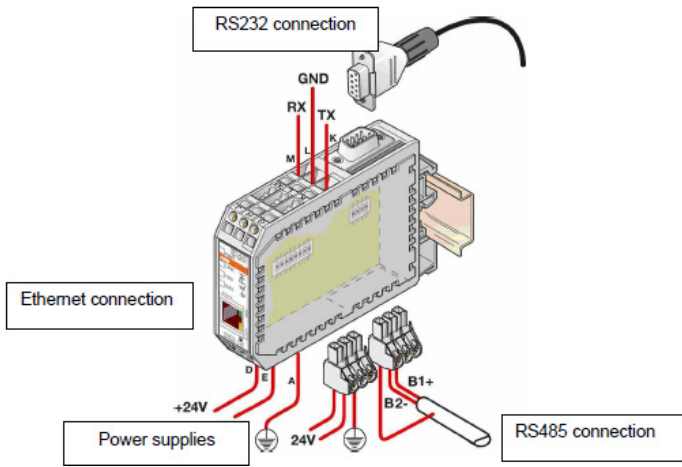
This product is intended to be used only in trusted automation network environments. The following communication services are implemented:

Port	Layer	Service	Security information
23	TCP	Telnet for remote configuration	There is no password protection implemented. Anybody with access to the network can change parameters using the Telnet service.
25	UDP	SMTP	Mail for sending unencrypted mails in case of an event See '5. Hayes commands (In mail mode)' on page 13
69	UDP	TFTP	Used for firmware updates
161	UDP	SNMP	-
502 (can be changed from user)	TCP	ModbusTCP	ModbusRTU does not define any security measures. Anybody with network access can read/write to this port.
30718	UDP	Product Identification Service	-

1. Specific functions are available on the product particularly in MODBUS/TCP:

- Asynchronous mode, Chap: Menu description 2 operating mode
- AC31 programming, Chap: Switch configuration 3: AC31 program
- Modbus Easy Net, Chap: Specific Modbus Easy Net function 2 operating mode

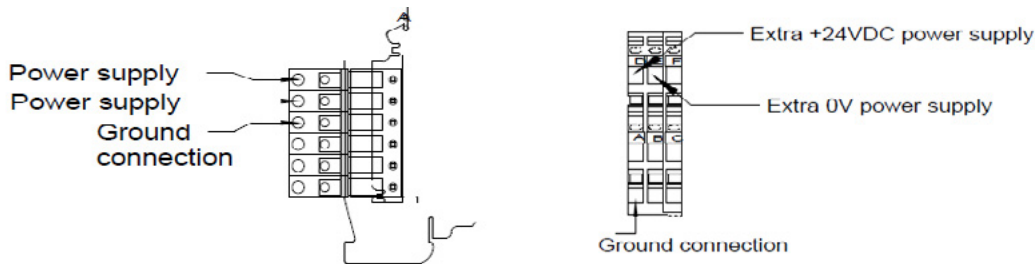
2. Connection



2.1 Power supply

The power supply uses a standard, removable, 5.08 mm size connector with ground connection. The voltage can be from 10 to 34V DC or 10 to 24V AC. The consumption is less than 2 Watts.

An additional connector provides an extra power supply (10 to 34V DC) for redundant power management. Ground connections are also available with screw connections on the same side of e-ILPH. This connection uses an A connector as shown on the following figure:



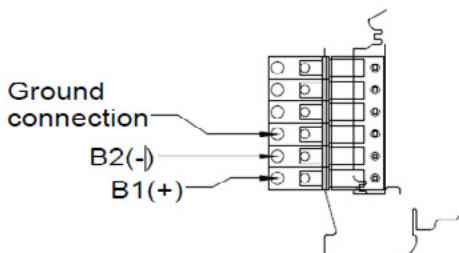
2.2 Ethernet Network

Network connection is realized through standard RJ45 CAT5 cable. This connection can be realized when the product is powered up. The speed of connection is automatically chosen between 10 or 100 Mb depending on network possibilities.

2.3 Serial port

2.3.1. RS485 connection:

This connection uses two removable 5.08 mm connector plugs. The following figure shows the connections and polarity



2.3.2. RS232 Connection:

The RS232 connection uses standard male DB9 connectors or screw connections. (You must choose only one). The metallic part of the connector is connected to ground. The wire configuration is the same as on the DB9 P.C.



This configuration can replace any serial PC connection with an Ethernet connection using e-ILPH and the same cable used before. E.g. with AC31, any CPU can be connected to the serial port using standard 07SK50 cable

RTS signal management: This signal is set to logical true (negative polarity) when characters are sent to the TX pin. It drops after sending the last character, and this signal can be used to manage other RS232/RS485 signal converters or telecommunication modems.

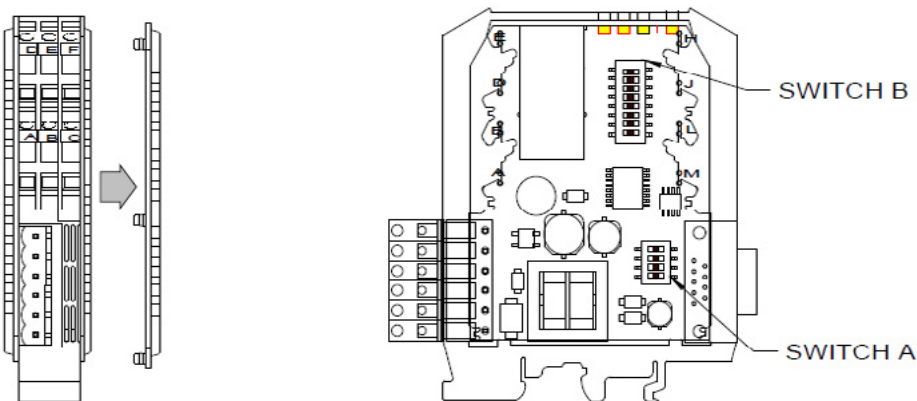
3. Configuration

The configuration menu and switches are used to define parameters such as IP address, TCP port address and also serial parameters and working mode (tunnel, MODBUS/TCP, etc.)

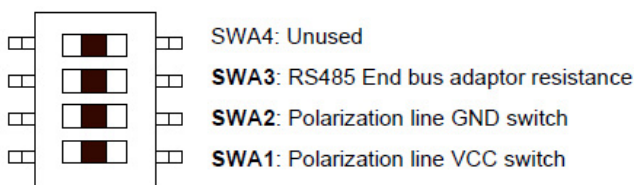
Default, from factory setup: All values are set to use the product in MODBUS/TCP slave mode. To use this mode just set IP address and it's ready to go!

3.1 Switch configuration

Configuration by switch is validated after a reset of the product. Changes only take effect after switching the power off and on again. The switches are accessed by opening the product on the left side as shown on the figure:



SWITCH A: used for hardware configuration of RS485

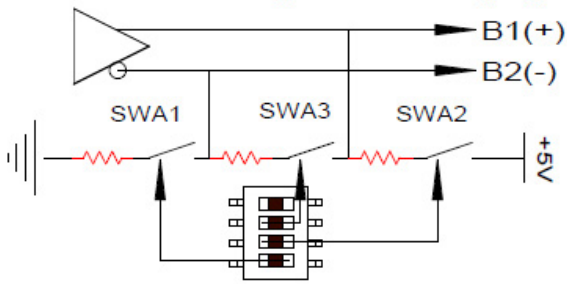


The on position is on the left side of the switch (keeping orientation of the previous figure)

Switch 1 and 2 must be in the same position. They are used to set polarization on the RS485 lines. When these switches are set to the on position the line is polarized.

Switch 3: connects RS485 line to 120Ω resistor. This is done to realize an adaptation line on the end of the bus. The

connection is made when the switch is set to the on position. The following diagram shows the connections



SWITCH B: used for serial parameters and principal functioning possibilities

9600 OFF 8 OFF 7	38400 OFF 8 ON 7	57600 ON 8 OFF 7	115200 ON 8 ON 7
ON	Functionality	OFF	
Even parity	6	Odd parity	
No parity	5	Parity	
1 Stop bit	4	2 Stop bit	
AC31 mode enable	3	Disable	
Modbus slave	2	Transparent mode	
Soft config enable	1	Switch enable	

1: Soft / switch configuration selection. When this switch is set to the on position switch configuration is ignored, and the system is configured using the software. When it is set to the off position, switch configuration is valid.

None of the parameters defined in the following switch can be modified by the software

2: Tunnel or MODBUS mode selection. When the switch 1 is in the off position, the e-ILPH always functions in server mode. Switch 2 is used to choose whether the working mode will be Tunnel mode (transparent mode) or MODBUS/TCP slave mode. When switch 2 is set to the off position, Tunnel mode (transparent mode) will be selected. Otherwise, e-ILPH works in MODBUS slave mode.

3: AC31 program mode selection. When this switch is set to the on position, it is used to select a specific working mode to switch automatically from MODBUS TCP to direct mode. This specific working mode makes it possible to download programs via the Ethernet connection.

4: Stop bits selection. When this switch is set to the on position the serial format uses one stop bit. Otherwise it uses two stop bits.

5: Parity / No parity selection. When this switch is set to the on position the serial frame includes no parity. When it is set to the off position the parity is determined by the position of switch 6.

6: Even or Odd parity. This switch selects even or odd parity when switch 5 is set to the on position. When it is set to the on position even parity is selected.

7: Speed configuration 1

8: Speed configuration 2

Theses switches select the serial speed from 4 values according to the following table:

Switch 7	Switch 8	Speed selected
Off	Off	9600
On	Off	38400
Off	On	57600
On	On	115200

3.2 Ethernet and serial line software configuration

Software configuration is accessible using the network or serial link. In both cases the configuration menu is the same.

3.2.1. Connection to configuration menu with network connection

To connect to the e-ILPH use the TELNET software. TELNET is a terminal mode under network connection and is always included in the Windows software package. The command to call TELNET is as follows (from the DOS command window):

```
TELNET <IP> <port>
```

where <IP> is the IP address in decimal mode separated by dots, e.g. 10.33.152.77 where <port> is the TCP port used for connection. The default standard is 23, so it is not necessary to add this value in the command. For example to connect to a brand new e-ILPH (with default factory-set values):

```
TELNET 10.33.152.76
```

On some recent Windows packages (WIN2000) hyper terminal mode gives the possibility of network connection using Win sock instead of COMx connection. This software can be used to configure e-ILPH (in this case TCP channel can be set to 23)

3.2.2. Connection to configuration menu using RS232 serial connection

Configuring e-ILPH is possible via the R232 serial port connection. This possibility is particularly useful because there is no need to know the IP address assigned to the product. To create this configuration:

Switch off the e-ILPH

Connect it to the serial line of the PC with a cross cable.

Open terminal mode (hyper terminal or other), and configure the link with 9600 bauds, 8 bits, no parity, 1 stop bit, no flow control. In this mode the serial configuration does not depend on switch or software configuration and will be always the same.

To enter in setup mode hold down the x key then switch on the e-ILPH. When the e-ILPH detects the xxx sequence it enters setup mode, and then the configuration process is the same and independent of connection type.

3.2.3. Entering the setup menu

Immediately after connection, e-ILPH displays an interface enabling you to select setup or monitor mode. Monitor mode is an advanced menu that allows you to read and write data from and to the setup memory. This is an expert mode and fairly complex. It will be described in another specific document.

In the first configuration menu wait a few seconds before pressing the enter key to switch to setup menu. Some interesting information is displayed. See in the following line some examples of this display:

```
***** ABB ----- e-ILPH *****  
  
MAC address 00204A86FB9F  
Software version 01.0b8 (051031) V3 550_XPTEX  
  
Press Enter to go into Setup Mode
```

the MAC address is the unique hardware address of each e-ILPH,

In the second line the software version is displayed (with date in parentheses) followed by the library version number.

After pressing ENTER the display goes to setup menu mode as the following lines show:

```

***** ABB ----- e-ILPH *****

***** Network parameters *****
IP Address : 10.33.152.76
No gateway set
e-ILPH is in slave MODBUS/TCP mode
Source Port : 00502
***** Serial communication port *****
Baudrate 9600 Bauds
8 Bits, No parity, 1 Stop bit, No flow control

***** Configuration menu *****
0: Network configurations
1: Serial line parameters
2: Operation mode
3: Factory defaults
4: Exit without save
5: Save and exit
6: English/Francais

```

The first part displays the current configuration values, with current IP address, current working mode (in the example e-ILPH is in MODBUS/TCP slave mode) and the serial lines parameters.

Then the choice menu is displayed, with the number and the corresponding choice:

3.2.4. Network configurations

The menu is used to configure the e-ILPH to be recognized by your network. Please ask your local network manager before setting values.

IP Address: Enter this menu by pressing “0” + “Enter”. E-ILPH asks you for the IP address, and the current value of each byte is displayed in parentheses. If you don’t want to change the byte value, just press the Enter or period key. The system displays the next byte. If modification is necessary just enter the new value in decimal mode followed by the Enter or period key.

Gateway address: This address is used when you need to go out of the internal network, using a server or a router. You must enter the address specified in our server or router. If you need this option, answer Y to the following question: “Set Gateway IP Address and subnetmask <N>”. The current value is displayed in parentheses. If no modification is needed just press the Enter key.

The procedure for changing the gateway IP address is the same as for setting the IP address.

Netmask: Netmask defines your local sub network. E-ILPH checks if the required address fits this sub netmask to check if the remote module is in your local sub network. If not, the Gateway IP address is used to route to the final destination. The procedure for entering the netmask is the same as for entering an IP address.

3.2.5. Serial line parameters

This menu is used to determine serial link parameters. Some parameters are not accessible if switch 1 is set to the on position (see chapter on switch configuration). For each parameter, the current value is shown in parentheses. If no modification is needed, just press Enter.

Setting the baudrate: enter the required baudrate value from the following list 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

If there is no modification of the current value, just press the Enter key. This setting is not accessible if switch 1 is on.

Setting character size: enter the character size (7 or 8 bits). This value is not accessible if switch 1 is on.

Input parity (0, 1, 2): 0: no parity, 1: Odd parity, 2: Even parity, this value is not accessible if switch 1 is on.

Input number of stop bit (1 or 2). This value is not accessible if switch 1 is on

Input flow control: 0 no flow control, 1 XON/XOFF control

3.3 Software operating mode configuration

You can choose between the 4 following modes. In addition, in Modbus® /TCP slave mode you will be able to use two additional functions, to improve system performance: Asynchronous mode and Modbus® Easy Net mode (more detailed description in the next chapter).

This menu is used to select the working mode from the following menu that is displayed afterwards:

e-ILPH is in slave MODBUS/TCP mode

- 0: slave MODBUS/TCP mode**
- 1: transparent server mode**
- 2: transparent client mode**
- 3: MAIL mode**

Each selected menu displays a new menu with the parameters required for the selected operation. The first line indicates the current operating mode. If no modifications are required just press Enter.

3.3.1. Slave MODBUS/TCP mode, simple use

Choose "0". The subsequent menu requests:

Source port: This is the TCP channel used for MODBUS/TCP communication. Usually the value is 502, but this value can be changed (any number from 1 to 65536, except 23 which is reserved for TELNET configuration), to correspond to the master configuration.

Slave Timeout: This is the timeout value expressed in ms for receiving the slave's response. This value is specifically used when there are two masters. This time is allowed to elapse before sending the request from the second master if there is no response. This timeout value is also used to manage the concentrator mode

Enable automatic switch MODBUS-DIRECT mode <Y>: This parameter enables functioning of automatic switch mode from MODBUS/TCP to transparent mode. See Chapter 3.3.4 If the parameter is Y (Yes) the next parameter line is displayed, otherwise the next parameter is not necessary.

Communication port on AC31 PLC (1): Enter the communication port which is used to connect to AC31. 1 is the programming port, 2 is the CS31 port.

3.3.2. Asynchronous mode : Modbus@ Data table exchange

Asynchronous list<Y>: This parameter validates the concentrator operation mode. If Yes is selected, the following parameters are requested to define a list of MODBUS requests managed asynchronously from the Ethernet communication. The result catch from the serial slave is built in a data table in the e-ILPH. This table can be read with a limited number of requests. The limitation is 119 Words for each request. The read is performed at any slave serial speed, Response time is then fully optimized

Frame delay: Enter the wait time generated between each request in ms. This may set a value different from zero when slow slaves are connected to the serial line. Default value is 0

Result address: Enter MODBUS address of the result table. The default value is 31000. This value can be modified if it is not in the supervisor range. Table is 1200 words in length, but only 119 words can be read in the same request (MODBUS limitation).

Request address: Enter MODBUS address of the configuration table. The default value is 30000. The table contains 12 requests: each request uses 4 words; the first is the slave number, the second is the function code, the third is the MODBUS address, and the fourth is data size. The table should be read of write only with one MODBUS request, starting at the <Request address> value. Warning! The data modified using the MODBUS write command are not stored in flash memory and will be lost if the power supply is interrupted.

Request: this value is only displayed. it indicates, from 1 to 12, the number of request which parameter follows

Slave number: Enter slave number from 0 to 255. 0 is used for broadcast message

Function: Enter the MODBUS function code. The following table shows the permitted function code in the request table:

Function code	Function description
1 or 2	Read bit
3 or 4	Read word
15	Write bit
16	Write word

Enter 0 in this parameter to end the input table.

Modbus address: Enter Modbus address of the slave data

Data size: Enter amount of data exchanged, limited to 100 words for each request, i.e. 1600 bit in the case of function codes 1, 2 and 15.

Example:

15 function: Write in Modbus Slave 79 , one bit in address 5088.

Minimum size for bit is 16, and modulo 16.

Afterwards, end the table configuration by 0 for slave number and 0 for function.

```

0: slave MODBUS/TCP mode
1: transparent server mode
2: transparent client mode
3: MAIL mode
0
Source Port : 00502
Slave timeout (2000)
Enable automatic switch MODBUS-DIRECT mode <N>
Asynchronous list <Y>
Frame delay:0
Result address:31000
Request address:30000
Request:1
  Slave number:79 Function:15 Modbus address:5088 Data size:16
Request:2
  Slave number:0 Function:0
    
```

3.3.3. Specific Modbus Easy Net function

This mode allows data exchange between any MODBUS slave connected to e-ILPH, without Modbus master operation. Data are exchanged between the different e-ILPH participants connected to the Modbus/TCP network using specific data tables. These tables are updated with slave data using the asynchronous mode.

The first step is to create the data exchange table, as in Asynchronous mode. Please refer to last paragraph After creating the data exchange table, follow the menu.

Data Exchange <N>: type “Y” for Yes

Destination port: 00025 by default. All the e-ILPH which exchange data together must have the same port. You can use 1 to 65536.

Destination IP: <000> Enter the address you want. Press Enter or “.” to validate or go to the next parameter.

Destination IP: <010> <33> <152> <076>,” 0” at the end is used to send to all the addresses of the network which are on the same port.

Refresh delay <250>: Delay between 2 transmissions of tables in milliseconds. Minimum value “0” means as far as possible, do not overload the network. Maximum value: 65636. This refresh delay has to be less than all the timeouts from the other e-ILPH.

Refresh timeout <512>: If no answer is received from anyone when this timeout has elapsed, 2 choices are available: reset or keep the values. The choice is made using the next parameter.

Reset Value on timeout : <Y> Choose between “Y” to reset the values or “N” to not reset the values.

Number of blocks exchanged < 12> From 1 to 12 is the result of the Table. You can send just a part of the table (always from the beginning).

You come back to the Menu. Save and Exit by pressing “5” option.

Function code associations:

Function code	Function description	Associated function	Associated function code
1 or 2	Read bit	Write bit	15
3 or 4	Read word	Write word	16
15	Write bit	Read bit	1 or 2
16	Write word	Read word	3 or 4

In this example, we will use 3 different products, which exchange some variables.

e-ILPH N°1: IP 10.33.153.76 Will give access to all the information from the table to the 2 other e-ILPHs

e-ILPH N°2: IP 10.33.153.77 Will give access to all t he information from the table to the 2 other e-ILPHs

e-ILPH N°3: IP 10.33.153.78 Will give access to all t he information from the table to e-ILPH N°2

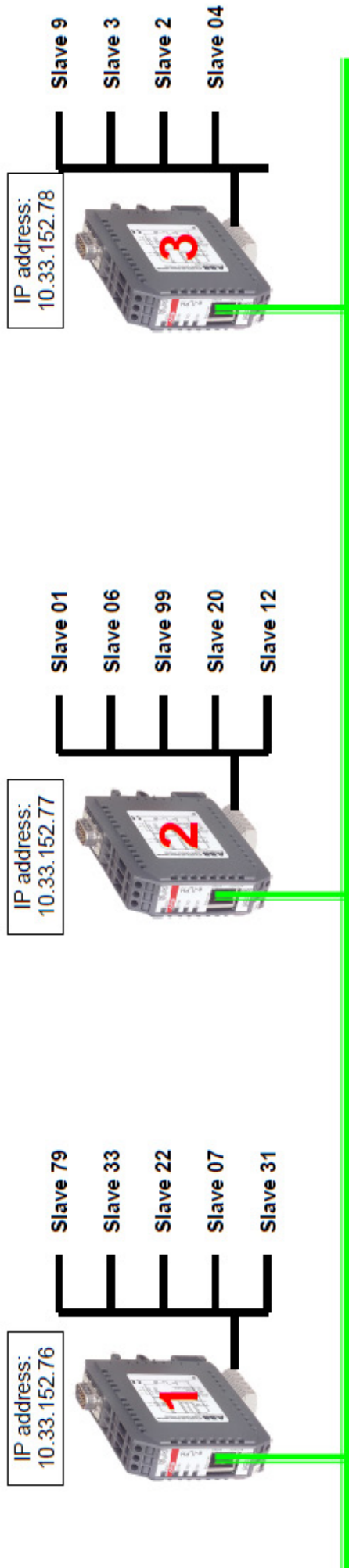


Table 1

Read word: f 4
Write word: f 16
Write word: f 16
Write word: f 16
Write word: f 16
Read word: f 4

This table will be exchanged with all tables

Table 2

Write word: f 16
Write word: f 16
Read word: f 4
Read word: f 4
Write word: f 16

This table will be exchanged with all tables

Table 3

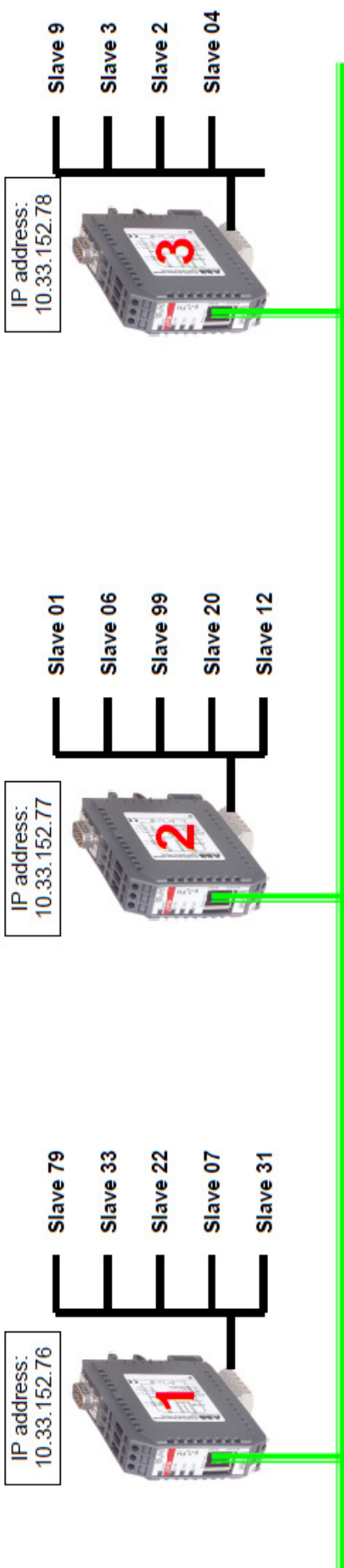
Write word: f 16
Read word: f 4
Write word: f 16
Read Bit: f 1

Restriction on the IP address 10.33.152.77, so it will be able to send to the e-ILPH N2, only what it read in the slave.

Only the 3 first requests will be sending.

But it can receive all the information when the requests are corresponding.

The e-ILPH will compare the table request by request. So beginning your tables always by the information you want to exchange with the others e-ILPH



Source Port : 00502
 Slave timeout (2000)
 Enable automatic switch MODBUS-DIRECT mode <Y>
 Asynchronous list <Y>
 Frame delay: 0
 Result address:31000
 Request address:30000
 Request:1
 Slave number:79 Function:4 Modbus address:5088 Data size:1
 Request:2
 Slave number:33 Function:16 Modbus address:3000 Data size:4
 Request:3
 Slave number:22 Function:16 Modbus address:992 Data size:2
 Request:4
 Slave number:07 Function:16 Modbus address:0476 Data size:1
 Request:5
 Slave number:31 Function:4 Modbus address:1233 Data size:1
 Request:6
 Slave number:0 Function:0
 Data Exchange <N>
 Destination Port : 01000
 Destination IP : (010). (033). (152). (0)
 Refresh delay (250)
 Refresh timeout (512)
 Reset value on timeout <Y>
 Number of block exchanged (5)

Source Port : 00502
 Slave timeout (2000)
 Enable automatic switch MODBUS-DIRECT mode <Y>
 Asynchronous list <Y>
 Frame delay: 0
 Result address:31000
 Request address:30000
 Request:1
 Slave number:01 Function:16 Modbus address:88 Data size:1
 Request:2
 Slave number:06 Function:16 Modbus address:300 Data size:4
 Request:3
 Slave number:99 Function:4 Modbus address:502 Data size:2
 Request:4
 Slave number: 20 Function:4 Modbus address:76 Data size:1
 Request:5
 Slave number: 12 Function:16 Modbus address:233 Data size:1
 Request:6
 Slave number: 0 Function:0
 Data Exchange <N>
 Destination Port : 01000
 Destination IP : (010). (033). (152). (0)
 Refresh delay (250)
 Refresh timeout (512)
 Reset value on timeout <Y>
 Number of block exchanged (5)

Source Port : 00502
 Slave timeout (2000)
 Enable automatic switch MODBUS-DIRECT mode <Y>
 Asynchronous list <Y>
 Frame delay: 0
 Result address:31000
 Request address:30000
 Request:1
 Slave number:9 Function:16 Modbus address:588 Data size:1
 Request:2
 Slave number:3 Function:4 Modbus address:100 Data size:4
 Request:3
 Slave number:2 Function:16 Modbus address:3572 Data size:2
 Request:4
 Slave number:04 Function:1 Modbus address:650 Data size:16
 Request:5
 Slave number:0 Function:0
 Data Exchange <N>
 Destination Port : 01000
 Destination IP : (010). (033). (152). (077)
 Refresh delay (250)
 Refresh timeout (512)
 Reset value on timeout <Y>
 Number of block exchanged (3)

3.3.4. Automatic switch from MODBUS/TCP to direct mode

This specific mode is used when connected to AC31 PLC range series 50 & 40.

This mode enables automatic switching from MODBUS mode to direct (transparent mode). The change is performed when the connection is in MODBUS mode and it arrives with a frame that is not a MODBUS frame.

When this new connection or new frame is received by the e-ILPH, it sends a specific frame (depending on whether COM1 or COM2 is selected in the configuration) to convert the PLC to programming mode. When the connection is closed, the e-ILPH returns to MODBUS mode, after sending a frame to switch the PLC back to MODBUS mode.

While the direct connection is open, if a MODBUS connection already exists, exception code 6 (device busy) is sent to the master when each request is made. This normally generates no timeout and the whole network's efficiency is maintained.

WARNING: This automatic possibility is allowed if ONLY ONE PLC is connected to the e-ILPH

3.3.5. Transparent server mode

Choose 1 in the menu. The menu displayed asks for:

Source port: This is the TCP channel (from 1 to 65536, except 23 which is reserved for TELNET configuration) used to communicate in transparent mode.

1st ASCII code for pack data (0): This is the ASCII code that is checked for Ethernet sending decision. The e-ILPH makes it possible to group characters before sending the frame to Ethernet. One or two characters can be defined. The main example is to send the frame when a Carriage return followed by a line feed needs to be detected to send the frame to Ethernet. If both the 1st and 2nd characters are set to 0 the Ethernet frame is generated for each received character.

2nd ASCII code for pack data (0): second ASCII code for pack decision.

3.3.6. Transparent client mode

Choose "2" in the menu. The menu displays asks for:

SMTP server IP address: Enter the server IP address, using the same procedure as entering your own IP address.

Destination Port: Enter server destination port (from 1 to 65536)

Connection with HAYES command <Y>: Enter the HAYES command used for connection. If the response is N (No), the subsequent menu lines ask for the characters (1 or 2) needed for connection

1st ASCII code for connection command (13): 1st character for connection decision

2nd ASCII code for connection command (0): 2nd character for connection decision. The procedure is the same as for the packing decision. If both parameters are set to 0, connection is generated with any character.

1st ASCII code for pack data (0): this character is used for the packing decision (generate Ethernet frame) when connection is established. The procedure is the same as in server mode.

2nd ASCII code for pack data (0): second character for pack decision, using the same procedure as in server mode

3.3.7. Mail mode

In this mode e-ILPH is able to send simple and limited text mail to two different receivers with a simple text command.

Choose "2" in the menu. The menu displayed asks for:

SMTP server IP address: enter the SMTP server IP address (procedure is the same as entering your own IP address)

TCP port for mail server: Enter the TCP port for mail server, default value 25. This value can be modified to correspond to a specific SMTP server

Mail recipient 1: (mail1@fr.abb.com): Mail recipient 1: Enter (with limit of 48 characters) mail addresses of the first mail recipient. To delete the value just press the space bar and Enter key. If no modification is required, press Enter

Mail recipient 2: (mail2@fr.abb.com): Enter (with limit of 48 characters) mail addresses of the second mail recipient. To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Domain name (e-ILPH.com): Enter (with limit of 23 characters) the domain name of e-ILPH (sender of message). To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Unit name (e-ILPH): Enter (with limit of 23 characters) the unit name of e-ILPH (sender of message). The mail sender address will be generated by adding the Domain name and unit name separated by @ such as UnitName @DomainName. To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Message 1 (This is the subject): Enter (with limit of 23 characters) the subject of the message. To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Message 2 (This is first line): Enter (with limit of 23 characters) the first line of the message. To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Message 3 (This is second line): Enter (with limit of 23 characters) the second line of the message. To delete the value just press the space bar and Enter key. If no modification is required, press Enter.

Connection with HAYES command <N>: Enter the HAYES mode command is used for connection. If the response is N (No), the next menu lines ask for the characters (1 or 2) needed for connection

1st ASCII code for connection command (13): 1st character for connection decision. If the connection is successful it will automatically send mail

2nd ASCII code for connection command (0): 2nd character for connection decision. The procedure is the same as for the packing decision. If both parameters are set to 0, connection is generated by any character.

3.4 Factory settings

Name	Value	Description
Speed	9600	Speed of serial line, valid if switch configuration is inactive
Size	8	Size of serial line character
Parity	No	No parity in the character frame, valid if switch configuration is inactive
Stop bit	1	One stop bit in the frame, valid if switch configuration is inactive
Flow control	0	No flow control
AC31 Com port	1	Default value is connection on com1 for automatic protocol switch management (programming com port)
MODBUS	Yes	e-ILPH is in server configuration mode with MODBUS/TCP protocol
Source port	502	Default value for MODBUS/TCP protocol
Asynchronous list	No	Flag for concentrator mode operation
Frame delay	0	Delay between two asynchronous requests
Result address	31000	MODBUS address of result table
Request address	30000	MODBUS address of asynchronous list configuration table
Request table	0	All request table values are set to 0
Remote port	25	Remote destination port in client mode
CarCon1	13	Character trigger 1 for connection (default value is carriage return)
CarCon2	0	Character trigger 2 for connection, only one character will be checked
CarPack1	0	Character 1 for pack decision (TCP frame will be created on each character received on serial line)
CarPack1	0	Character 0 for pack decision, (TCP frame will be created on each character received on serial line)
SMTP Port	25	Port number of remote mail SMTP server
Recipient1	mail1@fr.abb.com	First mail recipient for automatic mail transfer
Recipient2	mail2@fr.abb.com	Second mail recipient for automatic mail transfer
Domain	e-ILPH.com	Default domain name of sender
Unit	e-ILPH	Default mail address sender will be e-ILPH@e-ILPH.com
Subject	This is the subject	Subject of the mail
First line	This is first line	First line in the text of mail
Second line	This is second line	Second line in the text of mail

All IP addresses will be kept as previously defined 3.5.

3.5 Exit without save

Choose “4” to cancel all modifications. All the parameters are stored during the configuration in volatile memory.

3.6 Save and exit

Choose “5”, to validate all modifications. After saving, the e-ILPH will reset automatically. If connections are still active, they will be cancelled.

3.7 English/Français

This menu allows you to change configuration menu language; the value will be kept in non-volatile memory for the next connection.

Choose “6” to change the language and 0 for English or 1 for French

The menu is displayed again, in the selected language.

4. Display (LED) description

Power: indicates correct power supply on the product

Link: indicates TCP connection is currently active on this e-ILPH

TXD: light during transmission on serial port

RXD: Light during reception on serial port

Ethernet speed: indicates current network speed: Amber color: 10 base-T connection, Green color: 100 base-T connection

Ethernet activity: Momentary amber color: Half duplex activity, Momentary green color: Full duplex activity

5. Hayes commands (In mail mode)

Hayes commands are used in Mail mode; there is a command for configuration, display values and a command for connection. The commands are not case-sensitive

5.1 Configuration command:

ATM1 or ATM2: Set mail recipient 1 and 2, followed by 48 characters max. If the command is sent alone (with no following characters) the mail recipient will be deleted

ATMU: set unit name, followed by 23 characters max. If the command is sent alone (with no following characters) the unit name will be deleted

ATMD: set domain name followed by 23 characters max. If the command is sent alone (with no following characters) the domain name will be deleted.

ATMS1, ATMS2, and ATMS3: set message 1, 2 or 3, message 1 is the subject of mail, others are lines of body. Limited to 23 characters. If the command is sent alone (with no following characters) the message will be deleted.

5.2 Display command:

ATL: Display command; shows the current configuration (IP address of server mail recipient etc.)

5.3 Connection command:

ATDT: Connection command. This command will automatically generate connection to the remote SMTP server and send mail to the recipients

6. Monitor mode

Monitor mode is an expert mode that makes it possible to set configurations more efficiently than in the configuration menu.

6.1 Enter monitor mode with serial link

Connect the terminal to the serial port. Set the terminal's serial line parameters to 9600 bauds, 8 bits, no parity, and 1 stop bit

Switch off e-ILPH, keep the terminal's z key pressed down and switch on e-ILPH. When the e-ILPH detects zzz it will automatically switch to monitor mode.

The connection is made when the terminal prompts with a number followed by >. The value of the number depends on the previous command (see table below with command response codes)

6.2 Enter monitor mode with Ethernet connection

Connect to the e-ILPH using TELNET or hyper terminal with a sock IP connection. In the first menu, instead of the Enter key press the M key to switch automatically to monitor mode

6.2.1. Command Response Codes

Response	Meaning
0>	OK; no error
1>	No answer from remote device
2>	Cannot reach remote device or no answer
8>	Wrong parameter(s)
9>	Invalid command

All the commands accessible in monitor mode are described in detail in a specific document. Here is the description of the most important one as is it can be used often to set the IP address for production or installation tools.

6.2.2. Command *co*:

This command is used to set the IP address and gateway address, and also to define the port number and number of host bits. The command memorizes the new value and then generates a reset. Communication will be lost because of this reset. An X is sent by e-ILPH before reset if the command is successful

co IP1.IP2.IP3.IP4 N GIP1.GIP2.GIP3.GIP4 P

Where:

IP1.IP2.IP3.IP4 is the e-ILPH IP address

N is the number of host bits

GIP1.GIP2.GIP3.GIP4 is the gateway IP address

P is the port number. Entering 0 will generate the factory default configuration after the reset.

6.2.3. Command *NC*:

This command shows the current network configuration

Here is an example of a result given by the NC command on an e-ILPH whose IP address is 010.033.152.077, with no gateway set and a mask definition of 255.000.000.000 (network class A)

IP 010.033.152.077 GW 000.000.000.000 Mask 255.000.000.000

6.2.4. Command *QU*

This command quits the monitor mode. This is not necessary when using the co command.

7. Expert debugging mode

7.1 Trace debug with telnet

Telnet connectivity makes it possible to debug serial communication by tracing communication exchanged on the serial port. This debug tool is accessible on the main menu by entering menu 66 (this menu command is not shown on the list to reserve access for the expert team).

7.2 Trace debug in MODBUS communication

The following trace shows an example that could be encountered in MODBUS communication:

```
Connection established  
From TCP:[73][2][0][0][0][6]<1><3><0><99><0><10><53><211>Wait:31  
(1)(3)(20)(0)(110)(110)(101)(99)(116)(105)(0)(0)(0)(0)(110)(101)(99)(116)(105  
) (111)(110)(32)(101)(115)(0)(0)(0)(0)(110)(101)(99)(116)(105)(111)(110)(32)(1  
01)(115)(116)(97)(98)(108)(105)(0)(0)(0)(0)(0)(101)(99)(116)(105)(111)(110)(3  
2)(101)(115)(116)(97)(98)(108)(105)(115)(104)(101)(100)(13)(10)(0)(0)(0)(163)(10  
3)(0)(101)(99)(116)(105)(111)(110)(32)(101)(115)(116)(97)(98)(108)(105)(115)(104  
) (101)(100)(13)(10)(0)(32)(67)(111)(110)l = 31/CRC OK /Packed  
From TCP:[74][2][0][0][0][6]<1><3><0><99><0><10><53><211>Wait:31  
(1)(3)(20)(0)(0)(0)(101)(99)(116)(105)(111)(0)(0)(0)(0)(0)(101)(99)(116)(105  
) (111)(110)(32)(101)(115)(116)(0)(0)(0)(0)(0)(101)(99)(116)(105)(111)(110)(32)  
(101)(115)(116)(97)(98)(108)(105)(115)(0)(0)(0)(0)(0)(0)(0)(0)(163)(103)(111)(11  
0)(32)(101)(115)(116)(97)(98)(108)(105)(115)(104)(101)(100)(13)(10)(0)(32)(67)(1  
11)(110)l = 31/CRC OK /Packed  
From TCP:[75][2][0][0][0][6]<1><3><0><99><0><10><53><211>Wait:31  
(1)(3)(20)(0)(0)(0)(0)(163)(103)(111)(0)(0)(0)(0)(0)(0)(0)(163)(103)(111)(  
110)(32)(101)(115)(116)(0)(0)(0)(0)(0)(0)(0)(163)(103)(111)(110)(32)(101)(115  
) (116)(97)(98)(108)(105)(115)(0)(0)(0)(0)(0)(0)(0)(163)(103)(111)(110)(32)(10  
1)(115)(116)(97)(98)(108)(105)(115)(104)(101)(100)(13)(10)(0)(0)(0)(163)(103)(0  
) (0)(0)(163)(103)(111)(110)(32)(101)(115)(116)(97)(98)(108)(105)(115)(104)(101)(1  
00)(13)(10)(0)(32)(67)(111)(110)l = 31/CRC OK /Packed  
Trace:  
Passive mode: Listen for Connection on port: 502
```

All data are displayed in decimal mode. Each byte is inserted in () or []. Data in () are exchanged physically on the serial line, data in [] are additional byte exchanges on the TCP level.

The byte following the indication From TCP is the request. This message is followed by Wait: nn. This is the number of bytes to wait for a response. This number is calculated from the function code and the amount of data requested

The trace which follows this request line contains the byte received on the serial line. At the end of the frame l=nn indicates the number of received characters, CRC OK indicates that CRC coming from serial line is OK, and Packed indicator shows the message has been sent to the TCP connection.

When the connection is stopped a message indicates on which port TCP connection can occur.

7.3 Trace debug in SMTP communication

The following example shows an exchange between e-ILPH and SMTP server mode

```
DEBUG TELNET Press any key to exit
Trace:<10><13>Active mode : Connection to port : 25
Trace:<13><10>Connection established<13><10>
From TCP:220 ArGoSoft Mail Server Freeware, Version 1.8 (1.8.6.0)<13><10>
To TCP:HELO e-ILPH.com<13><10>
From TCP:250 Welcome [10.33.152.77], pleased to meet you<13><10>
To TCP:MAIL FROM:e-ILPH@e-ILPH.com<13><10>
From TCP:250 Sender "e-ILPH@e-ILPH.com" OK...<13><10>
To TCP:RCPT TO:michel.combat@fr.abb.com<13><10>
From TCP:250 Recipient "michel.combat@fr.abb.com" OK...<13><10>
To TCP:DATA<13><10>
From TCP:354 Enter mail, end with "." on a line by itself<13><10>
To TCP:Subject: This is the subject<13><10><13><10>
To TCP:This is first line<13><10>
To TCP:This is second line<13><10>
To TCP:<13><10>.<13><10>
From TCP:250 Message accepted for delivery. <vfohn5tzvdms0uo.220720041023@|
KHMN9F><13><10>
To TCP:QUIT<10><13>
```

In this trace text we can see trace information, such as Active mode: Connection to port: 25 when the connection starts.

Some messages are specific to the SMTP protocol, such as commands like HELO, MAIL FROM etc.

At the end of the connection we see the information trace for Disconnect.

8. Update firmware

Firmware update is performed via the Ethernet connection. The functionality uses the tftp function implemented into the Windows package. The firmware update is a ROM extension file. To update, launch this command in the DOS window from the directory where the eILPHxxx.ROM file is located. "xxx" is the version number

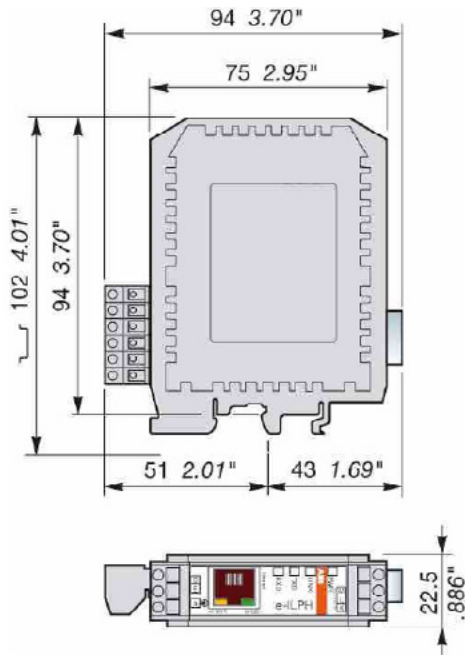
```
tftp -i 10.33.152.76 PUT eILPH100.ROM X2
```

Where 10.33.152.76 is the remote IP address of the e-ILPH to be updated

And eILPH150.ROM is the code file that contains updated firmware (example with 1.5 version number)

The update time is about 1 second using the 100 Mb network. The e-ILPH will be automatically reset once the update is finished.

9. Dimensions



10. Technical data

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

	ILPH RS 232 - 485 / Ethernet
Power supply 1	
Voltage	10...34 V DC, 10...24 V AC
Voltage tolerance	-10%, +10%
Consumption	2 W max
Connections	coding screw removable connector 0 to 2.5 mm ² (22-14 AWG)
Power supply 2	
Voltage	10...34 V DC
Voltage tolerance	-10%, +10%
Consumption	2 W max
Connections	screw connector (AWG 20)
Serial link 1: RS 232	
	EIA RS 232
Overvoltage protection	integrated
Baud rate / Transmission distance	max. 115.2 kbits/s / max. 15 m
Connections	2.5 mm ² screw connector (AWG 20) or male SubD 9 points
Serial link 2: RS 485	
	EIA RS 485
Voltage	integrated
Line polarization	integrated
End line resistance	integrated
Baud rate / Transmission distance	max. 115.2 kbits/s / max. 1200 m
Connections	coding screw removable connector 0 to 2.5 mm ² (22-14 AWG)
Ethernet link	
Overvoltage protection	integrated
Baud rate / Transmission distance	10-100 Mbits/s / max. 100 m without Hub or Switch with CAT5 cable
Connections	RJ45 connector
Traffic indication	
Voltage	1 yellow LED
Status of signal	3 green LED (RxD, TxD, LINK), 2 amber or green LED (Speed, Activity)
EMC behavior	
Electrostatic discharge	EN 61000-4-2
Radiated electromagnetic field	EN 61000-4-3
Burst	EN 61000-4-4
Surge	EN 61000-4-5
Electromagnetic compatibility	EN 55022
Other characteristics	
Electrical isolation between serial link / power supply / Ethernet link	750 VDC / 1500 VAC
Configuration of the operating mode	using internal switches or/and software (TELNET or HYPERTERMINAL)
Operating temperature	0°C ... +60°C
Storage temperature	-20°C ... +70°C
Mounting	any required
DIN rail fixing (EN 50002)	snap-on mounting
Wire size	2.5 mm ² / stranded with ferrule, 4 mm ² solid
Dimensions (WxDxH)	94 x 22.5 x 100 mm
Weight	120 g

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