

Operation Manual



INSYS Ethernet

Version 1.4 / 01.03

INSYS
MICROELECTRONICS

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Publisher:

INSYS MICROELECTRONICS GmbH

Waffnergasse 8

93 047 Regensburg

Phone: +49/(0)941-560061

Fax: +49/(0)941-563471

E-Mail: insys@insys-tec.de

http: www.insys-tec.de

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0 Scope of Delivery

Before you start installation and commissioning, please check whether all accessory parts are contained in the box:

- 1 INSYS Ethernet
- RS 232 cable (9-pin plug to 9-pin jack)
- 1 Operation Manual

If the content is not complete, please refer to your supplier. Please check your modem for damages in transit as well; please refer also to your supplier in case a damage exists. Please keep your packing material for a possible future dispatch or storage.

1 Technical Data

1.1 General

1.1.1 Performance Features

- Assembly on DIN-rail DIN EN 500 22
- Protocols: ARP, ICMP, TCP/IP, UDP/IP
- Power supply 10..60 V DC, 5% ripple
 50..80 V DC, 5% ripple
- Level on V.24 interface according to V.28
- Screw-fastened V.24/V.28 interface with 9-pin SUB-D jack
- Ethernet connection: 10Base-T to RJ-45
- Reset via key button or terminal screw
- Extended AT command set
- Hardware handshake
- Speed can be set automatically and fixed
- Alarm function, 2 alarm inputs, 2 control outputs
- Data Transmit Control

1.1.2 Mechanical Features

Weight	250 g
Dimensions (max.)	w x d x h = 55 x 110 x 75
Temperature range	0°C ..55°C
Protective class	Housing IP 40/ terminal screws IP 20
Humidity	0 - 95% not condensing

Note: The INSYS Ethernet must not be used in wet conditions.

1.2 Interfaces and Display Elements



front view

1.2.1 Display Elements

The INSYS Ethernet 4.0 provides four LEDs for status indication.

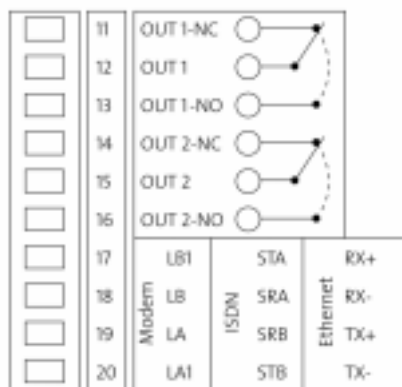
Name	Color	Off state	On state
Power	green	no power supply	power supply connected
OH (off hook)	yellow	no connection	connected or active
		AT&O0: OH is on as soon as a physically functionable connection exists at the Ethernet connection (link ok, default) AT&O1: OH is on as soon as a connection is active	
DCD (Data Carrier Detect)	green	no connection established	connection established (carrier detected)
RX/TX (Receive / Transmit)	green	no data exchange	data is exchanged via the modem

1.2.2 Terminal Layout

Top side terminal

1	GND
2	50...80VDC
3	10...60VDC
4	GND
5	GND
6	RESET
7	GND
8	INPUT1
9	INPUT2
10	GND

	Terminal	
1	GND	Ground
2	50..80VDC	Power supply 50V - 80V DC
3	10..60VDC	Power supply 10V - 60V DC
4	GND	Ground
5	GND	Ground
6	Reset	Reset input
7	GND	Ground
8	Input 1	Alarm input 1
9	Input 2	Alarm input 2
10	GND	Ground

Bottom side terminal:

	Terminal	
11	OUT1NC	Output 1 – normally closed
12	OUT1COM	Output 1
13	OUT1NO	Output 1 – normally open
14	OUT2NC	Output 2 – normally closed
15	OUT2COM	Output 2
16	OUT2NO	Output 2 – normally open
17	RX+	Receive
18	RX-	Receive
19	TX+	Transmit
20	TX-	Transmit

1.2.3 Power Supply

Voltage supply: 10..60 V DC or 50..80 V DC

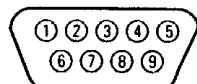
Power consumption: approx. 2W

Current Consumption:

Input voltage	Current (static)	Current (connection)	max. current at make
10 VDC	150 mA	150 mA	250 mA
24 VDC	70 mA	70 mA	120 mA

1.2.4 Serial Interface

Layout of the 9-pin D-Sub jack



9-pole D-Sub Plug

Description of the signals on the 9-pin D-SUB connector of the DCE:

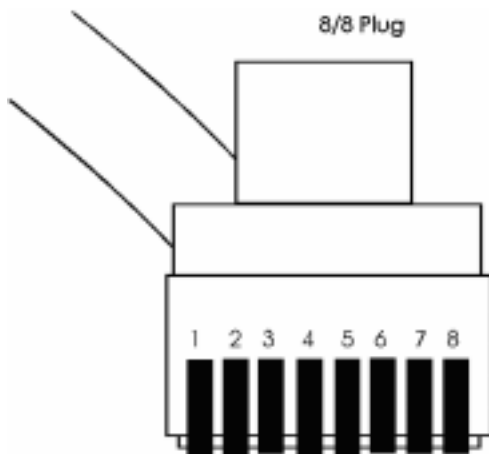
9-pin D-SUB DCE Pin No.	Description	Function	CCITT V-24	EIA RS232	DIN 66020	E/A DCE to DTE
1	DCD	Data Carrier Detect	109	CF	M5	O
2	RXD	Receive Data	104	BB	D2	O
3	TXD	Transmit Data	103	BA	D1	I
4	DTR	Data Terminal Ready	108	CD	S1	I
5	GND	Ground	102	AB	E2	
6	DSR	Data Set Ready	107	CC	M1	O
7	RTS	Request To Send	105	CA	S2	I
8	CTS	Clear To Send	106	CB	M2	O
9	RI	Ring Indication	125	CE	M3	O

Interface speed of the INSYS Ethernet:

300, 600, 1.200, 2.400, 4.800, 9.600, 19.200, 38.400, 57.600, 115.200 bps.

The baudrate indicates the transmitted bits per second.

1.2.5 Ethernet Interface 10MBit/10Base-T



8-pin Western plug (front view)

Pin layout of the Western jack

Connection RJ-45	Signal
1	TX+
2	TX-
3	RX+
6	RX-

1.2.6 Reset

Modem reset can be triggered by an external unit over the screw terminal **Reset**. A low potential has to be applied for a minimum of 3 seconds.

Modem reset can also be triggered by the reset key on the front panel. The key has to be pushed for a minimum of 3 seconds.

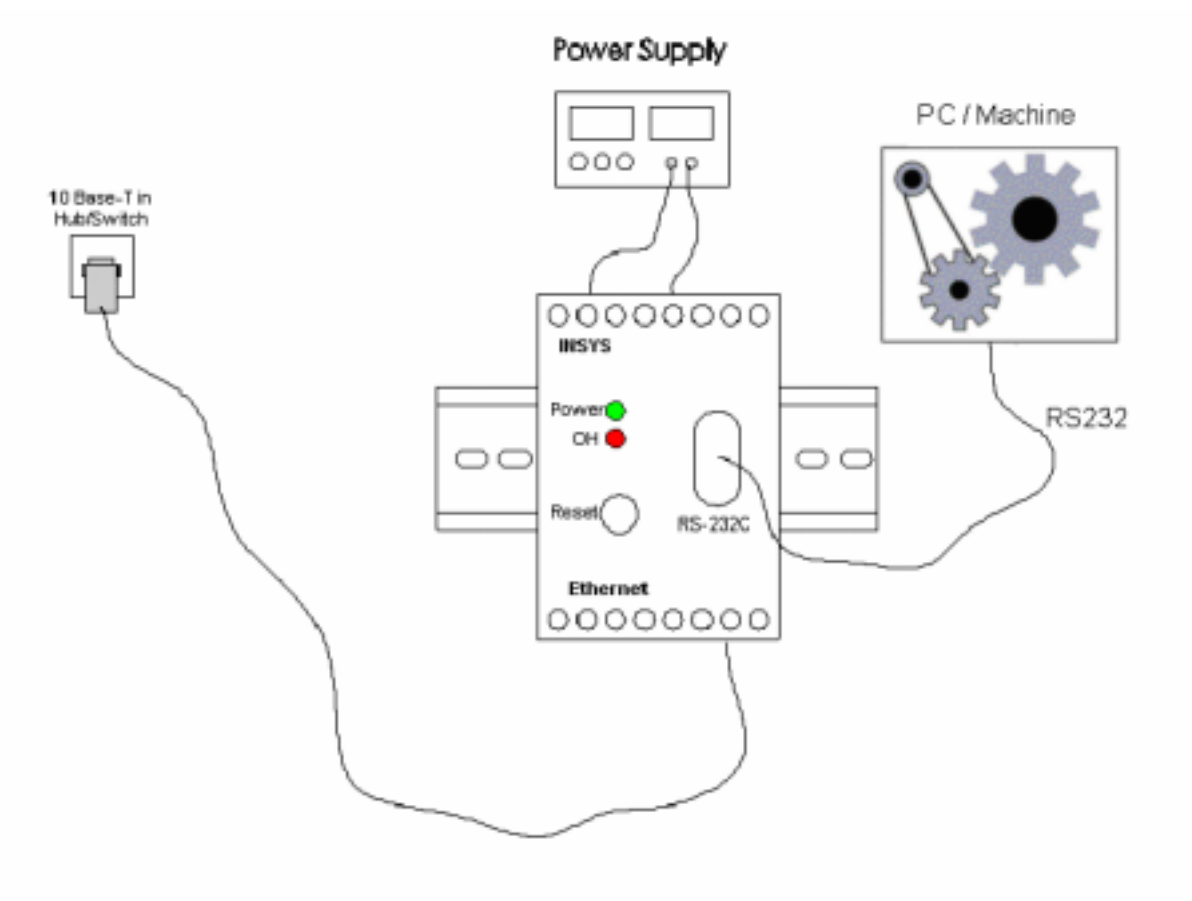
1.3 Approvals

The INSYS Ethernet has the CE mark of conformity. This symbol means that the INSYS Ethernet corresponds with the currently valid revisions of the following CE guidelines regarding its composition and implementation:

- CE

2 Installation and Commissioning

2.1 Installation Overview



2.2 Installation Steps

1. *Mounting on DIN rail:*
simply clip on
2. *Power supply:*
 - a) Connect earth cable to GND
 - b) Connect power supply cable to 10..60 VDC or 50..80 VDC
Specifications for power supply (pin2, pin3) are maximum ratings and must not be exceeded!
 - c) *Connect to power supply*

The power LED lights up on successful installation.

3. *Network access*

1	GND
2	50 .. 80 VDC
3	10 .. 60 VDC
4	GND
5	GND
6	RESET
7	GND
8	INPUT 1
9	INPUT 2
10	GND

- a) Plug the network cable into RJ-45 socket on the front of the housing
or alternatively
install via screw terminal on the bottom according to description (RX+, RX-, TX+, TX-)).
- b) connect cable to the Ethernet socket.

Disconnect the INSYS Ethernet from the network immediately in case of any fault or functional irregularities – e.g. when the OFF-Hook-LED switches on immediately - and contact your service partner. In order to preserve your guarantee please **do not open** or interfere with the modem.

4. *Connecting PC/terminal:*

Plug the enclosed RS 232 interface cable into housing front and connect with PC/terminal.

5. *Checking successful installation:*

Run a short test from your terminal program (e.g. HSComm terminal window, Hyperterminal, TeraTermPro, ProComPlus). Enter the command "**AT**" and press the "**ENTER**" button. If "**OK**" appears on your screen the INSYS Ethernet has been installed successfully.

3 Functions

3.1 Default Settings and Reset

In case of a **hardware- and software reset** (switching on, RESET key) the factory default settings are loaded.

These factory default settings (defaults) are loaded with the command **AT&F**.

The device can be reset to the delivery state with the command sequence **AT&F&WZ** (except the network settings).

AT&F concerns all settings, which can be stored with **AT&W** (not the network settings, see also under **AT&W**). Nevertheless, not the settings stored with **AT&W** are modified, but only the currently active.

The command **AT&W** stores all present settings in the permanent memory. The settings are restored from this permanent memory when switching on the device.

The following AT settings are stored:

AT&C, AT&D, AT#DTC, ATE, AT&K, AT&O, ATQ, AT#QUIET, ATS0, ATS2, ATS8, ATS12, AT*S, AT&S, ATT/ATU, AT*U, ATV, AT*Y

3.2 Alarm Functions

The INSYS Ethernet has two alarm inputs for supervising operation states for example, and two control outputs.

3.2.1 Control Outputs

INSYS Ethernet from version 4.0 provides two control outputs OUT1 and OUT2 at the bottom of the housing. These outputs are realised as SPDT (single pole double throw) switches by galvanic insulated relays. The outputs are controlled independently by software commands (AT*Y).

3.2.2 Alarm Inputs

INSYS Ethernet from version 4.0 provide two digital inputs which are activated by ground potential. An e-mail is transmitted In case of an alarm.

Functionality:

The alarm input has an internal pull-up resistor so that the input is inactive as long as it is not connected. An alarm can be triggered by a simple contact from alarm input to GND.

Activation:

The E-Mail will be sent when the alarm input set to "Low" for at least 300ms, and if an recipient address has been set (to be set with AT command **AT#MTO**). Interfering impulses of less than 100ms duration at the alarm input will be ignored.

Setting E-Mail sender address

AT#MFROM sets the E-Mail sender address the alarm message is sent with.

Example: **AT#MFROM=test@insys-tec.de**

The setting can be queried with **AT#MFROM?** again

Important: Most mail relays require a valid sender address to deliver mails (for spam protection). Usually, the user name of the sender is not checked, but only the domain.

Setting address of the mail relay

AT#MRELAY sets the IP address of the mail relay for the SMTP mail dispatch

Example: **AT#MRELAY=192.168.100.220**

Setting E-Mail return address

AT#MREPLY sets the return address for E-Mails.

The mail relay is set with „**AT#MRELAY=**“

Example: **AT#MREPLY=test@insys-tec.de**

The setting can be queried with **AT#MREPLY?** again

Setting E-Mail subject

AT#MSUBJ sets the subject of the alarm message.

Example: **AT#MSUBJ=Alarm Device 2**

The setting can be queried with **AT#MSUBJ?** again

Setting E-Mail text

AT#MTEXT sets the text of the alarm message (max. 120 characters)

Example: **AT#MTEXT=Temperature too high!**

The setting can be queried with **AT#MTEXT?** again

The actual dispatch of the E-Mail is started either by the command **AT%A** or by feeding GND to alarm input (triggered by high low transition)

Setting E-Mail target address

AT#MTO sets the E-Mail address to which the alarm message is to be sent.

Example: **AT#MTO=transmitter@insys-tec.de**

The setting can be queried with **AT#MTO** again

3.2.3 1st and 2nd Alarm Input

To configure the 2nd alarm input the following commands are extended by the index "1":

E-mail configuration	1 st alarm	2 nd alarm
text	AT#MTEXT0	AT#MTEXT1
relay (SMTP)	AT#MRELAY0	AT#MRELAY1
subject	AT#MSUBJ0	AT#MSUBJ1
sender	AT#MFROM0	AT#MFROM1
receiver	AT#MTO0	AT#MTO1
reply-to address	AT#MREPLY0	AT#MREPLY1

The index "0" for the 1st alarm input is optional

3.2.4 Electrical Specification

Alarm input:

LOW 0 .. 1 V
HIGH 4 .. 12 V

current from LOW to internal +5 V voltage: typ. 0.5 mA

Control output:

SPDT (single pole double throw) switches by galvanic insulated relays

maximum voltage: 30 V (DC) / 42 V (AC)

maximum current: 1 A (DC) / 0.5 A (AC)

3.3 Loading Function of the Flash Eeprom

This function enables a software update of the INSYS Ethernet without changing the Eeprom.

Precondition:

A PC and a terminal program are required for the flash loading function. The terminal program has to be able to execute an ASCII upload (ASCII data transmission protocol). Hardflowcontrol must be set. Any interpretation of characters (e.g. TAB, CR, BS...) by the ASCII upload protocol has to be prevented for security reasons.

The baudrate has to be between 9.600 baud and 57.600 baud. Other baudrates may lead to failures.

Activation and process:

AT** starts the update process for the firmware (flash update).

After entering **AT****, the firmware (file suffix IHX) has to be sent as text file.

After the flash update, the device resets automatically.

IMPORTANT:

- For the firmware update, hardware handshake (RTS/CTS) has to be activated at the terminal.
- The firmware update requires some (up to 30) seconds for several times during the update process to delete the flash memory during which the update seems to freeze (no points appear on the terminal anymore and the data transfer may be stopped by handshake). An already started flash update may not be stopped prematurely in any case!

Devices interrupted during flash update, can only be reactivated by INSYS.

AT commands for the flash loading function:

Command	Description
AT**	Starting the flash loading function

Note: The time delays between characters and lines have to be set to „0“ under the settings for the ASCII protocol. Moreover, the local echo has to be disabled.

3.4 Serial Data Transfer

The INSYS Ethernet has an automatic baudrate detection.

It detects the baudrate of the connected PC automatically from the AT string prefixing every command. It is also called interface speed, i.e. the speed between INSYS Ethernet and a computer.

3.4.1 Data Flow Control

There is the possibility of data flow control between the PC and INSYS Ethernet.

Hardware controlled data flow control with RTS/CTS

Here, both control lines RTS and CTS of the serial interface are used to control the data flow. As soon as the buffer of the INSYS Ethernet is full, the INSYS Ethernet indicates by resetting the line CTS that it cannot receive data from the PC anymore.

When the internal data buffer of the INSYS Ethernet is worked off, it sets the line to ON again and indicates the PC with this that it can receive data again.

The control line RTS is served by the PC. A set RTS line (state ON) indicates the INSYS Ethernet that it can request data from the PC.

The hardware controlled data flow control is set in the INSYS Ethernet with the command **AT&K**.

It depends on the respective software, which runs on the PC whether the RTS/CTS lines are served.

AT commands to control the serial data transmission

Command	Description
AT&K	Sets the function of the data flow control. At the moment, only hardware handshake (RTS/CTS) is supported.
AT&K0	Disables the data flow control (default)
AT&K3	Enables the hardware data flow control (RTS/CTS)

3.5 Data Transmit Control

Data Transmit Control is a function integrated in the firmware for supervising the data transmission in online operation. It is used to terminate an unused connection automatically.

With the command **AT#DTC=n** the time can be set (time = n*10 seconds), after which the devices terminates the connection, if no data is sent anymore.

A maximum timeout value of 2.550 seconds (**AT#DTC=255**) can be set. The data transmit controller can also be disabled by setting the time to „0“ (**AT#DTC=0**). This is also the default setting.

4 AT Command Set

4.1 Syntax of the Standard AT Command

The modem guideline V.25 ter is to be used in view of the chronological process of the interface commands. The AT standard is a line oriented command language. Every command consists of three elements: prefix, main part and end character.

The **Prefix** consists always of the characters „**AT**“, the only exception is the command „**A/**“.

The **main part** is composed of single characters, which are described in detail in this chapter. It consists of a name and, if necessary, accompanying values. If an accompanying value is optional, it is indicated in square brackets ([...]).

The **standard end character** is „<CR>“ (=0X0D).

Commands can be summarized to one command line. Spaces between the single main parts are ignored.

The commands are acknowledged with „**OK**“ or „**ERROR**“. A command in work is interrupted by every further received character. For this reason, the next command has to wait until acknowledgement, because otherwise the current command will be deleted.

The supported commands are listed in the following tables.

4.2 Return Messages at Normal Data Communication

The following message texts (at setting **ATV1**) or message numbers (at setting **ATV0**) are output by the device:

Message number short form (ATV0)	Message text long form (ATV1)	Importance
0	OK	command accepted
1	CONNECT	connection established
2	RING	connection request detected
3	NO CARRIER	connection terminated
4	ERROR	error in AT command string
7	BUSY	remote terminal did not accept connection

4.3 Overview about AT Commands

Command	Description
A/	Repeat last command The last entered command will be repeated. Exception: A/ does not work after a connection, i.e. an active connection deletes the command line.
ATA	Accept incoming connection manually ATA accepts an incoming connection. ATA only works, if the device received packets to the local port before, i.e. "ring" has been put out.
AT%A	Sending an alarm-email AT%A sends an e-mail, predefined with the command AT#M... AT%A can test the mail-sending or can send an e-mail manually alternatively to the alarm input
AT#ARP	Send ARP-Request AT#ARPa.b.c.d sends an ARP request (Address Resolution Protocol) to the network. If an answer arrives within 2 seconds, the MAC of the network board, owning the given IP number, will be sent. AT#ARP serves for the lowest-level diagnostics, whether a connection to another IP address in the same network segment exists. AT#PING delivers usually a more exact diagnosis.
AT&C	DCD control &C0: DCD is always active &C1: DCD is only active for existing connections (default)
ATD	Dialing remote terminal The remote terminal will be indicated in the form: IP number: port Optionally, it is possible to select the desired protocol (TCP/IP or UDP/IP) before indicating the remote terminal. Example: ATD192.168.100.111:1234 connects to port "1234" of the IP address 192.168.100.111. ATDU192.168.100.111:1234 connect explicitly to the port in UDP/IP mode. Dialing in the UDP/IP mode, an empty UDP/IP packet is sent to the remote terminal first so that this recognizes the wish to set up the connection. Stored IP-numbers (definable with AT&Z) will be connected with ATDS=n (n is the register number, 0...3).
AT&D	DTR drop control If the DTR line is deactivated during an existing connection, the function set by AT&D is executed.

Command	Description
	AT&D0: ignore DTR drop (for devices which don't use the DTR line) AT&D1: a DTR drop disconnects an existing connection AT&D2: like AT&D1 (default) AT&D3: a DTR drop causes the device to carry out a reset
AT#DTC	Data Transmit Controller The data transmit controller serves to disconnect an unused connection automatically. The command AT#DTC=n sets the time after which the device resets the connection (time = n*10 seconds), if no more data is sent. The maximum timeout value that can be set is 2.550 seconds (AT#DTC=255). The data transmit controller is disabled by setting the time to "0" (AT#DTC=0). This is the default setting.
ATE	Echo ATE0 disables the echo of the entered commands in command mode ATE1 enables the echo (default)
AT&F	Loads factory defaults The factory defaults are loaded. A device can be reset to the delivery state using the command sequence AT&F&WZ (except for the network settings). All settings saved with AT&W are affected by AT&F (except the network settings, see also AT&W). However, it does not alter the settings saved with AT&W but merely the active ones at the moment.
AT#GW	Setting gateway address AT#GW sets the address of the standard gateway. Remote addresses, which can not be reached directly but only via router, need these settings. IP packets (defined by AT#IP and AT#NM) which can not be sent to the local net, are sent to the address fixed by AT#GW . AT#GW is used in connection with AT#NM to make a connection via a router. If a router is used, AT#GW and AT#NM must be configured to be able to set up a data connection through the router. The default setting is AT#GW=0.0.0.0 The AT#GW setting is stored in the permanent memory immediately (independent of the command AT&W).
ATH	Dummy Command ATH has been implemented for reasons of modem compatibility. ATH allows 1 parameter and has no effect since the Ethernet device supports no online command mode.
ATI	Display information ATI sends different information strings: ATI0 displays the device-type (" ETHERNET ") ATI1 displays the checksum and the type of the controller (e.g. " A473-P ") ATI2 no function

Command	Description
	ATI3 displays the software version number and the features of the device ATI4 displays an identification string and the version number.
AT*I	Manual request of the alarm input Reply <Input 1>,<Input 2> The values „1“ für inactive (open) and „0“ für active (set to GND) are replied
AT#IP	Setting own IP address AT#IP sets the own IP address of the device e.g. AT#IP=192.168.1.1 The default setting is AT#IP=192.168.100.200 The AT#IP setting is stored in permanent memory immediately (independent of the command AT&W)
AT&K	Data flow control AT&K enables the data flow control function. Only hardware handshake (RTS/CTS) is supported at the moment AT&K0 no flow control (default) AT&K3 enables hardware flow control (RTS/CTS)
AT#KEEP	TCP/IP-Keepalive AT#KEEP sets the TCP/IP keepalive timer. This timer enables to supervise an existing TCP/IP connection if no data is transferred. AT#KEEP=n (n=1..255) sets the time between the supervision packets to n*10 seconds. If 3 subsequent supervision packets are not responded, the connection will be terminated and, if necessary, set up again (in leased line mode, see AT&L). The default setting is AT#KEEP=0 , i.e. no keepalive. The setting AT#KEEP is stored in the permanent memory immediately (independent of command AT&W)
AT&L	Setting leased-line mode with AT&L you can set 3 different operating modes of the module. AT&L0 selects the normal mode, the device behaves like a modem, i.e. the connection will be established manually via ATD command or via the accepting of an incoming call (ATA or ATS0=n). AT&L1 selects the leased-line mode. The device tries to establish the connection immediately after power on. The connection parameters are saved in the connection register 0 (i.e. they have to be set with AT&Z0=...). If the connection breaks, the module tries to connect again every 10 seconds. AT&L2 selects the on-demand mode. If data arrives at the serial interface, the device establishes the connection automatically. The parameters for the remote terminal are saved in the connection register 0, like at AT&L1 . After transferring the data the connection can be closed by the remote terminal or with DTC (see AT#DTC). If characters arrive at the serial interface while the connection is closed there will be an automatic restart of the connection, but earliest 10 seconds after the connection was closed.

Command	Description
AT#MFROMn	<p>Setting the e-mail sender address</p> <p>AT#MFROMn sets the e-mail-sender, with which the alarm message will be sent.</p> <p>n = 0 for alarm from Input 1 n = 1 for alarm from Input 2</p> <p>If n is not given, n=0 is presumed.</p> <p>Example: AT#MFROM=test@insys-tec.de</p> <p>You can check the setting with AT#MFROM?</p> <p>Important: The most mail relays need a valid sender address to send a message (protection of spamming). The username of the sender address will not be checked, only the domain.</p>
AT#MRELAYn	<p>Setting the address of the mail relay</p> <p>AT#MRELAYn sets the IP-address of the mail relay for SMTP-mail sending</p> <p>n = 0 for alarm from Input 1 n = 1 for alarm from Input 2</p> <p>If n is not given, n=0 is presumed.</p> <p>Example: AT#MRELAY=192.168.100.220</p>
AT#MREPLYn	<p>Setting the e-mail reply address</p> <p>AT#MREPLYn sets the reply address for e-mails.</p> <p>n = 0 for alarm from Input 1 n = 1 for alarm from Input 2</p> <p>If n is not given, n=0 is presumed.</p> <p>Example: AT#MREPLY=test@insys-tec.de</p> <p>You can check the setting with AT#MREPLY?</p>
AT#MSUBJn	<p>Setting the e-mail subject</p> <p>AT#MSUBJn sets the subject of the alarm message.</p> <p>n = 0 for alarm from Input 1 n = 1 for alarm from Input 2</p> <p>If n is not given, n=0 is presumed.</p> <p>Example: AT#MSUBJ=Alarm Device 2</p> <p>You can check the setting with AT#MSUBJ?</p>
AT#MTEXTn	<p>Setting the e-mail text</p> <p>AT#MTEXTn sets the text of the alarm message (max. 120 characters)</p> <p>n = 0 for alarm from Input 1 n = 1 for alarm from Input 2</p> <p>If n is not given, n=0 is presumed.</p> <p>Example: AT#MTEXT=Temperature too high!</p> <p>You can check the setting with AT#MTEXT?</p> <p>The actual sending of the e-mail will be started either with the command AT%A or with applying GND at the alarm input UE.</p> <p>(UE is edge-triggered, i.e. the e-mail will always be sent, when the UE changes from high/open to low).</p>
AT#MTO	<p>Setting the e-mail address</p> <p>AT#MTO sets the e-mail address to which the alarm message should be sent to.</p> <p>n = 0 for alarm from Input 1</p>

Command	Description
	<p>n = 1 for alarm from Input 2 If n is not given, n=0 is presumed. Example: AT#MTO=transmitter@insys-tec.de You can check the setting with AT#MTO?</p>
AT#NM	<p>Adjusting net mask AT#NM adjusts the address range of the local net in connection with AT#IP. All packets which aren't sent to the local net are sent to the gateway address set with AT#GW. The default setting is AT#NM = 255.255.255.0 The AT#NM setting is stored immediately in permanent memory (independent of the command AT&W)</p>
AT&O	<p>Setting the function of the OH line AT&O0: OH is activated (low), if a physically, functionable connection is available at the Ethernet connector (link ok, default) AT&O1: OH is activated (low), when the connection is active</p>
AT#PING	<p>Sending PING AT#PINGa.b.c.d sends (like the standard TCP/IP program) an echo request (=PING) to a remote terminal. If the echo is received within a timeout time of 2s, the time required is shown. AT#PING serves to control, whether an IP number is reachable. If AT#PING fails, no connection can be built up to the given IP number in general. Reason for this can be a wrong configuration or a firewall between the two net parties.</p>
AT#PORT=	<p>Setting local port number AT#PORT=n sets the local port number to the value n (1..65535) . The local port number is used - at dialing with ATD for the local port value - at the automatic call acceptance as port number on which the device "reacts" The default setting is AT#PORT=1234 The AT#PORT setting is stored in permanent memory immediately (independent of the command AT&W)</p>
ATQ	<p>Quiet mode ATQ0 enables messages of the device (OK, ERROR...). ATQ1 disables this messages Default is ATQ0</p>
AT#QUIET	<p>Suppress start-up message AT#QUIET=1 suppresses the start-up message of the device AT#QUIET=0 displays the start-up message at reset (default) The setting of AT#QUIET is stored with AT&W permanently in the power-failure-safe memory of the device.</p>
AT#RESET	Reset

Command	Description
	AT#RESET causes a reset (same as applying a RESET signal to the device)
ATS0=	<p>Setting the number of rings for the automatic pick-up</p> <p>ATS0=n sets the number of rings (received packets) after which it is picked up automatically.</p> <p>ATS0=1 picks up at the first access to the local port.</p> <p>ATS0=0 deactivates the automatic pick-up at access to the local port. Rings are single (also empty) UDP/IP network packets at UDP/IP connections. For TCP/IP connections, connection attempts of a remote terminal ("SYN") are recognized as ring signal. The devices send at the beginning an empty UDP data packet at a UDP connection set-up so that a remote device accepts the connection, if it was configured with ATS0=1. Default is ATS0=1. Essential difference to modems: In the TCP/IP mode, the connection acceptance is disabled when S0=0, i.e. no "ring" is sent at a connection attempt. For manual call acceptance S0 should be set to 200 (S0=200)</p>
ATS2=	<p>Setting the ESC character</p> <p>ATS2=n sets the character for the Escape sequence. Default value is 43 (ESC sequence „+++“). A setting of >127 deactivates the detection of the Escape sequence. The setting is stored in the permanent memory with AT&W.</p>
ATS3=	<p>Setting the carriage return (CR) character</p> <p>ATS3=n sets the character for the carriage return to n. The default is "13". The setting will not be stored in the permanent memory with AT&W.</p>
ATS4=	<p>Setting the line feed (LF) character</p> <p>ATS4=n sets the character for the line feed to n. The default is "10". The setting will not be stored in the permanent memory with AT&W.</p>
ATS5=	<p>Setting the backspace (BS) character</p> <p>ATS5=n sets the character for the backspace to n. The default is "8". The setting will not be stored in the permanent memory with AT&W.</p>
ATS8=	<p>Setting waiting time for block building</p> <p>ATS8=n sets the time to wait until a block is transferred over the network. The unit is 1/100 seconds, default is „10“ for 100ms waiting time. The time starts to run when a character is received. As soon as no data is received from the serial interface for the time set in S8, a data packet is sent. Small values in S8 result a quicker transfer of short telegrams, but increase the packet number and, as a result, the load on network side. High values in S8 result a delay of small data packets. The setting will not be stored in the permanent memory with AT&W. S8 can be set in the range of 2..255, equivalent to 20ms ... 2.55s.</p>
ATS12=	<p>Setting ESC lead and follow time</p> <p>ATS12=n sets the minimum lead and follow time which has to be kept</p>

Command	Description																				
	when sending an Escape sequence („+++“). The value given in S12 is in tenths of a second, default is „10“ for a lead and follow time of 1s. The setting is stored in the permanent memory with AT&W . S12 can be set in the range of 2..255, equivalent to 200ms ... 25.5s.																				
ATSn=	Setting S register																				
ATSn?	Querying S register Only the S register S0, S2, S3, S4, S5, S8 and S12 (s.a.) are defined. An access to other S-registers does not lead to any fault, however doesn't have any effect either. When reading no implemented S registers the value "0" is returned.																				
AT*S	Setting baudrate AT*S sets the baud rate of the serial interface. The following baud rates are supported: <table> <tr><td>AT*S1</td><td>300 Baud</td></tr> <tr><td>AT*S2</td><td>600 Baud</td></tr> <tr><td>AT*S3</td><td>1.200 Baud</td></tr> <tr><td>AT*S4</td><td>2.400 Baud</td></tr> <tr><td>AT*S5</td><td>4.800 Baud</td></tr> <tr><td>AT*S6</td><td>9.600 Baud</td></tr> <tr><td>AT*S7</td><td>19.200 Baud</td></tr> <tr><td>AT*S8</td><td>38.400 Baud</td></tr> <tr><td>AT*S9</td><td>57.600 Baud</td></tr> <tr><td>AT*S10</td><td>115.200 Baud</td></tr> </table> <p>Note: Every "AT" input re-adjusts the baud rate via autobaud. The AT*S commands are useful in conjunction with &W in the same line. After a restart the defined baud rate can be used without sending AT to the device before.</p> <p>Default is AT*S6 (9.600 Baud)</p>	AT*S1	300 Baud	AT*S2	600 Baud	AT*S3	1.200 Baud	AT*S4	2.400 Baud	AT*S5	4.800 Baud	AT*S6	9.600 Baud	AT*S7	19.200 Baud	AT*S8	38.400 Baud	AT*S9	57.600 Baud	AT*S10	115.200 Baud
AT*S1	300 Baud																				
AT*S2	600 Baud																				
AT*S3	1.200 Baud																				
AT*S4	2.400 Baud																				
AT*S5	4.800 Baud																				
AT*S6	9.600 Baud																				
AT*S7	19.200 Baud																				
AT*S8	38.400 Baud																				
AT*S9	57.600 Baud																				
AT*S10	115.200 Baud																				
AT&S	DSR behavior &S0: DSR is always active (default) &S1: DSR follows DCD, i.e. DSR is only active for existing connections																				
AT#STAT	Display packet statistics AT#STAT displays the following data: LINK: OK or ERROR (state of the network connection) #RX-ERRORS: number of received faulty packets #TX-ERRORS: number of occurred sending failures The error counters count up to 65535 and stop then. They can be reset with AT#STAT1 .																				
AT#TEL	Setting Telnet port (for remote maintenance) AT#TEL=n sets the TCP/IP port „n“ for the Telnet remote maintenance access of the device. AT#TEL=0 deactivates the Telnet access. The default setting is AT#TEL=23 . The setting AT#TEL is stored to the permanent memory immediately																				

Command	Description																		
	(independent of command AT&W)																		
ATT	Select TCP/IP mode ATT selects the TCP/IP mode for the next connection (instead of the UDP/IP mode). Default setting is ATT , i.e. TCP/IP mode																		
ATU	Select UDP/IP mode ATU selects the UDP/IP mode for the next connection (instead of the TCP/IP mode) Default setting is ATT , i.e. TCP/IP mode																		
AT*U	Select data format AT*U sets the data format of the serial interface. The following data formats (data bit, parity, stop bit) are supported: <table> <tr><td>AT*U0</td><td>8N1</td></tr> <tr><td>AT*U1</td><td>7E1</td></tr> <tr><td>AT*U2</td><td>7O1</td></tr> <tr><td>AT*U4</td><td>7E2</td></tr> <tr><td>AT*U5</td><td>7O2</td></tr> <tr><td>AT*U6</td><td>7N2</td></tr> <tr><td>AT*U7</td><td>8E1</td></tr> <tr><td>AT*U8</td><td>8O1</td></tr> <tr><td>AT*U9</td><td>8N2</td></tr> </table> <p>The default setting is AT*U0 (8N1)</p> <p>Note: Every "AT" input re-adjusts the baud rate via autobaud. The AT*<i>S</i> commands are useful in conjunction with &W in the same line. After a restart the defined baud rate can be used without sending AT to the device before. An exception are the data formats *U4...*U9. These data formats cannot be detected automatically. If one of the data formats is selected, the automatic detection of the data formats will be disabled. The automatic data format detection can be reactivated with AT*U0.</p>	AT*U0	8N1	AT*U1	7E1	AT*U2	7O1	AT*U4	7E2	AT*U5	7O2	AT*U6	7N2	AT*U7	8E1	AT*U8	8O1	AT*U9	8N2
AT*U0	8N1																		
AT*U1	7E1																		
AT*U2	7O1																		
AT*U4	7E2																		
AT*U5	7O2																		
AT*U6	7N2																		
AT*U7	8E1																		
AT*U8	8O1																		
AT*U9	8N2																		
ATV	Format of the return message For ATV0 the device displays the return messages (OK, ERROR...) in numerical form. In mode ATV1 the return message is displayed in plain text (default).																		
AT&V	Displaying settings or connection statistics AT&V0 displays current and stored settings of the device. AT&V1 displays diagnostic data of the last connection (reason of disconnection, connection participant).																		
AT&W	Storing settings AT&W stores the current settings in the permanent memory. The settings are restored from the permanent memory when switching on the																		

Command	Description
	<p>module.</p> <p>The following AT settings are stored:</p> <p>AT&C, AT&D, AT#DTC, ATE, AT&K, AT&O, ATQ, AT#QUIET, ATS0, ATS2, ATS8, ATS12, AT*S, AT&S, ATT/ATU, AT*U, ATV, AT*Y</p>
ATX	<p>Dummy command</p> <p>ATX has been implemented for reasons of modem compatibility.</p> <p>ATX allows 1 parameter and has no effect since the Ethernet device supports no online command mode.</p>
AT*Yx,y	<p>Control outputs</p> <p>x: Port (OUT1=0, OUT2=1) OUT1 is used if the port information (x) is missing</p> <p>y: Target state of the output ("0" = relay open, "1" = relay closed)</p> <p>Default: AT*Y0,0 AT*Y1,0</p>
ATZ	<p>Warm start</p> <p>ATZ initializes the device (warm start). The settings remain unchanged.</p> <p>Note: Further commands in the same line after ATZ are not executed any more!</p>
AT&Zn	<p>Setting/querying the connection number registers</p> <p>Frequently used connections can be defined with AT&Z.</p> <p>Example: AT&Z1=T192.168.100.201:1234</p> <p>So you do not have to insert these numbers completely at ATD. You only have to insert the register number at ATD, which is stored in the connection data.</p> <p>To use the connection from the example above it is enough to type the command ATDS=1.</p> <p>Altogether you have 4 connections registers (AT&Z0..AT&Z3). The connections will be immediately saved permanently at AT&Zn=..., i.e. you do not need AT&W. You can check the saved connections with AT&Zn? (n = register number, 0..3). They are also displayed with AT&V.</p>
AT**	<p>Firmware update</p> <p>AT** starts the firmware update procedure (flash update).</p> <p>After entering AT**, the firmware (file ending IHX) must be sent as text file.</p> <p>After the flash update, the module resets automatically.</p> <p>IMPORTANT:</p> <ul style="list-style-type: none"> - Hardware hand shake (RTS/CTS) must be activated for the firmware update at the terminal - The firmware update needs some time (up to 30 seconds) repeatedly for deleting the flash memory during the update procedure. During this time the update seems to hang (no more points appear on the terminal and perhaps the data transmission is stopped by hand shake). In no case, a started flash update may be interrupted! <p>Devices interrupted at the flash update can only be reactivated at INSYS again.</p>

Command	Description
+++	Escape sequence If during an active connection the sequence "+++" is sent with at least one second break in front and after, the device interrupts the connection. In contrast to the modem, the device does not support any online command mode.

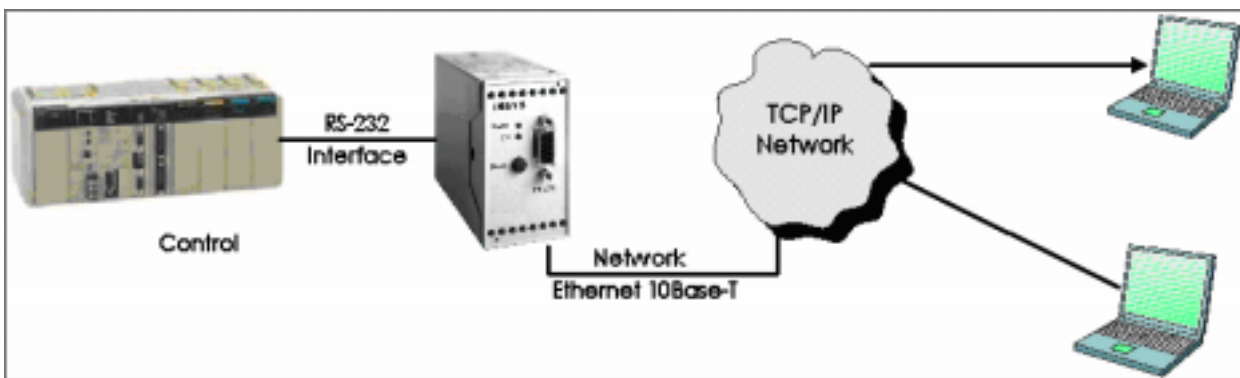
Appendix

I Ethernet COM Driver

I.I Description

With the Ethernet COM driver, you can simply establish a connection from a Windows PC with the INSYS Ethernet. On PC side, a standard COM port is simulated, and the data is output at the serial interface of the INSYS Ethernet transparently.

With this, it is possible to use existing software to communicate with a device at a remote RS232 interface via the LAN (Internet / Intranet).



Example application with INSYS Ethernet

I.II System Requirements

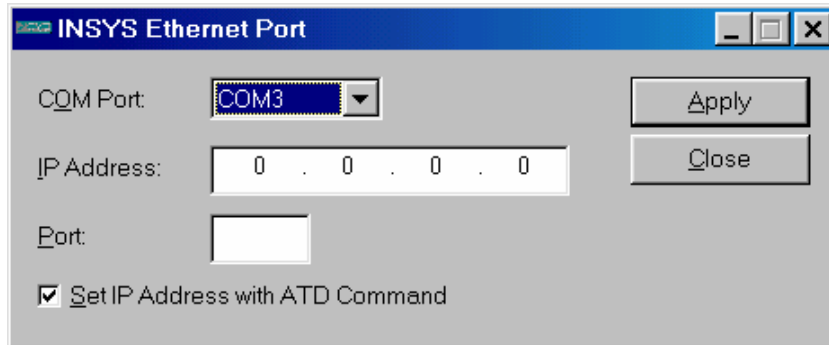
- PC with Windows 95, 98 or ME
- Installed network interface and installed TCP/IP network
- INSYS Ethernet from firmware V1.4 (query with **ATI4**)

I.III Installation

1. Insert the CD-ROM in drive D. (drive name may be different according to system)
2. Select the command Run... in the Start menu.
3. Enter the following command line in the Run dialog:
D:\SETUP (according to PC ,it may also happen that the autostart function starts the installation automatically)
4. Now, the installation program is started.
5. Upon installation the program can be started like the following:
Select Start-> Programs -> INSYS Ethernet -> **INSYS Ethernet Configuration**

I.IV Driver Settings

With the configuration program, you can make all important settings.
Up to 4 COM ports are supported, which can all be configured independently.



First, the desired COM port is selected. All displayed settings are only valid for this COM port.

I.IV.I Possible Settings

„IP-Address“

In this field, the IP address is set, under which the INSYS Ethernet can be accessed. This setting has to correspond with the **AT#IP** setting of the INSYS Ethernet.

„Port“

In this field, the port number is set, under which the INSYS Ethernet can be accessed. This setting has to correspond with the **AT#PORT** setting of the INSYS Ethernet.

„Set IP Address with ATD Command“

If this field is not checked, a TCP/IP connection to the above parameterized IP address/port is automatically established with every opening of the COM port.

If this field is checked, the AT emulation of the driver is activated. If the COM port is opened then, the driver follows the command **„ATD<IP-address>:<Port>“** and establishes only then the connection to the port set in the AT command. The parameterized IP address/port is then without importance.

Example: **„ATD192.168.100.200:1234“** establishes a TCP/IP connection to the Ethernet device with the IP address „192.168.100.200“ and the port „1234“.

The AT emulation enables to select different devices for programs, which support a dial-up via a modem.

Important: In order to activate the settings, the button „Apply“ has to be selected.

I.V General Notes for Use / FAQ

The driver ignores all settings which a program makes at the emulated COM ports. A change of the baudrate does not effect the INSYS Ethernet therefore. The desired baudrate and the data format of the serial interface have to be parameterized at the Ethernet device.

Possible error sources, if no connection can be established:

- 1.) Can the Ethernet device be reached via PING?
(Test: call up DOS shell and execute „**PING<IP-address>**“, e.g. „**PING192.168.100.200**“)
If PING doesn't work already, no IP network connection between PC and INSYS Ethernet exists.
Possible causes:
 - Wrong IP address settings at the PC or at the device
 - Network cables not connected or wrong network cable used
 - Firewall or router between PC and device blocks connections
- 2.) Is „S0=1“ set at the INSYS Ethernet?
Only for S0=1, an incoming TCP/IP connection is accepted automatically
- 3.) Are the port settings of PC driver and INSYS Ethernet identical?
- 4.) Is the selected IP address of the INSYS Ethernet and the PC unambiguous?
Note: It is not possible to manage several Ethernet devices with identical IP numbers in one network – even if the port numbers are set differently.
- 5.) Is the serial interface of the INSYS Ethernet set correctly?
Simply test this by connecting a PC to the INSYS Ethernet via RS232. The INSYS Ethernet should react on „**AT**“, and reply „**RING**“ and then „**CONNECT**“ when establishing a connection.
- 6.) Is the firewall configured correctly?
If a firewall is between PC and INSYS Ethernet, these firewall has to be configured correctly. In order to enable a communication of the driver with the device, both, TCP/IP and UDP/IP, have to be lead through for the desired port number.

II Configuration Software HS-Comm

For a simple parameterization of the INSYS Ethernet, the parameterization program HSComm is available (optional). You can get this from your dealer (order number: 130.1.V).

II.I System Requirements

Windows 95 or later
Monitor with resolution 800 x 600 pixel or higher
CD-ROM drive
Serial interface

II.II Program Description

Using the parameterization program HSComm, the most important settings and configurations can be made simple and convenient without knowledge of the AT commands.

Connect the serial interface of INSYS Ethernet with the serial interface of the PC..

The following settings can be entered directly:

HS-COMM INSYS ETHERNET

File Serial Interface Terminal Configure Error Device Language Help Info

General

IP address: 192.168.100.200

Port: 1234

Netmask: 255.255.255.000

Standard gateway: 192.168.100.255

Data transmit controller: 10

Alarm input

Mailrelay: 192.168.100.254

Subject: Alarm from INSYS Ethernet

to address: support@insys-tec.de

from address: insys_ethernet@insys-tec.de

Reply to:

Message text: 56 Characters remaining

ATTENTION

Alarm Input 1 of INSYS Ethernet has been activated!

Alarm output

☒ Default low

☐ Default high

Default protocol

☒ ATT

☐ ATU

other

☒ Echo

☒ auto answer

Rings to Offhook: 1

Data format

Baudrate: 115200

Data format: BN1

Handshake

☒ No handshake

☐ RTS/CTS

DTR control

☐ no DTR control

☒ Hang up

☐ Command mode

☐ Reset

Read settings

Reset modem

Send default settings

Send

NONE 9600 BN1

General	
IP Address	The address under which the device can be accessed and with which the device sends its data. The IP address has to be unique in the network.
Port	Distinguishing feature for different connections with one IP address. To select a device, its IP and the port, to be dialed to, have to be known. Some ports (<1024) are assigned to fix services (Mail, Telnet, WWW) according to RFC Standards.
Netmask	With the netmask and the target IP address, it is decided, whether the remote terminal can be contacted in the local network branch or only via router.
Standard Gateway	IP addresses, which are not in the local net, are accessed via the standard gateway. The standard gateway points to the router, which forwards the IP data to the other networks.
Data Transmit Controller	With activated DTC, a connection will be terminated automatically, when no data transfer takes place for n seconds.

Alarm input	Settings for first alarm input only (see chap. 3.2.3)
Mailrelay	The mail relay receives e-mails and forwards them to the recipient by SMTP.
Subject	Title of the e-mail
to address	receiver of the e-mail
from address	sender of the e-mail
Reply to	Reply address. If an e-mail is replied with a standard e-mail program, the reply will be sent to the "Reply-To" address.

Alarm output	Sets the default setting for the alarm output to high or low
Handshake	Setting of the handshake
DTR behavior	Setting of the DTR
Alarm text	Entry of the e-mail text to be sent

The settings are sent to the modem when pressing the button **Send**.

The actual settings of INSYS Ethernet can be queried by the button **Read settings**.