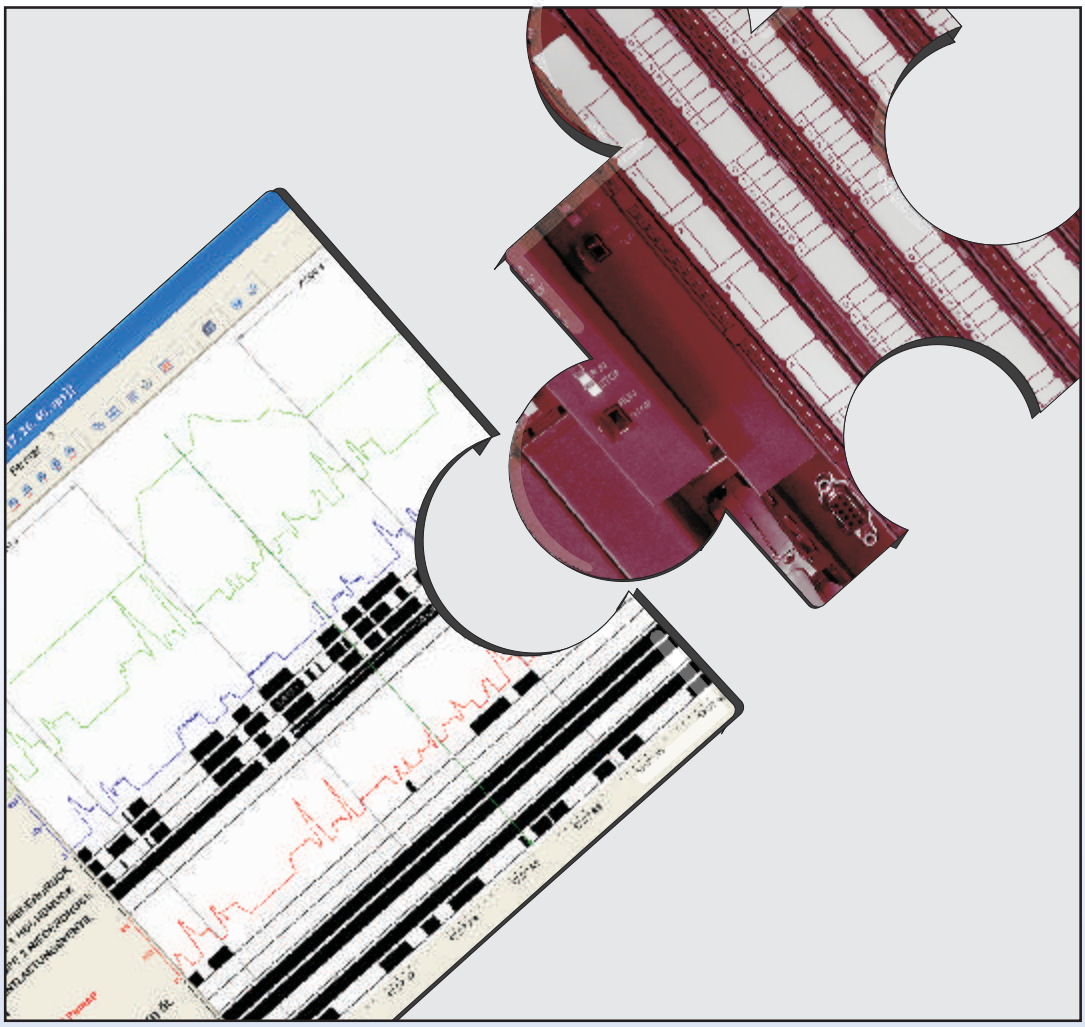
Driver-Addendum



PLC-Driver

Siemens SIMATIC S5

Industrial Ethernet TCP/IP

AUTEM

www.autem.de

PLC-ANALYZER *pro* **5**

The logic analyzer for programmable logic controls

Driver Addendum
Siemens SIMATIC S5 - Industrial Ethernet TCP/IP

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For references, suggestions and improvement suggestions we are always grateful. Please send these to AUTEM.

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1 Installation

This driver addendum describes the particularities of the following PLC driver and gives you hints on the usage:

- Siemens SIMATIC S5 - Industrial Ethernet TCP/IP

The listed driver makes the acquisition of PLC signals through Industrial Ethernet (TCP/IP) possible.

It is important, that you read through the driver addendum first, before you use a PLC driver. Please pay attention to the WARNINGS that advise you on possible dangers when using PLC-ANALYZER pro.

> **!** **WARNING**
>
> Errors that may occur in the automated facility endangering humans or causing large-scale material damage must be prevented by additional external precautions. These precautions (e.g. independent limit monitors, mechanical interlocks) must guarantee a safe operation even in the case of dangerous errors.

1.1 Installation of PLC driver

The PLC driver can be installed while PLC-ANALYZER pro is operating. Select *PLC driver* in the menu *Extras*. In the window PLC driver click the button *Add*. If the desired driver is not on the list, you have to install a new driver via the License-key management (s. *user manual PLC-ANALYZER pro 5 - chapter 2-2 Installation*).

With PLC-ANALYZER pro you can load the same or different PLC drivers more than once. You can, for example, acquire simultaneously signal data from two SIMATIC S5, which are connected to two different COM ports of the PC.

1.1.1 Installing additional hardware

If you have already connected your programming unit (or your PC) with the automation device via Ethernet TCP/IP network, usually nothing else must be done.

For connecting you PC to a TCP/IP Ethernet network, a normal network card can be used. The PLC must be equipped with a suitable communication processor (CP). Siemens CP1430 TCP, VIPA CP143 TCP/IP and INAT S5-TCP/IP are supported.

1.1.2 Installing additional software

In addition to the PLC-ANALYZER pro basic module and the PLC driver no other software is necessary.

1.2 Configuration of PLC driver

After installing the driver you can change important parameters under *Properties*. If you have loaded several drivers, you can set the properties for each driver individually.

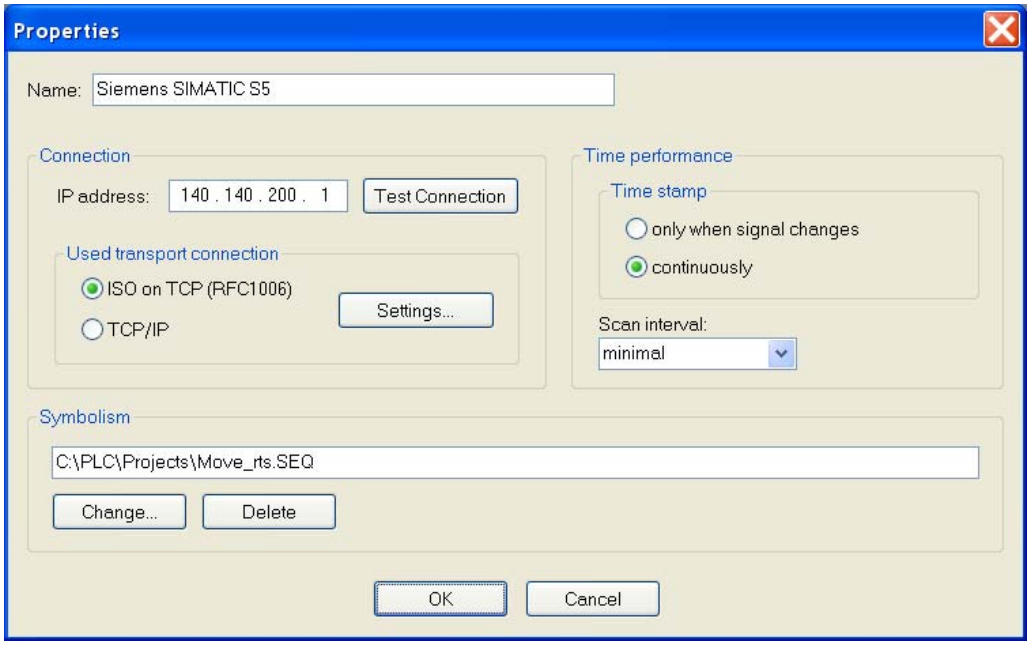

Fig. 1-1 Driver settings (SIMATIC S5)

Choose a *Name* for the driver first, than specify under *Connection* the *IP-Address* of PLC. The IP-Address must be identical to the IP-Address used for initialization of the communication processor (Siemens CP1430 TCP, VIPA CP143 TCP/IP or INAT S5 TCP/IP).

Use *Time stamp* to specify, if the time stamps should be entered into the signal file continually (at every scan point) or only for signal changes. For a continuous time stamp the exact scan points are documented even for a signal which does not change. The signal files are therefore larger.

Under *Scan interval* enter the length of time between read-out of data from the PLC. A longer scan interval may be chosen for non-critical time signals, e.g. temperature. The signal files thus created become smaller.

Under *Symbolism* you can assign a symbol file to the loaded driver. This makes the use of a symbolic identifier for the address definition possible (*s. user manual PLC-ANALYZER pro 5 - chapter 4.1 Address selection*). Besides the absolute addresses, the symbolic identifier and the comments will be shown and stored in a signal- or project-file.

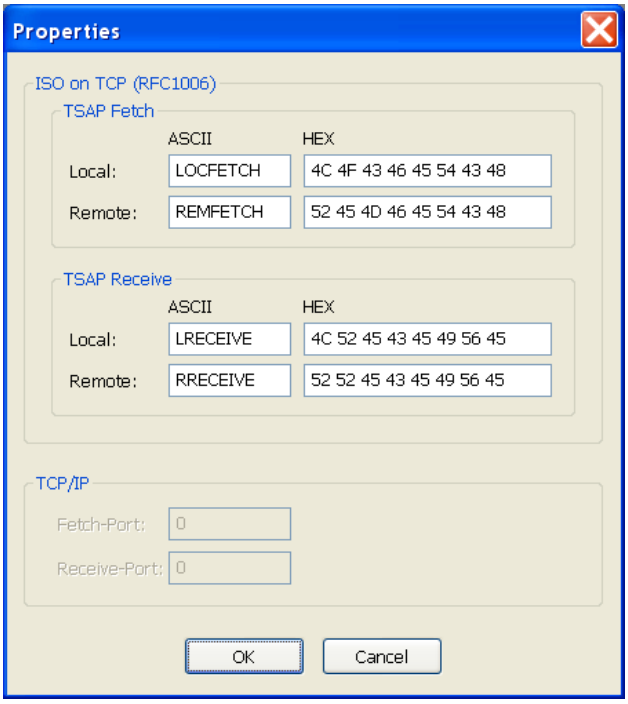

Fig. 1-2 Properties of transport connections

Select the *used transport connection*. Use *Settings* to specify the parameter for the selected connection. Use exactly the same parameter, which were used for the parameterized transport connections of the CP1430 (s. *1.3 Configuring of CP for data acquisition*)

1.3 Configuring of CP for data acquisition

The SIMATIC S5 PLC has to be equipped with a communication processor (CP) for data acquisition with PLC-ANALYZER via TCP/IP. Siemens CP1430 TCP, VIPA CP143 and INAT S5-TCP/IP are supported. The configuration of Siemens CP1430 TCP is exemplary described below. The configuration of the other CPs is similiar. Refer to the user manual of the CP for further information.

1.3.1 Initialization of Siemens CP1430 TCP

The CP1430 is parameterized with Siemens STEP 5 configuration software “COM1430 TCP/IP”. Go to “COM1430 TCP/IP” in STEP 5 if you want to configure CP1430 TCP or determine the settings.

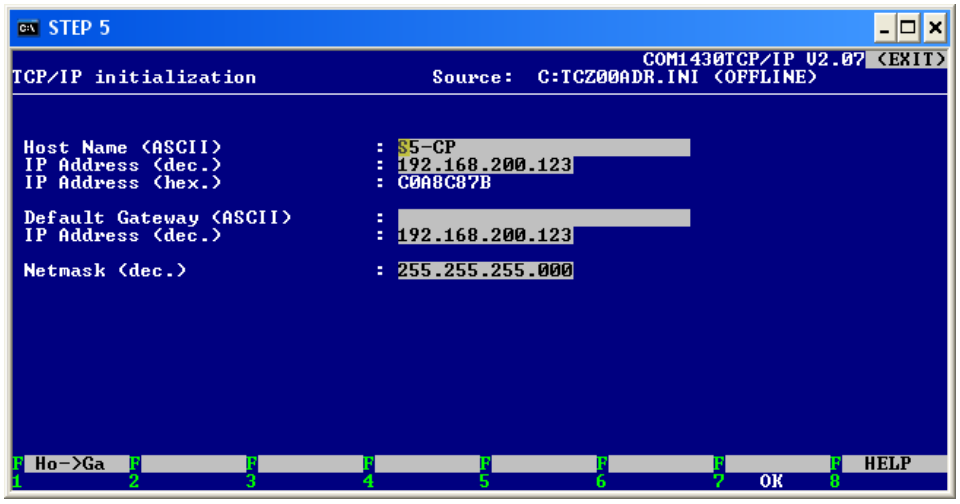

Fig. 1-3 Initialization of CP1430

Choose *CP Init* in menu *Edit* to determine the IP address of the CP. You can select an IP address here, if you did not already configure the CP. All settings must be transferred to the CP by choosing *FD -> CP* in menu *Transfer*.

1.3.2 Create a transport connection

Two transport connections with job type “Fetch” and “Receive” are necessary for data connection between PC and CP1430. These connections can be either of type RFC1006 (ISO on TCP) or TCP.

1.3.2.1 Create an RFC1006-connection

To create an RFC1006-connection choose *Connections - Transport Conn. (RFC1006)* in menu *Edit*.

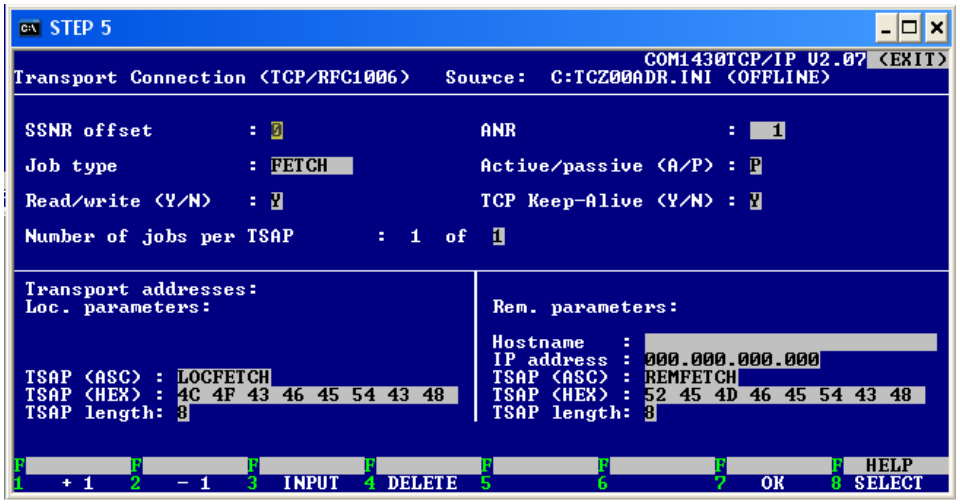

Fig. 1-4 Create an RFC1006-connection - job type "Fetch"

Choose “Fetch” as job type. Enter a unique TSAP[1] under *Transport addresses* for the local and remote site.

[1] TSAP = Transport Service Access Point

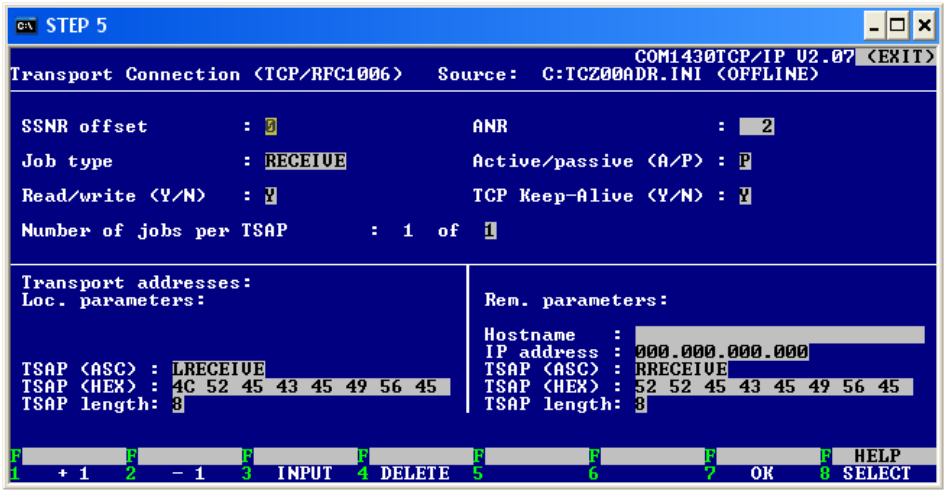

Fig. 1-5 Create an RFC1006-transport connection - job type "Receive"

Create another RFC1006-connection with job type “Receive”. Enter unique TSAPs here too.

1.3.2.2 Create a TCP-connection

To create a TCP-connection choose *Connections - Transport Conn. (TCP)* in menu *Edit*.

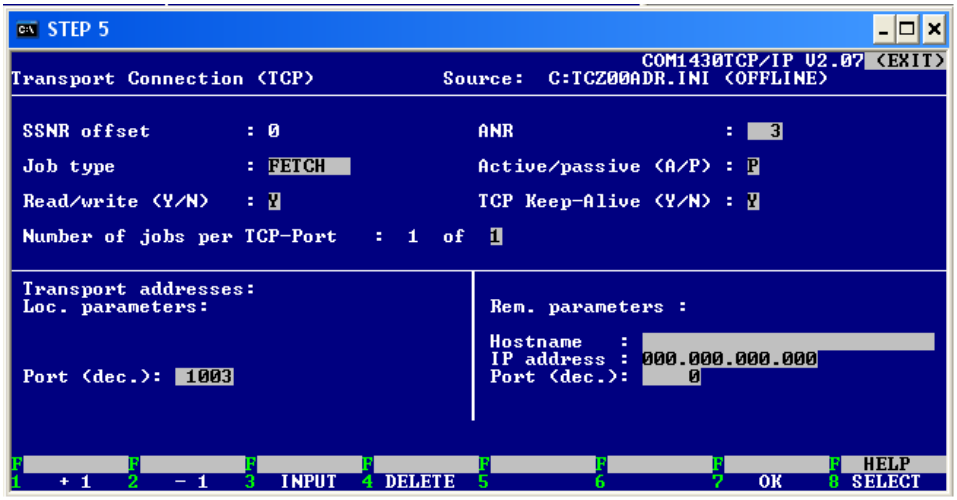

Fig. 1-6 Create a TCP-connection - job type “Fetch”

Choose “Fetch” as job type. Enter an unambiguous port number for the local site.

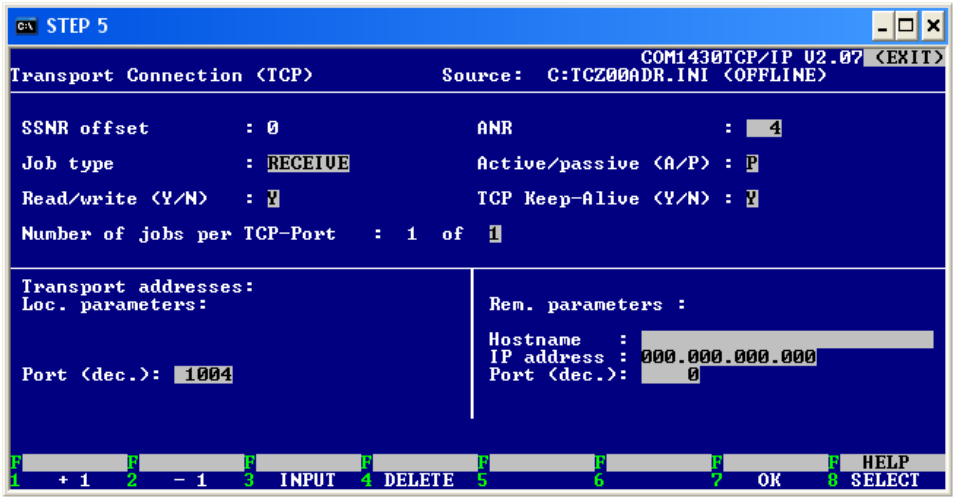

Fig. 1-7 Create a TCP-connection - job type "Receive"

Create another TCP-connection with job type “Receive”. Enter an unambiguous port number here too.

2 Data acquisition

2.1 Supported PLC models and CPUs

The following models of SIMATIC S5 family are supported by this PLC driver driver:

- Siemens SIMATIC S5-115U
- Siemens SIMATIC S5-135U
- Siemens SIMATIC S5-155U

A communication processor (CP) is required to record data through a TCP/IP network. The following CPs are supported by this PLC driver:

- Siemens CP1430 TCP
- VIPA CP143 TCP/IP
- INAT S5-TCP/IP

2.2 Recordable PLC addresses

The following table shows the recordable addresses and the corresponding address syntax:

Syntax	Address type	Example
Qx.z	Output byte x, bit z	Q32.4
QBx	Output byte x	QB9
QWx	Output word x	QW14
QDx	Output double word x	QD98
Ix.z	Input byte x, bit z	I17.0
IBx	Input byte x	IB127
IWx	Input word x	IW12
IDx	Input double word x	ID124
Fx.z	Flag byte x, bit z	F3.7
FBx	Flag byte x	FB250
FWx	Flag word x	FW24
FDx	Flag double word x	FD134
PWx	I/O word x (only input)	PW214
Tx	Timer x	T2
Cx	Counter x	C5
yDLx	Left data byte x from DB y	20DL15

Syntax	Address type	Example
yDRx	Right data byte x from DB y	21DR53
yDWx	Data word x from data block y	12DW5
yDDx	Data double word x from DB y	27DD0
yDXx	Data word x from DX-module y	22DX15

Table 2-1 Address syntax SIMATIC S5

NOTE

The automation devices of the SIMATIC S5 family allow only byte-oriented data acquisition. PLC-ANALYZER pro automatically converts a given bit address to a byte address. All bits are available for display.

2.3 Number of simultaneously recordable addresses

Up to 1000 addresses can be recorded simultaneously. The term “address” means a byte-address. The recording of a word- or double-word-address results in capturing of 2 or 4 bytes, respectively. So 500 word-addresses or 250 double-word-addresses can be recorded.

2.4 Time behavior and particularities

NOTE

Acquiring data with PLC-ANALYZER pro results in a small increase in cycle time in the automation device to the same manner as it happens with STEP5 in the operating mode STAT VAR.

The intervals between scan transfers from the SIMATIC PLC to the computer are depending on the following items:

- CPU type
- cycle time of PLC
- Number and combination of recorded addresses. Blocks for transfer are created. Every block requires additional time.

For the SIMATIC S5-135U (CPU928) the scan interval for a byte is approximately 30 ms, i.e. for a cycle time > 30 ms there is one scan for each cycle. For a longer PLC cycle time data transfer is synchronized with the PLC cycle.

For a shorter cycle time the computer does not obtain a scan for each cycle, resulting in a partial loss of information. This loss can be compensated by repeated measurements of the interesting signals.

Every additional requested byte of the same type leads to an insignificant increase of scan time only (s. *Table 2-2 Scan times on SIMATIC S5-135U*). Every new address type leads to an increase of scan time of ≈ 30 ms.

The following table exemplarily shows some values of time behaviour during acquisition:

Requested data	Scan time
1 flag byte	30 ms
50 flag words	32 ms
100 flag words	33 ms
1 flag byte, 1 output byte	61 ms
50 flag byte, 50 data words	64 ms
10 flag words, 10 data words, 10 inputs, 10 outputs	127 ms

Table 2-2 Scan times on SIMATIC S5-135U