PLC-ANALYZER pro 6

PLC-Logic analysis in no time

Driver Addendum

PLC-driver

Schneider

Modicon TSX Quantum/Momentum/Compact/M - Modbus TCP/IP
Modicon TSX Quantum/Momentum/Compact - Modbus I / Modbus+

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PLC-ANALYZER pro **6 - Driver Addendum**

Schneider Modicon TSX Quantum / Momentum / Compact / M - Modbus TCP/IP
Schneider Modicon TSX Quantum / Momentum / Compact - Modbus I / Modbus+

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1st Edition 2022

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Signal source

Schneider Modicon TSX Quantum / Momentum / Compact

This driver addendum describes the particularities of the following PLC drivers and gives you hints on using them.

- Schneider Modicon TSX Quantum / Momentum / Compact / M - Modbus TCP/IP
- Schneider Modicon TSX Quantum / Momentum / Compact - Modbus Plus
- Schneider Modicon TSX Quantum / Momentum / Compact - Modbus I (PG interface)

The drivers listed enable the acquisition of PLC signals via the TCP/IP interface, via the Modbus Plus automation network or via the programming interface of the PLC.

It is important that you read through the driver addendum before using 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 precautions. These precautions (e.g. independent limit monitors, mechanical interlocks) must guarantee safe operation, even in case of dangerous errors.

Installation

The PLC driver can be added to the project as a new signal source. If the driver you want is not yet in the list of available signal sources, you must first activate the license for the PLC-driver with the AUTEM LicenseManager on your computer.

Installing additional hardware

If you have already connected your PC with the PLC, usually nothing else must be done. Otherwise establish the connection for the coupling under Modbus. The Schneider Modicon TSX Quantum / Momentum / Compact - Modbus Plus PLC driver requires a Modbus Plus adapter (ISA, PCI, PCMCIA or USB adapter) to access Modbus Plus. Plug the Modbus Plus adapter into the appropriate slot in your PC. The Modbus Plus adapter comes with drivers that allow the adapter to communicate with your PC under Windows. Install these drivers and configure the Modbus Plus Adapter according to the instructions in the corresponding manual.

Installing additional software

No software is required in addition to the PLC-ANALYZER pro basic module and the PLC driver.

Configuration

Open driver settings to set important parameters for data recording. If you have added the driver to the project several times, you can set the properties individually for each individual driver.

First give the driver a meaningful name. Enter the parameters required for establishing the connection under Destination station:

Schneider Modicon TSX Quantum / Momentum / Compact / M - Modbus TCP/IP

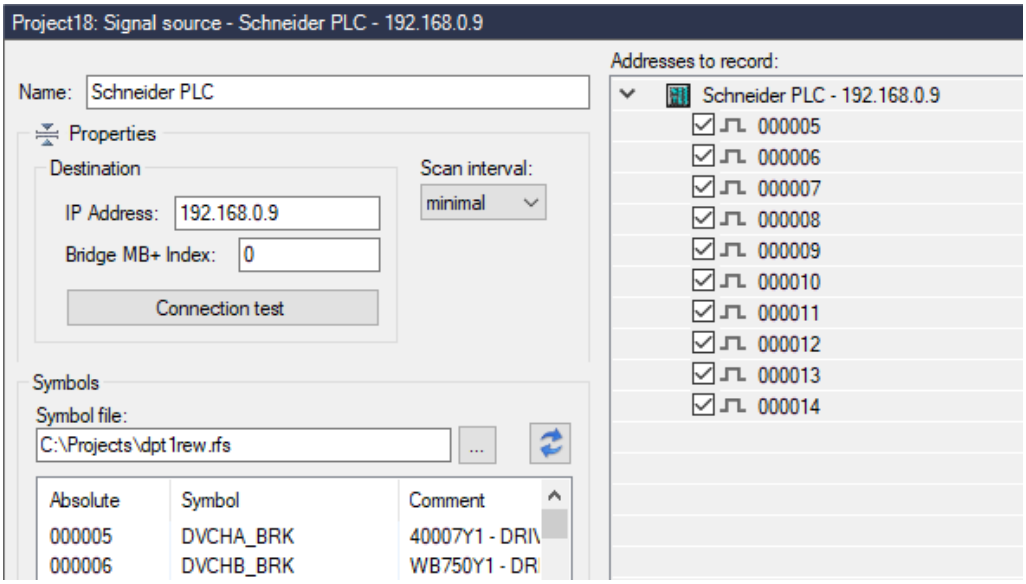

Fig. 1-1 Settings Schneider Modbus TCP/IP

Enter the *IP-Address* of the selected PLC (see Concept). For *Bridge MB+ Index*, enter an index with which you define the Modbus Plus routing path for data transfers from TCP/IP Host. If you are connected directly to the PLC, this value is not taken into account. Enter 0 in this case.

Schneider Modicon TSX Quantum / Momentum / Compact - Modbus Plus

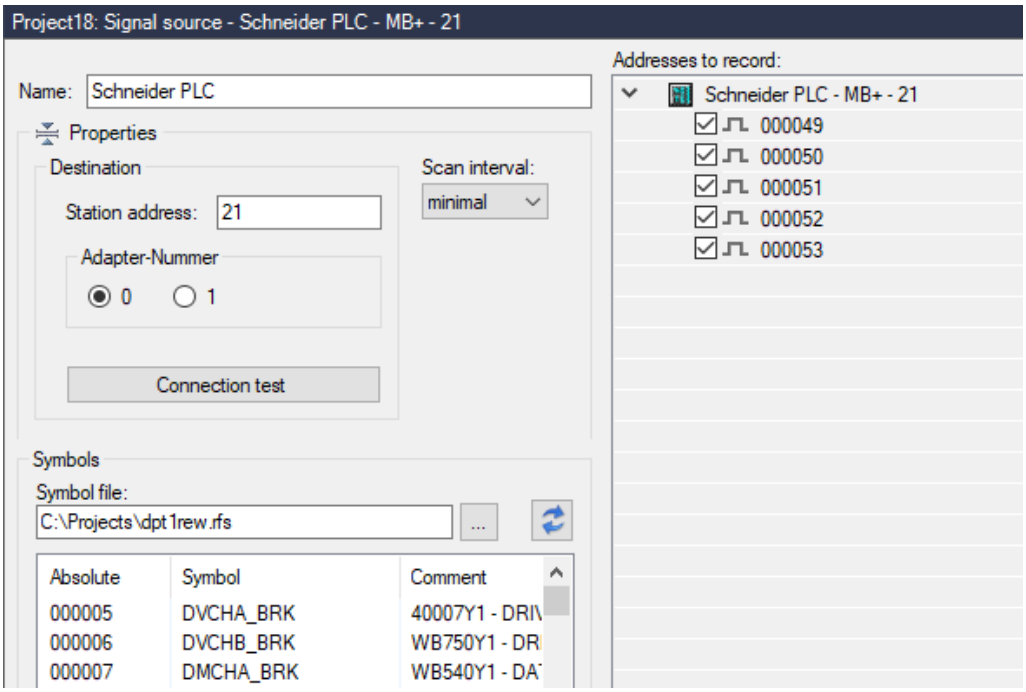

Fig. 1-2 Settings Schneider Modbus Plus

Under *Station address* you enter the network address of the PLC concerned. Note that you must enter a routing supplementation, if the PLC is in a different network segment, which is available over Bridges only.

The following table shows some valid network addresses:

Address	Explanation
3	Address 3 in the same segment as Modbus Plus adapter.
07	Address 7
02.10.01.25.13	Address 13 in the seg., which is reached over bridges 02, 10, 01 and 25.

Table 1-1 Valid network addresses

Device-Number lays down the device number of the Modbus Plus adapter. Because you can put two adapters in one PC, you must the PLC-ANALYZER pro make the device number (0 or 1) known.

Schneider Modicon TSX Quantum / Momentum / Compact - Modbus I (PG interface)

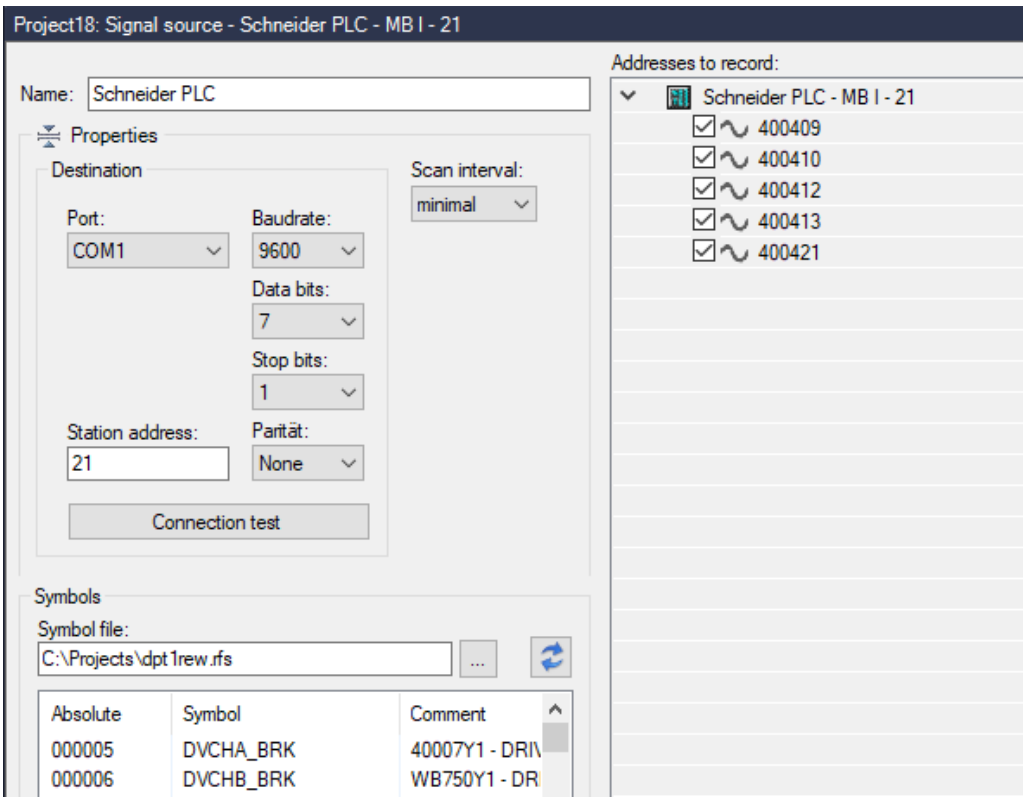

Fig. 1-3 Settings Schneider Modbus I (PG interface)

Enter under *Station address* the network address of the PLC concerned (s. Modsoft). Tick under *Port* the comport (seriell interface) for the connection which exists with the cable-connection to the programming unit. Choose the right transmission parameters for the connection between PC and PLC. This parameters have to fit with the attitudes of the PLC. For getting optimal speed RTU (Remote Terminal Unit) should be used, if necessary use Modsoft to adjust it on the PLC.

Press *Connection* test to check, whether a connection to the PLC can be established.

Under *Scan interval* you specify the time interval at which measured values are read out from the PLC. A

longer sampling interval can be selected for signal paths that are not time-critical, e. g. temperature. As a result, the generated signal files become smaller.

Under *Symbols you* select the Concept project or symbol file suitable for the PLC, to make the symbols of this project available for address selection. A selected project makes it possible to use symbolic identifiers when entering addresses. In addition to the absolute address, the symbolic identifier and comment are also displayed and stored in a signal- or project file. In addition to located variables you could record unlocated variables, if you have loaded a Concept project.

NOTE

When using Concept 2.5 or 2.6 it is necessary to activate the automatic variable export. Set the option ExportVariables=1 in the section [Common] of Concept.ini (usually in the Windows directory).

After setting the communication properties, add the PLC signals to be recorded. When a project or symbol file is loaded, the signals to be recorded can be conveniently selected from the symbol list by double-click or drag and drop.

Data acquistion

Supported PLC models and CPUs

Schneider Modicon TSX Quantum / Momentum / Compact / M - Modbus TCP/IP

The models of the **Schneider Modicon TSX Quantum, Momentum, Compact** and **M340** family are supported by the Modbus TCP/IP driver.

Schneider Modicon TSX Quantum / Momentum / Compact - Modbus Plus

The models of the **Schneider Modicon TSX Momentum** family, the **TSXCompact** family and the following models of the **TSX Quantum** family are supported by the Modbus Plus driver:

140 CPU 113 02, 140 CPU 113 03, 140 CPU 213 04, 140 CPU 424 02.

Schneider Modicon TSX Quantum / Momentum / Compact - Modbus I (PG interface)

The models of the **Schneider Modicon TSX Quantum** family are supported by the Modbus I driver:

140 CPU 113 02, 140 CPU 113 03, 140 CPU 213 04, 140 CPU 424 02.

The following models of the **Schneider Modicon 984** family are supported by the Modbus I driver :

PC-A984-120, PC-A984-130, PC-A984-131, PC-A984-141, PC-A984-145, PC-0984-380, PC-0984-381, PC-E984-381, PC-0984-385, PC-E984-385, PC-D984-385, PC-0984-480, PC-E984-480, PC-0984-485, PC-E984-485, PC-0984-680, PC-0984-685, PC-E984-685, PC-0984-780, PC-L984-785, PC-E984-785, P1-984X-008, Px-984A-xxx, Px-984B-xxx.

Other automation devices and CPUs from the Modicon family are generally compatible with PLC-ANALYZER pro, but have not been explicitly tested.

Recordable PLC addresses

There are two kinds of address types in the Modbus Plus driver:

- located variables
- unlocated variables

For recording of unlocated variable it is necessary to load the appropriate Concept project (s. Configuration) suitable to the PLC. All addresses, which are in the Concept-project, are listed in the symbol list and could be selected for recording there.

The data acquisition of located variables is possible without a Concept project, however no symbolic addresses are available then.

The following table shows the possible addresses and the appropriate syntax:

Syntax	Address type	Example
0xxxxx	Output or flag	000002
1xxxxx	Input	100007
3xxxxx	Input register	300144
4xxxxx	Output- or flag register	400352

Table 1-2 Recordable PLC addresses

Number of recordable addresses

255 addresses per signal source can be recorded. Simultaneous acquisition from up to 250 signal sources is possible.

Time behaviour and particularities

One Scan is normally from one PLC-cycle. The intervals between scan transfers depend on the items listed below:

Data transmission speed with Modbus TCP/IP

- Cycle time of the PLC
- Number of addresses which should be record. There will be address-blocks created and each block more needs more time

Two examples show typically scan intervals:

- PC directly connected with TSX Quantum over Modbus TCP/IP, acquisition of one address block (e. g. 3xxxx or 4xxxx): Scan interval ≈ 10 ms
- PC directly connected with TSX Quantum over Modbus TCP/IP, acquisition four address blocks (e. g. 0xxxx, 1xxxx, 3xxxx and 4xxxx): Scan interval ≈ 40 ms

For a scan interval of e.g. 20 ms and a equal cycle time of the CPU there is one scan for each cycle. If the cycle time of the PLC is longer, the scan interval synchronize 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. In normal acquisition mode this loss can be made up by repeated measurement of the signals in question.

Data transmission speed with Modbus Plus

- Token rotation time in Modbus Plus
- Connection path between the PC and the PLC (Bridge delay times!)
- Cycle time of the PLC
- Combination of the addresses.
- Polling interval of the SA85 driver.

Two Examples show typically scan intervals:

PC directly connected with Modicon 984-145 over Modbus Plus, no other participants in the net, acquisition of four address blocks (e. g. 1 block 0xxxx, 1xxxx, 3xxxx und 4xxxx):
Scan interval ≈ 20 ms

PC on a Modbus Plus network with 40 participants, acquisition of two address blocks from a 984B over one bridge (e. g. 1 block 0xxxx, 4xxxx):
Scan interval ≈ 45 ms

With the PLC-ANALYZER pro you could open max. 4 paths for commuication with the PLC. These paths stay open during the acquisition. In one communication path could only ask for a PLC variable of one reference type. That's why you need one of the four paths for each reference type. In each path you can request a block of coherent reference numbers. The size of those blocks is limited:

- max. 2000 bits (e.g. 10001 to 12000) or
- max. 125 register (e.g. 40300 to 40424)

The entered reference numbers will summarize in blocks. If you want to record the numbers 00002 and 00124 PLC-ANALYZER pro request the whole block from 00002 to 00124 (123 bits packed in 16 bit words).

If you exceed the maximally size of the reference block, (e.g. because you entered refernce no. which are

more apart from the limit as shown above, there will be generated a new reference block of the same typ. Therefore will be required a new path.

Example: Entered are the reference no. 10002 and 12025. because these reference no. do not fit into the block, two different blocks (each includes one reference no.) are necessary, therefore two different path will be necessary then. For other reference types only two path are left:

Example of a block formation:

The following reference numbers are entered:

00011, 00203

10001, 10101, 13001

30036, 30189, 30313

These blocks will be created:

Block 1: 00011-00203

Block 2: 10001-10101

Block 3: 13001

Block 4: 30036

More reference numbers do not fit into this block, because gap to 30036 is more than 125. Because 4 blocks are assigned, the PLC-ANALYZER pro shows an error message if you start the acquisition.

Remedy: Delete the address 13001. After this these blocks will be created:

Block 1: 00011-00203

Block 2: 10001-10101

Block 3: 30036

Block 4: 30189-30313

Before named blocks will be transferred from the PLC to the PC completely. In block 4 e.g. all values of variables between 30189 up to 30313 (125 words) are transferred.

In an extreme case you can create with 8 reference numbers 4 maximal blocks:

00006, 02005	Block 1: 00006-02005	2000 bits in 125 16-Bit words
10001, 12000	Block 2: 10001-12000	2000 bits in 125 16-Bit words
30001, 30125	Block 3: 30001-30125	125 words
40001, 40125	Block 4: 40001-40125	125 words

Although only 8 reference no. would requested, 500 words will be transfer, because of the special behaviour of the Modbus Plus (4 x 125 = 500). This will deteriorate the time behaviour of Modbus Plus, because this 500 x 16 = 8000 bit netto data need 8ms if you use a transfer rate of 1Mbit/s.

We will get better results, if we make other number inputs.

Example: Instead of the reference numbers 00006 and 02005 enter the numbers 00005, 00006, 02005 und 02006. The PLC-ANALYZER pro generates two blocks: block 1: 00005, 00006 and block 2: 02005, 02006. Instead of one block with 125 words there will be created two blocks with one word.

If the user will speed up the communication, he could copy the PLC variables in the PLC, so that the PLC-ANALYZER pro can create only one reference block.

Example: The registers 40001, 40125, 40170, 40294, 40500, 40625, 40800, 40925 should be recorded (four paths with 500 words would be needed). Copy these registers in 8 consecutive registers, e.g. 41001 to 41008. Because of that, the PLC ANALYZER creates only one path with eight words.