

VARAN Analyzer

ETVA 0501

With the ETVA 0501 VARAN Analyzer, the communication for a real-time Ethernet VARAN bus network can be analyzed. The connection is made over a free VARAN port. If no port is available, an existing VARAN bus connection can simply be removed and the VARAN Analyzer inserted.

The ETVA 0501 is operated through menus over the touch screen. On the 5.7" VGA TFT color display, diagnostic data are clearly shown.

An internal Compact Flash serves as the storage medium for the operating system, application and analysis data.

The VARAN Analyzer has a USB socket for connecting external storage devices. The analysis data can also be loaded under windows with the VARAN Analyzer software. The software is installed with the CD provided.



Technical Data

Performance data

Processor	ELAN SC520
Internal cache	16 Kbytes write back cache
BIOS	Yes
Internal main memory (SDRAM) 133 MHZ	64 Mbytes
Battery buffered internal expanded memory (SRAM)	256 Kbytes
Internal program memory	10 Mbytes
Internal data memory	40 Mbytes
Internal storage device (IDE)	64 Mbytes Compact Flash
Interface connections	1 x VARAN-IN (RJ45) (maximum length: 100 m) 1 x VARAN-Out or Ethernet 10/100 Mbits (RJ45) (maximum length: 100 m) 1 x USB V1.1 Type-A
Internal interface connections and devices	1 x TFT LCD color display 1 x Touch
Control panel	Touch-Screen (analog resistive)
Display	8.4" TFT color display 640 x 480 Pixel
Data buffer	Lithium battery
Signal generator	No
Real time clock	Yes
Cooling	Passive (fanless)

Electrical requirements

Supply voltage	Typically +24 V DC	
	Minimum +18 V DC	Maximum +30 V DC
Current consumption of voltage supply	Typically 350 mA (at + 24 V)	Maximum 500 mA
Current load on the VARAN bus (I/O module power supply)	Typically 530 mA (at + 24 V)	
Starting current	Maximum 2.4 A for 7 ms	

Terminal

Dimensions	203,5 mm / 170.1 mm / 47.5 mm (W / H / D)
Material	AlMg3 mm, anodized
Weight	Approximately 1 kg

Control unit

Touch foil	Integrated in display (TOP ITO Film: Anti-Glare Hard Coating & Anti-Newton Ring Sheet Resistance: 450±50 Ω BOTTOM GLASS: Sheet Resistance: 500±50 Ω)
Resolution	12-Bit (4096 x 4096)

Display

Type	5.7" TFT color display
Resolution	VGA 640 x 480 Pixel
Color depth	16-Bit (65 x 536 colors)
Pixel size	0.1815 mm x 0.1815 mm
Active surface	116.16 mm x 87.12 mm
Background lighting	LED
Contrast	300 : 1
Brightness	Typically 220 cd/m ²
Visible field CR>10 von	Left and right 100°, above and below 100°

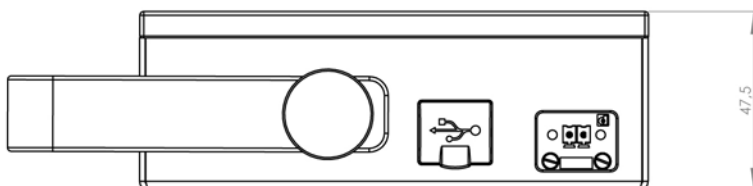
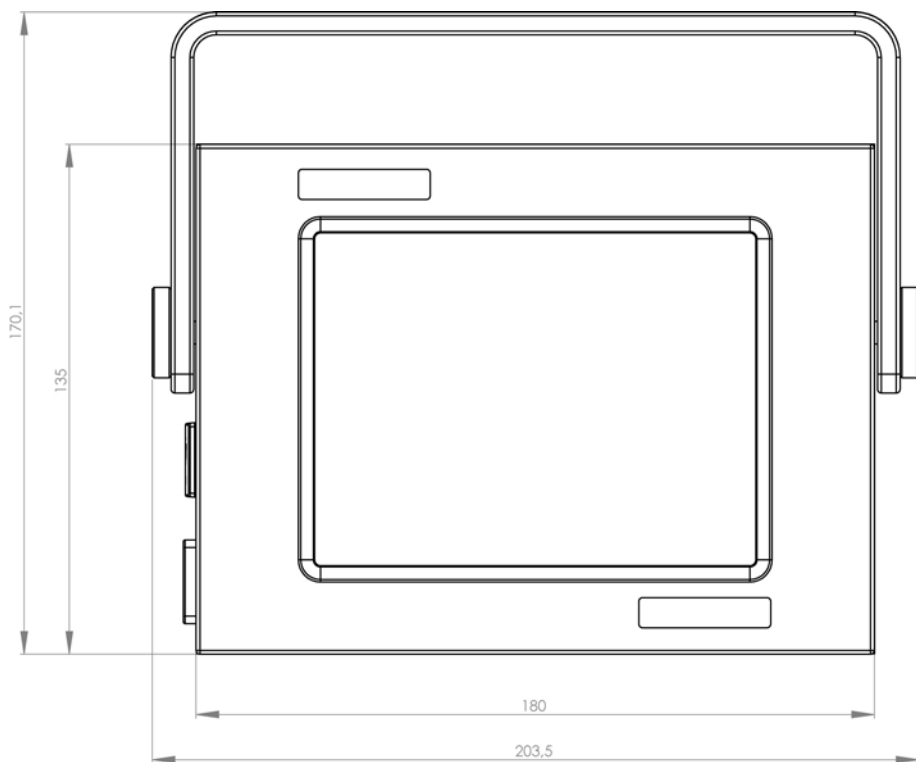
Miscellaneous

Hardware version	1.x
Article number	12-230-0501-VA

Environmental conditions

Storage temperature	-20 – +60 °C	
Operating temperature	0 – +50 °C	
Humidity	10 - 90 %, uncondensed	
EMV tolerance	EN 61000-6-2: noise immunity EN 61000-6-4: noise emission	
Vibration tolerance	EN 60068-2-6	2 - 9 Hz: Amplitude 3.5 mm 9 – 200 Hz: 1 g (10 m/s ²)
Shock resistance	EN 60068-2-27	15 g (150 m/s ²), Duration 11 ms, 18 Shocks
Protection Type	EN 60529: Protected through the housing	Cover: IP 20

Mechanical Dimensions



Chemical Resistance

Touch foil

LCD displays must be protected against chemical substances, as oil or lubricants can damage the surface of the display or the electrical components.

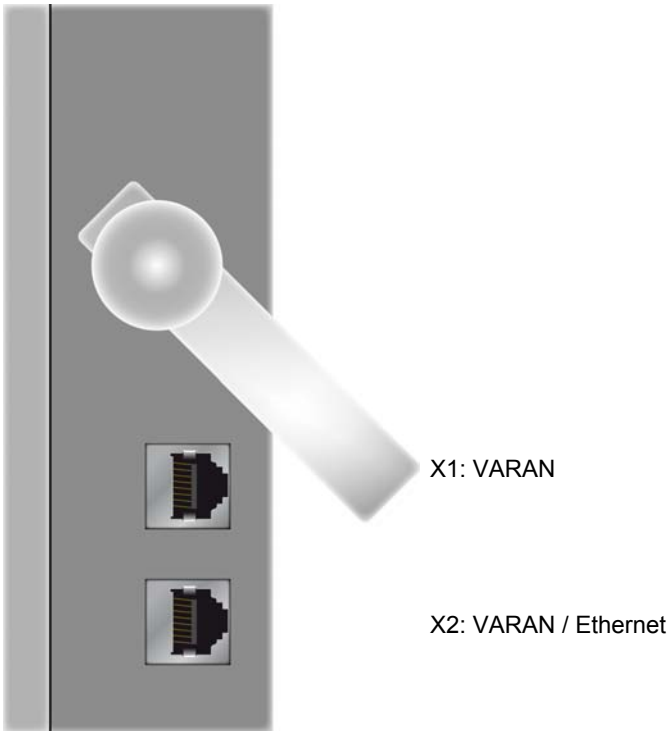
Connector Layout

Both RJ45 sockets are for connecting the VARAN Analyzer to a VARAN network and connecting a PC using TCP/IP. The RJ45 socket X1 is used exclusively as a VARAN-IN port. The socket X2 is used as either a VARAN-Out port for the connection to line structures or a TCP/IP port for connecting a PC to the Analyzer.

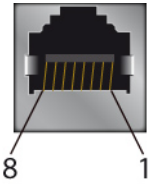
Whether the X2 socket is used as a VARAN-Out port as a TCP/IP port is detected through the connection automatically.

When changing between VARAN and a TCP/IP connection at socket X2, both X1 and X2 are automatically deactivated during the reconfiguration. If a recording is active during this time, the communication object is not registered.

Connections on the right side



X1: VARAN (RJ45)

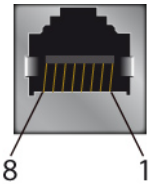


Pin	Function
1	TX+ / RX+
2	TX- / RX-
3	RX+ / TX+
4	n.c.
5	n.c.
6	RX- / TX-
7	n.c.
8	n.c.

n.c. = do not use

More information on the VARAN bus can be found in the VARAN bus specifications!

X2: VARAN / Ethernet (RJ45)



Pin	VARAN	Ethernet
	Function	Function
1	TX+ / RX+	TX+
2	TX- / RX-	TX-
3	RX+ / TX+	RX+
4	n.c.	n.c.
5	n.c.	n.c.
6	RX- / TX-	RX-
7	n.c.	n.c.
8	n.c.	n.c.

When using Socket X2 as a standard Ethernet connection:

Problems can arise if a control is connected to an IP network, which contains modules that are not running with a SIGMATEK operating system. With such devices, Ethernet packets could be sent to the control with such a high frequency (i.e. broadcasts), that the high interrupt load could cause a real time runtime error or runtime error. By configuring the packet filter (Firewall or Router) accordingly however, it is possible to connect a network with SIGMATEK hardware to a third party network without triggering the error mentioned above.

Connections on the left side

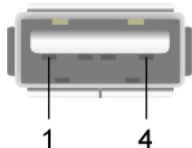


X3: USB

X4: Versorgung (GND/+24 V)

X3 : USB Type A V1.1

For file transfers, external storage devices can be connected to the USB socket.

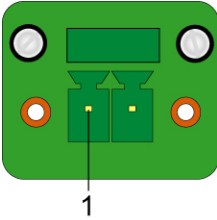


Pin	Function
1	+5 V
2	D0-
3	D0+
4	GND

X4 : Power supply (Phoenix DFK-MC1.5/2-GF-3.81)

Power for the VARAN Analyzer is provided with the 24 V DC power supply included or over an external connection.

2-pin Phoenix 3.81 mm (power supply)



Pin	Function
1	+24 V
2	GND

Buffer Battery

The exchangeable buffer battery ensures that programs and data in the expanded memory (SRAM) as well the clock time (RTC) are preserved in the absence of a supply voltage. A lithium battery is installed at the manufacturer.

The battery has enough capacity to preserve data in the absence of a supply voltage for up to 3 years.

We recommend however, that the battery be replaced annually to ensure optimal performance.

Battery order number: 01-690-055

	MANUFACTURER	DATA
Lithium battery	RENATA	3,0 V / 235 mAh

Use batteries from RENATA with the number CR2032 only!
Using other batteries could result in fire or explosion!

BIOS

The ETVA 0501 is started with BIOS developed by SIGMATEK that can boot LASAL and DOS. A bootable Compact flash need only be inserted into the ETV A0501 in order to start it.

Exchanging the Battery and Compact Flash

1. Turn off the VARAN Analyzer's power supply.
2. Open the housing with a PH-1 screwdriver.



3. Remove the battery and/or Compact Flash using the strap in the mounting.



4. Next, insert the battery (+ pole facing the front) or Compact Flash (CF above facing rear).

CAUTION:

After the +24 V supply is removed, the battery is buffered for approximately 5 minutes. The battery must be exchanged within this time, data loss occurs.

Cleaning the Touch Screen

CAUTION!

Before cleaning the touch screen, the terminal must first be turned off to avoid unintentionally triggering functions or commands!

The terminal's touch screen can only be cleaned with a soft, damp cloth. A screen cleaning solution such as anti static foam, water with a mild detergent or alcohol should be used to dampen the cloth. The cleaning solution should be sprayed onto the cloth and not directly on the terminal. The cleaning solution should not be allowed to reach the terminal electronics, for example, through the ventilation slots.

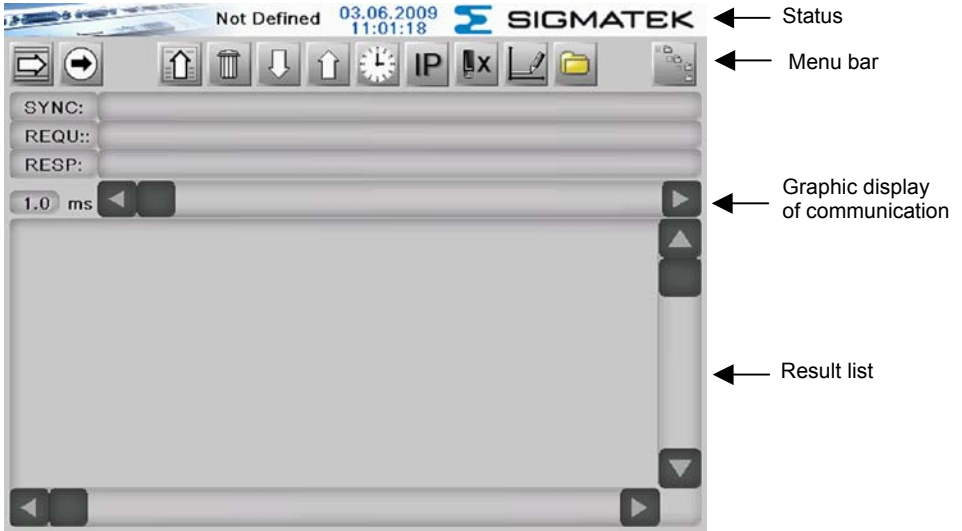
No erosive cleaning solutions, chemicals, abrasive cleansers or hard objects that can scratch or damage the touch screen may be used.

If the terminal comes in contact with toxic or erosive chemicals, carefully clean the terminal immediately to prevent acid damage!

To ensure the terminal functions optimally, it should be cleaned regularly!

Operating the VARAN Analyzer

In the following screenshot, the start page after turning on the VARAN Analyzer is shown.



Status line

In the status line, the actual status of the recording is shown.

The possible displays are:

Not Defined	Power-up status. No data available in the recording buffer
Wait for Start Trigger	The ETVA 0501 is waiting of the start condition to begin recording
Wait for Stop Trigger	To connect a recording, the ETVA 0501 waits for stop condition
Data Ready	Recording data is available
Wait for packages after Trigger	During this display, all data is registered after the stop condition has been triggered (if triggersetting/Extra was set: see Trigger Settings)

Setting the Date and Time

To set the date or time in the ETVA 0501, click on the corresponding entry in status line. A dialog box is opened to enter the settings



Version information

Press the logo in the upper right corner of the main screen to view information on the actual VARAN Analyzer version.



Menu Bar



Start, Stop and Capture settings



Start recording



Stop recording

This button is visible only when record is active.



Load analysis data from the recording memory



Delete actual analysis data from RAM. Available analysis data can be restored from record memory of the FPGA.



Jump to the next communication error



Jump to the previous communication error



Conversion of the time display absolute or relative from the beginning of the recording



Conversion of port X2 to IP in the VARAN nested mode
(See chapter "Converting to IP in VARAN Nested Mode")



Sets whether or not the record data should be deleted after being automatically copied from the Compact Flash card to the external storage device.



Activate/deactivate prolonged recording



Record data for loading display




Save record data in a file. This button is visible only when an analysis is being run.

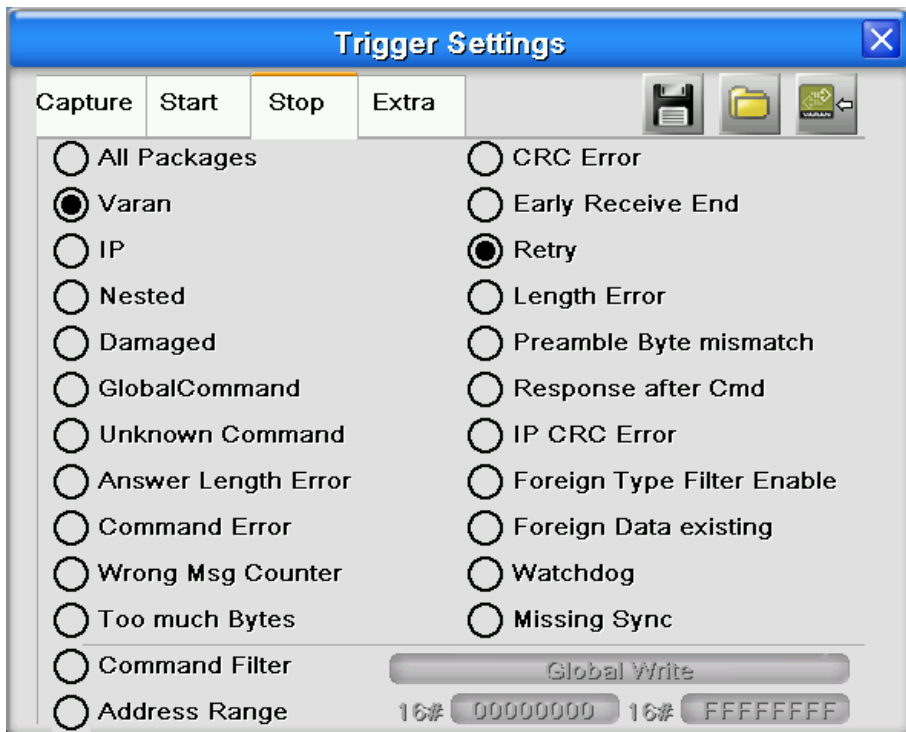


Start file explorer

Trigger Settings



With the  button, the trigger settings window is opened. Capture, Start and Stop should be set the same.



Control Fields



Save actual trigger setting in a file.
Required for prolonged recording!



Load trigger settings from a file



Assume settings and close window



Close window without assuming the settings

Capture Tab

This settings page can be used to define which data packet should be recorded. Multiple selections are possible.

Start Tab

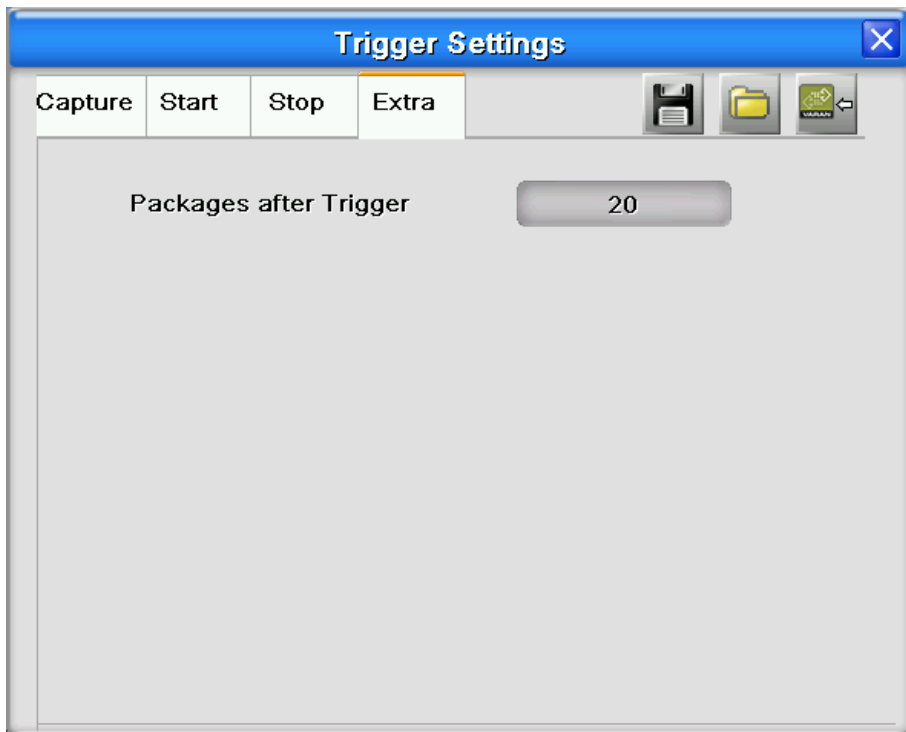
On this page, the start conditions for an analysis can be defined. Multiple selections are possible.

Stop Tab

On this page, the stop conditions for an analysis can be defined. Multiple selections are possible.

Extra Tab

Here, the number of data packets that should be recorded after the stop condition is triggered can be defined. Only packets that meet the Capture condition are recorded the maximum value for this setting is 65535.



Settings in Detail

All Packages	All data packets
VARAN	VARAN packets)
IP	IP data packets
Nested	VARAN frame in an IP frame
Damaged	Damaged packets
Global Command	Global command i.e. SYNC
Unknown Command	Unknown command
Answer Length Error	Length error in the answer packet
Command Error	Command error in the answer I.e. instead of a client answer to a query, an new query is sent from VARAN
Wrong Msg Counter	Message counter error
Too many Bytes	More bytes were received than expected in a query
CRC Error	Checksum error
Early Receive End	Length error I.e. if 10 bytes were expected but only 8 were sent
Retry	Repeat message
Length Error	Data packet length wrong
Preamble Byte mismatch	Preamble byte error This error is generated when the first byte in a data packet is not 0x55
Response after Cmd	General triggering of an answer after a query
IP CRC Error	CRC error in an IP data packet
Foreign Type Filter Enable	Filter for access time measurement packets in a VARAN network
Foreign Data existing	Foreign packet that have a data length > 0.
Watchdog	Watchdog error or missing SYNC command (generated after 127 ms)
Missing Sync	Missing SYNC command When the SYNC command is not received within 2 ms.

With the **Command Filter**, VARAN commands can be selected (See point 4 in the event list).

With the **Address Range** setting, Access of specific addresses can be triggered on the VARAN bus. A VARAN network can be seen as a 4-Gbyte virtual memory area. Sections in the value range of 0x00000000 to 0xFFFFFFFF can be used.

Event List

The event list is displayed automatically when the stop condition is met or the recording was stopped manually.

Index	Address	Value	Event Type	Count	Details
0			Memory Read	10	Address=0x...
1	5040	5040	Response	10	Daten=3E 7...
2	15940		Memory Write	11	Address=0x...
3	31160	15220	Response	11	CRC=0x431...
4	31820		Memory R/W	12	Address=0x...
5	35380	3560	Response	12	Daten=01 ,C...
6	36100		Memory Write	13	Address=0x...
7	39260	3160	Response	13	CRC=0x419...
8	39900		Memory Read	14	Address=0x...
9	43040	3140	Response	14	Daten=F4 0...
10	437540		Global Write	15	Sync=0x01,...

Event List Columns


1. Data packet number

Continuous numbering of data packets

2. Timestamp

The time stamp for a data packet is shown in the unit [ns].



With the  button, the display is switched between the absolute time and the time from the recording start.

3. Time Difference

Shows the time difference in [ns] and therewith the duration between the query and the answer from a VARAN client.

4. Command

Displays the command through which a packet was transferred.

The command options are:

Global Write	Global command (i.e. SYNC)
Memory Read	Read access of a VARAN client's memory area
Memory Write	Write access of a VARAN client's memory area
Memory Read/Write	Combined read and write access of a VARAN client's memory area
Control Read	Read access of a VARAN client's control area
Control Write	Write access of a VARAN client's control area
Control Read/Write	Combined read and write access of a VARAN client's control area
Foreign Pack.Request	Request to transport a foreign data packet (i.e. IP tunneling)
Foreign Pack.Response	Answer to the request to transport a foreign data packet (i.e. IP tunneling)
Multiple Memory Read/Write	Multiple operation for combined read and write access of multiple bus participants
Response	General answer from a VARAN client to the data transfer

Further information on the memory and control area of a VARAN client can be found in the VARAN specifications.

5. Message Counter

Each data packet contains an incrementing message counter in the range of 0 to 15. Between a query from the VARAN Manager and the corresponding answer from a VARAN client, the message counters remain the same. When a message is repeated by the VARAN Manager, the value of the query counter also remains unchanged. Therefore it is possible to test whether a data packet was lost and identify it as well.

6. Description

In this column, detailed information on the data packet is given. Additional information on the details can be found in the "Detail Window" chapter.

7. Status of the data packet

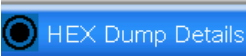
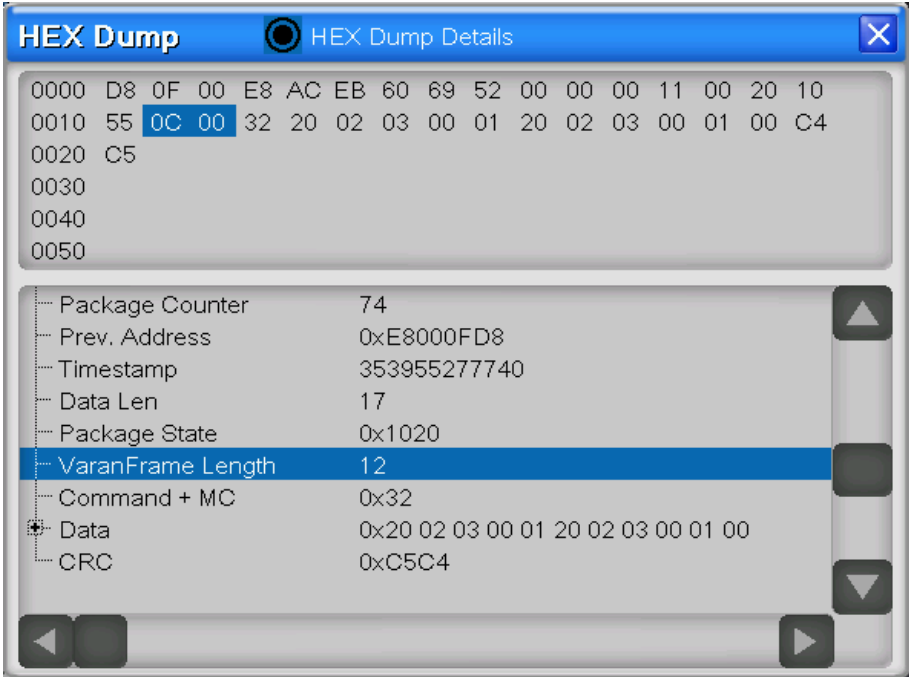
Data packet status options:
(Additional details can be found in the chapter "Settings in Detail")

Damaged	Damaged data packet
Early Receive End	Receive sent early
Wrong Msg Counter	Wrong message counter
Too many Bytes	Too many bytes
CRC Error	Checksum error
Retry	Repeat message
Res.Len	Length received
Ans.Cmd	Answer command
Len NULL	Data packet length is 0
Nested Frame	VARAN frame nested in an IP frame
Unk. Cmd	Unknown command
Global Cmd	Global command
VARAN Frame	VARAN data packet
IP or dam. Frame	IP data packet or damaged frame

Detailed information on the status of a Data packet can be found in the VARAN specifications.

Detail Window

With a double click on a line in the event list, detailed information on a data packet is shown. A marked line in the detail area is highlighted in the HEX Dump area.



With this setting, additional header data of a data packet is displayed or hidden.

Graphic Representation of the Communication



The graphical representation of the communication packages is arranged through the event list.

- SYNC = Display of the global SYNC signals to all bus participants
- REQU = Query from the VARAN Manager to a client
- RESP = Answer from a client to the VARAN Manager query



If a line in the event list is marked, this entry is shown in the graphic representation instead of in the left margin of the display area. The graphic display can be advanced through the event list as well as over the scrollbars.

Scaling the Graphic Display

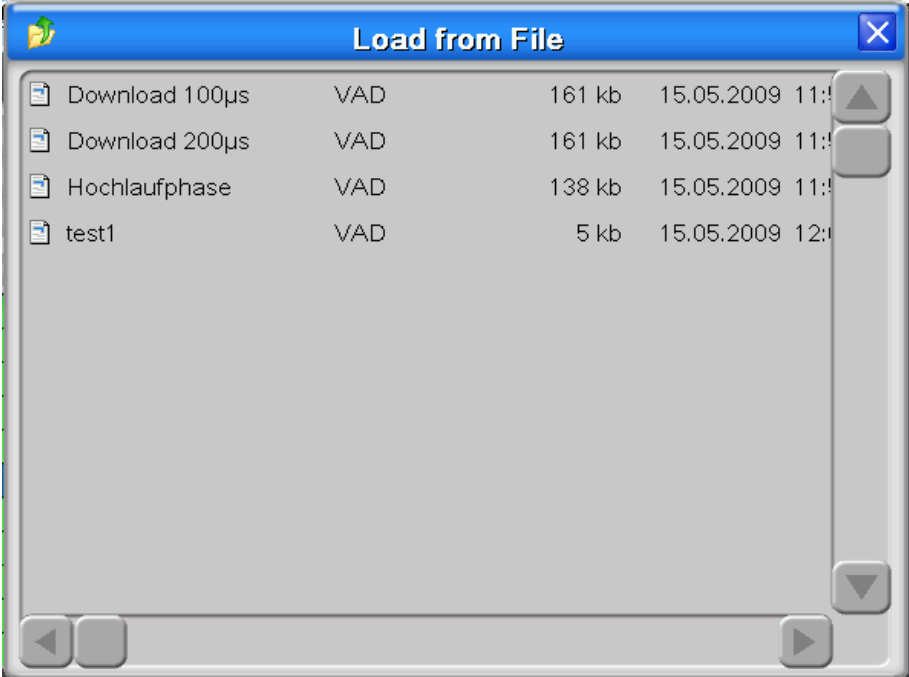
For detailed observation, the graphic display can be scaled horizontally. The entire graphic display is horizontally scaled to this time setting. This value can be set between 0.1 ms (100 µs) and 10 ms.



Loading the Analysis Data


With the  button, previously stored analysis data for the display from the local Compact Flash or an external storage device can be loaded. Through the loading process, the actual recording data in RAM is lost. The actual analysis data in the recording memory is not affected by the load process and can be restored with the  button.

Only data with the file extension .VAD can be loaded!




Press this button to switch back to the directory.

Saving Analysis Data

The actual recordings in RAM can be stored on the local hard drive or an external storage device. To save the analysis data, press the  in the menu bar of the main screen. A window is opened, which contains the file name entry. The file extension .VAD is automatically generated for the file.

Prolonged Recordings



With the  setting, prolonged recordings can be activated or deactivated. If this setting is not selected, a recording is run with the actual trigger settings only.

If prolonged recording is activated, recording restarts after the stop condition has been met. The individual recordings are stored in their own files, which can later be exported for further analysis. A prolonged recording remains active until it is deactivated by the user.

With a prolonged recording, the files are stored in the C:\LOG directory.

The trigger settings must be stored in the C:\LOG directory with the label "TS".

File Format for Prolonged Recordings





The time point of the recording is contained in the file name.


The file format is as follows: „VA_YYMMTT-hhmmss.VAD“


VA	=	VARAN ANALYZER
YY	=	Year
MM	=	Month
TT	=	Day
hh	=	Hour
mm	=	Minute
ss	=	Second

Note:
All stored files can also be loaded under Windows with the VARAN Analyzer tool.

Process for Prolonged Recording

1. Open the trigger settings with 
2. Specify the settings for START, STOP and CAPTURE
3. **Important!** Store these settings in the C:\LOG directory under the file name „TS“ using the  button.
This file containing the trigger settings can also be loaded with the VARAN Analyzer Tool.
4. Activate prolonged recording with the  button
5. Start recording with the  button

To stop prolonged recording, first deactivate the setting for prolonged recording using the  button

Afterwards, the stop button  can be used to end prolonged recording.


If the stop button is pressed during prolonged recording, a new recording starts immediately. Prolonged recording must first be deactivated before the actual recording can be stopped.

Automatic Copying

The files from a prolonged recording can also be copied to a USB stick automatically. If a USB stick is connected, all files in the C:\LOG directory are copied.

Analysis data is automatically copied to an external storage device only when the main screen is open!



By activating the  button, the recording files (.VAD) are deleted from C:\ LOG directory after being copied to the external storage device. The file with the trigger settings "C:\ LOG \ TS.VAS" is not included in the automatic deletion.

Conversion to IP in the VARAN Nested Mode

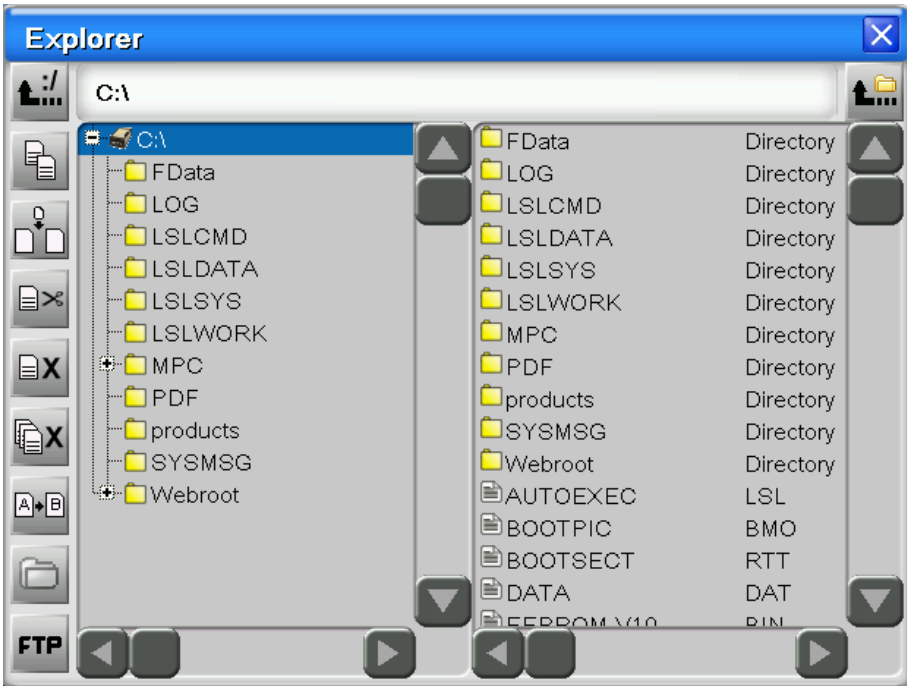
In the event that the Analyzer is operated in VARAN nested mode, Port X2 can be switched to a TCP/IP port during runtime with the **IP** button.

The VARAN Analyzer can also be operated in nested mode. In this mode, the VARAN data packets are nested within a TCP/IP packet. This is the case when using a standard network card for the VARAN Manager. To switch port X2 to a standard TCP/IP port during runtime, this button must be activated.

Further details on the nested mode can be found in the VARAN specifications.

File Explorer

With the file explorer, file operations can be performed locally or with an external storage device. File transfers with an FTP server are also supported.



Control Elements



Switch to the root directory



Go one directory level back



Copy file



Insert file



Cut file or directory



Delete file or empty directory



Delete several files



Rename file or directory



Create directory



File operations over an FTP server

The VARAN Analyzer Tool under Windows

With the VARAN Analyzer tool under windows, The ETVA 0501 VARAN Analyzer can be used as external network analysis device. All settings and conditions described here can also be operated in Windows.

The connection to a PC is made with standard Ethernet network connections to the lower network socket X2.

A detailed description for this software can be found in the "VARAN Service Tool - PLC VARAN Analyzer" documentation.