

PC software

S320

Short instructions

Translation of the German original

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Laminar*Master*Flow (LMF)

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A Description

A.1 Overview

The PC software S320 included in the scope of delivery, provides a complete development environment for the software that runs on the S320 controller that, among others, can be used in the LMF systems. Functionality ranges from the easy terminal program, real-time measurement value recording up to a programming environment, including compiler.

It would exceed the framework of the short instructions to detail programming of the S320 controller in SPELL (a dialect similar to Pascal) and compiling the programs here. Complete documentation can be found in the online help.

If a complete measurement system from TetraTec Instruments GmbH is required, the finished compiled software **LMF** runs on the S320 controller. The LMF software can be parametrized to the most possible extent. For complete documentation, refer to the reference manual, Chapter 8 and 9.

For the end user, the following functions on the PC software S320 are of interest:

- Establish connections
- Changing the IP-address of the LMF
- Query or change parameters
- Simultaneously loading multiple parameters
- Reading out or loading configuration files
- Real-time presentation of measurement values

A.2 Types of connection

For communication, the PC software S320 and controller S320 included in the LMF are two logical interfaces of significance:

- **LINK**
 - Real-time presentation and recording of measurement values (Graph function)
 - Reception of debugging or user messages (tab "UserMsg")
 - Protocol print function (possible, however, standard via COMM)
 - ...(other functions that are not a subject of the short instructions)...
- **COMM**
 - Query or change parameters
 - Load parameter sets as ASCII file
 - Protocol print function

Both logic interfaces are available addressed via RS232 interface or LAN:

	RS232	LAN	
LINK	LINK	IP address, refer to „Device Specific Documents“ or „Collection of	Port 54490
COMM	Ser0	serial numbers linearizations and certificates“ respectively	Port 54491

Each logical interface can be individually set in the Launchpad, whether the PC software S320 should address the interface via RS232 or the network (LAN):



Symbol for LAN connection



Symbol for RS232 connection

As long as no connection is established, the type of connection can be switched backwards and forwards by clicking on the symbol.

Note

Generally, the logical interfaces function independently of how the data transmission is established, however, the LAN connection enables a significantly greater rate of transmission which, in particular for the Graph function, is of significance.

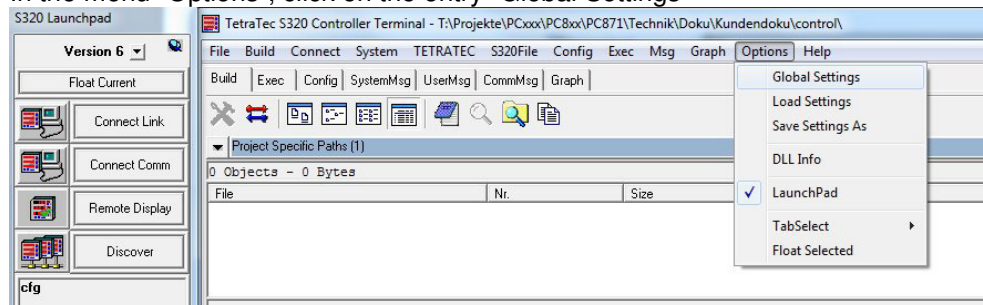
B Installation and once-off settings

For installation, you must be logged on as Administrator. It is not sufficient to be logged on as user and carry out Installer using the option "Carry out as Administrator". In this case, the complete program package is not installed!

- Insert the S320 CD.
- If the CD does not automatically open, carry out the tetratec-installer.exe.
- Start "S320 Installation".
The program package is installed fully automatic.

B.1 Basic settings

- In the menu "Options", click on the entry "Global Settings"



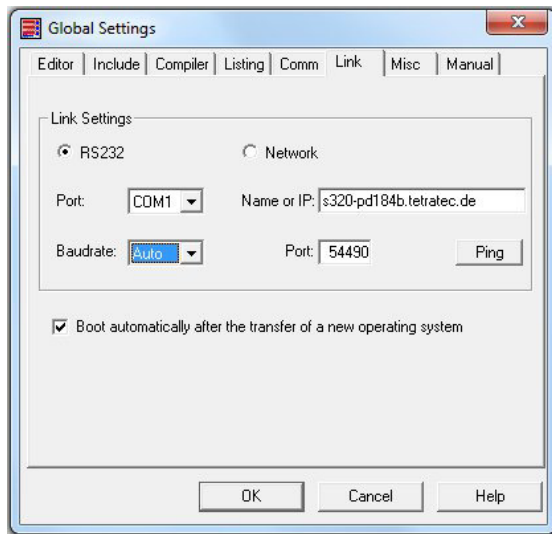
The dialogue "Global Settings" opens in the tab "Editor".



- If you wish, your Editor can be set up here. The settings for the free Editor "PSPad" is illustrated.

B.1.1 Link connection settings

- Change to the tab "LINK"



B.1.1.1 Serial Link connection settings

- Select option "RS232".
- For the LINK connection, select a free port on your PC.

Note

If a RS232 USB adapter is used, this can be identified or shifted to another free COM port in the Windows device manager after installation. The PC software S320 is able to address the ports COM1 to COM9, higher port numbers have to be adapted accordingly.

B.1.1.2 Settings for the Link connection via Network

If you can use the Discover function (see section D.2), the settings are made automatically.
Otherwise:

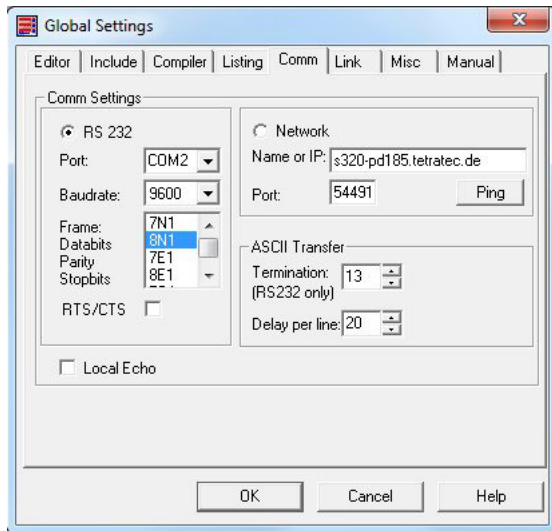
- Select option "Network".
- In the field "Name or IP" enter the **currently valid** IP address of the LMF.
- Change the setting in the "Port" only if you know what you are doing.
- Test the connection with the "Ping" button.

Note

To enter a device name instead of an IP address is only effective when the network includes a DNS server and the device name is assigned to an IP-address.

B.1.2 COMM connection settings

- Change to the tab "COMM"



B.1.2.1 Serial COMM connection settings

First steps as described in section B.1.1.1.

In addition:

- Make sure that the other settings beginning with field "Baudrate" in container "Comm Settings" agree with the values illustrated.


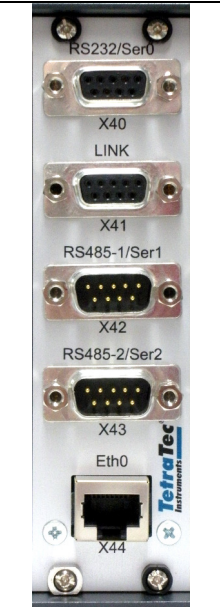

B.1.2.2 Settings for the COMM connection via Network

Exactly as described in section B.1.1.2.

B.1.2.3 Settings for ASCII transfer

- Make sure that the other settings in the container "ASCII-Transfer" agree with the values illustrated.

C Establish serial connection

		
<p>Interfaces on the OEM controller (slot card allocation, specific to project). The LINK adapter cable is included in the scope of delivery of the OEM controller.</p>	<p>Interfaces on the table device or rack insert</p>	<p>Interfaces on the housing</p>

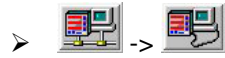
- If you want to connect via LAN, plug the network cable into the socket Eth0 or X44 and then go ahead to chapter D.
- In order to connect the serial LINK interface, connect your PC or laptop to the interface LINK, or X41.
- In order to connect the serial COMM interface, connect your PC or laptop to the interface RS232, or X40, or Ser0.

A 9-pole 1:1 cable, e.g. the cable DSK9/2, included in the scope of delivery, is required for each serial connection. For the Technical Data about the Link interface, refer to the Chapter Technical Data of the help file.

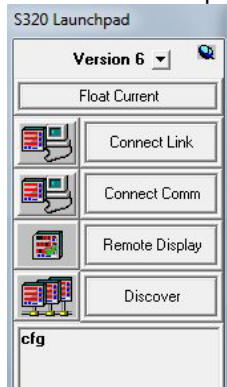
Notes

- If only one PC connection or only one cable is to be used for both connections COMM and LINK, both connections cannot be used simultaneously and the cable must be switched on the LMF for each change in connection.
- If you are unable to establish a serial connection the most common cause is the use of a third party D-Sub 9-cable that looks outwardly the same as the one included in delivery, but not all 9 poles 1: 1 connected. Also common is an incorrect configuration of the RS232 ports on the PC (see Section B.1.1.1 and B.1.2.1) or a mix-up of the terminals X40 and X41.

C.1 Establish serial link connection

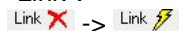


In the case of S320 Launchpad, in addition to the button "Connect Link" the symbol for a LAN connection is displayed, click on this in order to display the symbol for an RS232 connection:



- In order to establish the connection, click on the button "Connect Link".
The inscription of the button changes to "Cut Link" (whereby, it is also clear how to disconnect the connection)

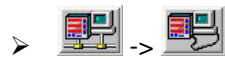
In the status row, at the foot of the main application, a yellow thunderbolt appears in the field "Link":



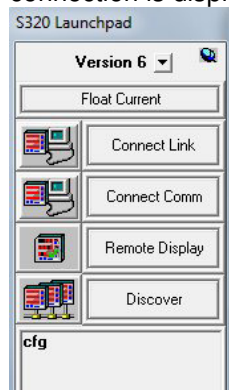
Note

The Link connection can be tested by, e.g. **Connect -> Link Check** or Ctrl+Shift+L or also using **System -> Get System Info**.

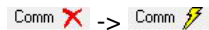
C.2 Establish serial COMM connection



In the case of S320 Launchpad, in addition to the button "Connect Comm" the symbol for a LAN connection is displayed, click on this in order to display the symbol for an RS232 connection:



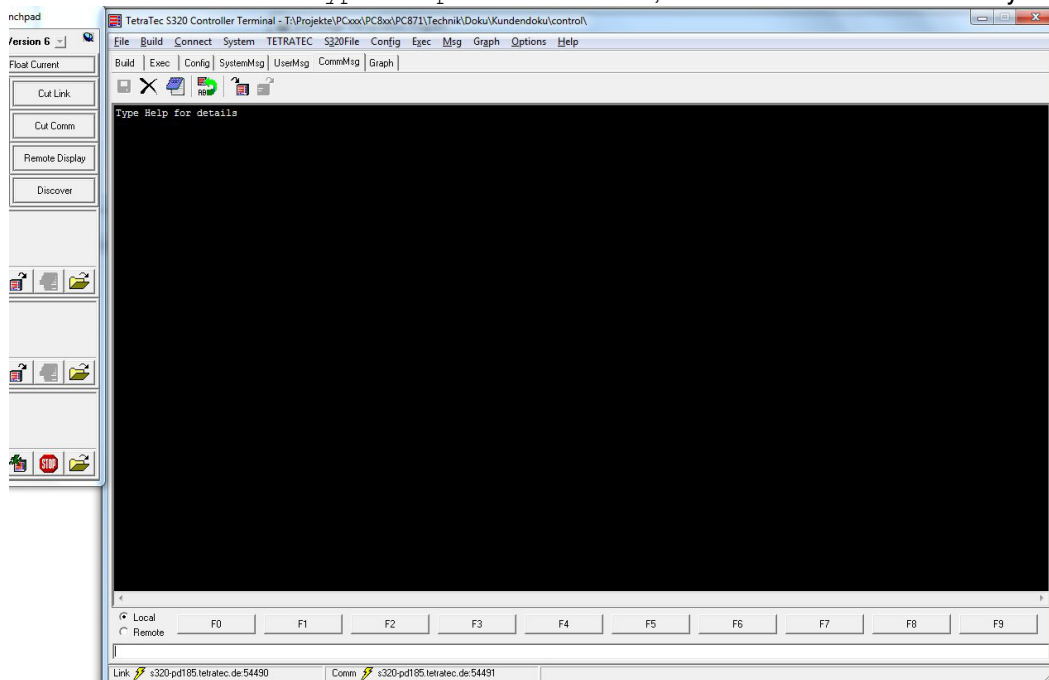
- In order to establish the connection, click on the button "Connect Comm".
The inscription of the button changes to "Cut Comm".
In the status row, at the foot of the main application, a yellow thunderbolt appears in the field "Comm":



Note

In the case of Comm connection, the yellow flash does not reliably indicate whether the establishment of the connection was successful, because testing can only be carried out when data is flowing.

- In order to test the Comm connection, in the main application, change to the tab "CommMsg" and then press the Enter key on your keyboard.
If the LMF answers with "Type Help for details", the connection is successfully established:



D Establish connections per network

Alternatively, the connection can also be established via the network (LAN), which permits a significantly greater rate of data transmission. In particular, this is of great significance for the Graph function.

D.1 Preparation

For a **1:1 connection** between an older PC and the LMF, a cross-link cable or two patch cables and a switch are required. For a current PC, a patch cable is sufficient.

If the LMF can be connected to your **Intranet**, only a patch cable and one free LAN socket on your Intranet is required.

- Connect your network cable to the interface X44 or Eth0 (photos, refer to Section C)

If a **1:1 connection** should be established, your PC must have a suitable fixed IP address, because it has no access to a server that allocates it an IP address.

The sub-network mask must be suitably adjusted.

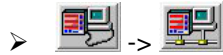
Example:

The IP address of your LMF is, for example, 192.168.67.151 (refer to „Device Specific Documents“ or „Collection of serial numbers linearizations and certificates“ respectively)

The IP address of your PC is, for example, 192.168.42.66 (refer to system settings for your PC)

Then the setting required for the sub-network mask is 255.255.0.0

D.2 Establish link connection



- In the case of S320 Launchpad, in addition to the button "Connect Link" the symbol for a RS232 connection is displayed, click on this in order to display the symbol for a LAN connection.
- In the S320 Launchpad, click on the button "Discover".
A list appears of all S320 controllers that can be found in the network.
- Double click on the S320 controller to which a connection should be established.
The Link connection is established.

D.3 Establish COMM connection

Note:

The easiest way is if a Link connection is already established. The PC software S320 has then already accepted the IP address of your S320 controller.



- In the case of S320 Launchpad, in addition to the button "Connect Comm" the symbol for a RS232 connection is displayed, click on this in order to display the symbol for a LAN connection.
- Click on the button "Connect Comm".
The Comm connection is established.

E Changing the IP-address of the LMF

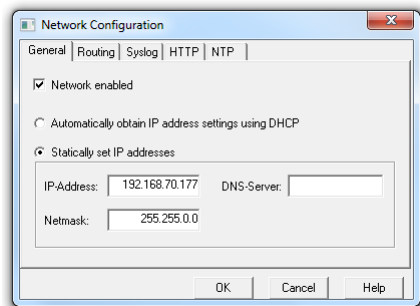
If necessary, the network settings of the LMF can be customized.


You require

- ✓ An established link connection, whether RS232 according to the instructions section C.1 or via a network according to the instructions section D.2.
- ✓ An IP address assigned by your network administrator that is not yet otherwise assigned.

Procedure

- Use the menu path "System -> Network Configuration" to open the following dialog:



- At "Network enabled" a hook must be set.
- In general, the "Statically set IP addresses" option is set.
- Enter the desired IP address.
- If required, adjust the net mask. See also explanations in section D.1.
- Close dialog with "OK".
- In order for the change to take effect, restart the device (button  in the Launch-Pad)

Notes

- It is recommended to equip the device with a label that documents the new IP address.
- You can use the option "Automatically obtain IP address setting using DHCP" alternatively. This is only effective when the network includes a DHCP server, and this always assigns the same IP address to the LMF. 1:1 connections are not possible with this setting, as with an 1:1 connection no DHCP server is available.
- Ensure that no two devices with identical IP address are in one network. Should a device in the network be inaccessible, this is next to a worn patch cable the most common cause.

F Query or change parameters

An established Comm connection is required.

- In the main application, change to the tab "CommMsg".
- In order to query a parameter, enter the parameter number in the input row (that is the white row at the lower edge, directly above the status row).

Example

Interrogation of the actual differential pressure:

Input: R0001 (conclude the input with the Enter key)

Answer: R0001=1.102345E+01

Meaning: The differential pressure is 11.02345 Pa = 0.1102345 mbar

Multiple parameters can be queried by using wildcards (?, *).

Every arbitrary parameter can be queried. The measurement values are available in the read parameters, here, also refer to the reference manual, Chapter 9.10.

- In order to provisionally allocate a new value to a parameter, enter the parameter number followed by an equal sign and the value required.

Example

Set the number of positions after the comma for the differential pressure in the program 0 to 3:

Input: P0013=3 (conclude input with Enter key)

Note

In this manner, numerous parameters can be provisionally allocated new values. However, these inputs are only effective with the command "activate", "temp" or "save":

- In order to allow changes to become immediately effective, without interrupting the actual processes, enter the command "activate" (without quotation marks, conclude input with the Enter key).

The changes are written in the working memory, however, not permanently saved, i.e. after restarting the LMF next time, the changes are lost.

- or -

- In order to allow changes to become effective and restart processes (e.g. a control), enter the command "temp" (without quotation marks, conclude input with the Enter key).

The changes are written in the working memory, however, not permanently saved, i.e. after restarting the LMF next time, the changes are lost. The processes are restarted.

- or -

- In order to allow changes to become permanently effective, enter the command "save" (without quotation marks, conclude input with the Enter key).

The changes are saved in the working memory and the memory safeguarded against mains failure. The processes are restarted.

Also refer to

- For a complete list of all parameters available, refer to Chapter 9 of the reference manual.
- Normally, the parameters of specific significance for your use are listed in the Chapter "Options" and "System configuration" of the operating instructions.
- For a complete overview of commands, refer to Chapter 5.5 of the reference manual.

Tip

Occasionally, via the logic interface LINK, answers and other messages are emitted to the tab "UserMsg" as response to inputs via the logic interface COMM. In this case, it is of benefit to move the tab "CommMsg" to another area of the screen as a free window:

- Right click on the area of the tab "CommMsg".
A context menu appears with two entries.
- Click on the entry "Floating Window".
- Now, suitably place the free dialogue "Comm Messages" and, as necessary, adapt the size.
- Call up the tab "UserMsg" in the main application. (In order to be able to receive messages, a LINK connection must also be established.)

Query parameters with third provider software

In general, access to every other arbitrary program is possible on the Comm connection, that can transmit and receive ASCII character strings. For the Comm connection via LAN, in addition to the correct IP address, the port number must also be taken into consideration.

There are third party providers of software that use another port number and, with regard to this, cannot be configured. In this exceptional case, the port number for the Comm interface for the controller S320 can be set; it is determined in parameter S0020. Do not forget to carry out the same change in the PC software S320 under **Options -> Global Settings -> Comm**, otherwise access to the Comm interface of the controller S320 via LAN is not possible.

G Simultaneously loading multiple parameters

If specific settings are required to be alternately loaded repeatedly, the following options are available:

- Loading ASCII files
- Allocating function buttons of the S320 software

The versions with the ASCII files are provided if significantly more than one lucid number of parameters are required to be simultaneously loaded, more than 10 versions are required, or the settings outside the S320 environment require to be managed or exchanged.

G.1 Loading ASCII files

An established Comm connection is required.

With your Editor, a text file is generated with the file extension ".dat" with the required contents.

- Click on menu path Msg -> COMM -> ASCII Send.
The dialogue "open" appears.
- Navigate to the file that is to be loaded.
- As soon as the file is open, this is loaded to the S320 connected.

Note

The loaded settings are also only effective with "activate", "temp" or "save". However, the command required can be integrated into the file to be loaded as the last row.

G.2 Allocating function buttons of the S320 software

There is a row of function buttons on the tab CommMsg located between the black output window and input row. By clicking on the right button, a dialogue window will open in which the name and sequence to be processed can be defined. **Caution:** In contrast to the ASCII file, each row must be preceded by an exclamation mark!

Each time when clicking on the function button with the left mouse button, the sequence is sent to the S320 controller. At the end of the sequence, it is recommended to add the command "activate". The settings can be saved on the controller or PC.

H Reading out or loading configuration files



Caution!

Option to cause difficult to find and grave errors, in particular when editing or overwriting the configuration files!

- Changes in this domain only under direct instruction, e.g. during telephone support! Never carry out changes arbitrarily!
- Under no circumstances transfer any files from one LMF to another if you are not fully conversant with this!
- Whilst transferring files or internally reorganizing data, the device must not be switched off!

This section explains how the S320-File-Explorer can be used to back up or reload saved configuration files (or delivered by support) on the device. Before starting, it is necessary to explain some of the background:

There are two classes of configuration files: On one hand, the initialization parameter files (*.init.dat) and, as an option, Script files (*.scr). Furthermore, there is the param.dat. Each time when a customer changes a parameter via the ASCII interface or Edit menu and saves with SAVE, all deviating customer settings from the delivered condition are saved in the param.dat. When delivered, the param.dat is empty.

Initialization parameter files are generated by copying templates and then overwriting them with settings specific to the project.

Before delivery, the initialization parameter files and, as necessary, the scripts in the file system of the device are stored in the directory ..\dat\.

When starting, the S320 controller initially loads the initialization parameter files into the working memory, subsequently, the settings are overwritten with the contents of the param.dat. Because we assume that the customer will not change the initialization parameter files, these present the delivered condition. In the event of an update or support, we query the contents of the param.dat and attribute relevant changes in the project files. If the customer subsequently receives new initialization parameter files and an empty param.dat, this is simultaneously a new delivered condition.

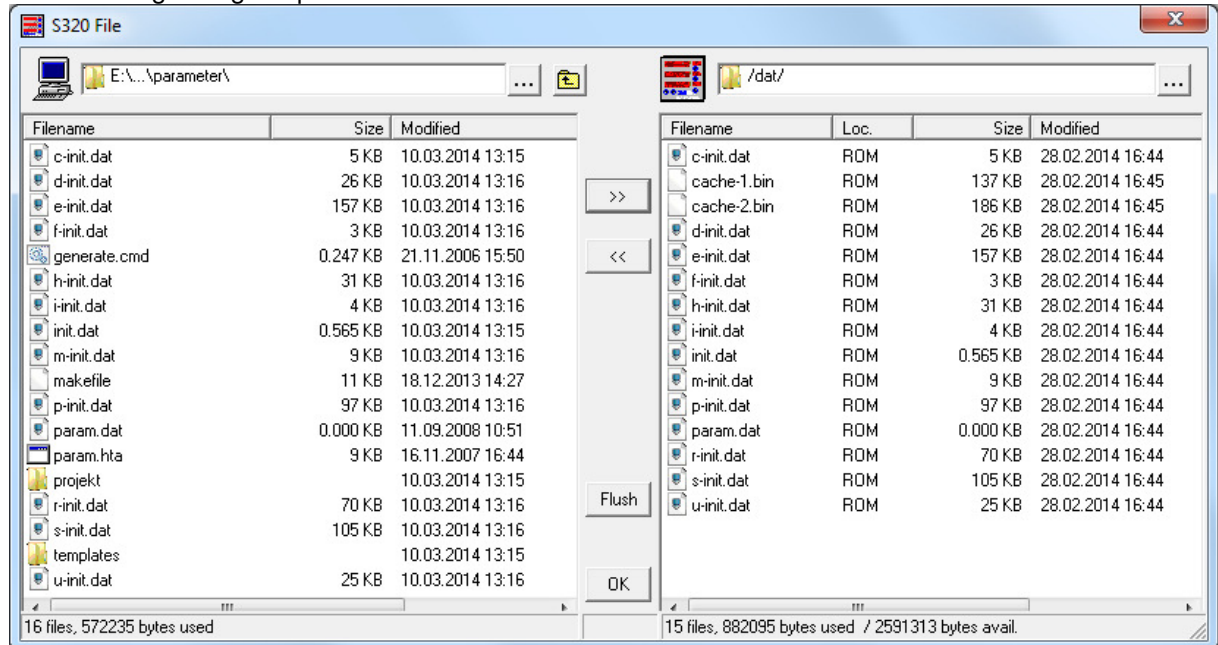
Problem can occur, e.g. if the customer has edited scripts or initialization parameter files without authority and we do not know about these changes. These changes are lost if there is an update!

Furthermore, problems can occur if files are transferred from one S320 to another. If the hardware is not compatible, curious error messages are quickly received. However, it is insidious that if the hardware is compatible but you have transferred incorrect linearization data. This results in measurement errors that possibly only become apparent later – e.g. if incorrectly checked parts have been already delivered six months ago and the first claims are received by the end customer...

H.1 Opening S320 File-Explorer

- ✓ An established LINK connection is required.
- Open the menu "S320File" and click on the entry "Explore".

The following dialogue opens:




On the left half, the last working directory used on your PC by the S320-File-Explorer is displayed.
On the right half, the /dat/ directory on the S320 controller is displayed.

H.2 Saving files

- ✓ The S320-File-Explorer is open.
- In the left half, navigate to a suitable location on your PC for storing.
- In the right half, select all files that must be backed up (the cache files must not be backed up, they will be regenerated as required).
- Using the button "<<", copy the files selected to the left half.

In the event of support, it is advised to back up all files, in particular the param.dat. Before sending per mail, change the file extension of the scripts from ".scr" to ".txt" (in order to prevent difficulties with firewalls and virus protection programs) and pack all files in a Zip archive.

H.3 Loading files

- ✓ The S320-File-Explorer is open.
- ✓ The configuration files are available **that are applicable for the target LMF**.
- As required, unzip the configuration files and rename any script files to the file extension .scr.
- In the left half of the S320-File-Explorer, navigate to the applicable configuration files.
- Mark the configuration files to transfer.
- Using the button ">>", copy the files selected to the left half.
- In order to close the dialogue and activate a flush, click on the button "OK".
- In order to accept the changes in the working memory, restart the device (button  in the Launch-Pad).

I Print protocol function

If a protocol print function is installed on your system, this is normally described in the operating instructions, at the end of the Chapter "Options".

The parameter S9300 indicates whether the protocol printing function is active and how it responds, in particular also to where the results are sent. For more detailed presentation, refer to the reference manual, Chapter 9.7.31.

Standard case:

If S9300=2, the results are emitted via the COMM interface and are then visible in the PC software S320, in the tab "CommMsg".

Notes

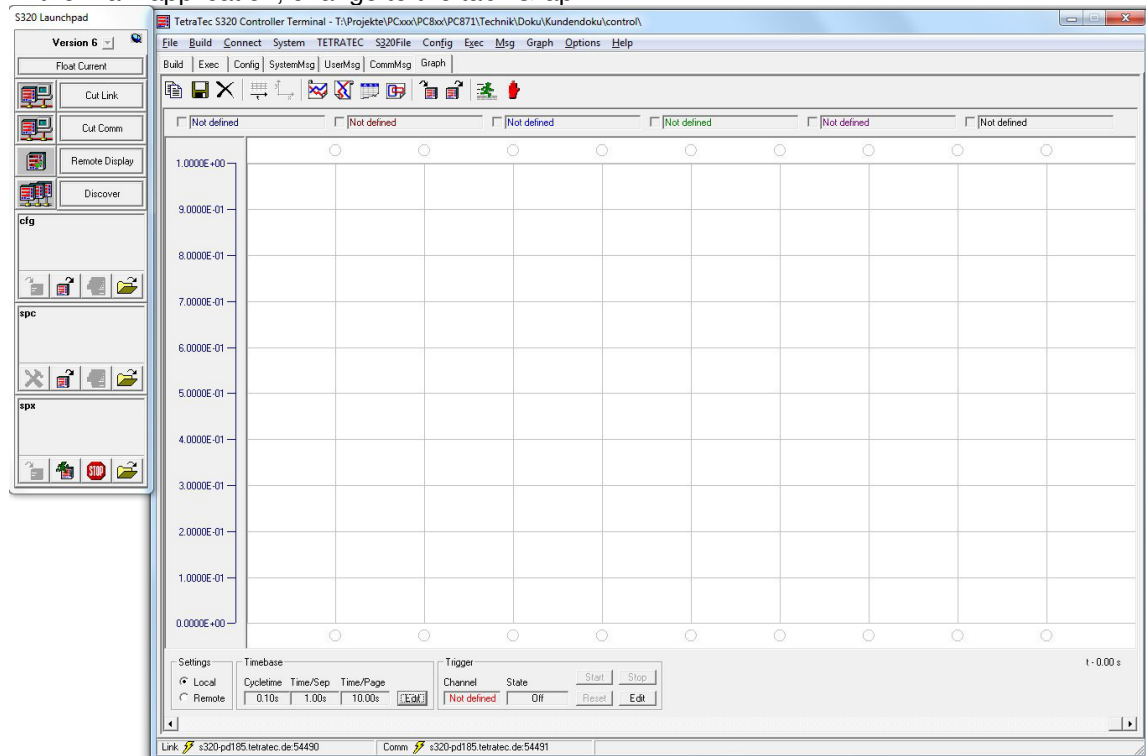
- It is admitted that setting up the parameter block S93xx is not easy. We would gladly provide you with an ASCII file with the required settings, as described in Section G, that can be easily loaded.
- If third party provider software with ASCII interface should receive the data, S9300 must be set to 2 (refer to the reference manual).
- If multiple Comm connections exist (max. 3 simultaneously), the protocol strings are sent via all Comm connections (in contrast to answers that only return via the respective connection).
- Individual rows from the display area of the tabs "UsrMsg" or „CommMsg“ can be marked and, with CTRL+V, accept in an editor (also if no mark is visibly indicated).
- The contents of the display area can also be completely accepted in the editor with the appropriate buttons, or saved directly in a text file.

J Graph function

Using the Graph function, the measurement values and their variables derived from them, can be presented graphically in real-time.

For this, an established Link connection is required.

➤ In the main application, change to the tab "Graph":

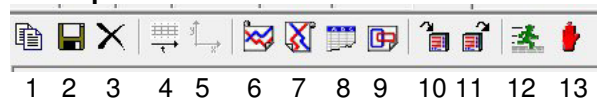


As standard, the mode y-t graph is active.

In order to be able to work with the Graph function, different settings must be made:

- Setting up the time axis, refer to Section J.1.
- Setting up the channels for recording the measurement value, refer to Section J.2.

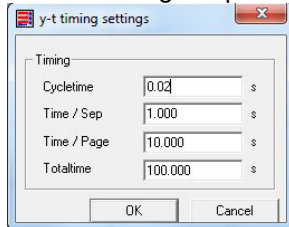
Description of the Toolbar



1. Save the actual section of the measurement curves on the clipboard as Bitmap
2. Save the measurement values recorded as CSV-List with the extension .dat
3. Delete the recorded data, window empty.
4. Call up the dialogue to set up the time axis for y-t presentations
5. Call up the dialogue to set up the axes for x-y presentations
6. Selection of y-t presentation, virtual plotter paper runs from right to left
7. Selection of y-t presentation, virtual plotter paper runs from bottom to top
8. Selection of tabular presentation
9. Selection x-y presentation
10. Save the complete graph settings on the controller S320
11. Read out the complete graph settings from the controller S320
12. Start the graphic recording
13. Stop the graphic recording

J.1 Aligning time axis

- At the lower edge, in the container "Timebase", click on the button "Edit".
A small dialogue opens:



Explanation of the input fields

Cycle time	It is mandatory that the cycle time for data query must be set the same as the cycle time for the controller S320. This is defined in parameter S0301 and is normally set to 20ms (=0.02s). For a cycle time deviating from this, the time axis is incorrectly scaled, because the Graph function passively receives data transmitted from the controller S320 and does not include a time stamp.
Time / Sep	Time per grid line.
Time / Page	Window size in the time dimension. The greater the value, the slower the virtual plotter paper moves across the screen.
Totaltime	Defines the variable of the ring buffer into which the data is written. Data that is older than the value specified in "Totaltime" is overwritten by new data. The setting "Totaltime" should be the minimum size as the setting "Time / Page". Normally, a value is selected that is many times greater. Maximum of 6000 seconds (= 100 minutes)

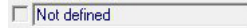
- Carry out the settings required and close dialogue with OK.

Note

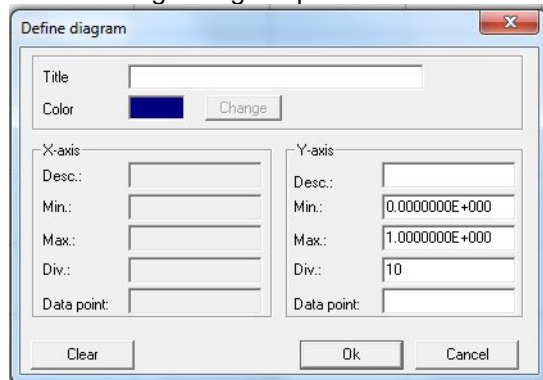
The parameter S0301 should not be changed without consulting TetraTec Instruments GmbH! It must agree with the analogue input tab on the hardware cycling and must not be less than the process time for a complete cycle of the LMF software.

J.2 Channels for setting up the measurement recording

There is the option to set, record or mask up to six channels. There is a control box and description field for each channel. Channels not yet set are identified with the designation "Not defined".



- In order to set a channel, click on the description field.
The following dialogue opens:

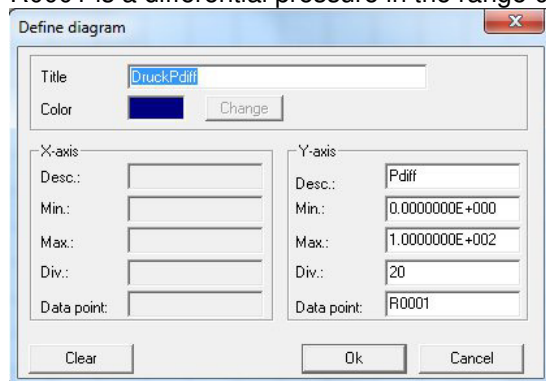


The container "X-axis" plays no role for the y-t presentations. Explanation of the other settings in detail:

Title	Text to indicate description field and in the context menu to select the Y-Scale to present
Colour	Not only the measurement curve is presented in this colour, but also the text in the description field and Y-Scale, in the event that this channel is selected for the Y-Scale.
Desc	Text for inscribing the Y-Axis if this channel is selected for the Y-Scale, - should be kept as short as possible.
Min.	Smallest value to be presented, in SI units
Max.	Largest value to be presented, in SI units
Div.	Scale division and distance of the grid lines, if this channel is selected for the Y-Scale.
Data point	Parameter whose value should be recorded and presented. Here, also refer to Chapter 9.10 in the reference manual.



Example:

R0001 is a differential pressure in the range 0 to 1mbar (0 to 100 Pa), presented in blue:



- Carry out the settings required and close dialogue with OK.

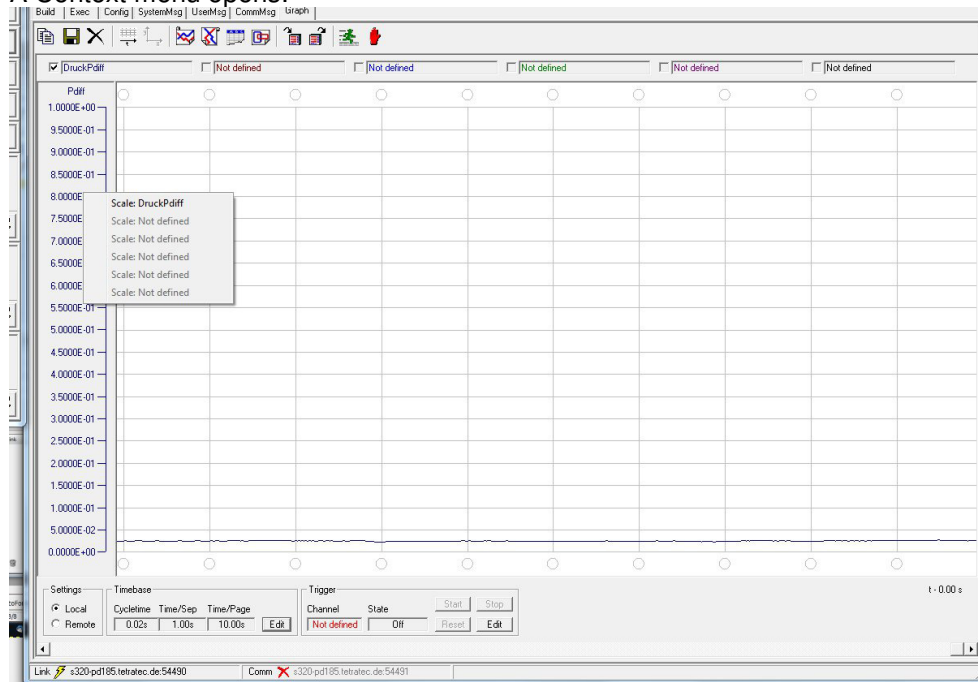
J.3 Starting, stopping recording, selecting scale

- ✓ All channels recorded are set up.
- Activate recorded channels using the corresponding control boxes.
- If the recording has not already automatically started, start using the icon .
- In order to stop the recording, click on the icon .

If multiple channels are recorded, or have been recorded, the Y-Scale can be selected:

- With the right mouse button, click on the Y-Scale.

A Context menu opens:



- Click on the channel designation of which the Y-scale should be presented.

Notes

- After the recording, you can save the measurement series as a semicolon-separated list.
- The recording time is limited by the setting "Total Time", see also section J.1.