MOVIDYN®
AC Servo Controller

User Manual

PC-Program MC_SCOPE V2.x

Edition 06/96

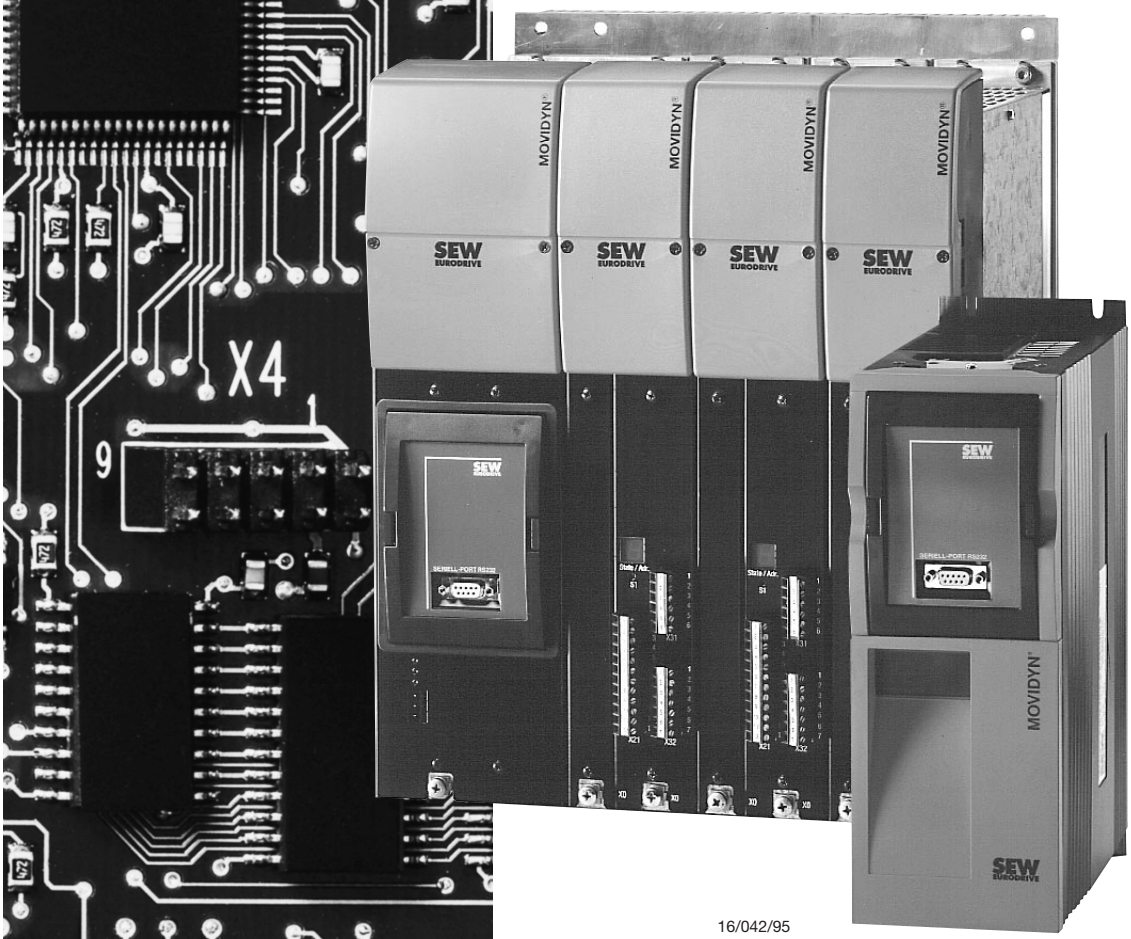

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Table of Contents

1. Introduction

Today stringent demands are made of servo drives as especially in this field of drive technology the requirement is for maximum precision and the best possible dynamic performance. To optimise running characteristics and operational performance of dynamic drives a frequently employed method is to analyse the response of the different controller parameters after the speed setpoint step. Therefore, the servo controller needs to be fitted with analog outputs where signals such as the speed signal can be output as analog signals. This method of optimization often requires the use of storage oscilloscopes and other measuring instruments.

With the introduction of the new MOVIDYN® Servo Controller series the user no longer needs storage oscilloscopes and other measuring instruments to commission dynamic servo drives. To commission the new MOVIDYN® Servo Controllers all you need is a laptop (PC), which at the same time allows you to parameterise, measure, log in, document and control the servo system.

The MD_SHELL user interface, an easy-to-use menu-driven program with a comprehensive on-line Help feature, has been tailor-written to parameterise the MOVIDYN® and is supplied together with the unit.

The MD_SCOPE user software allows you to carry out a machine test for example with a setpoint step. The response functions are recorded in the servo controller in real time. The information obtained can then be sent to the PC via the unit's serial interface and displayed there in waveform. This provides you with up to five traces displayed in different colours on your screen. Similar to an oscilloscope, both the horizontal and the vertical axes can be expanded and compressed with the various functions offered by the program.

Simple mouse or keybord operation along the lines of the SAA standard, supported by graphic controls and an on-line Help feature make MD_SCOPE a simple-to-learn, easy- to-use tool.

2. Installation

2.1 Hardware requirements

Administration, processing and waveform representation of the read-in process data require a powerful PC. For efficient working, we recommend, as a minimum requirement, a PC/AT with an 80386 processor. The program will also support an additional numeric coprocessor (if installed). Failing this, calculation of the waveform data for trace display on your screen will take significantly longer.

- PC/AT with 80386/80486 CPU (mathematical co-processor recommended)
  ideal system configuration: 80486 DX33, 256 KB Cache memory
- minimum 640 KB main memory (min. 560 KB free user RAM)
- 3.5" diskette drive (1.44 MB)
- approx. 2 MB free memory capacity on the hard disk
- VGA compatible video adapter
- DOS version ≥ 3.3, recommended: ≥ 5.0
- minimum one RS-232 serial interface to communicate with the MOVIDYN®
- recommended: serial IBM compatible mouse.

To connect MOVIDYN® and PC, a standard serial interface cable with a maximum length of 6 m is required (9-pin sub-D-plug to 9-pin sub-D-socket).

Pin assignment of the interface cable, PC side

9-pin cable assignment Cable side:	**RXD** Receive data	**TXD** Transmit data	**DTR** Data terminal ready (transmit/receive changeover)	**Ground**
9-pin connector (MOVIDYN® side)	PIN 2	PIN 3	PIN 4	PIN 5
9-pin socket (PC-COM1 side)	PIN 2	PIN 3	PIN 4	PIN 5

When using a 9- to 25-pin adapter:

9/25-pin cable assignment Cable side:	**RXD** Receive data	**TXD** Transmit data	**DTR** Data terminal ready (transmit/receive changeover)	**Ground**
9-pin connector (MOVIDYN® side)	PIN 2	PIN 3	PIN 4	PIN 5
25-pin socket (PC-COM1 side)	PIN 3	PIN 2	PIN 20	PIN 7

Caution:
Before you connect the two units make sure they are switched off.

2.2 Installing the programs

On the MD_SCOPE diskette you will find, among others, an installation program (INSTALL.BAT), which will copy all the files to the hard-disk directory specified by you. After you have inserted the diskette start the INSTALL.BAT program by entering:

a:\install C:\MD_SCOPE

Unless an MD_SCOPE directory already exists on your hard disk the installation program will now create it for you and copy all the files from the diskette to this directory. After successful completion of the installation process your directory should include the following files:

MD_SCOPE.EXE	MD_SCOPE process data visualization
MDSCOPDE.UIR	MD_SCOPE resource file (German)
MDSCOPEF.UIR	MD_SCOPE resource file (French)
MDSCOPGB.UIR	MD_SCOPE resource file (English)

SC_ALL_D.TXT	MD_SCOPE text file (German)
SC_ALL_F.TXT	MD_SCOPE text file (French)
SC_ALL_GB.TXT	MD_SCOPE text file (English)
ADAPTER .PRO	Current graphics driver file
HARDCOPY.PRO	Current printer driver file
ADAPTER .EXE	Utility to select/modify video adapter
HCSELECT.EXE	Utility to select/configure printer driver
PRINTER .DAT	File with complete printer driver list
SAMPLE??.SCP	Sample file with MD_SCOPE measured data
SAMPLE??.PAR	Sample file with MOVIDYN® parameter set

2.3 Starting MD_SCOPE

Change to the directory where your MD_SCOPE files are located. To start the program type MD_SCOPE and confirm by pressing RETURN.

Enter: MD_SCOPE

No additional parameters will be evaluated. As MD_SCOPE will take up the majority of your main memory (min. 500 KB) you may run into problems when you have loaded memory-resident programs. To free as much memory space as possible, avoid starting MD_SCOPE from other programs (i.e. PCSHELL, NC, DOSSHELL, Windows DOS Box).

2.4 Communications requirements

All MD_SCOPE windows with a red top line use the communication link with the MOVIDYN® Servo Controller. If your PC and MOVIDYN® are not connected or your communication link is faulty, the corresponding controls in these windows are not activated, they are dimmed. If this is the case the displayed values do not reflect the actual ones, they are substitute values, which were not received from the servo controller. If you have a faulty connection or none at all, please check the following:

2.4.1 Interface cable

The RS-232 interface cable has a 9-pin sub-D-socket to connect the PC and a 9-pin sub-D-plug to connect the MOVIDYN® Servo Controller. The cable has a minimum of 4 cores connecting pins 2, 3, 4 and 5 of plug and socket. The cable length should not exceed 6 m.

2.4.2 PC interface

Make sure that the cable is connected to the correct COM port of your PC.

2.4.3 Interface selection

Check whether the *"PC interface"* and *"MOVIDYN® interface*" settings in menu item "Options/Select interface" actually correspond to the connected hardware configuration.

2.4.4 Communication address

If you use the RS-232 or the RS-485 interface of the power supply module (MPx) for communication, remember to set the axis module addresses. Make sure that the address set in menu item "Options/Select interface" corresponds to the actual axis module address. To verify the axis module address briefly press the S1 pushbutton on the axis module. On the 7-segment display an "A" will start blinking followed by - ten's - unit's places (e.g.

"A"-"1"-"9" = axis module 19). In a network setup an address may not be assigned more than once otherwise a collision of data on the transmission line would be invoked, resulting in a faulted connection.

If you use the RS-232 interface (PC connection) of the AIO11 option pcb, you will not need to set the axis module address. The unit can be accessed under any address.

If you use any of the other RS-485 and RS-232 interfaces, however, i.e. those either integrated in the basic unit or available on the FIS31 option pcb, you will have to set the communications address.

2.4.5 RS-485 connection

When using the RS-485 interface of the power supply module (MP 50..., MPB 51..., MPR 51...) or of the compact servo controller (MKS 51...) check whether the ends of the two RS-485 lines are connected correctly.

2.4.6 RS-232 connection

On the MP 50... and MPB 51... power supply modules an on-board RS-232 port is standard. With the MPR 51... power supply module and the MKS 51... compact servo controller you will have to use the FIS31 option pcb.

2.4.7 Windows DOS Box

The program should not be started from the Windows DOS Box as this may cause interaction problems with the serial interface and jeopardize stable program operation!

2.5 Additional utilities

MD_SCOPE works in the graphic mode with a resolution of 640x480 dots and 16 colours. This standard IBM VGA setting is supported by all VGA compatible video adapters, it is the default setting when MD_SCOPE is started up. The default printer setting is HP DESKJET.
If your PC configuration is different from the above, use the ADAPTER.EXE utility (to select/modify the video adapter) and the HCSELECT.EXE utility (to select/configure the printer driver) in order to modify the settings to suit your specific platform. The utility programs (dialogues are in English) are part of the LabWindows software package by the National Instruments Corp.

2.5.1 ADAPTER.EXE

The ADAPTER.EXE utility allows you to adapt MD_SCOPE to the video adapter installed in your PC. When selecting a different video adapter please ensure that the resolution will remain the same (640x480 dots). A different resolution may result in fault messages and failure to start MD_SCOPE.
When you start the ADAPTER.EXE. utility the default configuration will appear on your screen:

Make:	IBM
Type:	VGA
Resolution:	640x480
Colors:	16 Monitor
Type:	Color

This standard VGA mode is supported by almost every VGA compatible video adapter. You may now select one of three program functions using keys 'y', 'n' or 'q'.

Key:	Function performed:
'y'	YES: Accepts selected configuration and exits program.
'n'	NEW: Selects different configuration.
'q'	QUIT: Exits program without accepting new configuration.

Video adapters marked with an asterisk do not work with MD_SCOPE! The configuration selected with the ADAPTER.EXE utility is saved to the ADAPTER.PRO file. This file is needed to operate MD_SCOPE.

Recommendation:
In particular on LCD screens (e.g. laptops) a 16-colour display may cause flickering. For these applications a 2-colour display is often prefered. To adapt the display select the following configuration:

Make: IBM
Type: MCGA
Resolution: 640x480
Colors: 2
Monitor Type: Monochrome

2.5.2 HCSELECT.EXE

The HCSELECT.EXE utility lets you select a printer driver for use with menu item *"Print"* and set a scaling. The settings are stored in the corresponding HARDCOPY.PRO file. It is not possible to set these variables in MD_SCOPE, you need to call up the HCSELECT.EXE utility to select a printer driver. Start HCSELECT.EXE and activate the *"Graphics printer configuration"* function, where you can enter your settings. All printer driver settings made with this utility only affect the graphics printout (hardcopy) of the MD_SCOPE screen. The following configuration is preselected:

Destination: LPT1
Graphics Printer: HP Deskjet
Orientation: Portrait
Image Width: Auto 0.00 inch
Image Length: Auto 0.00 inch
Eject Page: Yes

As printed page 1 is generally routed to LPT1 for printout the destination port should remain LPT1. The printer type can be selected from a list of 170 printer drivers. Printed page orientations are portrait and landscape. Image width and length are specified in inch. The entry 0.00 has a special function, it activates the 1:1 mode, i.e. the best possible print image of the selected printer. As all printouts are screen hardcopies, the 0.00 setting will provide the best possible print quality, however, the printout will only be in A5 format. Below we have listed a sample printer parameter setting for a hardcopy printout in A4 format.

Orientation: Landscape
Image Width: 8.00
Image Length: 10.00

Caution:
Graphics printout with a GPIB or RS-232 plotter and output to an HPGL plot file is not supported by MD_SCOPE and may cause the program to crash.

3. The Main Program Window

After starting MD_SCOPE the main program window appears on your screen (Figure 1). At the top of the screen you see the menu bar, which is either operated with the mouse or from the keyboard in accordance with the SAA standard. Immediately underneath the menu bar is the status and information line containing information about the program version and the program status. The majority of the screen is taken up by the oscilloscope display (plot area), where the acquired measured data are displayed in waveform. The bottom part of the screen is taken by the control and display elements required for measured data analysis.

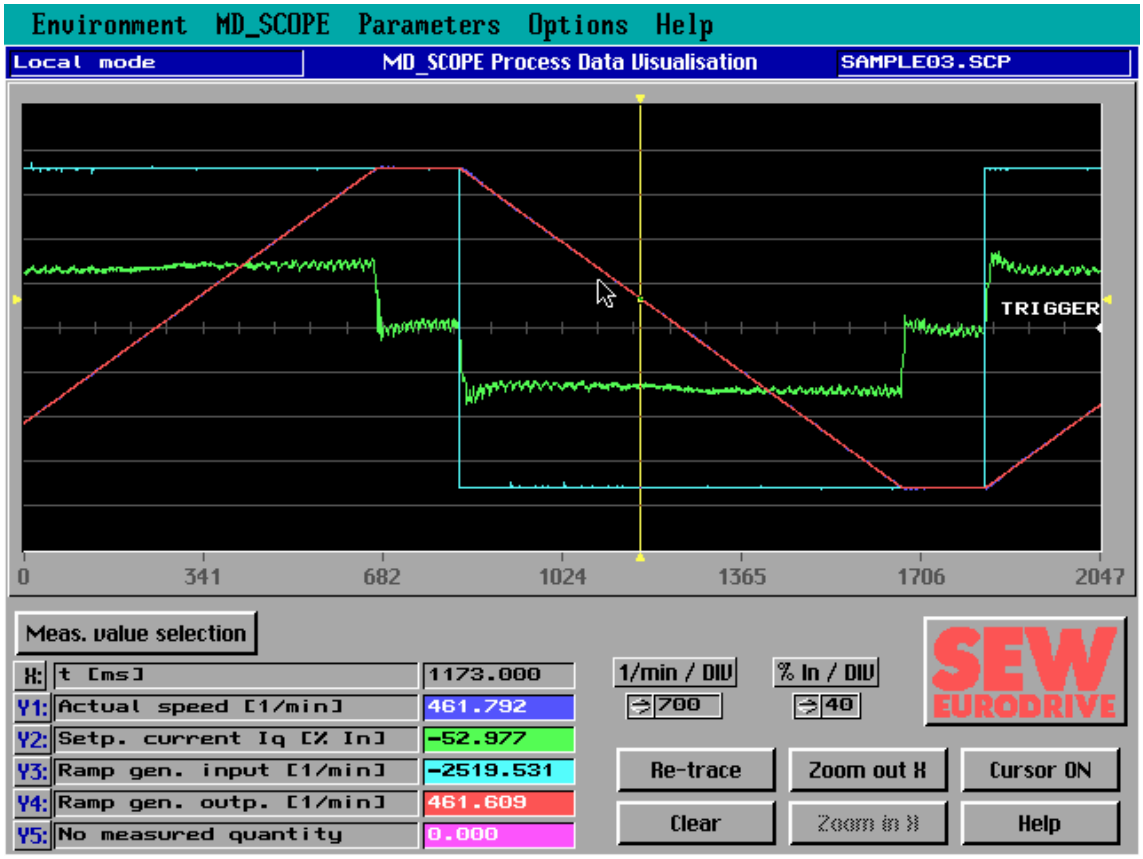

Figure 1: The main program window MD0117AE

3.1 Status and information line

The status and information line contains information about the program version and the current program status. The display panel on the left indicates the current program status. It indicates whether MD_SCOPE is in *local mode*, i.e. no ongoing communication with the MOVIDYN® Servo Controller, or which axis module has been selected. The display *MA- Adr.:X* tells the set axis module address with which the program communicates. This address can be changed in menu item *"Options/Select interface"*.

The program version number is displayed on the right-hand side of the status and information line immediately after program startup. If you have read in measured data from a file, the current file name will be displayed there.

3.2 Oscilloscope display (plot area)

The oscilloscope display (plot area) consumes the majority of the screen. In analogy to a real oscilloscope design the display is divided into 10 lines vertically (divisions). The horizontal division depends on amount of measured data displayed.

A maximum of 5 traces can be displayed at the same time. The X-axis readout is the number of data points on a trace. The Y-axis is assigned no particular readout as measured values with different measuring ranges/units can be traced on the five channels. As a general rule, the centre line represents the absolute zero line for all measured variables. Accordingly, the upper five divisions represent the positive value range, the lower five the negative one. The assignment of measured value trace and measured variable is evident from the trace colour.

All measured variables with the same unit of measurement are grouped in one scaling group. For each group a settable scaling factor has been included in the control panel area of the main window. This factor allows the traces to be expanded and compressed vertically. Setting the value range per division also provides a reference to the real measured value.

For an exact measured value analysis two zoom cursors (white) and one measured value cursor (yellow) are available. The zoom cursors serve to zoom out any trace section in the horizontal direction. The measured value cursor allows you, relative to the sampling instant, to read out individual measured values (please also refer to section "Plot area control").

In addition to the yellow "Measurement" cursor you can also activate a differential measurement (delta-x or delta-y) with the "Measurement" pushbutton, in order to perform more accurate measurements (see also section "Differential Measurements").

3.2.1 Control and display elements

At the bottom of the main window you will find a panel with various control and display elements required for measured value analysis. MD_SCOPE's control of these elements includes a plausibility check, i.e. the user can only operate elements the operation of which actually makes sense given the respective program status. If no measured data were acquired, for example, the "Re-trace" function just cannot be activated. Tables 1 and 2 give an explanation of the controls listed.

Control	Function performed	Type of Control
1/min/div	Scaling factor for speed measured values with the unit [1/min]	Ring control
% In/div	Scaling factor for current measured values with the unit [%In]	Ring control

Table 1: Scaling groups

Control	Function performed	Type of Control
Help (F1)	Activates main window on-line Help	Pushbutton controls
Re-trace (F2)	Waveform display of selected measured values (complete buffer)	
Clear (F3)	Deletes displayed traces	
Zoom out X (F4)	Zooms out trace section between white zoom cursors (horizontally)	
Zoom in X (F5)	Zooms in to previous trace section	
Cursor OFF/ON (F6)	witches zoom cursors ON/OFF	
S Measured value selection (F7)	Assigns new measured values to channels Y1-Y5	
IxT (F8)	Determines the rms utilization of the axis module	
Measure	Activates differential measurement (delta x, delta y)	ON/OFF pushbutton

Table 2: Main window controls

Six display elements (see table 3) read out the measured value assignment of channels X and Y1 to Y5. Presently, sampling instants are plotted on the X-axis. While the X-axis legend in the oscilloscope display area indicates the number of data points sampled (i.e. not the real sampling time), the measured value display for the X-axis reads out the real sampling time in the unit [ms] relative to the sampling instant furthest back.

To select the sampling instant move the yellow measured value cursor. The measured value display will read out the measured variables of channels Y1 to Y5 acquired at that point.

Display	Description	Measured Value Display
X:	Measured value of horizontal X-axis	Current X-value of the measured value cursor
Y1:	Measured value on channel Y1 (colour: blue)	Current measured value Y1
Y2:	Measured value on channel Y2 (colour: green)	Current measured value Y2
Y3:	Measured value on channel Y3 (colour: turquoise)	Current measured value Y3
Y4:	Measured value on channel Y4 (colour: red)	Current measured value Y4
Y5:	Measured value on channel Y5 (colour: violet)	Current measured value Y5

Table 3: Main window display elements

3.3 Measured value selection

To select the measured values to be displayed in waveform operate the *"Measured value selection"* control. The *"Trace selection"* window will appear (Figure 2). It contains five selection panels where all acquired measured variables are displayed. Starting with the X-axis you can now individually select or deactivate a different measured variable for all five channels *(No measured variable)*. In this version the X-axis is permanently set to *"t/ms"*, this setting cannot be altered.

When using the mouse remember that the mouse pointer, after double-clicking on the desired measured variable, should briefly change to a checkmark to indicate that your selection has been accepted.

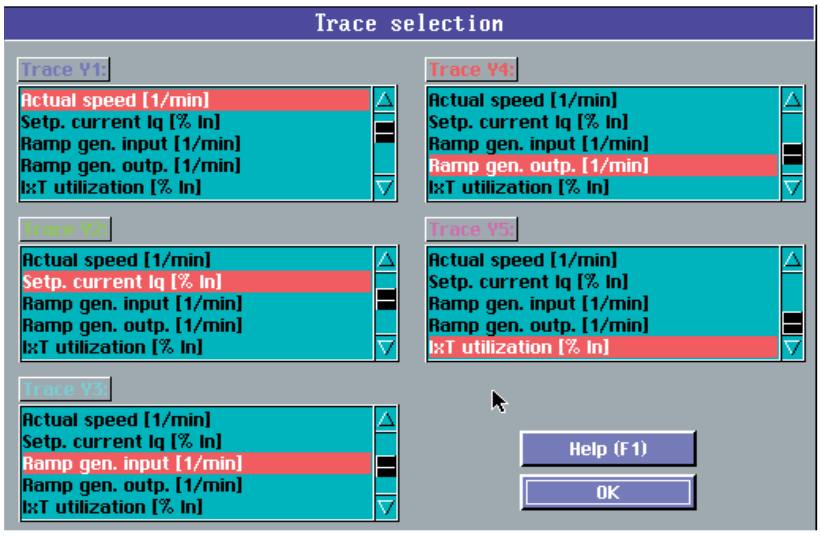

Figure 2: The *"Trace selection"* window MD0118AE

3.4 Differential measurement

The differential measurement function is activated with the "Measure" button in the main program window (Figure 4). The SEW logo is then replaced by a numerical display of the differential measurements (Figure 3) and the white zoom cursors are now displayed as cross hairs. The white cursors now serve as differential measurement cursors, with which the differential measurements delta x and delta y can be implemented.

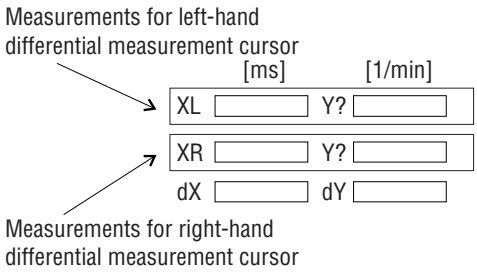

Figure 3: Numerical display of differential measurements MD0120AE

As the X-axis represents the sampled data points, it is generally possible to specify delta x, i.e. the time difference between the two differential measurement cursors. On the other hand, a delta y difference measurement can only be made between two measurements in the same measurement unit. The measurements for the left-hand and right-hand differential measurement cursors are specified in the numerical differential measurement display.

As only one Y measurement can be displayed for each differential measurement cursor, these lock into the traces. The colour of the measurement background and the designation in the display field for the Y measurement give information on the value measured. See the example below:

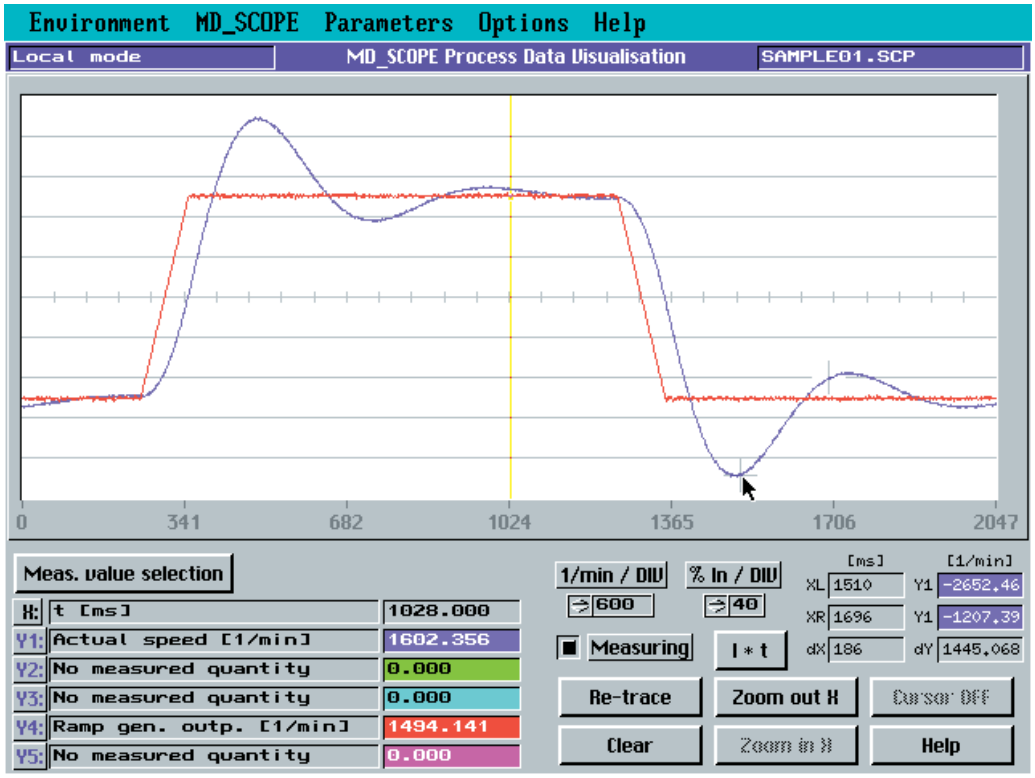

Figure 4: Window with activated differential measurement MD0119AE

All five traces are displayed in the display area. The left-hand differential measurement cursor locks into the trace for the "actual speed [1/min]" measured variable, which corresponds to the colour blue and therefore the designation Y1. In the numerical display field, the field for the Y measurement of the left-hand cursor bears the description Y1 and is highlighted in blue. This enables the measurement to be clearly allocated to the measured variable at any time. Table 4 describes the display elements for differential measurement.

XL	X position of left-hand differential measurement cursor
XR	X position of the right-hand differential measurement cursor
dX	Difference between XL and XR (absolute value)
Y?	Y measurement of left-hand differential measurement cursor
Y?	Y measurement of right-hand differential measurement cursor
dY	Difference between Y measurements of the same measurement unit

Table 4: Differential measurement designations

The differential measurement cursors can be positioned using the mouse or the keyboard. If you use the mouse, you can click on the cursor you wish to move, and, keeping the left-hand mouse button depressed, drag it to a different position or a different trace. The display will automatically recognise the left-hand and right-hand differential measurement cursor, and, where applicable, will switch over. If you use the keyboard, you can use the ARROW RIGHT/LEFT/UP/DOWN keys to move the active cursor and/or activate the next cursor by pressing PAGE UP/DOWN. The key combinations SHIFT + PAGE UP/DOWN furthermore enable you to lock the differential measurement cursor into a different trace. This is of particular importance when the traces are so close together that it is no longer possible to position the cursor using the mouse. Please see the section entitled "Operation of Keyboard and Mouse" for more information on controlling the cursors.

It is also possible to zoom in a horizontal direction during differential measurement. To do this, the area in which you wish to use the zoom function must be delimited with the two differential measurement cursors in a similar fashion to the zoom cursors.

3.5 Calculating the rms utilization

To determine the rms utilization of an axis module operate the "IxT" button. To do this, use the two zoom cursors to delimit the section of the current characteristic, for which you wish to determine the rms utilization of the axis module. After operating the "IxT" button a window will appear, indicating the rms utilization as percent of the axis module rated current.

This feature is helpful in determining the thermal utilization of the servo drive. If the two measurement cursors are used to delimit an operation cycle, the "IxT" function will calculate the rms utilization of the axis module based on the following formula:

$$I_{rms} = \sqrt{\frac{\sum_i I_i^2 \times t_i}{\sum t_i}}$$

The result is given as percent of the axis module rated current, which may now be compared with the motor rated current.

Example: DFY71LB motor; M_0 = 7.5 Nm; I_0 = 5.5 A; 3000 rpm,
controlled by MAS 51A-010-503-xx with I_N = 10 A

The IxT measurement of a travel cycle is I_{rms} = 45% = 4.5 A

$$\text{Motor utilization} = \frac{I_{rms}}{I_0} = \frac{4.5\ A}{5.5\ A} \times 100 = 81.8\%$$

4. The Main Menu

The main menu contains five menu titles: *"Environment", "MD_SCOPE"*, "*Parameters*", "*Options" and "Help"*. The menu options of the main menu can be activated using the mouse or from the keyboard [ALT+ 1st letter].

4.1 Menu title "Environment"

The "*Environment"* option provides an interface to the PC environment and includes the features:

- Information ...
- Load measured value file ...
- Save ...
- Copy parameters ...
- Print ...
- Start MD_SHELL ...
- EXIT ...

4.1.1 Menu title "Information"

Selecting this menu title will display information about the program (version number, licence number) and the Service telephone number, where you can get further information about the program and MOVIDYN® if required.

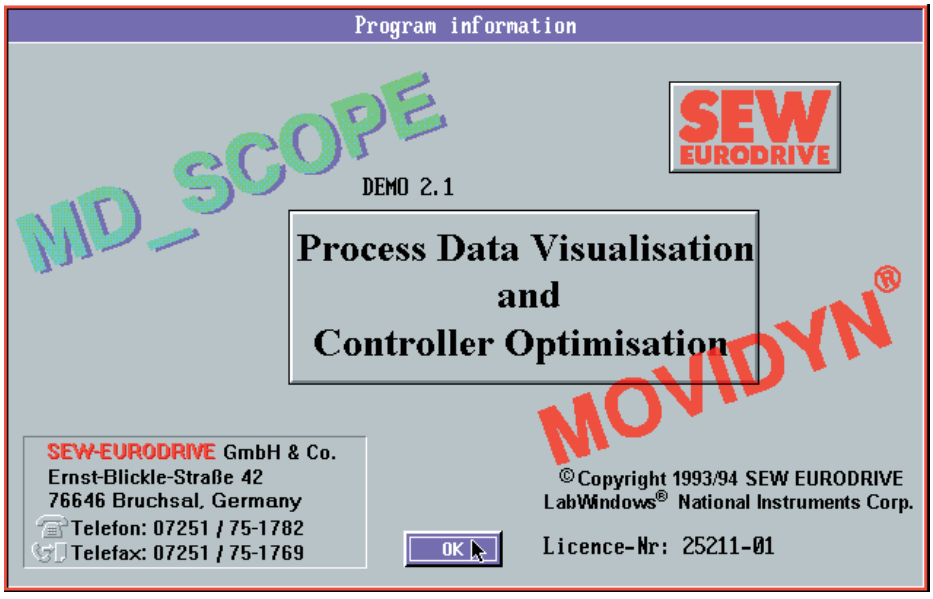

Figure 5: The *"Program information"* window MD0121AE

4.1.2 Menu item "Load measured value file"

This menu item allows you to read in measured values from a file, so you can document and edit system data without having a MOVIDYN® Servo Controller. When you select this menu item with the mouse or from the keyboard a file selection window will be opened (Figure 6). To confirm your selection (highlighted file) operate the *"Select"* control. *"Cancel"* will close the file selection window without retrieving measured data.

If you haven't saved the acquired data yet, the program will ask you whether you want to save these data or discard them.

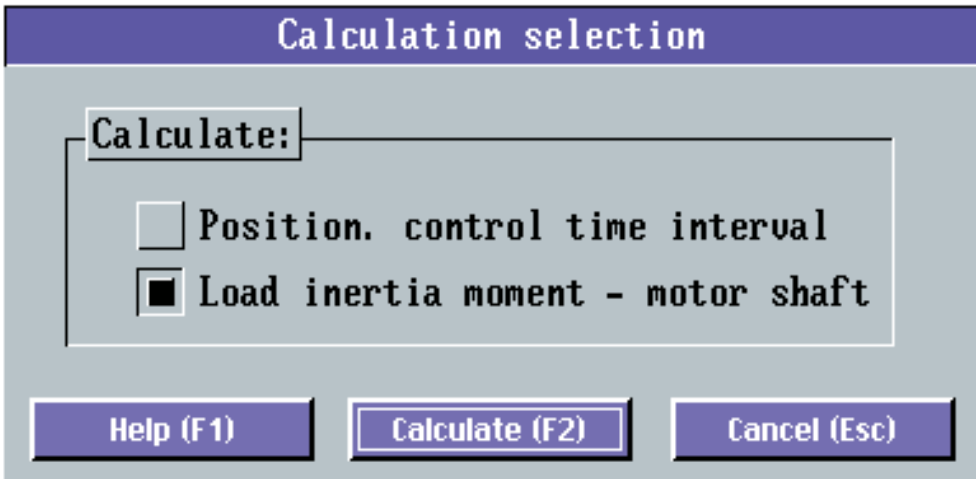

Figure 6: The file selection window MD0122AE

When loading the MD_SCOPE measured value file (*.SCP), the program will check whether a parameter file of the same name exists (*.PAR), which clearly relates to the measured value file. If it does, the file will be used for documentation of the parameters at the time the measured values were traced. If there is no clear relationship between measured value file and parameter file, a corresponding message will come up on the screen.

This combination of measured value file and parameter file is only supported by MD_SCOPE version 2.0 and higher. Files from an older version can of course still be uploaded.

4.1.3 Menu item "Save"

This feature allows you to save acquired measured values to a file. In addition, the parameter file valid at the time of recording is automatically saved, too. The parameter file has the same name as the measured value file but will have the file extension *.PAR instead. The file is compatible with the parameter files created by the MD_SHELL user interface and can be used again to set parameters in the servo controller (using the MD_SHELL or MD_SCOPE *"Copy parameters"* menu item). The date/time attribute establishes this clear relation between the measured value and the parameter files.

After you have entered the name of the measured value file you wish to save, MD_SCOPE will check whether a measured value or parameter file of that name already exists. If it doesn't, MD_SCOPE will prompt you to enter a system-specific comment in the program's documentation window and then save the measured value file for you. MD_SCOPE will then first save the parameter file, determine its date/time attribute and then save the measured value file.

4.1.4 Menu item "Copy parameters"

This menu item can only be activated if a communications link with a MOVIDYN® Servo Controller has been established, i.e. MD_SCOPE is not operated in local mode.

This function allows you to read (upload) parameters from the servo controller and save them in a file or copy (download) a parameter file to the controller.

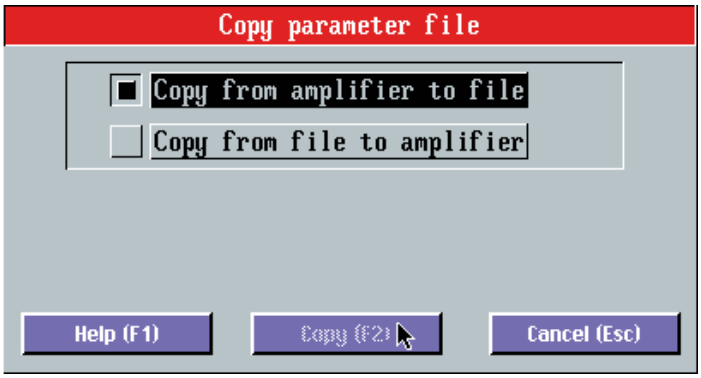

Figure 7: The "Copy parameter file" window MD0123AE

After selecting the direction of transmission start the copy process by operating the *"Copy"* button (Figure 7). This will open a file selection box, prompting you to enter the name of the upload or download file. In addition, you may enter a file comment when copying the controller parameters to a file, which will be saved together with the parameters.

During the copy process the progress of the serial data transmission will be displayed in percent. Upon successful completion of the transmission a corresponding message will be displayed. The parameter files are compatible with MD_SHELL parameter files.

4.1.5 Menu item "Print"

Activating the *"Print"* menu item will open a new window (Figure 8), where you can specify the data to be printed. MD_SCOPE gives you a choice of the following data for printout:

- current traces (1 page)
  Graphics printout of the current main window
- MD_SCOPE system information
  Printout of system settings such as sampling time, axis address, date/time of trace recording, etc. and system comment.
- Calculation parameters for commissioning (1 page)
  Printout of the motor parameters specified for calculation of the load moment of inertia.
- MOVIDYN® parameter set (3 pages)
  Printout of the MOVIDYN® parameter set valid at the time of trace recording
- MOVIDYN® fault memory (max. 3 pages)
  Printout of the MOVIDYN® fault memory at the time of trace recording

Immediately before the hardcopy printout the screen will change to monochrome display and a temporary information window will open showing an assignment legend of traces and measured variables as well as additional system information. After hardcopy printout the screen display will return to normal and the temporary information window be closed.

Recommendation:
For better distinction of the measured value traces on the hardcopy printout we recommend to activate the trace

attribute feature (menu item *"Options/Trace attribute"*) . This feature assigns certain markings to a trace for better distinction.

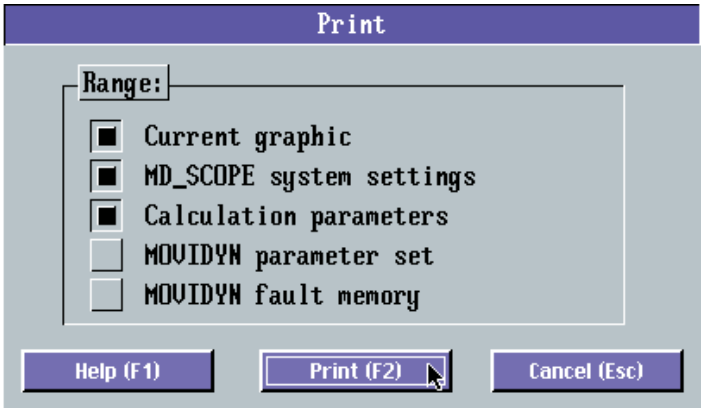

Figure 8: Printout options of the "Print" function MD0124AE

Printer driver:
Use the HCSELECT.EXE utility to match MD_SCOPE to the specifics of your printer, in particular for trace printout. It is not possible to set up the printer from MD_SCOPE. For more detailed information please refer to section "Additional utilities".

4.1.6 Menu item "Start MD_SHELL"

This menu item will call up the MD_SHELL user interface, while permanently exiting MD_SCOPE in order to free sufficient memory capacity. If you haven't saved the acquired data yet the program, before exiting, will ask you whether you want to save the data or discard them. Then MD_SHELL is started directly. The default setting assumes that the MD_SHELL user interface is located in path "MD_SCOPE path: \MD_SHELL". You may change this path in menu item *"Options/MD_SHELL path*". In addition, you can start MD_SCOPE directly from MD_SHELL. If MD_SHELL is not installed in the specified path the feature will be aborted and a corresponding message displayed. When exiting MD_SCOPE all program settings are saved to the MD_SCOPE.INI initialization file.

4.1.7 Menu item "Exit"

The *"Exit"* command takes you out of the program. Again, you will be asked whether you want to save the measured data or discard them (if you haven't saved them before). Then the program is exited, the last settings are saved to the initialization file. These settings will be available again when MD_SCOPE is restarted.

4.2 Menu title "MD_SCOPE"

The MD_SCOPE menu title contains all the functions required to set and analyse the measured data acquisition (tracing). It includes the features:

- Set trace
- Read measured data
- Document

4.2.1 Menu item "Set trace"

This menu item can only be activated if there is a communications link established with a MOVIDYN® Servo Controller, i.e. MD_SCOPE is not operated in local mode.

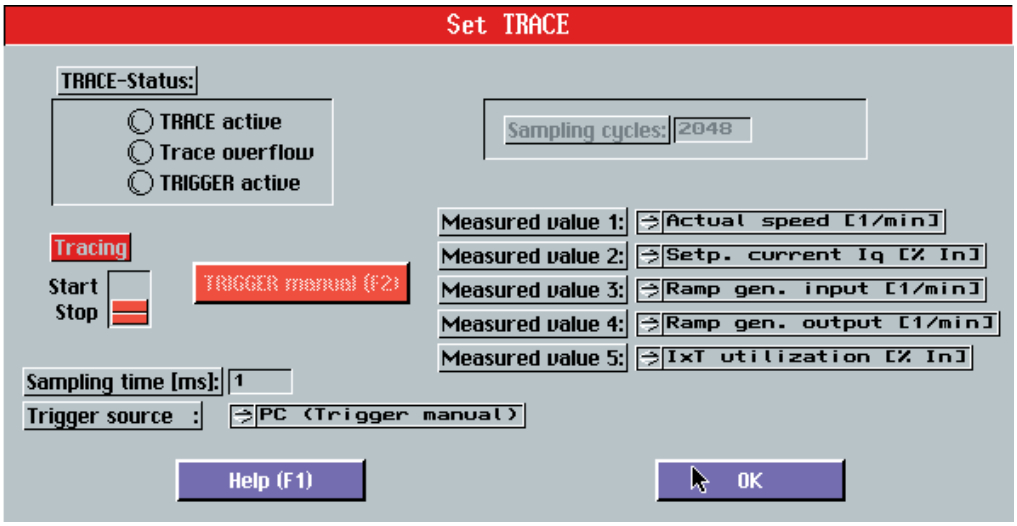

Figure 9: The *"Set trace"* window MD0125AE

In addition you can set the sampling time and select the trigger source and start, abort or stop the tracing process with a trigger event.

The red top line of the *"Set trace"* window (Figure 9) signals that in this program section direct communication with the servo controller takes place. In the absence of such a connection or when in local mode, the controls are inoperable, indicated by their dimmed status. When in this status, default values are displayed which are not received from the servo controller.

This window allows you to set all important tracing criteria. At the same time LED controls on the panel indicate the current trace status of the MOVIDYN® Servo Controller. In addition you can set the values for sampling time and trigger source and start, abort or stop the measured data acquisition by a trigger event.

Element	Value	Action	Control type
TRACE active	ON OFF	Measured value tracing active Measured value tracing not active	LED
TRACE overflow	ON OFF	Trace buffer full Trace buffer not completely full yet	LED
TRIGGER active	ON OFF	Trigger event pending No trigger event pending	LED
Tracing	Start Stop	Start measured value tracing Abort measured value tracing (no valid data)	On/Off switch
Sampling cycles:		Number of sampling cycles for these settings (depends on measured value type and number)	Output
Sampling time [ms]	1-1000	Time interval between two measuring cycles in ms	Input
Trigger source	PC Ext. terminal	Manual trigger event from panel "Manual TRIGGER from MD_SCOPE" Trigger event via external terminal Requires prior assignment of terminal to "Ext. trigger", using MD_SHELL!	Input
Measured value X:		Denotes traced measured values Presently five measured values are permanently set.	Ring
TRIGGER manual (F2)		Touch-panel for manual triggering if trigger source = PC	Pushbutton
Help (F1)		Displays on-line Help for this window	
OK (ESC)		Closes window	

Table 5: *"Set trace"* window controls

The various controls of this window are explained in table 4. MD_SCOPE carries out a plausibility check on them. The setting options therefore depend on the status of the measured value tracing. During data acquisition no measured value settings can be performed. Controls of blocked functions are dimmed. When the data acquisition is stopped *(Trace = stop)* or when a trigger event occurs the MOVIDYN® Servo Controller trace criteria can be defined anew (please also refer to section "First steps").

Trace channel	Measured variable
Measured value 1	Actual speed [1/min]
Measured value 2	Setpoint current Iq [% In]
Measured value 3	Ramp generator input [1/min]
Measured value 4	Ramp generator output [1/min]
Measured value 5	IxT utilisation [% In]

Table 6: Measured value assignment for MOVIDYN® Servo Controller

Caution:
Aborting the measured value recording with the "Trace = stop" command results in in the trace buffer not being written correctly. MD_SCOPE has no time reference as regards the measured data, i.e. it cannot detect the earliest measured value. Therefore only use the "Trace = stop" switch control to abort the measured value acquisition. For correct triggering only use the selected trigger source (external terminal or PC trigger).

The present program version does not yet allow for selection of the traced measured values. Measured variables are assigned as indicated in table 6 above:

4.2.2 Menu item "Read measured values"

This menu item can only be activated if a communications link with a MOVIDYN® Servo Controller is established, i.e. MD_SCOPE is not operated in local mode.

Activating this menu item will start the process of reading in the measurement and parameter data from the MOVIDYN® Servo Controller to the PC. First of all, though, different system conditions will be checked. If one of the following conditions prevails, the buffer will not be read in, instead a message will appear on the screen:

- Measured value recording still active.
- MD_SCOPE in local mode.
- No communication.
- The unit connected is not a MOVIDYN® Servo Controller.

Before MD_SCOPE reads in new measured data, you will be asked whether you want to save or discard the previously acquired data, which are not saved yet. MD_SCOPE does not recognise whether the recording was ended correctly with a trigger pulse or aborted with *"Tracing = stop"*, i.e. whether the data in the trace buffer are correct.

At the beginning of the transfer the *"Trace data transfer"* window will appear indicating the data transfer progress in per cent. This process can be aborted any time using the ESCAPE or RETURN keys. After MD_SCOPE has read in the buffer completely, the traces are automatically displayed on the screen.

Caution:
When the trace buffer is read in system values and speed controller parameters are acquired as well. Therefore, read-in data are only valid if neither the MD_SCOPE system values nor any other parameters were changed between the time the data acquisition was triggered and the time the trace buffer was read in (please also refer to chapter "First steps").

4.2.3 Menu item "Documentation for current recording"

The *"Documentation for current recording"* window (Figure 10) allows you to enter your own comments to describe the measured values recorded. The text controls *"Project", "Company", "Commissioned by"* and *"System comments"* can be used separately. These text controls require an entry (e.g. *) otherwise MD_SCOPE will display a corresponding message.

If you operate the *"Settings..."* button a new window will open, where all the system and parameter data valid at the time of data transmission are automatically documented (Figure 11), including:

- MD_SCOPE system information
- Calculation parameters for commissioning (basis for these measured values)
- MOVIDYN® parameter set
- MOVIDYN® fault memory

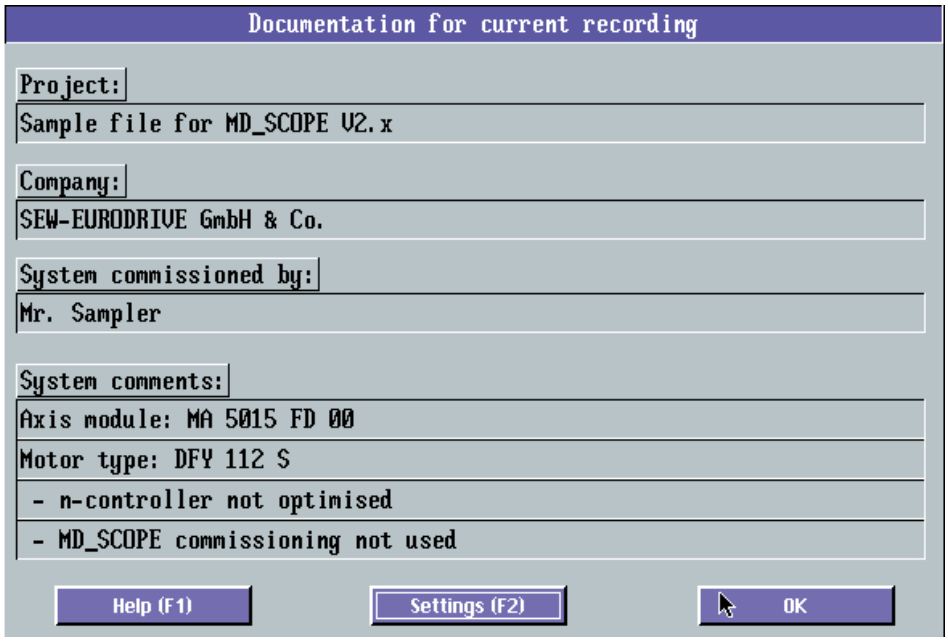

Figure 10: Documentation for current recording MD0126AE

However, this information is only available for files created with MD_SCOPE version 2.0 and higher. If an older MD_SCOPE version was used only MD_SCOPE system information and the controller parameters will be documented.

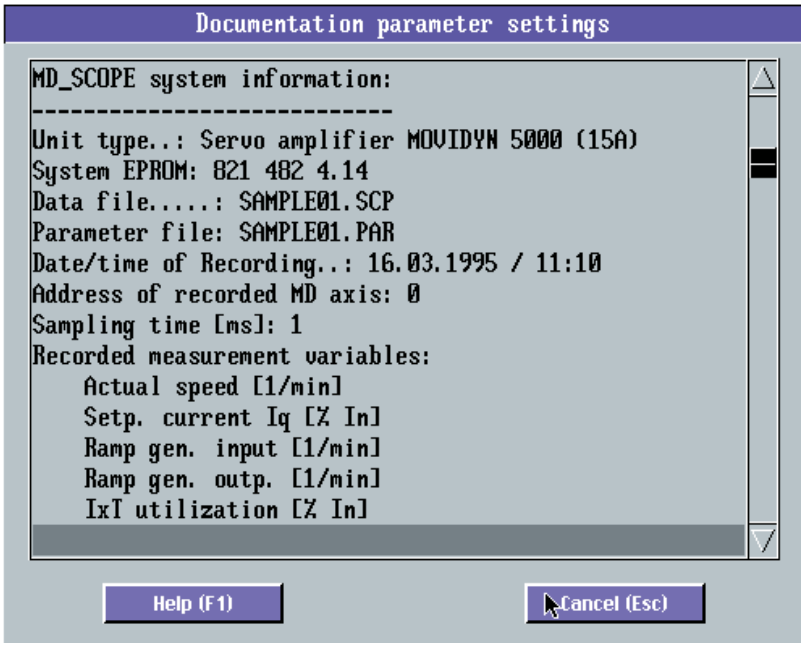

Figure 11: Documentation of MD_SCOPE and MOVIDYN® parameters MD0127AE

This window is displayed automatically before each save process prompting you to document the traced data. All entries made here can be saved and printed out together with the measured value file.

The comments are saved as long as the program is running until overwritten when a file is newly loaded or edited. The comment last entered is saved to the initialization file when you exit MD_SCOPE and will be available again when the program is restarted.

4.3 Menu title "Parameters"

The main menu option *"Parameters"* serves as direct interface with the MOVIDYN® Servo Controller. Its features allow you to directly parameterise the MOVIDYN® Servo Controller. In the present version 1.0 this menu title only includes the *"Controller parameters"* option. It includes the following menu items:

- Controller parameters
- Test function
- Commissioning

As the *"Controller parameters"* and *"Test function"* menu items require direct communication with the MOVIDYN® Servo Controller, they can only be activated if a serial communications link has been established, i.e. MD_SCOPE is not operated in local mode.

4.3.1 Menu item "Controller parameters"

When you activate this menu item the *"Controller parameters"* window (Figure 18) will open. The red top line signals that direct communication with the servo controller takes place. This window can also be called from the commissioning function, therefore the controls associated with the controller proposal are greyed out. You may now set the most important controller parameters directly from MD_SCOPE. If you wish to change any other parameters, you will have to start the MD_SHELL user interface from the *"Environment/Start MD_SHELL"* menu item.

In addition to the speed control parameters the *"Controller parameters"* window includes various other parameters (Table 7).

200	Speed controller gain:	The speed controller gain increases the P component.
201	Speed controller time constant	The speed controller time constant is used to set the I component. The I component is inversely proportional to the time constant, i.e. a high figure will result in a small I component. Special case: If the time constant = 0, the I component is eliminated.
202	Speed controller D component:	The D component sets the differential component of the speed controller.
203	Feedforward threshold [1/min/ms]:	If the filtered setpoint increase is greater than this parameter setting the acceleration feedforward will be active.
204	Feedforward gain:	Sets the feedforward gain factor.
205	Feedforward filter:	Filter time constant for the digital filter that filters the ramp generator output before it is used by the feedforward.
206	Speed setpoint filter:	Filter time constant for the digital filter that filters the ramp generator output before it is used as speed setpoint.
207	Speed actual value filter:	Filter time constant for the digital filter that filters the speed actual value before it is used as speed actual value.
210	Max. speed CW [1/min]:	Limit value for CW direction of rotation.
211	Max. speed CCW [1/min]:	Limit value for CCW direction of rotation.
212	Max. current [% In]:	Setting the internal current limit as a percentage of the axis module rated current.
220	Hold controller gain:	Hold controller gain increases the P component.
120-123, 130-133 ramp generators:		The ramp generators are used to set the ramp values. Acceleration and deceleration ramps are available for both directions of rotation. The settable ramp times refer to a speed change of 0...3000 1/min.
P120, P130:		Acceleration ramp - positive speed
P121, P131:		Deceleration ramp - positive speed
P122, P132:		Acceleration ramp - negative speed
P123, P133:		Deceleration ramp - negative speed

Table 7: MOVIDYN® controller parameters settable with MD_SCOPE

MD_SCOPE will perform a value range check, i.e. if you enter values outside the valid range, MD_SCOPE will change these to the next higher increment or the relevant minimum or maximum and transmit them to the MOVIDYN® Servo Controller. At the same time the value read from the MOVIDYN® Servo Controller will be displayed in the control.

For further information and a detailed description of the speed control parameters activate the on-line Help feature.

If the serial communications link is interrupted all window controls are greyed out. Substitute values will be displayed (0.00) which do not reflect the servo controller's actual status!

4.3.2 Menu item "Test function"

Activating the *"Test function"* menu item will open a window of the same name (Figure 12), where you can set the following two MOVIDYN® parameters:

- 208 7-segmental test indicator
- 209 Controller test function.

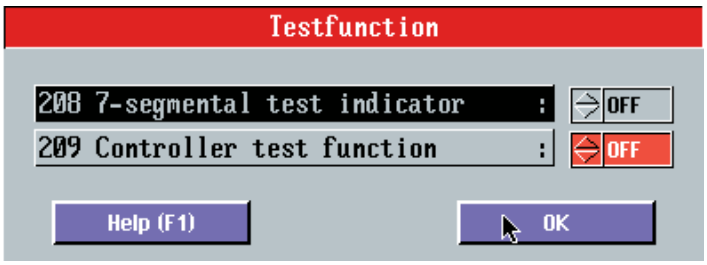

Figure 12: Parameters of the "Test function" menu item MD0128AE

208 7-segmental test indicator:

This parameter will switch the 7-segment display of the MOVIDYN® axis module to the feedforward test display. The 7-segment display will indicate in real time whether the feedforward is active or not. If it is active, all segments will light up, if not, none will. This parameter is not saved permanently to EEPROM. Any of the following actions will deactivate the display:

- Resetting the axis module
- Isolation from the mains supply
- Parameter setting "NO"
- Pressing the pushbutton on the axis module

209 Controller test function:

The controller test function allows you to trace measured data, these will be used for automatic calculation of system-specific parameters such load moment of inertia, load and friction torques in the commissioning window. The controller test function negates the setpoint at the ramp generator input in cycles of one second. This function can only be activated when the controller is in the "normal operation" operating mode. The system will always use the setpoint valid at the time the test is carried out.

4.3.3 Menu item "Commissioning"

Activating the *"Commissioning"* menu item will open a window of the same name (Figure 13) where you can commission and optimise the MOVIDYN® Servo Controller settings. This MD_SCOPE function provides you with a tool which allows you to display and set the most important drive parameters.

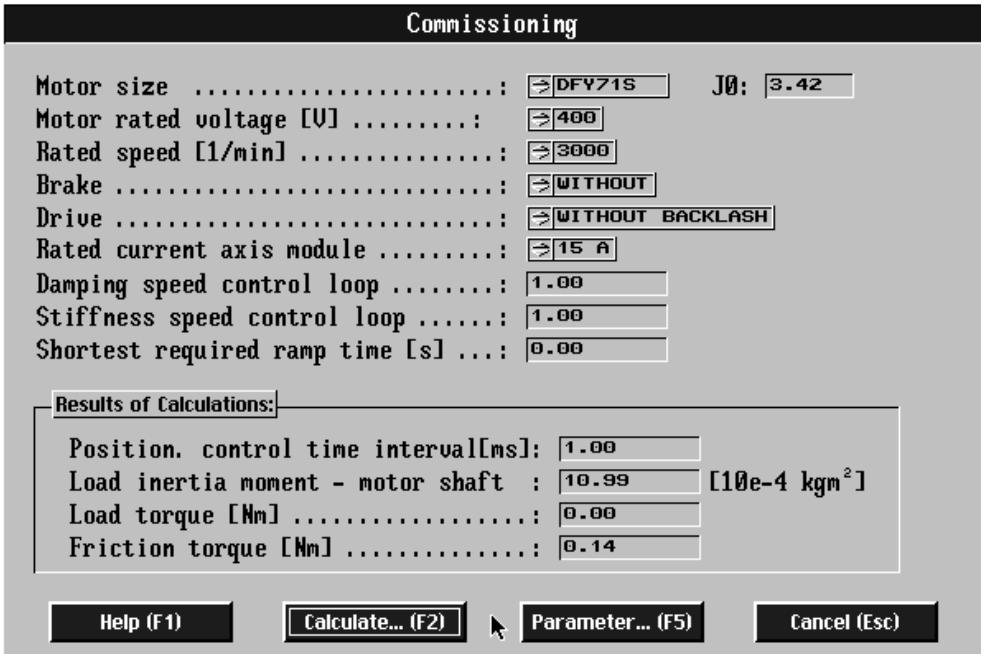

Figure 13: MD_SCOPE commissioning window 00237AEN

The window is divided into two sections. The calculation parameters are listed in the upper section of the window, the calculated system-specific parameter values, e.g. the time interval of the positioning control, load moment of inertia reduced to the motor shaft, friction torque and load torque, in the lower section. Based on these values the system will calculate and suggest a customised controller setting.

4.3.3.1 Calculation parameters

To calculate the system-specific parameters and generate a proposal for controller parameterisation, you have to set the calculation parameters in the upper section of the commissioning window. They are explained in table 8 below.

Motor size:	MD_SCOPE provides a listing of all SEW servo motors from which to select the motor used in your system. This listing includes a multitude of motor-specific data which are automatically used for calculation when the motor is selected (see nameplate).
Motor rated voltage [V]:	Enter the rated voltage of the motor used (see nameplate).
Rated speed [1/min]:	Enter the rated speed of the motor used (see nameplate).
Brake:	This calculation parameter indicates whether the motor is operated with or without a brake.
Drive:	Enter the type of application (with backlash/without backlash).
Axis module rated current [A]:	If a communications link is established the rated current of the axis module is automatically read in. If MD_SCOPE is operated in local mode, you will have to enter the rated current manually.
Shortest required ramp time [s]:	The shortest ramp time is required for optimum setting of the ramp generators.
Damping of the speed control loop:	Damping affects the amount of overshoot and the dying out of the oscillation. The default setting is 1.0. Values of less than 1.0 will increase the overshoot, values of more than 1.0 will reduce the oscillation.
Stiffness of the speed control loop:	Stiffness is a measure for the speed of response of the speed control loop. The default setting is 1.0. Increasing the stiffness will increase the speed of response. From a critical value on the control will oscillate. Decreasing the stiffness will slow down the speed of response and increase the lag error.

Table 8: Commissioning parameters for calculating the system-specific parameters

When a calculation parameter is changed, the calculated values in the lower section of the commissioning window will become invalid. Each time you change a parameter you will have to perform a new calculation using the *"Calculate"* button.

4.3.3.2 Calculating the load moment of inertia reduced to the motor shaft

To calculate the load moment of inertia reduced to the motor shaft several requirements must be met. An easy way of calculation is described below:

1) Commission the drive in accordance with the MOVIDYN® Installation and Operating Instructions. Use the estimated J_{ext} (design data) as the basis for commissioning.

2) Activate the test function (Parameters/Test function menu item, P209 test function = ON). The setpoint entry requires an absolute change of minimum 15% of the rated speed.
If the servo controller test function cannot be used for reasons inherent in the system, you may enter a speed setpoint profile that is tailored to the specifics of your system. It is important though, that you enter an absolute setpoint change of 15% of the motor rated speed. As a rule, the calculation algorithm also works with measured values for one direction of rotation, we recommend however, to use both the positive and the negative speed range so as to optimise the calculation result. Load torque and friction torque can only be determined on the basis of both ranges.

3) Check whether a minimum of 5% of all sampled data points are within one speed range. Of 2048 sampled data points a minimum of 308 points must be within one speed range (see also Figure 14).

4) Enter your system-specific calculation parameters in the upper section of the commissioning window.

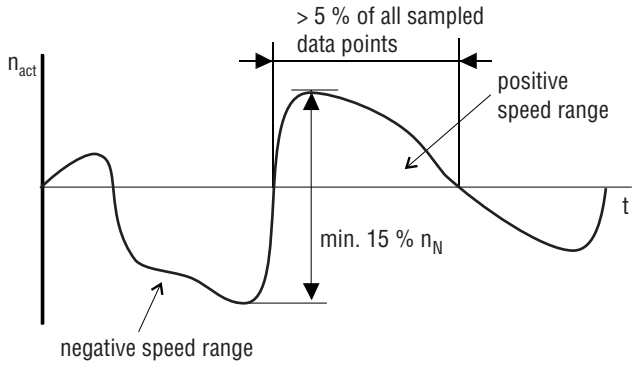

Figure 14: Calculating the load moment of inertia reduced to the motor shaft MD0130AE

5) Press the *"Calculate"* button. The *"Calculation options"* window will open. Select the "load moment of inertia" option by operating the ON/OFF pushbutton with the mouse (Figure 15), and then press the *"Calculate"* button to exit the window. The program will now calculate the load moment of inertia reduced to the motor shaft and enter the result in the *"Calculated results"* field in the bottom part of the commissioning window. At the same time the greyed-out "Parameters..." button will become active.
If MD_SCOPE cannot determine a load moment of inertia from the data specified, an error message will be displayed.

6) Pressing the *"Parameters.."* button will automatically activate calculation of a controller parameter suggestion. A new window *"Commissioning/Controller parameters"* will open. It is the same window that can be activated from the *"Controller parameters"* menu item, now, however, a controller parameter suggestion is made (see also section "Commissioning/Controller parameters" window).

7) With the new modified controller parameters retrace the required variables in MD_SCOPE. You may change the calculation parameters *"Stiffness speed control loop"* or *"Damping speed control loop"* to influence the calculation of a new parameter suggestion according to your evaluation of the system setup.

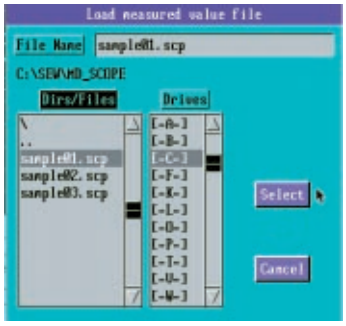

Figure 15: Calculation options window MD0131AE

If, after several attempts and using different traces, it is still not possible to determine the load moment of inertia, enter an estimated value in the *"Calculation results"* field. The "Parameters..." button will become active. If you operate this button the program will make a controller parameter suggestion based on the load moment of inertia you have entered.

4.3.3.3 Determining the load and friction torques

The load and friction torques are automatically determined when the load moment of inertia reduced to the motor shaft is determined. To calculate these torques the measured values used must have a positive and a negative speed range. Load and friction torques are only of an informative nature. They do not affect the calculation of the controller parameters.

4.3.3.4 Determining the positioning control time interval

The time interval of an external positioning control is only to be taken into account in connection with an external positioning control. If an internal API/APA positioning pcb is fitted or if no position control is provided, the default value 1.0 ms should be entered. The value specifies the time interval, at which the higher-level positioning control enters the analogue speed setpoint.

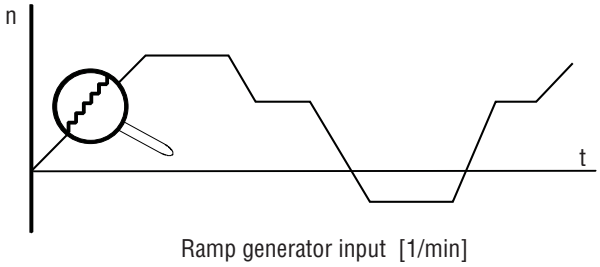

Figure 16: "Step function" of the external setpoint input MD0132AE

If the time interval is known, the value may be entered manually, if not, you may have the program calculate the time interval for you. To do this, proceed as follows:

1. Trace a measured value curve (MD_SCOPE sampling time 1ms), using the analogue setpoint entered by the higher-level positioning control. The given setpoint change must be big enough to obtain a clear step function (Figure 16) for the "ramp generator input [1/min]" variable. To calculate the time interval, the setpoint ramp rate must be less than 1s (Figure 17).

2. Enter the calculation parameters specific to your system in the top part of the commissioning window.

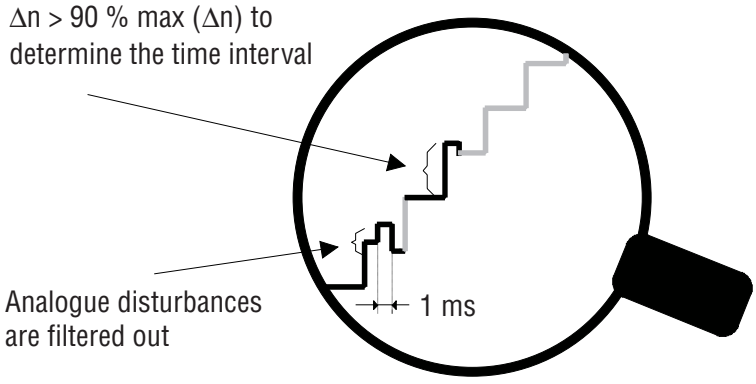

Figure 17: Peripheral prerequisites for determining the time interval MD0133AE

3) Operate the *"Calculate"* button. The *"Calculation options"* window opens. Click on the corresponding pushbutton to select the "Calculate positioning control time interval" option. Then exit this window by clicking on the *"Calculate"* button. The time interval will now be calculated and the result entered in the *"Calculated results"* field in the bottom part of the commissioning window. At the same time, the previously greyed-out "Parameters..." button will become active. If MD_SCOPE cannot calculate a time interval from the data specified, a error message will appear.

If the sampling time for the external positioning control is shorter or the same as the MD_SCOPE sampling time, the time interval has no influence on the speed control loop. The value will only affect the filter time constants if the sampling times are longer.

4.3.3.5 Error messages

MD_SCOPE will abort the calculation of the load moment of inertia or the time interval and display an error message if the calculation requirements are not met. Table 9 gives an explanation of the different problems, which may cause an error message.

Message	Problem	Remedy
Calculation of the moment of inertia not possible!	- Speed change 15% of the motor rated speed. - No speed range with more than 5% of all sampled data points available.	Increase the setpoint input and trace the variable again.
Not enough user memory! Calculation not possible!	- Your PC has not enough free user memory to perform a calculation. CAUTION: MD_SCOPE will not operate stably.	Exit the program and make at least 560 KB of free user memory available.
Time interval of the positioning control cannot be calculated!	- Current trace was recording with an MD_SCOPE sampling time of more than 1ms. - The greatest speed difference between two samplings is greater than the motor rated speed.	Set the MD_SCOPE sampling time to 1ms and re-trace the variable.
Speed changes too small for time interval calculation!	- The speed change of the analogue setpoint is greater than 1s.	Reduce the setpoint ramp rate to less than 1s.
Not enough differential values to calculate the time interval!	- The time interval determined is not representative of the system, as less than 1.5% of all sampled data points are within this time interval.	Change the setpoint profile and re-trace the variable.

Table 9: Error messages which may come up during calculation

4.3.3.6 The "Commissioning/controller parameters" window

You may also activate this window directly via the menu bar from the "Parameters/controller parameters" menu item. However, if you activate it this way, the controls for the controller parameter suggestion are inactive.

When you call this window from the commissioning function, the program will automatically present you with a calculated proposal for controller parameter settings (Figure 18). The calculated controller parameters are compared with the actual controller parameters. You may now download the suggested controller parameters to the servo controller by operating the *"Copy"* button. The progress of the copy process is indicated in percent in the display.

When the suggested parameters are copied to the servo controller, the program does a value range check, which may result in a minor difference between the parameter value suggested and the one transmitted. Again, you may correct the parameters manually, if you wish. For a more detailed description of the settable parameters see the "Menu item *Controller parameters*" section.

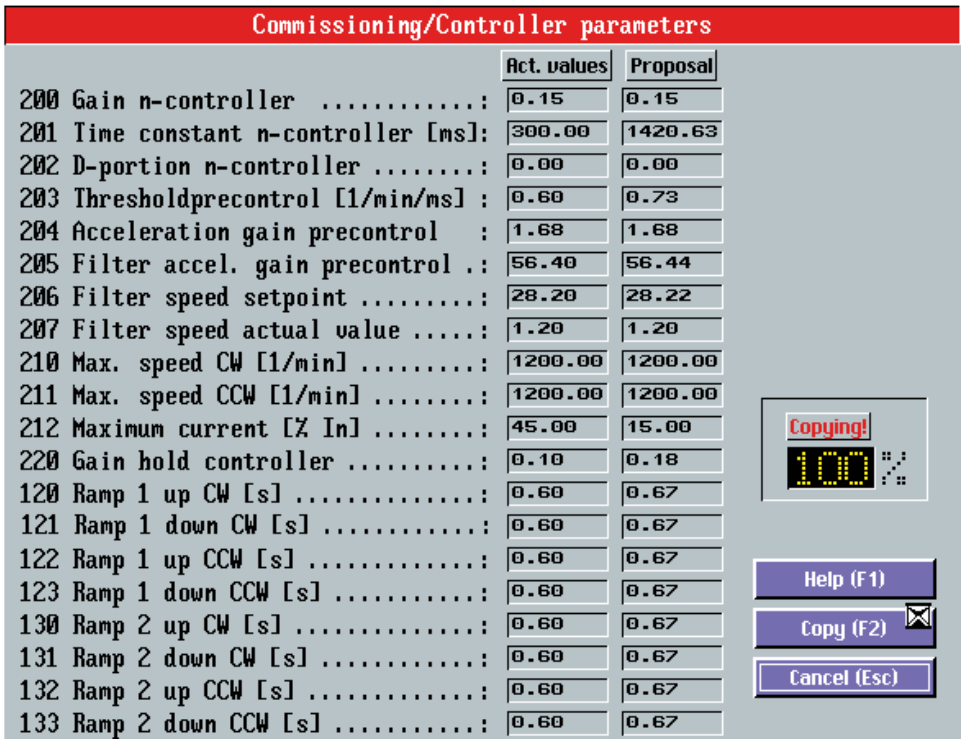

Figure 18: The controller parameters window MD0134AE

4.4 Menu title "Options"

The "Options" menu title comprises features, which are required to set the MD_SCOPE program parameters or select the type of communication link. Mainly, though, it includes features which you will rarely use. The main menu titles includes the options

- Select interface
- Trace attributes
- Language
- MD_SHELL path

4.4.1 Menu item "Select interface"

The *"Interface selection"* window (Figure 8) is opened when this menu item is selected. The window contains three controls to select the communication link.

- PC interface
- MOVIDYN® interface
- Communication with MA address X

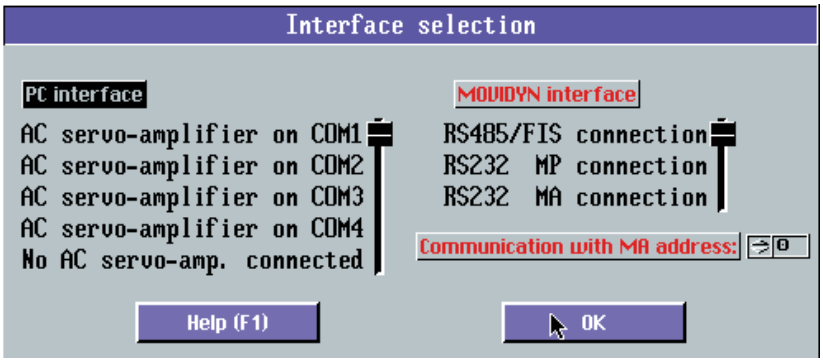

Figure 19: The *"Interface selection"* window MD0135AE

Selectable PC interfaces are the serial RS-232 interfaces COM 1, COM 2, COM 3 or COM 4 interfaces as well as local mode (no controller connected).

To connect the controller either the RS-232 or RS-485 power supply module interfaces or RS-485 or the RS-232 interface of the AI011 option p.c.b can be used. Connection via the RS-232 or RS-485 interfaces supports access to all axis modules connected to the supply module. In this case you have to select the address of the servo axis with which you want to communicate. To select operate control *"Communication with MA address X"*.

MD_SCOPE carries out a plausibility check on the *"Interface selection"* window too, i.e. only those controls are activated the setting of which makes sense. If the *"PC interface"* control is set to *"No AC Servo-controller connected"*, obviously there is no need to select the MOVIDYN® interface or the axis module address. Similarly, the selection *"MOVIDYN® interface = RS-232 MA connection"* and setting the axis module address are incompatible, as a direct connection from axis module to PC only permits point-to-point communication.

In many cases one PC interface is already taken by the serial mouse. If this interface is selected a corresponding fault message is displayed on the screen.

To connect servo controller and PC via the RS-485 interface of the supply module you will need an external interface adapter which adjusts the V.24 level to a RS-485 level. We recommend the PSM- V.24/RS-485-P/BB interface (order no.: 2787321, PHOENIX CONTACT), which has proved a good choice with the MOVITRAC® 3000.

4.4.2 Menu item "Trace attributes"

This feature will open the *"Trace attribute"* window (Figure 9). Since you may not always have a colour monitor available when you commission a system, it may often prove difficult or even impossible to discriminate between the different traces. The "*Trace attribute"* window allows you to assign trace attributes individualising the traces. To differentiate the traces you can, for example, mark them with different symbols etc.

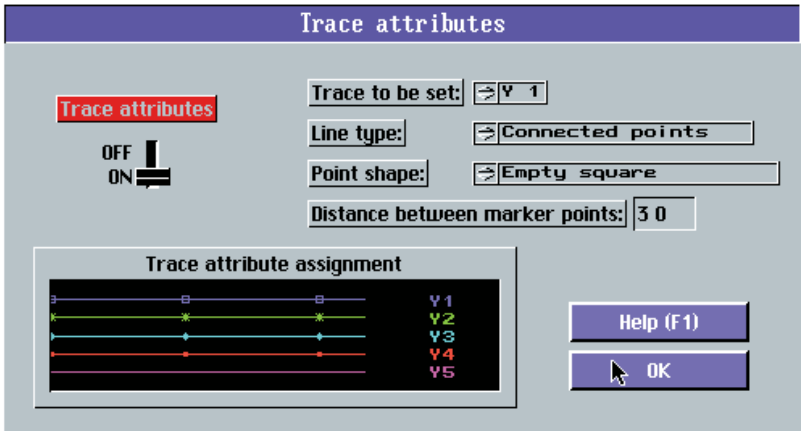

Figure 20: The *"Trace attributes"* window MD0136AE

The trace attribute feature is also of interest for the hardcopy printout which as a rule will be in black and white.

In table 10 you will find the different attributes and their respective controls explained.

Element	Value range	Action
Trace attributes	ON: OFF:	Draws traces with markings Draws traces as lines
Trace to be set	Y1-Y5	Specifies measured value trace to be set
Line type	Text	Specifies line type of measured value trace
Point shape	Text	Specifies shape of marker points
Distance between marker points	30-500	Specifies distance between two marker points (e.g. 70 = every 70th data point on a trace = marker point)

Table 10: *"Trace attributes"* window controls

The trace attributes selected are indicated immediately after each change on the display panel *"Trace attribute assignment"*. Only the distance between the marker points is not shown. It is to be checked against the actual trace.

MD_SCOPE carries out a plausibility check in this feature, too. Trace attributes can only be applied when the switch control setting is *"Trace attributes=ON"*. Otherwise all controls will be passive, i.e. dimmed.

The *"Trace attributes=On"* condition where all traces are plotted with the set attributes is signaled by a checkmark which appears in front of the menu title *(" Trace attributes").*

Caution:
The amount of user memory needed to display the marked traces increases in proportion with the density of the marker points, i.e. if you see the warning "*Not enough memory....*" after setting the trace attributes, you should decrease the point repeat frequency.

4.4.3 Menu item "Language"

If you select this menu item, the *"Language"* window, in which you can set the language of your choice, will open (Figure 21). When you select the language you require and confirm by pressing the *"OK"* button, the system checks whether all the necessary language files are available and switches the program over to the new language. An error message is displayed if the selected language file cannot be found.

Figure 21: Language selection window MD0137AE

All texts and messages displayed while you are selecting the language are shown in German, English and French.

The first time you call up MD_SCOPE, you will first see this language selection window so that you can select the language of your choice.

4.4.4 Menu item "MD_SHELL path"

As not all MOVIDYN parameters can be set using MD_SCOPE, the "*Environment/Start MD_SHELL*" menu item enables you to call MD_SHELL user interface directly. MD_SCOPE is then exited and MD_SHELL started.

You can specify the call path in which the MD_SHELL.EXE file is located in the *"MD_SHELL path"* menu item. When you do this, a file selection box is opened where you can enter the call path directly. If you use the *"Select"* feature, the system checks whether the file is in the path specified; if it is not, an error message will be displayed.

This setting is stored permanently in the initialization file. The MD_SHELL user interface is called in the usual way using the *"Environment/Start MD_SHELL"* menu item.

4.5 Menu title "Help"

The *"Help"* feature offers general on-screen information about the *"Menu structure"* and the *"Keyboard assignment"*.

4.5.1 Menu item "Menu structure"

This Help feature provides you with condensed information about the various features offered by the main menu options.

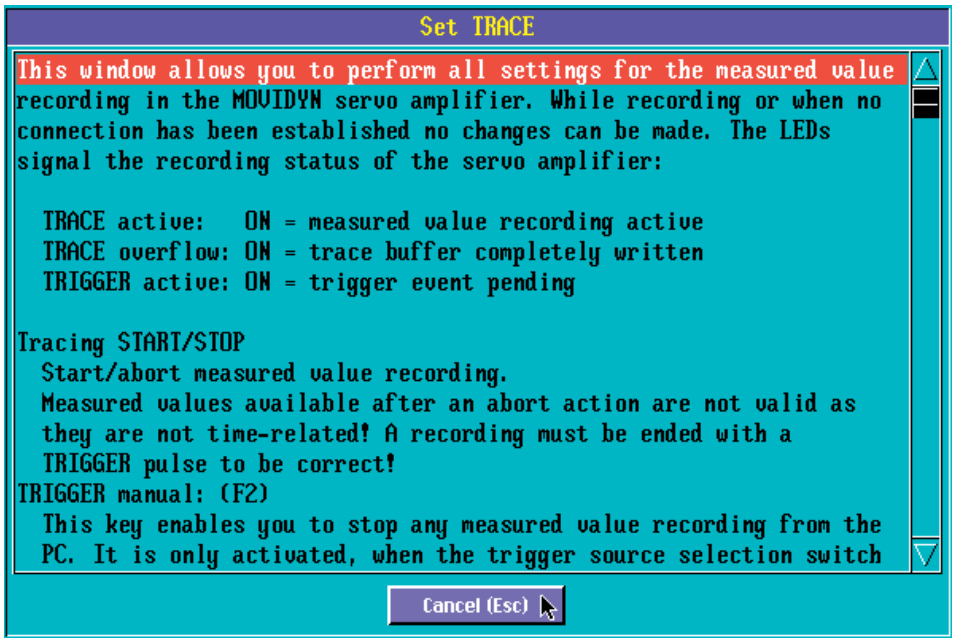

Figure 22: The *"On-line Help"* window MD0138AE

4.5.2 Menu item "Key assignment"

This Help feature tells you how to operate MD_SCOPE from the keyboard.

5. Important MD_SCOPE Files

For correct operation MD_SCOPE requires some additional files, which must be located in the same directory as the MD_SCOPE.EXE file. These files contain important information, which is read in when MD_SCOPE is started and saved back to the file when you exit the program.

Caution:
All the files referred to below are created automatically (by MD_SCOPE or its system utilities) and therefore do not require modification.

5.1 MD_SCOPE.INI file

This initialization file contains program settings, which you have made while the program was running. The file is saved as an ASCII file when you exit MD_SCOPE and just before startup of MD_SHELL. When MD_SCOPE is restarted this file is read in again with the program settings last made. If MD_SCOPE cannot find the file or the file is faulty the default program settings will be used. In this case MD_SCOPE will first display the *"Language"* window, in which you have to set the language of your choice. As all settings can be made directly from the program, there is no need to discuss the individual initialization parameters in great detail at this point.

For use in a network setup this file must be located in a separate directory for each user with assigned read-write access rights and be accessible via the LWPROFILES DOS variable (see also section "Installation in a network environment").

Make sure that the MD_SHELL path is set correctly. Otherwise, you will not be able to switch from MD_SCOPE to MD_SHELL. If the setting is incorrect, choose the *"MD_SHELL path"* menu item where you can automatically correct your entry.

5.2 Resource files (*.UIR)

The resource files contain all the details of the graphics interface and must be located in the same directory as MD_SCOPE.EXE. Each language has its own resource file. These are binary files and must not be modified as otherwise stable program operation cannot be ensured.

5.3 Text files (*.TXT)

The text files contain all the ASCII texts required by MD_SCOPE when running. Each language must have its own text file. Any modification of this file may cause MD_SCOPE to crash and hence is not permitted!

5.4 ADAPTER.PRO file

This file contains the system-specific adaptation of your video adapter. It is generated by the ADAPTER.EXE utility and read by MD_SCOPE. For use in a network setup this file must be located in a separate directory for each user with assigned read-write access rights and be accessible via the LWPROFILES DOS variable.

5.5 HARDCOPY.PRO file

The HARDCOPY.PRO file contains all settings of the selected printer driver. It is generated by the HCSELECT.EXE utility and required by MD_SCOPE for hardcopy printout. For use in a network setup this file must be located in a separate directory for each user with assigned read-write access rights and be accessible via the LWPROFILES DOS variable.

5.6 PRINTER.DAT file

This file is used by the HCSELECT.EXE utility and contains a list of all supported printer drivers. It must be located in the current program directory together with the MD_SCOPE.EXE and HCSELECT.EXE files.

5.7 Measured data (*.:SCP)

These files are MD_SCOPE measured value files. They contain sample measured value trace of the MOVIDYN® Servo Controller. All MD_SCOPE measured value files are saved in ASCII format. They should not be modified, however, as loss of data may result.

5.8 The parameter files (*.PAR)

These files contain the parameter data of the MOVIDYN® Servo Controllers. They can be created and used from the MD_SCOPE and the MD_SHELL user interfaces. When saving the measured value files (*.SCP) MD_SCOPE version 2.0 and higher will at the same time also save the parameter files valid at the time of data transmission. Using MD_SCOPE or MD_SHELL these parameter files can be copied to the servo controller again at any time.

MD_SCOPE parameter files which have been saved together with a measured value file will have the following entry in the comment line *"... Created by MD_SCOPE"*.

6. Operation of Keyboard and Mouse

In addition to menu assistance in accordance with the SAA standard MD_SCOPE offers graphic elements for program operation and readout. These elements can all be operated with the mouse or from the keyboard. This section introduces all control and display elements.

6.1 Menu bar

To operate the menu bar using the mouse:

Click on the menu title you want to activate. A pull-down menu associated with this title will appear (Figure 23) with a set of menu options avaible from this menu title.
To select a menu option click on it with the mouse. The pull-down menu will be removed automatically.
Click anywhere outside the menu bar to remove the menu without selecting an option.
Menu titles and items that are dimmed are not selectable.

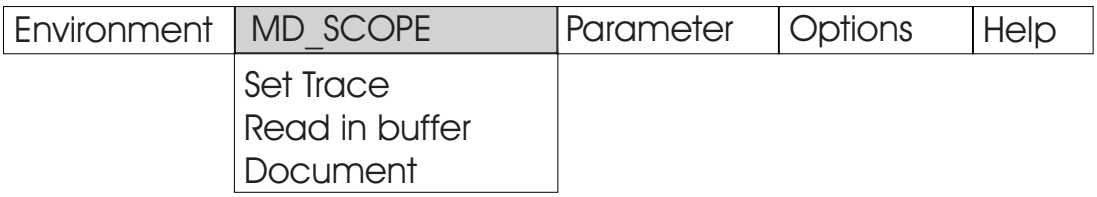

Figure 23: The menu bar MD0139AE

To operate the menu bar from the keyboard:

Key:	Function performed:
ALT + 1st letter of menu title	Selects menu title
then: 1st letter of menu item	Executes menu item
RIGHT, LEFT arrow key	Selects adjacent menu titles
RETURN	Executes the selected menu item
ESCAPE	Removes pull-down menu without executing command

Table 11: Keyboard operation of menu bar

6.2 Selection of window controls

Almost all MD_SCOPE windows contains several control and display elements, which can be operated from the keyboard or using the mouse. To move from one control to another move the mouse pointer to the element of your choice and click on it. If you use the keyboard press the TAB key to move to the next control. To return to the previous control press SHIFT+TAB.

6.3 Operation of controls

MD_SCOPE uses different types of controls, which can be operated from the keyboard or using a mouse. Frequently, they are displayed as electric controls, so their graphic representation often already explains their action or operation. Nevertheless this chapter will discuss all keystroke combinations and mouse movements.

6.3.1 Binary switch controls

You use binary switches to select between two states. The slider position represents the current selection. You will find this control in the *"Set Trace"* window where it serves to activate the measured value tracing.

Figure 24: Sample binary switch control MD0140AE

To operate the control from the keyboard:

Key:	Function performed:
UP ARROW or HOME	Selects upper switch state
DOWN ARROW or END	Selects lower switch state
SPACEBAR	Toggles the switch state

Table 12: Keyboard operation of binary switch control

To operate a binary switch with the mouse click on the upper or lower portion of the switch to select the desired setting.

6.3.2 Slide controls

Slide controls are characterised by a variable number of switch settings and therefore are used to select from a set of more than two functions. In MD_SCOPE you fill find this type of control in the *"Select interface"* window for example to select the PC and MOVIDYN® interface. The slider position represents the current selection.
To operate a slide control with the mouse click on the desired slide position.

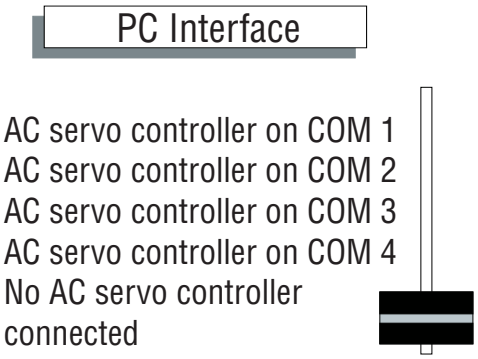

Figure 25: A sample slide control MD0141AE

To operate a slide control from the keyboard, see table 13 below:

Key:	Function performed:
UP ARROW	Moves slider up one position
DOWN ARROW	Moves slider down one position
HOME	Moves slider to the top of the slide
END	Moves slider to the bottom of the slide

Table 13: Keyboard operation of a slide control

6.3.3 Ring controls

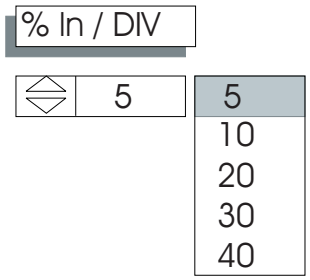

Figure 26: A sample ring control MD0142AE

You use ring controls to select from a group of functions. Unlike a slide control, however, the group of items is arranged as a ring, i.e. there is no start and no end position on this control. The last item is immediately followed by the first one etc. A ring control can also be operated in pop-up format.

To operate a ring control with the mouse click on an item to select it:

- On the up arrow to move up one position.
  (Hold the mouse button down on the up arrow to scroll up.)
- On the down arrow to move down one position.
  (Hold the mouse button down on the down arrow to scroll down.)
- On the ring control to display a linear list of all ring items in a pop-up panel.
- On the desired item in the pop-up window to select it. This removes the pop-up window and updates the ring control to match the new selection.
- Outside the ring control to remove the pop-up panel without changing the selected item.

To operate a ring control from the keyboard, see table 14 below:

Key:	Function performed:
SPACEBAR	Displays a list of all ring items in a pop-up window
UP ARROW	Highlights the previous item in the list
DOWN ARROW	Highlights the next item in the list
HOME	Highlights first item in the list
END	Highlights last item in the list
PAGE-UP	Scrolls up one window page
PAGE-DOWN	Scrolls down one window page
RETURN	Selects the highlighted item
ESCAPE	Removes pop-up window without changing the selected item

Table 14: Keyboard operation of ring controls

6.3.4 ON/OFF pushbutton

ON/OFF pushbuttons can only take the states ON and OFF. When in the ON state, the pushbutton is displayed as being "pressed" (see Figure 27). To operate an ON/OFF pushbutton with the mouse click on it with the left mouse button. The pushbutton will change its state each time you click the mouse button. To operate an ON/OFF pushbutton from the keyboard see table 15.

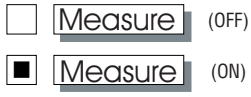

Figure 27: ON/OFF pushbutton MD0143AE

Key:	Function performed:
PAGE-UP/HOME	Switches on
PAGE-DOWN/END	Switches off
SPACEBAR	Toggles the pushbutton state

Table 15: Keyboard operation of ON/OFF pushbuttons

6.3.5 Pushbutton controls

You use pushbutton controls to activate a program function. The associated function appears on the control label. Operating these controls will always get you to the *"Help"* and *"OK"* controls.

Figure 28: A pushbutton control

To operate a pushbutton control with the mouse click on the button.

All of MD_SCOPE's pushbutton controls can be accessed directly from the keyboard, i.e. to each pushbutton control of a certain window a key (e.g. function key, ESCAPE, etc.) is assigned. In the "Main menu" section of this manual you will find the key assignment of the pushbutton controls together with the window description. To operate any of MD_SCOPE's pushbutton controls from the keyboard:

Key:	Function performed:
TAB, SHIFT + TAB	Selects pushbutton control
ENTER	Operates pushbutton control

Table 16: Keyboard operation of pushbutton controls

The pushbutton control will depress momentarily to indicate that it was selected.

Generally, every window which is activated with the menu bar includes the *"Help", "OK"* and *"ESC"* button controls. In addition to the above method these controls can also be directly accessed from the keyboard. Table 17 below shows the key assignment for these functions.

Keys:	Function performed:
ESCAPE	Operates "OK" and "ESC" buttons to remove current window
F1	Operates "Help" button and calls up on-line Help

Table 17: Keyboard operation of pushbutton controls *"Help", "OK"* and "*ESC".*

6.3.6 Selection list controls

You use selection list controls to select an item from a list. In MD_SCOPE you will find selection list controls for example in the *"Trace selection"* window to assign measured value traces Y1 - Y5, but also in the file selection windows to select files to be retrieved or saved.

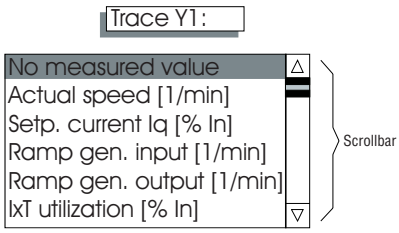

Figure 29: Selection list control MD0145AE

Move the scroll bar marker on the right side of the list to scroll the list up and down.

To operate the selection list control with the mouse:

- Click on any item to highlight it.
- Double-click on an item to select it.
- Click on the up arrow in the scroll bar to highlight the previous list item. (Hold the mouse button down to scroll through the list).
- Click on the down arrow in the scroll bar to highlight the next list item. (Hold the mouse button down to scroll through the list).
- Click on the scroll bar marker and drag it to a new item.
- Click above or below the scroll bar marker to scroll the list up or down one page at a time.

To operate the selection list control from the keyboard, see table 18 below:

Key:	Function performed:
UP ARROW	Highlights the previous list item
DOWN ARROW	Highlights the next list item
HOME	Scrolls to the top of the list
END	Scrolls to the bottom of the list
PAGE-UP	Scrolls up one page
PAGE-DOWN	Scrolls down one page
RETURN	Selects the highlighted item

Table 18: Keyboard operation of the selection list control

Caution:
To select a list item you must double-click on the item or press RETURN to confirm.

6.3.7 Input/output controls

Input/output controls are used to display or enter numeric data or text strings. There is a difference between indicator controls which cannot be edited and input/output controls which display current data and accept user input. In MD_SCOPE you will find indicator controls in the main program window for example, which display the measured data acquired with the measured value cursor. The *"Speed controller parameters"* window also contains input/output controls. Speed controller data received from the MOVIDYN® servo controller are read out while at the same time you can enter new parameter values to be sent to the Servo Controller. These controls also appear in the *"System comments"* window. When a numeric/string control that can accept user input is active, a cursor appears in the control.

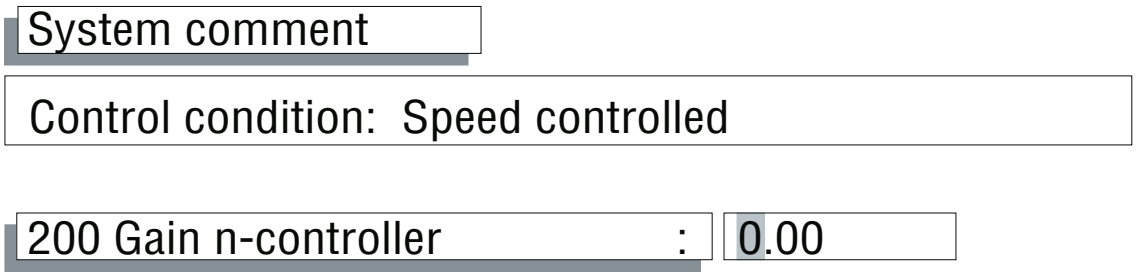

Figure 30: Sample input/output controls MD0146AE

Operation of input/output controls is from the keyboard only, as these controls require numeric value or text string input. You may, however, use the mouse to position the cursor inside the control and thus activate it. Depending on the character set used in MD_SCOPE not all special characters may be available all the time.

The following table lists keystrokes with special functions:

Key:	Function performed:
RIGHT, LEFT ARROW	Moves the cursor
HOME	Moves the cursor to the beginning of the text
END	Moves the cursor to the end of the text
CRTL + D	Erases the text from the current cursor position to the end of the text
F10	Toggles between overtype and insert mode
RETURN	Accepts the input

Table 19: Keyboard operation of input/output controls

6.4 Plot area control

The plot area of the main program window serves to plot the acquired measured data in waveform and analyse them. It includes a variety of oscilloscope-type functions. Vertically the plot area is divided into 10 lines (Figure 18). These lines provide the basis for the scaling switch control of the main program window. There are three cursors available in the plot area, two for zooming functions and one for measured value analysis. The two white zoom cursors mark the trace section to be zoomed out when you select the *"Zoom out X"* control. The position of the third cursor, the measured value cursor, appears at the bottom of the screen. This is where the actual sampling instant is read out, whereas the X-axis of the plot area only reads the sampling sequence number of the data points on the trace.

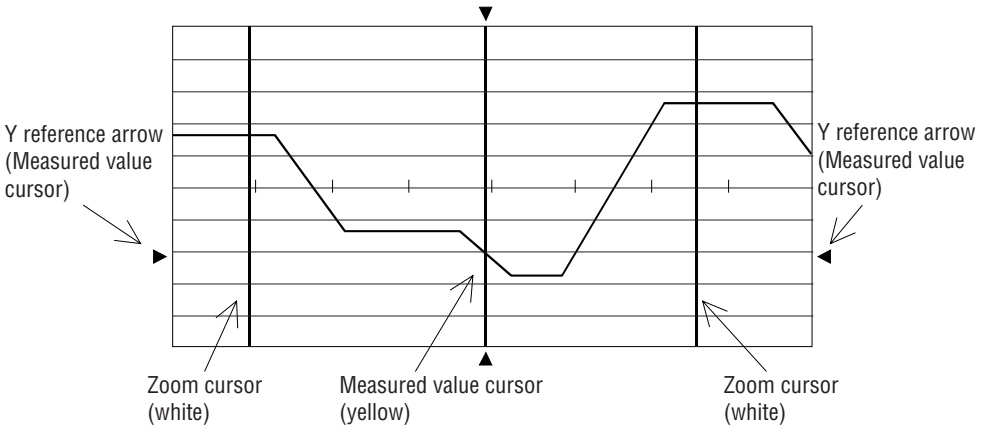

Figure 31: The MD_SCOPE plot area MD0147AE

While the zoom cursors can be moved freely inside the whole plot area, the measured value cursor always snaps to the nearest data point. This ensures direct assignment of measured value and sampling instant. Table 15 explains how to operate the individual cursors from the keyboard. To operate the cursors with the mouse just click on the desired cursor.

Key:	Function performed:
UP ARROW	Moves to previous cursor
DOWN ARROW	Moves to next cursor

Table 20: Toggling between plot area cursors

You can tell the active cursor by the 4 reference arrows at the plot area borders. The vertical reference arrows of the measured value cursor snap to the measured value trace which is used as reference for the measured value cursor.

To activate the plot area using the mouse just click inside the plot area or operating from the keyboard press TAB or SHIFT+TAB. The displayed cursor reference arrows indicate that the display area is active.

6.4.1 Zoom cursors

You use the zoom cursors (white) to delimit a section of the plot area and zoom it out in the horizontal direction using the *"Zoom out X"* control of the main program window. Table 16 explains how to operate the zoom cursors from the keyboard. The zoom cursors are freely movable inside the plot area. To operate the cursors with the mouse click on them and while holding the mouse button drag the cursor to the desired position.

Key:	Function performed:
RIGHT ARROW	Moves zoom cursor right ten pixels
LEFT ARROW	Moves zoom cursor left ten pixels
UP ARROW	Moves zoom cursor up ten pixels
DOWN ARROW	Moves zoom cursor down ten pixels
SHIFT + RIGHT ARROW	Moves zoom cursor right one pixel
SHIFT + LEFT ARROW	Moves zoom cursor left one pixel
SHIFT + UP ARROW	Moves zoom cursor up one pixel
SHIFT + DOWN ARROW	Moves zoom cursor down one pixel
CRTL + RIGHT ARROW	Moves zoom cursor to the right edge of the plot area
CRTL + LEFT ARROW	Moves zoom cursor to the left edge of the plot area
CRTL + UP ARROW	Moves zoom cursor to the top edge of the plot area
CRTL + DOWN ARROW	Moves zoom cursor to the bottom edge of the plot area
HOME	Moves zoom cursor to the upper left corner of the plot area
END	Moves zoom cursor to the lower right corner of the plot area

Table 21: Keyboard operation of zoom cursors

6.4.2 Measured value cursor

The measured value cursor (yellow) allows you to analyse individual data points sampled. In the lower left section of the main program window details of the current position of the measured value cursor are displayed. Displayed are the sampling instant in ms and the measured values of channels Y1-Y5. Table 22 shows how to operate the measured value cursor from the keyboard. To operate the cursor with the mouse click on it and while holding down the mouse button drag it to the desired position. As this cursor only snaps to real data points it will only snap from data point to data point when dragged.

Key:	Function performed:
RIGHT ARROW	Moves measured value cursor to the next point on the current trace
LEFT ARROW	Moves measured value cursor to the previous point on the current trace
UP ARROW	Moves measured value cursor to the next point on the current trace
DOWN ARROW	Moves measured value cursor to the previous point on the current trace
SHIFT + RIGHT ARROW	Moves measured value cursor forward 10 points on the current trace
SHIFT + LEFT ARROW	Moves measured value cursor back 10 points on the current trace
SHIFT + UP ARROW	Moves measured value cursor forward 10 points on the current trace
SHIFT + DOWN ARROW	Moves measured value cursor back 10 points on the current trace
CRTL + RIGHT ARROW	Moves measured value cursor right to the closest point in the X direction on the current trace
CRTL + LEFT ARROW	Moves measured value cursor left to the closest point in the X direction on the current trace
CRTL + UP ARROW	Moves measured value cursor up to the closest point in the Y direction on the current trace
CRTL + DOWN ARROW	Moves measured value cursor down to the closest point in the Y direction on the current trace
HOME	Moves measured value cursor to the first visible point on the current trace
END	Moves measured value cursor to the last visible point on the current trace

Table 22: Keyboard operation of the measured value cursor

Recommendation:
Occasionally you will find that the measured value cursor cannot be positioned properly, i.e. it will not stay at the data point specified but snap to another one. To prevent this switch the Y-reference point of the measured value cursor to a visible trace channel (drag the measured value cursor with the mouse and place the mouse pointer directly on the trace).

The reference arrows at the right and left plot area borders then snap to the selected trace channel. Table 23 explains how to select the Y-reference point of the measured value cursor from the keyboard.

Key:	Function performed:
SHIFT + PAGE-UP	Switches measured value cursor to next trace channel (Y1-Y5)
SHIFT + PAGE-DOWN	Switches measured value cursor to previous trace channel (Y1-Y5)

Table 23: Switching the measured value reference point

6.4.3 Differential measurement cursors

The differential measurement cursors are only active if you have switched on the function for determining delta x and delta y differential measurements in the main program window using the *"Measure"* button. The measurement cursors are represented as cross hairs and replace the white zoom cursors in this program state. The differential measurement cursors snap onto a trace, and as such describe a clear data point at any time. You can allocate a differential measurement cursor to a trace using the mouse or the keyboard, as described in the previous section *"Measured value cursor"*.

You can also zoom in a horizontal direction when measuring the difference. For this purpose, the area must be delimited with the two differential measurement cursors similarly to the zoom cursors.

7. First Steps

This chapter is designed to provide quick information on how to commission the MOVIDYN® Servo Controller using MD_SCOPE. It discusses the different steps necessary to record and visualize/analyse measured data. For more detailed information please refer to the respective chapters of this manual.

7.1 Establishing a communication link

Connect the serial interface of the MOVIDYN® supply module with one of your PC's RS-232 interfaces. Make sure the units are switched off when connecting them (See also section 2.4). Then switch both units on.

7.2 System parameter setting with MD_SHELL

Start the MD_SHELL user interface and select menu item *"Interfaces"* to set the appropriate PC and MOVIDYN® interfaces as well as the axis module address. Now perform all the necessary parameter settings.

At this point decide whether you want to stop the measured value tracing in MD_SCOPE via an external terminal (in real time) or from the PC. MD_SCOPE's option *"Trigger source: Ext. terminal"* requires you to assign the *"Ext. trigger"* function to a binary input of the MOVIDYN® Servo Controller at this stage, using the MD_SHELL user interface, and to set the corresponding switch at the unit. If later you wish to stop the recording from the PC, no special parameter setting will be required.

7.3 Set trace

Start up MD_SCOPE and set the correct PC and MOVIDYN® interfaces as well as axis module address in menu item *"Options/Select Interface"*. Select menu item *"MD_SCOPE/Set trace"* to open the *"Set trace"* window. If the communication link has been established correctly (i.e. all controls are visible), the following settings will appear:

- Sampling time: [ms]: 1
- Trigger source: Ext. terminal

Start the tracing by operating the *"Tracing=Start"* switch control. The LEDs will now signal the servo controller recording status. The *"Trace active"* LED signals that the measured values are being traced. At the same time all controls are dimmed to signal that sampling criteria cannot be changed while the recording goes on. After approx. 2 seconds the *"Trace overflow"* LED will signal that the measured value buffer has been fully written once already. From this point on the complete MD_SCOPE trace buffer can be used. The buffer is overwritten until the selected trigger source stops the recording. The *"Trigger active"* LED signals the state of the trigger source. The recording is now finished correctly. All controls are active again.

Caution:
At this point do not perform any settings and close the *"Set trace"* window.

7.4 Reading measured values

To start the trace data transfer select menu item *"MD_SCOPE/Read measured values"*. The *"Trace data transfer"* window will appear. Now the complete trace buffer is read in from the servo controller. The read-in progress is indicated in percent. After approx. 40 seconds the complete trace buffer is read in. The data are represented in the plot area of the main menu program and are available for further editing. Menu item *"MD_SCOPE/Measured data"* shows the tracing criteria and speed controller parameters valid at the time of trace data transfer. You may now add your own comments if you wish and save the data to a file using the *"Environment/Save"* command.

7.5 Setting speed controller parameters

To optimize the drive setup select menu item *"Parameters/Speed controller"* to modify controller parameters and start a new recording (step 3: Set trace).

8. Messages

This section describes all the messages that can occur when working with MD_SCOPE. In general, messages will be displayed on the screen in the form of information or decision windows. In order to be able to continue with the program, you have to acknowledge these messages. In the case of information windows, MD_SCOPE issues a message which you have to acknowledge either by pressing the *"OK"* button or with the "ESCAPE" key. In the case of decision windows, MD_SCOPE gives the message in the form of a question which you have to answer. You thus determine how the program is to continue.

8.1 Information windows

Below you will see all the possible messages which may occur when using MD_SCOPE.

0: File faulty or not an MD_SCOPE file!
You entered a wrong file name when loading a file or the file specified is faulty.

1: File not found!
The file specified has not been found.

2: No measured data available!
There are no measured data available for processing.

3: Only SCP file extension allowed!
When saving the measured values, only file names ending in the extension *.SCP are allowed.

4: PC interface not available/occupied!
The PC interface (COM port) you have selected is occupied by the mouse or is not available on your PC.

5: DEMO version: Selection of measured variables not possible!
Selection of measured variables is not possible in this DEMO version.

6: Please observe correct sequence!
Please observe the correct sequence when selecting measured variables.

7: The same measured value cannot be traced twice!
Multiple tracing of the same measured variable is not possible.

8: The selected unit is not a MOVIDYN® 500 Servo Controller!
You have set up a communications link with a unit which is not a MOVIDYN® 500 Servo Controller.

9: No measured data available!
There are currently no measured data available.

10: Select section with zoom cursors!
Use the zoom cursors to first delimit a section which is to be zoomed in horizontally.

11: Preliminary test version! Not a customer version!
This preliminary program version may contain errors and is only for SEW internal use. It cannot be guaranteed that the program will run smoothly and that parameters can be set correctly. **This software may not be made available to customers!**

12: Not possible in the DEMO version!
This function is not possible in the DEMO version.

13: Insufficient user memory! Tracing interrupted!
MD_SCOPE requires approximately 560 KB of free memory. Otherwise the program may not run properly!

14: Check printer connection!
The printer is offline or not connected.

15: No data exported!
No data has been exported.

16: Not implemented!
This function is not implemented in the current program version.

17: Recording still active!
The measured data recording function in the servo controller is still active. In this state, no changes to the MD_SCOPE system parameters can be made and no measured data can be read from the servo controller.

18: MD_SHELL.EXE not found in specified path!
The MD_SHELL.EXE program has not been found in the directory path given in the *"Options/MD_SHELL path"* menu item. Please check the path entry.

19: File not found!
The language files for the language selected are not available or not complete.

20: Recording aborted! No data available!
You have aborted a measured value recording. No measured data are available. Measured value recordings may only be ended correctly with a trigger pulse (PC or external terminal).

21: Cannot run program! Please exit MD_SCOPE!
MD_SCOPE cannot run because of memory problems. Please ensure that at least 560 KB of free memory is available.

22: Load moment of inertia cannot be calculated!
It is not possible to calculate the load moment of inertia. Check whether you have satisfied the minimum requirements for a setpoint change. See the "Commissioning" menu item section for further details on this message.

23: Positioning control time interval cannot be calculated!
It is not possible to calculate the time interval of the higher-level positioning control. Check whether the "ramp generator input [1/min]" measured variable is clearly stepped. Try again with changed positioning control setpoint ramps. See the "Commissioning" menu item section for further details on this message.

24: The axis module rated current cannot be read in!
MD_SCOPE runs in non-local mode, there is no servo controller connected though. Switch MD_SCOPE to local mode and enter the axis module rated current manually.

25: Not a MOVIDYN® parameter file!
The specified parameter file is not a MOVIDYN® parameter file.

26: Transmission error! Please check serial connection!
A transmission error has occurred. Check the serial connection and the axis address against the axis address set in MD_SCOPE.

27: Copying completed!
Transmission of the parameter data from or to the servo controller was successfully completed.

28: Re-parameterise the servo controller!
A transmission error has occurred during transmission of the parameter data. Controller parameters could not be set. The servo controller now has a mixture of old and new parameter data. Set parameters of the controller again or activate the factory setting.

29: Only the file extension .PAR is permitted.
For parameter files only the file extension *.PAR is permitted.

30: File already exists! Please choose new file name!
A file with the file name specified already exists. Please choose another name.

31: Parameter file does not exist!
The parameter file saved together with the measured value file was not found in the same directory.

32: Not enough user memory! Calculation not possible!
There was not enough free user memory available for the program to calculate the load moment of inertia or the time interval. See the "Commissioning" menu item section for further details on this message.

33: Transmission of parameter data aborted!
A transmission error occurred, the transmission of the parameter data was aborted. Check the communications link.

34: Speed changes too small for time interval calculation!
The change in speed given by the positioning control is too small. See the "Commissioning" menu item section for further details on this message.

35: Not enough differential values!
The speed differential values determined for calculation of the time interval do not suffice to carry out a definite calculation of the time interval. See the "Commissioning" menu item section for further details on this message.

36: Parameter lock active! Parameterisation not possible!
You have activated the *"Parameter lock = YES"* parameter. The servo controller cannot be parameterised. Remove the parameter lock before transmitting a parameter file.

8.2. Decision windows

The following messages require you to make a decision as to how the program is to continue. The following messages may occur:

0: Current measured data not saved! Do you wish to save?
The measured data currently loaded have not been saved to a file.
Yes: Save the measured data to a measured value file and a parameter file resp. and continue the program.
No: Cancel the current measured data, i.e. do not save them and continue the program straight away.

1: Data file (*.SCP) already exists! Do you want to overwrite it?
A data file of the same name already exists. Do you still want to save it?
Yes: The existing data file will be overwritten and will be lost.
No: The existing data file will not be overwritten; a new file name will be chosen.

2: Are you sure you want to exit MD_SCOPE?
You have activated the *"Environment/Exit"* menu item to exit MD_SCOPE.
Yes: Exits MD_SCOPE correctly, all settings are saved in the MD_SCOPE.INI initialization file.
No: MD_SCOPE is not exited.

3: Are you sure you want to start MD_SHELL?
You have activated the *"Environment/Start MD_SHELL"* menu item to switch to the MD_SHELL user interface.
Yes: Exits MD_SCOPE correctly, all settings are saved in the MD_SCOPE.INI initialization file. Then the program automatically switches to the MD_SHELL directory, calling up the MD_SHELL user interface.
No: The program does not switch to the MD_SHELL user interface.

4: Parameter data do not relate to measured data! Load anyway?
A parameter file of the same name as the measured data file was found, however their date and time attributes do not match. Consequently, there is no guarantee that the two files actually describe the same parameter set. Do you still wish to load the parameter file to your PC?
Yes: The parameter file is loaded to the PC together with the measured data file. This enables you to take a look at the parameter settings effective at the time when the measured values were recorded. To do this, you have to activate the *"MD_SCOPE/Document"* menu item.
No: Only the measured value file will be loaded to the PC. In the *"MD_SCOPE/Document"* menu item only the details of the measured value file will be displayed.

5: Parameter file already exists! Overwrite?
A parameter file of the same name already exists. Do you want to overwrite this existing file?
Yes: The existing parameter file will be overwritten and thus be discarded.
No: The existing parameter file will not be overwritten and another file name will be chosen.

6: Do you really want to abort the data transmission?
You have interrupted the transmission of measured data from the MOVIDYN® Servo Controller.
Yes: The data transmission will be aborted and all transmitted data discarded.
No: The data transmission will be continued.

7: Transmission error! Repeat data transmission?
Errors have occurred during data transmission. Check your communications link.
Yes: The data transmission is continued. The faulty message is repeated again.
No: The data transmission is aborted.

Index

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