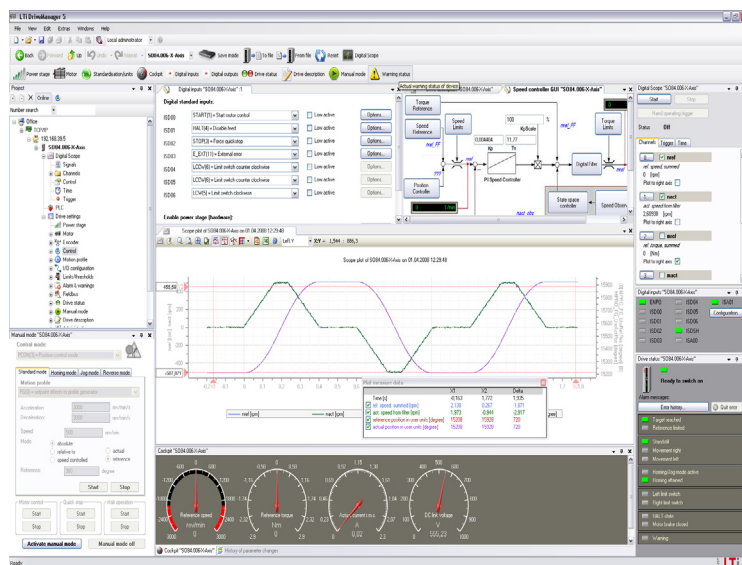


DRIVEMANAGER 5 User Manual



Service and
Diagnostics Tool





DRIVEMANAGER 5

DriveManager DM5 is a tool for communication between the multi-axis servocontroller ServoOne and a PC.

This service and diagnostics tool assists commissioning personnel in

- Commissioning
- Parameter setting
- Troubleshooting
- Analysis of control performance

We reserve the right to make technical changes.

The content of our Operation Manual was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated in line with ongoing technical developments in our products.

Information and specifications may be subject to change at any time. Please visit www.lt-i.com for details of the latest versions.

DRIVEMANAGER 5 User Manual

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Version 5.3.4

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1. Safety

1.1 Measures for your safety

The instructions set out below should be read through prior to initial commissioning in order to prevent injury and/or damage to property. The safety instructions must be followed at all times.

1.1.1 Read the Operation Manual first!





	<p>Read the Operation Manual first!</p> <ul style="list-style-type: none"> • Follow the safety instructions! • Refer to the user information!
	<p>VElectric drives are dangerous:</p> <ul style="list-style-type: none"> • Electrical voltages 230 V to 480 V • Dangerously high voltages ≥ 50 V may still be present 10 minutes after the power is cut (capacitor charge). so always make sure the system is no longer live! • Rotating parts • Hot surfaces
	<p>Protection against magnetic and/or electromagnetic fields during installation and operation</p> <ul style="list-style-type: none"> • Persons fitted with heart pacemakers, metallic implants and hearing aids etc. must not be allowed access to the following areas: <ul style="list-style-type: none"> – Areas where drive systems are installed, repaired and operated. – Areas where motors are installed, repaired and operated. Motors with permanent magnets pose a particular hazard.
	<p>DANGER: If it is necessary to access such areas, suitability to do so must be determined beforehand by a doctor.</p>

Table 1.1 Safety instructions



	<p>Your qualification:</p> <ul style="list-style-type: none"> • In order to prevent personal injury or damage to property, only personnel with electrical engineering qualifications may work on the device. • The said qualified personnel must be familiar with the contents of the Operation Manual (cf. IEC364, DIN VDE0100). • Knowledge of national accident prevention regulations (e.g. BGV A3, formerly VBG 4, in Germany)
	<p>During installation observe the following instructions:</p> <ul style="list-style-type: none"> • Always comply with the connection conditions and technical specifications. • Comply with the standards for electrical installations, such as regarding cable cross-section, PE conductor and earth connections. • Do not touch electronic components and contacts (electrostatic discharge may destroy components).

Table 1.1 Safety instructions

1.2 Intended use

Drive controllers are built-in units intended for installation in stationary electrical systems or machines.

The drive controllers may not be commissioned (i.e. it may not be put to their intended use) until it has been established that the machine complies with the provisions of EC Directive 2006/42/EC (Machinery Directive); EN 60204 is to be observed.

Commissioning (i.e. putting the device to its intended use) is only permitted in compliance with the EMC Directive (2004/108/EC).



The ServoOne SO8000 conforms to the Low Voltage Directive 2006/95/EC.

The drive controllers conform to the requirements of the harmonised product standard EN 61800-5-1:2003.

If the drive controller is used for special applications (e.g. in areas subject to explosion hazard), the required standards and regulations (e.g. EN 50014, "General provisions" and EN 50018 "Flameproof housing") must always be observed.

Repairs may only be carried out by authorized repair workshops. Unauthorized opening and incorrect intervention could lead to death, physical injury or material damage. The warranty provided by LTI DRIVES would thereby be rendered void.



NOTE: Deployment of the drive controllers in non-stationary equipment is classed as non-standard ambient conditions, and is permissible only by special agreement.

1.3 Responsibility

Electronic devices are fundamentally not fail-safe. The company setting up and/or operating the machine or plant is itself responsible for ensuring that the drive is rendered safe if the device fails.

EN 60204-1/DIN VDE 0113 "Safety of machines", in the section on "Electrical equipment of machines", stipulates safety requirements for electrical controls. They are intended to protect personnel and machinery, and to maintain the function capability of the machine or plant concerned, and must be observed.

The function of an emergency off system does not necessarily have to cut the power supply to the drive. To protect against danger, it may be more beneficial to maintain individual drives in operation or to initiate specific safety sequences. Execution of the emergency off measure is assessed by means of a risk analysis of the machine or plant, including the electrical equipment to EN ISO 14121 (formerly DIN EN 1050), and is determined with selection of the circuit category in accordance with EN ISO 13849-1 (formerly DIN EN 954-1) "Safety of machines – Safety-related parts of controls".

1.4 Summary

All documents relating to the ServoOne and DriveManager DM5 are set out in the following list.

Available documents:

Document	Contents
Operation Manual	Safety, Technical data, Initial commissioning – ServoOne
Application Manual	ServoOne Function Description
CANopen User Manual	Application of the CANopen profile
EtherCAT User Manual	Application of the EtherCAT profile
SERCOS User Manual	Application of the SERCOS profile
PROFIBUS-DPV User Manual	Application of the PROFIBUS profile
Parameter Description	List of all accessible parameters
DRIVEMANAGER DM5	DM5 User Manual
CANopen + 2 analog outputs - Specification	Description of the two analog outputs
ENDAT2.1 / SINCOS MODULE SPECIFICATION	Description of the EnDat2.1 / SinCos channel

Table 1.2 Available documents

How do I read the documents?

- First be sure to read the Operation Manual, so as to install the device correctly.
- Refer to the Application Manual with regard to the basic configuration and operation of the motor.
- If the device is controlled by way of a field bus option card, please use the separate user manuals for the individual bus systems.
- The parameter list sets out all the parameters at the Local Administrator level (the user level of the DriveManager) in table form. Their sequencing is oriented to the layout of subject areas in the DriveManager DM 5. Consequently, the parameters are not numbered consecutively.
- Once wired up, the drive unit can be parameterised with the DriveManager DM5.0 and commissioned into operation.



Attention:

Failure to comply with the safety instructions during commissioning may pose a danger to life for the operating personnel and lead to destruction of the device.

Abbreviations

DRIVEMANAGER DM5	DM5
ServoOne	SO8
Oscilloscope software	Scope
Firmware (device software)	FW
Software	SW

Table 1.3 Abbreviations used in the document

Pictograms used

The safety instructions detail the following hazard classes:







Warning symbols	General explanation	Hazard class to ANSI Z 535
	ATTENTION: misoperation may result in damage to the drive or malfunctions.	Misoperation may result in damage to the drive or malfunctions.
	DANGER: from electrical tension! Improper behaviour may endanger human life.	Death or serious injury will occur.
	DANGER: from rotating parts! Drive may start up automatically.	Death or serious injury may occur
	NOTE: Information	Useful information

Table 1.4 Explanations of warning symbols

2. System requirements

Requirements	Interfaces	Supply package
<p>Supported operating systems:</p> <p>MS Windows XP, Vista</p> <p>MS WINDOWS .NET 2.0</p>	<p>USB port: Cable designation: CC-USB 0x: USB cable, A to B</p> <p>TCP/IP interface: Cable designation: CC-ECL 0x: Crosslink Ethernet cable, CAT 5, with 2 x RJ45 connectors</p>	 <p>No interface cable is supplied!</p> 



NOTE: The cable designation is at the same time the order code for purchase of interface cables.

The cables are not supplied with the DM5!

Installation of Windows .NET 2.0:	Instal. USB driver::	Configuration of the network port under WINDOWS XP:
<p>If the WINDOWS .NET 2.0 program is not installed on the computer, it needs to be installed.</p> <p>The installation is carried out in the language in which DM5 is installed.</p>	<ul style="list-style-type: none"> • Connect the PC and the device. • Connect a USB cable (CC-USB 03) to terminal X² or an Ethernet cable to X³. • After connecting, the driver must be installed. • The installation process is guided by a Setup Wizard. • The driver is also to be found on the supplied CD-ROM. 	<p>To enable communication via the Ethernet port, a number of settings need to be made.</p> <p>Since there are a large number of different configurations and application cases, this description focuses solely on connecting to a single drive unit.</p> <p>To configure the network port, the network connections must first be opened.</p> <p>Menu:</p> <p><START</p> <p><Settings</p> <p><Network connections</p> <p>From the dialog box which opens up, click on a network port to select it as the communication interface.</p>

Table 2.5 Preconditions for installation

The IP address of the network card:

To connect via TCP/IP, note that the IP addresses of the device and the PC must be different.

The IP address assignment must be in accordance with **Class C (192-223)**. The controller address always begins with the end digit 5 (see example).

Example:

- **Device IP address**

For the first controller in a network:

1st controller: 192.168.39.**5**.

2nd controller: 192.168.39.**6**.

3rd controller: 192.168.39.**7**... etc.

- **PC IP address**

Must differ from the device IP address in its last digit.

The device and PC addresses must never be identical.

e.g. PC: 192.168.39.**102**

Ethernet connection by red Crosslink cable



Figure 2.1 Ethernet connection by CC-ECL 0x: Crosslink Ethernet cable, CAT 5, with 2 x RJ45 connectors

2.1 Installing and uninstalling

Installation	Deinstallation
<ul style="list-style-type: none"> • Insert the CD-ROM. • Run Setup.exe. • Follow the instructions in the Wizard. <p>When installation is complete, the DM5 icon is placed on the desktop. Double-clicking on it connects to the controller which is physically connected to the PC.</p> <p>Then start configuring the controller parameters.</p>	<p>Uninstalling via WINDOWS</p> <ul style="list-style-type: none"> • Settings • Control Panel • Uninstall software

Table 2.6 Installing / uninstalling



ATTENTION: If the Ethernet port is used for communication between the DM5 and a controller, an installed and enabled software firewall may hinder communications. Make sure the firewall is configured correctly, and also check your network settings. Contact your system administrator if you are in any doubt.

3. Starting DriveManager DM5

3.1 Opening the user interface

When installation is complete, this icon is automatically installed on the desktop.

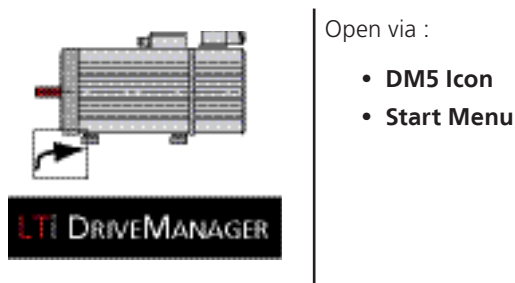


Figure 3.1 Opening the user interface



NOTE: Before a connection is made, the following points should be checked:

- The controller is being supplied with 24 V control voltage (X9 or X10).
- An Ethernet cable CAT5 RJ-45 or a USB cable CC-USB 0x is connecting the PC to the device.
- When connecting via Ethernet, a valid IP address must be configured on the PC.

3.2 Creating a new project:

- Menu **<File**
- Menu **<New** "Create new project"
- Double-click on **"New project"** (please give the project a unique name).
- Select the port to use (Ethernet or USB)

DM5 start screen

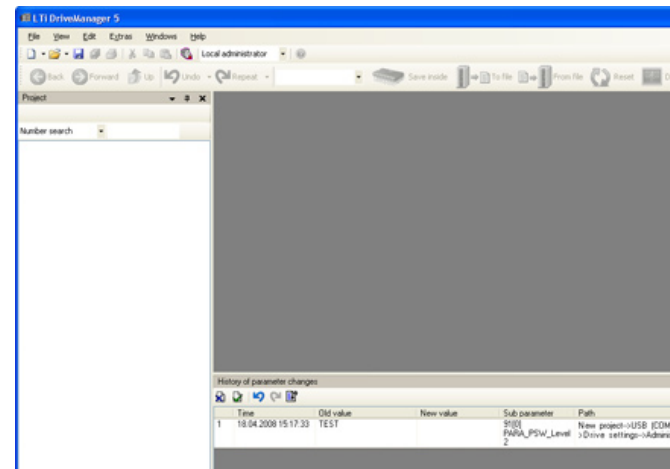


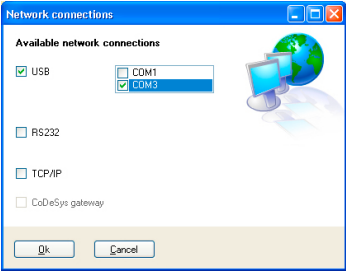
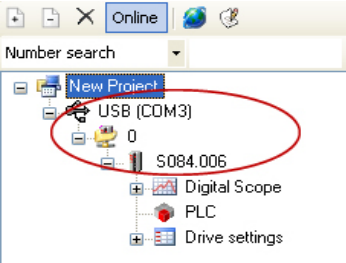
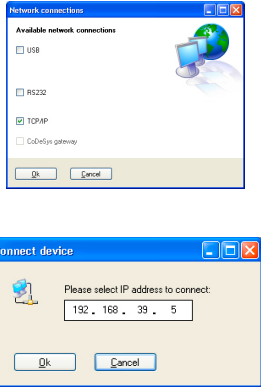
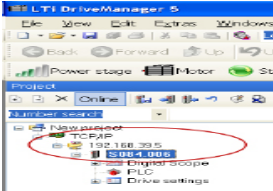
Figure 3.2 Blank DM5 user interface: No project yet exists



NOTE: Communication between the DM5 and one or more controllers can optionally be routed via the two diagnostic ports:

- USB
- Ethernet port TCP/IP

Port selection:

USB connection	TCP/IP connection
 	 <p data-bbox="645 770 1037 943"> It is possible to change the default IP address (192.168.39.5). If the application involves a network of multiple drive units, each unit is identified by its IP address. In our example only one active device is selected. Only one IP address is displayed in the explorer (see red marker below). </p>  <p data-bbox="645 1230 1037 1299"> When you double-click on the IP address 192.168.39.5 in the explorer DM5 begins downloading the settings. </p>



NOTE: If the directory structure (explorer) is displayed in black the communication has been successfully set up; the controller is in Online mode. Blue type signifies that the controller is in Offline mode; parameter changes are not updated.

Figure 3.3 Selecting the communication port

4. User interface

4.1 General

The user interface can be customised by users, and so may vary widely in appearance.

Parameters map defined variables from the device firmware which can be edited in **dialog boxes**, in the **Parameter Editor** or over **a bus system**. As well as single parameters, there are also many field parameters in the relevant subfolders. Each parameter is detailed by additional attributes (see table 4.4 Parameter information).



ATTENTION: Changes must be saved on the drive unit. Any data not saved will be lost as soon as the device is disconnected from the 24 V control voltage.

4.2 User interface layout

When DM5 is launched for the first time, the user level is preset to "Local Administrator".

On the left-hand side you see the explorer, enabling you to navigate through your projects and subject areas. On the right you see your open window layout, and the Parameter Editor if it is open.

You can customise the user interface to suit your personal needs. You can move the various windows around as you want.

If no project has yet been selected the user interface is empty!



Figure 4.1 DM5 user interface

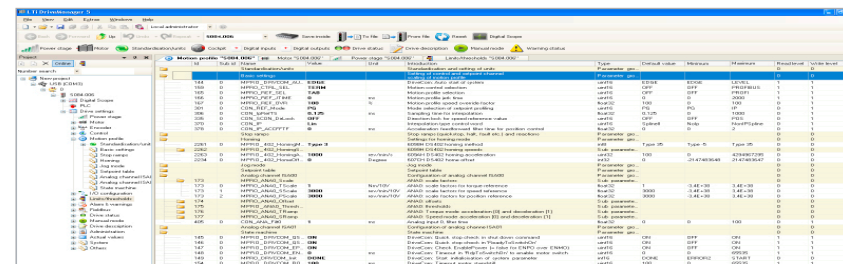
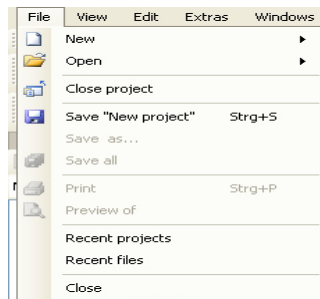


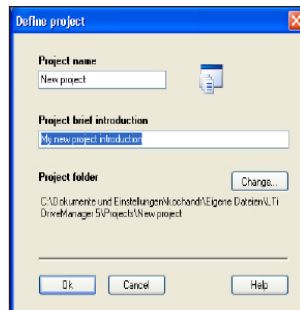
Figure 4.2 Parameter view in Parameter Editor



Windows menu bar



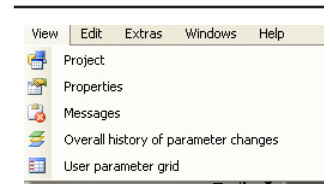
Screenshot 1



Screenshot 2

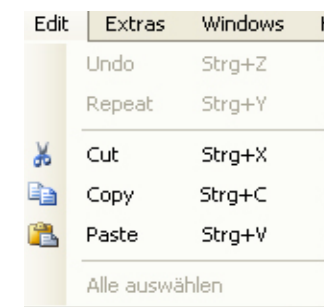
File

- **New**
 - Project: Dialog box to create a new project; see screenshot 2
 - Scope Plot: Open an empty plot. In the empty plot you can arrange curves from other plots.
- **Open:**
 - Open project,
 - Scope plots,
 - Parameter settings,
 - Message Logger (session log)
- **Save "New project"**
 - Save a project
- **Save "new plot" as...**
 - Save under a defined file name
- **Save all:**
 - All settings open in the background are saved
- **Recent projects:**
 - Path to recently opened projects
- **Recent files:**
 - Path to recently opened files
- **Close:**
 - Last setting is saved and DM5 closes.



View

- **Project**
 - Changes are updated and saved in the DM5 folder under Projects Properties
- **The Properties dialog**
 - The Properties dialog box is not supported.
- **Messages:**
 - All actions in DM5 are logged and saved when a session is ended. The log can be retrieved at any time.
- **Overall history of parameter changes:**
 - Log of all parameter changes made in a session.
- **User parameter grid:**
 - Create a user-defined parameter list.
 - A marked parameter can be dragged and dropped onto the "user parameter grid".



Edit

- **Cut:**
 - Take out
- **Copy:**
 - Copy:
- **Paste:**
 - Insert
- **Usage:**
 - Creating and editing a "user parameter grid" means creating a custom parameter list or selection of plots

Table 4.1 Windows menu bar

Table 4.1 Windows menu bar

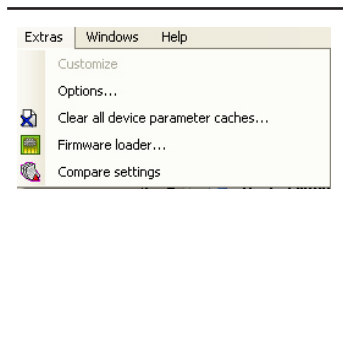
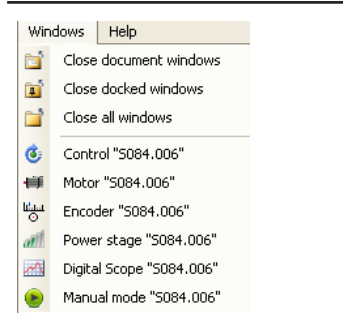
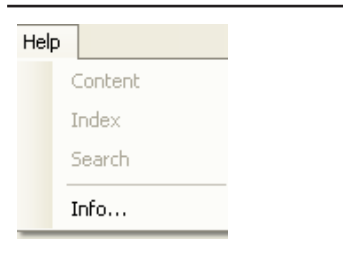
	<p>Extras:</p> <ul style="list-style-type: none"> • Options: <ul style="list-style-type: none"> - Options: - DM5 settings: What is saved how and where, e.g. paths to the storage locations of projects, data sets, log. Definition of the startup user level • Clear all device parameter cache... <ul style="list-style-type: none"> - Parameter value substitution texts can be deleted and new ones loaded • Firmware loader <ul style="list-style-type: none"> - Firmware download wizard • Compare settings <ul style="list-style-type: none"> - Data set comparison feature
	<p>Windows window handling</p> <ul style="list-style-type: none"> • Close document windows <ul style="list-style-type: none"> - Close all open windows • Close docked windows including <ul style="list-style-type: none"> - Drive status, Manual mode, etc.) • Close all windows: <ul style="list-style-type: none"> - Close all windows • Beneath the "Close all windows" option all the open windows are listed
	<p>Help</p> <ul style="list-style-type: none"> • Info: <ul style="list-style-type: none"> - Information about the installed DM5 version.

Table 4.1 Windows menu bar



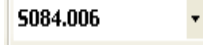

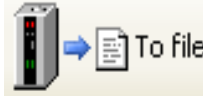
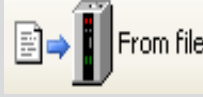


<p>2 Icon bar for data set handling</p> <p>A detailed description of data set handling procedures is given in section 4.4.</p>	
	<ul style="list-style-type: none"> • Compare data sets Data sets from an active device or a database can be compared.
	<ul style="list-style-type: none"> • Set the user level For a standard commissioning procedure the "Local Administrator" level is sufficient.
	<ul style="list-style-type: none"> • Display: Active device
	<ul style="list-style-type: none"> • Save parameter settings (data set) in device
	<ul style="list-style-type: none"> • Save a data set to a database
	<ul style="list-style-type: none"> • Load a data set from a database
	<ul style="list-style-type: none"> • Reset to factory defaults
	<ul style="list-style-type: none"> • Open the "Digital Scope" function

Table 4.2 Saving, loading, resetting data sets

Shortcut icon bar

These icons provide shortcuts to useful subject areas and status displays. The scope, device status and control windows can be accessed very quickly. The meanings of the various icons are explained in section 7, "Device status".

Power stage	Open the Power Stage dialog box
Motor	Open the motor parameters from the Parameter Editor
Standardisation/units	Open the "Standardisation" [scaling] selection box (Standard / DS402, Sercos, User)
Cockpit	Open the display instruments You can read the value/alarm range directly from the device setting.
Digital inputs	Status display for digital inputs
Digital outputs	Status display for digital inputs
Drive status	Device status: according to the state machine, error display
Drive description	Device type, FW version, serial number

Manual mode	Open the control window for manual mode
Warning status	Display of pending warning messages

Table 4.3 Icon bar with shortcuts to frequently used subject areas

The explorer

The explorer is a directory structure used to navigate around DM5. Its layout is familiar from that of Windows Explorer. The explorer displays the following information:

- Project name
- Communication method
- Number of interconnected controllers (first device corresponding to node 0)
- Device name
- Scope function
- PLC programming level (as from FW V 2.0)
- "Drive settings": Selection of subject areas

Figure 4.3 Explorer

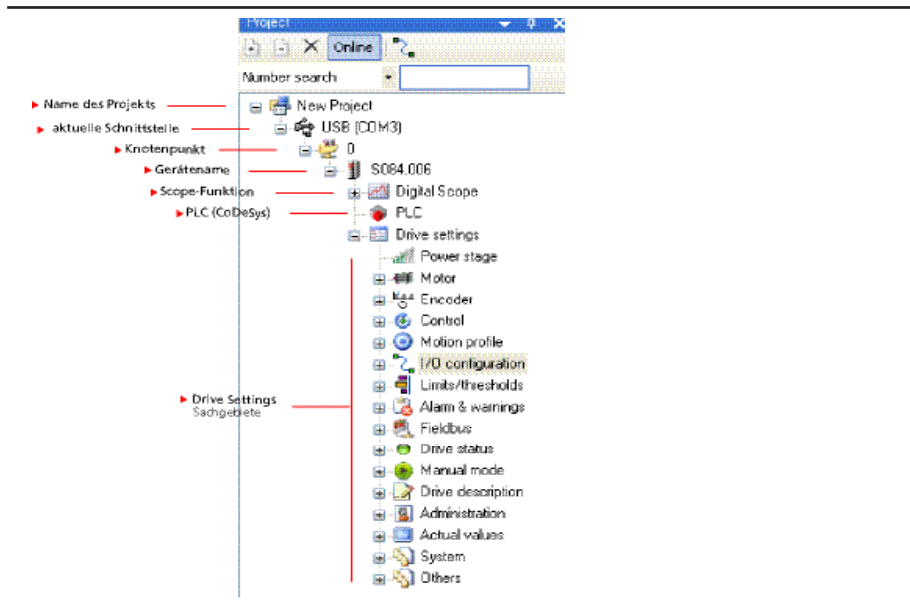


Figure 4.3 Explorer

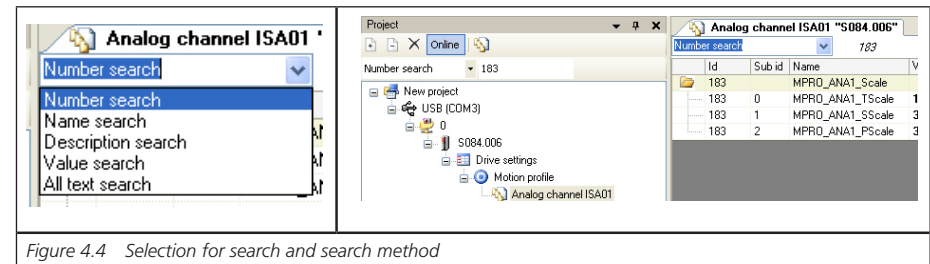


Figure 4.4 Selection for search and search method

The Control, Scope, I/O Status and Device Status function windows

5	7 9	8	10	11	The functions in these windows are dealt with in separate sections of this document.
Manual mode via the Control window Section 6	Scope window Section 5	Cockpit	I/O window	Drive status	
Status displays Section 7					

Figure 4.5 Function windows

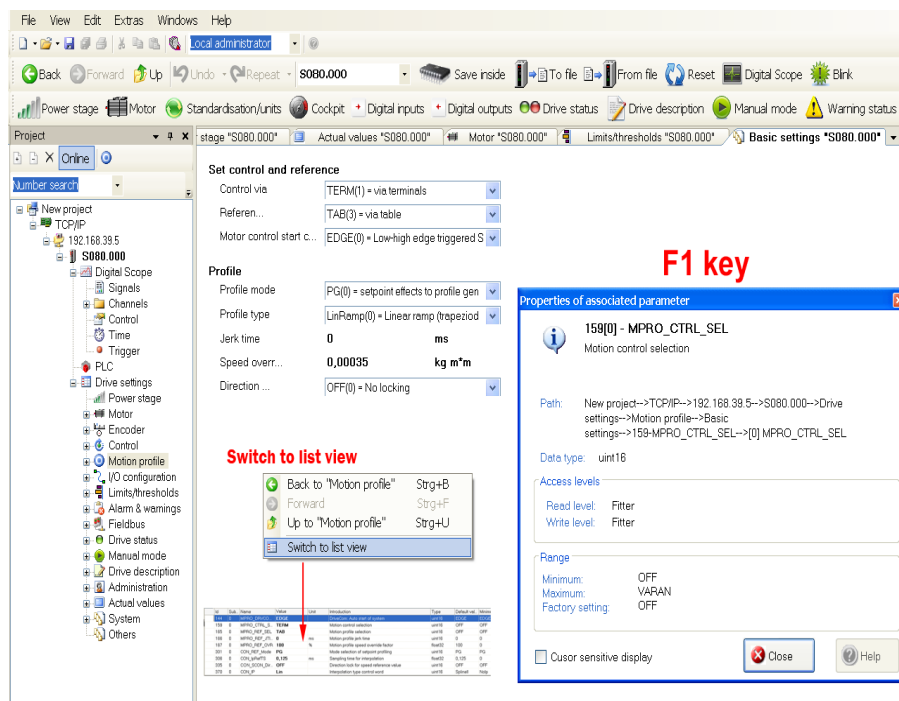
The search function

The search function permits searching based on a variety of criteria. If you are looking for a specific parameter number for example, the explorer displays the subject area(s) containing the parameter in question. When you double-click on the subject area in the explorer the parameter opens up in the Parameter Editor. To return to the previous view, clear the search term from the input box.

4.3 The Parameter Editor and parameter dialog boxes

To provide user-friendly handling, subject areas are presented as dialog boxes. The underlying parameters can all be displayed in table form.

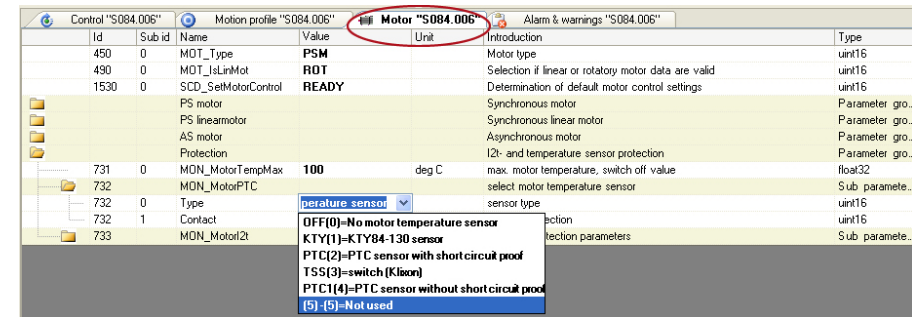
6 Dialog box and parameter views



- Each list box or input box in the dialog is a parameter. Details on the stored parameters can be viewed in a pop-up accessed by pressing the F1 key.
- To switch from the dialog box to a parameter list view, right-click anywhere inside the box and from the pop-up menu choose "Switch to list view".

Figure 4.6 "Motion profile" subject area: "Basic settings" dialog box with F1 pop-up

Accessing multiple subject areas



- The "Motor" subject area is the current open one (marked in red).
- The other subject areas, such as Control, are open in the background and can be quickly accessed.
- The open window in the foreground shows the settings of parameter P 0732 Type.

Figure 4.7 Opening multiple subject areas at once

Changing a parameter value

A parameter contains either a value or an option selectable from a list box. Preset numerical values are always based on the selected user units ("Standardisation" subject area).



NOTE: A parameter can only be written or read with the appropriate access rights (e.g. "Local Administrator"). A changed parameter must always be saved on the device. When editable online, a parameter executes a reaction on the device immediately, so inputs must always be carefully checked.

Parameter Data menu

Display field	Explanation	Example
Id	Parameter number	731
Sub Id	Index of field parameter	0
Name	Parameter name	MON_Motor TempMax
Value	Value	100
Unit	Unit	deg C
Introduction	Summary description	max. motor temperature, switch off value
Type	Data type	float32
Default value	Factory preset default value	100
Minimum	Minimum value	0
Maximum	Maximum value	1000
Read level	Read level	0
Write level	Write level	1

Table 4.4 Parameter data

Parameter dialog box

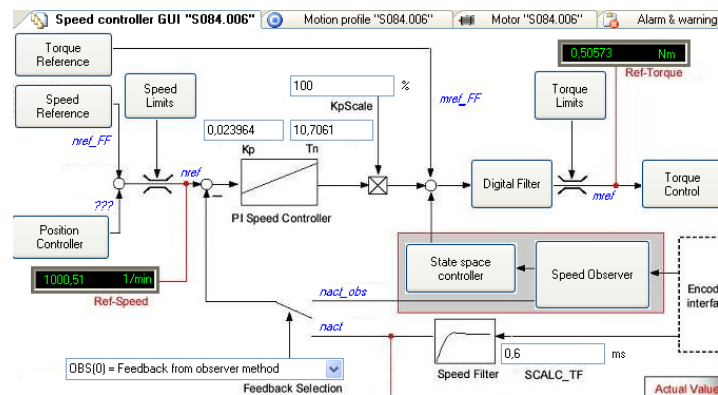


Figure 4.8 Parameter dialog box, "Speed controller" subject area

4.4 Handling of data sets

Saving, loading, printing factory defaults

Window	Explanation
	<p>Save a project Saving</p> <ul style="list-style-type: none"> via the File menu always saves a complete project. A project comprises: the data sets of the network devices as well as any scope plots, log entries and views. A project file is identified by the extension .dmpj (drivemanager project)
	<p>Save to controller</p> <ul style="list-style-type: none"> As soon as changes are made to a parameter they must be saved to the device. Otherwise the setting will be lost if the 24 V control voltage fails. Saved projects, data sets and scope plots can be retrieved .dmdvadj (drivemanager device adjust)
	<p>Save to PC</p> <ul style="list-style-type: none"> Device data are saved to the PC.
	<p>Download from PC</p> <ul style="list-style-type: none"> Saved projects, data sets and scope plots can be retrieved.
	<p>Reset</p> <ul style="list-style-type: none"> Reset the device to its factory defaults. All customer settings are overwritten.

Table 4.5 Data set handling

Window	Explanation
	<p>Save a scope plots</p> <ul style="list-style-type: none"> • “Save scope plot of...” Save under the general name • “Save scope plot of... as” Save under a self-defined name • “Save all” Save all windows open in the background.
	<p>Print a scope plot</p> <ul style="list-style-type: none"> • To launch the print function choose File - Print - Scope plot.
	<p>Print parameters</p> <ul style="list-style-type: none"> • Select the parameter, press Ctrl+C to copy it and paste it into an Excel worksheet. The list can be printed from there.

Table 4.5 Data set handling

5. Digital Scope

5.1 General

The digital scope of DM5 offers the basic functions of a physical oscilloscope.

It enables control variables required for commissioning, fault analysis and control optimisation to be plotted over time.

- Simultaneous plotting of up to 6 variables
- Selection of a trigger signal (rising/falling edge)
- Pretrigger (preview)
- Bit trigger (trigger in response to a bit signal)
- Preset the recording time
- Archive plots
- Save and load scope projects

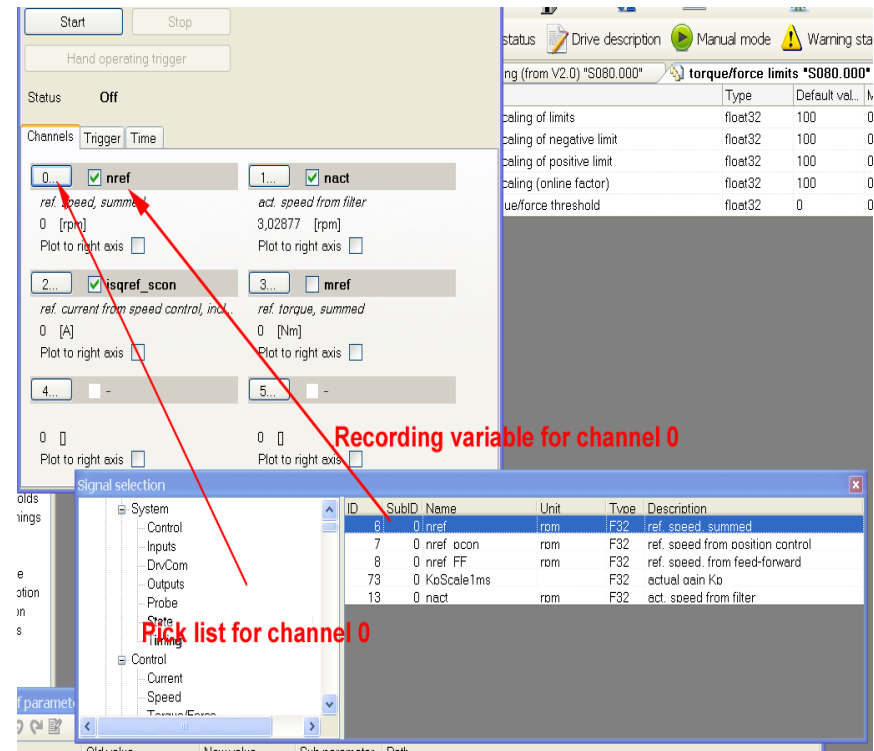
Opening the scope function

The scope can be opened by clicking the Scope icon or from the explorer.



5.2 Scope settings

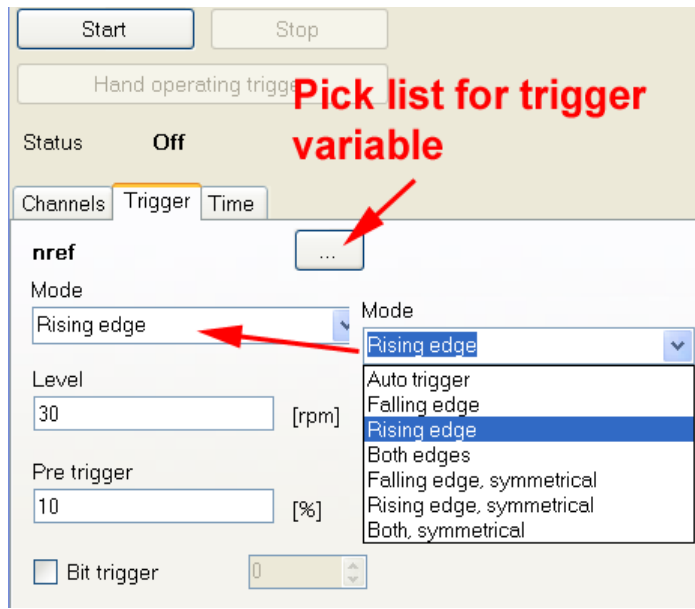
“Channel” settings



- To record a variable with a channel, click on one of the channel boxes 0 to 5. A box then opens in which you can select the variable from a pick list. To find a variable more quickly, you can use the explorer to make your selection. When you have selected the variable, it is displayed to the right of the ticked checkbox.
- A channel is hidden by clearing the checkbox.
- Tick the “plot to right axis” box to switch the dimensioning axis.

Figure 5.1 Selecting the variable to plot

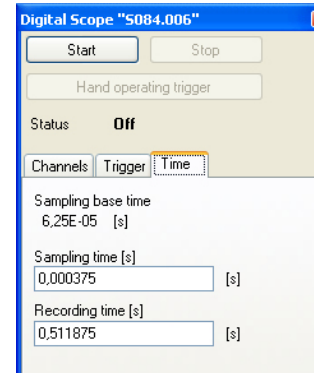
“Trigger” settings



- Click on the "trigger variable" button to open a pick list.
- “Mode”
Edge setting: Rising / Falling/ both edges
- “Level”
When the trigger threshold is reached, the scope starts plotting the selected variables.
- “Pretrigger”
The scope starts plotting a programmable time prior to actual triggering.

Figure 5.2 Trigger condition settings

“Time” settings



- Sampling base time [s]: 6.25E-05 is the base value referred to the sampling time.
- Sampling time: The preset sampling time can only ever be a multiple of the base time.
- Recording time: Any recording time value can be entered. Values less than the base sampling time are ignored and adjusted to the preset base sampling time. The recording time is limited by the preset sampling time, the available scope memory and the number of active channels. The recording time entered by the user is then checked according to those criteria and optimised.

Figure 5.3 Time setting for a scope plot



Note: To achieve the best resolution the “Sampling time” is set to 0. Then the “Recording time” should be set to the desired duration.

When the settings have been made the scope is enabled by clicking the Start button. The status indicator on the Scope screen then passes through the following states:

<p>Digital Scope "5084.006"</p> <p>Start Stop</p> <p>Hand operating trigger</p> <p>Status Waiting for trigger</p> <p>Channels Trigger Time</p>	Waiting for trigger
<p>Digital Scope "5084.006"</p> <p>Start Stop</p> <p>Hand operating trigger</p> <p>Status Recording</p> <p>Channels Trigger Time</p>	Recording

Figure 5.4 Starting a scope plot

When recording is complete the plot window might look like this.

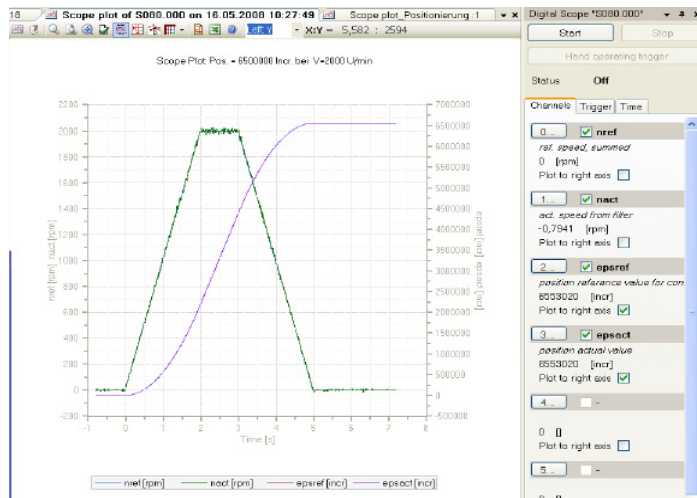


Figure 5.5 Example of a scope plot (target/actual speed and target/actual position)

Scope plot editing tools

User-friendly editing tools:

Icon	Dialog box	Function
	<p>Visual signal settings</p> <p>nref [rpm] ret speed summed</p> <p><input checked="" type="checkbox"/> Signal visible</p> <p>Axis alignment: <input checked="" type="radio"/> Left y axis <input type="radio"/> Right y axis</p> <p>Color: [Color picker]</p> <p>Thickness: 1</p> <p>Decimal place: 6</p> <p>Close</p>	<ul style="list-style-type: none"> The scaling of the Y axis can be moved from the right to the left side. Change colour setting Change line thickness Show/hide a plotted variable
		Create a custom headline for the scope plot
		Zoom into a selected area
		Move a scope plot.

Figure 5.6 Scope tools







Icon	Dialog box	Function
		Scale the X axis and the two Y axes.
		Restore the original view.
		Hide and show the key The title bar, the footer and the key can be hidden.

Figure 5.6 Scope tools

Icon	Dialog box	Function
		Measure
		Move the Y axis from left to right



Scope plot of S082_004 on 03.12.2007 14:05:27

Scope plot of S082.004 on 03.12.2007 14:05:27

Time [s]

Y1 [rpm] usqref [V] Y2 [A]

— rref [rpm] — usqref [V] — isq [A]

fiscnoib 03.12.2007 14:05:27

	X1	X2	Delta
Time [s]	0,056	3,803	3,747
<input checked="" type="checkbox"/> ref. speed, summed [rpm]	6,26	-697,279	-703,539
<input checked="" type="checkbox"/> quadrature axis ref. voltage [V]	4,355	-11,453	-15,808
<input checked="" type="checkbox"/> quadrature axis actual current [A]	0,023	-0,049	-0,072

If the function is enabled, red markers and an additional window showing the measured values are displayed in the plot window. Four slide gauges are provided, permitting the difference between two points on the X and Y axis to be determined. The X axis (abscissa) is plotted by X1/X2 and the Y axis (ordinates) by Y1/Y2.

The measured values are displayed at the bottom of the screen, with "X1" corresponding to the values at the position of marker X1, "X2" the values at the position of marker X2 and "Delta" the difference between the two values.

The markers can be adjusted in two ways:

- Click on their triangular handles and, holding the mouse button down, drag them to the left or right or up or down.
- Click anywhere in the graph. Move the marker pair "X1" and "Y1" until the point of intersection between them is at the point where you clicked. If you hold additionally press the <Ctrl> key as you click, the marker pair "X2" and "Y2" will be moved.

Figure 5.6 Scope tools

Icon	Dialog box	Function																				
	When markers "X1" and "X2" have been moved to the measurement location, the values of the plotted curves are displayed:																					
		<table border="1"> <thead> <tr> <th></th> <th>X1</th> <th>X2</th> <th>Delta</th> </tr> </thead> <tbody> <tr> <td>Time [s]</td> <td>-0,122</td> <td>3,825</td> <td>3,947</td> </tr> <tr> <td><input checked="" type="checkbox"/> ref. speed, summed [rpm]</td> <td>6,233</td> <td>-674,779</td> <td>-681,012</td> </tr> <tr> <td><input checked="" type="checkbox"/> quadrature axis ref. voltage [V]</td> <td>4,021</td> <td>-11,49</td> <td>-15,511</td> </tr> <tr> <td><input checked="" type="checkbox"/> quadrature axis actual current [A]</td> <td>0,042</td> <td>-0,047</td> <td>-0,089</td> </tr> </tbody> </table>		X1	X2	Delta	Time [s]	-0,122	3,825	3,947	<input checked="" type="checkbox"/> ref. speed, summed [rpm]	6,233	-674,779	-681,012	<input checked="" type="checkbox"/> quadrature axis ref. voltage [V]	4,021	-11,49	-15,511	<input checked="" type="checkbox"/> quadrature axis actual current [A]	0,042	-0,047	-0,089
	X1	X2	Delta																			
Time [s]	-0,122	3,825	3,947																			
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<input checked="" type="checkbox"/> quadrature axis actual current [A]	0,042	-0,047	-0,089																			
	The window shows the designation of the plotted curve, its units, and the values at the "X1" and "X2" positions along with the difference between them. On the left are checkboxes which you can use to show (default) or hide the individual curves. If the number of curves you are wanting to display exceeds the available space in the window, scroll bars are automatically displayed enabling you to view the areas not immediately visible.																					

Figure 5.6 Scope tools


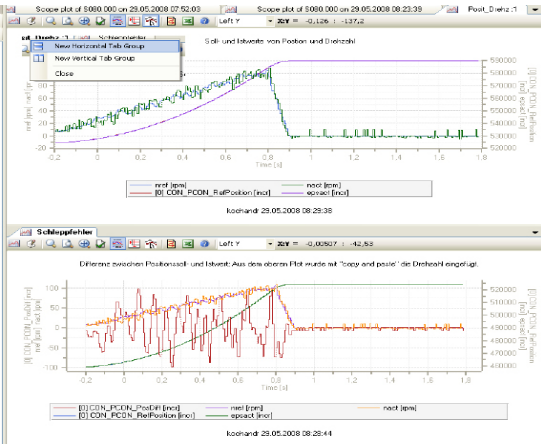
Icon	Dialog box	Function
 Copy and paste		<ul style="list-style-type: none"> • Multiple plots can be opened simultaneously. • It is possible to copy and cut individual curves, or to move them from one window into another. <p>Procedure:</p> <ul style="list-style-type: none"> • Right-click on the tab of the plot you want to additionally open. • Horizontal or vertical window opening by Tab Group. • Click the "Cut/Copy/Paste" button • After clicking the button, click on a curve. It is then displayed in double line thickness to indicate that it is activated. Click again on an area next to a curve to deactivate the selected curve again.

Figure 5.6 Scope tools




Icon	Dialog box	Function
	<p>Copy, cut and paste</p> <p>Having activated a curve, right-click to open a pop-up menu from which you can select the available functions:</p>  <p>If you choose "Copy", the marking of the current selected curve is cancelled. When you right-click inside a second plot the pop-up reappears. This time the "Cut" and "Copy" functions are disabled and the "Paste" function is active. When you choose this option a copy of the curve you selected in the first plot is pasted into the second plot. The scaling is automatically adjusted, and the inserted curve is displayed in a colour not previously used in this graph.</p> <p>The curve colours are not saved when the graph is saved to the hard disk. This might mean that the curves are a different colour when you reload the graph.</p> <p>Cutting is effected in the same way, except that the curve marked in the first plot is deleted.</p> <p>Drag-and-drop</p> <p>You can also copy a curve from one plot to another by dragging and dropping it. To do so, press and hold down the <Ctrl> key then press the left mouse button and, holding it down, drag the curve into the second graph. The cursor changes into an arrow shape with a plus sign:</p>  <p>In the second plot, release the mouse button and a copy of the curve marked in the first plot will be inserted at that point.</p>	
 Mathematical functions		Currently not yet implemented

Figure 5.6 Scope tools




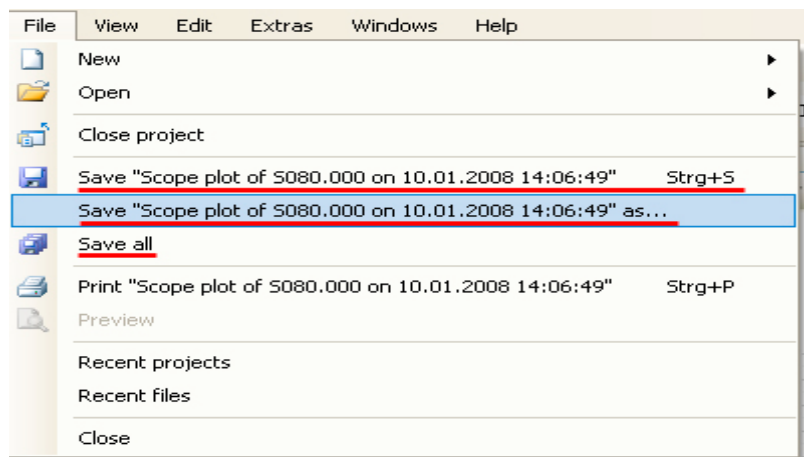
Icon	Dialog box	Function
 Back-up scope settings		Back-up a scope setup Enables the graph to be plotted on a different computer with the same scope settings as were used to create the original image.
 Import measuring points into an Excel worksheet		Measuring points of a scope plot can be displayed and edited in an Excel worksheet.
 Help		Currently not yet implemented

Figure 5.6 Scope tools

Saving, printing and loading a scope plot



Saving:

- Open **File** menu
There are two ways of saving a plot:
- **Save Scope plot...**
The plot is saved to the folder
LTI Drivemanager\Projects\Name of project\digital scope (see also Recent files).
- **Save scope plot as...**
This enables you to select your own location and plot name.
- **Save all**
All windows which have not yet been saved are saved in the project.

Figure 5.7 Saving a scope plot

Loading:

- Choose **"File" - "Open"** - "Digital scope record..." to open the folder containing the scope files, where you can select the plot you want and open it.

Printing:

- From the **"File"** menu
- choose "Print" - "Scope plot of..."

Figure 5.7 Saving a scope plot

6. Control window “Manual mode”

6.1 General

Manual mode enables a controller to be controlled in different modes regardless of whether a higher-level control system is pre-installed or not. All that is required is for the hardware to be enabled first (STO and ENPO).

The drive motion can be plotted with the scope function, permitting analysis of the control performance.



ATTENTION: Before this function is started, a controller must have been commissioned into operation as stipulated in the Operation Manual. When the Control window is opened the parameter settings in the connected device are automatically changed and are then restored when the window is closed. Communication should not be interrupted (such as by a power failure, unplugging the connecting cable or suchlike) while the Control window is active.



DANGER: Manual mode causes the axis to execute movements. The connected control system is not active, and cannot intervene in the movement. It must be ensured that no hazard is posed to people or machinery.

In an emergency, the drive can be stopped at any time by cancelling the hardware enable (ENPO, STO). In the case of lifting applications, it must be ensured that a mechanical brake is installed.



NOTE: If a drive cannot be moved by way of the Control window, check the following points:

- Controller system state
- Motor data
- Possibly safety switch
- Quick stop active
- Hardware enable via STO and ENPO

6.2 Opening the Control window

The Control window can be opened either by clicking the icon or by way of the folder in the "Manual mode" explorer branch.



The Control window

	<p>1 Selection of control mode:</p> <ul style="list-style-type: none"> • VF Control • Torque Control • Speed Control • Position Control • Current Control
<p>Acceleration: 100 rev/min/s</p> <p>Deceleration: 100 rev/min/s</p> <p>Speed: 1000 rev/min</p>	<p>2 Basic setting: The basic settings (Standard mode) view changes depending on the selected control mode.</p>
<p>Mode: <input type="radio"/> absolute <input checked="" type="radio"/> relative to <input type="radio"/> speed controlled</p> <p>Reference: 360 Degree</p>	<p>3 Reference enable active, motor rotating</p>
<p>Start Stop</p>	<p>4 Start and stop control</p>
<p>Motor control Quick stop Halt</p> <p>Start Stop Start Stop Start Stop</p>	<p>5 Activate the "Quick stop" function</p>
<p>Activate manual Manual mode off</p>	<p>6 Activate the "Halt" function</p>
<p>Manual mode off</p>	<p>7 Activate and deactivate the Control window</p>

Figure 6.1 Control window

The Control window is launched by clicking the "Activate manual" button. The following warning then appears, which you must acknowledge by placing a tick in the box.



NOTE: Only when you have acknowledged the warning notice can the Control window be activated. Please be sure to read and observe the safety instructions.

- When the Control window is opened a number of drive parameters are automatically changed. When you close the window the original parameter settings are restored.
- It is not possible to save the parameters while the Control window is open.
- Current is applied to the motor.
- The motor builds up its rotating field and is able to execute movements.
- A connected and parameterised motor brake is opened. The brake must be connected to X13 and the digital brake output P 0125 must be set to BRAKE (2)!
- Before activating control, make sure no hazards are posed to people or machinery.

Figure 6.2 Safety instructions

6.2.1 Standard mode

Here the basic settings for control in manual mode are shown based on the example of PCON (position control).



DANGER: If “Motion profile IP(1)” is selected, the reference (setpoint) values are passed through directly to the controller. No ramps are active. The drive attempts to reach its end position with maximum dynamism. There is a risk the mechanism may be destroyed!

Selection of control mode → **PCON(3) = Position control mode**

Setting for:
Standard mode
Homing mode
Jog mode
Reverse mode

Motion profile
PG(0) = setpoint effects to profile generator

Acceleration: 0 usr/s/s
Deceleration: 1000 usr/s/s

Speed: 360 usr/s → Reference value processing via Profile Generator

Mode:
 absolute
 relative to
 speed controlled

Reference: 36000 usr → Reference value amount

Start Stop → Enable reference

Start and stop control enable → Start Stop Start Stop Start Stop

Open/close window → Activate manual mode Manual mode off

Figure 6.3 Standard mode (basic setting) for the relevant control mode

6.2.2 Homing mode

When positioning in manual mode, all homing methods can be selected from the “Homing mode” list box.

Standard mode Homing mode Jog mode Reverse mode

Homing method:
pe 3(3) = Pos. reference cams, zero pulse at RefNock=Low

Zero pulse
Reference cam

Start Stop

Figure 6.4 Selection of homing mode

6.2.3 Jog mode

Two speeds can be selected for both directions. Click the Jog(+) or Jog(-) button to start jog mode in infinite positioning mode. When you release the button the drive stops with the programmed braking ramp.

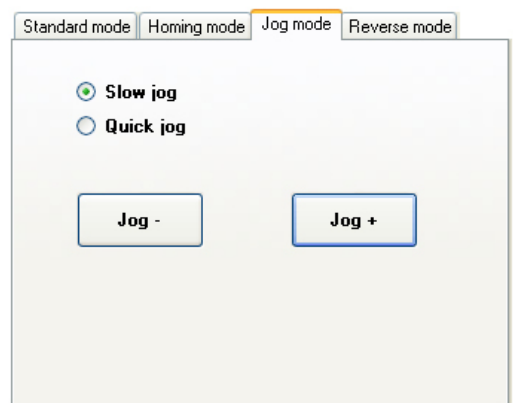
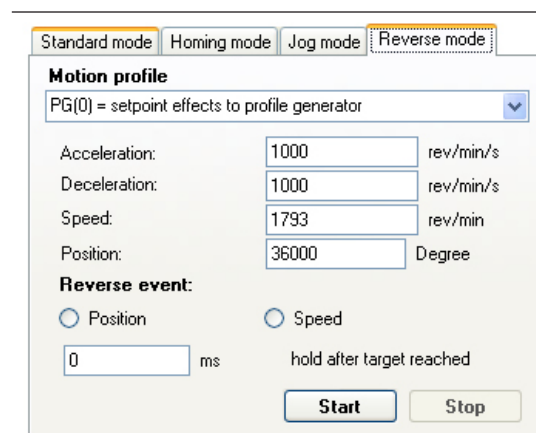


Figure 6.5 Jog mode

Reverse mode

In reverse mode it is possible to execute a change of direction on reaching a defined position or velocity. At a position of 360° for example, the drive rotates 360° in the positive direction and then 360° in the negative direction.



- Selection of the variable by which a reversal of direction is triggered.
- Hold after target reached: Delay before reversing direction

Figure 6.6 Reverse mode



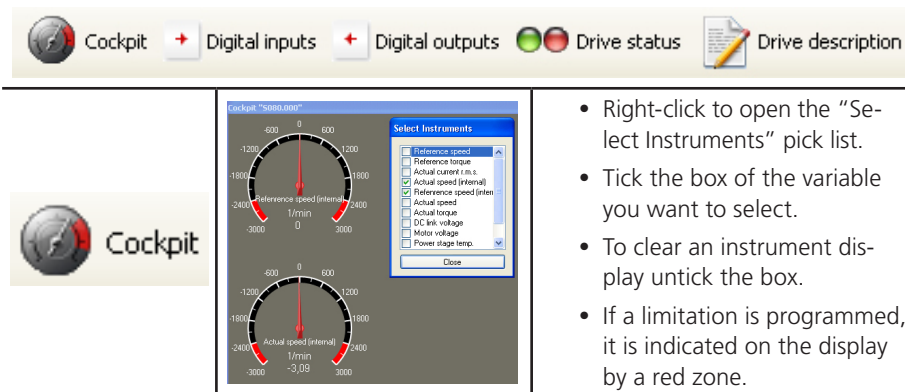
NOTE: Manual mode is particularly well suited to control optimisation. Step responses can be recorded using the scope function. The controller optimisation procedure is detailed in the Application Manual.

7. Drive status

7.1 Status displays

There are various monitors providing information on the device status and displaying device-specific data.

- Cockpit (actual value display)
- Digital inputs
- Digital outputs
- Drive status
- Drive Description



- Right-click to open the "Select Instruments" pick list.
- Tick the box of the variable you want to select.
- To clear an instrument display untick the box.
- If a limitation is programmed, it is indicated on the display by a red zone.

Figure 7.1 Status window

		<ul style="list-style-type: none"> • Current status of a digital input. • Click "Configuration" to open the Digital Inputs dialog box. • Key: <ul style="list-style-type: none"> ▶ Input/output high ▶ Input/output low
		<ul style="list-style-type: none"> • Current status of a digital output. • Click "Configuration" to open the Digital Outputs dialog box.
		<p>Controller status</p> <ul style="list-style-type: none"> • Fault (red bar) • No fault (green bar) ▶ Fault ▶ Input/output high

Figure 7.1 Status window

Drive description	Type:	S080.000	▶ Device type
	SW-version:	V1.25-99	▶ SW version
	Serial number:	0000000000	▶ Serial number

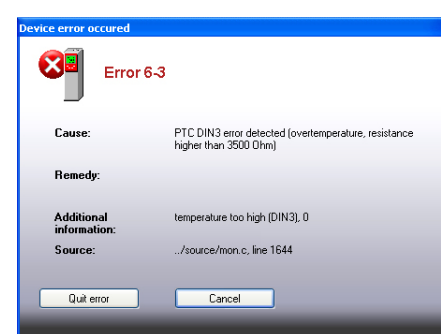
Figure 7.1 Status window

7.2 Fault display

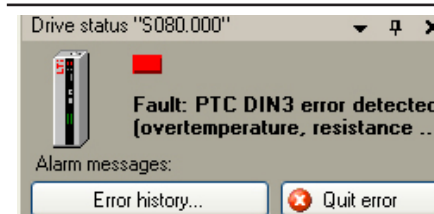
In the event of an error, the "Drive status" monitor displays a red signal and in parallel a pop-up appears showing more details on the error. For this to happen the "Drive status" monitor must be open. Alongside the error number, it displays information including a description of the error and possible remedies. The error history provides details of the last 20 error messages, including the information also given in the actual error display. The error history also includes a time stamp. This indicates the time after power-up (switch-on of the 24 V voltage) at which an error occurred (no real-time clock).



NOTE: Errors can only be reset when their cause has been eliminated. In the case of some errors, it may be necessary to disable and then re-enable the power stage in order to perform a reset.



- Pop up displaying error messages, e.g.:
- Error name: "Error 6-1"
- Cause: "Motor temp too high"
- Remedy: "Wait and let motor cool down".



A fault is indicated in the status window by the red bar flashing. You can view the error history (max. 20 entries; see screenshot below). If there are more than 20 entries, the older ones are deleted to make space. Click "Quit error" to reset an error.

This is only possible when the cause has been eliminated though!

No.	Label	Time stamp	Cause	Remedy
8	Error 6-3	7057211h	PTC DIN3 error detected (overtemperature, resistance I	
9	Error 6-3	7057210h	PTC DIN3 error detected (overtemperature, resistance I	
10	Error 6-1	7057193h	Motor temp. to high	Wait and let motor cool down

Error history

Figure 7.2 Error display

8. Password and user levels

User levels

There are five user levels controlling access to parameters.

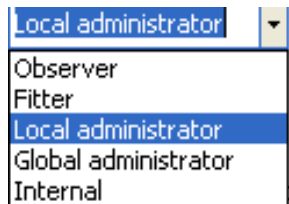


Figure 8.1 User level pick list

Description of the user levels

Level	User level	Description	Password
0	Observer	Authorised for read access only	No
1	Fitter	Restricted parameter access	No
2	Default Local administrator	95 % of all applications can be parameterised with this level authorisation.	No
3	Global administrator	In-house user level; access barred	Yes
4	Internal	Developer access; access barred	Yes

Table 8.1 Available user levels

Use of passwords

Access to parameters can be restricted further, beyond the constraints of the user level hierarchy. Passwords can be freely assigned, and bar access to the device for unauthorised personnel.



ATTENTION: Responsibility for administering passwords lies solely with the user.

Password window

Passwords are defined and assigned in the "Administration" subject area.

Passwords used to control parameter access:

Fitter (2)

Local administrator (3)

Passwords used to control hosts device access:

Manual mode

Data set operations



- Parameter access for the "Fitter" and "Local administrator" levels
- Access to the manual mode window
- Authorisation to download or to save device data.

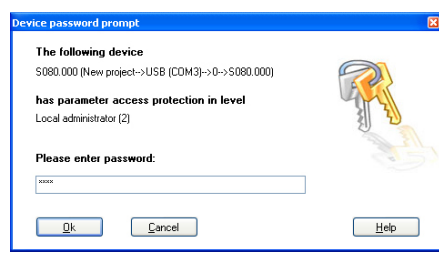
Figure 8.2 Selection of the area to be restricted

Procedure

Select area e.g. "Local administrator":

Choose password e.g. "TEST"

The next time a connection is made the following password prompt appears. The Editor opens when the password has been entered.



- Enter password (e.g. "TEST"). Input is case-sensitive. On entering the password access is granted.
- To cancel a password bar, the entry is cleared from the form shown in screenshot 8.2. When the user reconnects no password prompt appears.

Figure 8.3 Password prompt, if a password is required

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We reserve the right to make technical changes.

The content of our Operation Manual was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated in line with ongoing technical developments in our products.

Information and specifications may be subject to change at any time. Please visit www.lt-i.com for details of the latest versions.

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