

DA-52s

Installation Manual

V 3

Preface

This manual contains information necessary for installation of a DA-52s control on a pressbrake machine. It is meant for service people who are authorised for service and installation of the machine.

Limited guarantee

- The equipment is supplied by Delem without safety features. The machine manufacturer has to ensure a safe environment.
- This equipment must be installed and used in accordance with Delem's specifications. The guarantee on the equipment is invalidated in the event of improper installation and/or use of this equipment.
- The General Terms and Conditions of Delivery of Delem shall apply to this product. These conditions are available from Delem on request.
- This manual does not entitle you to any rights. Delem reserves the right to change this manual without prior warning.
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Version history

The control software is updated regularly to increase performance and add new functionality. This manual is also updated as a result of changes in the control software. The following overview shows the relation between software and manual versions.

Software version	Manual version	Description
V3	V0713	first issue V3
V3	V0813	update V3
V3	V0614	update V3

This manual is valid for software version 3.

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Part I - Hardware description

This section contains the hardware specifications of a Delem control DA-52s.

1. Introduction

This manual contains information necessary for installation of a DA-52s control. Such a control is the heart of a pressbrake control system with which a pressbrake machine is controlled.



Figure 1.a

A DA-52s control combines different tasks in one unit:

- programming products and tools;
- axis control during bending;
- adjustment of machine settings.

Product programming and control operation is described in the user manual [3] of the control.

2. Specifications

2.1. Physical dimensions

For the dimensions of the DA-52s control, see the included drawings at the end of this section.

The following environment specification values are valid for a DA-52s control:

Ambient temperature	5 - 45°C Warning: Avoid long-term exposure of the control to direct sunlight. Otherwise, the temperature inside the control will rise above tolerance levels. Operation of the control should be carried out indoors.
Storage temperature	min. -20°C max. 70°C
Relative humidity	max. 90 % non-condensing
EMC	designed and built to meet the following standards: EN50081-2 EN60082-2
Enclosure	designed and built to meet the following standards: IP20 (without optional enclosure) IP54 (with optional enclosure)

2.2. Technical specifications

Power supply	18 - 28 VDC 80 W
Display	LCD/TFT colour 7" Widescreen 800 x 480
Interfaces (see chapter 3)	Valve connector Analog A/B 4 x Encoder 1 x RS-232 1 x USB digital I/O
Memory	Flash memory, 64 MB embedded

3. System I/O

3.1. Introduction

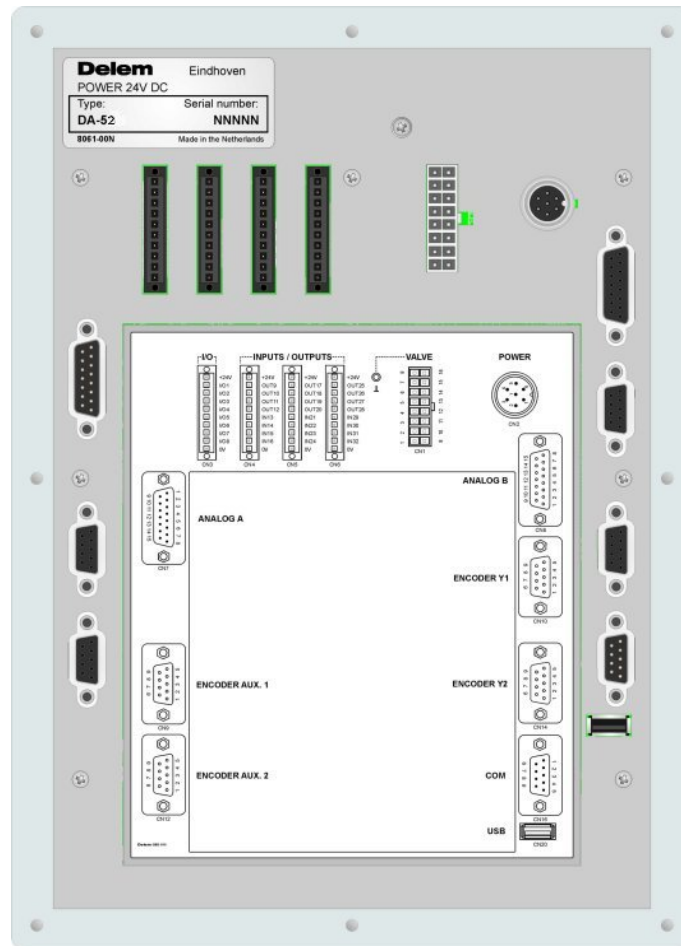


Figure 3.a

The DA-52s control is equipped with a large set of connectors for various functions:

- valve control
- system I/O
- encoder feedback
- communication
- USB

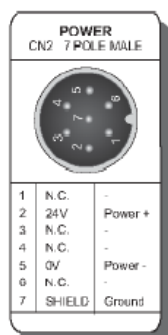
The various connectors are discussed in the following sections.

Warning:

Connectors may not be plugged or unplugged when power is ON. Connectors may only be connected or disconnected when power is OFF.

The only exception to this rule is the USB connector.

3.2. Power supply

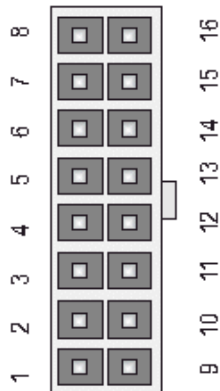


7-pole male binder connector

3.3. USB connector

The control has been equipped with one standard USB connector, according to the USB 1.1 specification.

3.4. Valve connector



16-pin connector for valve control.

Standard: P-VA

The connector is used for pressure valve control. The control signals for the valve amplifiers run through connector Analog B. An example of the required wiring is given in diagram 8061-102.

Optional: Y-VA

The connector is used for direct control of the proportional valves.

An example of the required wiring for direct valve control is given in diagram 8061-101. This schematic also includes a pin description of the connector. The position feedback from the valve transducers (LVDT) is connected to connector Analog B.

See section 3.4 for more information about connector Analog B.

Analogue outputs:

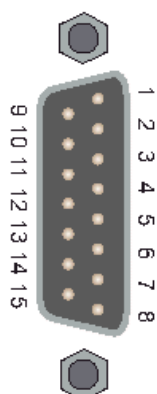
Prop. Valve:	Y1/Y2	4 x 3A max.
Pressure valve:	P	1.5 A max.

Analogue inputs:

24V Power Supply	18-30V DC ripple +/- 2V max. max. 13A
------------------	---

Shielding of cables should be connected to the available M3 ground plug beside the connector.

3.5. Analog A



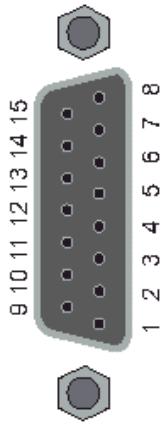
Connector Analog A provides several analog signals, two analog outputs and four analog inputs.

See schematic 8061-101 for connection details.

Specifications for Analog I/O

Analogue inputs (4x)	0-10V, input impedance 44 k Ω
Reference voltage (2x)	10V \pm 2%
Analogue outputs (2x)	+/- 10V 10mA max. maximum load 1 k Ω

3.6. Analog B



Connector Analog B provides several analog signals, two analog outputs and two analog inputs. It also includes power supply for possible valve position transducers (LVDT).

See schematic 8061-101 for connection details.

Specifications for Analog I/O

Analogue inputs (2x)	0-12V / -10V ... +10V, input impedance 44 k Ω Supply voltage 24V \pm 2%
Analogue outputs (2x)	+/- 10V 10mA max. maximum load 1 k Ω
Analogue output (1x)	0 - 10V (ext. pressure amplifier)
Power outputs (6x)	2x -12V 2x +12V 2x 24V 100 mA max. for each transducer

Notes:

- Used power supply depends on transducer specifications (+/-12V or 24V).

3.7. Digital I/O

12 inputs, 12 outputs, 8 programmable I/O.

	CN3	CN4	CN5	CN6
	+24V	+24V	+24V	+24V
	I/O-1	OUT-9	OUT-17	OUT-25
	I/O-2	OUT-10	OUT-18	OUT-26
	I/O-3	OUT-11	OUT-19	OUT-27
	I/O-4	OUT-12	OUT-20	OUT-28
	I/O-5	IN-13	IN-21	IN-29
	I/O-6	IN-14	IN-22	IN-30
	I/O-7	IN-15	IN-23	IN-31
	I/O-8	IN-16	IN-24	IN-32
	0V	0V	0V	0V

Figure 3.b

See schematic 8061-101 for connection details.

The use of I/O pins depends on the application and machine settings. For the purpose of all assigned I/O signals we refer to the Delem machine parameter manual.

I/O power supply: 24 V DC \pm 20%
10A max.

CN3: Pins 1 - 8

Programmable Digital In-/Outputs (8x):

Digital Output	Voltage	Current
ON state	20-28 V DC	0.5 A max.
OFF state	-	0.1 mA max. (leakage current)

Digital Input	Voltage	Current
ON state	9-28 V DC	20mA max.
OFF state	0-4 V DC	1 mA max.

CN4: Pins 9 - 16

Digital Outputs (4x)	Voltage	Current
ON state	20-28 V DC	0.5 A max.
OFF state	-	0.1 mA max. (leakage current)

Digital Inputs (4x)	Voltage	Current
ON state	9-28 V DC	20mA max.
OFF state	0 - 4 V DC	1 mA max.

CN5: Pins 17 - 24

Digital Outputs (4x)	Voltage	Current
ON state	20-28 V DC	0.5 A max.
OFF state	-	0.1 mA max. (leakage current)

Digital Inputs (4x)	Voltage	Current
ON state	9-28 V DC	20mA max.
OFF state	0 - 4 V DC	1 mA max.

CN6: Pins 25 - 32

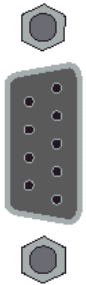

Digital Outputs (4x)	Voltage	Current
ON state	20-28 V DC	0.5 A max.
OFF state	-	0.1 mA max. (leakage current)

Digital Inputs (4x)	Voltage	Current
ON state	9-28 V DC	20mA max.
OFF state	0 - 4 V DC	1 mA max.

Notes:

- The sum of all output currents should not exceed 10A.
- All digital outputs are short-circuit proof.
- To guarantee a defined state during power on or off, the load of the outputs should comply with IEC 61131.

3.8. Encoders

ENCODER 9 POLE FEMALE						
			12VSE	5VSE	5VDE	
		1	T0 (REF)	T0	T0	T0
		2	T2 (B)	T2	T2	T2
		3	T1 (A)	T1	T1	T1
		4	+ 12V	+ 12V	/	/
		5	GND	GND	GND	GND
		6	$\overline{T0}$ (\overline{REF})		/	$\overline{T0}$
		7	$\overline{T2}$ (\overline{B})		/	$\overline{T2}$
		8	$\overline{T1}$ (\overline{A})		/	$\overline{T1}$
9	+ 5V	+ 5V	+ 5V			
<div>In case of 12VSE bridge pins 6,7,8 and 9</div>						

9-pole SUBD female encoder interface

5V DC/250 mA or 12V DC/200 mA
 12 V or 5 V single ended or 5 V
 differential
 Max. count frequency 1 MHz

See schematic 8061-101 for connection details.

Notes:

- In case of 12VSE encoder, connect pins 6, 7, 8 and 9 with each other.

4. Spare parts

4.1. Introduction

The following table gives an overview of the available spare parts for the DA-52s controls. The next chapter contains an exploded view of a DA-52s control, in which the same spare part numbers are used.

Number	Description
D5199-001	DA-52s frontpanel
D5180-003	Mainboard
D6194-002	Frame
D6195-002	Cover
D5195-003	Grip

5. Schematics

The following pages show several schematics about the DA-52s control.

A 3D CAD model of a mechanical bracket assembly, consisting of three dark gray components. The top component is a long, thin plate with a curved end and four small mounting holes. The middle component is a thicker, L-shaped bracket with a circular hole at its end. The bottom component is a smaller, L-shaped bracket with a single mounting hole. The components are shown in a perspective view, suggesting they are parts of a larger assembly.

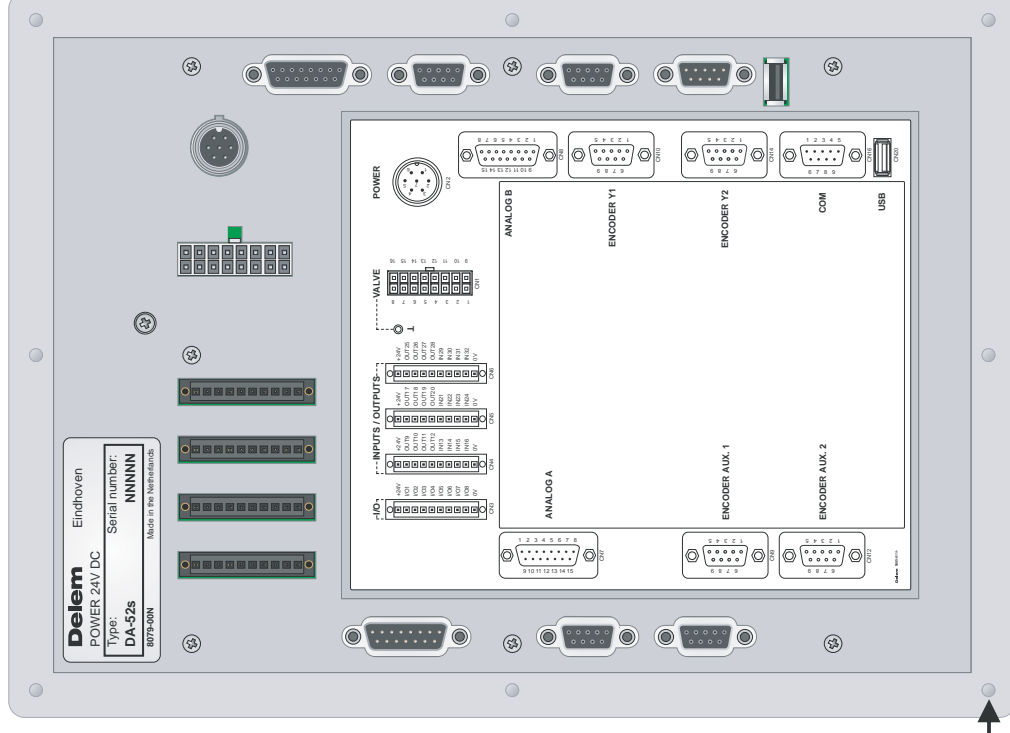
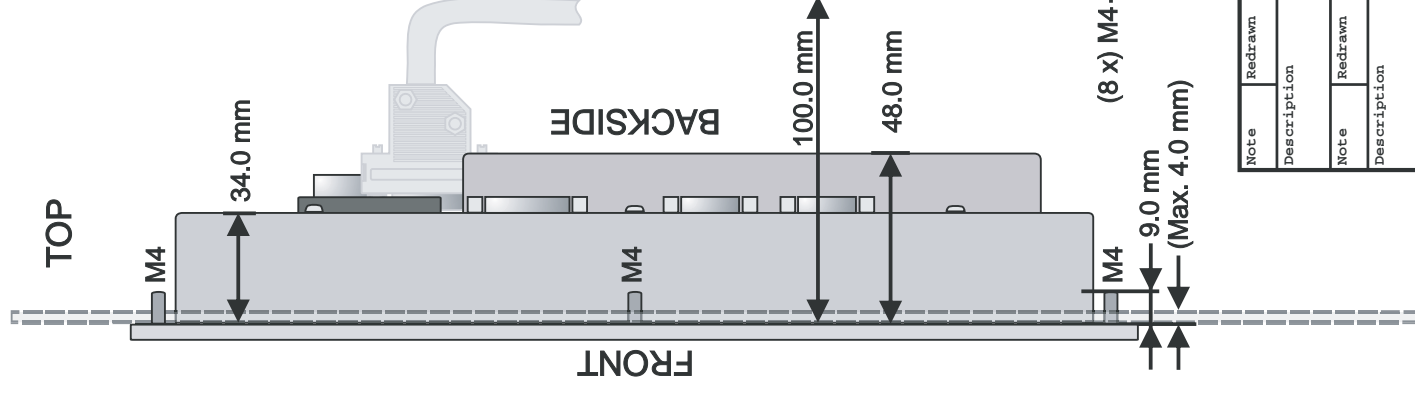


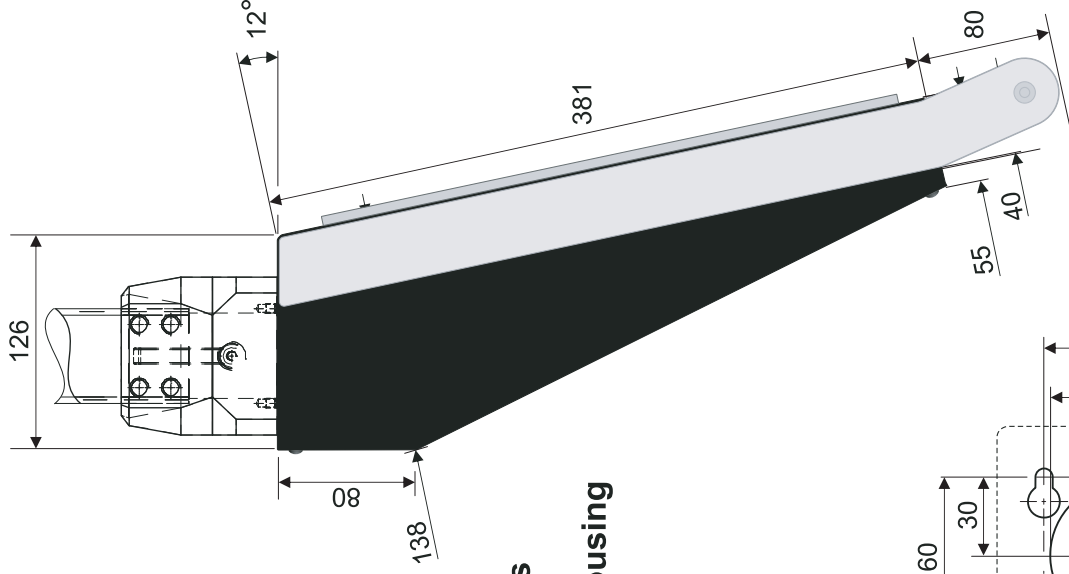
<div> <div>Delem</div> <div>Luchthavenweg 42, 5657 EB Eindhoven, The Netherlands</div> </div>		<div> <div>Spare parts</div> <div>DA-52s</div> </div>			
<div> <div>Note</div> <div>Redrawn</div> <div>Date</div> </div>					
Description					
<div> <div>Note</div> <div>B</div> <div>Redrawn</div> <div>HNF</div> <div>Date</div> <div>27-11-2012</div> </div>					
<div> <div>Description</div> <div>FRU Partnumbers changed / added</div> </div>					
<div> <div>Measures in mm, unless otherwise specified</div> <div>Drawn</div> <div>HNF</div> </div>		<div> <div>Date</div> <div>20-06-2012</div> </div>			
		<div> <div>Format</div> <div>A3</div> </div>		<div> <div>Number</div> <div>8079-903</div> </div>	
		<div> <div>No unauthorized copying allowed</div> <div>Scale</div> </div>		<div> <div>Issue</div> <div>B</div> </div>	

TOP

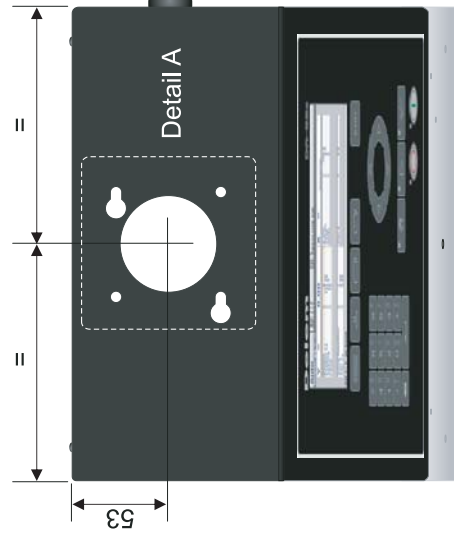
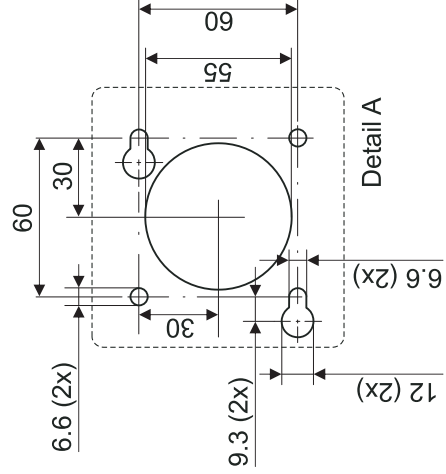
Technical drawing of a rectangular plate with the following dimensions and features:

- Overall Dimensions:**
 - Length: 297 mm
 - Width: 209 mm
- Internal Dimensions:**
 - Distance from top edge to center of top hole: 148.5 mm
 - Distance from bottom edge to center of bottom hole: 104.5 mm
 - Distance between hole centers: 200 mm
 - Distance from left edge to hole center: 288 mm
- Holes:**
 - 8 holes, each with a diameter of 4.2 mm ($8 \times \varnothing 4.2 \text{ mm}$).
 - Holes are arranged in two rows of four.
 - Row spacing: (4.5 mm) between the two rows.
 - Column spacing: (4.5 mm) between the two columns.
- Views:**
 - FRONTVIEW:** The main view of the plate.
 - TOP:** The top view of the plate.
 - BOTTOM:** The bottom view of the plate.

[illegible]



DA-52s
+
Optional housing



Note		Redrawn	Date	Date	
Description		Description		Date	
Note		Redrawn	Date	Date	
Description		Description		Date	
Measures in mm, unless otherwise specified		Drawn	HNF	Date	
09-08-2013		09-08-2013		09-08-2013	

Delem		Luchthavenweg 42, 5657 EB Eindhoven, The NETHERLANDS	
Dimensions DA-52s		Issue	
Format		Number	
A3		8079-918	
A		A	

No unauthorized copying allowed Scale


Part II - Machine settings

This section will describe the necessary settings of a DA-52s control regarding machine settings.

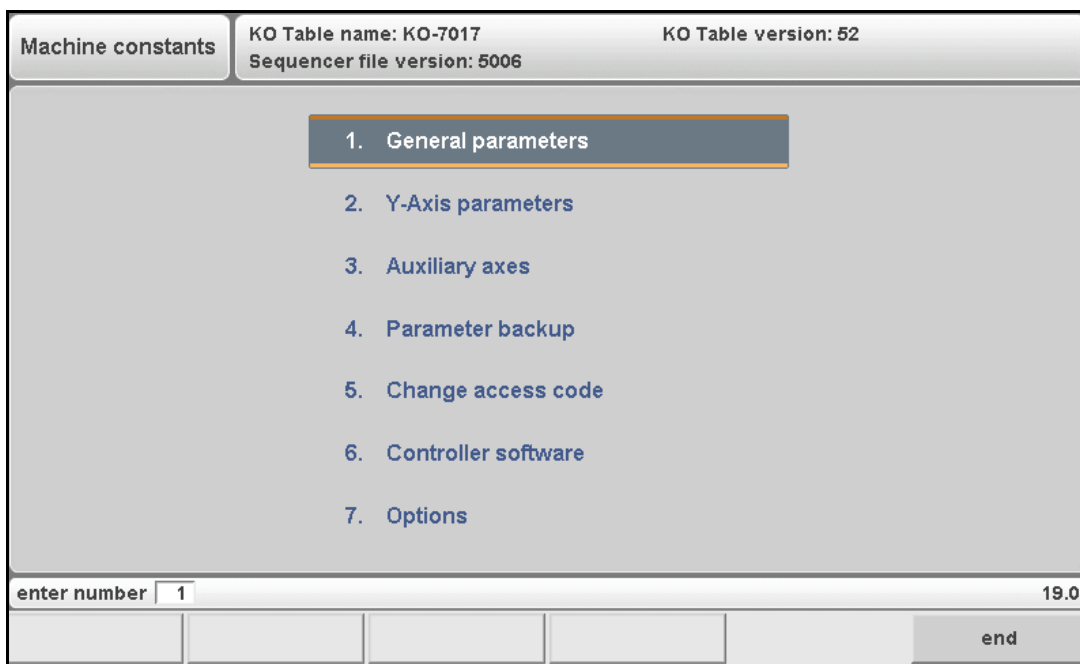
1. The machine parameters

1.1. Machine parameters menu

To open the machine parameters menu:

- press the key  to go to the program constants
- on the first parameter, enter the access code 14753

The main menu of the machine parameters appears.



The screenshot shows a software interface for machine parameters. At the top, there is a header bar with three sections: 'Machine constants' on the left, 'KO Table name: KO-7017' and 'Sequencer file version: 5006' in the middle, and 'KO Table version: 52' on the right. Below the header, a list of seven menu items is displayed: '1. General parameters' (highlighted with a blue bar), '2. Y-Axis parameters', '3. Auxiliary axes', '4. Parameter backup', '5. Change access code', '6. Controller software', and '7. Options'. At the bottom of the interface, there is a row of input fields. The first field is labeled 'enter number' and contains the value '1'. To the right of this field is a small box containing '19.0'. Further right, there is a button labeled 'end'.

For a description of menu 1 to 4 we refer to the Delem machine parameter manual [1]. In this chapter, the installation of new software and options is explained.
<https://www.machinemfg.com/>

1.2. Update control

1.2.1. Update procedure

The control can be upgraded with new software. Before you commence an update make sure you have a backup of all your data, such as products, tools, machine parameters, etc. New software can be loaded from a portable USB drive. A CD-ROM with the latest control software can be requested at Delem. It contains all software necessary to perform an update. To prepare for an update, copy the contents to the USB disk.

Note:

- When the update program has finished the installation procedure, the control needs to reboot. Therefore, do not disconnect the USB disk until the update has been completed.

The update procedure runs as follows:

- Insert the portable USB Drive into an available USB port;
- on the control, go to the machine parameter menu and choose "Controller software".

The control will search for a valid update set on the USB disk. If it is found, the installation program will start:

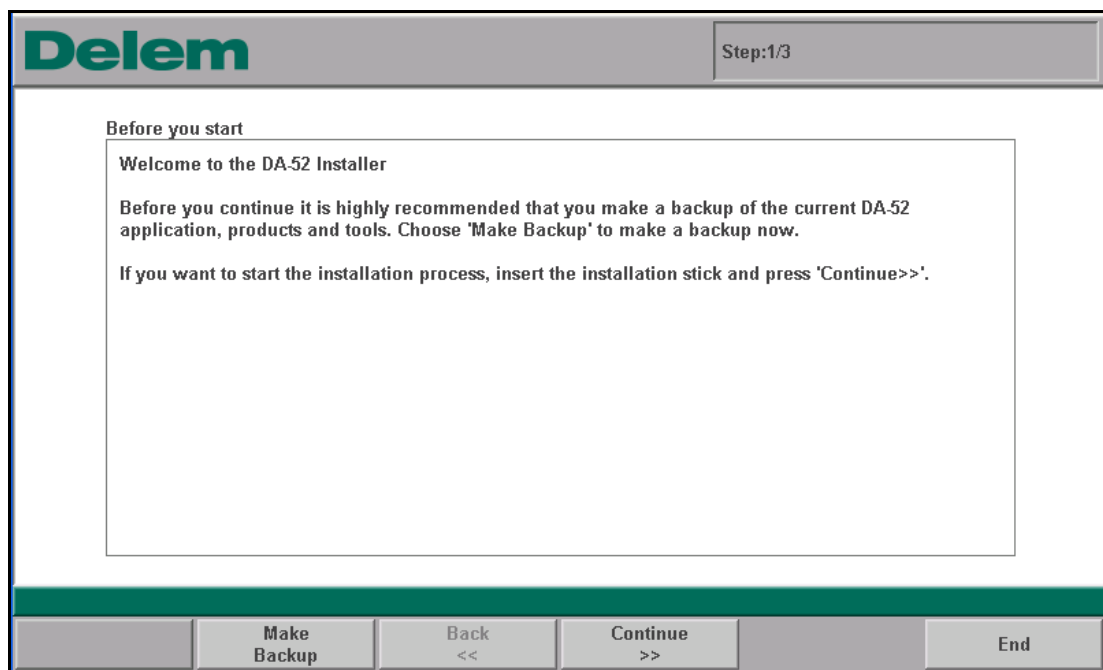


Figure 1.a

The program starts with a recommendation to make a backup of the currently installed software. See the next section for more about the backup procedure. Although a backup is recommended here, you are not obliged to follow this advise. If you do not wish to make a backup, press the key "N" (Continue>>) to proceed.

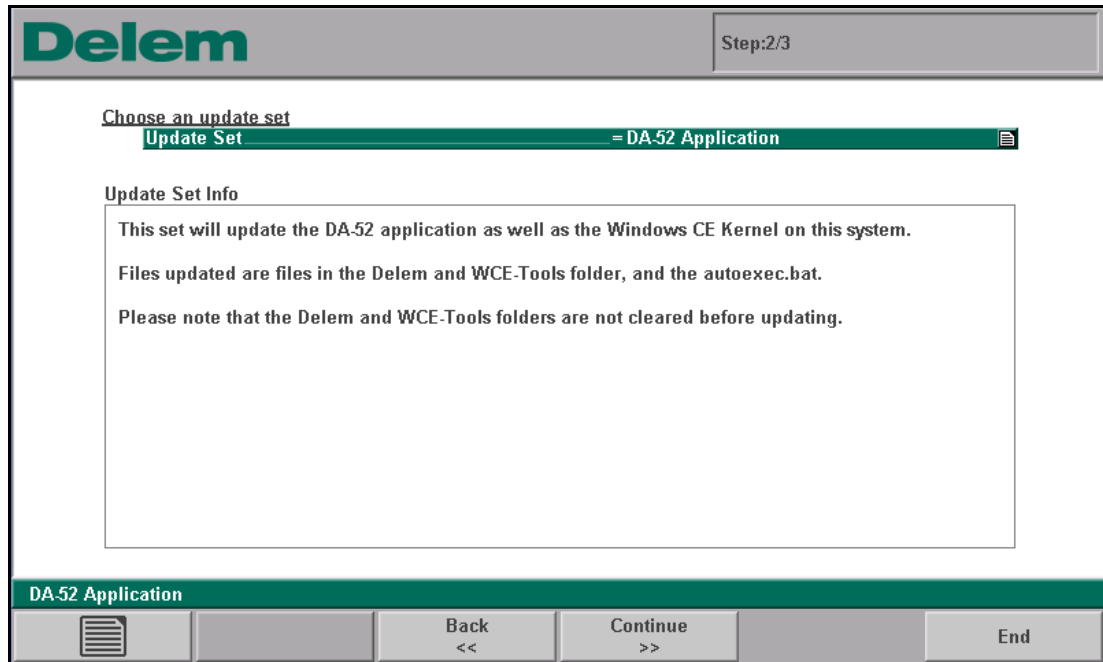


Figure 1.b

The installation program will now check for valid software that can be installed on the control. In case various update sets are present, it is possible to select one of them through the listbox. The standard updater offers several update sets:

- DA-52 Application
- DA-52 Factory Default
- etc...

A set called 'DA-52s Application' is used to upgrade the control Operating system and the DA application, without affecting the existing user data (products, tools, materials) on the control. A set called 'DA-52s Factory Default' is typically used for first time installation of all software on a DA-52s control, including example products, tools and materials. If this update set is used on a control which already contains such user data, this data may be overwritten. If the correct update set is shown, press "Continue>>" to continue.

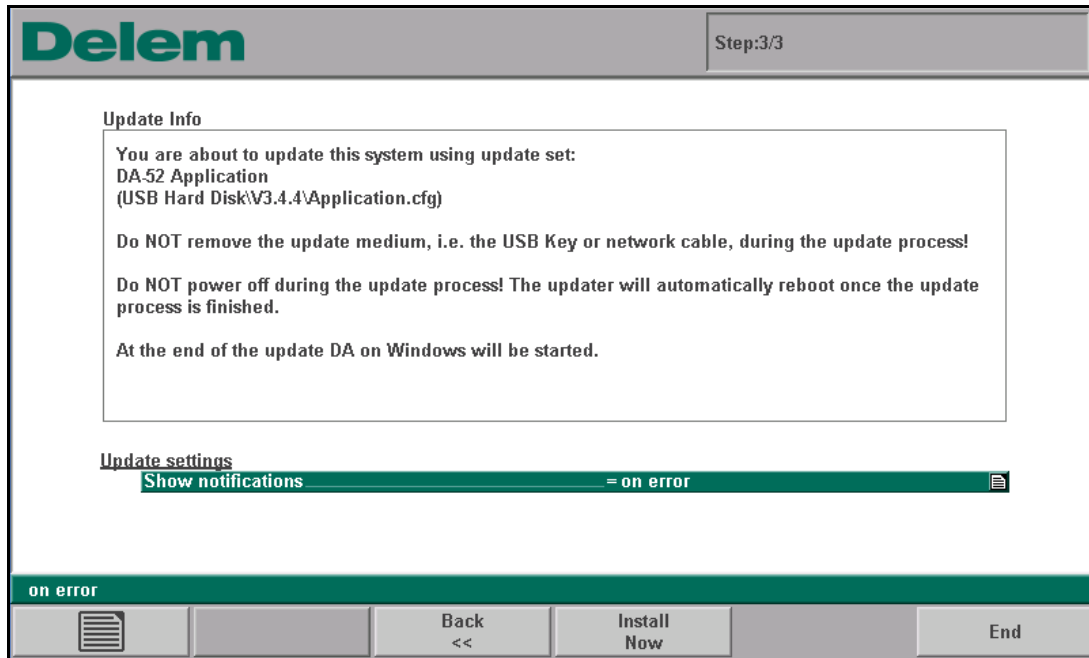


Figure 1.c

This third window shows the final information about the software update and a warning not to interrupt the update process. On the bottom, two parameters are available to modify the update behaviour:

Show notifications

Determine when messages must be displayed during the update.

Always: the updater will produce a message window after each stage of the update. With this setting on, the update process can be monitored in detail.

On error: you will not receive intermittent messages, unless an error has occurred.

Normally the setting 'on error' will suffice, unless you wish to follow the update process closely.

Automatic reboot when finished

Choose to let the control restart automatically when the update process has finished: yes or no.

Press the key 'Install now' to start the update process.

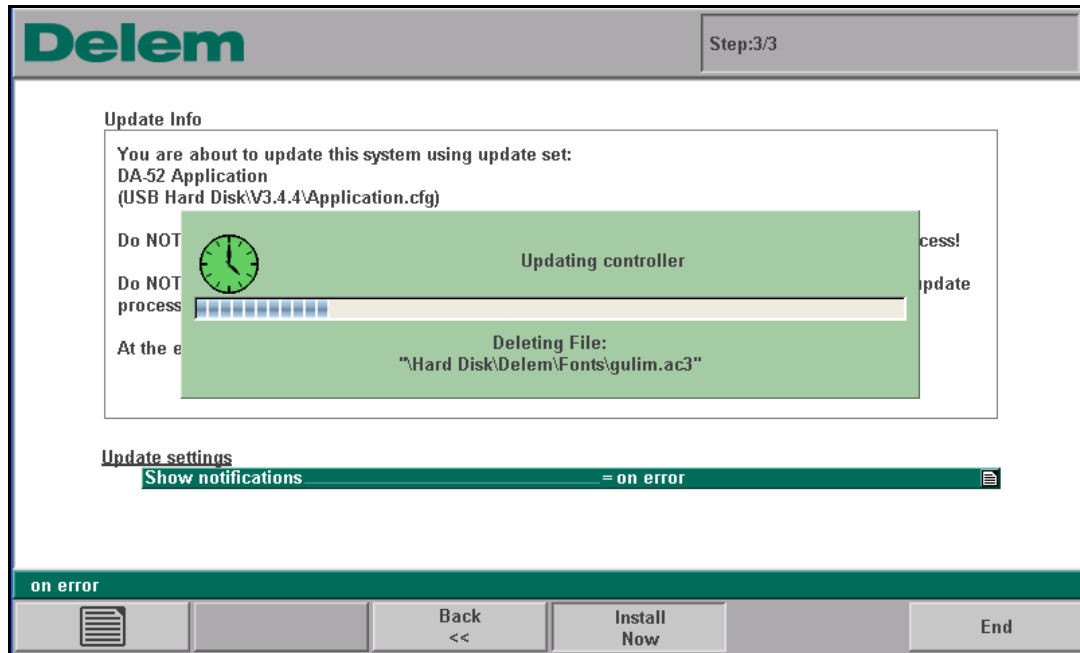


Figure 1.d

When the update process is finished, the control will reboot or (depending on the setting 'Automatic reboot') show a message the control should be restarted.

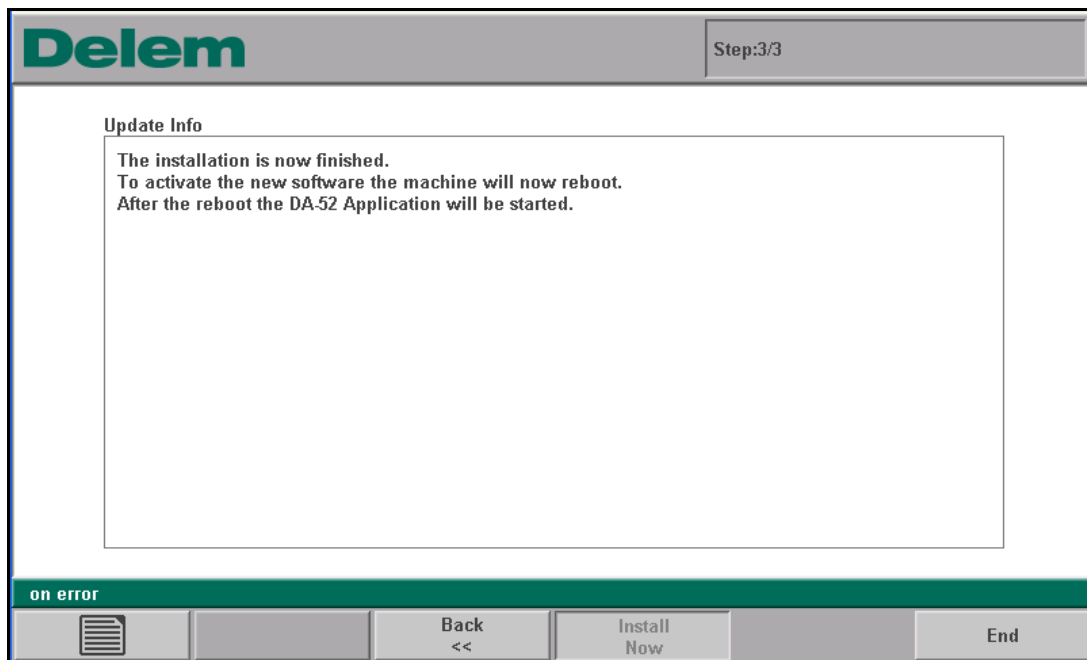


Figure 1.e

In case the update stops when finished, press the END key to start the control. After this reboot, the control will start as usual with the Delem DA application.

1.2.2. Backup/restore the application

Backup

The update program offers the possibility to make a backup of the current software set that is installed on the control. This way, the current application is saved with its existing settings before the software is updated. With this procedure all data is stored:

- the Windows system
- DA application
- license files for control options
- products, tools and machine parameters

The software is saved as an update set, so it can be re-installed on the current control. As shown in the previous section, the Updater offers the possibility of a backup on start-up. When the button 'Make backup' has been pressed, the following screen appears:

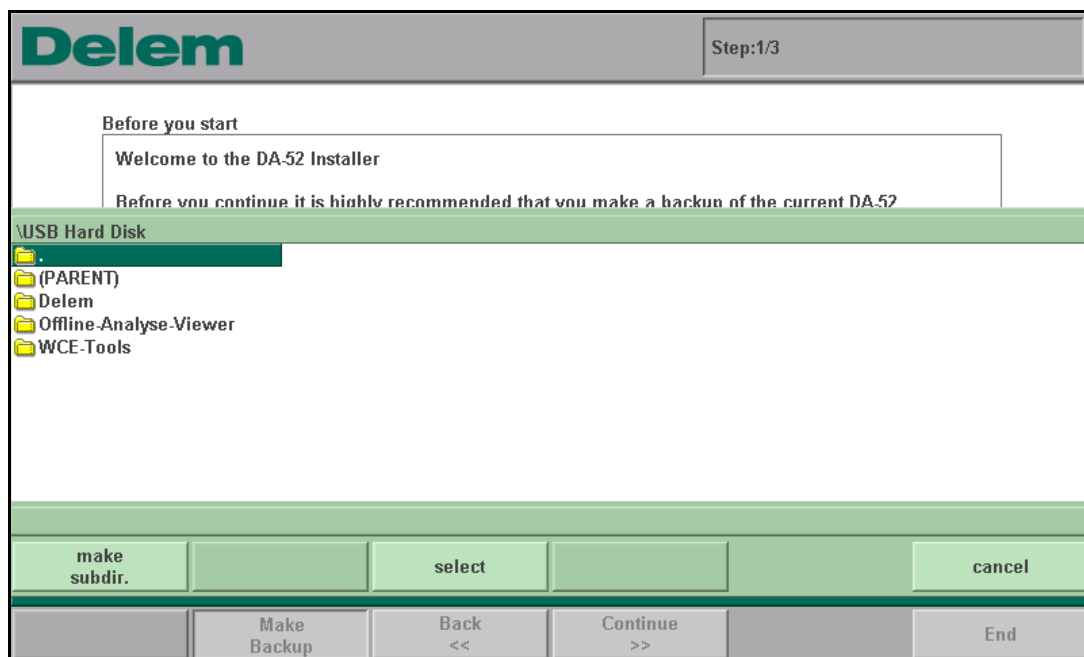


Figure 1.f

The Updater asks for a directory to store the application software in, anywhere on the USB disk. It is also possible to create a new subdirectory to store the system in.

Warning:

If the selected directory already contains an update set, these files will be replaced with the current backup.

As soon as the backup is complete, the program switches to step 2/3 of the update program to choose an update configuration. This is described in the previous section.

Restore

To restore software, simply run the update set that was created with the backup as described above.

1.2.3. Modify the update

As shown in section 2.5.1, it is possible to have various update sets available with which you can update the control. Normally, the standard 'DA-52s Application' is sufficient to update your control. If necessary, you can create your own update set.

An update set is described by a configuration text file, in which you can determine which parts of your system are to be updated. Such a configuration file is recognised by the extension '.cfg' in the filename. It must be present in the same directory as the updater program. When the updater program is started it searches the USB drive for all files which have such an extension in their filename. In the second window of the updater program, all available update sets can be selected with the dropdown list.

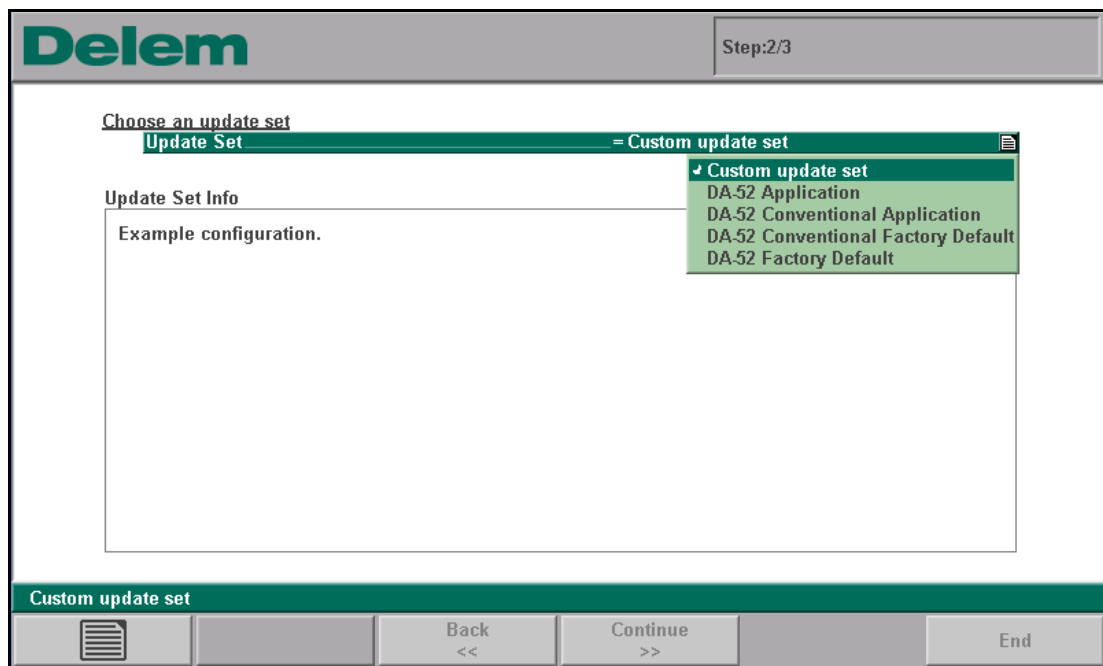


Figure 1.g

The names you see in the list are retrieved from each available configuration file.

You can change the content to add items to the standard Delem update set or create a small set which can be run separately, after the Delem update. A .cfg file contains six sections:

1. [INFO] Name and information of the update set
2. [FILEDEL] Files to be deleted
3. [FILECPY] Files to be added or replaced
4. [REGDEL] Registry entries to be deleted
5. [REGADD] Registry entries to be added or changed
6. [EXECUTE] Executables to be run

Updater.exe will always perform the actions in these sections in the order shown above, regardless of the order in the .cfg file.

You can create any number of .cfg files and put them next to the Delem update.cfg, or even remove the Delem update.cfg. The Updater will automatically show all update sets to the user. The [INFO] section of a .cfg file gives information about the update. The first line after the [INFO] gives the title of the update set, which is displayed in the dropdown list in the

updater. The lines following after that give additional information which is displayed in the updater window.

The update program is delivered with a text file, called 'UpdaterReadme.txt'. Also, the standard configuration file 'Application.cfg' contains a lot of comment which describes the possibilities of the update set. Study these files closely for more information.

1.3. Option installation

1.3.1. Request option on the control

It is possible to install software options on the control. Options can be requested at Delem. Options for a DA-52s control can be purchased at any moment. It is done by buying an 'Option Voucher' for a specific function (e.g. 2nd servo axis). A new option voucher is valid for any DA-52s control. Hence, it is possible to buy one or more option vouchers and keep them in stock until the option becomes necessary on a control. An option voucher looks as follows:

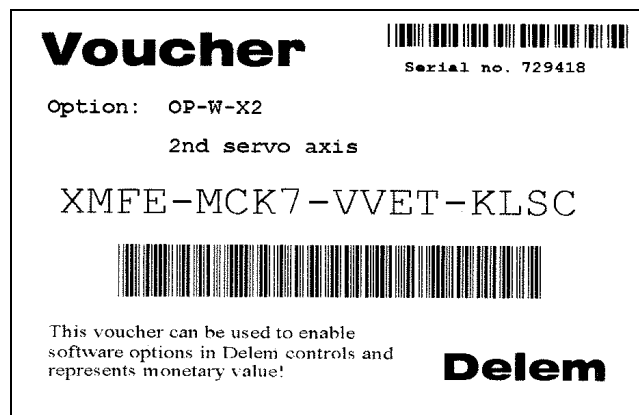


Figure 1.h

At the top, an option identifier and a short description is placed. In the middle, a 16-digit number is placed, divided by dashes. When requesting an option you must enter this number exactly as it is shown, including the dashes.

When an option must be installed on a control, you can take a voucher for the specific function and request the option on the control. Once an option is requested on a control, the control will receive a certificate (license) for the requested option. From that moment on, the voucher is linked to this control, it cannot be used anymore on any other control.

If necessary, the option can be requested many times. Should a certificate get lost somehow, simply request the same option again for the same control.

The procedure to install an option runs as follows:

- Go to the machine parameters menu.
- Choose menu 7: 'Options'.

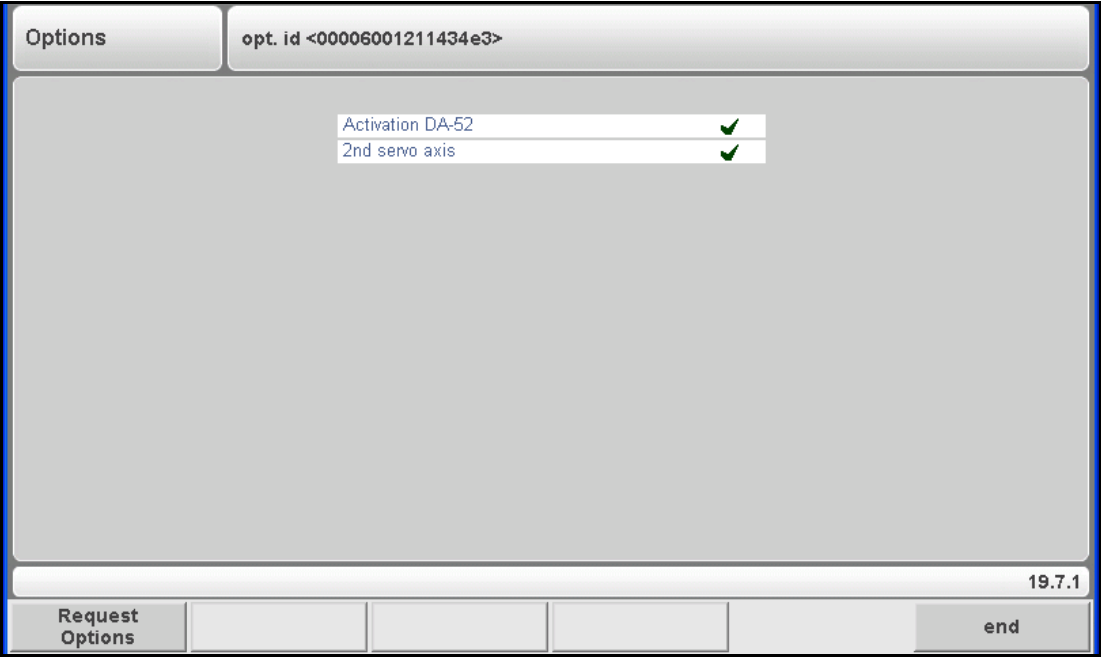



Figure 1.i

This window shows which options are available. To activate an option, press the key  (Request options) to start option installation.
When pressed, the screen looks as follows:

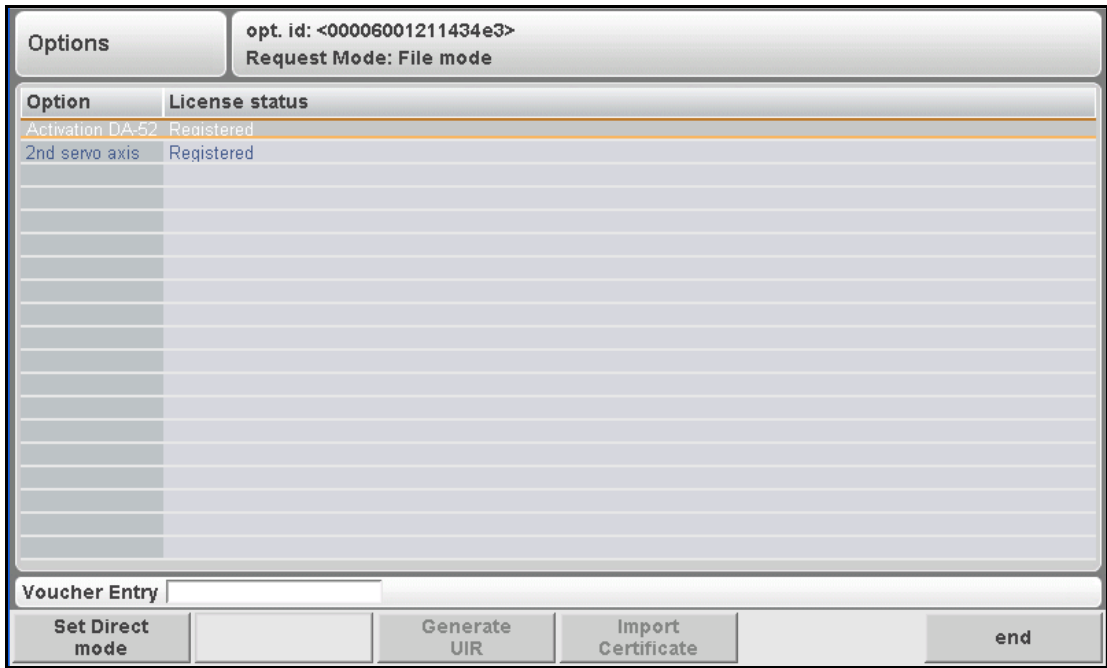


Figure 1.j

At the top of the screen, the serial number of the control is displayed.

On the left side of the screen, a list of possible options is displayed for the control. If an option is already enabled, the word 'registered' is displayed in the second column.

File mode

To install an option:

- go with the cursor to the desired option;
- plug in a USB-stick;
- enter the 16-digit option voucher number in the field 'Voucher entry' and press the button 'Generate UIR': a text file is generated on the USB-stick, which contains the code to request a license, a UIR file;
- submit the contents of the UIR text file to the Delem Certificate Server (certificates.delem.com); this is explained in detail in the next paragraph;
- obtain a certificate file from Delem and put it on a USB disk or on the control disk;
- in the option program, select the requested option and press the button 'import certificate'.
- in the file dialog that appears, select the received certificate file (anywhere on USB or hard disk) and press 'OK'.
- When successful, the message 'license successfully imported' appears and the license status of the option will change to 'registered'.
- Press 'END' to return to the menu of the machine parameters.

1.3.2. Request option code at Delem

The UIR file that was generated by the option program must be submitted to the Delem Certificate Server. From this UIR file a certificate file is generated. This certificate file can then be used to enable the option on the control.

There are different ways to send the UIR file to Delem. The simplest (and slowest) way is put the file on a portable disk and send this to Delem. After a certain period, you will receive a disk with the license file.

Another method is to send the UIR file by e-mail to Delem and request the option. You will receive a license file shortly.

The third method is to use an internet connection and connect to a special Delem license website: <http://certificates.delem.com>. <https://www.machinemfg.com/>

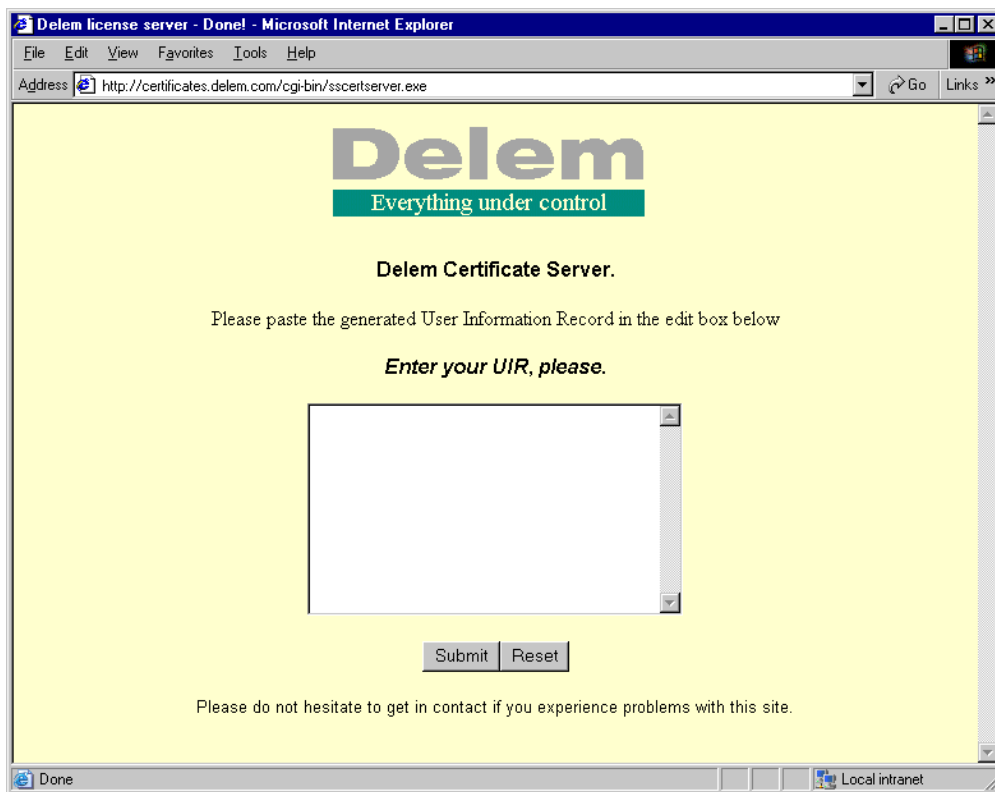


Figure 1.k

On this site, you can directly request the license code. Make sure the generated UIR file is accessible from your internet PC. Proceed as follows:

- open the UIR file and copy all text to the clipboard memory;
- in the browser, paste the clipboard contents into the license field; it should look as follows:



Figure 1.l

- press the button 'submit' below the field;

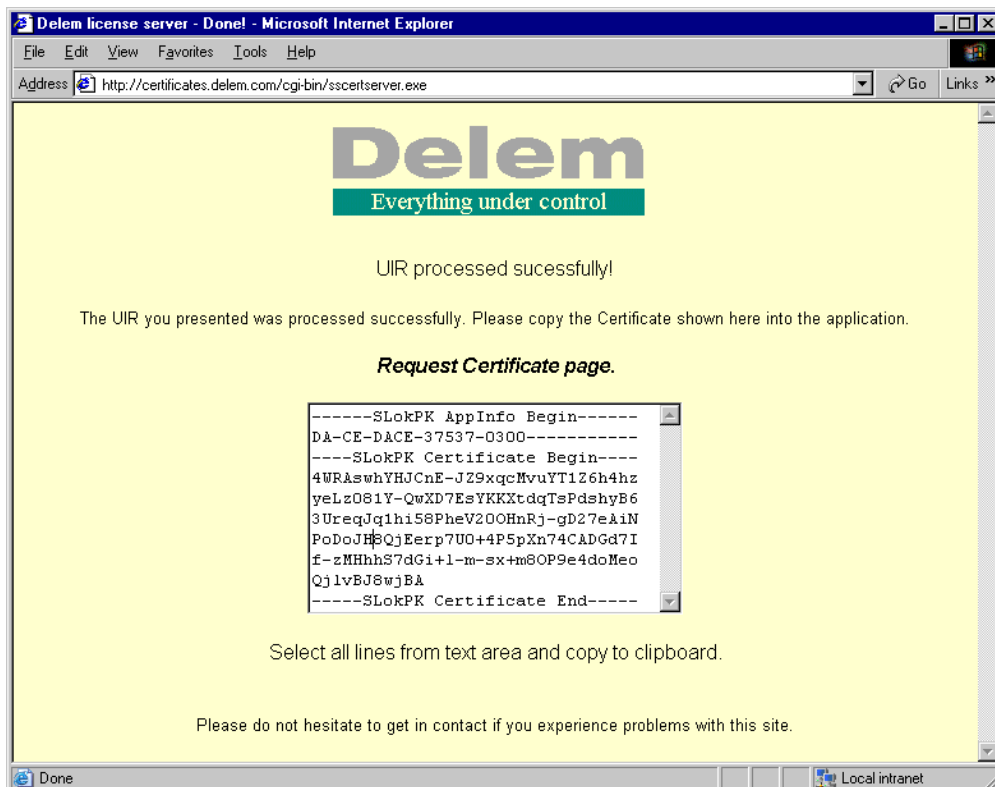


Figure 1.m

You will get a message whether or not the code has been processed successfully.

- the text has changed: copy this new text to the clipboard;
- open a new empty text document, paste the clipboards contents and save this as a new text file: this is your certificate file;

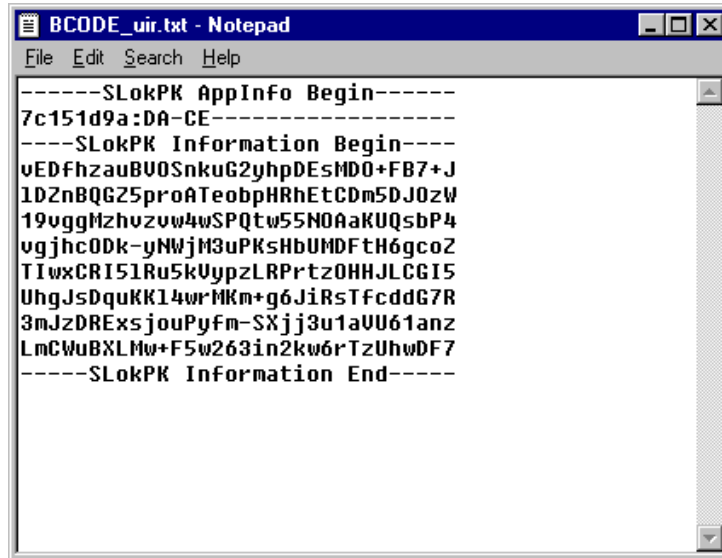


Figure 1.n

- transfer this file to the control (USB disk);
- resume with the option procedure as described in the previous section.

When a license has been registered, the file with the registration code is stored on the control disk, in the directory \Hard Disk\Delem\Licenses. The file has the extension '.lic'. It is possible to copy these files to a USB disk. When the control has been re-installed or rescued, the license files can be copied back into the 'Licenses' directory to enable the control with its options again. This can work faster than having to request all licenses again.

2. Windows tasks

2.1. Windows introduction

To be able to operate the Windows system, an external keyboard and mouse must be connected. Press the Windows key on the keyboard to activate the Windows menu.

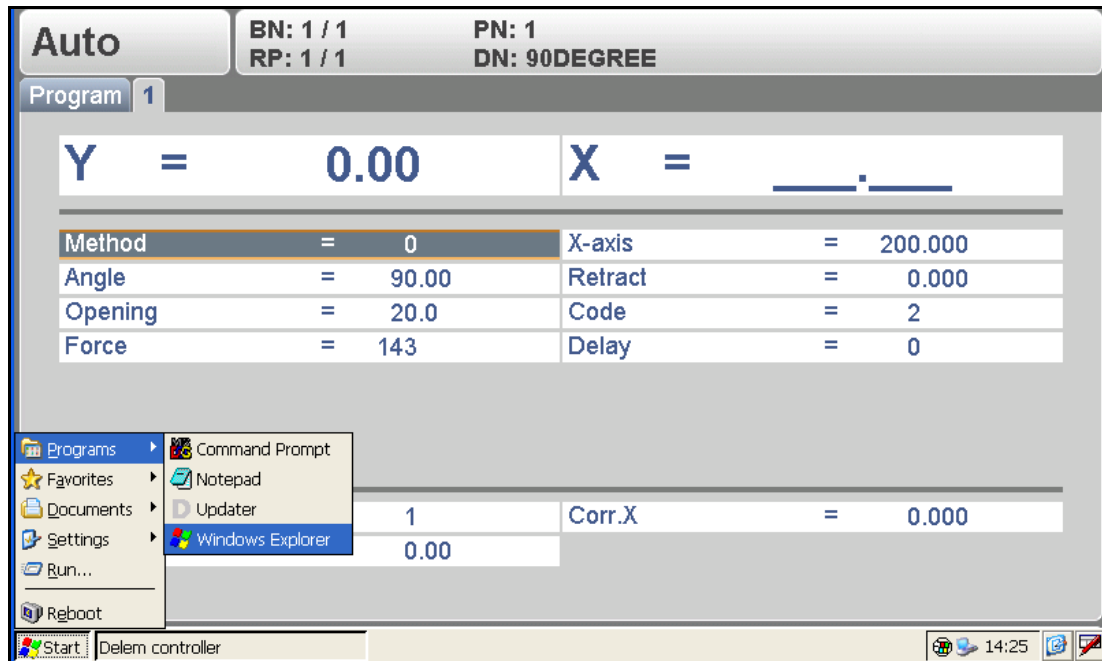


Figure 2.a

To switch to Windows without opening any application, click on the pencil symbol in the lower right corner of the screen. The Delem control application is switched to the background, but remains active.

To activate a certain application, click on the Start button in the lower left corner of the screen. Choose an application from the list. The list of available applications in your Start menu depends on the control type.

For some of the machine tasks this procedure will be necessary, so be sure to familiarise yourself with this routine.

The 'Reboot' command right above the Start button serves to restart the control. It will be indicated in this manual when this is necessary.

The Delem control application can be switched off. The application is switched off as follows:

- move the mouse to the lower edge of the screen: the Windows taskbar appears;
- move the pointer to the expression 'Delem controller';
- click on the right mouse button: a small pop-up box appears, with the instruction 'close' (see figure below);
- click on 'close': the control application is stopped.



Figure 2.b

To restart the control application: go to the Windows Start Menu and choose 'Reboot'.

2.2. Directory structure

The data on the control has been organised into directories, like on a computer. Within the graphical interface of Windows, the term 'Folder' is used.

Most directories on the Windows desktop are volatile directories, which means they are lost when the control is shut off and are re-created when the control is started. Only the directory 'Hard Disk' is permanent, because it refers to the embedded flash memory of the control.

This flash memory is the internal storage device of the control. In this manual the expression 'hard disk' will be used to indicate this internal storage device.

Any file that must be stored for later use, should be stored somewhere in the directory tree of the hard disk.

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Some important directories:

\Hard Disk\Delem\Bin

This directory contains the Delem control application files. The control application 'Delem.exe' is automatically started when the control is activated. Furthermore the Delem sequencer file and the KO-Table are located here.

\Hard Disk\Delem\Data

Directory with the 'products' and 'tools' subdirectories, which contain all products and tools for this control.

\Hard Disk\WCE-Tools

This directory contains several additional Delem utilities.

\Hard Disk\Delem\Licenses

Directory with license files. See also section 3.3 about option installation.

2.3. Important files

A lot of control settings are stored in files, which are located on the hard disk of the control. This is the case for the Delem application as well as for the Windows platform. Whenever the control is (re)started, the software will search for these files and retrieve the last saved settings.

If for any reason the settings are mixed up, it is possible to delete these files. At the next start-up, the control will assume its default settings. This should only be done as a last remedy, if the control does not function properly anymore.

If the settings are correct and you do not wish unauthorised people to change them, it is possible to set these files as read-only files. This way settings cannot be changed. To set the file to read-only, proceed as follows:

- open the Windows Explorer
- browse to the correct location (directory) to find the file
- click on the desired file
- open the File menu and select 'properties'

A window like the one shown below should appear:

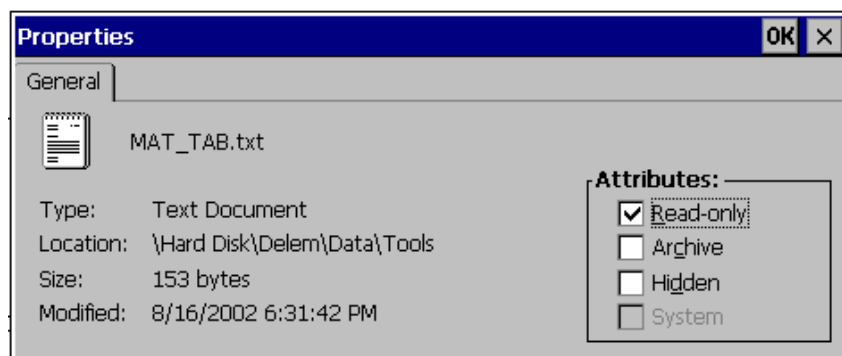


Figure 2.c

In the 'attributes' section of the window, mark the setting 'Read-only' and click on 'OK' to save the setting. The file cannot be altered anymore.

In the example above, the properties of the material table are shown. Materials are programmed in the menu 'program constants' of the control. If material properties are changed or materials are added or deleted, the information is written to this file. If the file is set to read-only, any attempt by an operator to change material properties or to add or delete materials will be ignored.

Another possibility is to mark files as 'hidden'. A hidden file is not shown in the Windows Explorer and as such it is protected against unauthorised user actions. A hidden file can also not be opened from within Windows applications, such as Wordpad. The Delem application can still open a necessary settings file, even though it is hidden.

If an authorised person wishes to access hidden files, the Windows Explorer has the setting to view all files. From within the Explorer, open the View menu and select 'Options...'. The following window appears:

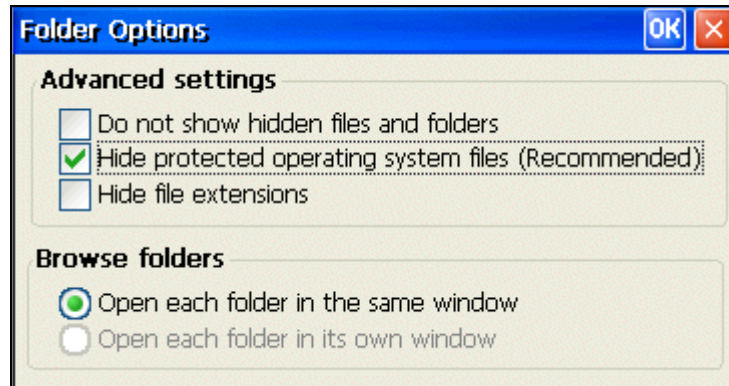


Figure 2.d

Do not show hidden files and folders

The file Explorer will not show files that have been marked as hidden.

Hide protected operating system files

The Explorer will not show files that are used by the Windows Operating system.

Hide file extensions

The Explorer will not show the three-digit extension in file names.

On the following pages a list of files is given that contain settings for the Windows Operating system and for the Delem control application.

Files with **Delem control settings**:

MAT_TAB.TXT

Location: \Hard Disk\Delem\Data\Tools

This file contains the material properties of the Delem control application.

Since this file is a plain text file, it is possible to program materials for the Delem application by editing this file directly. Normally, materials are programmed in the menu 'program constants'.

ANGLECOR.CDB

Location: \Hard Disk\Delem\Data\Tools\ ppsupp

File with the angle correction database. See the operation manual of the control for more information about the angle correction database.

This file contains angle corrections for bends and is maintained by the Delem application.

SPCORxx.TAB

Location: \Hard Disk\Delem\Data\Tools\mpsupp

These files contain spindle correction tables for correction of axes positions. See the Delem machine parameter manual for more information about spindle corrections.

MAC_0001.DLC

Location: \Hard Disk\Delem\Data\Tools

This file contains all machine parameter settings of the control.

POC_0001.DLC

Location: \Hard Disk\Delem\Data\Tools

This file contains the settings of the programming constants, which are programmed in the menu 'program constants'.

NONVOLATILE.BIN

Location: \Hard Disk\Delem

Contains the momentary Delem application settings: manual mode parameters and active program. In case a loaded program causes problems with operation, you could delete this file. On the next restart, manual mode parameters will have been cleared and no bend program will be active.

KO_TAB.BIN

Location: \Hard Disk\Delem\Bin

Contains the active KO-Table of the Delem application. See also section 3.2.

Files with **Windows settings**:

AUTOEXEC.BAT

Location: \Hard Disk

File with commands, which are executed at start-up of the control. This file can be edited through the utility 'Autoexec.exe'. See section 2.7 for more information.

NK.BIN

Location: \Hard Disk

Windows archive. Do nothing with this file! If this file gets deleted or lost, the control will not function anymore!

BLDR

Location: \Hard Disk

Windows startup file. Do nothing with this file! If this file gets deleted or lost, the control will not function anymore!

BOOT.INI

Location: \Hard Disk

Windows startup file. Do nothing with this file! If this file gets deleted or lost, the control will not function anymore!

BOOT.PCX

Location: \Hard Disk

Graphic file with illustration that is shown at startup. You may replace this file with another file of the same type. The name of this file has to be 'boot.pcx'.

2.4. Editing the autoexec.bat

The file 'autoexec.bat' is a standard file in the Windows system. Any command that can be executed from the command prompt can also be put in this 'batch file'. Whenever the control is started or rebooted, the system will first look for the special batch file 'autoexec.bat'. Any command that is written down there will be executed by the system automatically.

Common tasks for such a file can be to copy files to or from the flash memory. In the standard file, one task is implemented: activate the Delem application. Other tasks can be added if required.

To enable fast editing of this batch file, the control is equipped with the application Notepad, it is located in the directory \Hard Disk\WCE-Tools. To edit the Autoexec.bat, start this application.

Note:

Upon delivery of the control or after installation of new software, the file 'autoexec.bat' may be set to 'read-only' for safety purposes. If that is the case, it cannot be edited. See section 2.3 on how to change file properties.

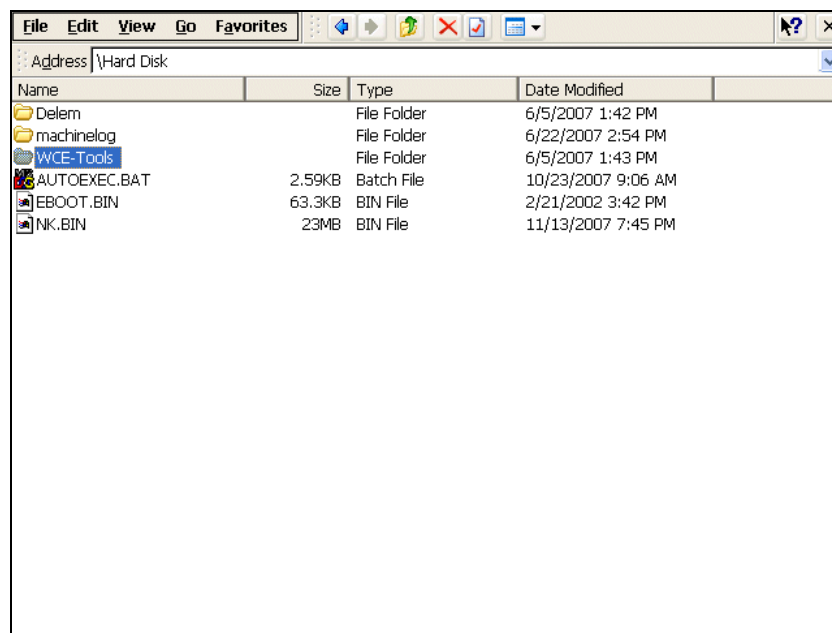
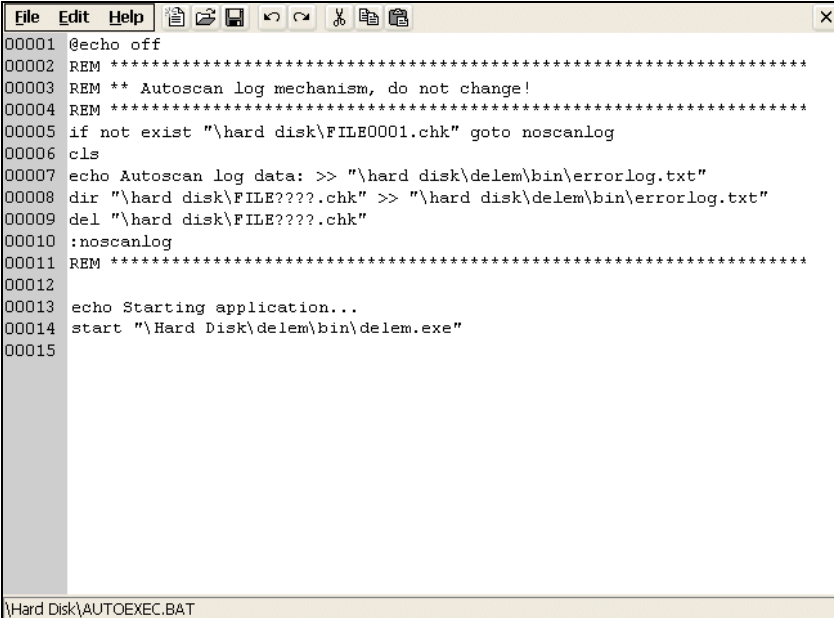


Figure 2.e

When the file has been opened, the following screen appears:



```
File Edit Help
00001 @echo off
00002 REM *****
00003 REM ** Autoscan log mechanism, do not change!
00004 REM *****
00005 if not exist "\\hard disk\\FILE0001.chk" goto noscanlog
00006 cls
00007 echo Autoscan log data: >> "\\hard disk\\delem\\bin\\errorlog.txt"
00008 dir "\\hard disk\\FILE???.chk" >> "\\hard disk\\delem\\bin\\errorlog.txt"
00009 del "\\hard disk\\FILE???.chk"
00010 :noscanlog
00011 REM *****
00012
00013 echo Starting application...
00014 start "\\Hard Disk\\delem\\bin\\delem.exe"
00015

\\Hard Disk\\AUTOEXEC.BAT
```

Figure 2.f

The file can now be edited. When finished, click on 'Save' to save the changes and close the file. If you wish to abort the operation, click on 'cancel'. The file will be closed and the changes will be lost.

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Lines in the file that start with 'REM' are considered as comment.

In the beginning of the file, the 'if' instruction checks if the Delem application has a KO-table to work with. If such a KO-table is present, the subsequent instruction is skipped.

At the end of the file, the Delem application is started through the instruction:

```
start "\\Hard disk\\delem\\bin\\delem.exe"
```

This will ensure that the control automatically activates the Delem application at start-up of the control.

2.5. Control Rescue procedure

The Rescue procedure for the Delem control is meant to re-install all original software on the control. It is meant as a last resort, when other attempts to 'cure' the control have failed and/or the control does no longer boot from the internal flash memory).

When this procedure is carried out, all existing data on the hard drive is erased: products, tools, etc. This also means that license codes for control options are erased. These options can be requested again with the original vouchers.

This procedure can only be successful when all hardware is still functional.

Following two situations have different approaches for the rescue operation:

- What to do when the DA-52s application does not start?
(The control boots and shows the desktop)
- What to do when the Control does not boot?
(The display shows a black screen with a Delem logo)

What to do when the DA-52s application does not start?

(The control boots and shows the desktop)

Preparation

To perform the procedure on the control the following is necessary:

- USB-stick with a backup or update software

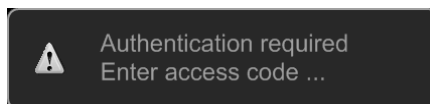
Procedure

1. Switch off the power of the control

2. Press and hold the  - key

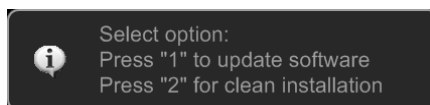
3. Switch on the power

The following message will appear:



4. Enter the access code: 25789 followed by the enter-key

The following message will appear:



5. Select option: 1
6. Follow the instructions on the screen (here you need the USB-stick with backup- or update software).

7. The control reboots and starts with the updater:

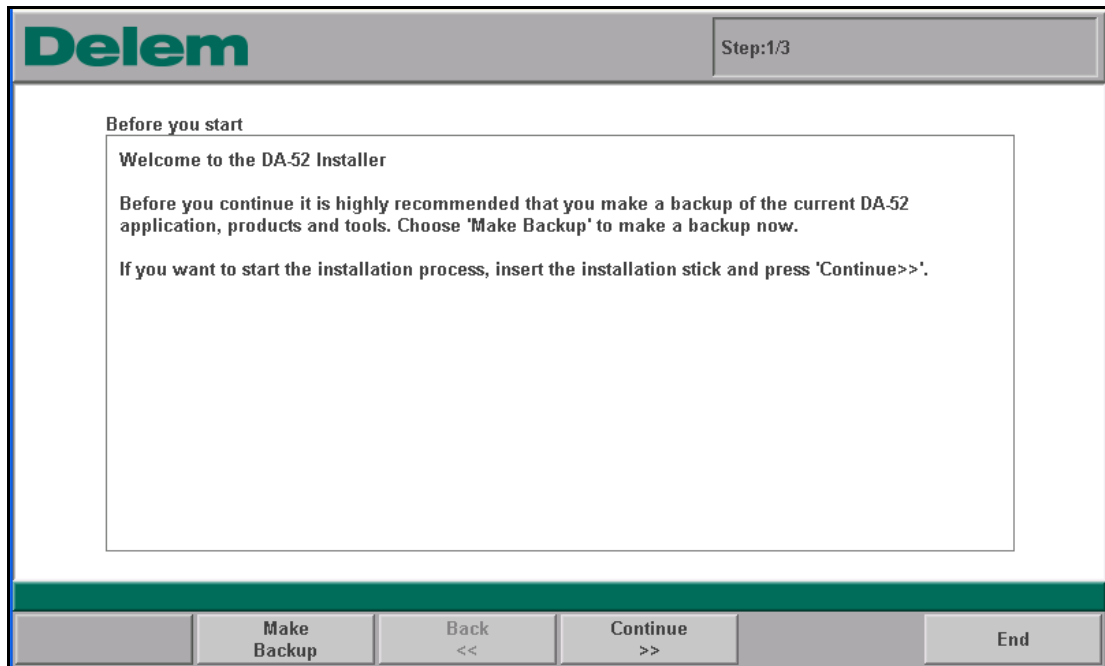


Figure 2.g

8. Follow the update procedure as described in paragraph 1.2.1, Update procedure.

What to do when the Control does not boot?

(The display shows a black screen with a Delem logo)

Preparation

To perform the procedure on the control the following is necessary:

- empty USB-stick (to create a Rescue-stick if required)
- USB-stick with a backup or update software

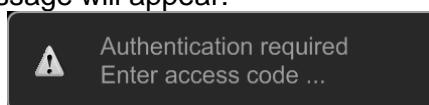
Start Procedure:

1. Switch off the power

2. Press and hold the  - key

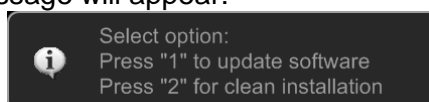
3. Switch on the power

The following message will appear:




4. Enter access code: 25789 followed by the enter-key

The following message will appear:

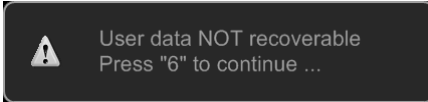


5. Select option: 2
6. Recover files from the control.

One of following screens will show:

- a. 

Follow the instruction on the screen (for backup use the empty USB-stick).

- b. 

Follow instruction on the screen.

7. After the backup the kernel will be installed, follow the instructions on the screen.
(Do not use the USB-stick with recovered data. Use the USB-stick with a backup- or the update-software).
8. The control reboots and starts with the updater:

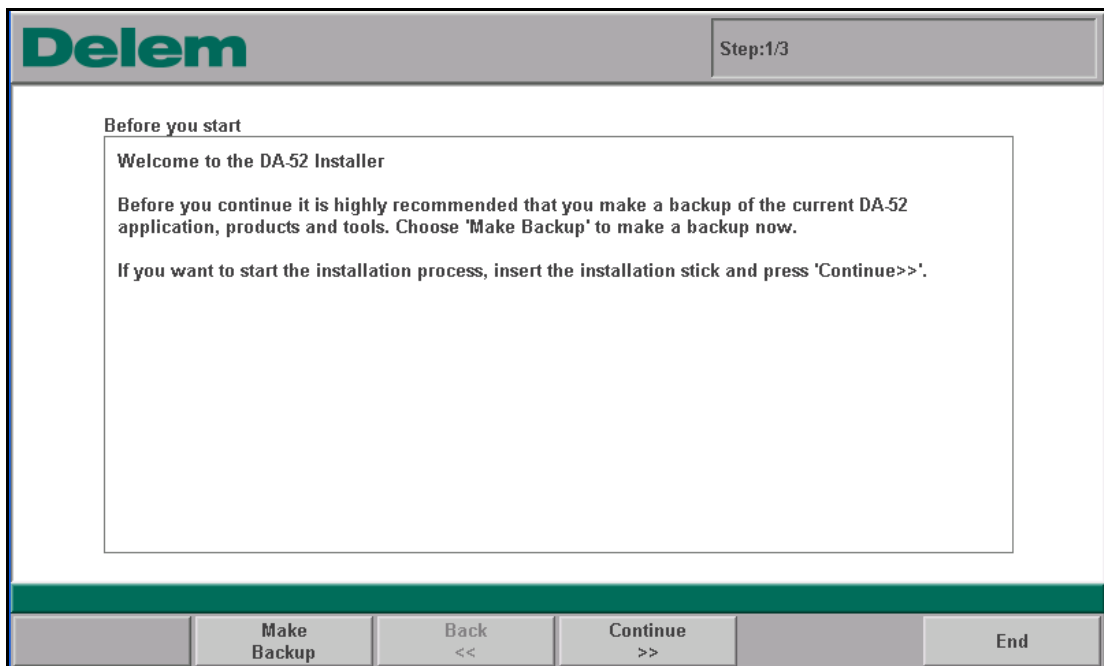


Figure 2.h

9. Follow the same update procedure as described in paragraph 1.2.1, Update procedure.

10. When installation is finished the control starts with the Voucher application.

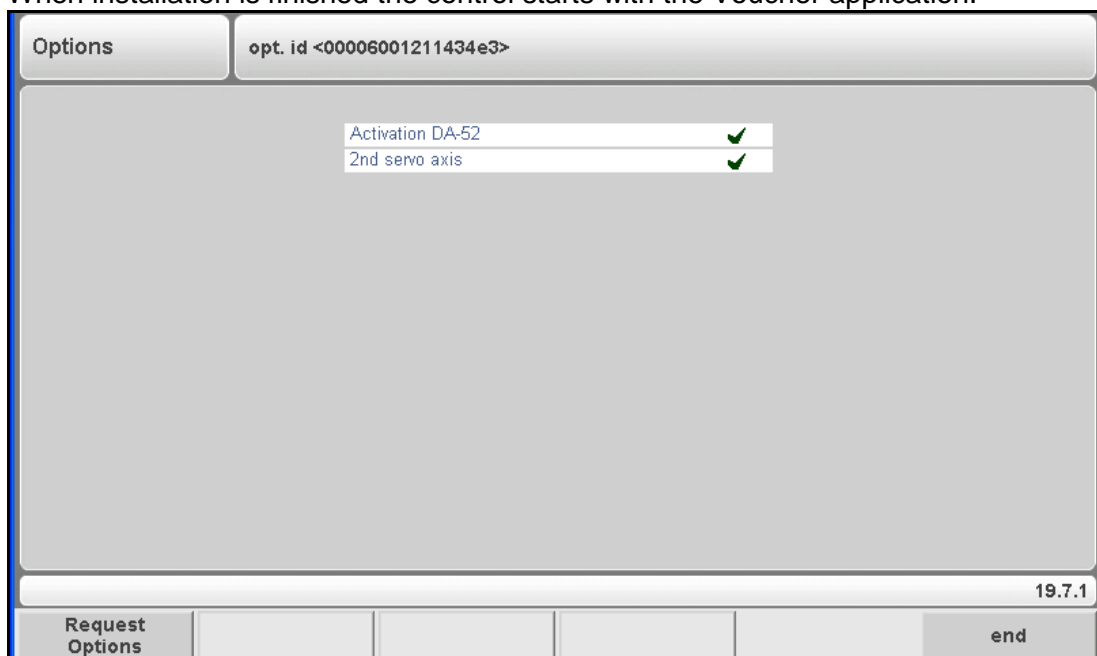


Figure 2.i

11. Plug in the USB-stick with a backup- or the stick with the recovered-data)
12. ¹Select "Import Certificate" and find the license files on the USB-stick.
Find it in: \\Delem\Licences\
13. Optionally follow the same procedure for the X2 option.
14. Via Machine Parameters you can now choose to update the control with the rescue stick. This gets the control to as close as possible to its last status.

¹ If there is no backup available and the rescue did not manage to salvage the license files you need to get the voucher sheet that was sent with the control and follow the procedure as described in paragraph 1.3, Option installation.

2.6. Sequencer adjustment

The sequencer is the built-in PLC function of the Delem system. The text file with sequencer code is stored on the hard disk of the control, in the file seq_inp.txt. This file can be edited with the application Notepad that is built-in on the control. An alternative could be to copy the file to a USB disk and edit the file from a PC. After that, the file can be copied back to the control.

The procedure to open and modify the sequencer runs as follows:

- go to the Windows environment;
- activate the Windows Explorer;
- go to the subdirectory \Hard Disk\Delem\Bin: a large list of files is shown;
- search the file 'seq_inp.txt';
- replace this file with your own sequencer program or modify this file. It is recommended to keep a backup of the standard file, in case of programming errors;
- when sequencer modifications are completed, save the text file and close it.

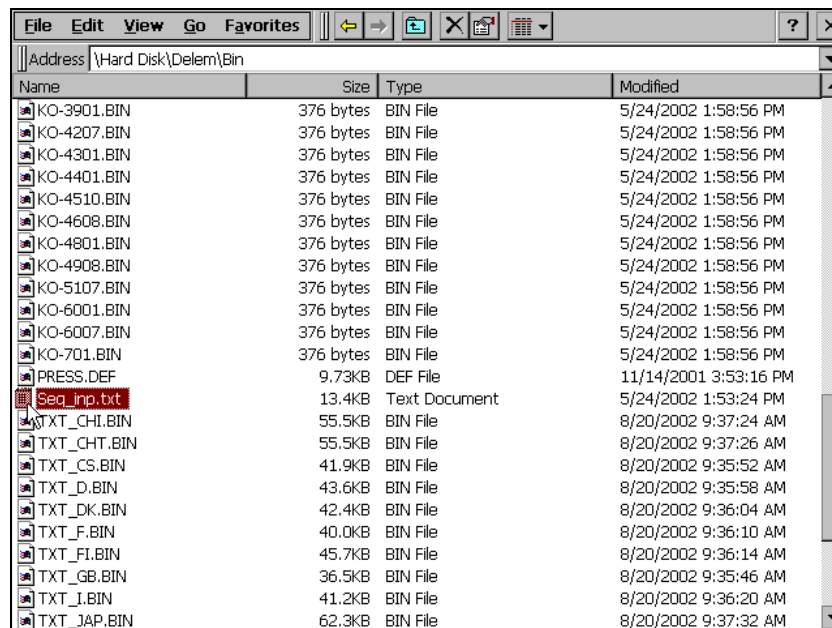


Figure 2.j

- Go to the start menu and choose 'Reboot'. The control will restart.

To simplify testing during the development of a sequencer modification the sequencer can be loaded from a USB-stick without having to copy it to the control.

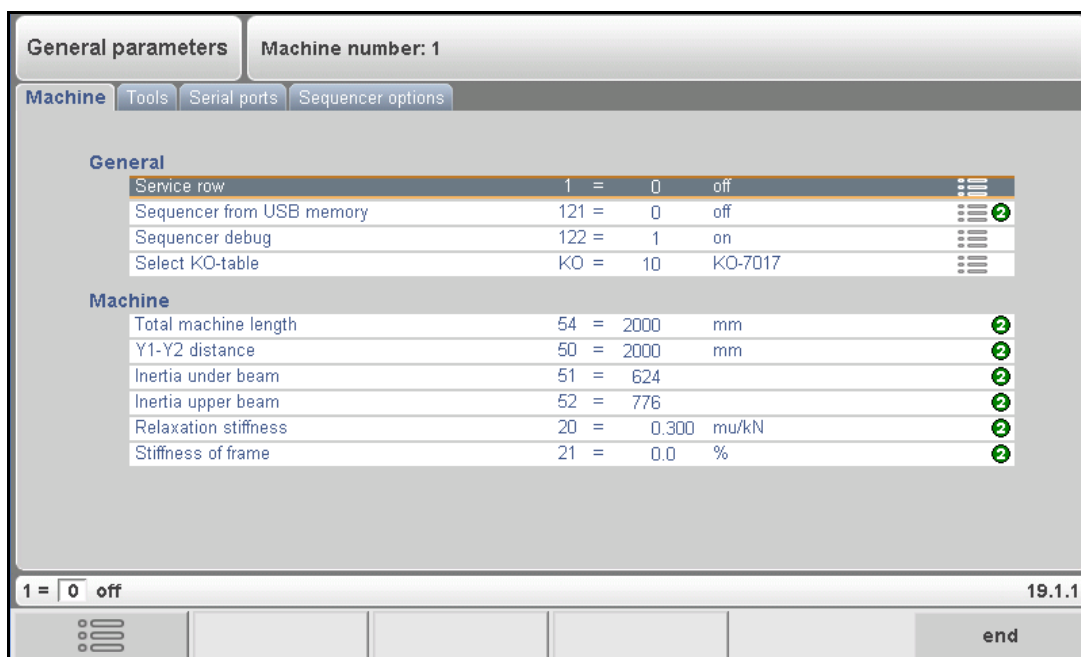


Figure 2.k

In the machine parameters the parameter 'Sequencer from USB memory' can be switched on. When the sequencer is final, the softkey 'Install Sequencer' can be used to copy the sequencer files seq_inp.TXT and *.DEF to the sequencer directory in the control. After installing the new sequencer the parameter 'Sequencer from USB memory' can be switched off again.

For a description of sequencer programming we refer to the Delem sequencer programming language manual [2].

2.7. Analysis program

The control is equipped with a program for analysis of a pressbrake cycle. This analysis program can run parallel to the DA application.

The working principle is as follows. During one bend cycle, the program records the values of a number of analog and digital I/O signals. All this data is immediately stored in a file on the control disk and can be represented graphically.

The program is called YAnalyse.exe and is located in the directory:

\Hard Disk\Delem\YAnalyse.

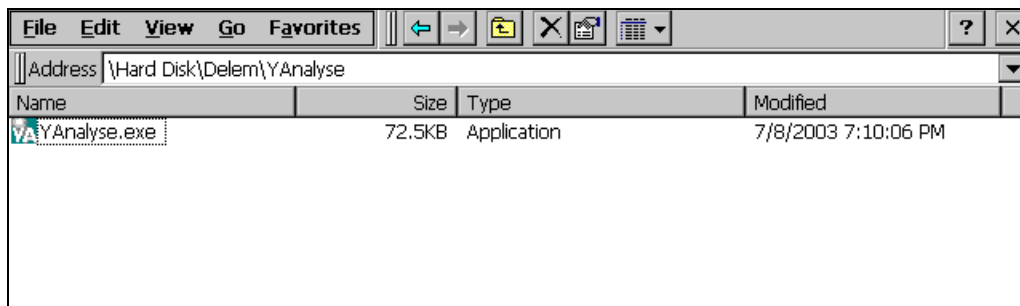


Figure 2.l

Upon start-up, the program will first prompt for an access code:

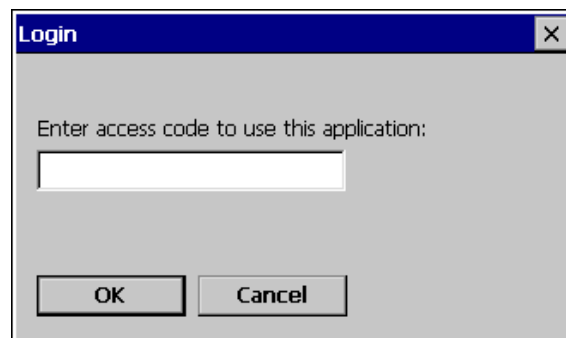


Figure 2.m

Here you must enter a 'level 2' code, which is also used to modify all Delem machine parameters in the DA application. The default access code here is 32157.

With the 'new' command, a new file is created. Type a name you wish to give to the file. At the beginning this file is empty, it will be filled with cycle information as soon as a cycle is recorded by the analysis program.

Each cycle is stored in a separate file. To this end, the name of each file consists of the name you entered, followed by a number. Every time a cycle is recorded, the number in the filename is incremented by 1. So it is possible to record all bends of a product, each bend is stored in a file. Each bend can be analysed afterwards. With the buttons 'previous' and 'next' it is possible to browse through the collection of bends.

To record a bend cycle, use the 'start measure' command. The program will show the following dialog:



Figure 2.n

This means the analysis tool is now waiting for a bend cycle to be executed. Now switch to the DA application and execute a bend cycle in the normal way. The analysis program actually starts recording when a fast closing or a pressing command is activated. The program will continue to record until an UDP (upper dead point) signal is generated, indicating that the bend cycle is finished.

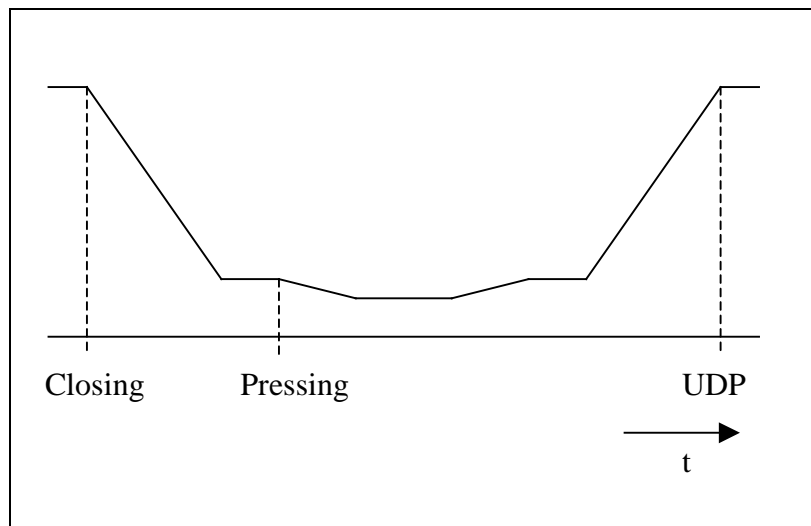


Figure 2.o

When the bend cycle is finished, switch back to the analysis program. On the screen you can see a graphic of the beam position as a function of the cycle time. As already explained, each recorded cycle is stored in a file. So it is also possible to open a previously recorded file for further analysis.

A typical analysis screen of one cycle could look as follows:

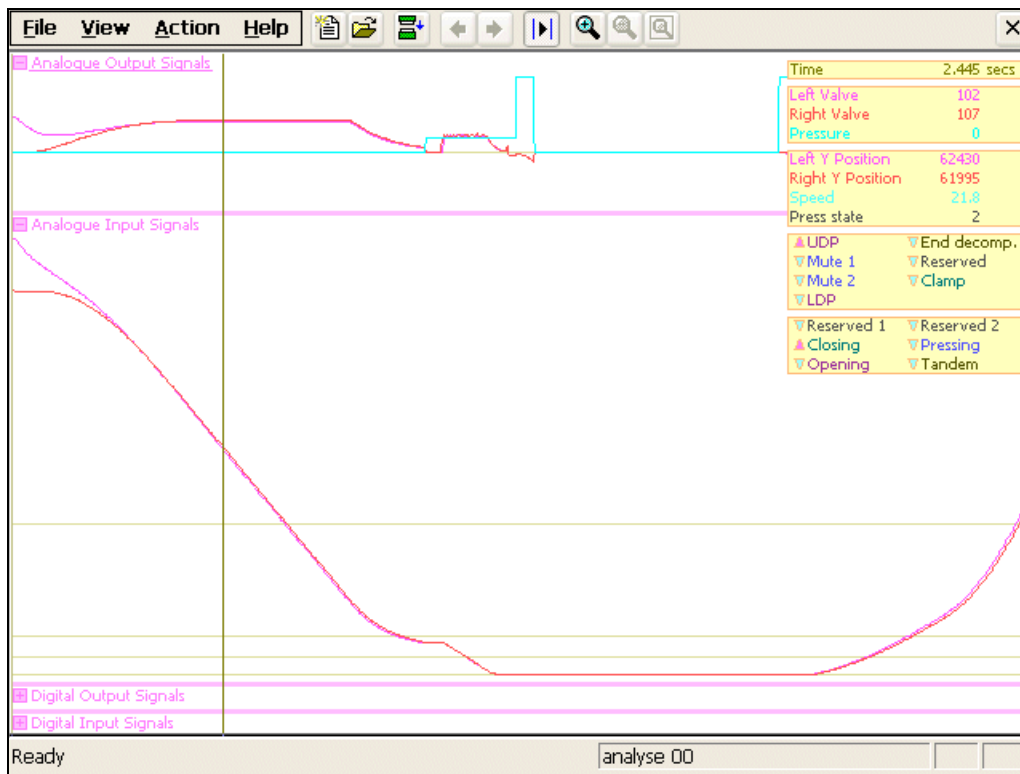











Figure 2.p

The toolbar at the top of the screen has the following commands:

	new	create a new file for recording of cycles
	open	open an existing analysis file
	start measure	record a pressbrake cycle
	previous	jump to previous recording
	next	jump to next recording
	fix cursor	freeze the cursor on the current position and move with a second cursor to another moment in the cycle, for comparison purposes
	zoom in	increase magnification, to study specific signals more closely
	zoom out	decrease magnification, to get a more global view
	reset	reset view to initial state, with smallest magnification

The signals are divided in four groups. Each group can be opened or closed, in order to examine one group more closely. The value of all recorded signals is shown in the text box, which can be placed left or right with the <tab> key.

The following groups are shown:

- analog output signals
- analog input signals
- digital output signals
- digital input signals

For the meaning of all signals we refer to the Delem machine parameter manual, where all signals are described in detail.

Remarks:

- If cycle files must be kept for further analysis, it is recommended to store them in non-volatile memory. For instance, when the 'new' command is first used to create a file, the directory \Temp is offered. This directory is lost when the control is switched off! To keep the files on a permanent medium, store the cycle files on the control hard disk or a USB disk. See also section 2.2 for more information about directories.
- The cycle files are automatically given the extension '.frd' and can be read on any control that is equipped with this analysis software. They can also be sent to Delem if more support is necessary.

Part III - The diagnostic program

To be able to test a DA-52s control, it has been equipped with a diagnostic program. With the test functions of the diagnostic program the service engineer can test the control itself and the communications to externally connected system components.

1. General remarks

1.1. Valve outputs

Before starting the diagnostic program it is required to check if the hydraulic pump of the pressbrake is not running. This is because during the diagnostic operation of the control no regulation of the pressbeam is performed.

With the diagnostic program you have to be very careful because the proportional valves can be deflected. The height-retaining valves have to be in the closed position in order to prevent the top beam coming down. It is good practice to place the top beam in its lowest position before starting the diagnostic program.

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1.2. Components check


In the description of the tests it is indicated which component(s) is(are) responsible for correct functioning of that particular part.

See for exploded view drawing with all internal cables and cards of the DA-52s controls the included diagrams at the end of part I.

2. Test-menu

2.1. Start diagnostic mode

To open the diagnostic program:

- press the key  to go to the program constants
- on the first parameter, enter the access code 741

2.2. The menu

When the diagnostic program has been started the screen shows the menu as indicated in figure 2.a (example of diagnostic main menu).

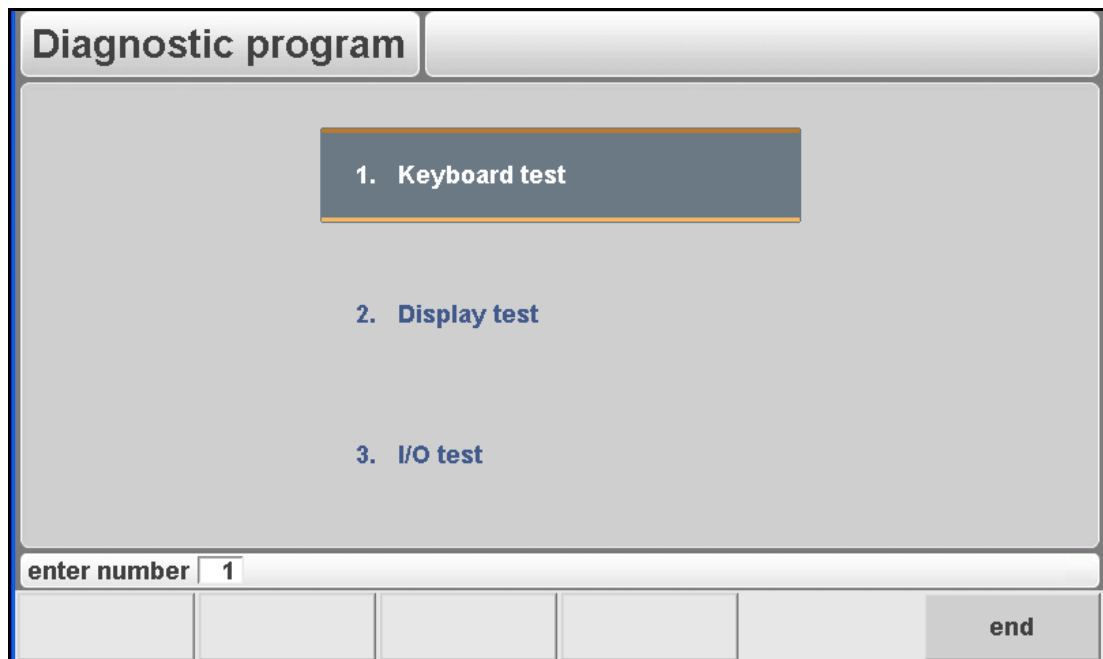


Figure 2.a

Diagnostic Options:

- | | | |
|---|--------------|---|
| 1 | Keys | Testing all the frontpanel keys. See Chapter 3. |
| 2 | Display test | Testing the screen. |
| 3 | I/O test | Testing the I/O. |

To end the diagnostic program the power supply to the control can be switched off and then on again to enter the normal operation menu.

It is also possible to leave the diagnostic program with the 'END'-key. The Delem application will restart.

3. Key test

Function

This test is meant to check the functioning of all the frontpanel keys.

Description

First you see a matrix with all keys, like in figure 3.a.

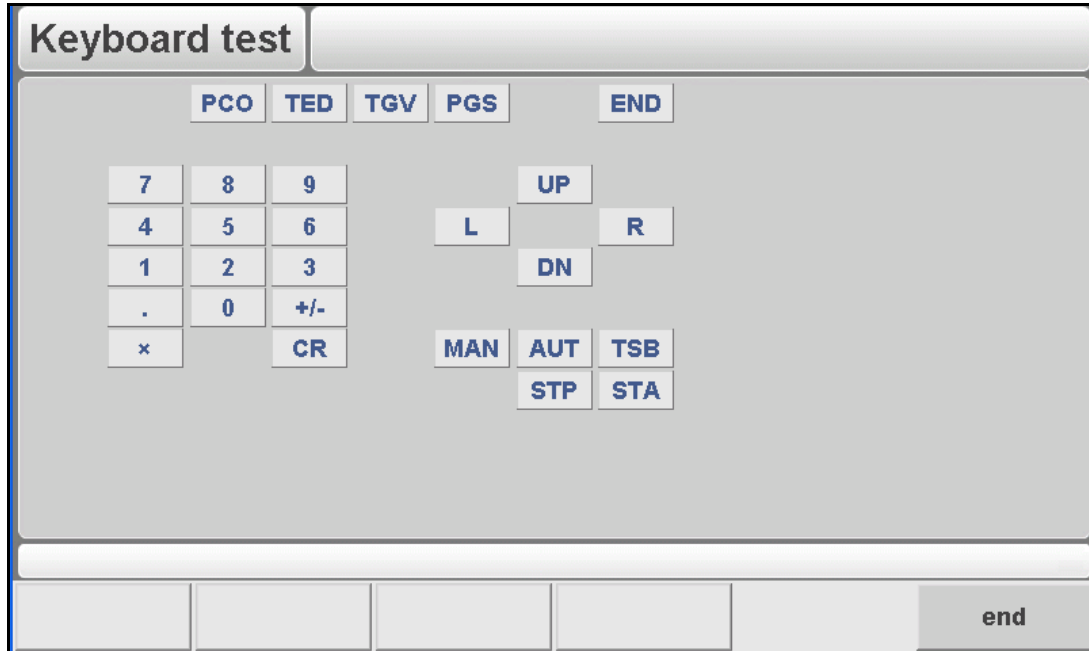


Figure 3.a

- Each time you press a key on the front, the corresponding position on the screen will give a unique indication. Entering the key test will result that all LED's in the mode keys and start/stop keys on the frontpanel automatically will light-up (and stay on during the diagnostic mode). You can test these mode keys and the start/stop keys by pushing the corresponding keys. The result is that the corresponding key on the screen will light up.
- The reading of the movement keys is tested by a counter. When you press the key '+', it must result in an increasing value on the screen (up counting). When you press the key '-', it must result in a decreasing value on the screen (down counting).
- The key lock status is displayed and can also be tested by turning the key from the ON to the OFF position. In the 'keylock is off' position the program data cannot be changed.

Failure

A failure (a key is not operative) can be caused by the frontpanel electronics, the front cable or the front interface on the mainboard.

End

Pushing the softkey 'END' finishes this test.

4. Screen test

Function

The screen of the control can be tested with 2 different test programs, to be selected with the front panel keys.



Figure 4.a



colortest

Check the display of colours on the screen.

Colortest

To get a good idea about the colour setting and correct functioning of the colour screen you will see a number of vertical bars. It is important that the 3 main colours are available (red, green and blue).



Figure 4.b

End

To end the monitor-test program press softkey END.

5. I/O test

5.1. Test screen

Description

In this screen the system I/O of the control can be tested and monitored. Analog and digital outputs can be set high and low with keys on the front panel.

The read-out of analog inputs and the encoders is continuously. When a reference pulse of the linear scales is received in the electronics, the corresponding measured value will shortly be highlighted in inverse colour. (Only when the concerning reference check has been enabled with the function key).

Diagnostic program				IO error = E48					
Digital-in		Digital-out		Analog-in		Analog-out		Offset	
1	0	2	0	1A	0.29 %	1	0	1	3
5	0	3	0	1B	0.29 %	2	0	2	1
6	0	4	0	2A	0.29 %				
7	0	9	0	2B	0.29 %				
8	0	10	0	Enc 1 = 0		Enc 3 = 0			
13	0	11	0	Enc 2 = 0		Enc 4 = 0			
14	0	12	0	Left valve deflection		= 0 % Pos.			
15	0	17	0	Left valve LVDT		= 0.04 V			
16	0	18	0	Right valve deflection		= 0 % Pos.			
21	0	19	0	Right valve LVDT		= 0.03 V			
22	0	20	0	Pressure valve deflection		= 0 DA			
23	0	25	1	(800mA = 136 DA max. 1500mA = 255 DA max.)					
24	0	26	0						
29	0	27	1						
reset all outputs		toggle anin. disp.		reference disable				end	

Figure 5.a

Reset all outputs

Reset all digital outputs of the control (set to zero).

Toggle anin display

Function to switch value of analogue input voltage between AD-points and a percentage.

reference disable

Testing the encoder counting of the X-axis or any Auxiliary axis. Toggle function between enabled and disabled. Default disabled. In the disabled situation you can test the count direction. In the enabled situation you can test whether the reference pulse is received (once per encoder rotation). ENC in the upper row.

Cursor left-right

Change from Digital-out to Analogue-out.

Enter

Press enter to toggle Digital-out between 0 and 1.

Manual movement keys

To change the value of the Analogue-out parameters.

- Testing the analogue output

With this option the analogue outputs can be tested. These signals are used for the control amplifiers of the X-axis and auxiliary axes. The output voltage varies between -10V and +10V. The value (+/- 255 DA-points) can be altered with the manual movement keys. The string 'OUTAN1' and 'OUTAN2' refer to the outputs in the analog A connector. See the schematic 8063-104 for the location of these outputs.

- **Output test and adjustment procedure**

1. Set both the OUTAN1 and the OFFAN1 to zero by using the manual movement keys. Meaning that you should measure 0V at the output and the connected axis should not move.
2. If the measured output voltage is not zero, you must set the output voltage to zero with the OFFAN1 adjustment.
3. With the zero output voltage the motor should not move. A possible movement can be corrected with the offset adjustment of the concerning motor drive.
4. For further fine-tuning you can adjust the value of the OFFAN1 again.

- **Testing the digital inputs**

In case a digital input is active, the indication on the screen will be '1', otherwise the indication is '0'. When you connect a DC-voltage of 24V at the selected input, the signal indication of the corresponding input on the screen must become '1'.

If none of the inputs is working, please check the common input connection and the general +24V.

- **Testing the digital outputs**

Move with the cursor keys to a digital output number, Press '1' to activate the output. In case you press '0' the output is deactivated.

- **Testing the analogue inputs**

The value on the screen is the read-out of the voltage in DA-points which is offered to the analogue input. By varying the voltage the read-out should vary likewise.

Failure

External electronics, DA-52s or the wiring (including connectors).

5.2. Testing the valve deflection

Function

With this test the hydraulic-valve drive circuitry can be tested. Also the hydraulic pressure can be tested. To perform this test all the valves must be connected correctly.

Description

Via the cursor keys or the function keys S1, S2 and S3 you can select the required valve.

The test procedure for valve deflection depends on the type of valves that is installed. On the following two pages two different procedures are described. The first procedure is for Hoerbiger valves, which are connected directly to the DA-52s. The second procedure must be followed when external valve amplifiers are used to control the valves.

- **Test procedure (Hoerbiger valves)**

Diagnostic program				IO error = E45	
Digital-in		Digital-out		Analog-in	Analog-out
1	0	2	0	1A 0.29 %	1 0
5	0	3	0	1B 0.29 %	2 0
6	0	4	0	2A 0.29 %	
7	0	9	0	2B 0.29 %	
8	0	10	0		
13	0	11	0	Enc 1 = 0	Enc 3 = 0
14	0	12	0	Enc 2 = 0	Enc 4 = 0
15	0	17	0	Left valve deflection	= 0 % Pos.
16	0	18	0	Left valve LVDT	= 0.03 V
21	0	19	0	Right valve deflection	= 0 % Pos.
22	0	20	0	Right valve LVDT	= 0.03 V
23	0	25	1	Pressure valve deflection	= 0 DA
24	0	26	0	(800mA = 136 DA max. 1500mA = 255 DA max.)	
29	0	27	1		

	reset all outputs	toggle anin. disp.	reference disable		end
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Figure 5.b

1. Move cursor to 'Left valve deflection'.
2. Set 'Left valve deflection' at +10% by using the manual movement keys. To avoid possible influence of hysteresis it is recommended to go first to +100% and then to the required +10%.
3. Move cursor to 'Left valve LVDT'. This is the read out of the left proportional valve. The value should be 8.0V. If not, then adjust this value with the manual movement keys.
4. Move cursor to 'Left valve deflection' again.
5. Set 'Left valve deflection' at -10% by using the manual movement keys. To avoid possible influence of hysteresis it is recommended to go first to -100% and then to the required -10%.
6. Move cursor to 'Left valve LVDT'. This is the read out of the left proportional valve. The value should now be 7.15V. If not, then adjust this value with the manual movement keys.
7. Repeat this procedure (step 1 through step 6) for the right proportional valve.

The **pressure valve** can be tested by measuring the current through the pressure valve at several DA-points. With the manual movement keys you can regulate the valve deflection in DA-points (0 DA = 0 mA). The current can be measured with an ammeter in series with the pressure valve.

Note

The maximum allowed DA-points per installed current type of the pressure valve.

Failure

External electronics, wiring, valves or DA-52s.

End

Press the END-key to finish this test.

- **Test procedure (External valve amplifier)**

In this menu the analogue output for valve control is tested.

Diagnostic program									
Digital-in		Digital-out		Analog-in		Analog-out		Offset	
1	0	2	0	1A	0.29 %	1	0	1	3
5	0	3	0	1B	0.29 %	2	0	2	1
6	0	4	0	2A	0.29 %				
7	0	9	0	2B	0.29 %				
8	0	10	0						
13	0	11	0	Enc 1 =	0	Enc 3 =	0		
14	0	12	0	Enc 2 =	0	Enc 4 =	0		
15	0	17	0	Left valve deflection	= 0	% Pos.			
16	0	18	0	Left valve offset	= 0	*			
21	0	19	0	Right valve deflection	= 0	% Pos.			
22	0	20	0	Right valve offset	= 0	*			
23	0	25	1	Pressure valve deflection	= 0	DA			
24	0	26	0	(800mA = 136 DA max. 1500mA = 255 DA max.)					
29	0	27	1						

	reset all outputs	toggle anin. disp.	reference disable		end
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Figure 5.c

1. Move the cursor to the field 'left valve'.
2. Use the manual movement keys to put both the output value and the offset value at zero. The voltage at the output should now also be zero.
3. If the measured output voltage is not zero, you must set the output voltage to zero with the offset adjustment.
4. Repeat these steps for the other valve.
5. Further fine-tuning can be done through the calibration procedure as described in the Delem machine parameter manual at parameter 15, 'Calibrate valves'. That procedure is designed especially for external valve amplifiers.

Failure

External electronics, wiring, valves or DA-52s.

End

Press the END-key to finish this test.

Appendix A - Reference list

- [1] Delem machine parameters
- [2] Delem Sequencer Programming Language
- [3] Reference manual for operation of DA-52s