Diagnostic Tool
for Scan Heads using *iDRIVE* Technology

iSCANcfg

Contents

1   Introduction

This manual describes how to use the iSCANcfg diagnostic tool revision 3.1.0 for the following purposes:

- Check for proper communication between RTC boards and scan heads using SCANLAB's *iDRIVE* technology
- Check whether a scan head is operational
- Identify error states and write a scan head's operational state to a text file
- Select different scan head tunings (and with it different dynamic performance)
- Select a scan head's scaling (1/1, 1/2, 1/4 or 1/8)
- Save a scan head's tuning and scaling setting permanently.

1.1   Manufacturer

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1.2   System Requirements

Hardware

The usage of the iSCANcfg diagnostic tool revision 3.1.0 only makes sense under the following conditions:

- At least one of the following RTC boards and their drivers must be correctly installed in/at a Windows PC (for installation see the respective manual):
  - RTC6 Ethernet
  - RTC6 PCI Express
  - RTC5 PCI Express
  - RTC5 PCI
  - RTC5 PC/104-Plus
  - RTC5 PCIe/104
  - RTC4 PCI Express
  - RTC4 PCI
- At least one scan head using SCANLAB's *iDRIVE* technology (e.g. intelli*SCAN*, intelli*cube*, intelli*WELD or* intelli*DRILL*) should be properly connected to one of these RTC boards.

Operating system

The iSCANcfg diagnostic tool revision 3.1.0 is a dialog-based Win32 application usable with the following Microsoft operating systems:

- MS Windows 7
- MS Windows 8
- MS Windows 10

2   Installation

▸ Before installing the iSCANcfg software, ensure that the drivers for the corresponding RTC boards are installed on the PC in which your RTC boards are installed.

▸ Copy all the following files to a directory on your PC:
  – `iScanCfg.exe`
  – `RtcHalDLL.dll`

▸ Depending on the RTC boards installed, additionally copy the following RTC software files listed in the following table into the same directory of your PC:
  – Preferably copy the files from the latest RTC software package (this can be downloaded from the SCANLAB website if required), otherwise copy the files from RTC software packages with a minimum version as listed in the table.
  – For RTC6 boards, the board's BIOS version must also be taken into account (RTC6 software packages contain a BIOS file, too).

RTC board	Files to copy	Minimum required RTC software package version (appropriate for iSCANcfg revision 3.1.0)
RTC6 Ethernet	`RTC6Dat.dat` `RTC6DLL.dll` `RTC6ETH.out` `RTC6RBF.rbf`	`RTC6_Software_Package_Rev.1.3.2_2018_01_23.zip` DAT 601, DLL 608, OUT 608, RBF 611 BIOS version 21 (BIOS file `RTC6BIOSETH_21.out`)
RTC6 PCI Express	`RTC6Dat.dat` `RTC6DLL.dll` `RTC6OUT.out` `RTC6RBF.rbf`	`RTC6_Software_Package_Rev.1.3.1_2017_11_09.zip` DAT 601, DLL 607, OUT 607, RBF 611 BIOS version 21 (BIOS file `RTC6BIOSOUT_21.out`)
RTC5 PCI Express, RTC5 PCI, RTC5 PC/104-Plus RTC5 PCIe/104	`RTC5Dat.dat` `RTC5DLL.dll` `RTC5Out.out` `RTC5RBF.rbf`	`RTC5_Software_2009_09_24.zip` DAT 500, DLL 515, OUT 514, RBF 512
RTC4 PCI Express, RTC4 PCI	`RTC4D2.hex` `RTC4DLL.dll`	any version

3 Program Start and Connection Setup

Recommended procedure

▸ Launch the iSCANcfg program by double-clicking `iScanCfg.exe` or an appropriately created desktop symbol.

The main program window appears. The following is displayed there after a search run started automatically by iSCANcfg:
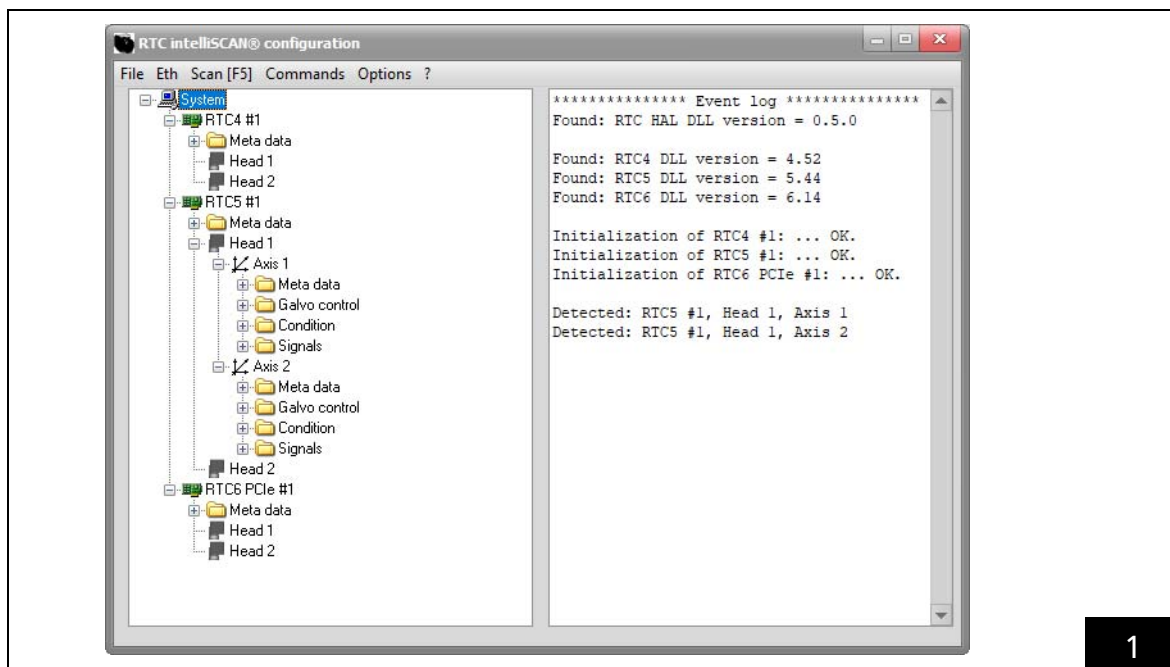
- RTC software files located in the program directory (see the 'Event log' window on the right)
- Installed RTC PCI and PCI-Express boards and the scan heads connected to them (see the 'Event Log' window on the right and the tree structure in the 'System info' window on the left).
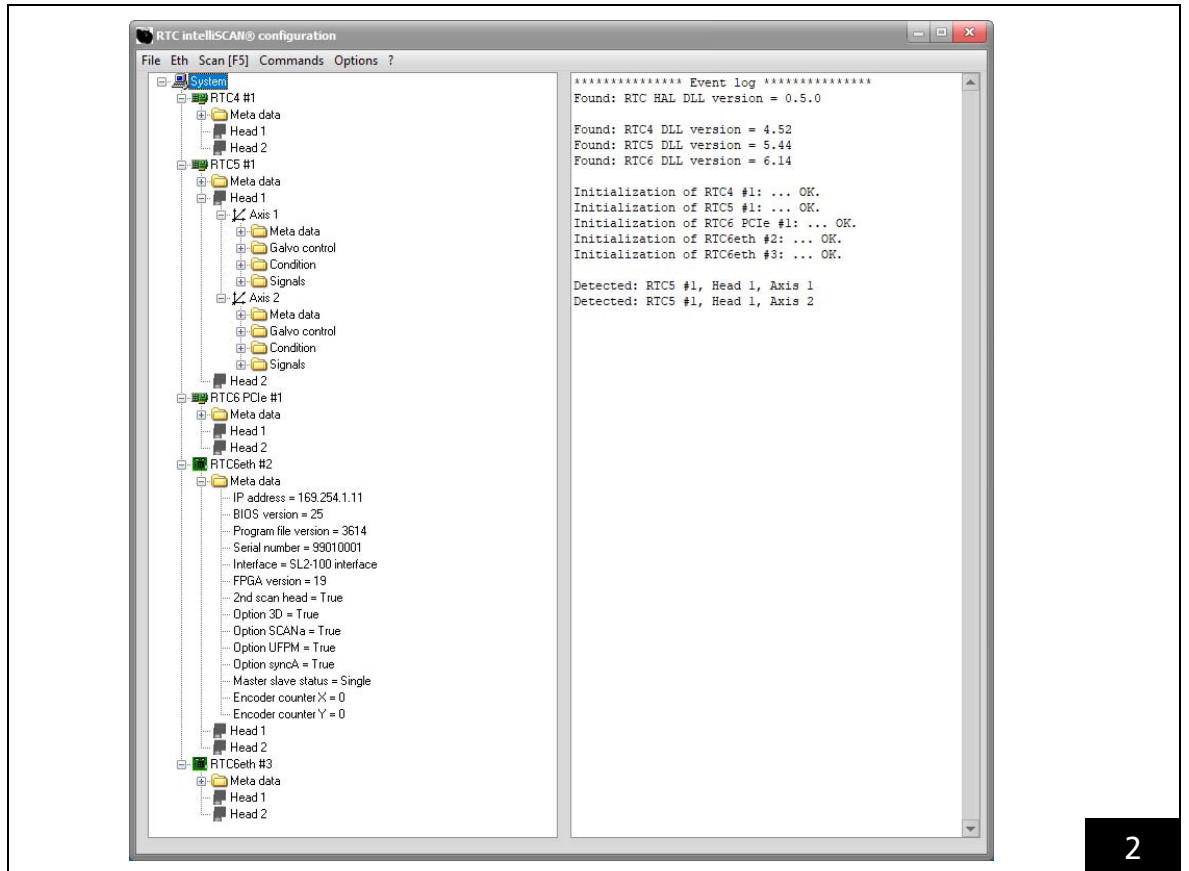
Figure 1 shows an example display of the main program window after such a search run.

Searching for installed RTC Ethernet boards is **not** performed automatically. Herefore, proceed as follows (see the following sections for details):

▸ Open the 'Eth > Eth settings' menu.

▸ Optionally double-click on the desired network interface controller in the 'NIC addresses' list of the 'Eth settings' window (double-click on the controller to which the RTC Ethernet boards to be searched for are connected).

▸ Optionally select the appropriate search type.

▸ Optional specify a search range.

▸ Click on the 'Search' button.

▸ In the 'Found Eth boards' list, select the desired RTC Ethernet boards via checkbox.

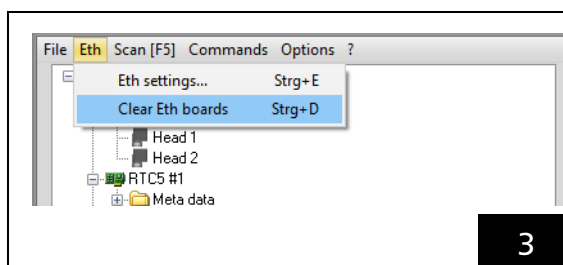▸ Click on the button 'Acquire selected boards'.

Now the selected RTC Ethernet boards and the scan heads connected to them should also be displayed in the main program window – if necessary together with the RTC PCI and PCI Express boards installed on the PC and the scan heads connected to them (see figure 2 on page 7).

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Via menu 'Eth >Clear Eth boards' (see figure 3),
the listed RTC Ethernet boards can be removed from
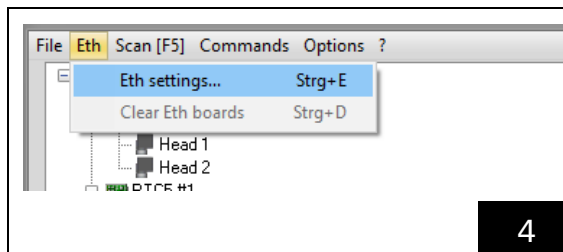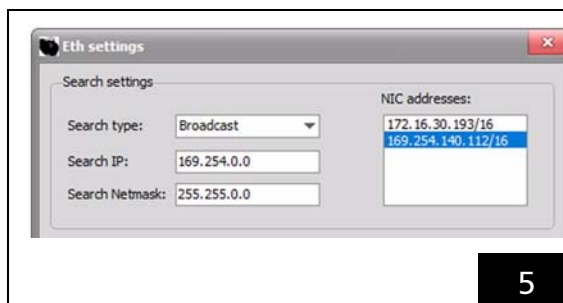the tree structure of the system info window.

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Automatic RTC board search

- iSCANcfg only searches for RTC boards, for which suitable software files are located in the program directory (see chapter 2 on page 5).

- iSCANcfg automatically starts a search run for RTC PCI and PCI Express boards after program launch. In case of success, iSCANcfg will automatically attempt to set up a connection to these boards and the connected scan heads, too.

RTC-Ethernet board search

- iSCANcfg does **not** automatically search for RTC Ethernet boards.

- After opening menu 'Eth > Eth settings' (see figure 4), iSCANcfg automatically searches for all network interface controllers of the PC and lists them under 'NIC addresses'. Additionally iSCANcfg displays the assigned Broadcast IPv4 address of the first network interface controller (from the list) under 'Search-IP' and 'Netmask' (see figure 5).
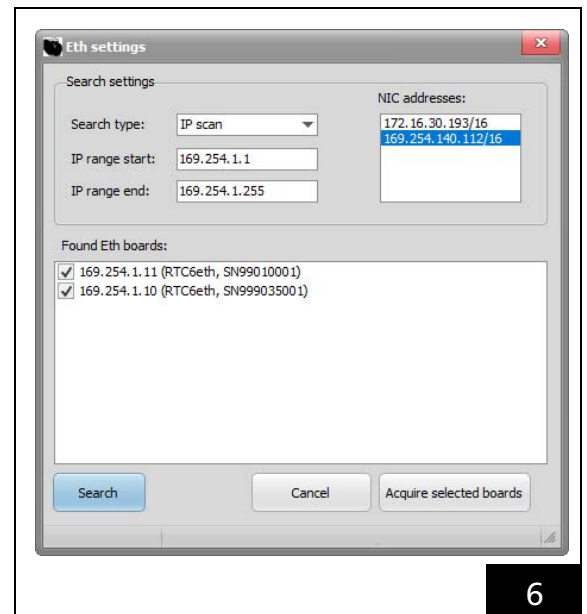

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- After double clicking on one of the network interface controllers listed in 'NIC addresses', iSCANcfg displays the assigned broadcast IPv4 address of the selected network interface controller under 'Search IP' and 'Search Netmask'.

- The search type should be selected according to the respective network (e.g. according to the network guidelines). The following types can be selected:
  - 'Broadcast'
  - 'IP scan' for searching for RTC Ethernet boards in a specific IP search range [IP range start ... IP range end]: The width of the search range is limited to 1024 by iSCANcfg. If the search range width is too large, a corresponding error message is displayed ('IP range too large'). See also figure 6.

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- After clicking the 'Search' button, iSCANcfg starts a one-time search for RTC Ethernet boards.
  - With a 'Broadcast' search the specified subnet is searched, with an 'IP scan' search the specified IP search range is searched.
  - Found boards are listed in the 'Found Eth boards' window with IP address, serial number and board type (see figure 6). iSCANcfg automatically sets the selection checkboxes for all boards. If you do **not** want to acquire certain RTC Ethernet boards listed in the list, **de**activate their checkboxes in the window 'Found Eth boards'.
  - Each search refreshes the list. A simultaneous use of several Ethernet boards in different subnets is currently only possible if their subnets are so close to each other that the relevant IP range can be searched with a single 'IP scan' search.

- In case an Ethernet board is **not** found by iSCANcfg with the procedure described above, this could be due to the following reasons:
  - The board may be not powered or connected incorrectly.
  - The board's IP configuration has been set such that – although it might be reached via one of the found network interface controllers – it is located in a different subnet (than searched via 'Search IP' and 'Search Netmask') or its IP address is not in the specified IP search range.
  - The IP configuration of the board has been set such that it is located in a subnet that cannot be reached by the PC (e.g. because the firewall blocks the board search).
- After clicking the 'Acquire selected boards' button, iSCANcfg (also) lists the found RTC Ethernet boards in the tree structure in the 'System info' window. iSCANcfg will then automatically attempt to set up a connection to these boards and the connected scan heads, too. The listed RTC Ethernet boards can be removed from the 'System info' window's tree structure via menu 'Eth >Clear Eth boards'.

Automatic connection setup to found RTC boards

- iSCANcfg tries to initialize and acquire the found RTC boards (found RTC **Ethernet** boards only after 'Acquire selected boards') and displays the corresponding result in the 'Event Log' window (right) and in the 'System Info' window (left):
  - In case of success: 'OK'
  - Otherwise: an error message
- In case of success, iSCANcfg also displays metadata of the respective RTC boards in the tree structure of the 'System info' window.
- An error may occur if initialization and acquisition of an RTC board is blocked because the board has already been acquired by another program. iSCANcfg can only establish a connection to an RTC board if the board has not already been acquired by another program. Therefore, iSCANcfg cannot be used to monitor a scan head during a running RTC user program. Conversely, no other RTC user program can use an RTC board if iSCANcfg has acquired this RTC

board before and has not yet released it again (PCI and PCI Express boards will be released only by closing iSCANcfg, RTC Ethernet boards also by deleting them from the tree structure).
- If the connection state between PC and an RTC board changes, iSCANcfg automatically updates the display in the main program window.
  - If connection to an RTC board is interrupted for any reason, this will be displayed as 'BOARD ERROR' in the 'Event Log' window and in the 'System info' window.
  - If connection to an RTC **Ethernet** board is interrupted, the connection will **not** be automatically resumed when the disturbing cause has been eliminated. To do this, first click on 'Acquire selected boards' again.

Automatic connection setup to scan heads

- iSCANcfg automatically checks if scan heads with SCANLAB *iDRIVE* technology are connected to acquired RTC boards and lists the found scan heads in the 'Event log' window and in the 'System Info' window. In the 'System info' window iSCANcfg additionally displays status information of the found scan heads in the tree structure.
- If the connection state between RTC board and the connected scan head changes, the display is updated.
- Scan heads **without** *iDRIVE* technology are **not** displayed by iSCANcfg.
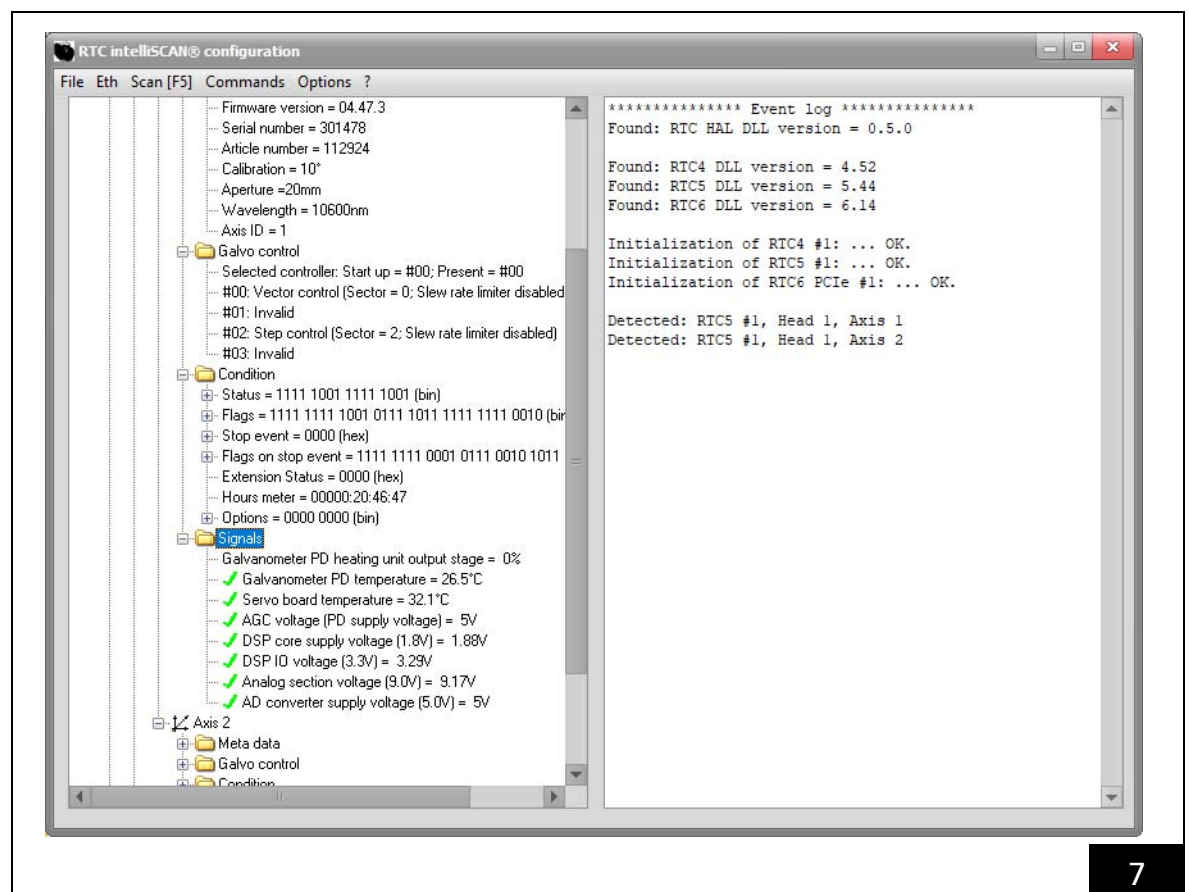
4 Diagnostics

Checking communication

Notes on checking the communication between PC and RTC boards or between RTC boards and the connected scan heads:

- A working communication is displayed as 'OK' in the 'Event log' window.
- Errors may also be displayed in the tree structure of the 'System Info' window.
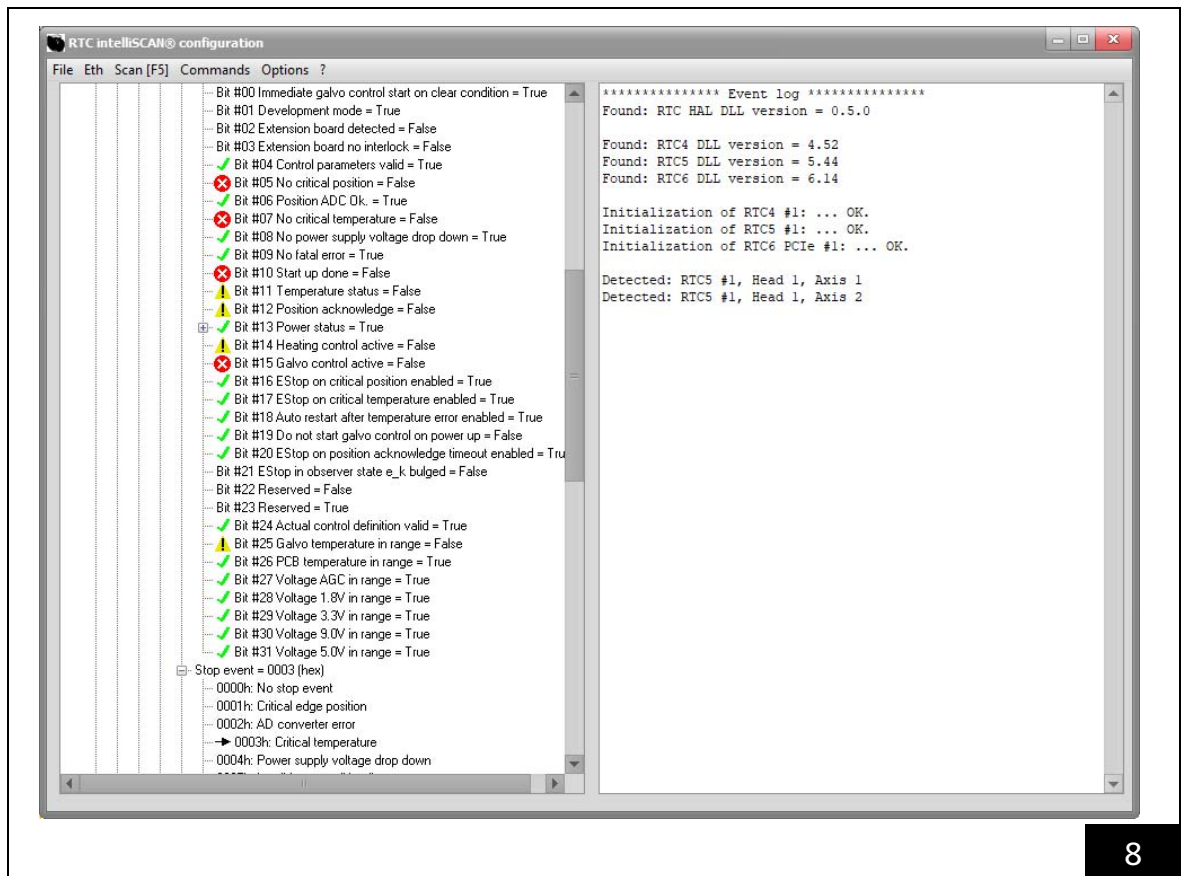
Checking the current operating status

▶ To check the metadata of an RTC board or the operating state parameters or settings of a scan head, expand the desired folders and subfolders by clicking the corresponding symbol in the tree structure of the 'System info' window (see figure 7).

▶ Select 'File > Save' from the menu bar. The individual operating state parameters and settings of the RTC boards and scan heads are then written to a text file.

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If iSCANcfg identifies a malfunction of a scan head, iSCANcfg automatically expands the corresponding folders/subfolders in the tree structure (see example in figure 8).

- ❌ indicates malfunctions which leads to a switch-off of a galvo power stage.
- ⚠ indicates malfunctions, which do **not** lead to a switch-off of a galvo power stage.

Malfunctions can be caused, for example, by exceeding the critical temperature during a previously executed (and ended) user program.

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5   Settings

Additional to the diagnostic function, iSCANcfg lets you perform the following scan head settings:

- Selecting the tuning
- Selecting the scaling
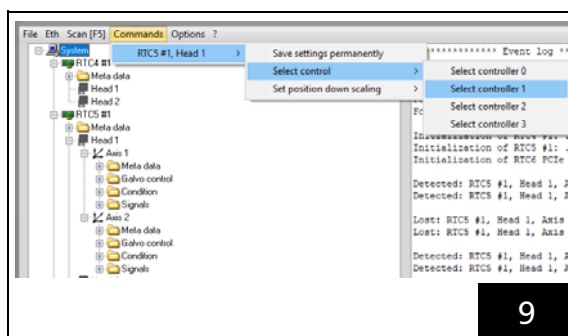- Saving the settings permanently

Notes:

- The settings described below will be performed via the menu bar. The menu bar becomes visible, once communication with the scan head is established.
- These settings are **not** possible with an excelli*SCAN* scan head.

Selecting the tuning

Diverse applications have differing requirements regarding the laser positioning dynamics. *iDRIVE*® scan systems can be equipped with multiple tunings with different dynamic performance.
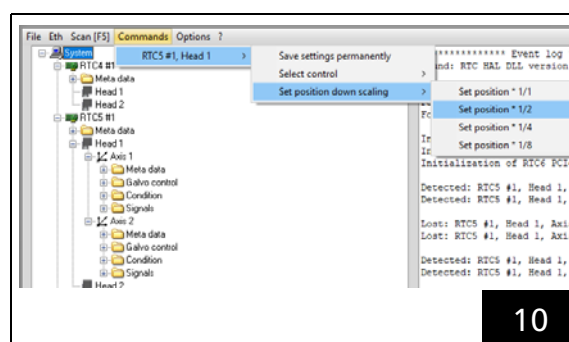
▸ Select the desired tuning (within the iSCANcfg program called "controller") via the menu 'Commands > RTC number, Head number > Select control > Select controller...' (see figure 9).

Selecting the scaling

The scaling lets you (down) scale the position values received from the RTC by a specific factor (1/1, 1/2, 1/4 or 1/8). Thereby, the scan area can be confined to a smaller angular range (see RTC5 or RTC6 manual).
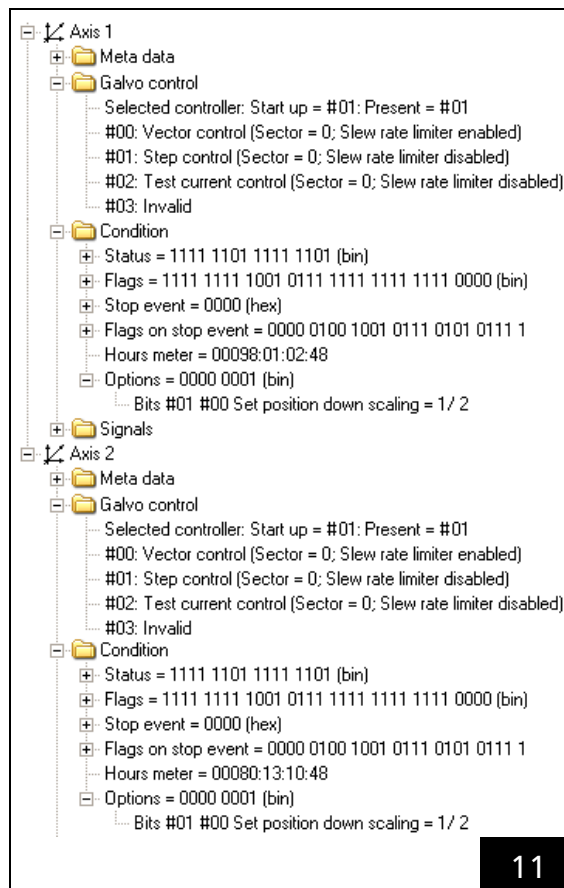
▸ Select the desired the scaling of the input/output signals via the menu 'Commands > RTC number, Head number > Set position down scaling > Set position * ...' (see figure 10).

Verify settings

The current settings can be verified by expanding the corresponding folder (both below 'Axis 1' and 'Axis 2', see figure 11):

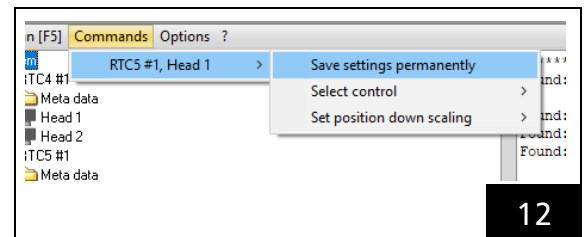- Tuning: 'Axis...\Galvo control'
- Scaling: 'Axis...\Condition\Options'

Saving settings permanently

The scan head settings described above are reset to default after power cycling.

▸ If current settings shall get persistent, then save them permanently in the flash memory via the menu 'Commands > RTC number, Head number > Save settings permanently' (see figure 12).

Notes