

MCS2 SERVICE TOOL

USER MANUAL



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Document Version: 1.0.2

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1 INTRODUCTION

Each MCS2 device has a set of default parameters. These parameters are usually saved and loaded from the EEPROM of the controller. While some of these parameters may change during operation, usually users want to change the default values, which are loaded after a reboot. The purpose of the *MCS2 Service Tool* is to change these default values for the parameters.

The *MCS2 Service Tool* can also be used to display hardware and firmware versions of all components of the device.

2 OVERVIEW

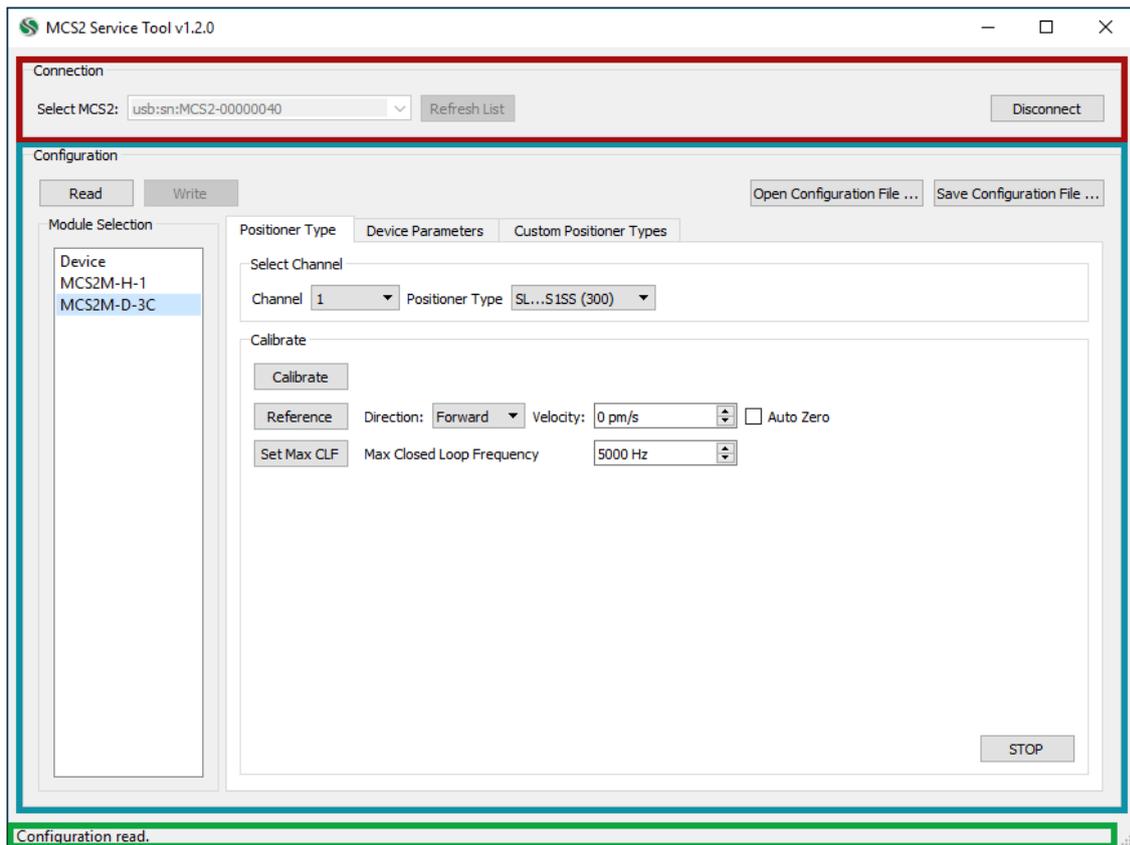


Figure 2.1: Initial View of the MCS2 Service Tool

The *MCS2 Service Tool* is divided into distinct groups, which are highlighted in figure 2.1 “Initial View of the MCS2 Service Tool”

The upper part (red highlight in figure 2.1) is the Connection group. Here you can establish a connection to your MCS2 device, further described in chapter 3 “Connecting to the device”.

Right below (blue highlight in figure 2.1) is the Configuration group. After connecting to a device, the Configuration group is used to manipulate parameters of the device. The different tabs, their different purposes and their usage are described in chapter 4 “Configuring the device”.

Information, errors and actions taken by the tool are displayed in the statusbar at the lower border (green highlight in figure 2.1).

3 CONNECTING TO THE DEVICE

To establish a Connection connect the device to the PC and power up the device. Usually the device should either be found as soon as the PC recognizes it or as soon as the user has pressed the refresh button. If no device was found, the last known locator will be displayed. The user can alternatively enter a locator in a format described below:

- For USB devices a locator is defined as "usb:sn:<deviceSerialNumber>" (e.g. "usb:sn:MCS2-12345678").
- For Ethernet devices a locator can be defined as "network:sn:<deviceSerialNumber>" or as "network:<deviceIP>" (e.g. "network:sn:MCS2-12345678").

After selecting the device, press the Connect button to establish a connection. As the tool reads the current default configuration of the connected device right after connecting, this may take several seconds to actually seem connected. If this step was successful the formerly disabled options in the Configuration group will become available. If this step failed, an error will be displayed in the statusbar.

4 CONFIGURING THE DEVICE

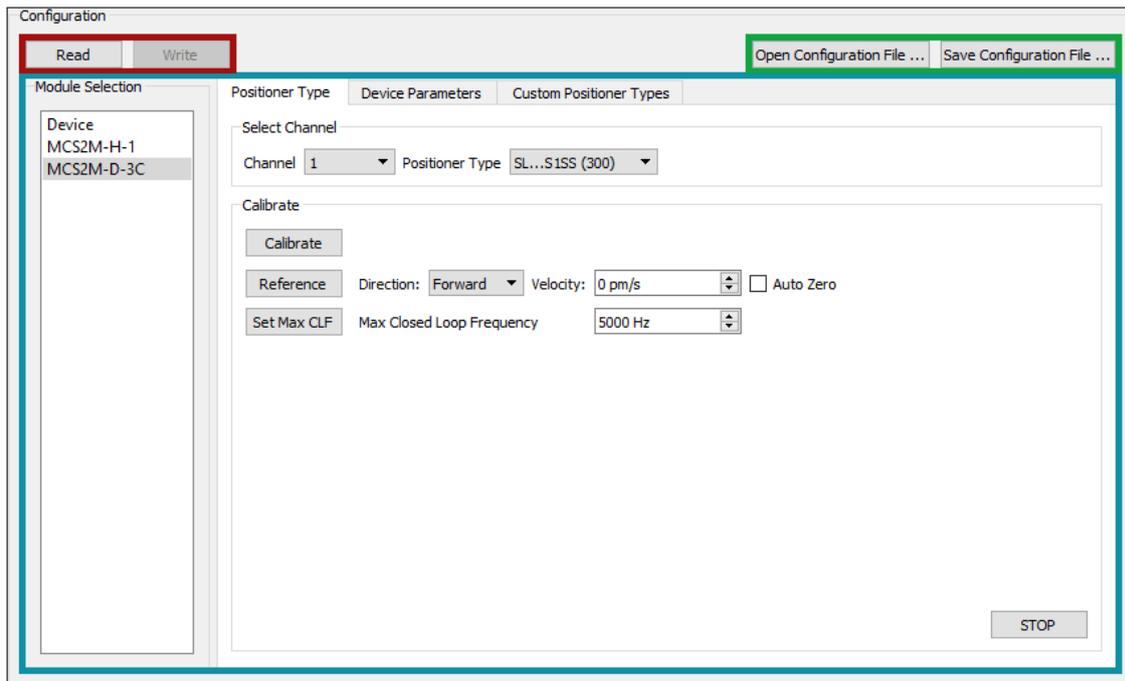


Figure 4.1: Configuration group

Figure 4.1 “Configuration group” displays a part of the GUI, and highlights different parts. The upper left part of the configuration group (red highlight in figure 4.1) contains buttons to respectively read and write the current configuration to the device. If the read button is pressed all parameters for the device will be reloaded, discarding possible changes made in the *MCS2 Service Tool*.

The write button will only be available if changes were made to the configuration (indicated by an asterisk (*) behind a modified tab). When pressed, it will write the contents of modified tabs. It is not useful for resetting the device to a specific state as only modified values will be written.

Next to those buttons (upper right side) exists another set of read and write buttons (green highlight in figure 4.1) to read or write a configuration file. Saving to a configuration file allows to store, restore or duplicate a configuration, which can then be loaded and written to several MCS2 devices.

Furthermore the *MCS2 Service Tool* arranges different functions in several tabs (blue highlight in figure 4.1). The tabs are grouped by module type which can be selected on the left. Only connected modules are shown in the list. The next few sections will describe purpose and functionality for each tab in detail.

4.1 Positioner Type

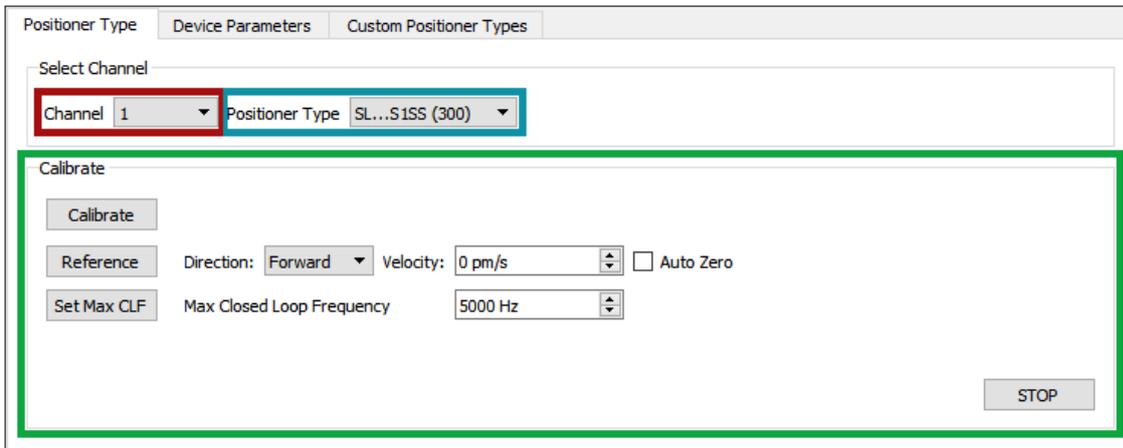


Figure 4.2: Positioner Type tab

The *Positioner Type* tab is used to configure the positioner type for the selected channel of the current device. A channel is selected through the box in the upper left corner (red highlight in figure 4.2). The corresponding positioner type is then selectable by the box right next to it (blue highlight in figure 4.2). The tool allows to choose from all positioner types that are known to the connected device. Please refer to the *MCS2 Positioner Types* document for a list of possible positioner types.

The lower part of the *Positioner Type* tab (green highlight in figure 4.2) can be used to start a calibration of the system. After changing the positioner type the sensor should always be calibrated, as a calibration gathers information needed by the device, which may be invalid otherwise. If for example the positioner type includes an endstop-referenced sensor, calibrating is crucial for finding the right position to stop when referencing.

Another function available in the *Positioner Type* tab is referencing. For referencing a positioner non-permanent settings for direction, velocity and auto zero option can be given. In case of distance-coded sensor types a possible inversion of the sensorstrip can be found by pressing the button 'Detect Dist Code Inversion'. This option can also be changed in the *Device Parameters* tab described in section 4.2. If a high velocity is chosen to reference the device, the MaxCLF might hinder the device to achieve that speed. Therefore the Max CLF may be changed here, this parameter will stay with the device until it is reconfigured or restarted.

4.2 Device Parameters

	Global Value	Separate Values	Channel 1	Channel 2
Physical Scale Offset	0	<input type="checkbox"/>	0	0
Logical Scale Offset	0	<input type="checkbox"/>	0	0
Logical Scale Inversion	Normal	<input type="checkbox"/>	Normal	Normal
Safe Direction	Forward	<input type="checkbox"/>	Forward	Forward
Sensor Power Mode	Enabled	<input type="checkbox"/>	Enabled	Enabled
Sensor Power Save Delay	100	<input type="checkbox"/>	100	100
Position Mean Shift	32	<input type="checkbox"/>	32	32
Default Max CLF	5000	<input type="checkbox"/>	5000	5000
Distance Code Inversion	Normal	<input type="checkbox"/>	Normal	Normal
Sensor Input Select	Position	<input type="checkbox"/>	Position	Position
Control Loop Input	Sensor	<input type="checkbox"/>	Sensor	Sensor
	<input type="checkbox"/> Accumulate Relative Position		<input type="checkbox"/>	<input type="checkbox"/>

Figure 4.3: Device Parameters tab

Configuration of device and channel specific parameters can be done in the *Device Parameters* tab, displayed in figure 4.3.

The tab mainly consists of a table, where each row represents a parameter and each column a different channel. As values can either be set for all channels at once or one by one, the table has two additional columns. The *Global Value*, which defines a default parameter value, and the *Separate Values* checkboxes, which defines whether the global default value or each separate default parameter is used. Some values are always global and the *Separate Values* checkboxes for these are not available.

Parameters not present in the current firmware are disabled and can not be written. All values displayed in the table are checked for their respective range limits. What these parameters are used for and what their ranges are can be looked up in the *MCS2 Programmers Guide* document.

4.3 Custom Positioner Types

Positioner Type	Device Parameters	Custom Positioner Types			
Channel 1					
	Custom Slot 0 (250)	Custom Slot 1 (251)	Custom Slot 2 (252)	Custom Slot 3 (253)	
Movement Type	Linear	Linear	Linear	Linear	
Base Unit	Meter	Meter	Meter	Meter	
Base Resolution	-12	-12	-12	-12	
Head Type	C01	C01	C01	C01	
Reference Type	Single Coded	Single Coded	Single Coded	Single Coded	
P Gain	120	120	120	120	
I Gain	0	0	0	0	
D Gain	10	10	10	10	
PID Shift	10	10	10	10	
Anti Windup	0	0	0	0	
ESD Distance Threshold	1000000	1000000	1000000	1000000	
ESD Counter Threshold	100000	100000	100000	100000	

Figure 4.4: Custom Positioner Types tab

Each channel may be configured with one of 4 custom positioner type slots. These custom slots allow fine tuning for special configurations, which are not covered by the default positioner types. In figure 4.4 an overview of the *Custom Positioner Types* tab is shown.

At the top the currently selected channel can be changed. Below a table shows the parameters that may be configured for this channel. Each row represents a positioner type parameter which is displayed for each of the custom slots. For a list of all parameters and their meaning refer to the *MCS2 Programmers Guide*.

4.4 HCM Configuration

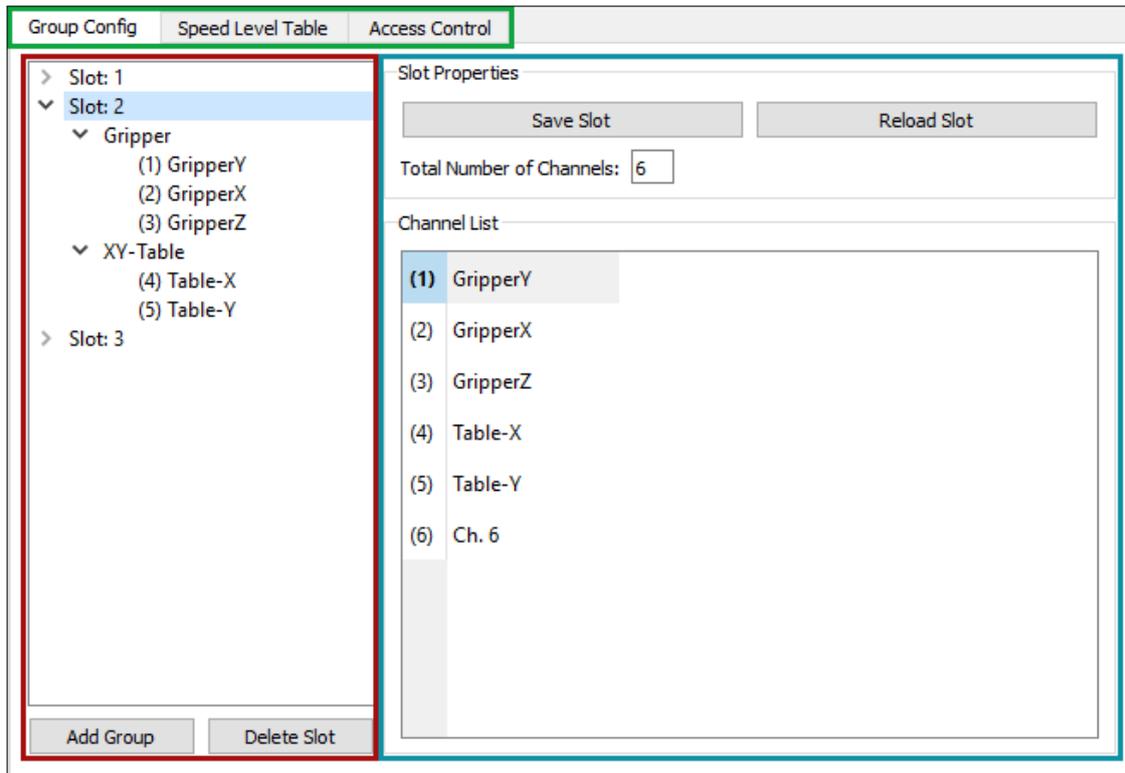


Figure 4.5: HCM Configuration tabs

Each MCS2 Hand Control Module (HCM) has a set of configuration slots, which are saved in internal EEPROM. If a HCM is connected to the device, the *MCS2 Service Tool* can be used to configure these slots. The *HCM Configuration* is organized into several tabs (green highlight in figure 4.5). For further information regarding the HCM and its values refer to the *MCS2 HCM User Manual*.

The left side of the *Group Config* sub-tab (red highlight in figure 4.5) is used to display the hierarchical structure the HCM uses to save slots. Inside this GUI-element a tree is drawn, where each node level contains a single type of node:

- Top most node is the HCM itself, it is not displayed.
- The second level are three slots.
- Each slot can contain up to ten groups.
- Each group can contain up to three 'groupchannels' - a mapping between groups and channels with additional properties.

The tree allows to modify, copy, paste, add and delete nodes. This can be used to generate a multitude of different configurations for the HCM. It is possible to define different amounts of channels per slot, which can be useful if one HCM is used for multiple devices.

**NOTICE**

When copying one node and pasting it somewhere else, the actual copy happens not until the paste action is triggered. Therefore, if copying one group, changing some parameters and then pasting it, will have the changes inside the pasted group.

Depending on the selection in the left side of the tab (the tree), the context sensitive area (blue highlight in figure 4.5) displays different options:

- Figure 4.6 displays the right area, when a slot node is selected in the tree. Having selected a slot, the context sensitive area contains two buttons (save and reload slot), a box to set the amount of channels and a list of these channels. The reload button will reload only the selected slot, unlike the global read button, which reads all slots at once. The save Button will write the slot, regardless if it was modified or not, unlike the global write button, which will only write a slot if it was modified. Setting the amount of channels for a slot is not dependent on the connected device, as slots can be configured for different devices this way. The list of channels gives an overview as to how many channels the slot configuration has and their names.

Figure 4.6: Context area when a slot node is selected

- Figure 4.7 displays the right area, when a group node is selected in the tree. The only option available for a group is to change its name. Adding and deleting groups or channels within the group is done through the tree itself, not the context area.

Figure 4.7: Context area when a group node is selected

- Figure 4.8 displays the right area, when a channel node is selected in the tree. When a channel is selected, the context area displays all configurable properties for the group channel. If a property is not available for the current firmware, it is disabled.

Channel Properties	
Channel Name	Table-X
Group Channel Properties	
Channel Index	4
Joystickmap	X1
<input checked="" type="checkbox"/> Joystick inversion	<input type="checkbox"/> Knob inversion
<input type="checkbox"/> Joystick Control in Menu	
Control Mode	
Mode	Simple
Speedlevel	11
Steps	5
Step Amplitude	65535
Step Frequency [Hz]	5000
Scan Increment	1000
Scan Speed	5
Position Increment	1000000
Velocity	0
Acceleration	0
Holdtime	INFINITE

Figure 4.8: Context area when a channel node is selected

The second *Speed Level Tables* sub-tab contains four tables. The first two define the parameters to be used when selecting a specific speed level in simple mode or scan mode. The last two tables define the selectable position increments in closed-loop mode. The increment tables can be defined for linear and rotary positioners separately.

The last *Access Control* sub-tab allows disabling of individual HCM features. For a description of each feature see the *MCS2 Programmers Guide* document.



NOTICE

Changing values inside the HCM Configuration tab has no effects on the HCM until either the global write button or a save slot button was pressed.

4.5 Feature Permissions

Device Parameters				Feature Permissions				Diagnostic				Device Info			
Apply Feature Upgrade ...															
Module Type	Module ID	Enabled Features										Status			
MCS2M-I-U	00000021	None										Idle			
MCS2M-H-1	00000018	None										Idle			
MCS2M-D-3C	00000028	Low Vibration Mode, Advanced Sensor Correction										Idle			

Figure 4.9: Feature Permissions tab

The feature permission tab shows all features currently enabled for a specific module and also allows upgrading features. New features can be unlocked by clicking the *Apply Feature Upgrade...* button and selecting the upgrade file you've received from SmarAct. After selecting the file the *MCS2 Service Tool* will perform upgrades for all contained modules and report the status of each module in the *Status* column.



NOTICE

Verify that the correct upgrade file is selected for the device and in case of upgrades for external modules, e.g., sensor or hand control modules, they must be connected for the upgrade.

4.6 Diagnostic

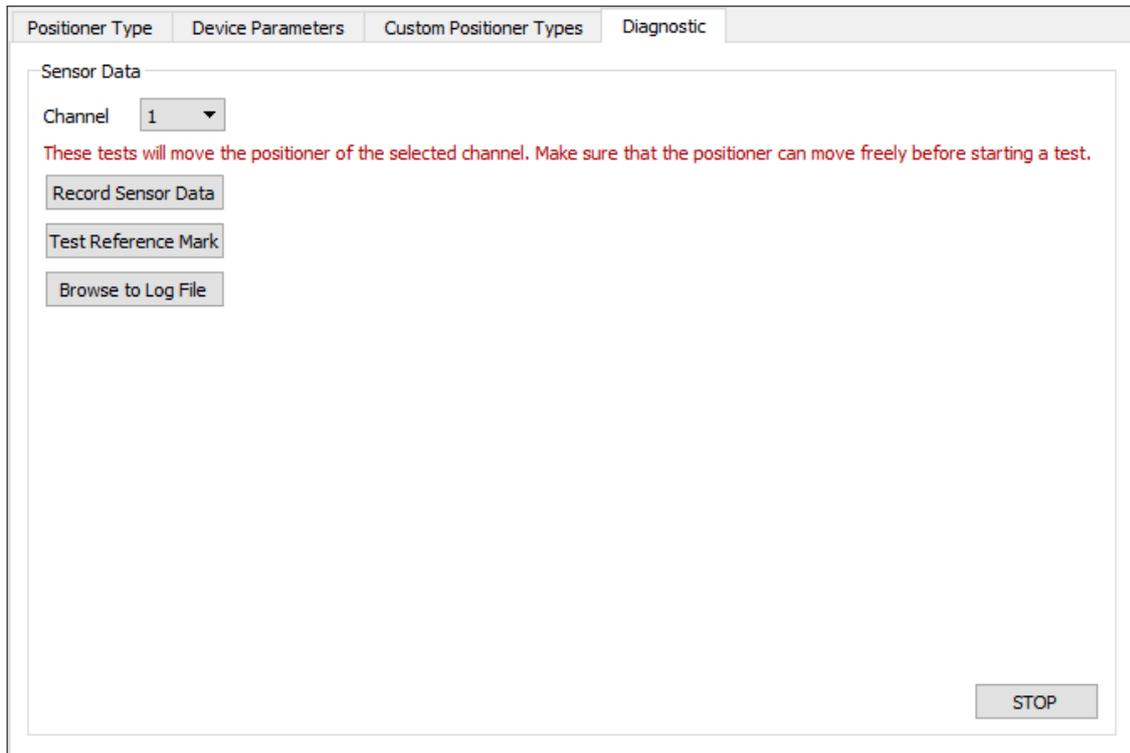


Figure 4.10: Diagnostic tab

The *Diagnostic* tab offers several tools to troubleshoot MCS2 devices. The *Record Sensor Data* button triggers multiple open loop movements on the selected channel and records the raw sensor data during the movements. The data is written to a logfile named *SmarActCTL.log*, which is located in the same directory as the service tool. This logfile needs to be sent to SmarAct for further analysis. The *Test Reference Mark* similarly moves the positioner to a reference mark and measures its position. The results are also written to the log file mentioned above.

4.7 Device State

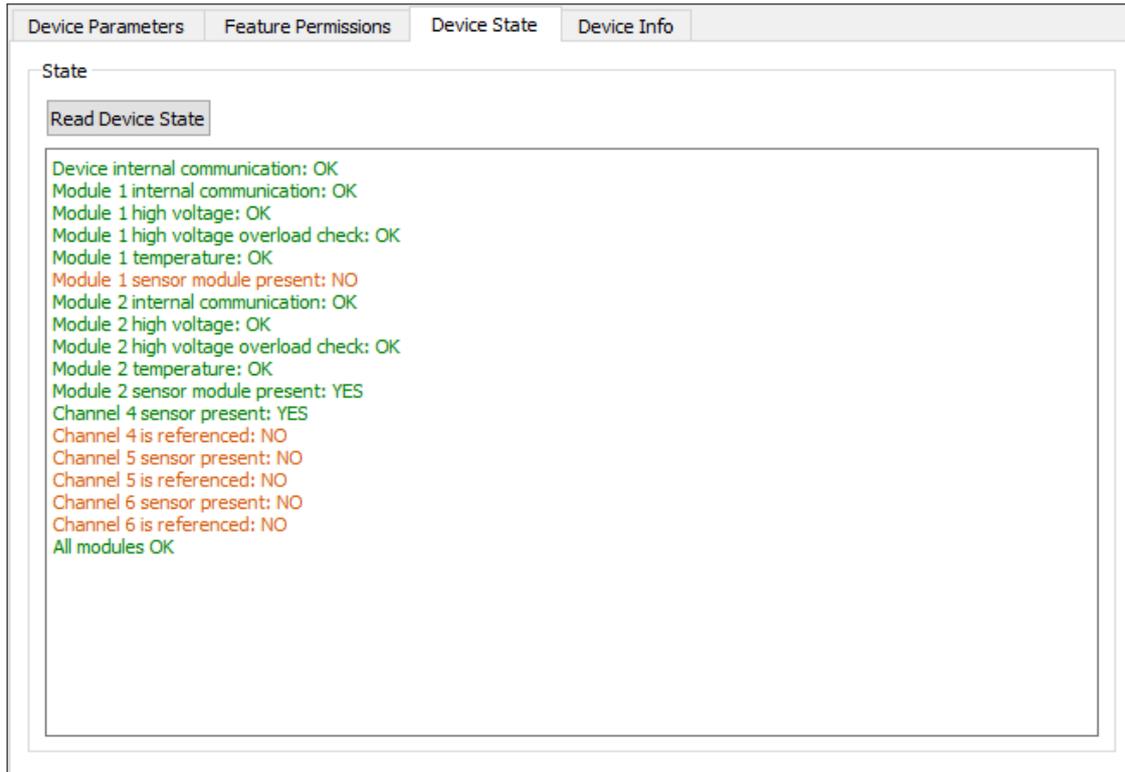


Figure 4.11: Device State tab

The *Device State* tab allows a quick self-test of MCS2 devices. When the *Read Device State* button is clicked, the state of all connected modules is read and checked for errors. In case of an error this helps finding the affected module and gives information about the type of problem. Fatal failures are displayed in red. Warnings about not connected modules and possible problems are shown in orange. For warnings it should be verified that they match the expected result, e.g. a channel state reporting *no sensor present* while a sensor is actually connected indicates a problem.

4.8 Device Info

Device Parameters	Feature Permissions	Diagnostic	Device Info
Device Name: <input type="text" value="MCS2-00000040"/>			<input type="button" value="Read"/> <input type="button" value="Write"/>
Device Serial Number:		MCS2-00000040	
Interfacemodule:			
Module ID:		00000021	
Hardwareversion :		(Code 1) 5.0.0.1.0	
Firmwareversion :		(Type 1) 1.1.0 [Release 11/15/2017]	
Handcontrolmodule:			
Module ID:		00000018	
Hardwareversion :		(Code 1) 3.0.0.1.0	
Firmwareversion :		(Type 1) 1.0.55 [Release 11/15/2017]	
Module 1:			
Drivermodule:			
Module ID:		00000028	
Hardwareversion :		(Code 1) 5.0.0.1.0	
Firmwareversion (BU0) :		(Type 1) 1.1.74 [Release 11/15/2017]	
Firmwareversion (BU1) :		(Type 1) 1.1.17 [Release 11/15/2017]	

Figure 4.12: Device Info tab

The purpose of the *Device Info* tab is to give a general overview of the device. Figure 4.12 displays information on firm- and hardware of a testdevice. In the tab the information is structured as follows:

- Device Name (with Read/Write)
- Device Serial Number
- Interfacemodule
- Handcontrolmodule, if available
- Modules 1 – *N* of the device
with versions for each updateable component.

The tab contains all firm- and hardwareversions for each component of the connected device. Information on hot-plugable components is displayed, too, if they were connected at the time the read button was pressed. When pressing either the write or the write XML button, neither writes information contained in the *Device Info* tab. But the Information that is displayed can be selected, copied and saved manually. The Read and Write buttons contained in the tab are solely used to read/write the device name.

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