ICS Trouble shooter/ICS FAQ’s

1. About this document

This document is a guide to handle various problems and frequently asked questions related to ICS and ICS/R-net.

It is assumed that the reader has basic skills in using WheelchairBuilder, Rnet PC-Programmer and OBP. This document does not include basic instructions how to open and use these programs, but more details to handle certain situations. Use the table of content to find what you need.

_Note that the document generally describes the functionality for chairs delivered or updated with program versions released from December 2010 and that some functions described may not exist on or be different on older chairs._

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### 1.1. Abbreviations and definitions

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<th>Abbrev./Defin.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CJSM</td>
<td>Color Joystick Module, color display</td>
</tr>
<tr>
<td>C3G</td>
<td>Corpus 3rd Generation</td>
</tr>
<tr>
<td>GM</td>
<td>ICS General Module</td>
</tr>
<tr>
<td>ICS</td>
<td>Intelligent Control System, the seat control system from Permobil</td>
</tr>
<tr>
<td>JSM</td>
<td>Joystick Module, monochrome display</td>
</tr>
<tr>
<td>LED</td>
<td>Light Emitting Diodes</td>
</tr>
<tr>
<td>Node</td>
<td>A node is any unit connected to a communication bus, for example units connected to the ICS LIN-bus</td>
</tr>
<tr>
<td>OBC</td>
<td>On Board Configuring, a way to adjust ICS settings without using WB</td>
</tr>
<tr>
<td>OBP</td>
<td>On Board Programming, a way to adjust R-net parameters without using PCP.</td>
</tr>
<tr>
<td>PC</td>
<td>Personal Computer</td>
</tr>
<tr>
<td>PCP</td>
<td>PC-Programmer for R-net</td>
</tr>
<tr>
<td>PGDT</td>
<td>PG Drives Technology Ltd, supplier of the R-net control system</td>
</tr>
<tr>
<td>R-net</td>
<td>The control system from PGDT</td>
</tr>
<tr>
<td>SB</td>
<td>ICS Switch-box</td>
</tr>
<tr>
<td>SW</td>
<td>Software (program)</td>
</tr>
<tr>
<td>URIB</td>
<td>Universal R-net Interface Board</td>
</tr>
<tr>
<td>VS</td>
<td>Permobil Vertical Seat</td>
</tr>
<tr>
<td>WB</td>
<td>WheelchairBuilder, programming tool for ICS.</td>
</tr>
</tbody>
</table>
2. **R-net/ICS related**

2.1. **What tools do I use for programming Rnet/ICS.**

The wheelchair is provided with basically two electric systems. The **R-net system** controls the driving of the wheelchair (input device, motors and brakes) and the **ICS** controls the actuators for seat movements. The two systems are to a certain degree integrated and the ICS can for example order the R-net system to reduce the maximum speed when the seating position requires for safety reasons.

**WheelchairBuilder (WB)** is used to program the ICS system, such as changing settings and/or updating the firmware. Refer to the ‘WheelchairBuilder Technical Manual’ (many languages). Note: In the Help-dropdown menu in WB are included support documents (such as instructions and manuals) that are related to the actual application.

**ICS OnBoard Configuration** is a method to change some basic ICS settings using the ICS Switch box. Refer to the ‘ICS OnBoard Configuration Manual’ (many languages)

The **Rnet PC-programmer (PCP) (Dealer)** is used to program the Rnet system, which means typically the driving characteristics such as speeds and accelerations etceteras but also for changing settings for special input devices such as Compact Joystick Advanced. PCP is also used for reading the fault log for all Rnet units and also the ICS. Refer to (PGDT) ‘Rnet PC-Programmer Dealer’ Manual (available at Permobil web-site/Intranet under Technical Manuals) If the PC-programmer is installed with Permobil installation file the manual is also available via ‘Start – ‘All Programs’ - ‘Permobil’ - ‘Rnet’ – ‘Instructions PGDT’ on your PC. Note: this manual describes generally the PC-programmer. More detailed information can be found under the Help-drop down menu in the actual programmer.

The **R-net OnBoard Programmer (OBP)** is a way of programming some of Rnet parameters without using a PC. To activate OBP an Rnet-dongle (programming key) must be connected to any Rnet bus-connector. The wheelchair must be provided with a joystick module with display or an OMNI. Refer to (PGDT) ‘On Board Programming’ Manual (available at Pemobil web-site/Intranet under Technical Manuals)

Some ICS settings can also be programmed from PCP and Rnet OBP.

2.2. **How to eliminate seat icons on the JSM-display?**

This can be done via Rnet PC-Programmer or OBP.

From PCP:
'Read from Controller' – click in the 'Mode Enable' field for the actual profile(s)
Unmark 'Seating Mode' (2) as in picture below.
'Write to Controller'

From OBP:

Enter OBP – Go to 'Modes' – Set mode 2 to 'No’ in actual (all) profiles.

2.3. What makes “the Turtle” pop up on the display?

The wheelchair speed is restricted when a turtle-icon is displayed. A flashing turtle means drive inhibit and a non-flashing turtle means maximum speed reduced.

The turtle can be displayed due to any of the following reasons:
1. The seat is in a position that makes the chair less stable. That could be due to seat elevator raised, tilting over a certain angle or backrest exceeding a certain angle or when the leg rest position is interfering with the castor wheels.

2. The parking brakes are manually released. (Not valid for M300/M400)

How to find out what is causing the turtle?

If any indication on the ICS Switch Box is lit Yellow or Red the seat position for that function is causing the turtle and speed restriction.

It is also possible to see the inhibit status from ICS through the Status window in WB. The status of ‘Inhibit Out’ can be displayed as ‘Full speed’, ‘Half speed’ or ‘X-Low speed (make a Verify System in order to update the screen). When status is ‘Half speed’ or ‘X-Low speed’ a turtle will be seen on the display.

2.4. How to see the ICS Error Log?

ICS errors is logged and can be seen by using the Permobil Dealer PC-Programmer. Click on ‘Tools’ – ‘System Logs’

And then on ‘Log’ – ‘Read log’ in the System Log partition.
Expand the data for ICS

In the example above two types of errors have occurred. Two times 20B2 from the Backrest and one 20C4 from the Seat Lift. The latest is always on top of the list.

To get more information about the error, just hold the cursor over the error and an explanation will be displayed. It is the same text as in the document “ICS 3x Active Error codes on Rnet” found in the WB Help-menu and in the WB Instruction sheets.

2.5. Can the Error Logs be seen without PC or dongle

If the chair is equipped with the JSM with Color display it is possible to see the Error Log on the display without use of dongle and PC. The Error Log for ICS is though restricted to indicating which function that has failed and the number of times. No error codes or explaining text is shown.

The Diagnostics is entered by pressing both speed up and speed down buttons at the same time when system is powered. Scroll with the joystick until ‘Diagnostics’ is high-lighted. Move joystick to the right and select the sub-system Error-Log you want to view and move joystick to the right.
2.6. How to program a replacement R-net Power Module

Follow the instructions in the Instruction sheet ‘Programming a replacement Power Module’ found on your PC as shown in figure below.

3. ICS related

3.1. When shall the ICS be updated with the latest revision?

Refer also to the *WheelchairBuilder Technical Manual* (available in several languages).

**Rules for when to update:** Updating an ICS on a wheelchair is only recommended when
a) a safety issue has been identified in the old version and solved
or
b) the customer complaints about a problem that is solved in the newer version
or
c) it is stated from Permobil.

For special adaptations – contact Permobil support. Updating can in some cases be rather complicated and might not be possible unless a new ics-config file is created.

For most ICS systems (with URIB SW versions from 2.0) the function”Find configfile that matches wheelchair” can be used to identify the actual version and the latest.
In the example above is v32 installed but v33 is set as the file that matches. When a newer version has the same Firmware, Model and UI as the installed version the newer will be set as the “file that matches”.

You can also open the version that is installed via ‘File’ – ‘Open’, as in picture below, and look in the ‘old files’ folder for the actual chassis/seat and in this case open v32.
List of versions when an update might be required due to malfunctions or safety improvements.

<table>
<thead>
<tr>
<th>Application</th>
<th>Config file version</th>
<th>Note / Recommendation</th>
<th>Update to version</th>
</tr>
</thead>
<tbody>
<tr>
<td>C400VS, C500VS</td>
<td>&lt; v11</td>
<td>Update due to increased safety. Pillar lift softpot monitoring improved from v11</td>
<td>latest</td>
</tr>
<tr>
<td></td>
<td>&lt; v18</td>
<td>Update to suit new softpot (new brand) for Pillar lift</td>
<td>v34 or latest</td>
</tr>
<tr>
<td>C300 with Tilt</td>
<td>&lt; v34</td>
<td>Update if ‘No Load’ alarm occurs when tilting downwards</td>
<td>v34 or latest</td>
</tr>
<tr>
<td>C350 with Tilt</td>
<td>&lt; v34</td>
<td>Update to suit new softpot (new brand) for Pillar lift</td>
<td>V33 or latest</td>
</tr>
<tr>
<td>Street</td>
<td>&lt; v12</td>
<td>Update to suit new softpot (new brand) for Pillar lift</td>
<td></td>
</tr>
<tr>
<td>See list in 3.24</td>
<td>See list in 3.24</td>
<td>Update if the system is beeping unexpectedly now end then and customer requests.</td>
<td>v34 or latest</td>
</tr>
<tr>
<td>C300/C350/C400/C500</td>
<td>&lt; v31</td>
<td>Current limit for tilt increased to 10A. Update if tilt stops indicating over current</td>
<td>V34 or latest</td>
</tr>
</tbody>
</table>

3.2. What are the major differences between ics-config files before and after v30

In December 2010 was a major general functional upgrade released, including WheelchairBuilder (v3), ICS Master Firmware, ICS Master URIB Software (3.0) and all ICS config files (v30). In addition also a new Rnet PC-programmer 4.2 with new Personality files was released in order to be able to use all new functionality.

The ics-config file version number was stepped up to version 30 at this release. That means that there is a gap in the version numbers below v30 for all ics-config files.

The new functionality achieved with the release was basically:

- Ability to adjust some common ICS parameters using Rnet OBP or PC-programmer.
- System Logs can be cleared with the PC-programmer
ICS Errors visible via the R-net display.

ICS has its own System Log in R-net (view via Rnet PC-Programmer)

Correct error codes are shown in the Dealer PC-programmer System Log for all device types.

Automatic calibration of Vari-Smart actuators mounted on seat is now possible.

New ICS functionality that can be configured via setup menus.

ICS Config-files layouts are now consistent between chairs, and also prepared for special adaptations. For ex: All Seat axes have now the same function on all seats.

Rnet OBP Menu structure slightly changed. Speeds and Accelerations have been split up

3.3. What is the safest way to update an ICS system?

Refer also to the *WheelchairBuilder Technical Manual* (available in several languages).

This method is not always the fastest but is the safest.

1. Identify and open the ics-config file that shall be used for updating.

2. Select ‘Advanced settings’ in ‘View’ drop-down menu

3. Go to settings and make a 'Read from ICS'

4. Right click on the top-line and select 'Expand All'

5. Make notes or save screenshots of all parameters that are marked with orange. Be careful to get all correct.

Make also a back-up file (File – Save As)

6. Open once again the ics-config file as in #1 above.

7 Go to 'Status' and click on 'Verify System'.

8. Make sure that 'Write settings' is marked. Click on 'Update All Nodes'.
9. The system will now be updated with the latest version of all Firmware.

10. When ready, go to 'Settings' and carefully change the settings for all parameters that were marked with orange to match the settings you saved in point #5. When ready make 'Write to ICS'.

11. Go to 'Status' and click on 'Verify System'.

11. Check that all nodes have an OK in the Node column and that no node has an 'Extra' in the 'Rev Status' column.

12. Update ready. Check that all seat functions work properly.

Caution: This method is not sufficient for adaptations as changes might have been done to settings not visible in ‘Advanced settings’. Contact Permobil support before update. Don’t update unless necessary.

3.4. What can get lost when I do an 'Update all nodes'?

Refer also to the WheelchairBuilder Technical Manual (available in several languages).

If the 'Write settings' box is marked when 'Update All Nodes' is activated all settings made for particularly for this chair (that differs from the default settings) will be lost, e.g. user weight, memory positions, etceteras. Also will for some seat types some axes have to be defined after update when the system can’t define which of the possible functions that are installed when more than one is possible with the same V-smart actuator or General Module.

The safest way to do 'Update all nodes' and to get back to the settings before update is to follow the step by step instruction in chapter 3.3 “What is the safest way to update an ICS system?”

3.5. WB ‘Can’t find an ics-config file that matches’

The reason for this is most likely that the chair has a later version than what is installed on the PC.

Get the latest installation packages for WB (WB-basic) and WBConfigfiles. Contact Permobil Support if you don’t know how this is done.
Refer also to chapter 3.1

3.6. Red marked ‘Extra’ is shown in the ‘Rev Status’ column in WB?

<table>
<thead>
<tr>
<th>Id</th>
<th>Node Type</th>
<th>Function</th>
<th>Serial No</th>
<th>Firmware</th>
<th>Actype</th>
<th>Pos</th>
<th>Node</th>
<th>Rev status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Seat Actuator</td>
<td>Tilt</td>
<td>99999999</td>
<td>2635</td>
<td>619434</td>
<td>1</td>
<td>Failed</td>
<td>OK</td>
</tr>
<tr>
<td>2</td>
<td>Seat Lift</td>
<td></td>
<td>2644</td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Seat Actuator</td>
<td>Legs</td>
<td>56748022</td>
<td>2655</td>
<td>612247</td>
<td>2005</td>
<td>Failed</td>
<td>OK</td>
</tr>
<tr>
<td>4</td>
<td>Seat Actuator</td>
<td>Back</td>
<td>0461283</td>
<td>2655</td>
<td>613420</td>
<td>2064</td>
<td>Failed</td>
<td>OK</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
</tr>
<tr>
<td>9</td>
<td>Switch Box</td>
<td>Main switch box</td>
<td>32153</td>
<td>2653</td>
<td>0</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
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<td>11</td>
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<td>Non-installed</td>
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<td>12</td>
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</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-installed</td>
</tr>
</tbody>
</table>

There are two possible reasons for the red marked text “Extra” written last in the ‘Rev Status’ column after that ‘Verify System’ has been made.
1. No or in-correct function is selected in the ‘Settings’.
2. Two nodes of same type are installed.

3.7. Replacement of an ICS Master

Case A: It is possible to read settings from the old ICS master.
- Start WB and connect to ICS Master.
- Find config file that matches wheelchair. Open the file that matches (Open the updated file if you want to update the system, first read chapter 3.1 and 3.3)
- Read from ICS
- File Save as S/N …. icscfg on your PC
- Switch off Rnet system and replace the old Master unit with the new. Don’t close WB.
- Connect PC to the Master and switch on system.
- Go to Settings and click on ‘Verify System’

- Make sure that the Write Settings is marked and click on ‘Update All Nodes’
- After completion check settings for User Weight, Switchbox layout etc.
- Perform full functional check.

**Case B:** ICS Master is “dead” and Read settings can’t be performed.

Use ‘Back-up Finder’ *) to get the back-up file of the programming when chair was delivered, **or** find the latest (or other suitable) config file for the chair and seat-type via ‘File’ – ‘Open’ and clicking your way down in the folder structure until the matching config file is found.

Note that if you want to use a certain icsconfig file version that is not the latest, you can find it in the ‘old files’ folder for that specific chassi – seat.

Using that means that will have to manually set the correct user weight, SB layout, indication level and probably also define type of backrest, tilt etceteras for the chair unless you start with downloading the backup file to ICS and then performs the update as described in 3.2)

Note *) Back-up Finder can only be used on Permobil Pone PC’s.
3.8. Replacement of a V-Smart Actuator or General Module

Switch off chair
Disconnect and dismount the unit that shall be replaced.
Mount and connect the replacement unit.
Switch on chair. Red lights will now toggle on the ICS Switchbox.
Switch chair off and on again.

If the new unit and the replaced unit has the same item number it shall be plug-and-play, and the new unit should function without any more action. Check functionality thoroughly.

If for some reason the plug-and-play fails to detect the new device, follow the steps in chapter 3.6 and/or 3.14 if applicable.

3.9. It is flashing red on the ICS Switch-box

If the indication for a function is flashing red on the Switch-box it means that the current to the actuator has exceeded the trip level. This is probably due to
a) that the actuator has reached an end stop it should not reach or
b) due to over load. (Due to user weight or high friction or other mechanical issue)
c) Error detected (for ex: feedback error, communication error)

If the reason is over-current due to that the actuator moves towards a mechanical end-stop in one direction it should be calibrated as described in chapter “Service” in the Technical Manual ‘ICS OnBoard Configuration’.

If it is a Vari-Smart actuator the stroke can be moved out or in by turning the actuator rod. The stroke length that the system wants to do will not be changed. The actuator has to be loosened in one end first and the stroke will move 1.5-2 mm per half turn.

It is wise to check the position read by ICS with the real actuator position in both ends before doing this. It should be almost the same difference in both ends for this action to help.

Tip: To get information about the error, perform a ‘Verify System’ and look for red lines and read in the ‘Rev Status’ column and in the information in the window in the lower part. See example below.
3.10. **What can happen when a General Module is faulty?**

A hardware fault in a GM can theoretically cause a lot of faults related to the function it is connected to. Below is listed some examples.

- Position feedback error, Sensor Failure
- Current is measured wrong leading to false over current or no load error indications
- The actuator is moving unevenly (could also be caused by softpot or other things)
- LIN-bus communication error, leading to for example that no nodes are seen when doing a ‘Verify System’ in WB.
- Any unlogical malfunction related to the seat function that the GM is connected to.
3.11. **LED-indication on General Module**

The General Module is provided with a green LED that can indicate the following.

*Flashing green* – communication with ICS Master Module is OK. Power output is inactive.

*Solid lit green* - Power Output is activated, or when used for reading feedback from manual seat function.

*Dark* - Not communicating with the ICS Master Module.

3.12. **What can cause “Sensor failure”?**

Some possible things that can give ‘Sensor error’:

- Cabling to Soft-pot, potentiometer, switches or other feedback signal. Open or short circuit.
- Loose or incorrect connected connectors.
- Faulty General Module
- Error in Soft-pot, potentiometer, switches or other feedback signal. (Could be intermittent)

For safety reasons are the monitoring of the Soft-pot more rigorous for some functions, such as for the Pillar Lift Soft-pot on the VS. A fault detected on this is displayed as M8 on the display and red-yellow flashing indication for the seat elevator on the Switch-Box.

3.13. **No nodes found during ‘Verify System’.**

If the result of a ‘Verify System’ is like picture below the ICS Master can’t find any nodes on the LIN-bus. Note: Master Firmware, Model and UI must have correct versions before the system looks for the nodes, so if not perform ‘Update all nodes’ first.
The reason for No nodes detected can be:

a) that one node (for example General Module, Vari-Smart actuator, Switchbox etceteras) connected to the LIN-bus is corrupting the LIN-bus communication or
b) ICS Master Module LIN-communication is failing or

c) LIN-bus connectors is not connected to the ICS Master Module

Disconnect the nodes one by one to find out which one is failing. If you can disconnect all without finding any nodes, connect the first one again and try Verify System again before you change the ICS Master as it might have been the last one that was the failing unit.

3.14. How to change function type for a GM?

There are a number of General Modules with different Item numbers. These have the same hardware and firmware but are pre-programmed for different functions like Tilt, Back, Option1, etceteras.

If needed it is possible to reprogram any GM to any function using WheelchairBuilder. Here is an example of how to reprogram a GM for Seat lift to become a GM for the Raise actuator on VS.

The GM for seat lift with serial number 351215 is connected to the ICS system on VS
Double Click on the function type for the GM (see picture above) and an Actuator Type – window will open.

Select Raise and check that it is the correct actuator type in the line below, if not select the correct and click OK.

Perform ‘Verify System’ and if required also ‘Update all nodes’ but decide first which ics-config file version to use (refer to chapter 3.1 to 3.4).
3.15. Pinch-protections on VS.

VS without tilt – includes one switch for pinch protection (for pinch protection for rising movement)

VS with tilt – includes two switches for pinch protection (one for pinch protection for rising movement and one for seat elevator)

When the pinch-protection switch for the raise movement is activated is the raise actuator stopped from moving downwards. If activated when going downwards the movement is reversed for a short distance thus making the seat move up a small distance. A M8 icon is displayed for indication (also for Seat elevator Soft Pot error)

When the pinch-protection switch for the elevator is activated is the elevator movement downwards stopped.

The mechanical tolerances make the adjustment of the pinch protection switches a bit tricky. Improper adjustment might lead to false activations of these switches.

3.16. Pinch protection activates when seat is moving to lowest position on VS

After change of Pillar Lift or SoftPot or other mechanical changes it might be that the seat elevator moves down to a position where the pinch protection is activated due to that it touches the chassis cover.

It is possible to restrict how low the elevator is allowed to travel in two ways. Both methods are changing the same parameter in ICS.

Method A: By changing the ‘Additional seatfunction restriction’ – ‘Seat Elevator’ with Wheelchair Builder. Find the configfile that matches. Read from ICS and set the Min value for Seat Elevator to a value as in table below. See example below

Note this can only be done on chairs programmed with ICS configfiles v30 or higher.

<table>
<thead>
<tr>
<th>Version of ICS configfile</th>
<th>Set Min value to</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; v30</td>
<td>N/A</td>
</tr>
<tr>
<td>v30 - v34</td>
<td>&gt; 22 mm</td>
</tr>
<tr>
<td>&gt; v35</td>
<td>&gt; 0 mm</td>
</tr>
</tbody>
</table>
Method B: By using Rnet OBP. Refer to “ICS Onboard Configuration Manual” Chapter “Configuring ICS through R-net control panel”.

Activate OBP, select ‘ICS’ - ‘Actu Mvmt Limits’ – ‘Min Elev Travel’ and adjust the settings according to table above.

Note method B can only be done on chairs programmed with ICS configfiles v30 or higher and URIB SW version 3.0 or higher.

### 3.17. ICS Seat Lift error 20C4/Pinch protection alarm on VS without Tilt

As described in chapter 3.15 the pinch-protection switch for the seat lift is not mounted when the VS has no tilt. The ‘Function type’ setting for the ‘Power Seat Elevator’ for VS without Tilt shall be ‘Pillar, no Pinch Protect’ in order to avoid the seat elevator pinch protection alarm, see figure below.

A seat elevator pinch protection alarm leads to

- a) seat elevator movement downward is inhibit.
- b) a flashing M8 is displayed on the JSM with seat elevator symbol in Seating Mode (this together with a) indicates a pinch protection alarm)
- c) the error message “ICS Seat Lift Error 20C4” is displayed on JSM (only with URIB SW version 3.0 or higher and ics-config file version v30 or higher)

### 3.18. What to do when an actuator is not working as expected.

Here are some general things to check when an actuator does not work as expected.

Check that position feedback is correct, refer to chapter 3.19. If the real position differs from the by ICS calculated there might be a fault in the position sensor (softpot/V-smart/angle switch) or a calibration is needed (after changed actuator or softpot).
Check if any other seat position is preventing the movement of the actuator. Move the other seat functions to a normal sitting position with seat elevator all way down. The “problem-actuator” should now be able to run and indication on the ICS Switch-box shall be green.

On VS, make sure that the seat is not in a standing sequence and that none of the pinch protection switches are activated. Refer also to 3.15..

Check for a too old version of Firmware on an exchanged unit. Use the ics-config file that matches the installed version to see if the exchanged unit needs update.

Is the actuator reaching unintended the mechanical end stop? Refer to 3.7

### 3.19. How to check if the positions used internally by ICS are correct?

The ICS system uses feedback signals from sensors to determine the position of the actuators in order to be able to calculate the position and angle of for example tilt, back, legs etceteras. The actuators and sensors used vary between different types of seats.

The measured position of the actuator (that means the length of the actuator at the actual stroke position) and the calculated angles of the seat functions can be seen using the WheelchairBuilder.

The **actuator position** (= actual length of the actuator c-c the fixating bolts), can be seen in the Pos-column in the Status-window, refer to picture below. A ‘Verify system’ has to be done after each change in position as the Pos value is not continuously updated. The displayed value is in 1/10 mm, which means as an example that the actual length of the V-smart actuator for Tilt is measured to be 260.3mm.

This measured length can be compared to the real length of the actuator and the difference should normally be within +/- 3mm. If the difference exceeds 5-6mm it might need recalibration in order to get the correct seat function.

<table>
<thead>
<tr>
<th>Start</th>
<th>Settings</th>
<th>Status</th>
<th>Firmware Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICS Master</td>
<td>Status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SlotType</th>
<th>ChassisType</th>
<th>SerialNo</th>
<th>Firmware</th>
<th>ActType</th>
<th>Pos</th>
<th>Node</th>
<th>Key status</th>
</tr>
</thead>
<tbody>
<tr>
<td>VS</td>
<td>C900</td>
<td>2149477</td>
<td>3469</td>
<td>613055</td>
<td>2463</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>VS</td>
<td>C900</td>
<td>3190488</td>
<td>3556</td>
<td>613030</td>
<td>2465</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>VS</td>
<td>C900</td>
<td>2149569</td>
<td>2469</td>
<td>613058</td>
<td>2061</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>VS</td>
<td>C900</td>
<td>2149569</td>
<td>2469</td>
<td>613057</td>
<td>2795</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>VS</td>
<td>C900</td>
<td>2154195</td>
<td>2556</td>
<td>614941</td>
<td>5434</td>
<td>OK</td>
<td>OK</td>
</tr>
<tr>
<td>VS</td>
<td>C900</td>
<td>2154195</td>
<td>2556</td>
<td>614941</td>
<td>5434</td>
<td>OK</td>
<td>OK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch box</th>
<th>Options</th>
<th>Not installed</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main switch box</td>
<td>4150341</td>
<td>2853</td>
<td>0</td>
</tr>
<tr>
<td>Second switch box</td>
<td>Not installed</td>
<td>Installed</td>
<td></td>
</tr>
<tr>
<td>Third switch box</td>
<td>Not installed</td>
<td>Installed</td>
<td></td>
</tr>
<tr>
<td>Fourth switch box</td>
<td>Not installed</td>
<td>Installed</td>
<td></td>
</tr>
<tr>
<td>All switch box</td>
<td>Not installed</td>
<td>Installed</td>
<td></td>
</tr>
</tbody>
</table>

The calculated seat positions can be seen in the ‘Settings’-window, see example below.
Click on the “transmitter-icon” in tool bar to get live values and expand so that “Live” values can be seen.

The live values can be compared with the physical real values in different positions in order to check if feedbacks are working correctly. The live values are continuously updated as long as the transmitter icon is “down”.

Note that the ‘Live values’ for seat elevator with switches and also backrest with angle switches (e.g. C300/C350 Corpus) will not correspond to the true seat height and backrest angle. For these shall the position values displayed in WB be changed in a step when the switch is changing from closed to open or vice versa.

### 3.20. When to do a ‘Calibrate Hall Sensor’ for a Vari-Smart actuator?

See also chapter 3.21 “When to do an Auto calibration (or Manuel) of Vari-Smart Actuators?” and the Technical Manual “Wheelchair Builder”.

With ‘WheelchairBuilder’ it is possible to perform a Calibration of the Hall sensor for the position feedback in the Vari-smart actuators. This is done before the actuator is delivered from the manufacturer and should normally not be needed to do ever again. This calibration calibrates the Hall-sensor and the offset.

Caution: To be able to do a successful Hall sensor calibration the actuator must be able to perform a full stroke, otherwise it will fail.

It is recommended to perform the auto-calibration, refer to 3.21, whenever possible instead of the “Calibrate Hall sensor”. If auto-calibration is not possible and the stroke of the actuator seems to be wrong it can be suitable to perform a Calibrate Hall sensor.

### 3.21. When to do an Auto calibration (or Manuel) of Vari-Smart Actuators?

See also chapter 3.20 “When to do a ’Calibrate Hall Sensor’ for a Vari-Smart actuator?” and the Technical Manual “ICS Onboard Configuration” section “Service” (available in several languages).
Automatic calibration can only be done for Backrest, Tilt or Legs with Vari-Smart actuators and ICS configuration file v30 or higher must be installed.

Automatic calibration may be useful “to get it right” when:

- An actuator has been replaced with a new.
- The actuator piston has been manually screwed out or in and the position thus got lost, for example after some repair work.
- The movement of the seat function is reaching an end stop position in one end.
- The movement is shorter than expected.

Note: Before performing auto-calibration of the tilt for VS-chairs with ics-config file v34 or higher, make sure that the rubber bushes for the lower tilt position are about 15mm high. If not put some washers under the rubber to increase their height.

3.22. Red flashing on ICS SwitchBox and error code 21x3 after update

This description is only valid for chairs programmed with ics-config files v30 or higher when the adaptation is controlled with a General Module (GM Option).

For older/other contact Permobil Support.

In WB: Select ‘Advanced Mode’ in ‘View’-drop down menu on the ‘Toolbar’

Find and open the appropriate ICS configfile for the actual chair (use ‘Start’- tab functions in WB). Refer to the Technical Manual ‘Wheelchair Builder’.

Go to the ‘Settings’-tab.

Below is described the settings needed for the option “Powered Flip-up Footplate” and “Powered Footplate Height” (both have the same settings). These adaptations use ‘Option 1’ functionality via General Module (GM).

Make sure that ‘Seat function’ – ‘Option 1’ is set to ‘GM(RightLegLift)’
Make sure that for ‘Sensor Type setup’ – ‘Option 1 GM’ is ‘Sensortype set to (8) Two Switch and that ‘Monitor Sensor’, ‘Monitor Open Load’ and ‘Monitor Current’ is set to No

The ‘Max Curr In’ shall be set as low as possible (still able to function) to avoid that it get stuck in the end position. It has to be tested to find out the setting, but 3000mA is a good start point.

The most common SB Layout for “Powered Flip-up Footplate” and “Powered Footplate Height” is Layout 7. If that does not match the label on the ICS Switchbox try Layout 8, 9, 11 and 12 to find out which matches.

List of adaptations using Option1 – Option4 functionality with GM and no feedback

For adaptations (Option1-4) using Vari-Smart Actuators contact Permobil Support for help.
<table>
<thead>
<tr>
<th>Adaptation</th>
<th>OptionX</th>
<th>Function type</th>
<th>Sensor type</th>
<th>Monitor Sensor/Open/Load/Current</th>
<th>Current settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powered Flip-up Footplate</td>
<td>Option1</td>
<td>GM (RightLegLift)</td>
<td>(8) Two Switch</td>
<td>No/No/No</td>
<td>4000mA Out 3000mA In</td>
</tr>
<tr>
<td>Powered Footplate Height</td>
<td>Option1</td>
<td>GM (RightLegLift)</td>
<td>(8) Two Switch</td>
<td>No/No/No</td>
<td>4000mA Out 3000mA In</td>
</tr>
<tr>
<td>Separate Legrests (left)</td>
<td>Option2</td>
<td>GM (LeftLeg)</td>
<td>(8) Two Switch</td>
<td>No/No/No</td>
<td>4000mA Out 4000mA In</td>
</tr>
<tr>
<td>Separate Legrests (right)</td>
<td></td>
<td>Legs</td>
<td>GM (Adaption leg)</td>
<td>N/A</td>
<td>4000mA Out 4000mA In</td>
</tr>
<tr>
<td>Seat belt (refer to chapter 3.23)</td>
<td>Option3</td>
<td>Seat belt GM</td>
<td>(8) Two Switch</td>
<td>No/No/No</td>
<td>2000mA Out 2000mA In</td>
</tr>
<tr>
<td>Powered footplate height (separate legrests)</td>
<td>Option4</td>
<td>GM (LeftLegLift)</td>
<td>(8) Two Switch</td>
<td>No/No/No</td>
<td>4000mA Out 3000mA In</td>
</tr>
</tbody>
</table>
3.23. Settings for Power SeatBelt

The figures in the example below show configuration on a C350 Corpus.
Open WheelchairBuilder(WB) with the actual ICS Config-file and select ‘View’ – ‘Advanced Mode’.
Select Function type for Option3 = ‘Seat Belt GM’ as seen in figure below.

Set ‘Monitor Current’ = No for ‘Option3 GM’ in ‘Sensor Type Setup’ as in figure below. The Seat Belt can now be controlled from Joystick in ‘Seating Mode’.
3.24. The system beeps unexpectedly now and then.

Chairs programmed with the following ics-config files may make an unexpected beeping sound from the JSM occasionally.

320305 C300_C3G basic v30-33
316985 Corpus C300 basic v30-33
317110 PS C300 basic v30-33
318112 K300 PS-Jr basic v30-31
320300 C350_C3G basic v30-33
317008 Corpus C350 basic_v30-33
317842 PS C350 basic v30-33
319974 C400 C3G basic v30-33
317338 Corpus C400 basic v30-32
317341 PS-Jr C400 Basic_v30-31
317501 VS C400 basic v30-33
319979 C500 C3G basic v30-33
317300 Corpus C500 basic v30-32
317375 PS-Jr C500 Basic v30-31
317357 VS C500 basic v30-33
318080 MX K450 basic v30-32
317383 Corpus Street basic v30-32

To get rid of the beeping it is necessary to update the ICS System to a higher version than those listed above. Refer to chapter 3.3 “What is the safest way to update an ICS system?”
3.25. **MD/DL or CJA seat functions are not working properly after update to > v30**

Seat function channels have been changed for some seats from version 30 of ics-config files.

Change program setting in MD/DL to the correct seat function channels, or change Compact Joystick Advanced (CJA) settings in R-net using R-net PC-Programmer according to table below.

OBP Text = Channel number to be set in MD/DL
or as drive axis in settings for the Compact Joystick Advanced

<table>
<thead>
<tr>
<th>OBP Text</th>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>OFF</td>
<td>No function</td>
</tr>
<tr>
<td>1</td>
<td>Elevator</td>
<td>Seat elevation</td>
</tr>
<tr>
<td>2</td>
<td>Tilt</td>
<td>Seat angle</td>
</tr>
<tr>
<td>3</td>
<td>Roclne</td>
<td>Backrest</td>
</tr>
<tr>
<td>4</td>
<td>Legs</td>
<td>Legrest</td>
</tr>
<tr>
<td>5</td>
<td>Recall Mem Pos 1</td>
<td>Return to memory position 1</td>
</tr>
<tr>
<td>6</td>
<td>Recall Mem Pos 2</td>
<td>Return to memory position 2</td>
</tr>
<tr>
<td>7</td>
<td>Recall Mem Pos 3</td>
<td>Return to memory position 3</td>
</tr>
<tr>
<td>8</td>
<td>Set Mem Pos 1</td>
<td>Save memory position 1</td>
</tr>
<tr>
<td>9</td>
<td>Set Mem Pos 2</td>
<td>Save memory position 2</td>
</tr>
<tr>
<td>10</td>
<td>Set Mem Pos 3</td>
<td>Save memory position 3</td>
</tr>
<tr>
<td>11</td>
<td>Axis 11</td>
<td>Standing function A or Extra function</td>
</tr>
<tr>
<td>12</td>
<td>Axis 12</td>
<td>Standing function A or Extra function</td>
</tr>
<tr>
<td>13</td>
<td>Axis 13</td>
<td>Extra function</td>
</tr>
<tr>
<td>14</td>
<td>Axis 14</td>
<td>Extra function</td>
</tr>
<tr>
<td>15</td>
<td>Axis 15</td>
<td>Extra function</td>
</tr>
<tr>
<td>16</td>
<td>Axis 16</td>
<td>Extra function</td>
</tr>
</tbody>
</table>
3.26. Red-yellow flashing for Seat-lift on ICS Switch-box on VS

It is essential that the SoftPot for pillar-lift on VS is working correct so that the seat elevator is raised to the intended height in the standing sequence. To achieve this additional monitoring of the signal has been implemented in the General Module Firmware. This implementation included a “bug” that made it possible to achieve a false error alarm.

A false or correct SoftPot error is shown as red-yellow flashing on indication for the seat-lift on the ICS Switch-box, and/or with a seat icon with flashing M8 on the JSM display (and ICS Seat Lift error - 20C1).

To avoid the risk of getting the false alarm the Firmware in the General Module for the VS seat lift should be updated to version 3954 or higher. It is done in the following to only update the General Module for the Seat lift by using WheelchairBuilder.

1. Find and open the Configfile that matches the chair. (Don’t use the latest if you just want to update this GM)

2. Click on “Firmware Update”
3. Click on "Update General Module". Make sure that the version is equal or higher than _3954.

![Selected firmware window]

4. Click OK and follow the instructions and steps given on the screen.

5. Perform test of the seat lift to verify function after that the GM has been update.

3.27. Seat icon with flashing M8 on the JSM display (and ICS Seat Lift error - 20C1).

See chapter 3.27 above.

4. Document Revision history

<table>
<thead>
<tr>
<th>Revision</th>
<th>Changes</th>
<th>Changed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>First issue</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>Chapter 3.25 – 3.27 added</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chapter 1.1 ‘Abbreviations and definitions’ added</td>
<td>JÅF</td>
</tr>
</tbody>
</table>