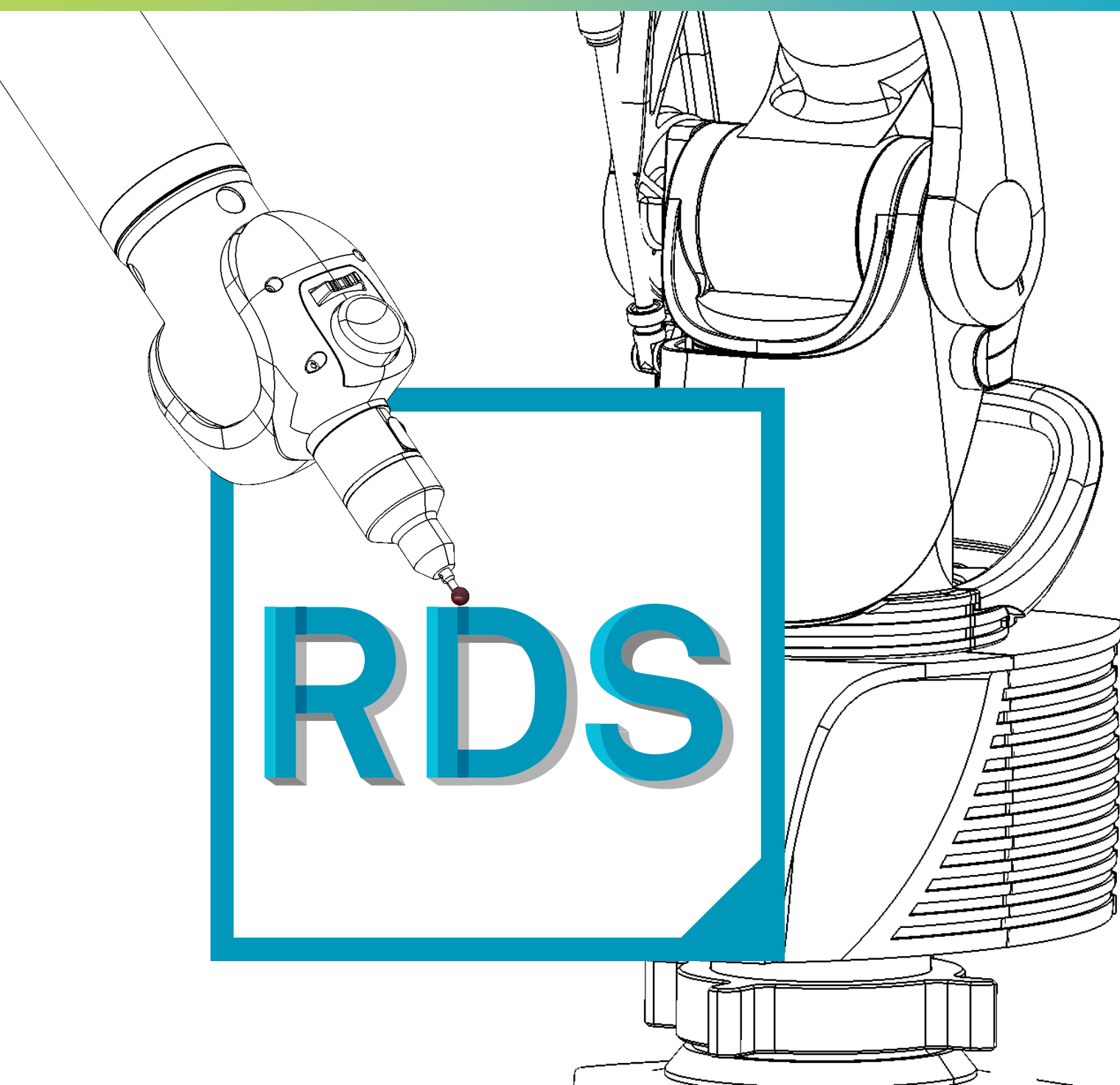


RDS Software

USER MANUAL



RDS Software User Manual

Information, support:

www.HexagonMI.com

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Introduction

Dear customer, thank you for purchasing a product from Hexagon's Manufacturing Intelligence division. Before starting any operation with RDS, please read these instructions.

This guide describes best practices for installing, configuring, and using your portable measuring arm and tracker.

For any other device or option not described in this manual please refer to other Hexagon products manuals (e.g. RDS Data Collector, Absolute Arm...) available on the provided media.

For further information, please contact your local Hexagon agent.

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Conventions used in this Guide

This manual uses the following conventions to alert you to information that varies from optional to critical in nature. These guidelines are used to distinguish the difference between these passages:



WARNING

A Warning indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

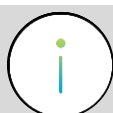


CAUTION

A Caution, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

A Notice indicates useful advice about operation of your Hexagon system or its sub-parts. Information contained in a Notice is not safety related. Failing to heed this advice may result in damage to your Hexagon system or in inaccurate measurements.



Information indicates general advice or links to relevant documentation.

Moreover, the present document mostly respects the following international standard: ISO 8601 (format of the dates),

Pictures in the Manual

Pictures presented in this manual are not contractual, especially regarding the colours that may change depending on the arm version or type.

Complete Documentation

or more detailed information, please read complete manuals:

- Instrument: Absolute Arm manual, Absolute Tracker manual
- Application software: software user manual (TubeShaper, Inspire, Pc-Dmis, Quindos...)
- Accessories: accessory guide
- Maintenance: RDS Technician manual

Important Note

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

NOTICE

Incorrect use can lead to equipment malfunction and/or damage. The person responsible for the product should inform the user about hazards and how to counteract them. The software should not be operated until the user has been instructed on correct use.

Responsibilities

- Manufacturer of the product

Hexagon, is responsible for supplying the product, including the user manual and original accessories, in a complete and safe condition.

- Manufacturer of non-Hexagon accessories

The manufacturer of non-Hexagon accessories for the product is responsible for developing, implementing and communicating safety concepts for their products, and is also responsible for the effectiveness of those safety concepts in combination with the Hexagon product.

- Person in charge of the product

The person in charge of the product has the following responsibilities:

- To understand the product's safety instructions and user manual instructions.
- To inform Hexagon immediately if the product and the application becomes unsafe.

NOTICE

The person responsible for the product must ensure it is used in accordance with these instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

1 Presentation - Installation

1.1 What is RDS

RDS is the Hexagon software package for the management of the Hexagon Portable Measuring Arms and Leica trackers (AT960) with Absolute Scanners.

It is the interface between the measuring systems (Absolute Arm and Cimcore arms, Leica AT960 with LAS, LAS-XL, AS1 and AS1-XL scanners) and all the application software.

RDS is compatible with most software for portable metrology applications. RDS is composed of 5 main modules:

RDS Agent	Main operator interface, always present on the screen and giving relevant information during the measurement. It gives the access to all other modules.
RDS Control Panel	Module for the settings of the arm, probes, scanner and system.
RDS Data Collector	Module for aligning probes and scanners, performing accuracy checks and so on.
RDS Toolbox	Module for surveying and investigating the state of the arm and perform maintenance operations.
RDS Quick Measure	Utility to quickly measure basic dimensions.

1.2 RDS Levels and Securities

There are different types of installations:

- Standard installation (End-User): standard installation for end-user profile (Level1).
- Compensation installation: only for technician profile (Level2).

Some functions are protected according to the RDS user level (see §1.8 [RDS User Profiles](#)).

1.3 System Requirements

The following information presents the computer **minimum** required specifications depending on the final application.

Always ensure that the application software you are using is not requiring higher specifications.

Probing and tubing

Tubing / Probing		Probing with CAD
Processor	2 Core / 2 GHz	4 Core / 2 GHz
RAM	2 GB	4 GB min 👍 16 GB
Disk space	30 GB	
Ports	2 x USB Port	
Graphic card	512MB (SVGA graphics card capable of OpenGL representation) 👍 NVIDIA	
Screen	HD1080 (1920x1080)	
Operating System	Win10/Win11 Pro/Enterprise 64-bits	
Wi-Fi card	FP2+ / FP3+ CP2 / CP3	Any card supporting IEEE802.11ac (Access Point)
	CP-W	Any card supporting IEEE802.11acx (Access Point)
Internet connection	For SMART data exchange, an internet connection must be available, and firewall allows the connection to RDS Toolbox.	

👍: Recommended for higher performances



It is highly recommended to keep Windows up-to-date.
Windows10 Enterprise LTSC is not recommended.



Wireless connection to the RA7 with FP2 and FP3 is not more supported.

Scanning

		HP-L-8.9	LAS / LAS-XL	RS2 / RS3 RS4 / RS5	AS1 / RS6 / AS1-XL	RS-SQUARED
Processor		4 Core	4 Core	6 Core (I7-8 th gen)	6 Core (I7-10 th gen) 👍: 16 Core (I9-12 th gen)	6 Core (I7-8 th gen)
RAM		16 GB min 👍: 32 GB	16 GB min 👍: 32 GB	32 GB min 👍: 64 GB	64 Gb min	64 GB min
Disk space		60 GB 👍:SSD				
Ports	USB	2x <u>USB 3.0</u> Port				
	Ethernet	1 x LAN Port Gigabit (on-board) or provided USB-Ethernet adapter				
Graphic card		SVGA graphics card capable of OpenGL representation (NVIDIA)				
		RTX3000	RTX3000	RTX A3000 👍: RTX A4000	RTX A4000 👍: RTX A4500	RTX A3000 👍: RTX A4500
Screen		HD1080 (1920x1080)				
Operating System		Win10/Win11 Pro/Enterprise 64-bits				
Wi-Fi card		Not supported	Not supported	Any card supporting 802.11ac	Any card supporting 802.11acx (CP-W only)	
Internet connection		For SMART data exchange, an internet connection must be available, and firewall allows the connection to RDS Toolbox.				

👍: Recommended for higher performances



Only provided USB to Ethernet adapters can be used as the communication may slow down or even fail.



It is highly recommended to keep Windows up to date.
Windows10 Enterprise LTSB is not recommended.

1.4 Compatibilities

RDS supports the following instruments:

Measuring arms

	Connection			Probing	Scanning		Tubing	RDS
								
Absolute Arm RA8	✓	✓	✓	✓	✓	✓	✓	✓
ROMER Absolute Arm RA7	✓	✓	✓	✓	✓	✓	✓	✓
Cimcore CA7	-	✓	✓	✓	✓	✓	✓	✓
Multi Gage	-	-	-	-	-	-	-	-
Infinite I & II	-	-	-	-	-	-	-	-
Stinger	-	-	-	-	-	-	-	-
Sigma / Omega	-	-	-	-	-	-	-	-
Flex	-	-	-	-	-	-	-	-
System6 / R100 / IT5 Armony	-	-	-	-	-	-	-	-

*: excepted HP-L-8.9



- Wireless connection to the RA7 with FP2 and FP3 is no longer supported.
- The RS1 laser scanner is not supported since RDS V5.0.
- Wireless scanning with RS6 / AS1 / AS1-XL on the RA7 (RA7 v5) is not supported

Measuring Laser Trackers

	Reflector	T-Probe	T-Scan	T-Mac	LAS, LAS-XL	AS1, AS1-XL	RDS
AT960	✓	✓	✗	✓	✓	✓	✓

Any other Laser Tracker cannot be used with RDS.

Partner Application Software Compatibilities

	Min V°	Contact probe	Tube Probe	AS1 AS1-XL	RSx HP-L-8.9	LAS LAS-XL	RS- SQUARED
Pc-Dmis	2011MR1	✓	✗	✓	✓	⊙	✓
Inspire	V 1.0	✓	✗	✓	✓	✓	✓
Bending Studio	XT	✗	✓	✓(*)	✗	✗	✗
Recreate	2022	✓	✗	✓	✓	⊙	✓
Pc-Dmis Touch	V 1.0	✓	✗	✗	✗	✗	✗
TubeShaper	V 1.0	✓	✓	✗	✗	✗	✗
Cyclone 3DR (3DReshaper)	V 6.3	✓	✗	✓	✓	⊙	✗
Visi	V 2018R2	✗	✗	✓	✓	⊙	✗
Apodius 3D		✗	✗	✓	✓	✗	✗
Romosoftware	V 2.05	⊙	⊙	✗	✗	✗	✗
Docs	V 3.0	⊙	⊙	✗	✗	✗	✗
Spatial Analyzer	V 2011	⊙	✗	✓	⊙	✓	⊙
Quindos	V 7	⊙	✗	✗	✗	✗	✗
TubeInspect			✗	✗	✗	✗	✗
PolyWorks	V 12.0.7	✓	✗	✓	✓	✓	✓
Verisurf	X5	⊙	✗	⊙	⊙	⊙	✗

⊙ : Implemented by the software, but not tested and validated by Hexagon | * : RS6/AS1 only

Other Application Software Compatibilities

	Min V°	Contact Probe	Tube Probe	AS1 AS1-XL	RSx HP-L-8.9	LAS LAS-XL	RS- SQUARED
3DTubeCAD		⊙	×	⊙	⊙	⊙	×
Aberlink	V 30.30	⊙	×	×	×	×	×
Arcocad		⊙	×	×	×	×	×
BuildIT		⊙	×	×	×	×	×
Calypso	V 5.2.16	⊙	×	×	×	×	×
DezignWorks		⊙	×	×	×	×	×
Geomagic		⊙	×	⊙	⊙	⊙	×
Inca3D		⊙	×	⊙	⊙	⊙	×
Inspect 3D		⊙	×	×	×	×	×
MCosmos		⊙	×	×	×	×	×
Metrolog	V 13	⊙	×	⊙	⊙	✓	×
Metromec		⊙	×	×	×	×	×
MetroSoft		⊙	×	×	×	×	×
Point2CAD		⊙	×	×	×	×	×
PowerInspect		⊙	×	⊙	⊙	⊙	×
PowerShape		⊙	×	×	×	×	×
Rapidform		⊙	×	×	×	×	×
Reverse Eng.		⊙	×	×	×	×	×
RevWorks			×	×	×	×	×
Rhino		⊙	×	×	×	×	×
SurferNT		⊙	×	×	×	×	×
Tezet		⊙	×	⊙	⊙	⊙	×
TopSolid		⊙	×	×	×	×	×

	Min V°	Contact Probe	Tube Probe	AS1 AS1-XL	RSx HP-L-8.9	LAS LAS-XL	RS-SQUARED
TubeExpert		⊙	✖	✖	✖	✖	✖
VTube Laser	V 2.9	⊙	✖	⊙	⊙	⊙	✖

⊙ : Implemented by the software, but not tested and validated by Hexagon

1.5 Installation



It is recommended to proceed Windows Update before the installation of RDS, to ensure the all the necessary components are installed.

It is advised to set the size of text in Windows to 100%.

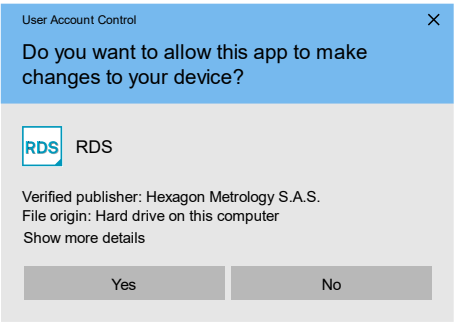


Application Software: The measurement software (PCDMIS, TubeShaper, and any other software) can be installed before or after RDS: please see in appendix or follow the instructions of the measurement software for this installation.

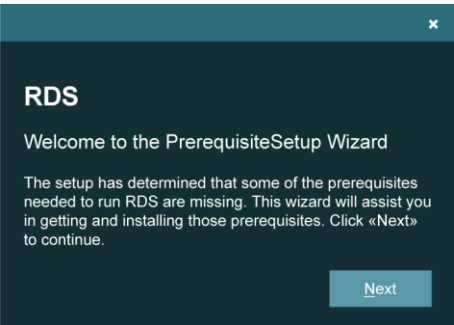


If a legacy version of RDS (up to RDS V4) is already install, you may need to uninstall it manually.

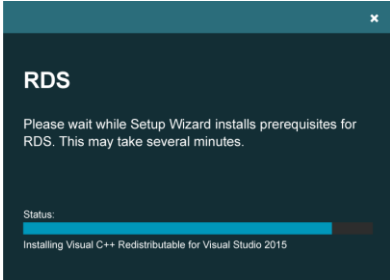
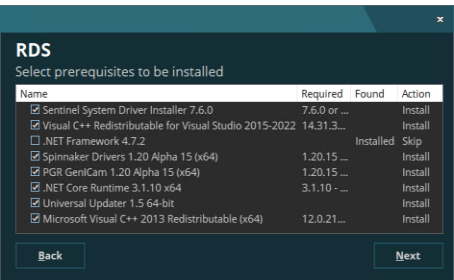
1. From the Installation media, run “Menu.exe” and select “Install RDS”. RDS installation can be run also directly by running “RDS Installer V#.#.#.exe” located on the RDS folder or from a downloaded file.
2. Depending on the computer security settings (User Account Control), a confirmation may be asked: press “Yes”.



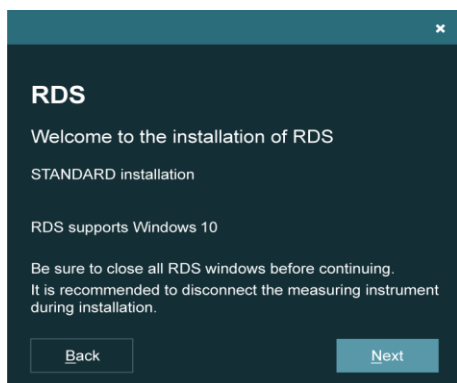
3. The following window appears. Click on {Next}.



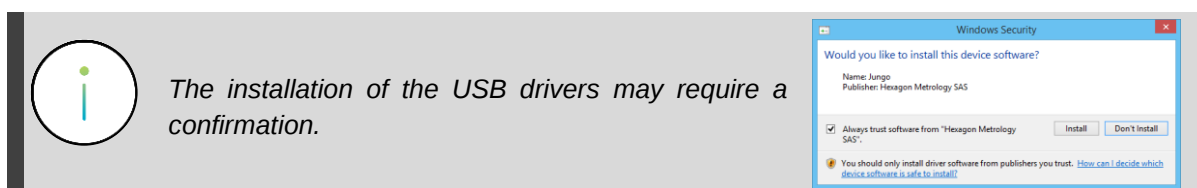
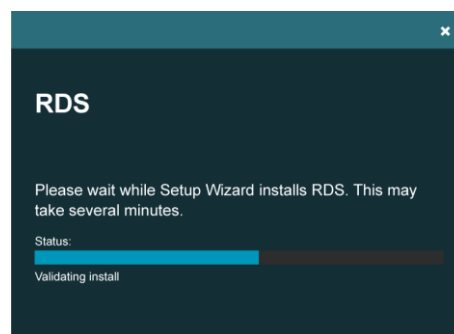
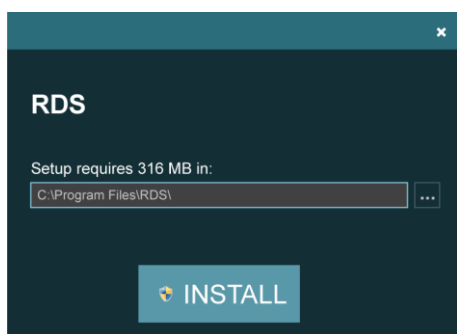
4. Prerequisites checking: check and select the appropriate needed tools and click on {next} (the selected components are installed).



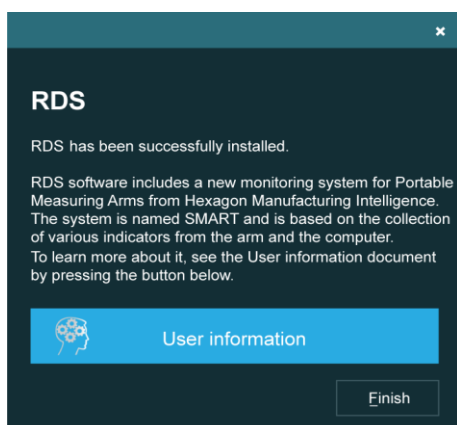
- Once the dependencies are installed, click on next to proceed with the RDS installation



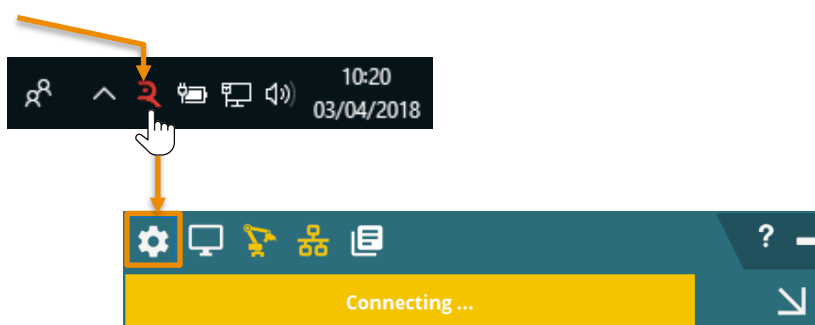
- Select the destination path and click on next: let the installation proceeding.



- At the end of the installation, read the user information and press Finish.



- Set-up the connection to the instrument.



NOTICE

Disabling transmission of SMART data to Hexagon is not advised. If you do this, it will make difficult diagnosing potential problems with your equipment. This could increase machine downtime.



RDS Toolbox requires the authorization to communicate with the networks to access the Hexagon Server.

Ensure that RDS Toolbox is registered for Windows firewall or any other firewall to access internet through the network.



When updating to a newer version, RDS must first be uninstalled, to be able to install the new version: during the update installation, click on YES to uninstall the previous version before processing to the new installation.



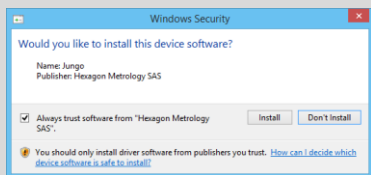
All settings, configuration and options are preserved.



It is recommended to disable any firewall as it may prevent RDS from functioning properly.



Depending on the version of Windows, it may be necessary to confirm some message boxes or allow some installation such as Jungo driver installation, dotnetfx, netfx, Sentinel driver...



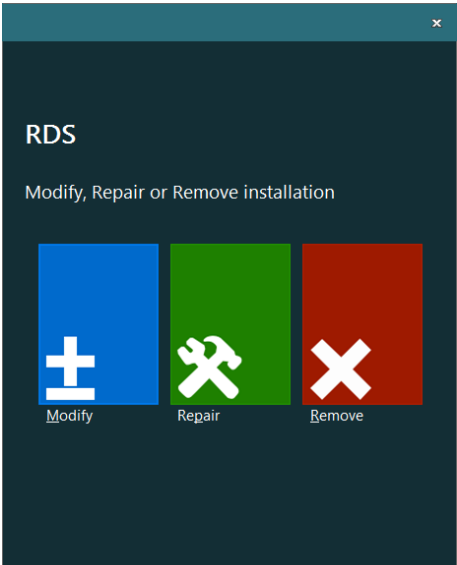
Windows .NET Framework 3.5 needs to be activated. If not, RDS installation will try to install it or prompt to activate it: Access Windows control panel > group "Programs" > "Turn Windows features on or off".



In case of using RDS on a user profile, Registry needs to be open in writing.

Location: HKEY_LOCAL_MACHINE\SOFTWARE\ROMER.

Uninstall



When running the installer on a computer pre-equipped with RDS, several options are proposed:

Modify	Permits to choose components to keep or remove.
Repair	Reinstalls RDS keeping the settings
Remove	Removes RDS software package.

1.6 Keep RDS Up-to-date

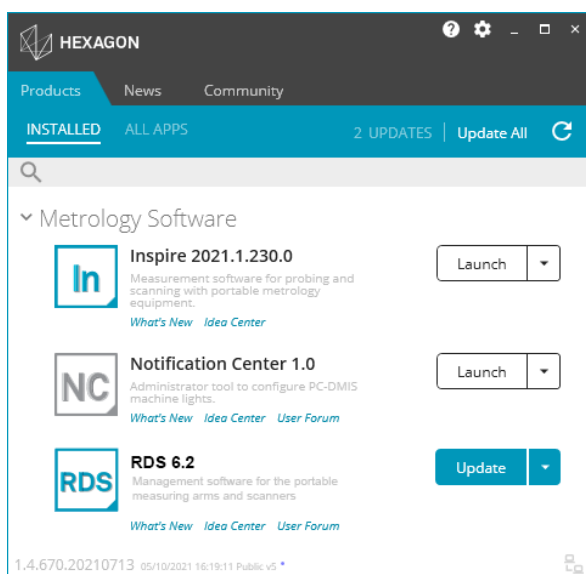
Once RDS software is installed on the PC, a dedicated tool is available: the “Hexagon Universal Updater”.

The Universal Updater is the Hexagon software updater for all Hexagon applications.

As soon as a new RDS version becomes available, the Universal Updater icon in the notification bar will increment the number of available updates. Click on the Universal Updater icon to open the tool.



Then simply press on “Update” to download and install the new version.



Downgrade is not possible with the Universal Updater.

1.7 Quick Reference

Topic	How to?	Page
Use the manual 	Find with keyword	Ctrl + F
	Jump to a link	Click on it
	Go back	Alt + ←
	 Install RDS	18
	 Setup the measurement software for RDS	1
Connection 	 Setup a USB connection	75
	 Setup a Wireless connection	77
	 Configure the Wi-Fi chipset	370
	 Setup an Ethernet connection	75
Probe 	 Program a probe	367
	 Align a probe	92
	 Delete a probe	93
	 Modify a probe	95
Reference 	 Move the arm by a Leap-Frog	123
	LOK Activate a GridLok	124
Various settings 	 Change the sound volume	55
	 Modify the mouse settings	128
	 Switch on/off the wrist camera	130
	 Configure the wrist camera	130
	 Switch on/off the wrist headlight	86
	 Activate the haptic feedback	128
Scanner 	 Configure a Hexagon scanner	100
	 Save a scanning profile	104

Quick Measure		Use a scanning profile	52 / 68 / 104
		Upgrade the scanner	370
		Proceed a quick measurement	385
Backup / Restore		Backup the arm data	316
Arm Status		Restore the Arm data	320
		Survey the arm indicators	338
		Show the status of the current arm	329 / 293 / 70
Options		Show the status of a not connected arm	328
		Ask / Add a feature code	136
		Get the packages of an arm	307
Vault		Send a package by E-Mail	318
Maintenance		Check the system	356
Alerts		Hide the notifications	335 / 27
		Analyse an alert	334

1.8 RDS User Profiles

Different profiles exist to use RDS; according to the selected profile, functions may be available or not. This provides security on the configuration of the system.

According to the user profile, the prohibited functions or settings may concern advanced settings, alignment operations (in RDS Data Collector), and any function which could result on a risk of wrong measurements, or potential damage on the system.

5 levels of profiles are defined, respectively protectable or protected with a password or with an activation code.

	Standard 	Advanced 	Admin 	Support 	Service 
Level	1	2	3	4	5
Protection	None	Password (default = "Advanced")	Password (default = "Administrator")	Feature Key / Password	Feature Key / Password
Verifications	✓	✓	✓	✓	✓
Alignments		✓	✓	✓	✓
Incorrect alignments				✓	✓
Basic settings	✓	✓	✓	✓	✓
Advanced settings		✓	✓	✓	✓
System parameters				✓	✓
Password change			✓	✓	✓
Service tools					✓

Activate a Profile

Standard user is the default profile.

RDS always starts with the default profile. When the user switches to another profile, this new selection remains active until a new selection is done or until RDS is restarted.

The selection of a User profile can be done indifferently in RDS Control Panel or in RDS Data Collector.



RDS Control Panel



RDS Data Collector



As soon as a Feature code is activated (and valid), then the corresponding profile (Support or Service) becomes the default one.

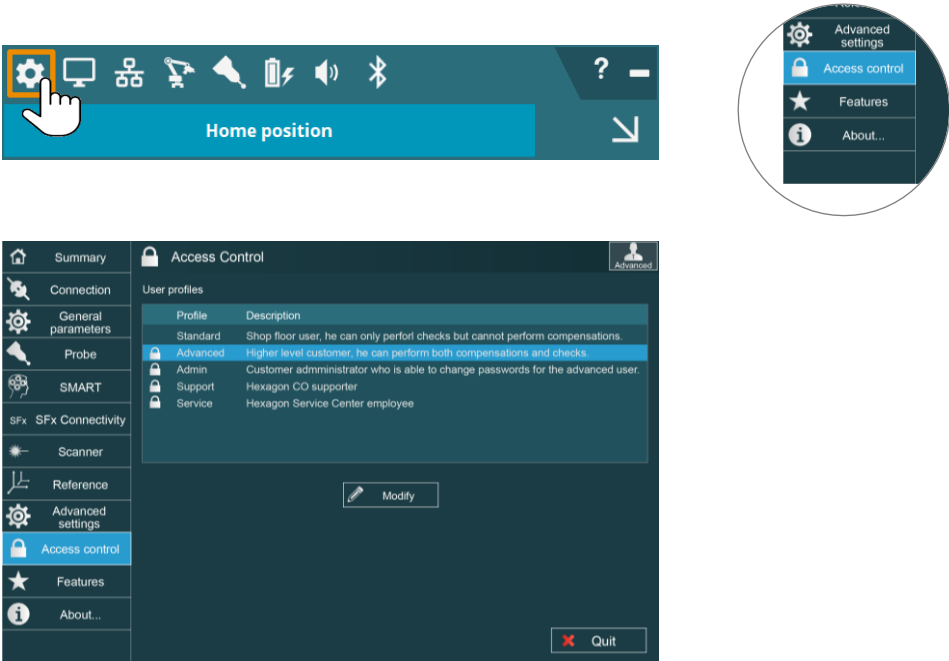
Activate Hidden Profile

By default, End-Users can access only Standard and Advanced user profiles (upper profiles – Admin, Support, and Service – are hidden).

To activate one upper profile, select the Advanced profile, and enter the appropriate password or enter the activation code in “Features” tab.

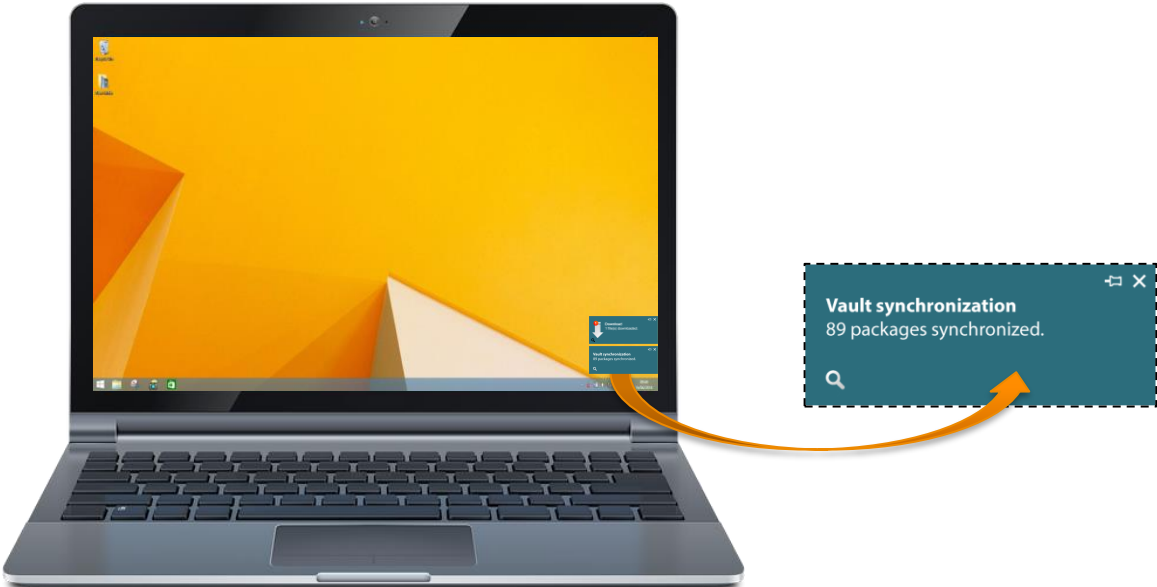
Change Passwords

To change the password of one profile, the Tab “[Access Control](#)” in RDS Control Panel can be used.



1.9 RDS Notifications

One aspect of RDS is to keep the user informed. This can concern warnings about the status of the arm or information about Hexagon news, or new available accessory, or software version, ...



The notification is display for some seconds, after what it is automatically hidden.

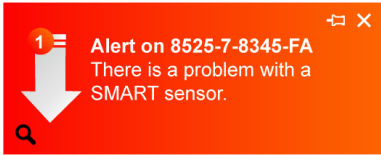
The notifications can be displayed again after a while.

	Colour of the notification	 Warning notification  Information notification
	Description of the notification	
	Pin the notification	Pin the notification to keep it displayed (on the foreground) until it is unpinned or until the user click on it to open in RDS Toolbox.
	Unpin the notification	Unlock the notification and let it be hidden.
	Close the notification	
	Symbol of the notification	According to the type of notification.
	Details	Displays details in a window.


Alert and news notifications pop-up only if the connected arm is in rest position or if no arm is connected.

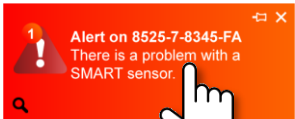
SMART Notifications

RDS SMART is designed to survey all the electronic indicators of the arm to detect any anomaly so prevent from any potential issue. As soon as an indicator becomes abnormal, RDS Toolbox displays a notification to warn the user about this defect.



The number of occurrences of the alert is shown under the form of icon: 1/2/3/...

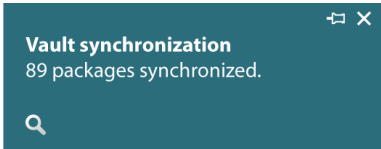
Click on the text of the notification to open the complete description and recommendations in [RDS Toolbox](#).



Depending on the priority of the notification, it will be reminded several times until it is acknowledged or postponed, or after a certain number of reminders.

Information Notifications

Some notifications may pop-up giving simple information regarding an event, ... A click on this pop-up will bring you to the details.



News Notifications

One aspect of RDS Toolbox is to provide latest news, information or useful links to the user. When the computer is connected to internet, the news is automatically downloaded and displayed by RDS Toolbox.



All the news can be found in the News & Links group of tiles, however as soon as one is downloaded by RDS Toolbox, a notification is displayed above Windows status icons.

As for the Alerts and information, the News notifications can be pinned, moved, and a click on the text of the notification directly opens the complete news in RDS Toolbox. Once opened, the notification will not pop-up again.

2 RDS Agent

2.1 Overview

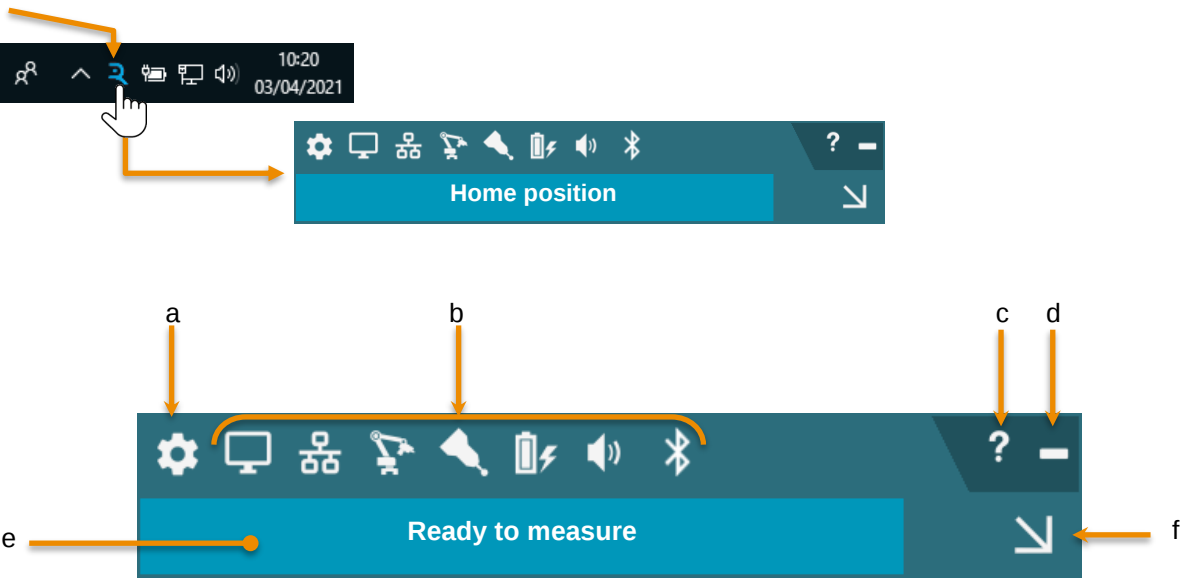
2.1.1 Window Description

RDS Agent is the user entry door to RDS. It provides

- Basic status information
- Access to the RDS Tools
- Quick Access Menu (remotely controlled from the arm)

An icon on the status bar at the bottom of the screen gives access to its interface.

At any moment, it is possible to access those functions, by clicking on RDS icon in the task bar on the right bottom of the screen, the RDS Agent then appears.



- a. Control Panel quick access
- b. Status icons overview
- c. Access to help manuals on the download site
- d. Window control (see below).
- e. Global status
- f. Shortcuts to RDS tools

Window Control

	Switches the window size (reduced / medium / maximized) (When using scanners)
	Closes the interface window (the agent remains active)

2.1.2 Global Colours

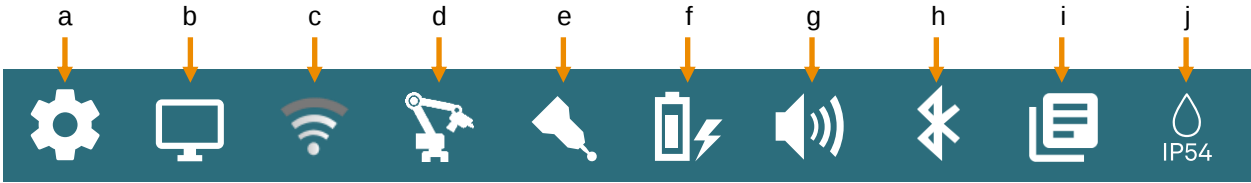
One of the purposes of the RDS Agent is to quickly display main information about the status of the system. When the Agent appears, the global status is shown on the lower line.

The colours use the following conventions:

Colour	Signification	Status example	
Blue	Operational mode	Ready	The instrument is operational (home position)
Green	Ready to measure	Press trigger...	The system is ready to measure
Yellow	Scanning	Scanning	The system is currently digitizing with a Laser scanner
	Non-critical issue	Axis over limit	The instrument is connected, but an event prevents from measuring: Encoder on its limit No probe mounted ...
Red	Critical issue	Not connected	No instrument is connected, or issue of connection

2.1.3 Status Icons Overview

On the left upper line, is shown the status of major components. Clicking on those icons shows the details or opens the appropriate set-up panel.



a	RDS Control Panel: opens the settings. 
b	Status and setup of the system 
c	Type and status of the connection to the machine 
d	Type and status of the instrument 
e	Type and status of the sensor 
f	Status of the battery (*) 
g	Sound level (*) 
h	Bluetooth (*) 
i	Logbook (*) 
j	IP54 notifications (*)  IP54

*: only when needed

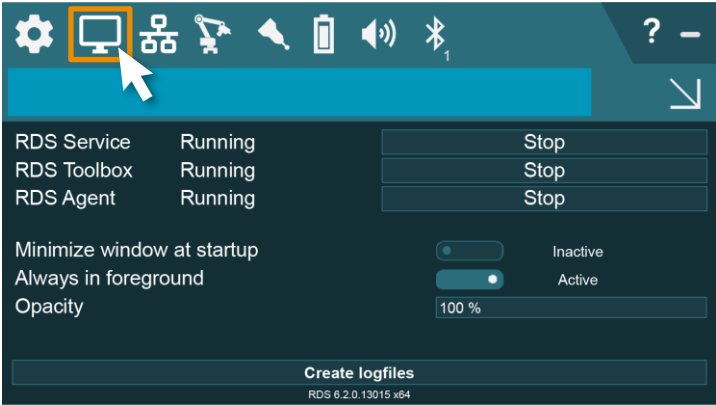
2.2 System Status

Status Icon

-  RDS is functional
-  Critical issue (ex: RDS service is stopped)
-  Non-critical issue

Tab Details

Click on the System icon.



Item	Status	Action	
RDS Service	Running / Stopped	Stop () / Start	Shows the activity of the component and gives a quick way to restart it.
RDS Toolbox	Running / Stopped	Stop / Start	
RDS Agent		Stop	
Minimise window at start-up	Active / Inactive <i>(default=inactive)</i>	Activate	Configuration of the RDS Agent window display.
Always on foreground	Active / Inactive <i>(default=inactive)</i>	Activate	
Opacity	Percentage of opacity <i>(default = 100%)</i>	Set the value	
RDS 6.0.0	Current version of RDS		

: at least advanced user.

Create Log File

On the request of a support technician, this button dumps all necessary logs and system information into a single zip file that can be sent.

Once the button pressed, RDS collects all the information and opens the Windows explorer; highlighting the created file.

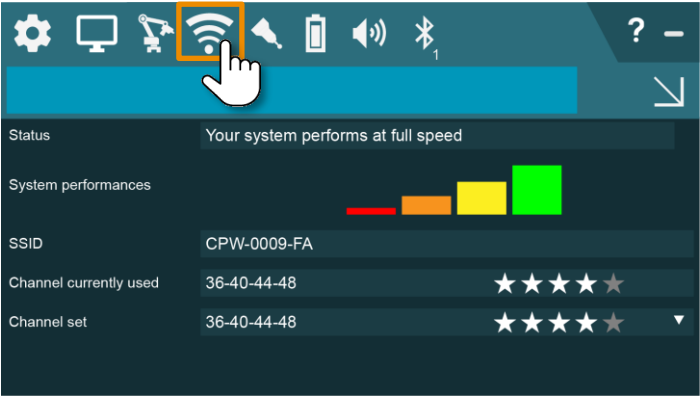
2.3 Connection

 Status Icon

	Instrument connected through WLAN
	Instrument connected through Wired Ethernet
	Instrument connected through USB
	WLAN signal strength
	Connection issue
	Maintenance connection by RDS Toolbox
	Wireless connection failed

Tab Details

Click on the connection status icon.



  			
Status	✓	✓	✓ Status of the connection. Indicates a low performance of the system when scanning
Solution(s)	✓	✓	If the performance is not optimal, solutions are proposed to solve the issue
System performances	✓	✓	When digitizing with a 3D scanner, the RDS Agent shows the level of performances with a bar graph.
SSID	✓		Wi-Fi network name broadcasted by the CP-W.
Channel used	✓		If a DFS* channel has been selected by the user, the currently used channel can be different.
Channels	✓		Channel set by the user and selection of new channel.

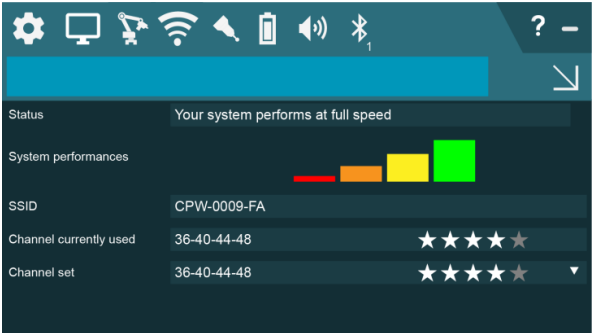


**: DFS Wi-Fi Channels*

When using the Dynamic Frequency Selection (DFS), the access point automatically selects frequency channels with low interference levels. The time to connect might be longer.

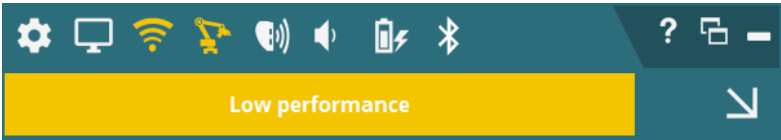
System Performance indicator

The RDS Agent provides feedback about the communication quality with a “System Performance” indicator.



	The system is running in an optimal way
	The system runs smoothly but the user experience is not optimal. Some change is recommended. (for inst. Change Wi-Fi Channel)
	Tuning some settings is highly recommended. (for inst. decrease the scanning frequency in RDS Control Panel)
	The system is critically low.

The RDS Agent warns the user as soon as the system performance becomes too low.





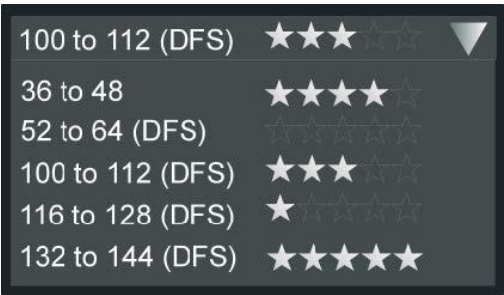
The system performance is displayed only while scanning. As soon as the acquisition is stopped, the performance graph disappears.

Channel selection

The choice of the channel has an importance on the performances the instrument can reach, especially when scanning.

RDS evaluates how performant is each channel and shows a rating from 0 to 5 stars (5 is the best).

If the current channel is low rated, then a new channel should be used: simply select an appropriate channel with the drop-down list.



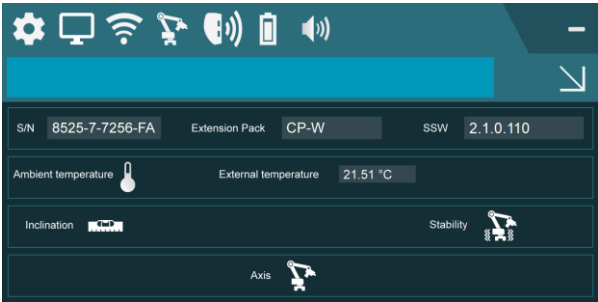
2.4 Instrument Tab

2.4.1 Instrument Status

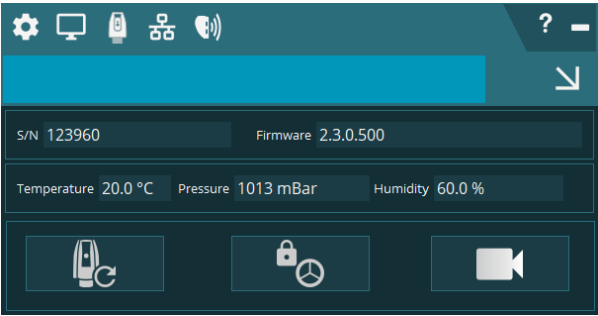
Status Icon

	The selected type of instrument is Arm
	The selected type of instrument is Tracker
	Issue with the instrument.
	No instrument of the selected type can be found.

Tab Details



Instrument tab for an arm



Instrument tab for a tracker

S/N	 	Shows the serial number of the connected instrument, when available
Extension Pack		Shows the type of Control / Feature Pack (CP1, FP2...)
SSW / Firmware	 	Shows the current system software / firmware of the instrument
Temperature Humidity Pressure		Gives the current meteo values measured by a meteo station.
Ambient temperature Ext. temperature		Gives the current temperature: • Status of the ambient temperature measured by the arm base • Object temperature measured by an external sensor (WTS, Wired sensor...)
Inclination Stability Axis		Status of the tilt, stability on the base of the arm and stress on axes of the RA8 v3.

2.4.2 Environmental Stress (RA8 v3)

When installed, it is absolutely vital that the arm and the part (to be measured) cannot move relative to each other. If there is any movement in the position of the arm or the part, this will result in a loss of accuracy. Also, the whole must be stable, especially if the part to measure is sensitively flexible. Not respecting those rules may result on loss of accuracy or erroneous measurements.

The Absolute Arm v3 contains sensors to check such factors of stability and will warn the operator in case of deviation.

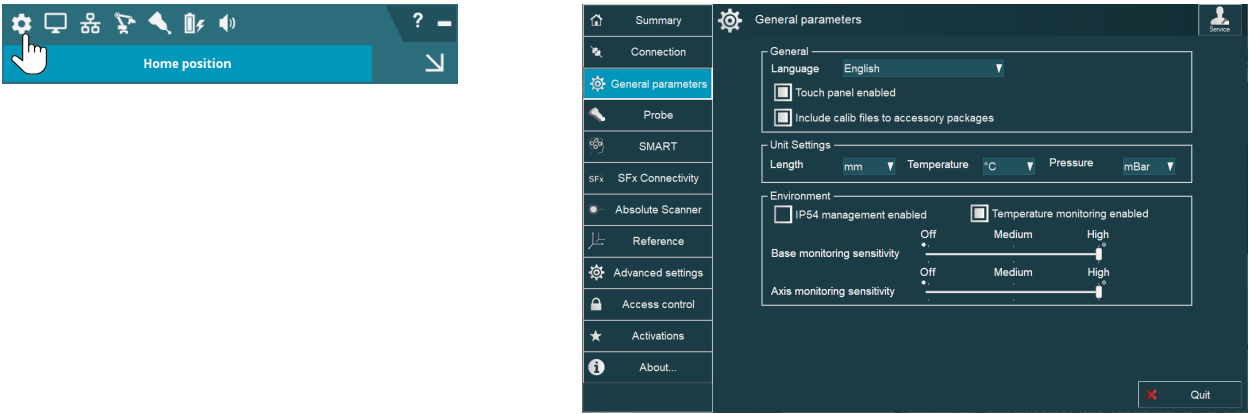
RDS can monitor all the stress indicators and then will warn the operator if one exceeds its limits.

Alerts are displayed on the RDS Agent and on the Absolute Arm 7-axis wrist display.

SMART Alerts are also then triggered (see Appendix B. RDS).

Enable the Monitoring

Open the RDS Control Panel > General parameters.

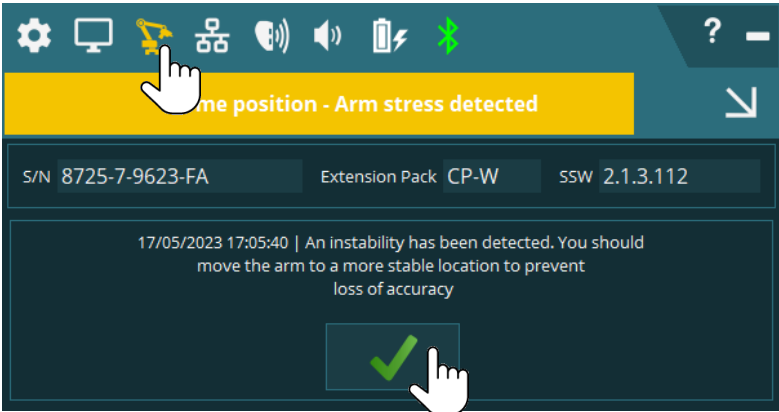


Set the wanted monitoring to the appropriate sensitivity.

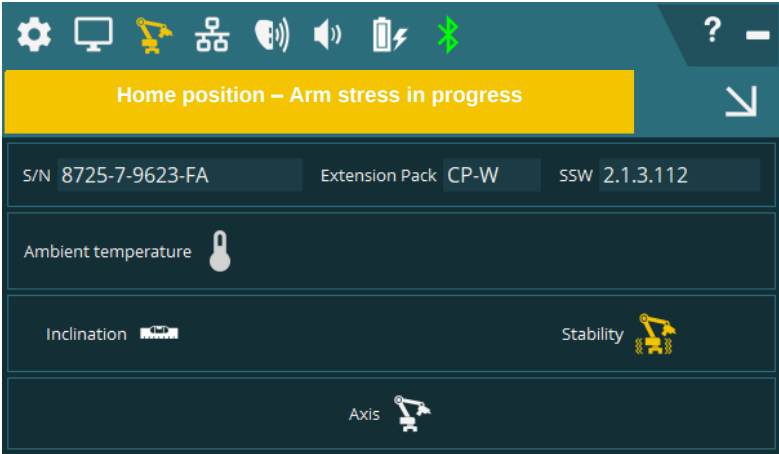
Off	The monitoring is disabled, no alert will be triggered.
Medium	High stress only will be warned. Suitable for most situations.
High	The system is defined as very sensitive. Suitable to ensure a careful handling when very accurate measurement is expected.

Detection of Stress

When a stress is detected, a warning is displayed on the RDS Agent. Open the Instrument tab to read the message and acknowledge.



If the stress is still present, then the incriminated stress remains highlighted until the stress disappears.



NOTICE

The environment monitoring by RDS is a security for your instrument. By ignoring the notifications displayed by RDS or de-activating the monitoring, you may be exposed to incorrect measurements.

Ambient Temperature

The Absolute Arm can be used between 5°C and 45°C in conditions of stable temperature. If the temperature is outside these limits, a deviation of the precision of measurement may occur. Also, if the variation of temperature evolves too quickly, it can affect part to be measured.

	The operating temperature is optimal	
	Temperature variations were detected, evolving up or down.	Part of the metrology relying on temperature compensation might not optimally work. It is advised to stabilize the temperature of the room and the part before starting the measurement.
	The Arm is not working in the optimal operating temperature range.	To improve accuracy, get into an environment with a stabilized temperature between 10°C and 30°C.
	The temperature exceeds the range. The measurement is forbidden.	Use the arm in a 5°C to 45°C operating range.
	Hardware issue	



The temperature sensor is located at the base of the arm. Don't place any source of heat nearby the base to avoid any erroneous alert.

Inclination

The counterbalance of the arm is designed for a horizontal mounting. If the arm is not level, it may affect the zero-G counterbalance.

	The arm is installed on a not horizontal enough workplane.	● Install the arm on a level workplane and restart the arm.
---	--	---



The verification of the absolute inclination is done when powering the arm.

Stability

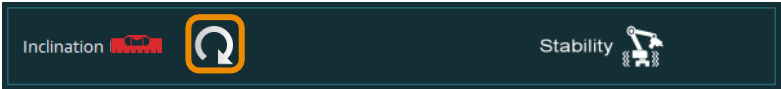
When installed, it is absolutely vital that the arm and the part (to be measured) remain fixed relative to each other. If there is any movement in the position of the arm or the part, this will result in a loss of accuracy. Also, the whole must be stable, especially if the part to measure is sensitively flexible. Not respecting those rules may result on loss of accuracy or erroneous measurements.

The arm contains sensors to check the relative tilt, vibrations and displacement and will warn the operator in case of instability.

	Origin	Solution
	The inclination of the arm has moved.	• Verify the stability of the workplane. • Ensure that the arm is well tightened.
	Vibrations have been detected.	• Check the stability of the floor or workplane. • Ensure that no exterior element can make the system unstable while measuring (vehicles passing nearby).
	A potential displacement of the base has been detected.	• Ensure the fixation of the mounting base and the workplane. • Place preventive signals to avoid anyone to hit the mounting support.

Reset

If the inclination is incorrect or if the base has tilted, a reset can be done to check again the absolute inclination and set it as a reference once the position of the arm is corrected.





The reset of the tilt is very useful when the arm needs to be displaced (Leap-Frog, GridLOK...).

Axes Stress

When handling the arm, no stress must be applied to the axes at the risk of disrupting the measurement. The system will detect any such kind of stress and warns the user.

	A stress is applied on one or several axes. • Ensure that the whole arm is free to move on all the axes.
---	---

2.4.3 Tracker tools

Specific buttons are available when a tracker is connected:



Initialize

At start-up, the system is automatically initialized. During the initialization process, all the subsystems in the Absolute Tracker AT960 are initialized and are verified to be functional. During the initialization process the sensor moves to safety position. Once the system is ready it will return back to its initial position.



Disable PowerLock (Advanced User)

PowerLock allows the system to detect when a reflector is in view of the AT960 and automatically locks onto it without operator intervention.

The field of view of PowerLock is 10°, which corresponds to a spot size of 1750 x 1750 mm at a distance of 10 meters.

When PowerLock is enabled, the tracker moves automatically to lock onto the reflector when it is on the field of view.



Overview Camera

Once the tracker is connected, and active, it has to focus on and lock the target (reflector, T-Probe or scanner).

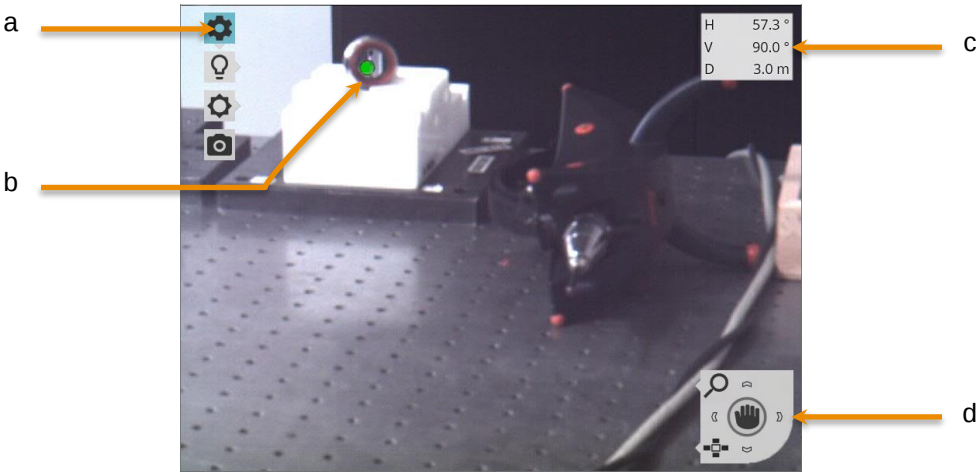
See next chapter for details.

2.4.4 Overview Camera

Once the tracker is connected, and active, it has to focus on and lock the target (reflector, T-Probe or scanner).

Either manually bring the target into the field of view of the tracker or help and guide the tracker to the target: open the instrument tab and press on “Overview camera” (📷).

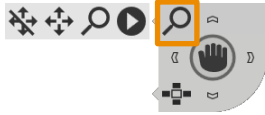
The Overview Camera (OVC) provides a coloured video stream in order to locate targets.



a		Show/hide additional actions:  Brightness Adjusts the brightness of the view image by moving the slider.  Help Shows the keyboard shortcuts for the OVC.  Save Saves an image of the current view as *.jpg-File.
b	 Target	The OVC image shows a green spot for each reflector in the field of view (FoV). Targets are shown in the field of view all the time regardless if the tracker is locked or not to a target.
c		Digital Readout stream
d		The Tracker head movement can be controlled with this pad  Moves the tracker head horizontally/vertically to the left/right resp. up/down from the tracker perspective with a mouse joystick.  Move the tracker head vertically down from the perspective of the Tracker with a step that can be chosen in the dropdown menu B.  Movement mode (see below)  Movement speed (see below)

Movement modes

On the movement control pad, press the movement modes button to show the options:



Action



No action

- It isn't possible to move the tracker by clicking in the OVC image.
- The tracker can be moved by the OVC controls or keyboard functions.



Position to mouse click

- The tracker head moves to the clicked position in the OVC image.



Position to mouse click & lock on

- The tracker head moves to the clicked position in the OVC image and lock on to the next reflector.

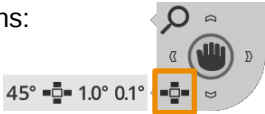


Position to mouse click & measure

- The tracker head moves to the clicked position in the OVC image and measure.

Movement speed

On the movement control pad, press the movement speed button to show the options:



Step

45°

Extra large

- Moves the tracker head horizontally/vertically to the left/right resp. up/down from the Tracker perspective with a step of 45°.



Next image

- Moves the tracker head horizontally/vertically to the left/right resp. up/down from the Tracker perspective to the next image.

1.0°

Fine

- Moves the tracker head horizontally/vertically to the left/right resp. up/down from the Tracker perspective with a step of 1.0°.

0.1°

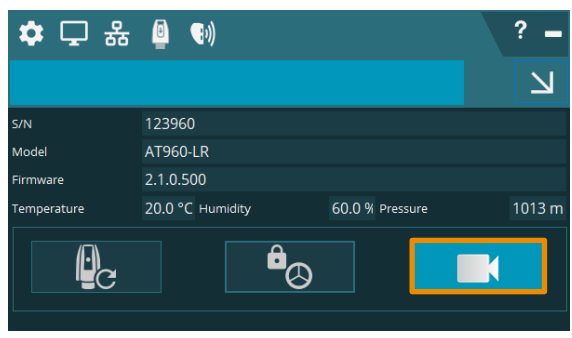
Extra fine

- Moves the tracker head horizontally/vertically to the left/right resp. up/down from the Tracker perspective with a step of 0.1°.

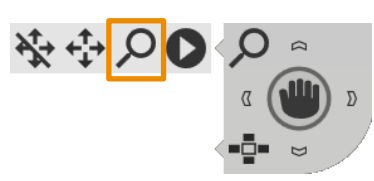
How to Find and Lock a Target

The purpose is to move the video in sort of placing the target at the middle of the view.

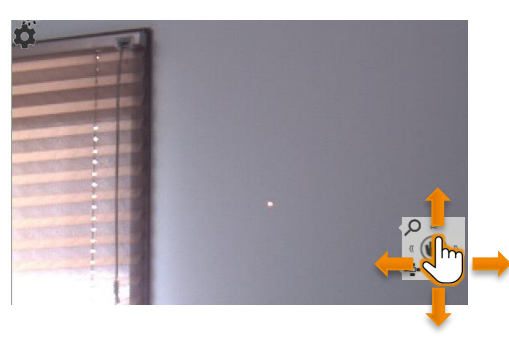
- 1. Open the OVC



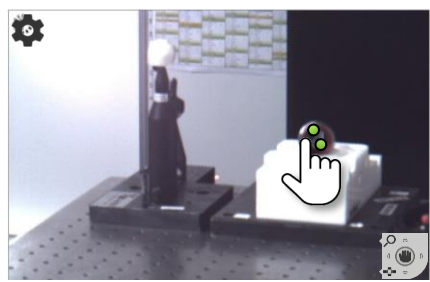
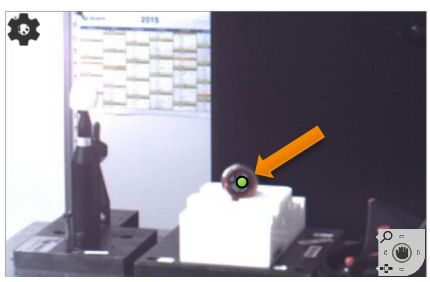
- 2. Set the Movement mode to "Position to mouse click & lock on".



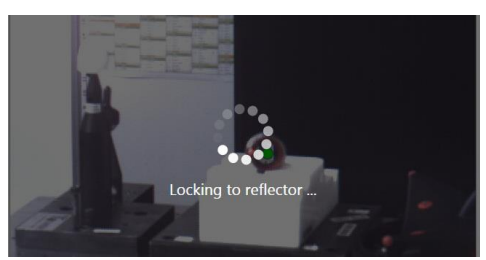
- 3. Move the tracker head.



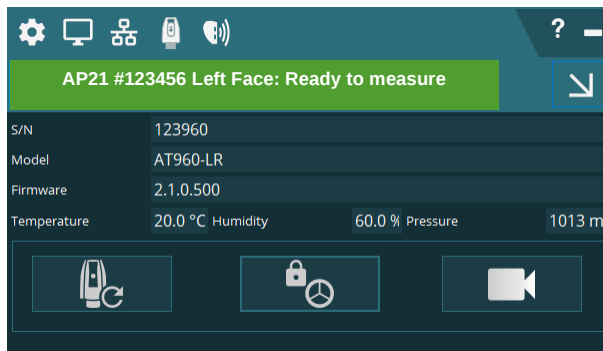
- 4. Once the target appears on the video, affine the position by clicking at the centre of the target: only one green dot is displayed on the target.

The target is not centred correctly: two green dots are displayed: click on the target. 	The view gets centred on the click point. Only one dot is displayed. 
--	--

- 5. The tracker automatically adjusts and locks target.



6. Once the target is locked, RDS indicates the status:



(depending on the locked-on target)

7. Close the OVC

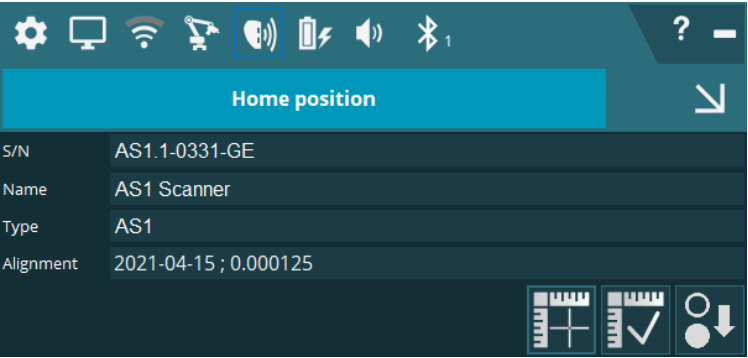
2.5 Sensors

2.5.1 Contact Probes, Tube Probes & All Scanners

Status Icon

	Contact probe		Issue with the sensor
	Tube probe		No sensor is currently detected
	Laser scanner		

Tab Details



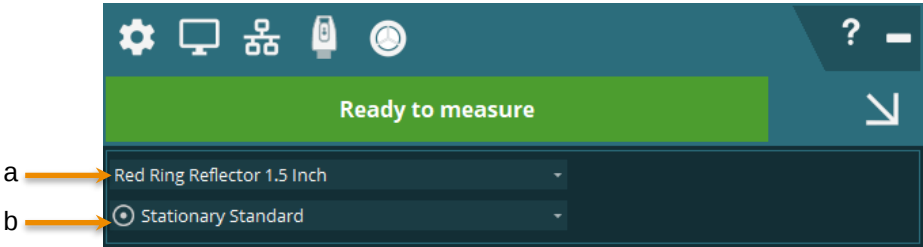
Name	Name of the sensor
Type	Shows the type of sensor (Contact probe / Scanner / NC Tube probe)
Alignment	Shows the date, time and calculation result of last alignment of the sensor.
	Switch sensor selection (up / down): change the probe / scanner selection
	Switch sensor selection: change the probe / scanner selection
	Runs the sensor alignment process in RDS Data Collector
	Runs the sensor verification process in RDS Data Collector
	Activates / deactivates the Depth sound guide for compatible scanners

2.5.2 Reflectors, T-Probe & T-Mac

Status Icon (tracker)

	Reflector		T-Mac Inspect (TMC 30-I)
	AP21 (with no sensor)		T-Mac Multiface (TMC 30-M)
	T-Probe		T-Mac Extended (TMC 30-E)
	T-Mac Frame (TMC 30-F)		Issue with the sensor
	T-Mac Basic (TMC 30-B)		No sensor is currently detected

When using probing sensors on a tracker, the RDS Agent proposes some sensors options.

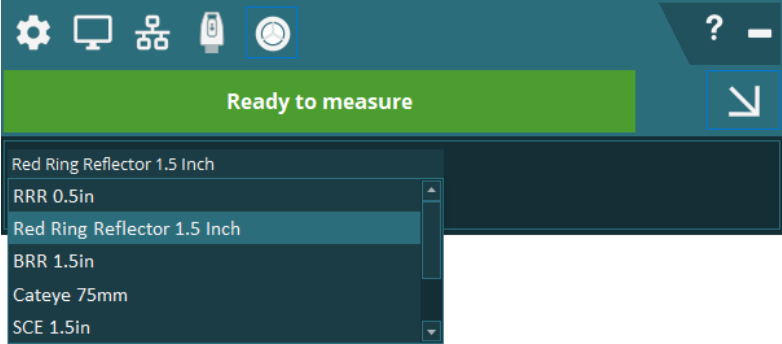


- a. Manual selection of the sensor (excepted T-Probe and LAS)
- b. Probing mode (see below)

Select a Target

Different kinds of measurement targets can be used: T-Probe and scanners are automatically recognized, no need to select. The SMR reflectors cannot be recognized and require to be selected in the list.

As soon as a target is locked on, it is displayed in the RDS Agent. The respective target information can be called up by clicking on the corresponding icon.

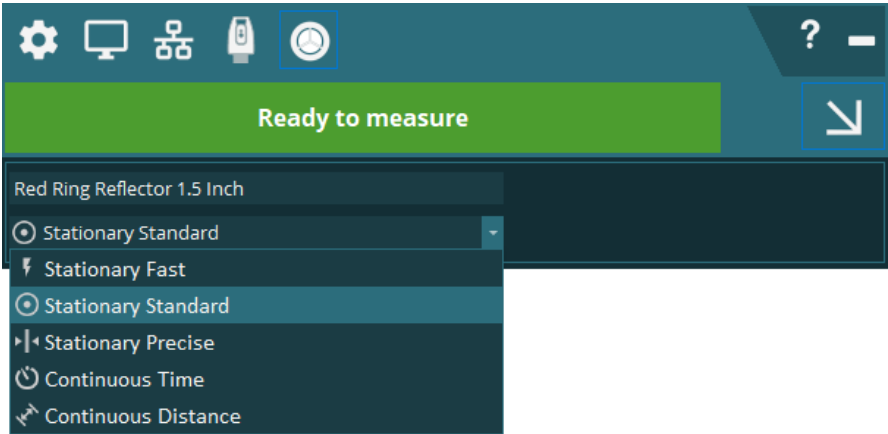
Target	Selection
T-Probe	Automatic
T-Mac	Automatic
Reflector	Click on the sensor icon to enter the reflector set-up tab and select the appropriate reflector in the list. 



The T-Probe only works with an attached and compensated tip.

Probing Mode

The mode enables the user to select the adequate measurement behaviour according to the application needs.



Stationary	This is the standard manual way to measure: single stationary points. (The slower, the more accurate).	
	Fast	With this mode, the delay for each point is reduced. - Handheld - Rapid measurements - Typically achieves specified accuracy in controlled environment
	Standard	This is the standard mode, a compromise between speed and accuracy. - Accuracy of application within manufacturers specification - Controlled environment
	Precise	With this mode, the time to take each point is longer, but it provides a higher accuracy. - Measurements with high reliability such as move station point - Sensor checks and compensations.
Sequential	The points are triggered automatically according to a time or distance criteria.	
	Continuous time	Frequency controlled scan probing: points are automatically triggered on a frequency defined with a specified period. The space between each point depends on the speed of movement: the faster it is, the more spaced the points are. The delay between each point can then be specified (default 500ms)
	Continuous distance	Interval controlled scan probing: points are automatically triggered at a specified distance from the previous point. The space between each point is constant and does not depend on the speed of movement. The distance between each point can then be specified (default 1mm)

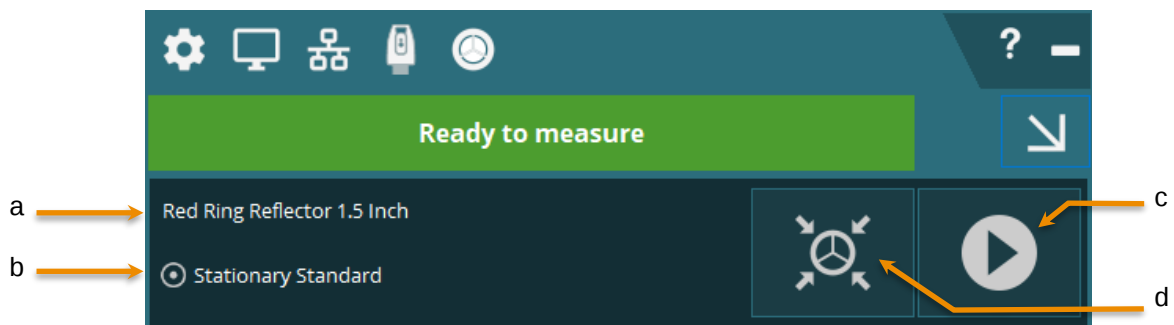
2.6 Probing Tab (tracker)

The tracker probing tab automatically appears as soon as a probing sensor is locked on:

- Reflectors
- T-Probe
- AP21 when no sensor is mounted on it
- T-Mac



Probing with RDS is available only with application software supporting this function.



- a. Current sensor/positioner and tip
- b. Current probing mode
- c. Start/Stop button
- d. Stable mode activation button



To define the current reflector or choose the probing mode, use the Sensor tab (see previous chapter)

Manual Probing (default)

When the probing mode is set to “Stationary”, the points are taken independently from the others: position the probe and click on the button (or press the trigger button on the T-Probe/AP21):



A single point is then taken.

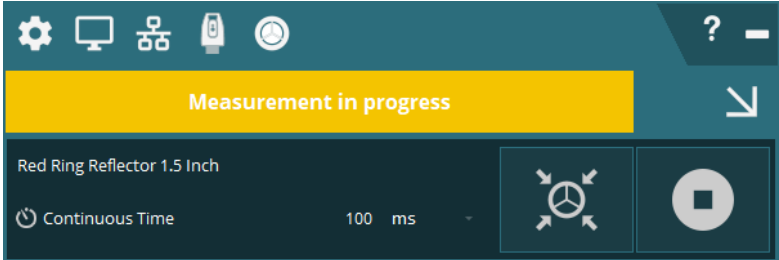
Scan Probing

When the probing mode is set to “Continuous time” or “Continuous distance”, the points are triggered automatically once the specified delay or distance is reached after the previous point.

Press the Measure button to start the automatic measurement.



Points are then automatically taken.



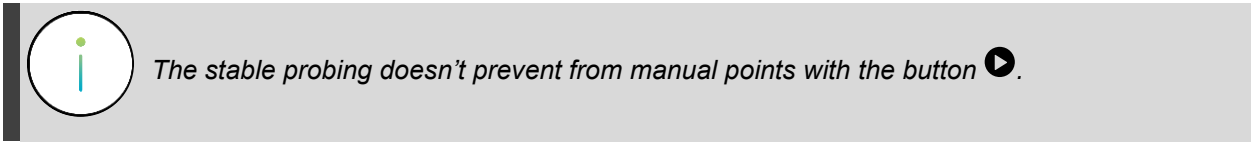
Then press the Stop button to pause.



Stable Probing (SMR only)

RDS provides the ability to trigger automatically a point when the probe stops moving: no need to press any button, move the probe to the desired position, as soon as it becomes stable, the point is automatically taken.

To activate the stable measurement, press the button.



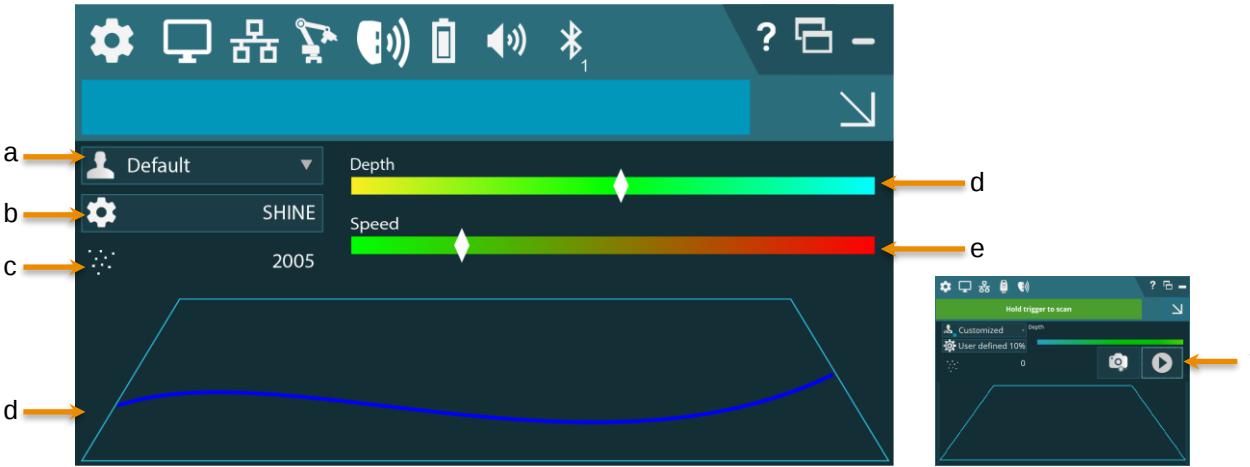
Laser Scanning

Please refer to the chapter [Scanner](#) for details on the use of the scanner.

2.7 Scanning Tab

When a Hexagon scanner is detected on the arm or the tracker, the RDS Agent provides useful tools for digitizing.

By default, the window is displayed minimized. Following information and options are available:



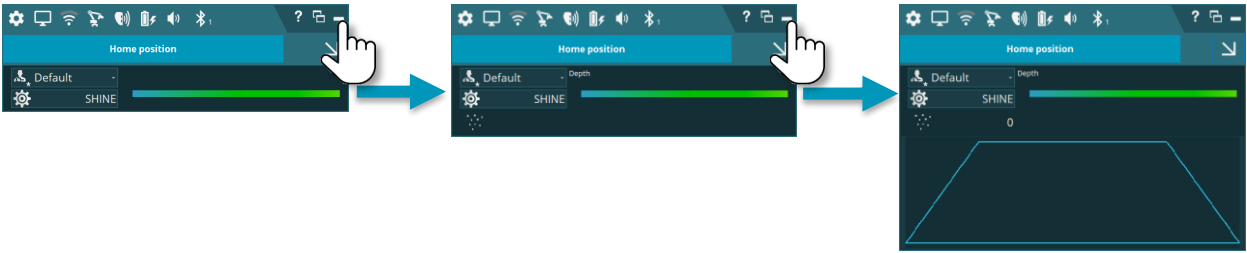
	Item	Description
a		Current scanning profile and profile selection. (See §D.7.2)
b		Access to the scanner settings (press on the button) Main scanner mode: - AS1 / AS1-XL / RSx / HP-L-8.9: Exposure + Auto / Manual modes - LAS / LAS-XL: Width + Points spacing
c		Nb of points per stripe
d	Depth 	Indicator bar graph showing how target is placed against scanner Z-field. Only in capture mode
e*	Speed 	Bar graph indicator telling the user if he is moving the arm too fast while scanning. If the bar is outside the range, RDS prevents from getting points.
f		Scanner controls (trackers only with Advanced user profile) ▶ : Start / Stop scan 📷 : Capture the exposure (only when exposure is set to “User Defined”)
g		2D view of the scan line

*: only for scanners on RA7 arm

For more details, refer to §0 [RDS Control Panel > Scanner](#)

Minimum / Extended Window

The window size can be modified by clicking on the resize button:



Extended window can then be displayed: to the basic items, is added the video of the scanner.

2.8 Battery

Status Icon

	  Battery(ies) level (high to low)
	  The battery level is low / very low
	  The battery level is critical
	 On power supply / the battery is charging
	 No battery detected

The level of charge in % can be displayed by pointing the icon.

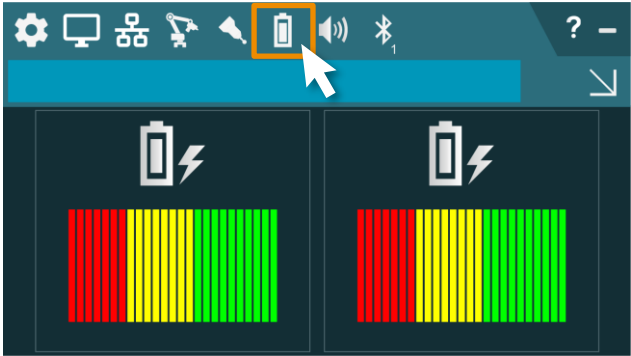
 : Used with arms |  : used with trackers



The battery status is not available when the tracker is on power supply.

Tab Details

Open the tab by clicking on the icon: the level and status of each battery are displayed graphically.



2.9 Sound (arm)

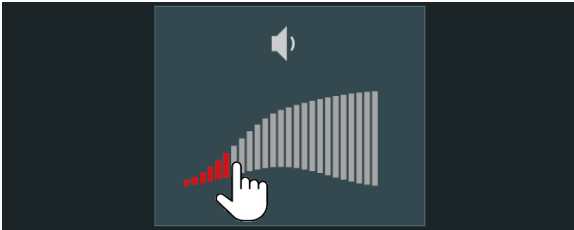
 Status Icon

	The sound is on the instrument speakers
	The sound is on the Bluetooth device
	Sound volume set (Min to Max)
	Sound set to zero

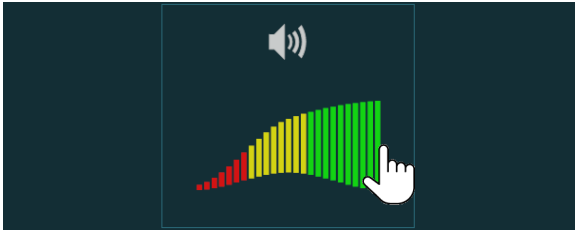
Tab Details

To change the sound level of the arm or the headset, click on the desired level.

Lower volume



Higher volume

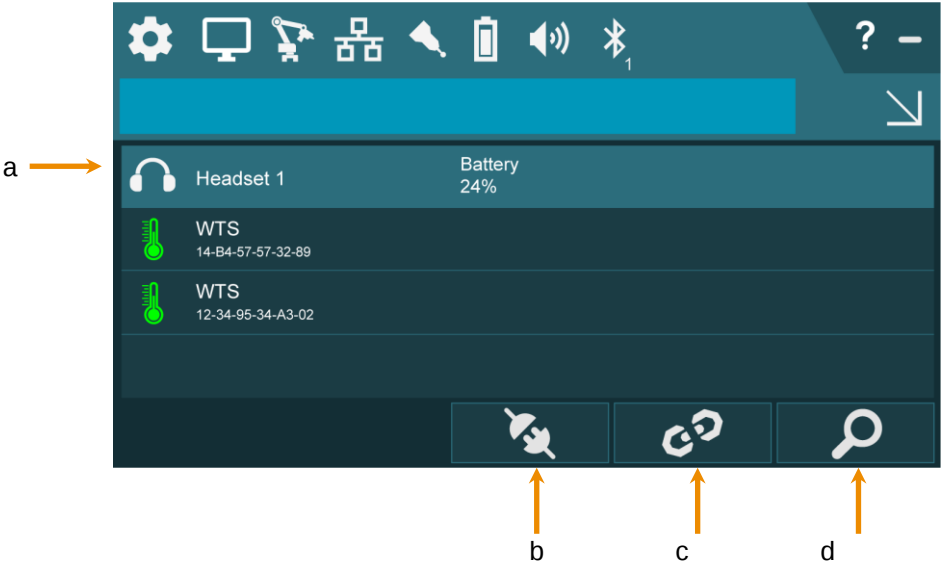


2.10 Bluetooth (arm)

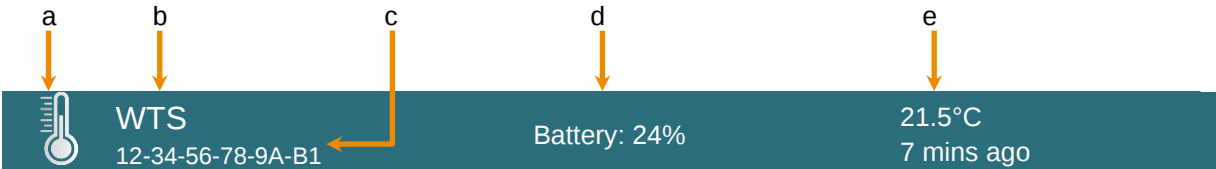
2.10.1 Tab details

Wireless accessories can be connected to the Absolute Arm (RA8 v1 and v2) or to the computer (RA8 v3 – Service profile for WTS only). Their connection is managed in the RDS Agent.

Click on the Bluetooth icon to display the list of available, connected or registered devices.



- a. Selected device
- b. Connect / disconnect the selected device
- c. Unsubscribe the selected device
- d. Seek again for new devices
- e.



a	Type of device	 Temperature sensor (WTS)  Speaker, headset, earphone...
b	Name of the device	
c	Address of the device	MAC address  : always shown  : shown only on the selected device
d	Battery status	
e	Information returned by the device	 : last temperature measured by the sensor  : Sound level (when available)

2.10.2 Bluetooth Status

Subscription and Connection

Bluetooth peripheral can be used subscribed or connected:

	Subscription	A subscription consists by getting data from the peripheral, but without a total control and monopole. Several arms can be subscribed to a peripheral at the same time, and then get data from it. If the device is no longer discovered, the subscription remains, and data can be collected from the device as soon as it is recovered.	WTS
	Connection	A connection consists by taking full control of the peripheral. Usually, a connection requires also a subscription (this process is then automatically done by RDS). Only one arm can connect a peripheral. When the device is no longer discovered, the connection is stopped (but subscription remains).	Speaker Headphone ...

As soon as a device is subscribed (for a simple subscription or for a connection), it remains memorized in the list.

Device Status

The icon of the discovered Bluetooth devices shows their type and status.

	Discovered	Device discovered (New or already subscribed) but not connected
	Subscribed	Device already subscribed but not available (not discovered)
	Connected	Device subscribed, discovered and connected

Bluetooth Functionality Icon Status

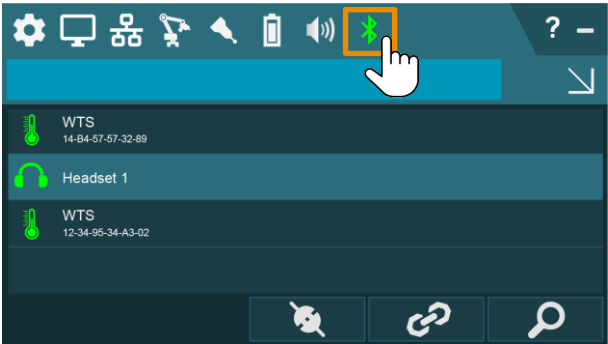
The Bluetooth functionality icon present on the RDS Agent, the Absolute Arm base and the wrist display of the Absolute Arm 7-axis, shows the current status.

	(blinking) Bluetooth initialising	(Startup of the arm)
	Bluetooth ready	The Arm is ready to discover, subscribe and connect devices.
	(blinking) Discovering	The arm is seeking for new devices.
	Subscribed	A device has been subscribed
	Discovered	One or several devices have been discovered and are ready to be connected
	(blinking) Connecting	
	Device connected	At least one device is connected.
	Bluetooth deactivated	(RA8 v3) Bluetooth is missing or deactivated on the computer.
	Error	

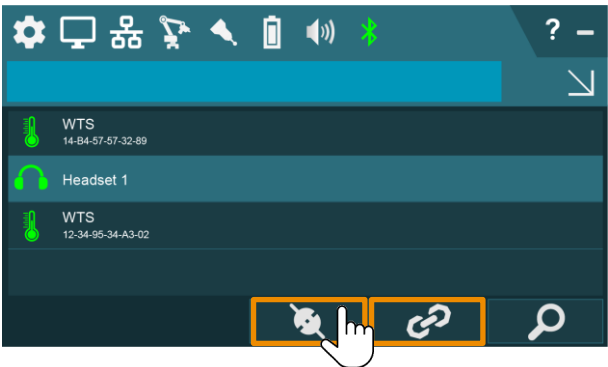
2.10.3 Subscribe/Connect a New Device

	Bluetooth interface	Compatible device
RA8 v1 / v2	Absolute Arm	 
RA8 v3	Computer internal device or USB adapter	

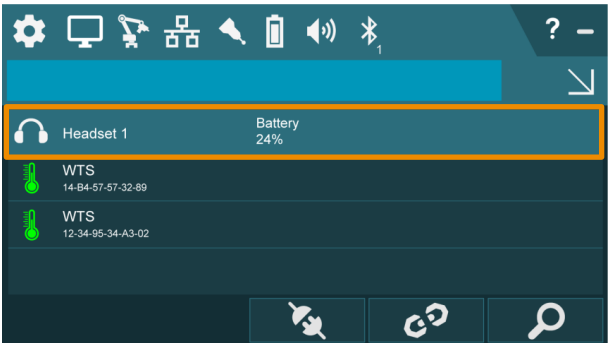
- Click on the Bluetooth tab to open the tab: RDS Agent seeks for available devices and lists them.



- Select the wanted device and click on Subscribe or Connect (depending on the type of device).



- The device is now ready.



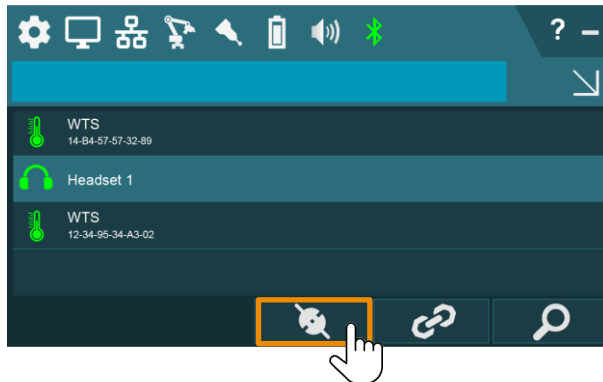
2.10.4 Connect a Subscribed Device

As soon as a device has been connected or subscribed once, it remains listed as subscribed until the user press the “Unsubscribe” button.

Then “Subscription only” devices are automatically back available when discovered by the arm.

The devices requesting a “Connection”, remain subscribed but need a new connection when discovered to be used.

Select the device and press “Connect”.



2.11 IP54 Monitoring (arm)

The RDS Agent provides a monitoring tool to detect the presence of components that may affect the protection of the system.

- When the arm is connected to the computer, RDS will verify if the IP54 conditions are respected.
- If RDS detects that IP54 protection is missing (for example the Nose Cone is not installed on the 7-axis wrist), RDS will invite the user to intervene, to ensure that protection is maintained at all times.



The IP54 monitoring is only supported by the Absolute Arm (RA8) v2 and v3.



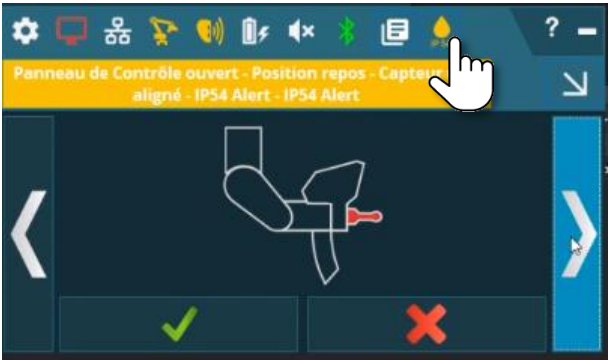
The IP54 monitoring can be de-activated: Open RDS Control Panel > General settings and uncheck the IP54 option.

IP54 Alerts

1. If the arm is not fully IP54 protected, the icon will show in the RDS Agent.



2. To locate the concerned component, click on the IP54 icon. A diagram will be shown to indicate what part of the arm requires attention. If there are several locations, scroll through them, by clicking on the right and left arrows.



3. Depending on the action, mount an accessory, or a cap (and then acknowledge), or reject if there is no possibility to respect the protection (IP54 alert remains).



NOTICE

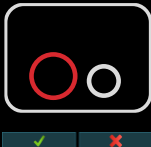
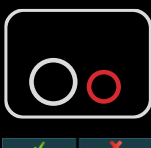
Any IP54 notification, acknowledgement or rejection is logged.



NOTICE

In case of rejection, the user undertakes to use the instrument in IP54 conditions.

List of potential situations

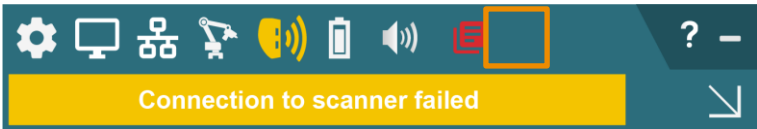
	No Scanner or Nose Cone is mounted.	Mount a scanner or a Nose Cone.
	A scanner is mounted but not compliant with IP54 (RS5, RS6, earliest AS1's).	Mount a scanner compliant with IP54. If not, reject (the arm then is not protected).
	No probe is mounted on the TKJ connector.	Mount a probe compliant with IP54 or Mount the TKJ cap and acknowledge.
	A probe is mounted but not compliant with IP54 (probe V1, tube probe).	Mount a probe compliant with IP54.
	The arm is connected through Wi-Fi.	Ensure that the LAN connector is protected by the cap and acknowledge.
	The arm is powered on battery.	Ensure that the power connector is protected by the cap.
	A Control Pack v1 is mounted	Change to a Control Pack v2 (CP-C / CP-B / CP-W).
	The Pistol grip has been removed.	Place the Swivel Panel and acknowledge.

2.12 Logbook

The Logbook in the RDS Agent warns the operator about events such as a connection failure or other specific information.

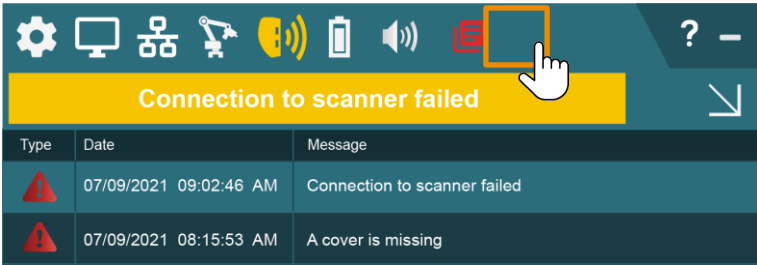
New Event

As soon as a new event is logged, the logbook status icon is flagged to the user by turning to red.



View the List of Events

Press on the logbook status icon to open the tab (the icon goes back to default-white)

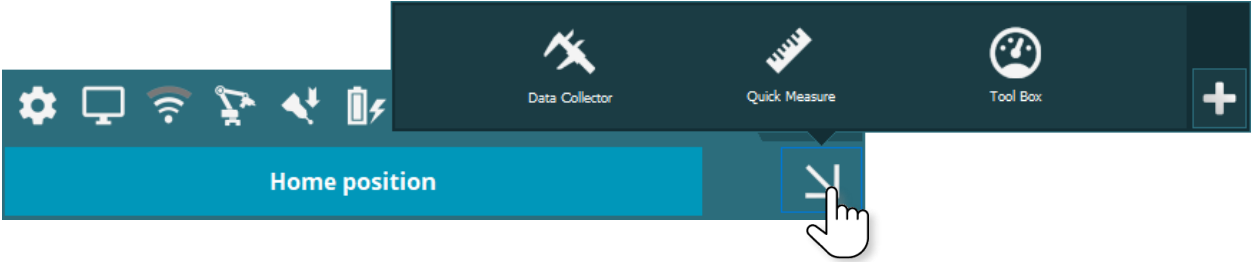


Type	
	Critical error
	Non-critical error
	information

 Only logs of the current session are displayed (last 24h).

2.13 Shortcuts

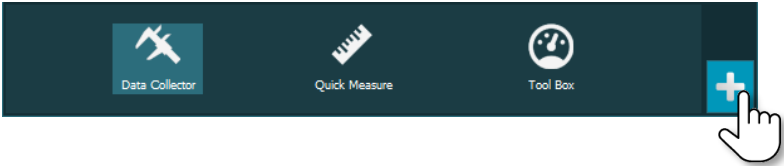
To access the RDS software components, click on the Shortcuts icon.



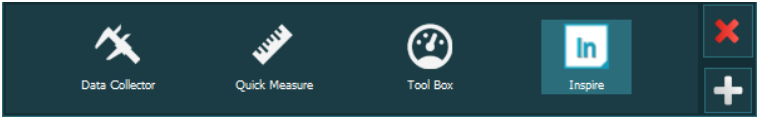
	RDS Data collector		Instrument and accessories verification and alignment.
	RDS Quick measure		Tools to do basic measurements.
	RDS Toolbox		Main interface for the configuration and maintenance.
	Add a shortcut		Gives the possibility to add a customized shortcut.
	Remove a shortcut		

Add Customized Shortcuts

1. Press “+” to add a new shortcut.

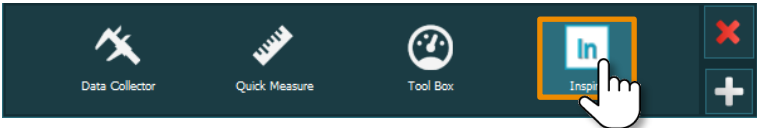


2. Browse and select the file (executable or not)

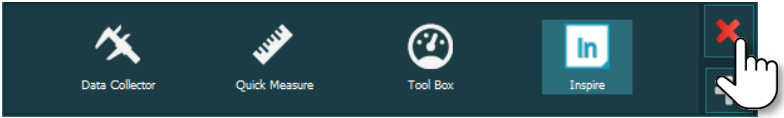


Remove Shortcuts

3. Select the shortcut to remove.



4. Press 



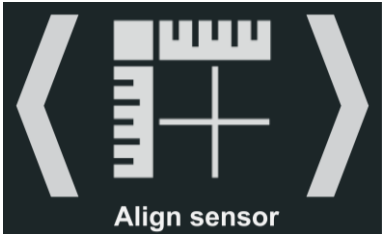
Only customized shortcuts can be removed.

2.14 Quick Access Menu (arm)

The Quick Access Menu (“Q.A.M.”) is a functionality of the RDS Agent, providing main useful actions very easily from the wrist of the arm without the need of going back to the computer. The Quick Access Menu is similar on the Wrist Display on the RA8 – 7 axes.

Actions may be

- Display system status information
- Access to verification or alignment
- Control main settings
- Real time feedback for scanning



The Quick Access Menu contains very basic and easy interface and use:

- Left-Right: make your choice
- Click: validates the choice.

2.14.1 Control the Q.A.M.

Open the Q.A.M.

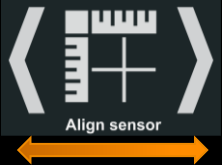
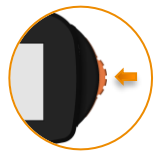
Press the 3-State Button (middle position) or swipe down the touch screen to activate the Quick Access Menu.

The menu appears then on the computer – and on the wrist display (on the display of the scanner if the RS-SQUARED is mounted).

3-State button (RA8)	Touch screen (RA8 v2)	Other arms
Press on the 3-State button (6 or 7 axes)	Swipe down	Press simultaneously the left and right buttons.

Navigate

The wanted action can be easily selected by going left or right with the buttons of the wrist.

	3-State button (RA8)	Touch screen*	Other arms
Previous – Next action 	    		 
	Press the 3-State button to the left or the right	Swipe right or left	Press left or right button
Validate the choice 	  		
	Press the 3-State button down	Tap the screen	Press Middle button
Exit the Q.A.M. 	 		
	Press the Trigger button	Swipe up	Press left & right buttons

* : only on RA8 V2

2.14.2 Available Actions

The settings and functions that can be reached from the Q.A.M. mainly depend on the type of arm (RA7 / RA8, 6 or 7 axes) and the type of sensor (contact probe, scanner, ...).

Some functions also can be used only in specific conditions:

- “Capture the exposure” is reachable only when the scanner is used in manual mode.
- Some actions are forbidden to Standard user profile (align sensor).
- Most scanning actions can be done only when the system is ready to measure.
 - Application software is connected to RDS
 - Arm not at home position

Conditions				
	Change profile	scanning	All Laser scanners	Offers the choice of profiles and activates the chosen one. Profile1 Profile2 ...
	Capture exposure	the	RS2-6 / AS1 scanners	 Starts the capture of exposure (only in Manual scanning mode)
	Switch mode	exposure	RS2-6 / AS1 scanners	 Switches automatic-manual exposure modes
	Switch sensor		RA8-7 RA7-7 V5	Switches to the upper or lower sensor location
	Align probe		All sensors	 Offers the choice of alignment method and runs the RDS Data Collector script: Sphere / Sphere with reference Plane / Plane with Reference Single point (contact probe only)
	Check probe		All sensors	Runs the appropriate script in RDS Data collector
	Control Panel		All	Opens RDS Control Panel for settings

: system status must be “Ready to measure” | : Advanced user profile or upper is required

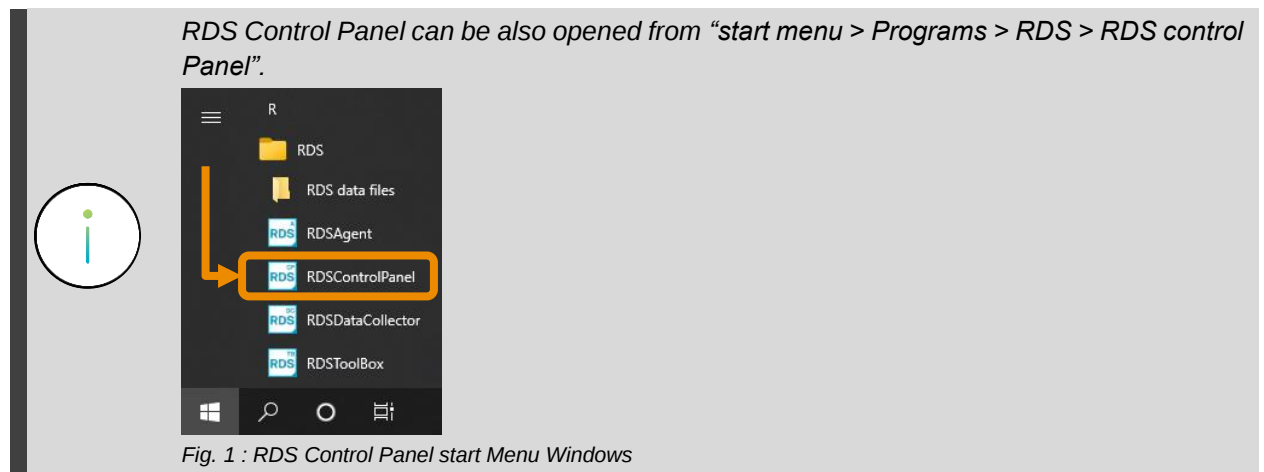
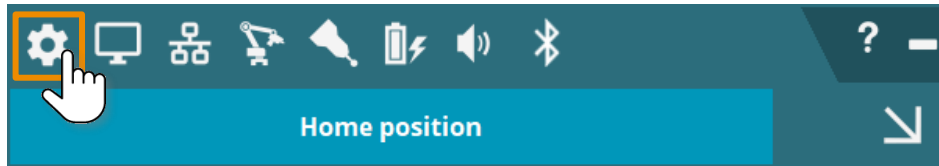
3 RDS Control Panel

3.1 Access and presentation

RDS Control Panel is the interface to manage the instrument settings.

Open RDS Control Panel

To access RDS Control Panel, open the RDS Agent (RDS icon on the notification bar) and select “Control Panel”.

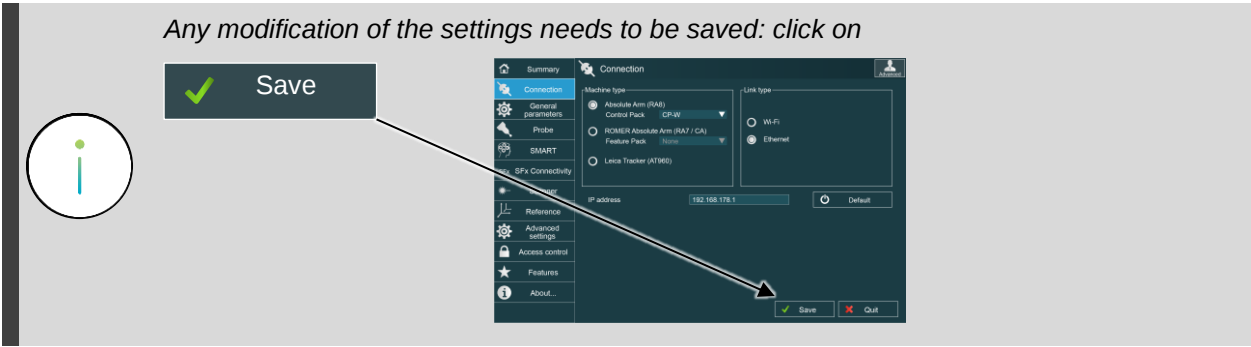


Components of RDS Control Panel

RDS Control Panel is divided in several tabs, available or not according to the connected machine:

	Summary		Shows the status of the machine
	Connection		Used to setup the connection with the machine
	General parameters		Language, units and environmental settings
	SMART		Privacy statement and activation of SMART functionalities
	Measurement Profile		Used to activate and manage Arm profiles when available
	Probe		Shows current probe and available probes settings
	Reference		Allows moving the instrument keeping the original reference
	Scanner		Available when a Hexagon scanner is connected
	Advanced settings		Various settings on arm for the buttons, mouse...
	Access control		Definition of the passwords for the User profiles
	Activations		Management of the activation codes for protected features
	Video capture		(On equipped arms): management of the wrist camera
	About		Information on the system.

● Available / ● Not available / ● Under condition



3.2 Summary

This page shows main information about the connected instrument.

3.2.1 Summary (arm)



Instrument

Connection	Type of system (NCA) connection (USB / WLAN / Wired Ethernet)
Type	Type of arm (RA7/RA8)
Arm volume	Diameter of the spherical measurement volume in mm
Arm version	Version of the arm
Performance	Performance level of the arm
Hardware version	Version of arm
Firmware version	Version of electronic program in the arm
Armspecs date time	Date and time of last arm compensation

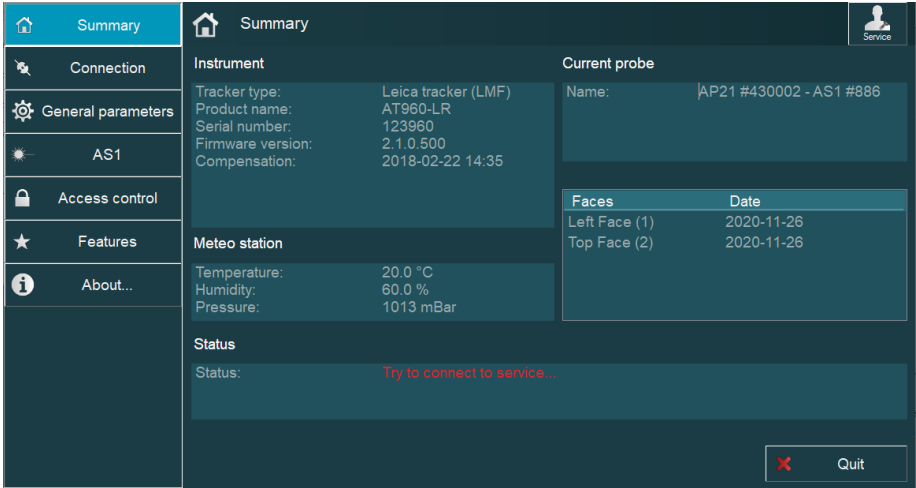
Current Probe

Name	Name of the probe (see Probes tab)
Type	Contact, trigger, scanner, or NC-Tube probe
Diameter	Ball probe diameter

Status

Arm Status	Information about connection and status
Battery Level	In % of full level
External Temperature	Gives the ambient temperature measured by the instrument (in °C – an external temperature sensor must be used)

3.2.2 Summary (tracker)



Instrument

Tracker type	Type of tracker and interface
Product name	Tracker model
Serial number	Laser tracker unit number
Firmware version	Installed package version on the laser tracker
Compensation	Date and time of last tracker compensation

Meteo Station

Temperature	Ambient temperature measured by the instrument (in °C)
Humidity	Relative humidity measured by the instrument (in %)
Pressure	Air pressure measured by the instrument (in mbar)

Current Probe

Locked on probe/positioner.

Name	Name of the positioner/sensor
Diameter*	 Ball probe diameter
Faces	 Date of alignment of each scanner faces

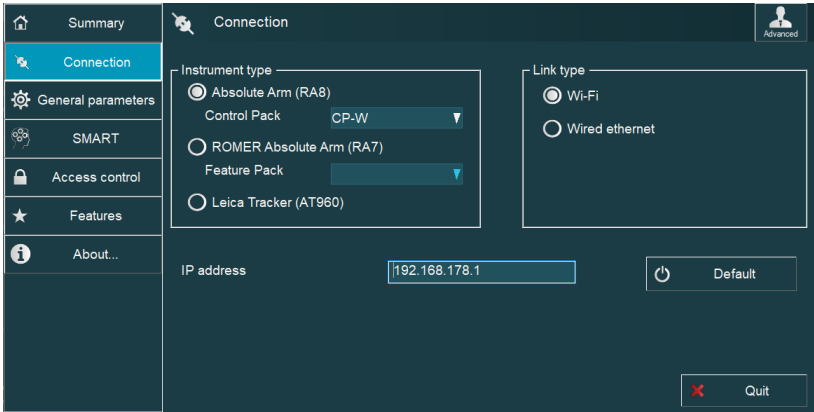
: Reflectors and T-Probe only | : Scanners only

Status

Status	Information about connection and status
--------	---

3.3 Connection

This tab is used to select the type of instrument and type of connection.



4 types of instruments and 3 types of connections are available:

	Connection module				
			Ad-Hoc	Access point	
Absolute Arm (RA8)	CP0	✓			
	CP1	✓			
	CP2	✓		✓	
	CP3	✓		✓	✓
	CP-C				✓
	CP-B				✓
	CP-W			✓	✓
ROMER Absolute Arm (RA7/CA7)	None	✓			
	FP1	✓			
	FP2	✓	✗		
	FP2+	✓		✓	
	FP3	✓	✗		
	FP3+	✓		✓	✓
Leica Tracker (AT960)					✓

According to the selected type of connection, additional parameters may be displayed above.

- Please refer to the arm manual (Absolute Arm / ROMER Absolute arm) for complete description of WLAN connection.

- SSID, Channel, IP address and WEP can be modified. Refer to RDS Toolbox (§ 7.4)

3.3.1 Wired Ethernet Connection (arm / tracker)

Please follow the instruction below to connect RDS to the arm (Absolute Arm or Cimcore CA7 Arm with FP3+ / CP3 / CP-C / CP-B / CP-W) or the tracker through wired Ethernet.

Instrument setup

1. Power on the instrument.



2. Ensure that the Ethernet cable is correctly connected from the instrument to the computer.



RDS setup

3. On the RDS Agent, open the RDS Control Panel and select the Connection tab.



4. Select the type of Instrument, type of Extension Pack (Absolute Arm) and “Wired ethernet”.

Machine type

☒ Absolute Arm (RA8)
Control Pack CP-W

☐ ROMER Absolute Arm (RA7 / CA)
Feature Pack None

☐ Leica Tracker (AT960)

Link type

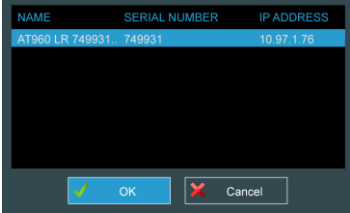
☐ Wi-Fi

☒ Ethernet

IP address 192.168.178.1

Default

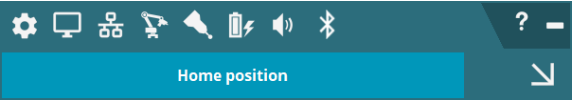
5. Use the default IP address or Set it up:

		
Enter the IP address of the Control Pack.	Click on “Discover”, select the tracker to connect and OK. 	Enter manually the IP address of the tracker

6. Save the modifications.



7. Now RDS automatically connects to the instrument.



The tracker is connected only when a measurement software connects its RDS plug-in.



The “Default” button permits to get back the original default address.

3.3.2 Wireless Connection (arm)

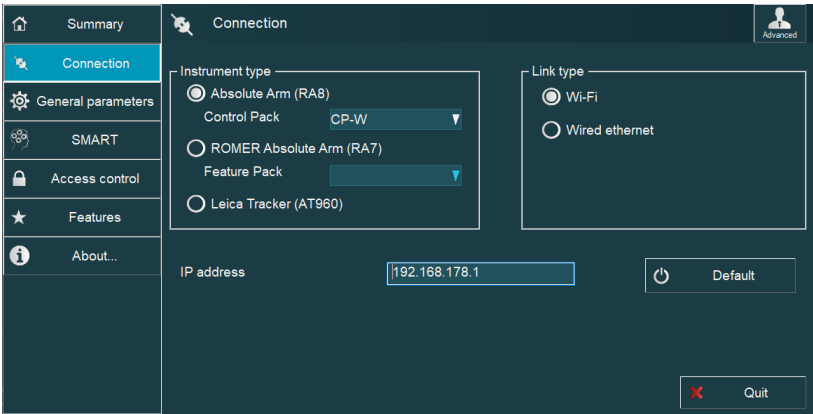
3.3.2.1 RDS Settings

The link type “Wi-Fi” (WLAN) is available only if the appropriate Feature/Control Pack is selected.



Wi-Fi selection with Multi Gage, FP2 and FP3 is no longer available due to the end of support by Windows.

When Wi-Fi link type is selected, Wi-Fi settings become available:



IP address	Area to enter the IP address of the instrument
Default	Changes back the IP address to the default one (192.168.178.1).

3.3.2.2 Computer Wi-Fi Setup

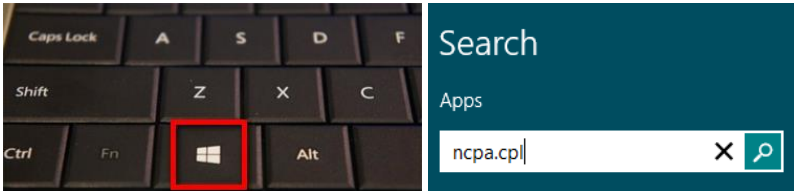
The following operation may be necessary before trying to connect RDS to any arm through Wi-Fi.



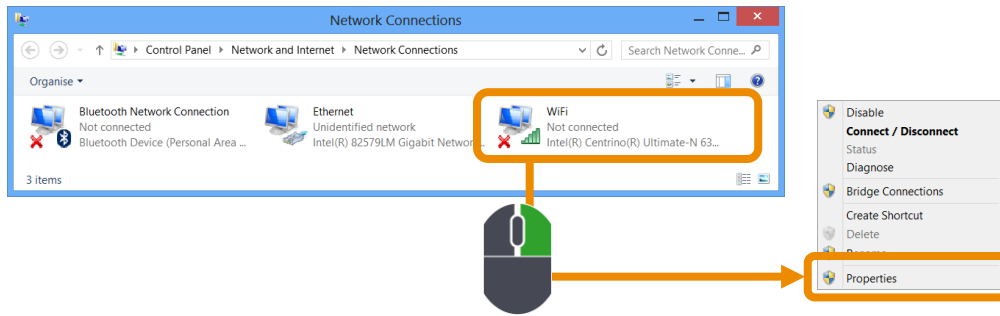
*The Wi-Fi chipset used for the wireless connection should be exclusively dedicated to it.
Please read in appendix the recommended settings for the Wi-Fi chipset.*

Wireless Device Setup

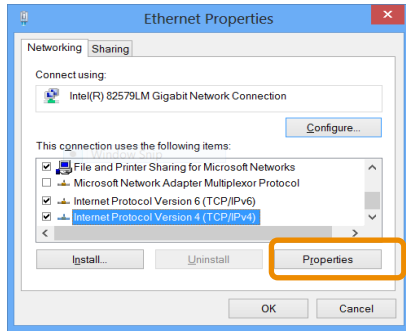
1. Switch on the computer's Wi-Fi adapter
2. Access the network settings: press the Windows logo touch on the keyboard and type in “ncpa.cpl”.



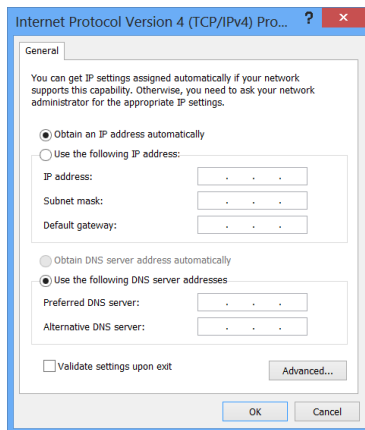
3. Right-click on the Wi-Fi device and select “Properties”:



4. Select Internet Protocol (TCP/IPv4) > Properties.



5. Select “Obtain an IP address automatically” and then OK.



Third Party Setup Software and Preferred Order of Networks



The Wi-Fi of the computer may be managed by specific software for the device. In this case, refer to its manual to connect to the arm network and setup the IP address.



If the Wi-Fi of the computer manages preferred order for networks, make sure that the arm network is at the top of the list.

Ex: if Windows manages the Wi-Fi, in the wireless configuration, select “change the order of preferred networks”

You access then to the following window: select then the arm network and click on “Move up” until it becomes at the top of the list.

Here, using “Properties”, you can also switch the “T-UN-FF” network as automatic connection if it is not

3.3.2.3 Wireless Connection

Please follow the instruction below to connect RDS to the arm through Wi-Fi.

Arm Setup

1. Make sure that a proper Extension Pack is installed on the arm.
2. Power on the arm.



3. Ensure that the USB/Ethernet cable is disconnected from the arm to the computer and that the Wi-Fi light on the front of the arm is on.

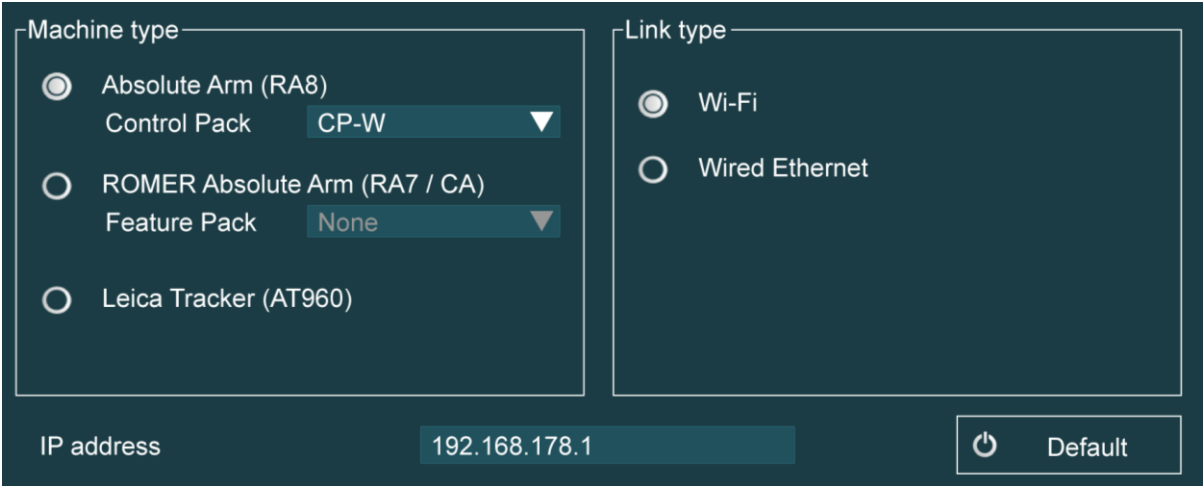


RDS Setup

1. On the RDS Agent, open the RDS Control Panel and select the Connection tab.



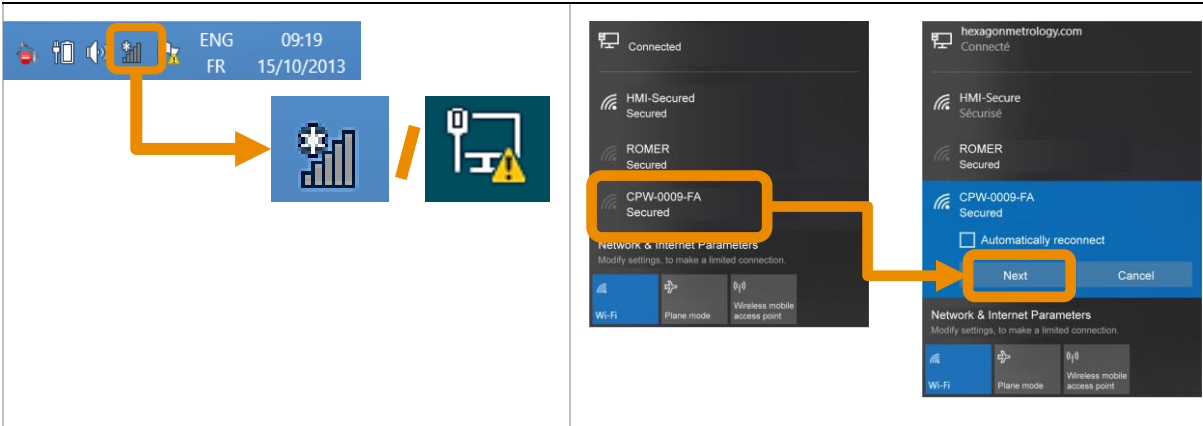
2. Select the type of Instrument, type of Extension Pack (Absolute Arm) and “Wi-Fi”.

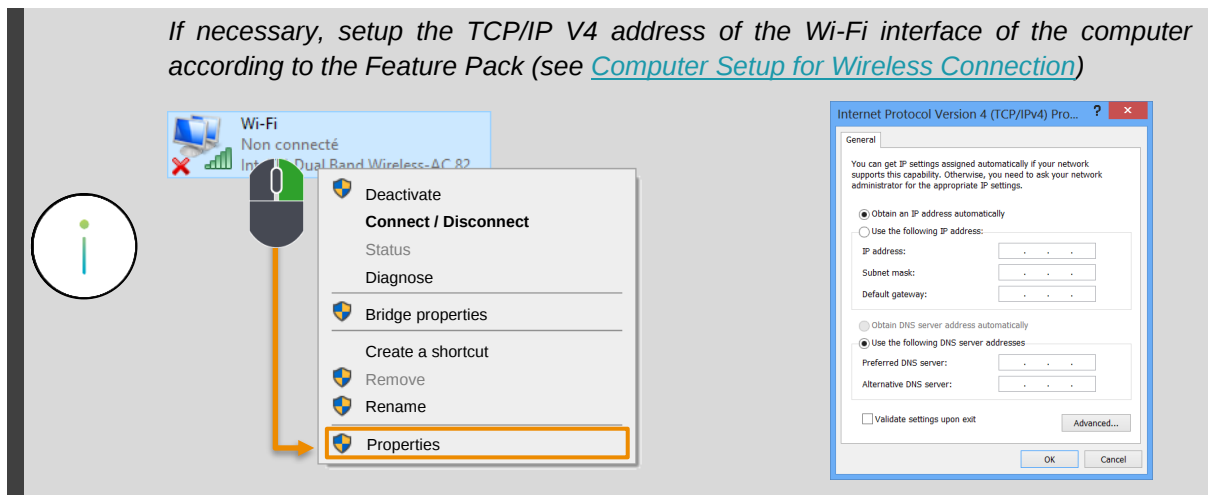


3. If the Pack address has been modified, enter the TCP/IP address.



4. Connect the network: display the available wireless networks and connect the Control/Feature Pack

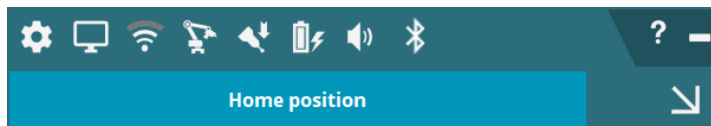




5. Save the modifications.



6. Now RDS automatically connects to the arm.



3.3.3 USB Connection (arm)

Please follow the instruction below to connect RDS to the arm through USB.

Arm Setup

- 1. Power on the arm.



- 2. Ensure that the USB cable is correctly connected from the arm to the computer.

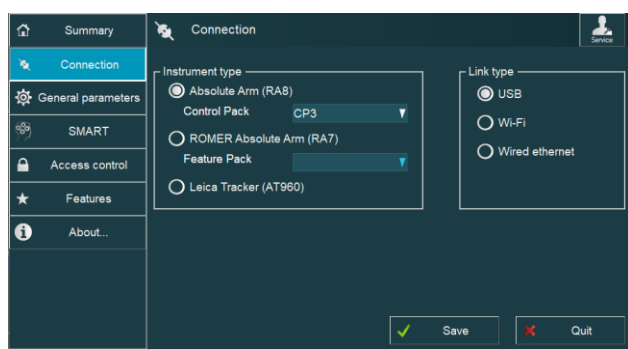


RDS Setup

- 3. On the RDS Agent, open the RDS Control Panel and select the Connection tab.



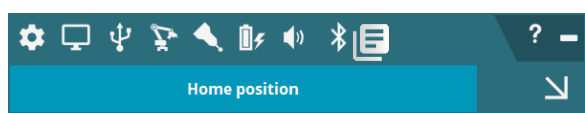
- 4. Select arm type and USB type.



- 5. Save the modifications.



- 6. Now RDS automatically connects to the arm.

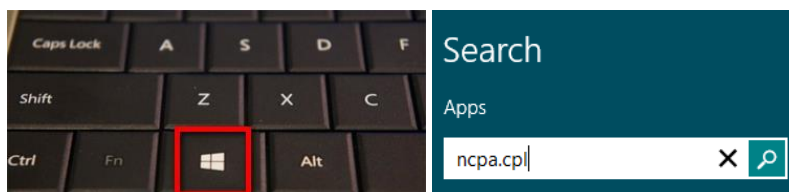


Scanner connection

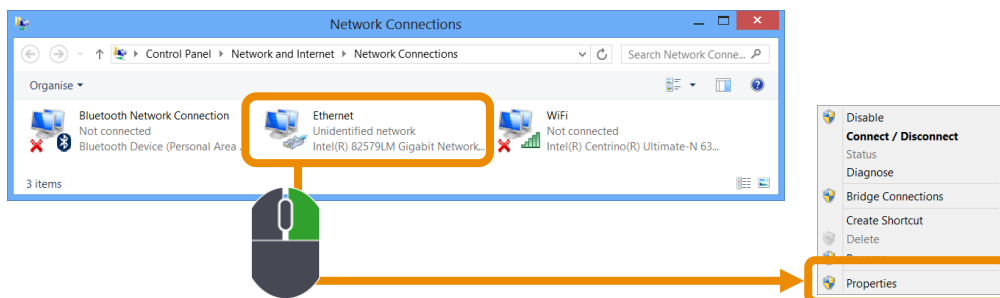
1. If the arm is used with a laser scanner, in addition to the USB cable, connect the Ethernet one and set the fixed IP address of the PC:



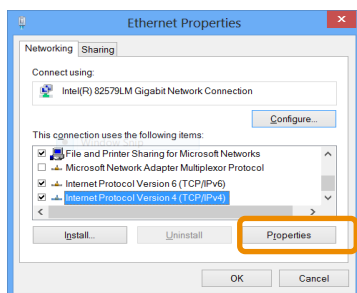
2. Access the network settings: press the Windows logo touch on the keyboard and type in “ncpa.cpl”.



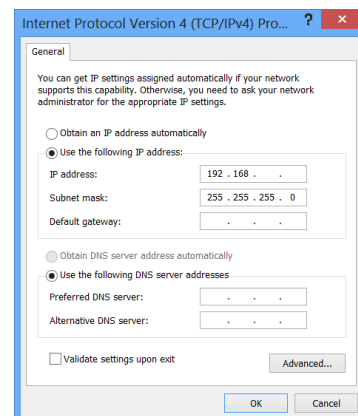
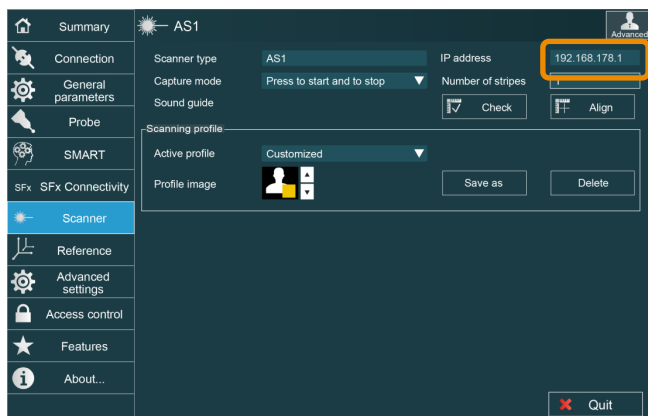
3. Right-click on the Wi-Fi device and select “Properties”:



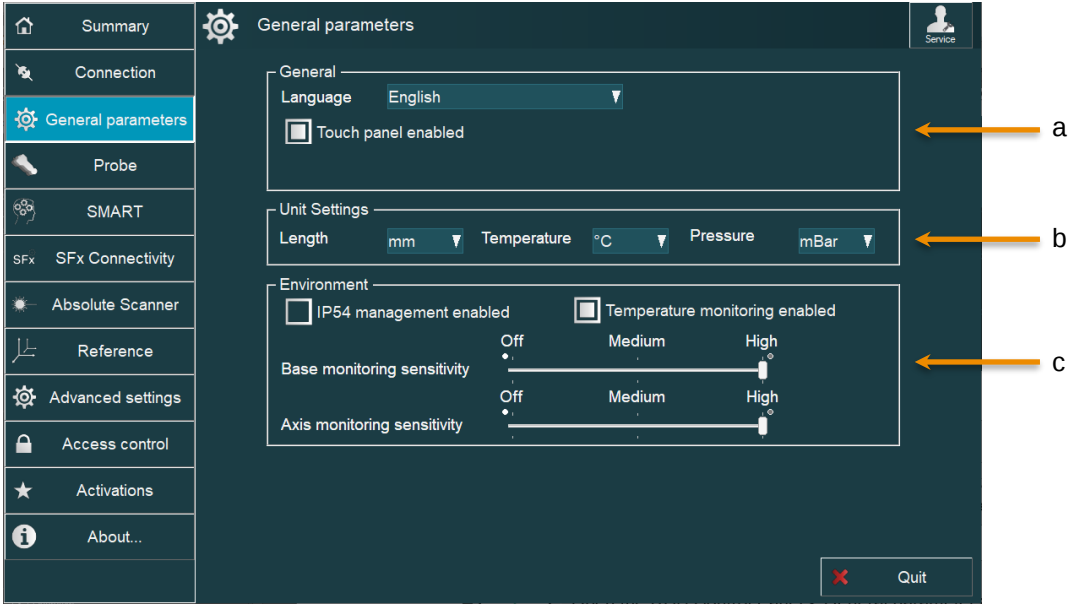
4. Select Internet Protocol (TCP/IPv4) > Properties.



5. Select “Use the following IP address” and set a correct address according to the one shown in the RDS Control Panel > Scanner tab.



3.4 General Parameters



a	General		Generic settings
b	Units		Change units displayed in RDS
b	Environment		(RA8 v2 and v3 only) Choices for monitoring the arm.

● Available / ● Not available / ● Under condition

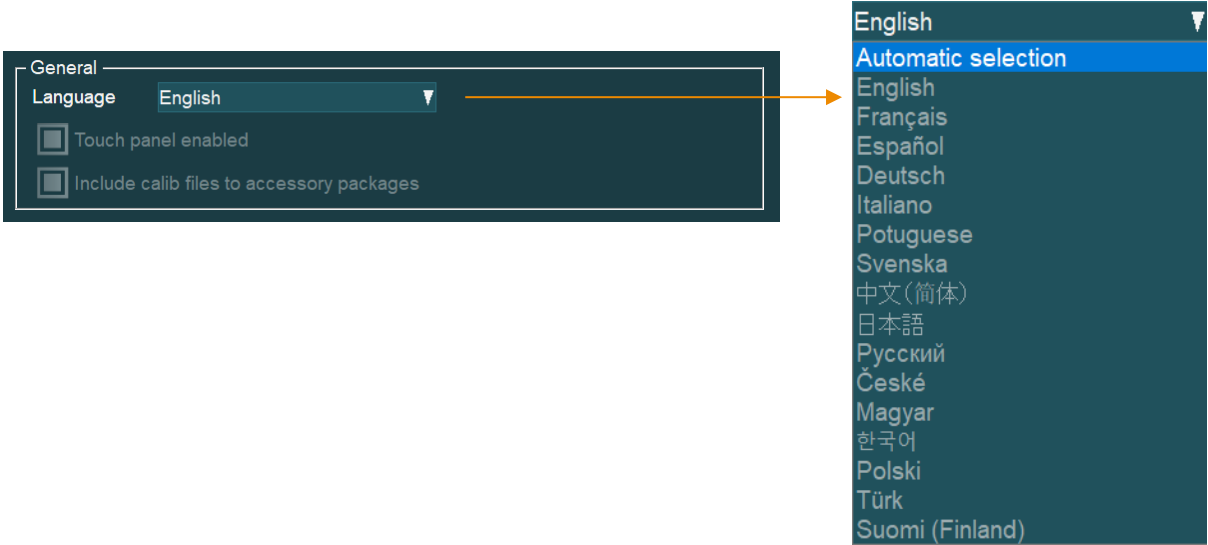


The sound level can be set directly on the RDS Agent

3.4.1 General

Language

By default, RDS automatically select the language depending on the language of the operating system.



Select the wanted language, then save (validate the message asking for restart).



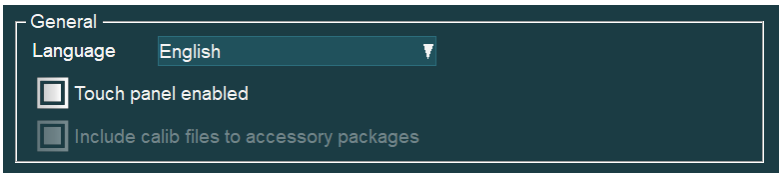
Once saved the change of language, RDS needs to be restarted:

For RDS Control Panel or RDS Data Collector or RDS Quick Measure, simply close and open again.

For all other tools (RDS Service, RDS Toolbox...), restart RDS Service itself or restart the computer.

Touch Panel (RA8 7-axis)

The Absolute Arm 7-axis v2 has a touch screen on its wrist. In some circumstances, to avoid actions on the screen, it can be useful to disable the touch actions.



3.4.2 Units

The units of lengths, temperature and pressure values displayed in RDS can be changed.

Unit Settings

Length

inch

▼

Temperature

°F

▼

Pressure

hPa

▼

Value	Available units
Length	<u>Millimetres</u> (mm)
	Inches
Temperature	<u>Celsius</u> (°C)
	Fahrenheit (°F)
Pressure*	<u>Millibar</u> (mbar)
	Hectopascal (hPa)

*: trackers only | Underlined = default unit

A restart of each RDS component is necessary to take into account the new units.
Some RDS screen remain displayed with the default units.

3.4.3 Environment (Absolute Arm RA8)

RDS embeds a monitoring system to always ensure optimal conditions of measurement.

Environment

☐ IP54 management enabled

☐ Temperature monitoring enabled

☐ Base monitoring enabled

Sensitivity 100%

☐ Axis monitoring enabled

Sensitivity 100%

IP54 management ^{v2-v3}	RDS checks that the arm is protected against dust and water drops.
Temperature monitoring ^{v3}	RDS checks that the ambient temperature is within the arm specifications.
Base monitoring ^{v3}	RDS monitors the tilt and stability of the arm base.
Axis monitoring ^{v3}	RDS monitors the stress on each axis of the arm.
Sensitivity ^{v3}	The sensitivity of the base and axis monitoring can be adjusted to fit with the measurement conditions.

v2/v3 : available on the designed version of arm only

For more details about the environment checking, read the Absolute Arm manual.

3.4.4 Head light (for equipped arms)



This tab is displayed only for a 6 axes 75XX (V1-V2-V3) and 73xx V3 series ROMER Absolute arm

Head light

 Start

 Stop

☐ Automatically start when connected to the arm

- Starts-Stops the head light on the F axis
- Activate-deactivate the auto start



Nb: do not forget to save configuration after modification.

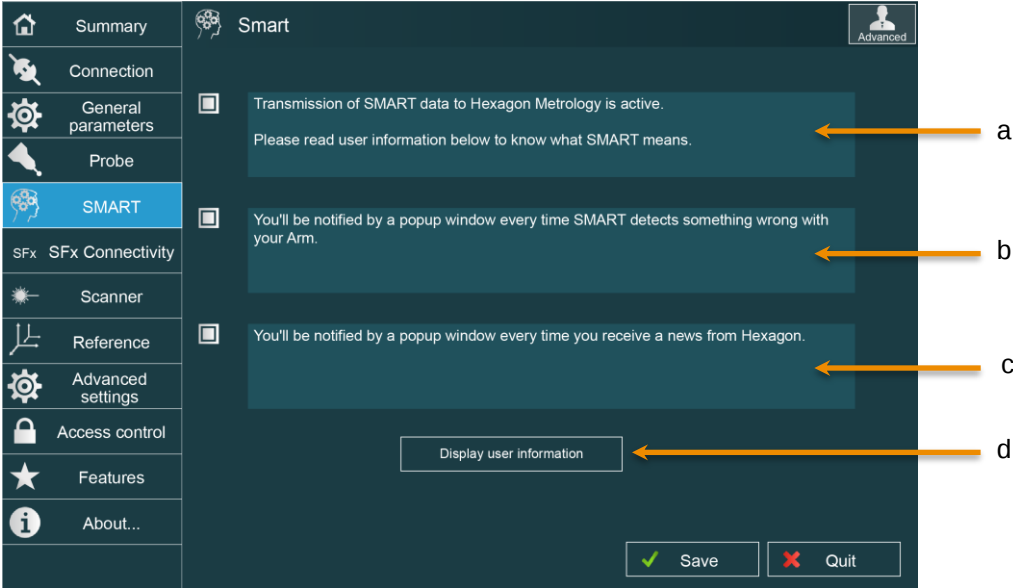
 Save

3.5 SMART (arm)



Find the SMART presentation on [RDS Toolbox > SMART](#).

The SMART tab in RDS control Panel gives access to the activation of the SMART automatic components, as well as the user information.



		Default
a	Activation of the transmission of SMART data: when activated, RDS will automatically send SMART data to the Hexagon Server.	Activated
b	Activation of the SMART alerts: when activated, RDS will display a popup notification when a SMART alert is detected, or when a publication is received.	Activated
c	Activation of the Hexagon news: when activated, RDS will be able to provide news regarding the product, new versions...	Activated
d	Display user information Display the official user information as during the installation of RDS.	English

To activate or deactivate an option, simply click on the check box:

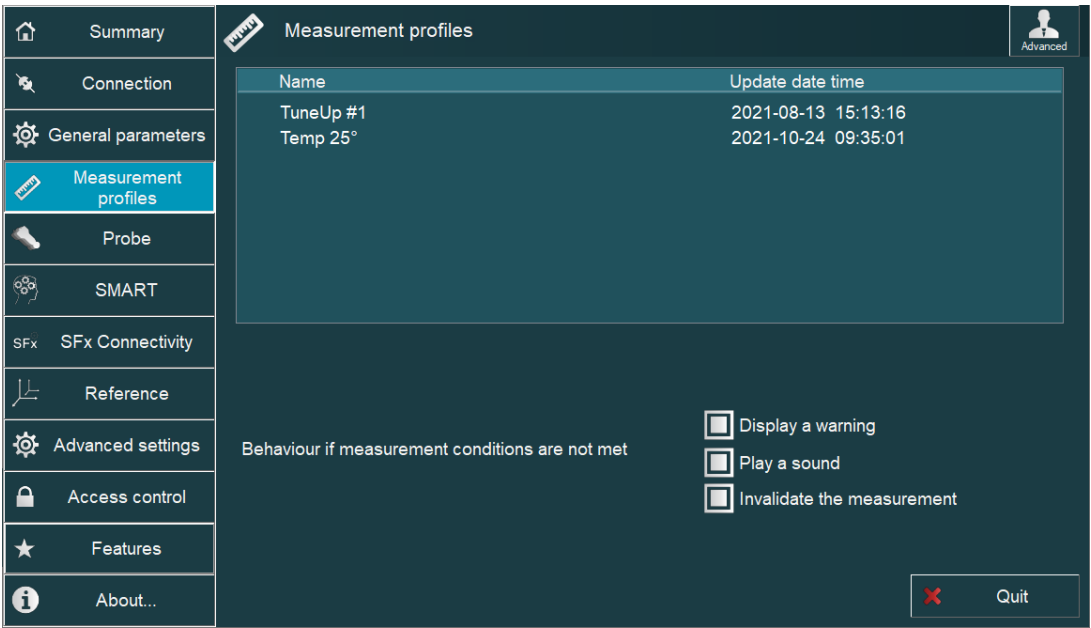




For all other information regarding RDS SMART, refer to chapter 6.6. [SMART](#)

3.6 Measurement Profiles (arm)

With RDS, one or several profiles can be created to manage specific uses of the arm.
These profiles then appear in this tab and can be activated.



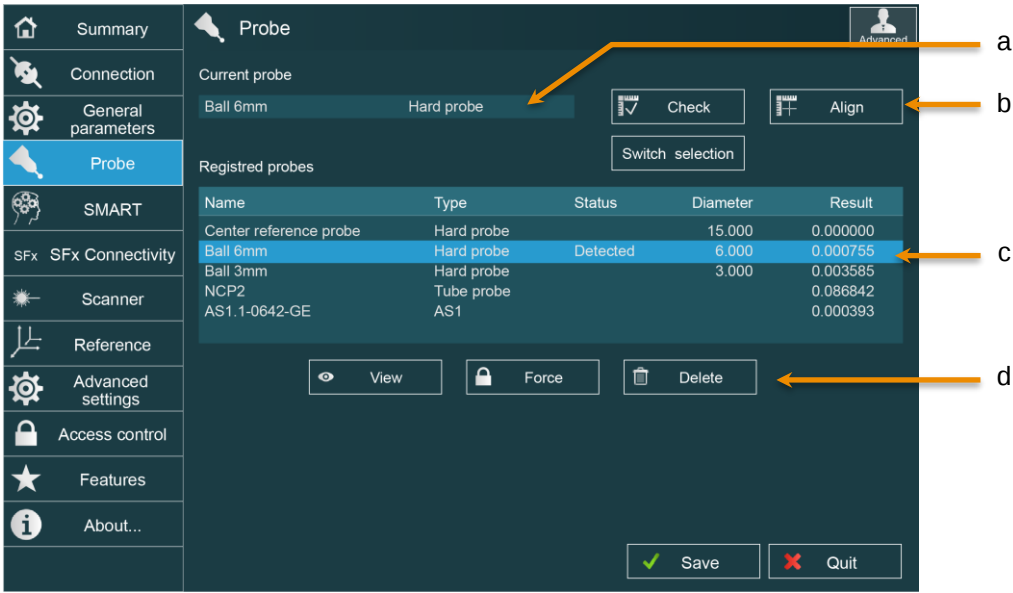
It is possible to specify how must react RDS when the user measures outside the restrictions.

- Display a warning: display a message at the centre of the screen
- Play a sound: a beep is emitted
- Invalidate the measurement: the point is not accepted.



Contact your Hexagon agent for more information about the profiles.

3.7 Probe (arm)



a	Current probe	Shows the name and type of the current mounted probe on the arm (detected or forced).
b	Action buttons	Shortcuts to RDS Data Collector: automatically opens and run verification or alignment scripts.
	 Check	Runs a Probing Quick Check script through RDS Data Collector.
	 Align	 Runs the current probe alignment through RDS Data Collector (different available methods are proposed).
	Switch selection	(RA8-7axes only) switches Centred probe <> Scanner (or Offset probe)
c	Registered probes	Displays the list of all the probes aligned and saved in the memory of the arm. Selected probe is highlighted in blue. (see next chapter for more details)
d	Action buttons	Management of the selected probe in the list. (see after)
	 View	 Displays the characteristics of the selected probe. Gives access to edit it.
	 Force	 Force the selected probe as current probe.
	 Delete	 Remove the selected probe from the memory of the arm.

 : at least advanced user.



When using “Force probe selection”, make sure that the selected probe is the one installed on the arm

3.7.1 Probe List and Selection

By default, the probe is automatically recognized and selected when plugged on the arm.

It is possible to deactivate and select manually the probe.

Name	Type	Status	Diameter	Result
Centre reference probe	Hard probe		15.000	0.000000
Ball 6mm	Hard probe	Detected	6.000	0.000755
Ball 3mm	Hard probe		3.000	0.003585
NCP2	Tube probe			0.086842
AS1.1-0642-GE	AS1			0.000393

In the sheet above, are shown all available probes, with all corresponding information.

Information	Description	Displayed value
Name	Name of the probe entered when Aligned	name
Type	Show the type of probe (contact, trigger, scanner, Tube probe)	type
Status	Current status (null / Detected / Forced)	status
Diameter	Diameter of the ball probe	Diameter in selected unit
Calculation result	Result of the last alignment of the selected probe	= “Not Aligned” when probe is not Aligned

3.7.2 View Selected Probe (Advanced user)

Once a probe is selected and settings saved, it is possible to edit the parameters of the probe:

Probe details

Probe

Name

Center reference probe

ID

2570210280797634739

Type

Hard contact

Repeatable probe

Yes

Custom probe

No

Dimensions

Diameter

15.000

mm

X deviation

15.000

mm

Length

50.000

mm

Y deviation

50.000

mm

Calculation result

0.000000

Created on

2014/09/09 16:58:09:751

Updated on

2014/09/09 16:58:09:751

Edit

Close

ID, Name, Type, Diameter, calculation result	All same values as before
Custom probe	Defines if the probe is specific or standard. (Yes / No)
Repeatable probe	Shows if the probe is repeatable (TKJ probe) or not and then needs realignment each time it is mounted. (Yes / No)
X dev, Y dev, Length	X, Y and Z dimension according to TKJ axis (mm)
“Created on”	Date of the first installation of the probe on the arm.
“Updated on”	Date of last modification (name or diameter change) or last alignment
Edit	Use this button to modify either the name of the Probe, either the diameter, or the length (approx.), in case of change of the stylus.



When the operator changes simply the end sensor of the probe, this is not automatically detected, but probe alignment is necessary: enter “View” button and edit the new diameter.



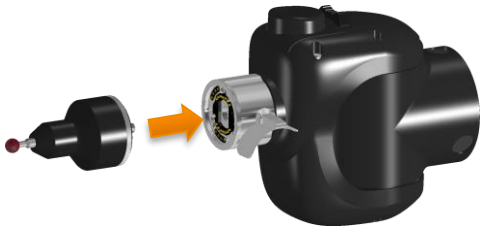
Only the installed probe can be modified. Once the name or diameter are modified, new values are automatically saved in the probe memory.

How to ... Edit the Settings of a Probe

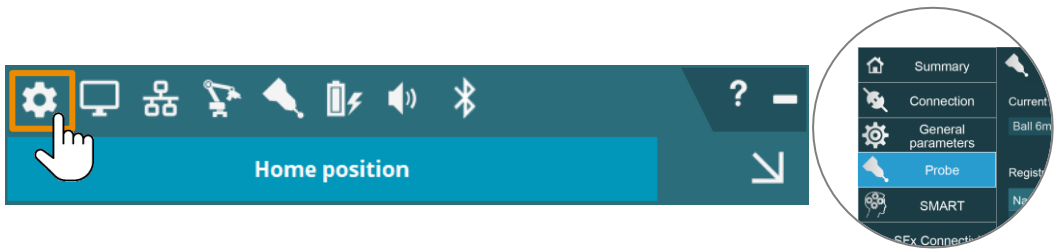
1. Connect the arm to RDS (wired or Wi-Fi).



2. Mount the probe to edit.



3. Open RDS Control Panel, Tab “Probes”.



4. Select the mounted probe and click on “View”.

Name	Type	Status	Diameter	Result
Center reference probe	Hard probe		15.000	0.000000
Ball 6mm	Hard probe	Detected	6.000	0.000755
Ball 3mm	Hard probe		3.000	0.003585
NCP2	Tube probe			0.086842
AS1.1-0642-GE	AS1			0.000393

View

Force

Delete

5. Click on “Edit”.

Probe

Name

Center reference probe

ID

2570210280797634739

Type

Hard contact

Repeatable probe

Yes

Custom probe

No

Dimensions

Diameter

15.000

mm

X deviation

15.000

mm

Length

50.000

mm

Y deviation

50.000

mm

Calculation result

0.000000

Created on

2014/09/09 16:58:09:751

Updated on

2014/09/09 16:58:09:751

Edit

Close

6. Modify the desired value(s) and click on “Save”.

Probe

Name

Center reference probe

Repeatable probe

Yes

ID

2570210280797634739

Custom probe

No

Type

Hard contact

Dimensions

Diameter

15.000

mm

X deviation

15.000

mm

Length

50.000

mm

Y deviation

50.000

mm

Calculation result

0.000000

Created on

2014/09/09 16:58:09.751

Updated on

2014/09/09 16:58:09.751

Save

Close

7. Validate the warning message.

?

If you continue, you'll have to realign the probe.
Are you sure you want to proceed ?

✓

Yes

✗

No

8. Proceed with the probe alignment.

?

This probe is not aligned.
Do you want to align it now?

✓

Yes

✗

No

3.7.3 Adding a New Probe

Contact or NC-Tube Probe

If a new probe (that is not in the probes list) is mounted on the arm, RDS automatically detects it and asks user to align it. Then it runs RDS Data Collector to align the new probe. Only after that, the new probe is displayed in the list.

Legacy Scanners

Legacy types of scanners have the same ID. It means that only one scanner can be used at time on one arm.



Legacy scanners: RS2, RS3, RS4, and third-party scanners.

If no scanner exists in the list of probes, as soon as a scanner is mounted on the arm, RDS notifies the user that a scanner was detected and asks for the type of scanner.



An unidentified scanner has been detected.
Please choose its type in next screen.

Yes

Probe type	Value
	RS2
	RS3
	RS4

 OK

 Cancel

External Scanner	Any 3 rd party scanner (such as Perceptron, Kreon)
RS2 / RS3 / RS4	RS2 / RS3 / RS4 laser scanner (SI arm)

Once this is informed, the scanner appears in the list of probes. In case of RSx, RDS connects it and asks for scanner alignment.



RDS can manage only one legacy scanner at a time. If a scanner already exists in the list of probes, it is no more possible to add another one.

To add a new one, it is then, necessary to delete the existing one in the list.

If a scanner (type1) already exists in the list, if another type (type 2) of scanner is plugged, then RDS will recognize it as the existing one and will try to connect it.

3.7.4 Non-Repeatable Probes (Absolute 71 Series)

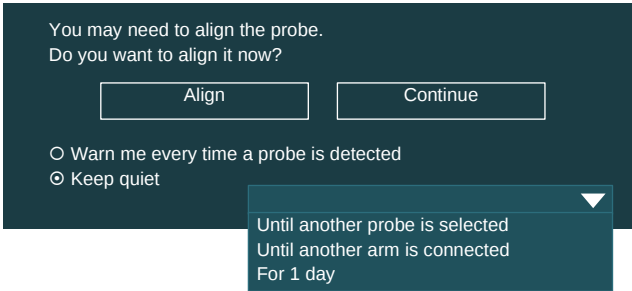
Threaded Probes

Some probes present the particularity not to be repeatable:

- Probe kit: the probe can be dismounted, to change the length, or configuration
- Thread probe.

Such probes, as they are assembled or mounted through a screw, are not repeatable.

It means that they must be realigned each time they are used. To prevent the operator to forget to realign, these types of probes are programmed as “Non-repeatable” probes and each time they are plugged on the arm, RDS asked for realignment:



For the non-repeatable probes, specific parameters are automatically displayed in Control Panel probe tab:



Warn me every time a probe is detected	(default – recommended): each time a non-repeatable probe is connected on the arm, RDS remind the user to do a probe alignment.	
Keep quiet	RDS will skip the warning:	
	Until another probe is detected	If the probe is dismounted from the arm, then mounted again, no message will appear when mounting again the same probe, even if it is a non-repeatable probe. If another probe is mounted, then RDS will warn again when the non-repeatable probe will be mounted.
	Until another arm is connected	Even if another probe is mounted, then the non-repeatable probe again, RDS will not warn. Only once another arm is connected, then again, the arm with the non-repeatable probe, then RDS warn again
	For 1 day	RDS will not warn in any condition for 1 day or 1 week.
	For 1 week	
	indefinitely	The notification functionality is deactivated. (not recommended)

TJK Probe Adapter Management:

For the arms on which the probe is threaded (no TKJ connection neither M27 Probe nut) such as 71xx series arms, the probes don't have the same repeatability as TKJ probes or M27 probes. Moreover, some probes, are available only with TKJ or M27 connectors (such as NC Tube probes, Touch trigger Probes, ...) thus can't be mounted directly on those arms.

To be able to use all TKJ connector advantages on a 71 series arm, a TKJ adapter can be mounted. Such adapter is normally designed to be let on the arm to be able to use repeatable probes (that avoid realignment each time the probe is mounted) and to use NC Tube probes, touch-trigger probes, etc....

Once the TKJ adapter is mounted, the arm can use probes as a standard 73 or 75 series arm.

NOTICE

The TKJ adapter is dedicated to definitely replace the threaded connector by a TKJ connector on the 71xx series arm. Thus, all the existing threaded probes should be replaced by TKJ probes.

However, if the adapter is dismounted (e.g. to mount again a threaded probe), each time the TKJ adapter is mounted back on the arm (=screw = not repeatable), all probe alignments should be invalidated, and all probes realigned.

RDS automatically detect when the adapter has been dismounted and ask the question for full probes realignment.

?

The TKJ adapter has been mounted.
You'll have to realign your probes before using them.
Press "Yes" to invalidate them now and then avoid accuracy issues.

Yes

No

For the TKJ adapter, specific parameters are automatically displayed in Control Panel probe tab:

Non repeatable probes

Warn me every time a probe is detected

Keep quiet

Until another probe is detected

Invalidate all probes when TKJ adapter is mounted or unmounted

Invalidate now

Invalidate all probes when TKJ adapter is mounted or unmounted.

Invalidate now

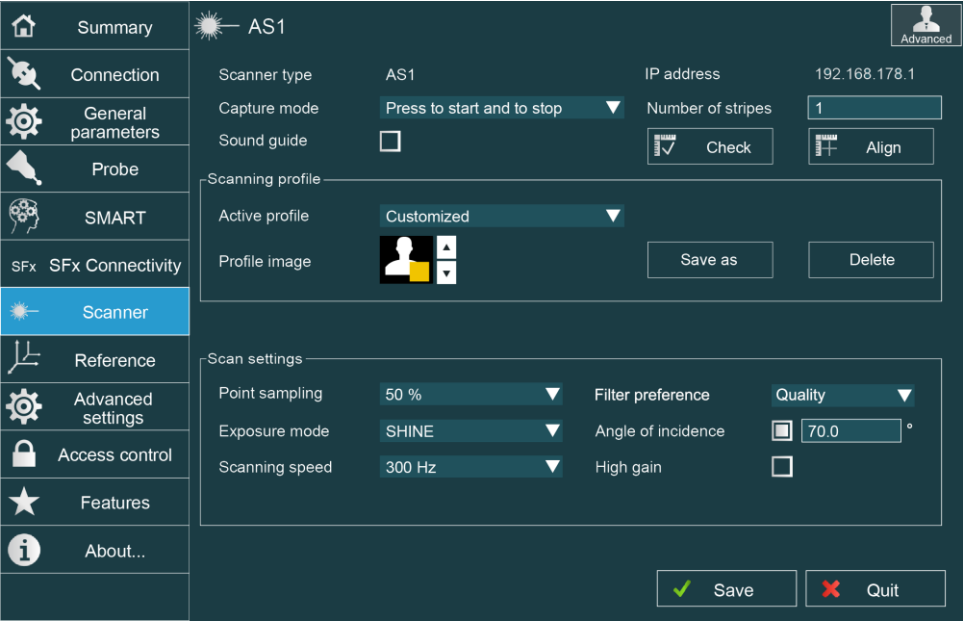
RDS recognizes when the TKJ adapter is dismounted from the arm and as soon as it is mounted back on the arm, all the probe alignments are automatically invalidated.

In case the automatic invalidation was not active and the message to invalidate was refused, this button gives the way to invalidate the probes alignment at any moment.

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3.8 Scanner

The Scanner tab appears only when a scanning head is activated on the instrument.



The available scan settings depend on the type of scanner.

	HP-L-8.9	RS2	RS3	RS4-5	AS1 / RS6	AS1-XL	LAS	LAS-XL
Capture mode	✓	✓	✓	✓	✓	✓	✓	
Scan profile	✓	✓	✓	✓	✓	✓		✓
Manual exposure	✓	✓	✓	✓	✓	✓		
Exposure capture	✓	✓	✓	✓	✓	✓		
Auto exposure		✓	✓	✓	✓	✓		✓
Points sampling			✓	✓	✓	✓		✓
Line sampling								✓
Filter preference					✓	✓		
Angle of incidence					✓	✓		
Gain					✓	✓		✓
Quality filter								✓

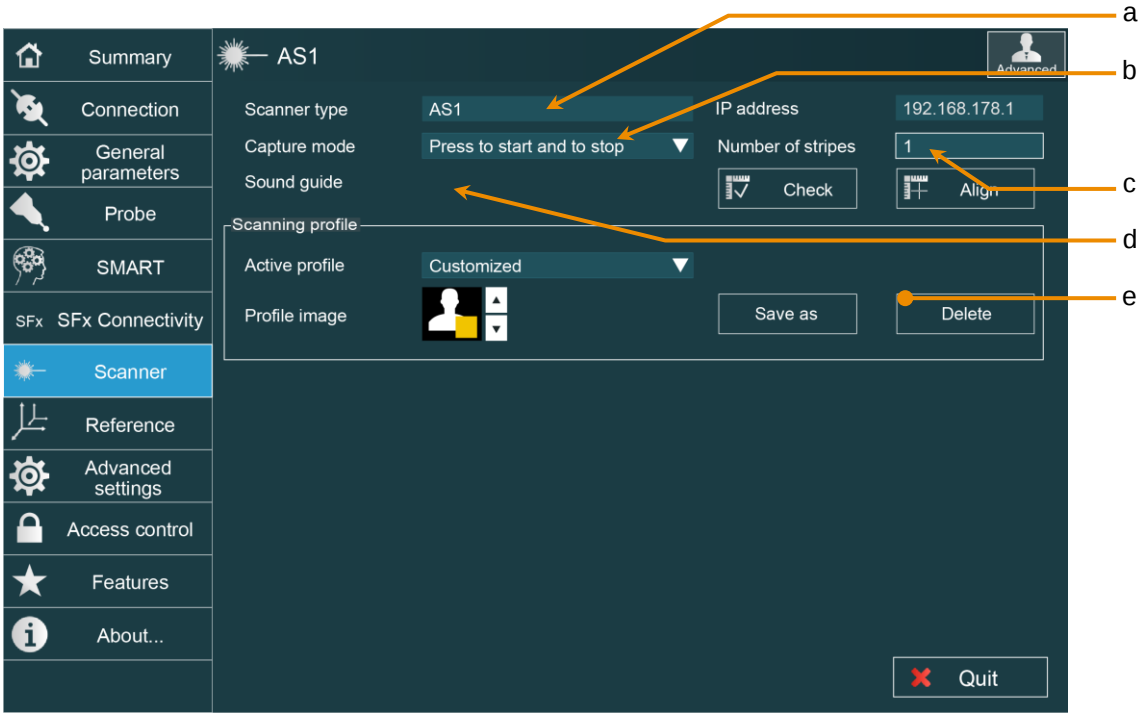
RDS User Profiles

Standard users can only select scan profiles.

Advanced users can set any parameters and save scanning profiles for the standard users.

User profile		Standard		Advanced and upper
Capture mode		✓		✓
Scanner alignment				✓
Scanner check		✓		✓
Scan Profile management				✓
Scan Profile selection		✓		✓
Scan settings				✓

3.8.1 Scanning Common Settings



a	Scanner type	 	Shows the model of scanner. (AS1, AS1-XL, RSx, RS-SQUARED, HP-L-8.9, LAS, LAS-XL)
b	Capture mode		Defines the way to start and stop digitizing. (Keep button pressed / Press to start and stop / n not empty stripes)
c	Nb Stripes		Number of scan lines above which the scan stops.
d	Sound guide		Emits a sound that helps to keep good height
e	Profile	 	This is used to save all the scanner settings into scanning profiles

Capture Mode

The capture mode defines the way to start and stop digitizing:

- “Press button once to start and stop”: the button of the arm is used as a switch: one simple press-and-release to start digitizing, another one to stop.
- “Capture while button is pressed”: press and hold the button to start and continue digitizing, release the button to stop.
- “Capture n not empty stripes” (Service user profile only): press the button to start digitizing, then RDS automatically stops when the defined number of stripes (“Number of stripes” parameter) is reached.

Depth Sound Guide

While digitizing, a sound can be emitted from the arm, giving information about the distance between the scanner and the surface to scan: when this option is activated, the closer the scanner is to the surface, the higher the sound frequency is, and no sound is emitted if the scanner is outside the scanning window.

3.8.2 Scanning Profiles

To facilitate the configuration of the scanning parameters when typical settings are used, RDS can record a set of parameters into a scanning profile.

RDS can memorize scanning profiles for each type of laser scanner. It means that the set of parameters (scanning mode, filters...) can be saved into different configurations.

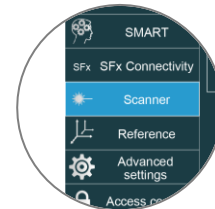
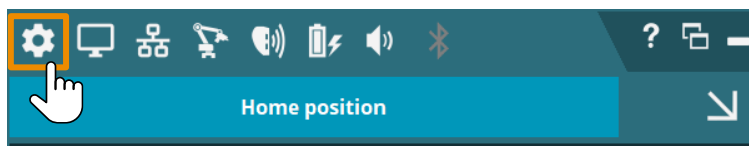
Default profiles are already proposed by RDS, but the operator can save new customized profiles, in order to quickly recall a configuration for a specific surface for instance.

Most scanning parameters are memorized. To easily enable one profile, the selection can be done either in RDS Control Panel, either on the RDS scanning window, either even with the button on the machine.

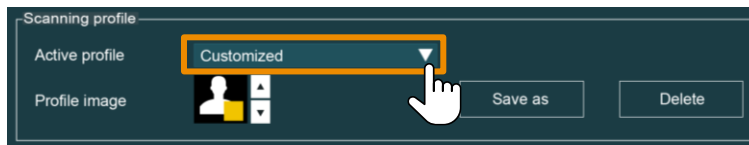
Save a Profile (Advanced User)

Whatever the type of scanner, to save a new scanning profile:

1. Access RDS Control Panel, Tab Scanner



2. Select the profile to modify.

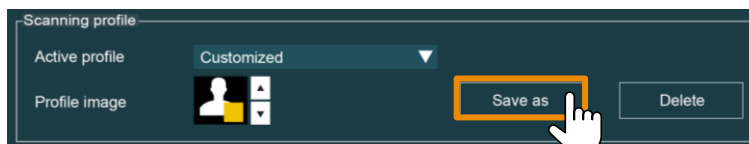


3. Set the parameters according to your needs (current profile becomes "Customized").

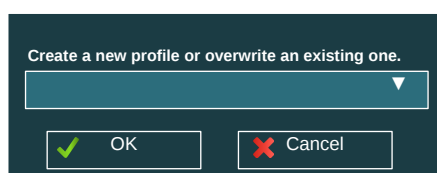
4. Choose an icon to associate with the profile.



5. Click on "Save"



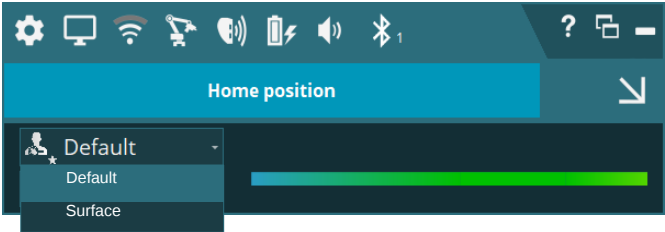
6. Give a name for the profile (existing profile can be selected from the drop-down list to be overwritten) and press "OK".



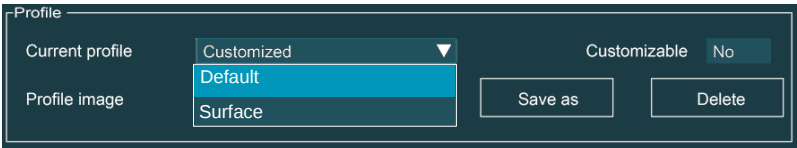
Use a Profile (all Users)

There are different ways to select and use a profile:

- From the RDS Agent: directly select the profile from the drop-down list on the RDS scanning window.



- From RDS Control Panel: access the tab “Scanner” and select the profile in the drop-down list (don’t forget to save Control Panel).



- With the instrument:

	 LAS	 AP21
Use the Q.A.M. (or Wrist Display) to select the profile.	Double click on the Trigger button to switch to the next profile.	Press “E” button on the AP21.
		

Default Scanning Profiles

	AS1 / RS2-6	AS1-XL	HP-L-8.9	LAS	LAS-XL	
Standard	✓	✓	✓			Default profile for AS1 / AS1-XL / RS6 (SHINE auto exposure) and RS-SQUARED / RS2-5 / HP-L-8.9 (manual exposure)
Sensitive		✓				This profile uses the SHINE HighSense mode instead of the standard SHINE mode, to provide further research of the exposure.
“Edge”				✓		Profile for small details: highest resolution, but narrowest line.
“Feature”				✓	✓	Standard profile, mid-size part and some details.
“Surface”				✓	✓	Profile for large parts with a few details.



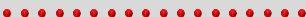
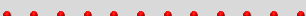
Specific scanning profiles are dedicated to the alignment or check of the scanner in RDS Data Collector. Those profiles are automatically selected by the processes and cannot be used for standard applications.

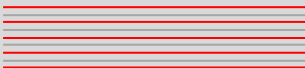
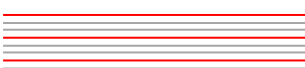
	Line width (mm)		Points spacing (mm)		 *			
	LAS	LAS-XL	LAS	LAS-XL	Points	Line		
“Edge”	51	-	0.013	-	100 %	100%	Normal	✓
“Feature”	63	228	0.013	0.226	100 %	100%	Normal	✓
“Surface”	220	468	0.050	0.905	100 %	100%	Normal	✓

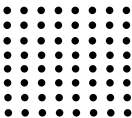
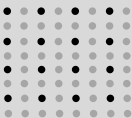
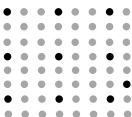
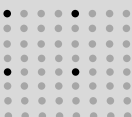
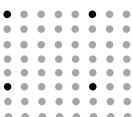
 : Sampling /  : Gain /  : Quality filter / *: excepted for LAS-LX : 20%

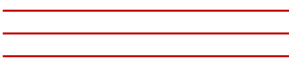
3.8.3 Acquisition Rate (all excepted RS2)

To improve the performance and speed of digitizing (depending on the performance of the computer and the final software), it is possible to setup the number of digitized points by regular sampling points or lines or adjusting the frames per seconds.

Points sampling	LAS LAS-XL	RS3	RS4 RS5	AS1 RS6	AS1-XL	
100% =keep all the points	✓	✓	✓	✓	✓	
80 % (4 pts / 5)	✓	✓				
75 % (3 pts / 4)			✓			
60 % (3 pts / 5)	✓	✓				
50 % (1 pt / 2)			✓	✓	✓	
40 % (2 pts / 5)	✓	✓				
33 % (1 pt / 3)						
25 % (1 pt / 4)			✓			
20 % (1 pt / 5)	✓	✓				
10 % (1 pt / 10)	✓					
5 % (1 pt / 20)	✓					...
2.5 % (1 pt / 40)	✓					
Etc.						

Line sampling	LAS LAS-XL	
None = keep all the lines	✓	
1/2 = keep 1 line on 2 (50% remain)	✓	
1/3 = keep 1 line on 3 (33% remain)	✓	
Etc...		

Grid sampling	RS-SQUARED	
All points = no sampling	✓	
2x2 = keep 1 point per 4	✓	
3x3 = keep 1 point per 9	✓	
4x4 = keep 1 point per 16	✓	
5x5 = keep 1 point per 25	✓	

Scanning frequency	LAS LAS-XL	AS1 / AS1-XL / RS6			
		 RA7	 RA8	 (AP21)	
300 Hz			✓	✓	
200 Hz			✓	✓	
150 Hz		✓			
100 Hz	✓	✓	✓	✓	
50 Hz	✓				
37 Hz	✓				
30 Hz	✓				...

3.8.4 Exposure (HP-L-8.9 / AS1 / AS1-XL / RS2-6 / RS-SQUARED)



The LAS and LAS-XL use a full automatic exposure on each individual point.
The Automatic mode is not available for the HP-L-8.9 / RS-SQUARED

Exposure Modes

RDS provides two kinds of exposure modes:

- **Automatic modes:**
 - **Auto mode (RS5):** the exposure of the line changes dynamically as the scanner moves from a pale surface to a dark one. The exposure is managed in a way that needs no input from the user.
 - **SHINE mode (AS1 / AS1-XL):** SHINE – Systematic High Intelligence Noise Elimination – mode dynamically adjusts the best exposure on each individual point to get the highest quality data in any condition without the need of any intervention for the user.
 - **SHINE HighSense mode (AS1-XL):** the HighSense mode brings a higher definition of the exposure for difficult surfaces (shiny, dark...).
- **Manual / User Defined modes:** while scanning, the exposure is fixed. This is useful for a regular scanning, on a single colour material. The adjustment of the exposure can be operated by 2 ways:
 - Manual setup: the exposure is setup manually defining the exposure value. It is not possible to setup while digitizing.
 - Capture the exposure: RDS switches temporarily to an automatic exposure, until it is setup. It is not possible to setup while digitizing.

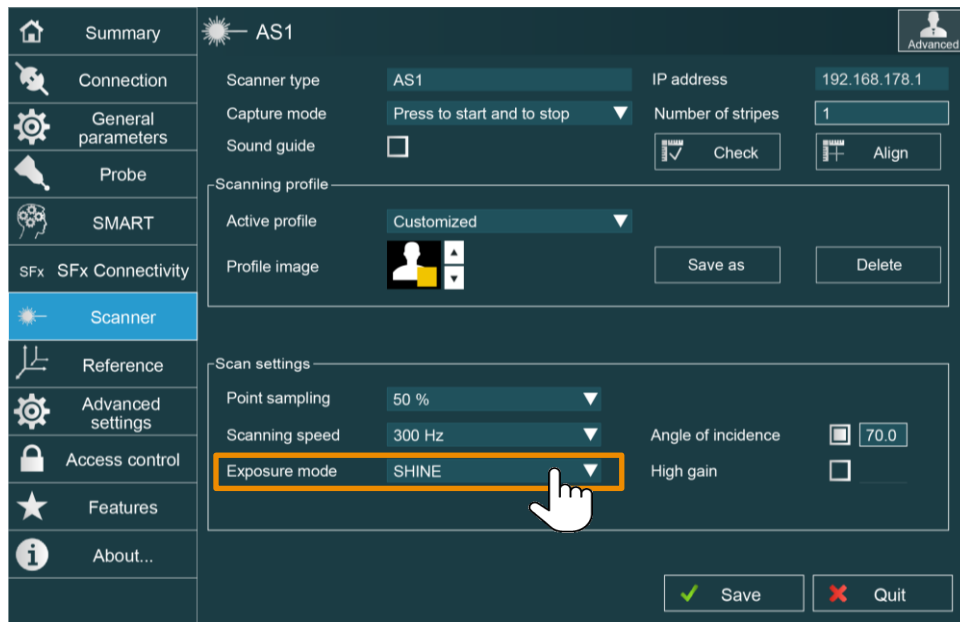
The mode can be selected in RDS Control Panel, scanner tab or switched through the Quick Access Menu (Q.A.M., see § D.3.4).

		Manual (all)	Auto (RS5)	SHINE (AS1)	SHINE (AS1-XL)
Adjustment	Manual	✓			
	Capture	✓			
	Automatic		✓	✓	✓
Adjustment while scanning			✓	✓	✓
Points re-affine				✓	✓
Standard surfaces		✓	✓	✓	Standard
Difficult surfaces		✓	✓	✓	HighSense

Switch the Exposure Mode

2 possibilities to select the exposure mode:

- Open RDS Control Panel > Scanner settings and set the exposure mode to “Manual /User Defined” or “Auto”/“SHINE”.



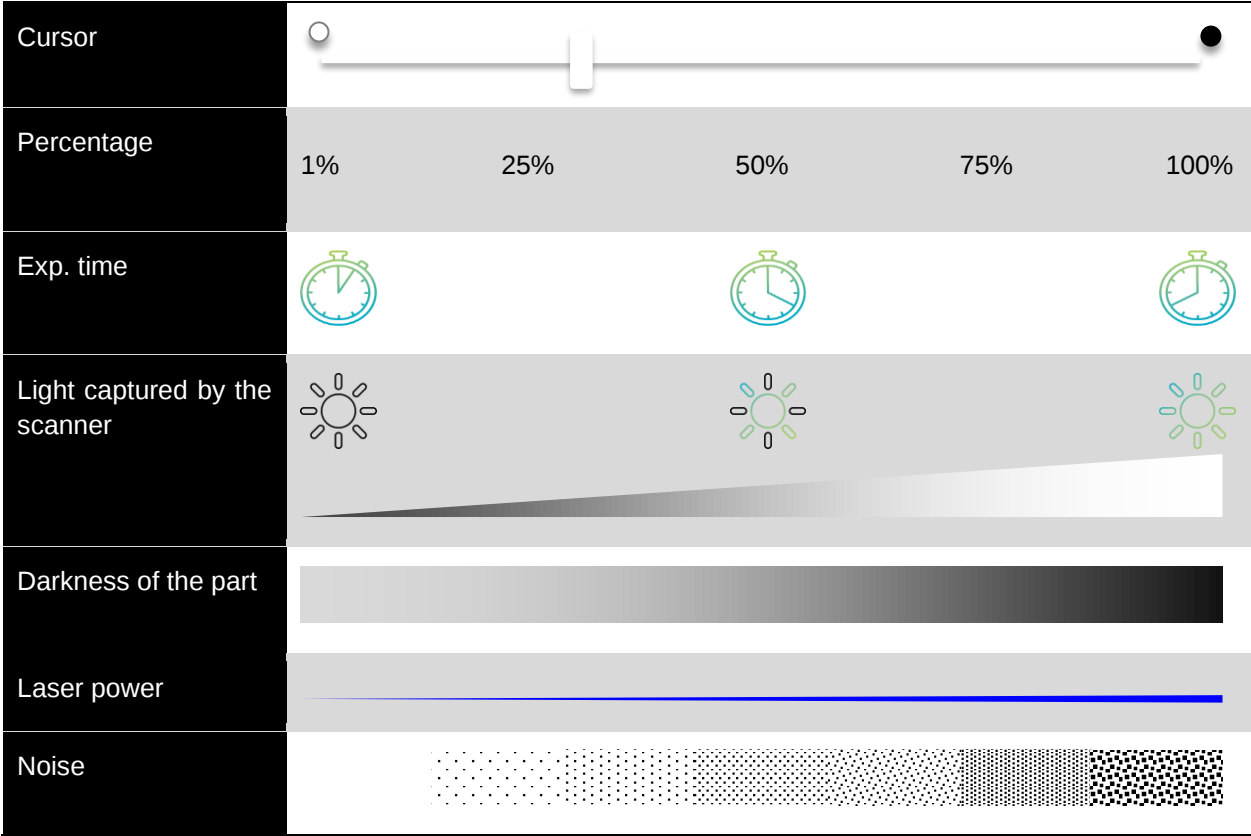
- From the portable measuring arm: Access the Q.A.M. with a press on the 3-State button or the touch screen and select “Manual /User Defined” or “Auto”/“SHINE”.



Manual Setup (manual mode)

Set up the exposure time of the camera: the higher the value is, the longer the camera is opened.

This parameter must be set up according to the ambient light and the darkness of the surface: set low value for clear surface and higher value for dark surface. However, a high value increases the risk of noise points. It is then necessary to adjust this parameter correctly.



Capture the Exposure (manual mode)

RDS provides a process to setup automatically the exposure.

Activate the capture:

	 (AS1)
Access the Q.A.M. with a press on the 3-State button or sweep down the touch screen and select “Capture the exposure”. 	Press “F” button on the AP21. 

Place the scanner over the surface: the scanner switches to a setup mode. Wait until the adjustment is finished (the exposure value is stabilized, giving correct number of points).

3.8.5 Scanning Modes (LAS, LAS-XL)

LAS and LAS-XL scanners can digitize using different widths and resolutions, combined into scanning modes.

- Line length: defines the width of the laser (width in mm).
- Point Spacing: defines the resolution distance between digitized points (points spacing in mm)

LAS Scanning Modes

Line width	Laser line	Point spacing	Rate (Hz)
220		0.050	37
130		0.050	51
63		0.025	50
		0.013	28
51		0.050	100
25		0.013	50

Table 1 : LAS scanning modes

LAS-XL Scanning Modes

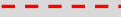
Line width	Laser line	Point spacing	Rate (Hz)
468		0.905	51
228		0.452	50
		0.226	29
182		0.905	100
91		0.226	50

Table 2 : LAS-XL scanning modes

3.8.6 Filter Preference (AS1 / AS1-XL)

Focusing on a high quality of data (e.g. for features extraction) or a high speed of scanning, two types of point cloud filter can be used. This can also be useful in case of low performance computer or some specific use cases for which the quality filter would require very high resources.

Scan settings

Point sampling50 %

Scanning speed300 Hz

Exposure modeSHINE

Filter preferenceQuality

Angle of incidence☐70.0

High gain☐

The “Filter preference” proposes two options.

Quality	This is the advanced filter which provides the best quality, particularly for geometric feature extraction and boundaries, by analysing the complete 3D neighbourhood for each point. Note: the calculation is intense and cannot be guaranteed by computers below the recommended specifications.
Performance	This filter provides the best throughput by limiting the analysis to the neighbourhood along a single scanline only for each point. Note: It is less demanding in terms of resources and leaves the system reactive even on weaker computers or when working with very big point clouds



The filter preference is not applied to the scanner alignment nor the ISO 10360-8 calibration process in RDS Data Collector which automatically uses the “Quality” filter.

3.8.7 Angle Of Incidence (A.O.I. – AS1 / AS1-XL / RS6)

A filter is available on the AS1, removing data that was collected at a high angle of incidence to the object surface (so essentially the scanner was leaned over too far, which can increase the risk of spurious data in your point cloud).

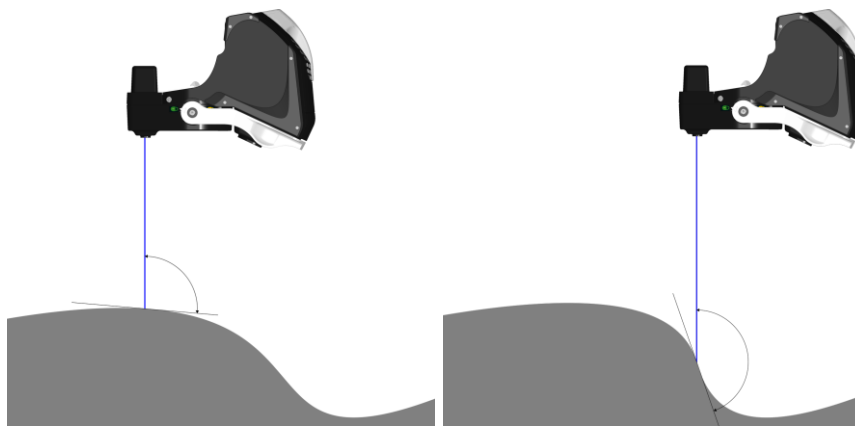
This is advised on parts with holes or to digitise only the top surfaces. It is also indicated to remove potential noise or outliers.



AOI is enabled by default and highly recommended. By disabling this option, it may result in collecting noise, outliers or low-quality data.

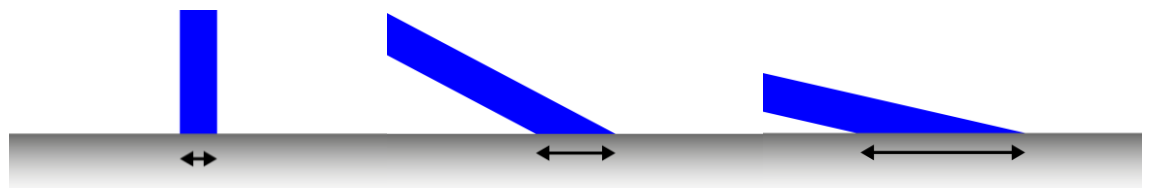
Diving Incidence

The diving incidence occurs when the angle between the surface and the laser plane becomes too high. In such case, the A.O.I filter removes the concerned points.

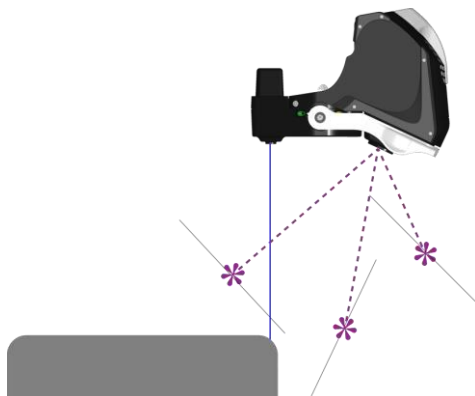


Here are some reasons of the utility of such filter:

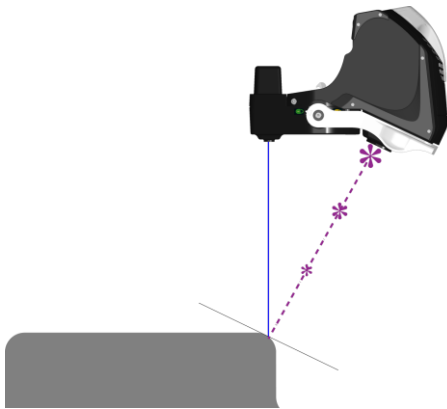
- High incident of the laser may result in a larger laser line on the surface, and then a loss of quality. The A.O.I. filter keeps only points that provides a good quality.



- Noise or outliers (due to reflexion for inst.) usually present a high incidence with the scanner. Applying the A.O.I. filter is a very good way to avoid such unwanted points.



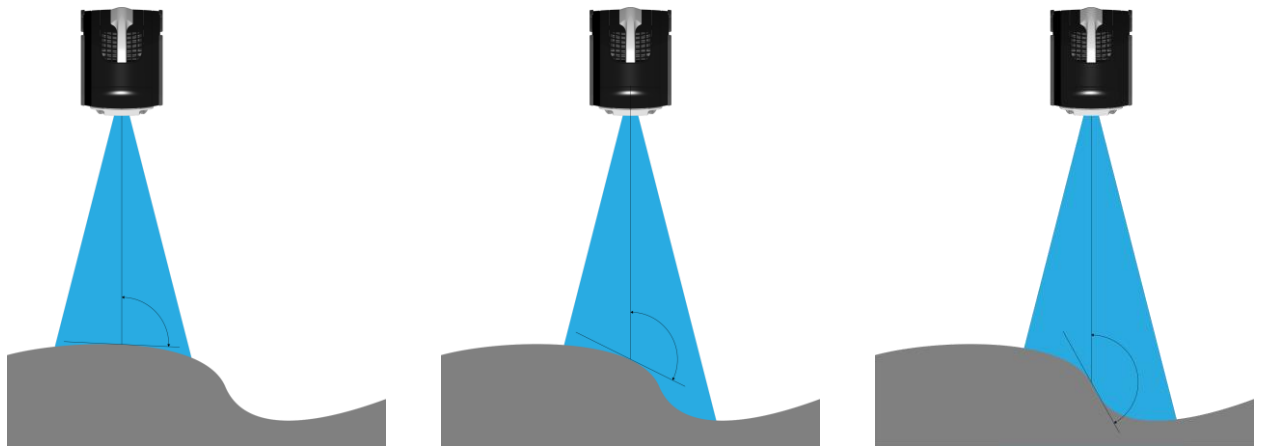
- When scanning a part with round-chamfered edges, there may be total reflexions of the beam (see §4). Removing incidence points can automatically remove such reflexion.



Lateral Incidence

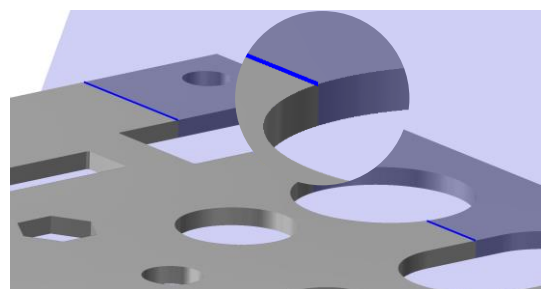
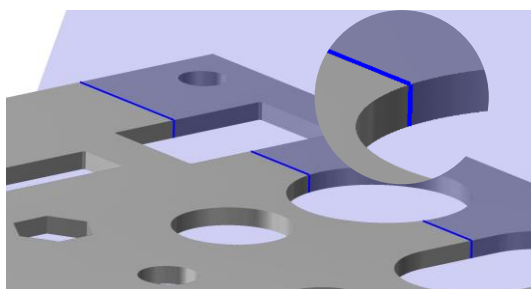
As well as diving incidence, lateral incidence may have undesired effects.

The A.O.I. filter also checks the angle between the surface and the scanner and drops incorrect points.



Here are main applications of the A.O.I. filter for lateral incidence:

- As well as diving incidence, lateral incidence may result on a loss of quality.
- When scanning the top surface of parts like sheet metal parts, the user may not want to collect point in the thickness. As thickness is usually orthogonal to the top surface, by removing the points on the perpendicular surface, only the scan lines on the top surface are kept.



3.8.8 Gain (AS1 / AS1-XL / RS6 / LAS / LAS-XL)

The High Gain setting amplifies the signal of the scanner. This can be useful when scanning very challenging surfaces like high-gloss black, chrome or semi-transparent parts. However, activating the High Gain also increases the risk of noisy data, so by default it is not active. We recommend that it is only used in very extreme cases.

The sensor should typically be used with gain set to Normal. When measuring dark, glossy or translucent surfaces, in the event it is hard to capture data you can set the gain to High or Very High (excepted AS1, AS1-XL and RS6).



The metrological performance of the system can be affected when gain is set to High or Very High since the likelihood of low-quality data being generated is increased.

However, if the quality filter is enabled, these data should be automatically removed (excepted AS1 / AS1-XL / RS6).

3.8.9 Quality Filter (LAS / LAS-XL)

The sensor has a quality filter to remove points which are deemed to be low quality, including:

- Double reflections
- Poor quality data on edges
- Isolated points/outliers

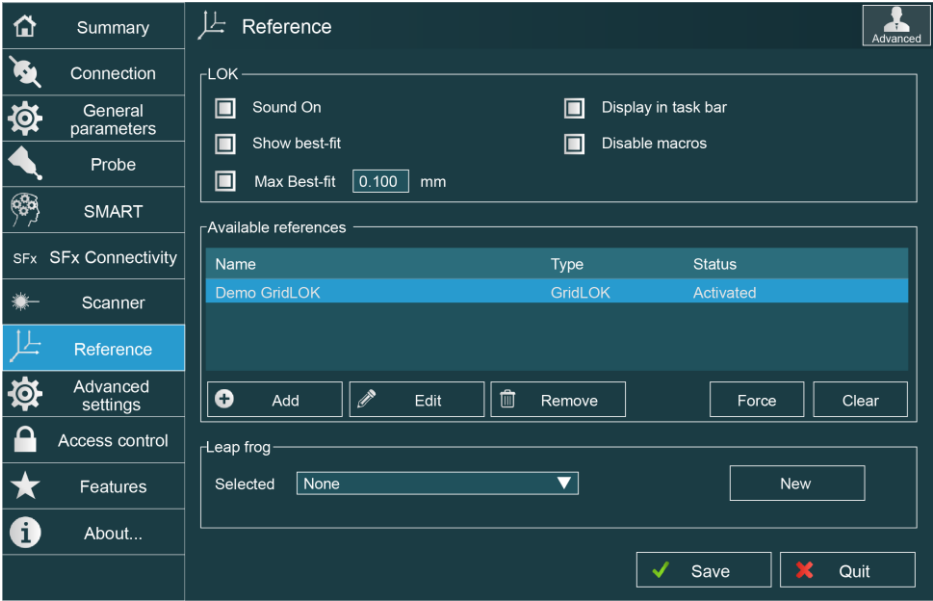
When measuring dark, glossy or translucent surfaces, in the event it is still difficult to capture data with gain set to High, you can also disable the quality filter at the cost of overall reduced data quality.



The metrological performance of the system is not guaranteed when this filter is disabled since low quality data may be generated

3.9 Auxiliary Referencing (arm)

RDS control panel offers the possibility of positioning the arm on several places, linking the different positions by a reference, extending then the measurement volume.



Several solutions are available:

- *Simple arm Leapfrog*: consists by taking common points before and after moving the arm.
- *Grid Lok*: permits to position the arm anywhere on the Lok floor and reference the position by taking Lok points.
- *Space Lok*: permits to move the arm around the “Space Lok” tool.
- *Part / Tool Loks*: used to move around the part / tool.
- Load a reference from a file.

3.9.1 Theory about Moving a Measuring Instrument

When the part to be measured is larger than the measuring instrument can do, it becomes necessary to find a way to move one (arm or part) to be able to measure the inaccessible zone.

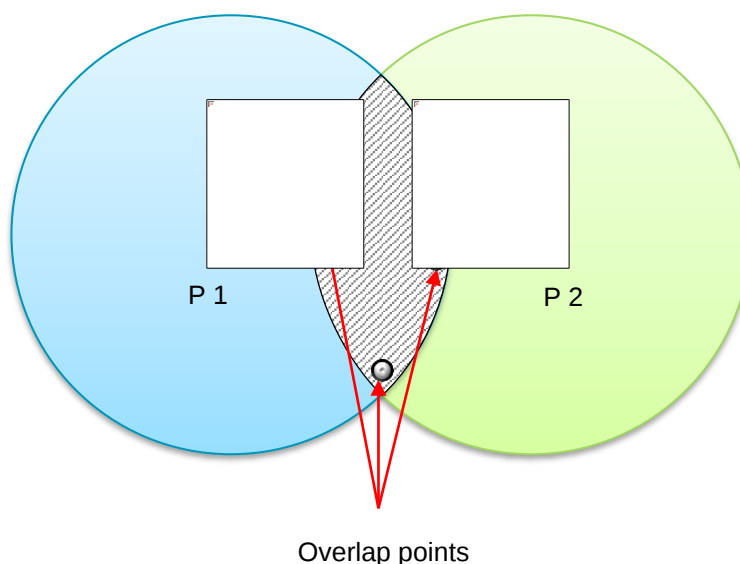
To move the arm from one place to another, Leapfrog uses a script in RDS Data Collector: click on “New”, RDS Data Collector appears, automatically executing a Leapfrog script.

During a measurement, both parts that are the measurement system and the part to measure must be imperatively interdependent from each other, that means any displacement is forbidden.

That means moving “without moving”, having a perfect knowledge of the movement done (distance, orientations, offsets...). Technically, such a displacement is a reference change (from a system of axes N°1 to a system of axes N°2), the start (Ref N°1), is then Machine reference. (RM).



To allow the software to know this displacement in all details, we use elements that will be accessible from both positions of the measuring instrument: those elements measured from both positions, the software comparing them, will calculate a displacement “matrix”: displacement in X, Y and Z, of the origin point, and each rotation it underwent between both positions (along X, Y and Z).



The displacement method consists by an “Overlap” method, using geometric elements, probed identically from both positions. Depending on the accuracy of the measuring instrument, this displacement will necessarily generate a loss of accuracy, as it results from two measurements of the elements. To minimize this lost, it is important to optimize the method. Here are the main rules:

- Use the most accurate measuring instrument.
- Look for the positions of the measuring instrument as to have a lap area (accessible from both positions) as large as possible, as to “stabilize” as best as possible the displacement. (as the 4 feet of a table are on each extremity of the table, not at the centre).
- Use a maximum number of elements (geometric elements used for this Leap-Frog) (a table is more stable on 4 feet than on 3).
- Use good quality elements (a machined bore will be much better than a tapping not clean).

3.9.2 Description of the Reference Tab

LOK / VPS

LOK

☐ Sound On

☐ Show Best Fit

Max Best Fit

mm

☐ Display in task bar

☐ Disable macros

☐ Disable the LOK disengagement

Sound On	Activate the sounds when VPS / Lok are used
Show best-fit	Display the best-fit maximum error when the positioning is done
Display in task bar	Display an information status window in the task bar after the calculation
Disable macro	
Max Best-Fit	Maximum authorized best fit value, over which the reference is not accepted.
Disable LOK disengagement	Prevents from any disengagement (unlock) of the current LOK position.

Available References

Available references

Name	Type	Status
Demo GridLOK	GridLOK	Activated

Add

Edit

Remove

Force

Clear

	Description	Possible values
Available references	Display the list of all references.	
Name	Name given to the reference	
Type	Type of reference	Leapfrog GridLOK...
	Memory	Permanent Temporary
Status	Shows which reference is engaged	Active (available) Engaged (used) Dongle detected (LOK)
Force	If the arm contains several LOK files, "Forcing" a LOK ensure to use the wanted one.	
Clear	Unforces a LOK	

Type of Reference:

- **Permanent:** a reference can be memorized in the arm memory, for use it even after a restart of the system: this can be necessary if the work is not finished and has to be continued after a restart.
- **Temporary:** (default for Leapfrog) the reference is not memorized in the arm memory, but simply temporary on the computer, until the arm is restarted. Then the reference is lost. In case there could be a necessity to stop the work and restart the system, then it is recommended to define this reference as a permanent, to save it, and when the work is finished, to delete it.



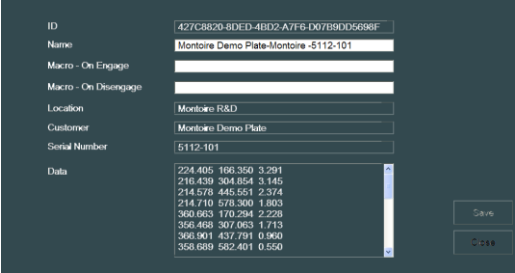
All references notified as “Permanent” are saved in the arm memory: if the arm is connected on another computer, it is not necessary to reload those references.

Available Reference Actions

Add

Edit

Remove

Edit	Display the characteristics of the selected reference.	
Add	Use to add a reference from a file, or to add a configuration file for LOK	
Remove	Use to delete a reference or LOK configuration from the memory of the arm.	

Leapfrog Choice

Leap frog

Selected

None

New

Selected	Use to select which of the active references is in-use
New	Use to move the arm by a Leap-Frog method.

3.9.3 Leapfrog in RDS

Principle

RDS transmits the coordinates of probed points to final software.



By operating the Leapfrog at the level of RDS, the displacement becomes transparent to the final software. That means it's like if it was a very large measurement volume. We can then use the final software as if there was no displacement.

To do, we use a group of points as Leapfrog elements: it can be cones, holes or angles in which the ball probe is seated, or targets, at the centre of which the point probe is placed (attention, however this way is less accurate).

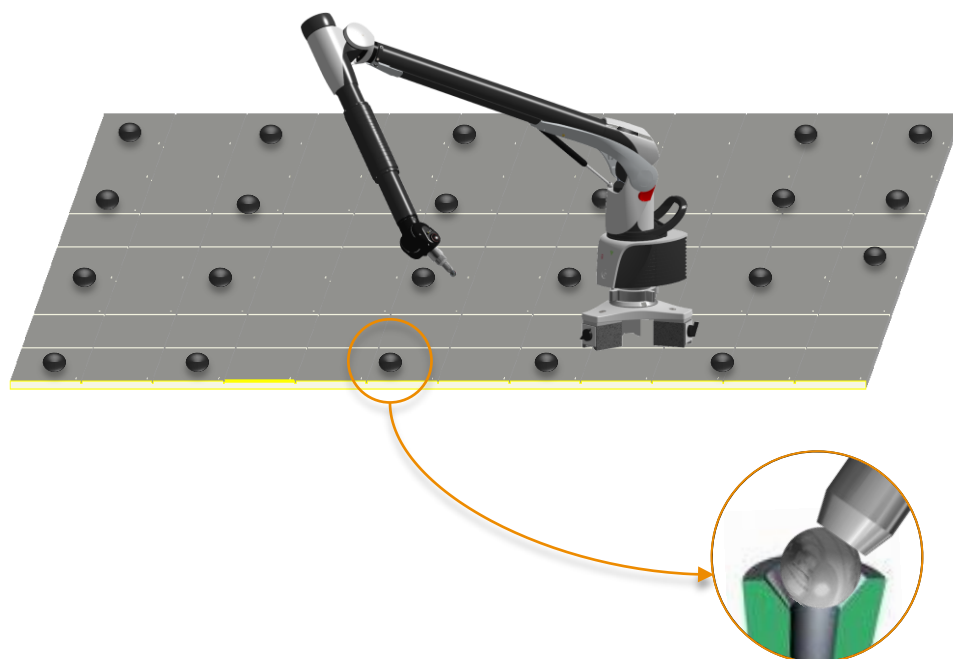
This group needs at least 3 points that will be probed IN THE SAME ORDER from position 1 and position 2. Only one probe can be used for this operation.

Please follow the instructions on the chapter 5.7, [Leapfrog](#).

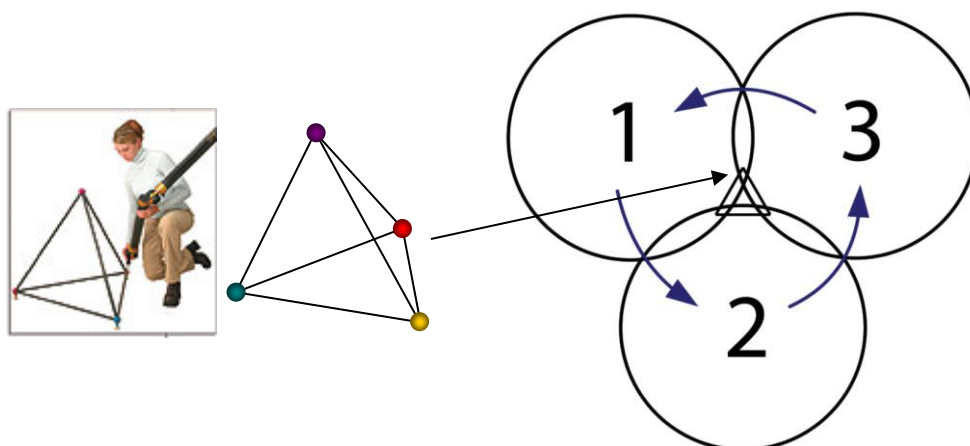
3.9.4 GridLOK / SpaceLOK

The principle of **GridLOK** is comprised of a grid system with conical seats installed in a concrete slab or steel plate and measured with a laser tracker. This means it can cover a very large volume.

Then at any moment, by taking points on 3 seats, RDS calculates automatically the position of the arm on the **GridLOK**. Measurements can be done, in any software, and the arm moved at any moment, only 3 points are necessary to take, without any button to press or click on, any other operation than hit 3 points on the seats.

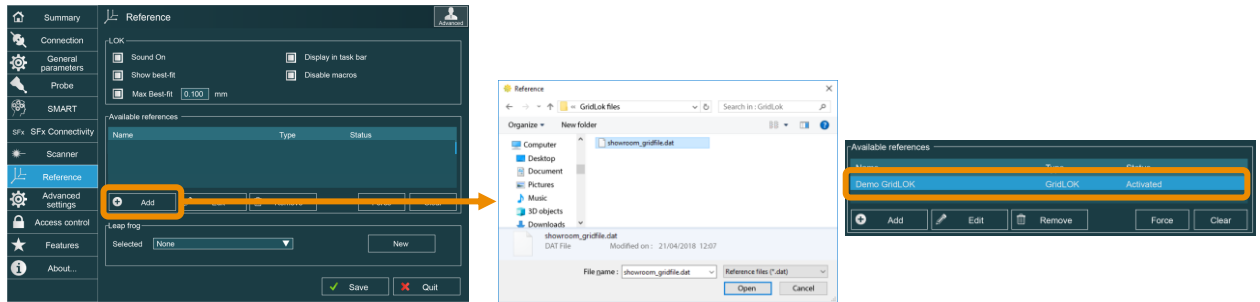


SpaceLOK recalls the principle of GridLOK, but instead of a large grid of several seats on a floor, the only 4 seats are fixed on a triangular 3D pyramid, that can be displaced (and disassemble in some cases). This tool can then be placed at the centre of the part to measure, as to move the arm all around the SpaceLOK tool.



Load the Configuration File on the Arm

Open RDS control Panel, tab Reference, then Load the GridLOK file (*.dat): the GridLOK file is then “Active” in the list of references. Save and exit RDS.



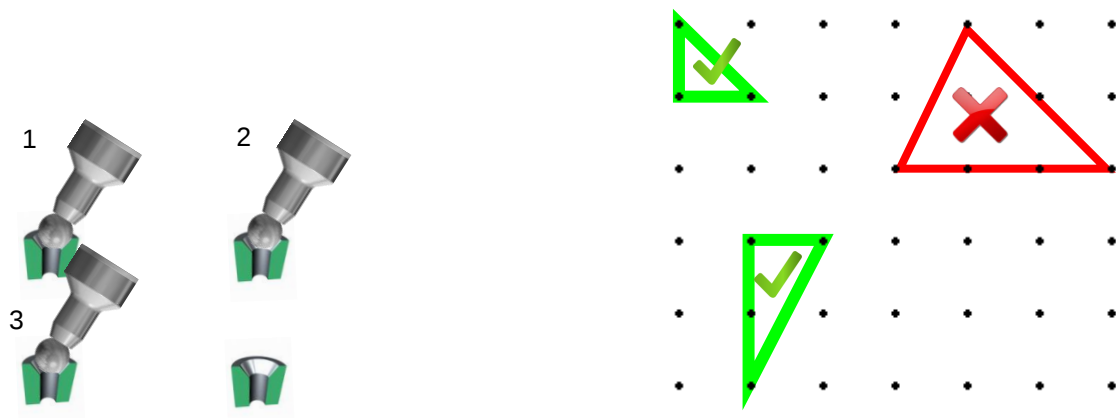
Plug-In the GridLOK Dongle on the USB Port of the Computer.



GridLOK is then Ready to Use

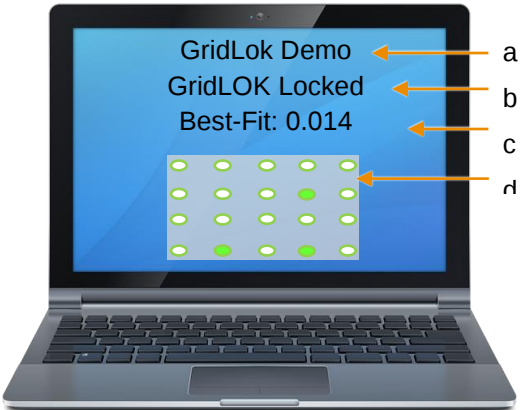
At any moment, under any software or even outside any software mount the ball probe dedicated to the GridLOK on the arm, and probe 3 GridLOK points. Attention, the three points must form a 90° triangle.

For each point, no need to hit the button, simply keep the probe seated in the target a few second, until a beep is emitted, then move to next target.



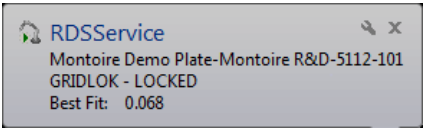
Automatic Calculation

RDS calculates automatically the position of the arm on the workshop and display the best fit value on the screen:



- a. GridLOK file name
- b. GridLOK status (Locked / Unlocked)
- c. Best-fit value
- d. Representation of the GridLOK targets, highlighting the measured ones

In RDS Control Panel, Reference tab, the GridLok reference appears as “Engaged”. The RDS status notification reminds then:

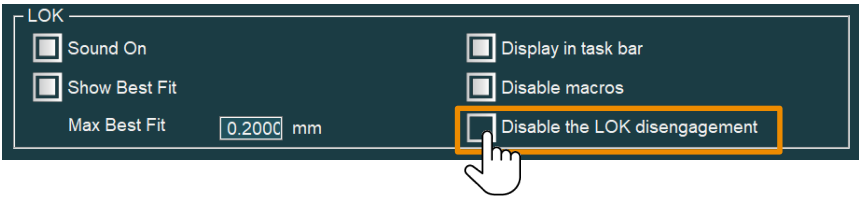


Back to Machine Reference

To come back to original arm reference, take three times the point. Be sure to slightly pause between each point, then RDS will display status information on the screen.

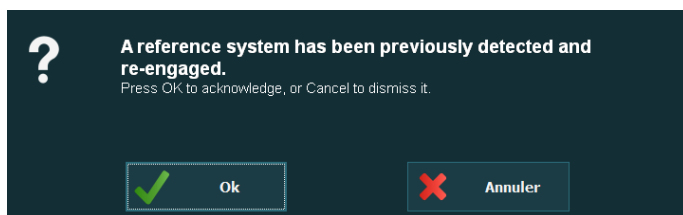


To prevent from any unwanted disengagement of the current LOK position, open the RDS Control Panel > Reference tab and check the option “Disable the LOK disengagement”. Then even taking 3 times the same point won’t disengage any LOK.

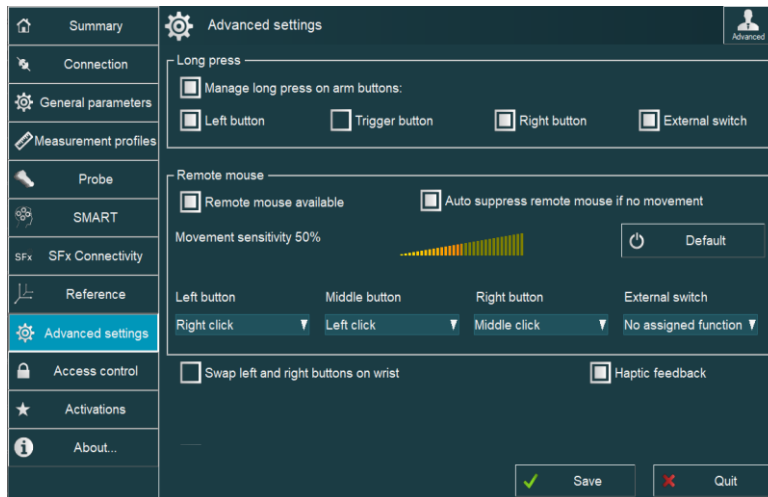


3.9.5 Persistence in Case of Disconnections

In case of short disconnection of the arm, the reference (Leapfrog, GridLOK or ToolLOK) is memorized and remains engaged when the arm becomes reconnected. No need to re-engage the LOK or any other action, just go on measuring.



3.10 Advanced Settings (arm)



Manage Long Press on Arm Buttons

Some measuring software are using separately short click and long press on the button of the instrument. The limit between short and long press is approximately 1second. Then the function on the software will be different (validate / cancel, ...).

By default, RDS manages this feature, but some software (such as GPad) already manages it. In this case, it is recommended to deactivate it in RDS.



The long press is not active when the mouse is active.

Remote Mouse

Through the last axes of the measuring instrument, the mouse in Windows can be controlled by the arm.

- Each button (button 0, 1, 2, 3) can be affected to a specific mouse function (Left Button, Middle Button, and Right Button).
- Movement sensibility (in % of highest sensibility): defines the minimum movement speed of the arm to start moving the pointer. This is useful to manage double click.
- Remote mouse available: unselect to completely deactivate the mouse of the arm.
- Auto suppress remote mouse if no movement: if RDS detects no movement of the arm, remote mouse is automatically deactivated, and reactivated as soon as the arm moves again.

Haptic Feedback

RA7 (V3-V4) and RA8 arms are equipped with a haptic motor in the wrist. This produces haptic feedback when one axis is reaching the electronic limit. This feedback can be deactivated with this option.



Enable Stops (only for Service Profile)

Enable / disable alarm and security on mechanical stops of the axes (B, D and F axes).

When enabled, when one axis (B, D or F) reaches the limit, measurement and mouse will be stopped.

NOTICE

For security and constraints reasons, it is recommended to always keep this setting “on”.

Allow Measurement even if Encoder Over Limit (only for Service Profile)

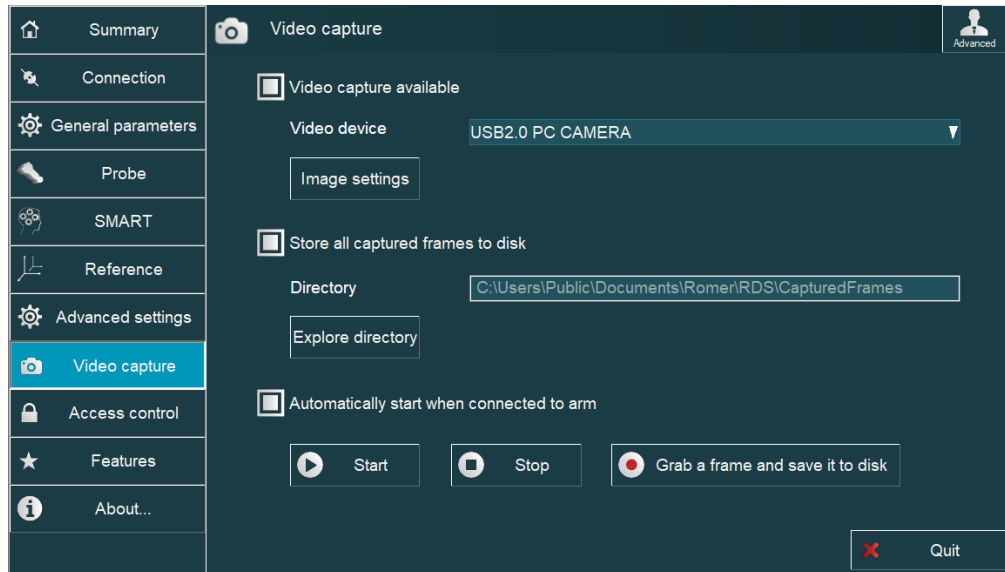
Enable / disable the possibility to take points when the arm reaches its limits (i.e. if it is under constraints).

3.11 Video Capture (for equipped arms)



This tab is displayed only for a 6-axes 75 (V1-V2-V3) and 73/77 V3 series ROMER Absolute arm equipped with a camera on the wrist.

RDS can manage video pictures coming from USB video camera. The camera can be either the one located on the wrist of the absolute arm, either an external USB webcam.



Some measurement software are able to manage, Align the video camera and use the picture.

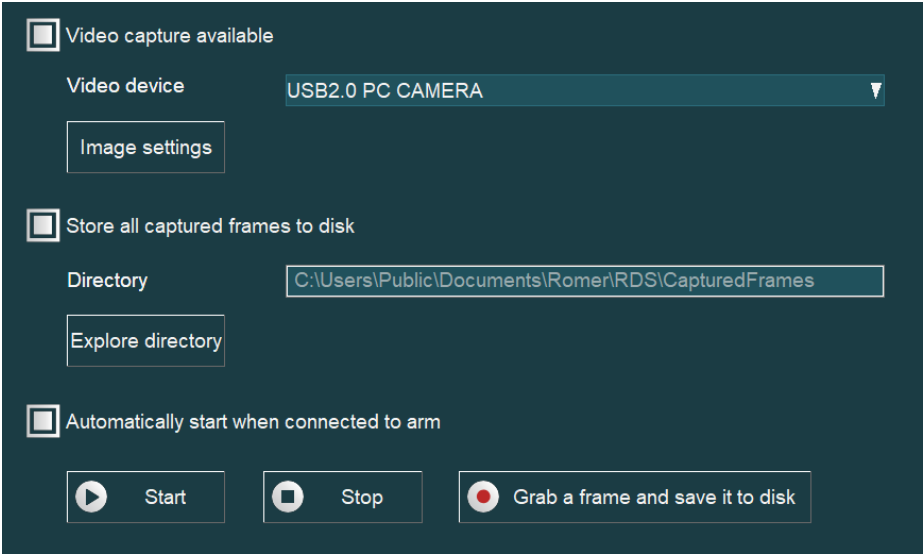


When Video capture is activated, a picture is automatically taken and sent to the measurement software each time a point is taken with a contact probe.

The picture can be also saved on the hard drive when this item is select in this RDS Tab.

This tab is then used to setup this management.

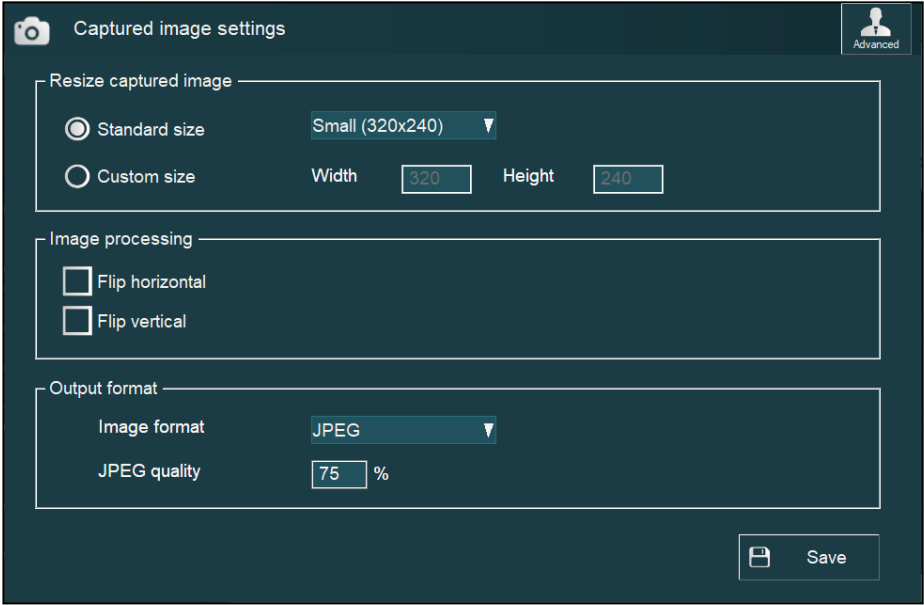
Main Settings



Video capture available		Activate the use of camera by RDS
	Video device	Use to select the camera to use
	Image Settings	Gives access to change the parameters of the image (see next paragraph)
Store captured frames to disk		When this option is ticked, the taken picture is also saved on the computer, on the specified folder
	Directory	Path for stored frames and pictures (please contact your local agent for modification)
	Explore directory	Opens Windows explorer on the specified folder.
Start / Stop	Automatically start video ...	As soon as the arm is connected, video capture starts, and the video window is displayed
	Start / Stop	Manually starts / stops the video
	Grab a frame	Records a picture by pressing the button

Image Settings

By clicking on “Image settings”, the user accesses to the parameters of the captured picture:



Resize captured image: definition of the resolution of the image (in pixels).

Item	Description		Values
Resize captured image	Standard size	Predefined sizes	Tiny (160x120) Small (320x240) Medium (480x360) Large (640x480)
	Custom size	Used for other resolutions	
	Width / height	Custom resolutions	In pixels
Image processing	Flip Horizontal Flip vertical	Used to mirror the image	
Output format	Format and quality of the shot picture		Jpeg Bmp

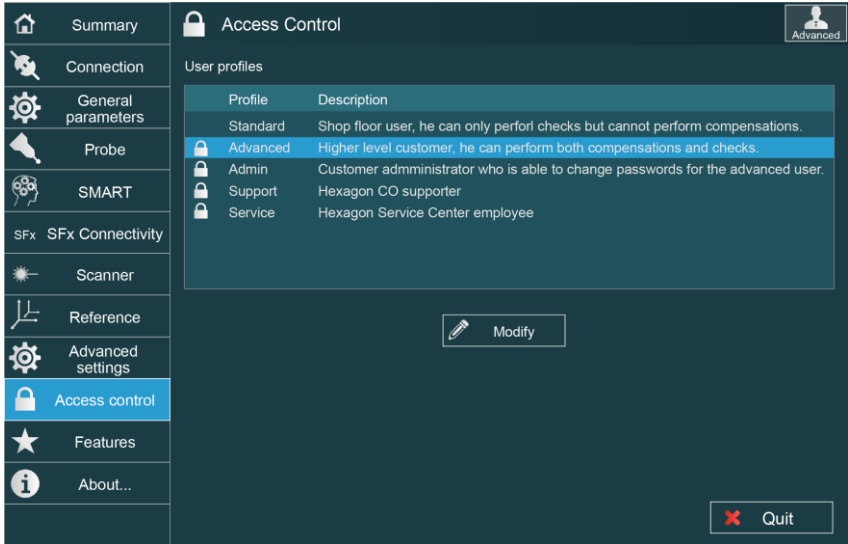
3.12 Access Control (advanced user)

User profiles define the levels of authorization in RDS.

Except the Standard profile, the access to the user profiles is protected by a password and/or a Feature code.

	Standard	Advanced	Admin	Support	Service
Level	1	2	3	4	5
Protection	None	Password (default "Advanced")	Password (default "Administrator")	Feature Key	Feature Key

The Access Control tab is used to manage those passwords.



Profiles can only be modified by users of the superior profile (so for example an Advanced User cannot modify an Administrator Profile because Advanced is 'lower' than Administrator).

To be sure about the password that has been entered, click on “Show plain password”: the asterisks are replaced by the real characters.

How to Modify the Protection of a Function

1. Open RDS Control Panel, tab “Access Control” (use at least the Advanced profile).
2. Select the profile to change and {Modify}

PROFILE	DESCRIPTION
Standard	Shop floor user, he can only perform checks but cannot perform compensations.
 Advanced	Higher level customer, can perform both compensations and checks.
 Admin	Customer administrator who is able to change passwords for the advanced user.
Support	Hexagon CO supporter

 Modify

3. Tick “Unlocked” to remove the protection or “Locked” to activate or modify the password.

Current status

☐ Unlocked

☒ Locked

Password

☐ Show plain password

 OK

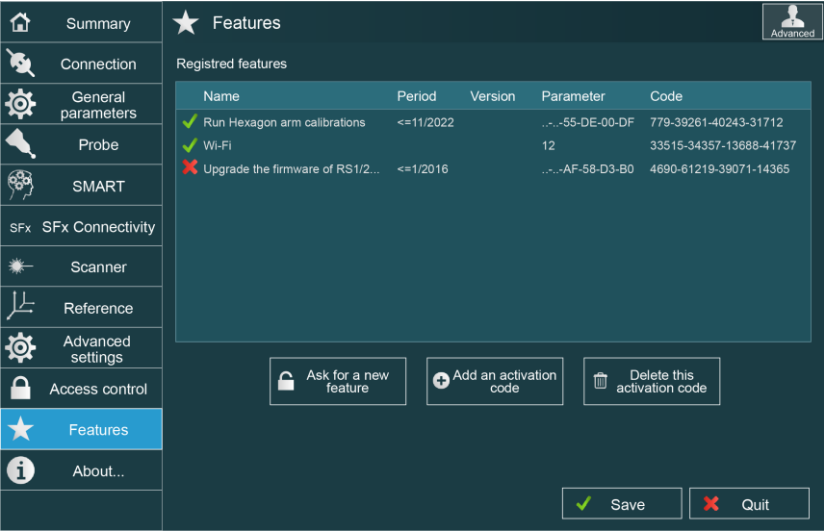
 Cancel

4. Enter or change the password if necessary (“Locked”) and click on OK.

3.13 Features Activations (arm)

3.13.1 Interface

Some features of RDS are protected and request an activation code.
This tab is used to manage such options (Arm compensation / Servicing...):



Activation Codes Options

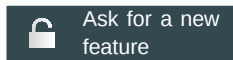
Codes can be linked either to the S/N of the arm, either to the Mac address of the computer.
Temporary activations and version-limited activations are possible.

Information	Description	Displayed value
 Ask for a new feature	Button to get a request code for an option (Advanced User profile)	
 Add an activation code	Button to enter a new activation code (Advanced User profile)	
 / 	Shows if the option is valid or not	 (valid)  (no more valid)
Name	Type of option	Run all compensations Upgrade firmware...
Period	Limitation date of the option (if limited)	
Version	Limitation version of the option (if limited)	
Parameter	Associated hardware identification	MAC address Serial number of arm
Code	Activation code of the feature	

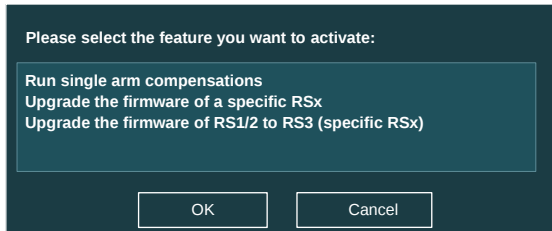
3.13.2 How to Add a New Feature (Advanced User)

Ask for a New Activation Code:

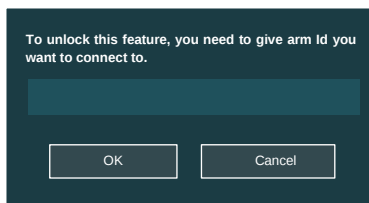
1. Click on "Ask for a new feature":



2. Then a choice of options is proposed:

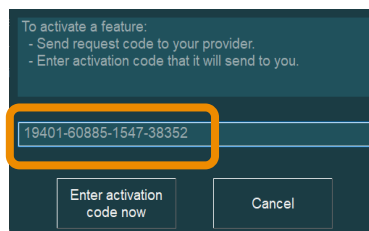


3. Select the type of feature to add, and then click on "OK".
4. Following window appears: by default, the serial number of the current connected measuring system is displayed.



5. Enter the serial number of arm and press OK.

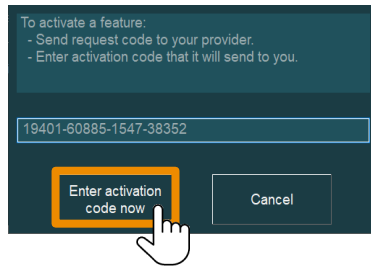
6. A request code is given.



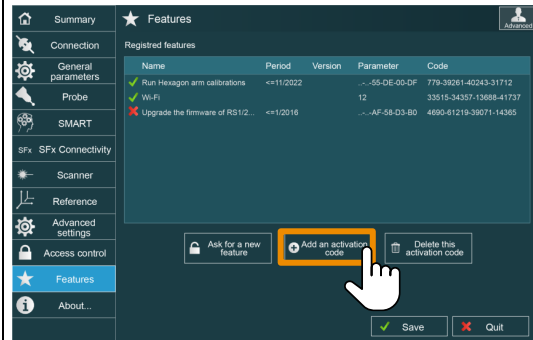
7. Send the request code to your Hexagon contact: give request code (20-digit code), you'll then get back activation code.

Enter the Activation Code

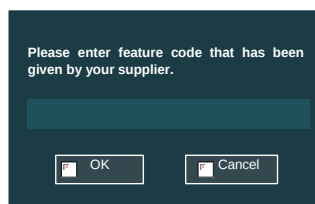
- Once you have the activation code, click on “Enter Activation code now”.



- Or from the main tab, click on “add an activation code”.

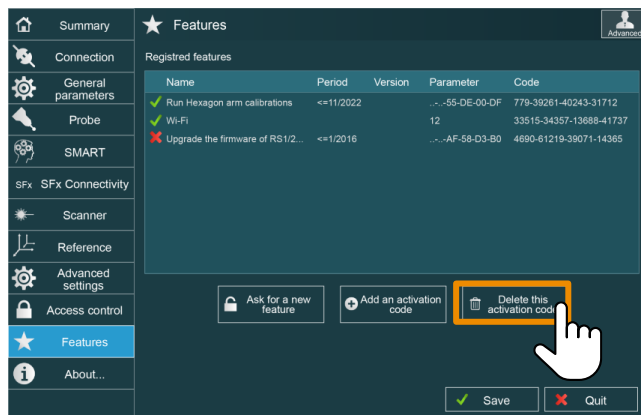


- Enter the code and click on “OK”.



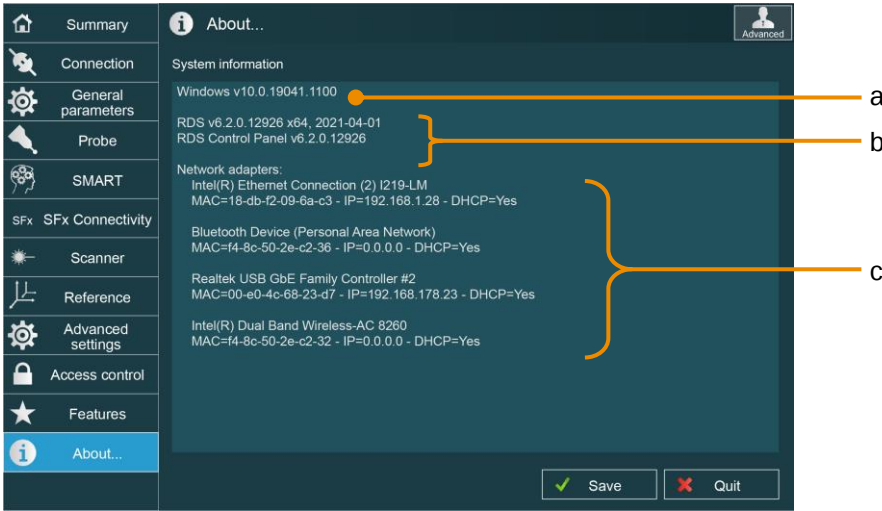
To Remove a Code:

Select the code, then click on “Delete”.



*If RDS is reinstalled on same computer, it is not necessary to re-enter activation codes.
If RDS is reinstalled on a new computer, it is necessary to re-enter activation codes.
Make sure to keep those activation codes in a safe place*

3.14 About



This tab displays useful information about the versions of RDS, Windows, and about the computer's adapters.

System Information

a	Windows ...	Operating system version
b	RDS v...	Details of RDS version
c	Network adapters	Checking and details of all available network devices on the computer (including Wi-Fi / Bluetooth / wired RJ45 network).

4 Scanning Best Practices

4.1 Adjust the Density of Points to the Needs

The number of points that the system can collect may be very high. Even if scanning a high density is possible, it may not be necessary depending on the purpose. Even more, a very high number of points may slow down the computer due to the points processing.

This is why it is important to adapt the density and number of points to the purpose of the scan: a quick surface inspection on a large part will require much less density than a reverse engineering on a small part with a lot of details.

Most application software themselves have tools to do treatment on the acquired points to reduce the density regularly or according to the shape and keep only useful data, but the less points are transmitted to the application software, the fastest the post-treatment is.



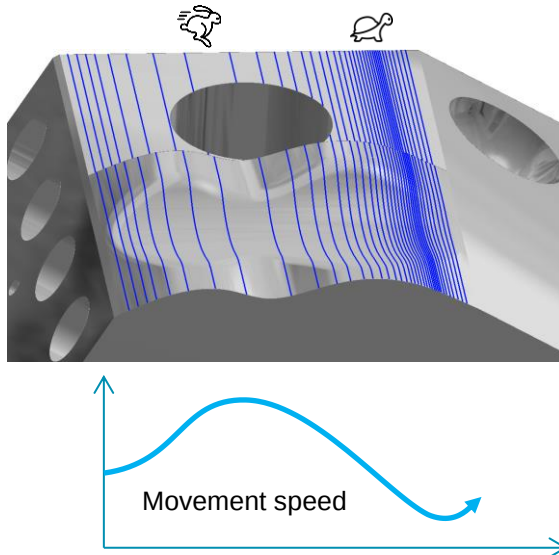
A very high rate of data may slow down a not powerful enough computer.



To get benefits of very high-speed scanning, Gigabit ethernet component is necessary.

Speed

Depending on the speed of movement, more or less points and details may be caught. The faster the speed is, the lower the density of stripes will be.



Acquisition Rate

Adjust the [rate of acquisition](#) in the RDS Control Panel to get the best density according to the needs.

- Points sampling
- Frequency (AS1 / AS1-XL)

Scanning Mode (LAS / LAS-XL)

The LAS and LAS-XL provide a set of scanning modes, adjusting the frame rate, the width of acquisition and the points spacing, to get the best according to the needs.

See how to select the wanted [scanning mode](#) in the RDS Control Panel ([chapter 3.8.5.](#))

4.2 Get all the Wanted Details and Quality

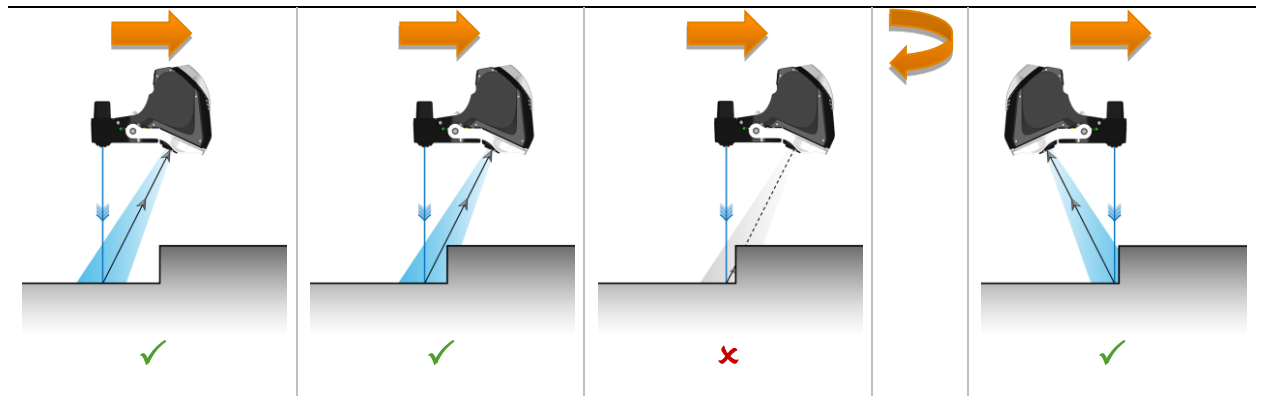
Several situations may prevent from obtaining the wanted points.

Adjust first the orientation of the scanner to avoid shadow fields or reflexion (it is recommended to keep the laser perpendicular to the surface).

Adjust the [exposure](#), the [gain](#) or even deactivate the [Angle Of Incidence](#) or the [Quality Filter](#) to increase the amount of collected points.

Shadow Fields

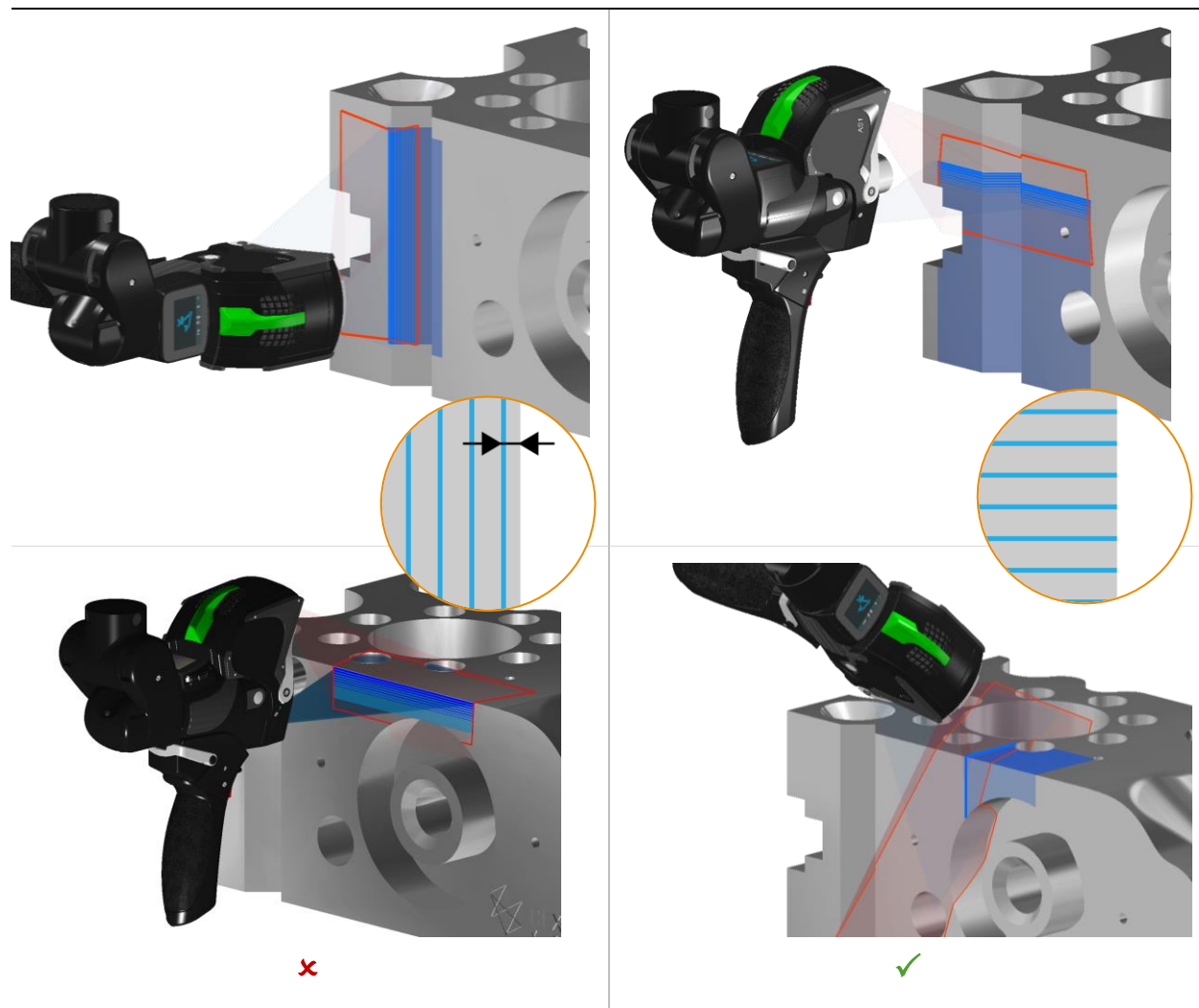
As there is an angle between the laser plane and the camera, depending on the relief, there can be areas where the object shadows the camera view. To get points in those areas, simply re-orientate the scanner and continue.



As a contact probe mounted on a 7-axis arm may occlude the field of view of the integrated scanner, a very large shadow field may occur. It is highly recommended to remove any contact probe from the 7-axis arm before scanning with integrated scanners.

Edges and other 3D Shapes

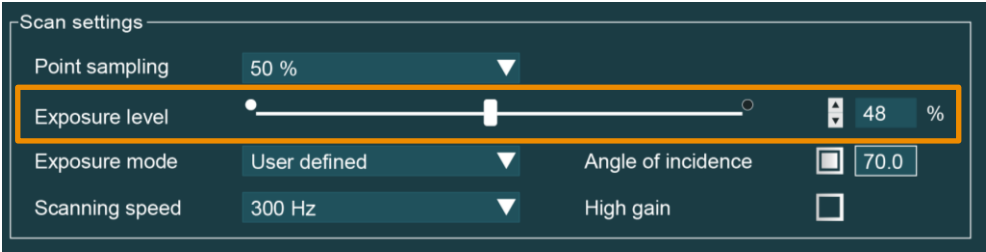
When measuring an edge, to get all its details, orientate the laser at 90 degrees to the feature as shown on the right side.



4.3 Missing data?

Missing points? Adjust the Exposure

If the collected scan lines show several gaps, or no data at all is collected, this may be due to a necessary adjustment of the [exposure](#).



Adjust the exposure in the RDS Control Panel ([chapter 3.8.4](#))

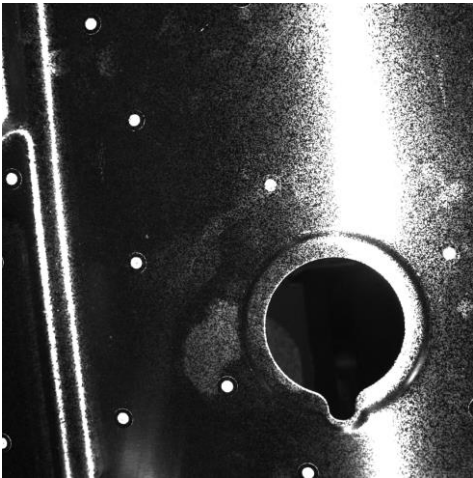


The LAS and LAS-XL only provide automatic adjustment of the exposure.

Under- and Over-Exposure

The adjustment of the exposure can face difficulties with very bright or shiny objects, or objects with slots or holes for which the exposure capture may focus on the extreme intensity.

In any difficult case, a [manual adjustment](#) should then be done.



Missing surfaces? Adjust the Gain (AS1 / AS1-XL / LAS / LAS-XL)

If a complete surface is missing, this may be due to a very dark and shiny surface. Then the [gain](#) of the scanner can be changed to a higher level.

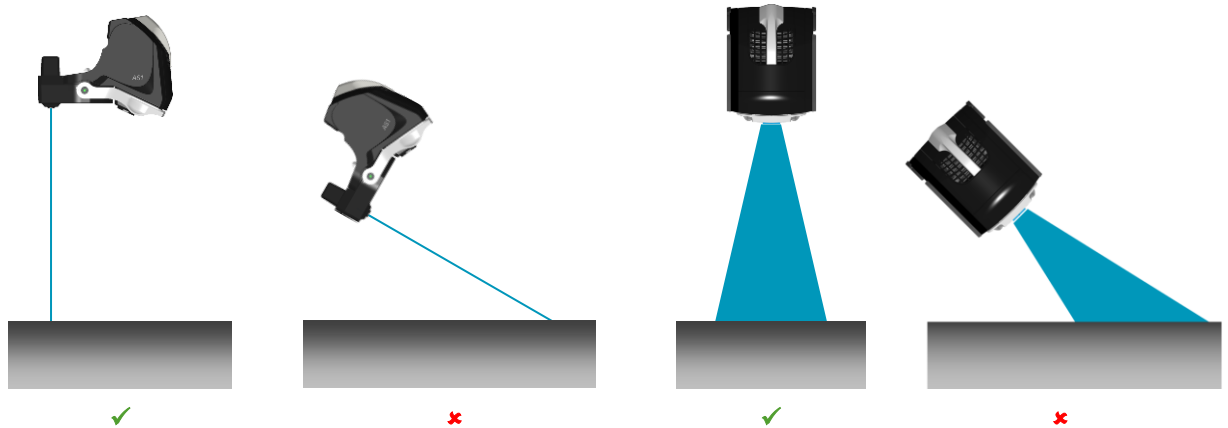


Adjust the gain in the RDS Control Panel ([chapter 3.8.8](#))

Missing Areas? Check the Orientation

High angle of incidence can cause data to not be collected. High angle of incidence can be from curvature of the object being scanned, or because the user is holding the scanner at too steep of angle.

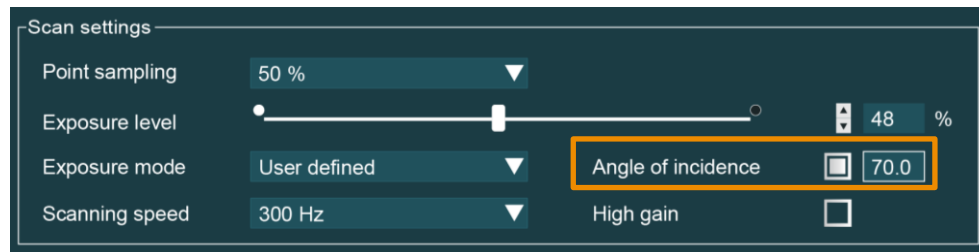
For best quality results, it is recommended to always keep the scanner perpendicular to the surface.



Missing Areas? Deactivate the Angle of Incidence Filter (AS1 / AS1-XL)

The [Angle of Incidence \(AOI\)](#) filter is designed to automatically eliminate any data at a large angle to the part surface. This is because points collected at significant angles can be erroneous, particularly if the part being scanned has a shiny surface.

But on parts with a lot of relief (such as foams), it may skip some areas. To avoid remeasuring the empty areas, the AOI can be de-activated in the RDS Control Panel ([chapter 3.8.6](#))



4.4 Avoid Unwanted Points

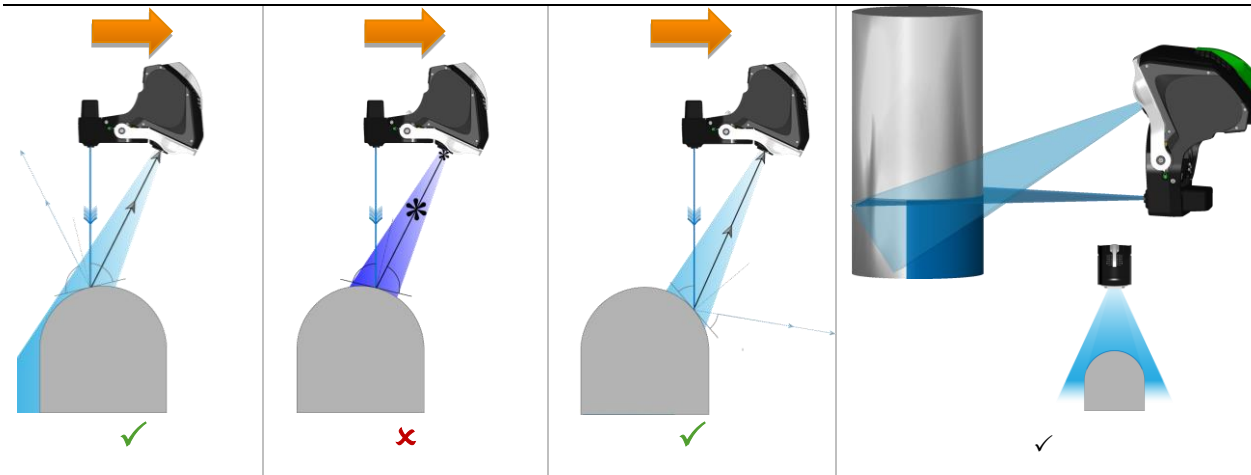
Over Exposure (HP-L-8.9 / RS5)

Overexposure may result in higher noise points, due to higher risk of reflection. Thus, on shiny, translucent parts, it is recommended to adjust manually the exposure.

To avoid any reflection or diffusion into the material, it is recommended to reduce manually the exposure.

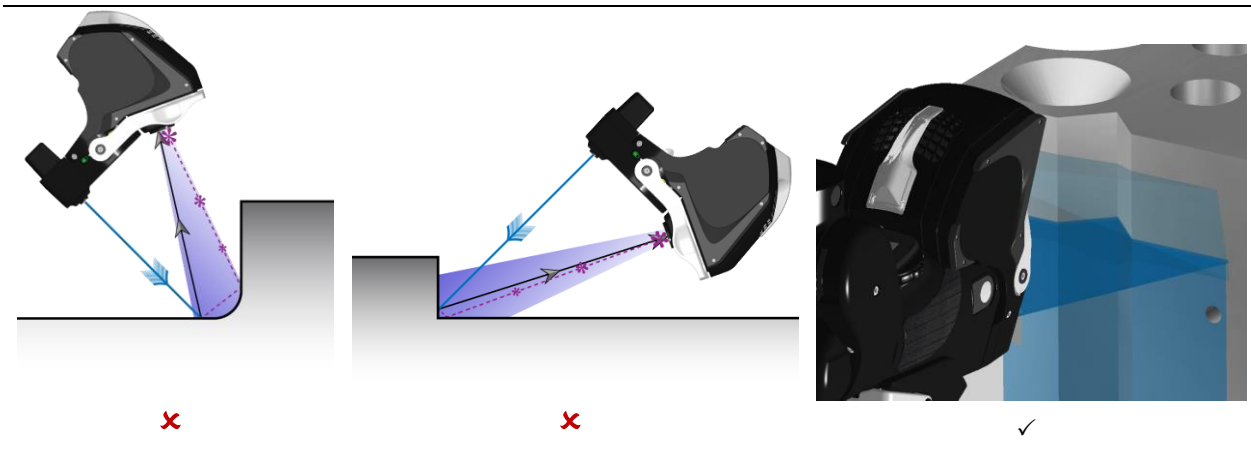
Total Reflection

Mirror like surfaces can cause a direct reflection from the laser to the camera; avoid these problems through careful orientation of the sensor as show below.



Secondary Reflection

Secondary reflections can occur on reflective, concave surfaces; avoid these problems through careful orientation of the sensor as show below.



Outliers - Noise

Translucid and high reflexion surfaces present a risk of outliers. The [Angle Of Incidence](#) removes efficiently such annoying points.

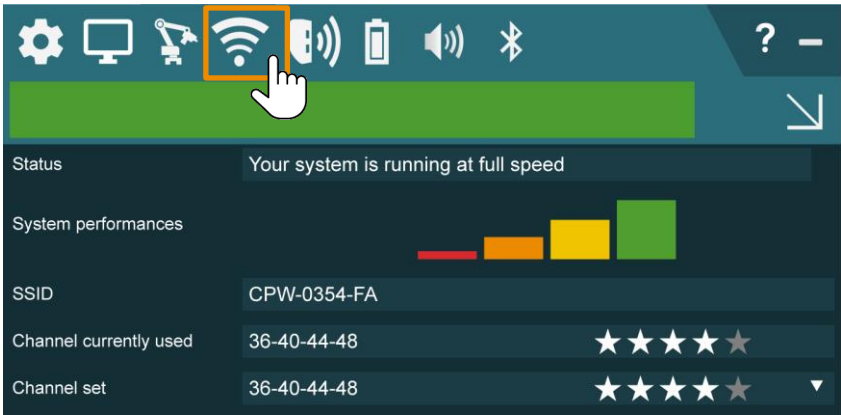


Always keep the AOI filter on by default to always ensure high quality data.

4.5 System Slowing Down ?

System Performance Indicator (arm)

When used with the Absolute Arm (RA8), the RDS Agent provides feedback about the communication quality with a “[System Performance](#)” indicator. Open the “connection” tab on the RDS Agent while scanning.



	The system is running in an optimal way
	The system runs smoothly but the user experience is not optimal. Some change is recommended. (for ex. change Wi-Fi Channel)
	Tuning some settings is highly recommended. (for ex. decrease the scanning frequency in RDS Control Panel)
	The system is critically low.

The RDS Agent warns the user as soon as the system performance becomes too low.



The system performance is displayed only while scanning. As soon as the acquisition is stopped, the performance graph disappears.

Wi-Fi Mode



High Data Throughputs in wireless mode

When using high throughputs devices, such as the AS1, the flow of data may be reduced due to the number of devices using the same channel.

If the used channel starts to be overloaded, then some scan stripes and/or segments of stripes may be thrown away to keep a digitizing operation with good quality. However, if the channel is saturated, then the channel should be changed for a less loaded one.

The RDS Agent shows the performance of the system and recommends free channels when necessary.

Insufficient Resources

In some cases, “insufficient resources” may be displayed on the RDS Agent, due to a not powerful enough computer (see [System Requirements](#)) or a very demanding surface (translucid, very dark and bright, high density reflective foam...).

- Reducing the frequency to 200Hz permits to free enough resources for the points acquisition.
- Switching to the “[Performance](#)” filter reduces the use of the processor.

4.6 Save Settings in Scanning Profiles

For regular scanning operations, saving [scanning profiles](#) with appropriate settings can be very helpful, avoiding changing the concerned settings.

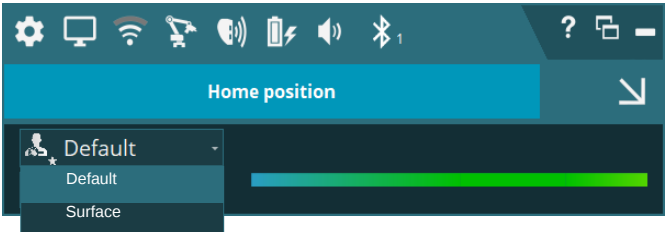
RDS can memorize scanning profiles for each type of laser scanner. It means that the set of parameters (scanning mode, filters...) can be saved into different configurations.

Open the RDS Control Panel > Scanner to manage scanning profiles.

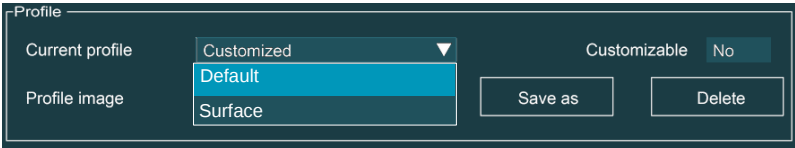
Use a Profile

There are different ways to select and use a profile:

- From the RDS Agent: directly select the profile from the drop-down list on the [RDS scanning window](#).



- From the [RDS Control Panel](#): access the tab “Scanner” and select the profile in the drop-down list (don’t forget to save).



- With the instrument:

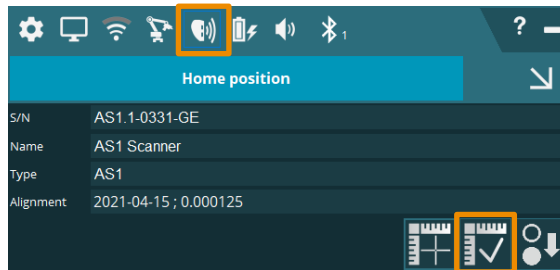
	 LAS	 AP21
Use the Q.A.M. (or Wrist Display) to select the profile.	Double click on the Trigger button to switch to the next profile.	Press “E” button on the AP21.
		

4.7 Verification and Alignment

As any measurement instrument, it is recommended to verify the accuracy periodically.

RDS Data Collector provides a script to proceed a quick verification of the arm with the current scanner: “Scanner – Quick Check”.

From the RDS Agent > Sensor tab, press on “Check current probe”.

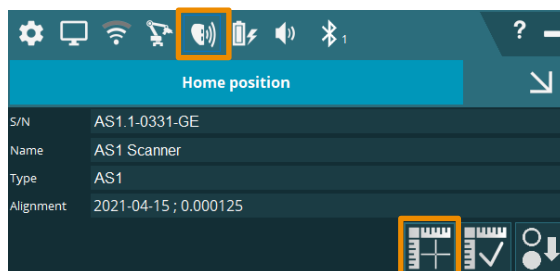


See [chapter 5.9.2 – Scanner Quick Check](#) and follow the instructions.

Alignment

Prior to be used, a new scanner must first be aligned on the instrument. Also, in case of accuracy issue, the scanner can be re-aligned.

From the RDS Agent > Sensor tab, press on “Align current probe”.



See [chapter 5.6 – Scanner Alignment](#) and follow the instructions.

5 RDS Data Collector

5.1 Terminology

For the sake of clarity, here are the definitions of the main terms used in the following chapter.

Term	Signification	
Alignment	This refers to the definition of the 3D position of an accessory relative to the measuring instrument. Ex: alignment of a probe on the arm.	Probe onto an arm Laser scanner onto an arm or tracker
	It is a curative operation and results on a modification of the specs file.	
Compensation	This refers to the definition of the independent mathematic 3D model of an instrument or a complex accessory such as a laser scanner. This is not related to a combination of instrument and accessory. Ex: compensation of an arm.	Arm Laser scanner Area scanner GridLOK
	It is a corrective operation and results in a modification of the specs file.	
Verification Checking	This refers to measurements operated with the system (instrument + accessory), to check its accuracy.	All systems
	This represents only measurements and does not affect the specs file.	
Calibration	This refers to measurements operated with the system (instrument + accessory) according to specific international standard, to check its accuracy and compare with its official specifications.	All systems
	This represents only measurements and does not affect the specs file.	



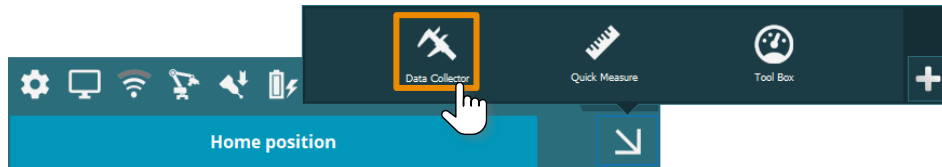
“Qualification” is not used.

5.2 Description of the Program

5.2.1 Access the Application

Open RDS Data Collector

To access RDS Data Collector, open the RDS Agent (RDS icon on the notification bar) and select “RDS Data Collector” in the shortcuts.



RDS Data Collector can be also opened from “start menu > Programs > RDS > RDS Data Collector”.

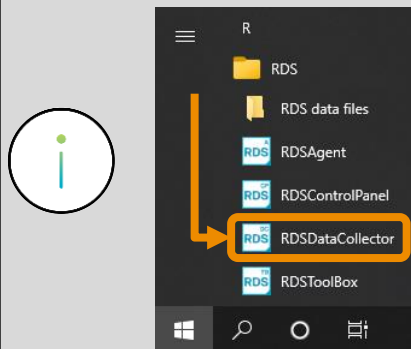


Fig. 2 : RDS Data Collector start Menu Windows

If the instrument status is “not connected” please refer to § 0 RDS Control Panel > Connection.
Launch RDS Data Collector. After some seconds, script selection screen appears.

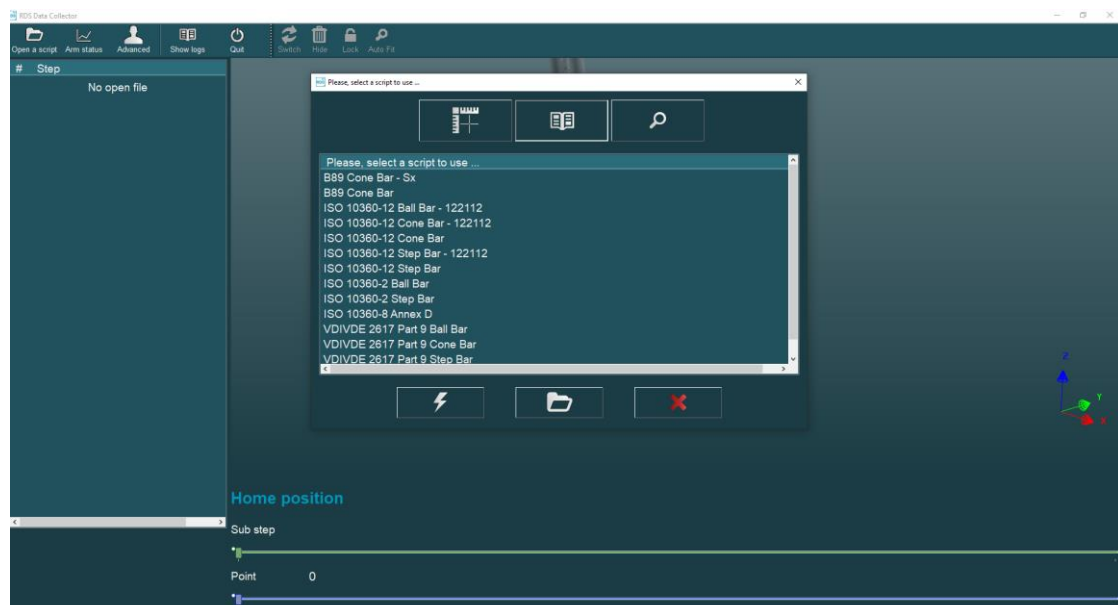


Fig. 3 : RDS Data Collector opening

5.2.2 Overview of the Screen



		Menu Toolbar
		Auxiliary view toolbar
		Script content steps
		Main 3D graphic view
		Auxiliary graphic view
		Step description zone
		Action buttons

To run an operation the operator must execute a script, which is divided in steps and sub-steps.

Steps may consist in

- points measurement
- calculation process
- instruction messages
- warning messages
- information messages
- dialog box to enter values.

Scripts can be executed all, or step by step, or from one step.

5.2.3 Main Screen Components

Toolbar



Main toolbar			
			Select the script to open
			Switch to the off-line Analysis mode
			Show the selection box for User profiles
			Toggle the information bar (rds.log)
			Close the application

● Admin user profile or upper

Auxiliary graphic view control			
			Switch the main and auxiliary views on the fore/background
			Hide the auxiliary view
			Lock the auxiliary view
			When activated, automatically resize the view when starting a new step.

● Available / ● Not available / ● Under condition

Script Content

Left list shows selected script name and all steps contained in the script.

#	Step
===	Script Rev 0.9 ===
?	Check artefact properties
-	Lengths-
▶	Length Step Bar 1
▶	Length Step Bar 2
▶	Length Step Bar 3
▶	Length Step Bar 4
▶	Length Step Bar 5
▶	Length Step Bar 6
▶	Length Step Bar 7

During script execution, a status icon appears besides step as below:

	No icon	information.
?	Question bubble	value entry step
◡	Yellow set square	Measurement step
⚡	Yellow flash	result step
√	Root	calculation step
▶	Blue play	it's the current step.
✓	Green check	step has been correctly executed
✗	Red cross	an error occurred during step execution, or the step has been cancelled.

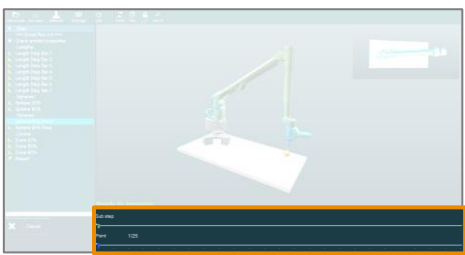
Action buttons

▶	Play all	Every step is played sequentially.
⏮▶	Play from	Execution begins at step selected by user.
▶⏭	Play step	Only selected step is played.
💾	Export	Exports the measurements points and clouds in several available file formats
⏹	Cancel	Stops the execution (when a script is running)

Step Description Zone

At the bottom of the screen, user will find an area containing information regarding current step execution.

For instance, if we execute a points' capture sequence, area will show:



- Current sub step index and its description.
- Current point index versus amount of wanted points.
- A list showing important information concerning script execution.



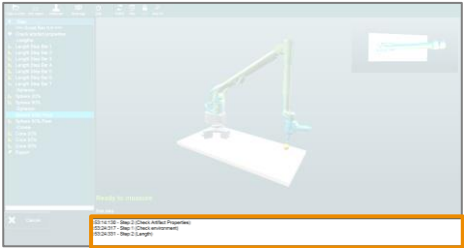
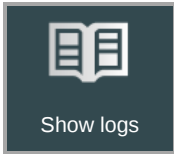


Sub step scroll shows the main operations of the current step. Point scroll shows the amount of ALL the points for the step, not only the current sub step.

Log Information Bar

This displays the log of events for RDS Data Collector: each action, error... is memorized in the log file (RDS.log).

This zone can be hidden or shown with the button on the top Toolbar:



Message Box

It is a simple information dialog box. It gives to user some details about step execution.



5.2.4 Graphic View

A large window space is reserved to 3D representation. This part has several objectives:

In capturing mode,

- It provides to user a real-time representation of connected arm.
- It helps user to capture points by displaying an arm reference and optionally the measuring artefact (Length ball bar for instance).

In analysing mode (Service profile only),

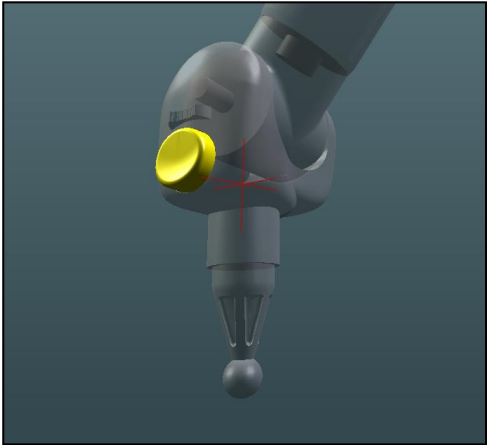
- It gives the opportunity to graphically show how points have been taken.
- It is useful to compare taken points with reference positions.

By default, when a script is played, scene camera is automatically moved to present the best view.

Scene Controls		
	Right mouse button + mouse move	Rotate scene toward pivot (red cross).
	Left and Right mouse button + mouse move	Translate scene
	<u>Left</u> Shift key + Left and Right mouse button + mouse move	Translate scene along X
	<u>Right</u> Shift key + Left and Right mouse button + mouse move	Translate scene along Y
	<u>Left</u> Ctrl key + Left and Right mouse button + mouse move	Translate scene along Z
	Mouse wheel	in and out zoom
	Shift key + Right mouse button + mouse move	in and out zoom

To help you manipulating camera, a red cross appears at the centre of the screen when you rotate or translate the view.

- Cross represents scene pivot point; Rotations are done using this special point.
- To change the rotation centre, do a translation of the view and move the desired rotation centre to the centre of the screen.



It is also possible to control the view using pad:

H	Display Help
A / Z	Rotate around X axis
Q / S	Rotate around Y axis
W / X	Rotate around Z axis
4 / 6	Horizontal camera pan
2 / 8	Vertical camera pan
+ / -	Zoom in / out
R	Display / Hide Axis

Several renderings are available for the arm:

Function Pad	Rendering
F1	Points
F2	Flat wireframe
F3	Smoothed wireframe
F4	Flat Shading
F5	Smoothed Shading

Auxiliary Graphic View



A second graphic view is displayed to help the user on the location to measure.

- This view is automatically switched on the foreground when the probe approaches the target position.
- It can also be switched manually, and the orientation can be locked.
- The auxiliary view is automatically activated on arm compensation scripts and on scanners alignment scripts.
- On compensation scripts, it shows the scene from a top view.
- On scanner alignment scripts, it shows the laser and stripes. (See § 5.4.4 [Hexagon scanner](#)).

5.3 Run a Script

5.3.1 Select and Execute a Script

To select a script, press the “Open a script” button, the script selection screen is automatically displayed.



The script selection screen is automatically opened at the launch of RDS Data Collector.

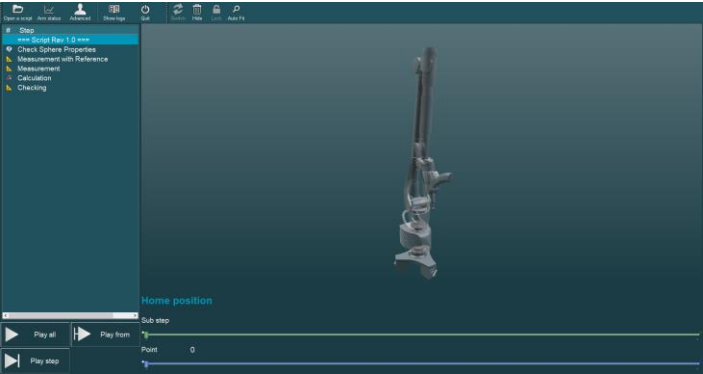
Scripts are sorted by categories:

	Accessories alignment	Alignment of probes, scanners and volume extensions
	Calibrations	Verifications and calibrations according to official standard (B89 / ISO10360 / VDI-VDE)
	Diagnostic tools	Quick checks for probes, NCP and scanners.

Choose a category, a script and press “Open” button.



Main screen appears as below, the script is ready to be played.





The script can be directly played when selected by pressing “Run” button instead of “Open” or by double clicking on the script.



If a script is already running when pressing “Open a script”, RDS Data Collector asks to confirm stopping the script.



Running script will be stopped.

Are you sure you want to continue?



Yes



No



RDS Data Collector always memorizes data in Data Collection folder. If this folder already contains data when executing a script, the following message will appear (Service profile only):



Output directory already contains data files. Do you want to erase them?



Yes



No

Press Yes if the existing data can be deleted or No if you want to keep them (in this case, if the script creates files that already exist, they will be overwritten one by one). A confirmation message then appears:



Are you sure you want to erase these files?



Yes



No

5.3.2 Available Scripts

According to the type of machine and accessory, different types of scripts are available:

Scripts for Arms

		TKJ contact probe	Threaded contact probe	Touch trigger probe	Tube Probe	HP-L-8.9	AS1 / RS6	AS1-XL	RS2-5	RS-SQUARED
	Plane	✓	✓	✓			✓		✓	
	Plane with reference	✓		✓			✓		✓	✓
	Single Point	✓	✓							
	Sphere	✓	✓	✓		✓	✓		✓	
	Sphere with reference	✓		✓		✓	✓	✓	✓	
	Tube				✓					
	B89 Cone bar	✓	✓							
	ISO 10360-12 Cone bar	✓	✓							
	ISO 10360-12 Step bar	✓	✓	✓						
	ISO10360-2 Step bar	✓	✓	✓						
	ISO 10360-8 Sphere						✓	✓	✓	✓
	Sphere check	✓	✓	✓		✓	✓	✓	✓	✓
	Plane check	✓	✓	✓		✓	✓	✓	✓	✓
	Distance check	✓	✓	✓		✓	✓	✓	✓	✓
	Tube length check				✓					
	Free digitize					✓	✓		✓	✓

: Alignments | : Calibrations | : Diagnostic tools

Scripts for Trackers

		AS1	AS1-XL	LAS	LAS-XL
	Plane – Measurement range	✓	✓		✓
	Sphere	✓	✓	✓	✓
	Sphere with reference		✓(1)		✓(1)
	Sphere check	✓	✓	✓	✓
	Plane check	✓	✓		✓

: Alignments | : Calibrations | : Diagnostic tools

(1): for AS1-XL / LAS-XL back face alignment

5.3.3 Dialog Boxes

During the execution of the script, dialog boxes may be displayed:

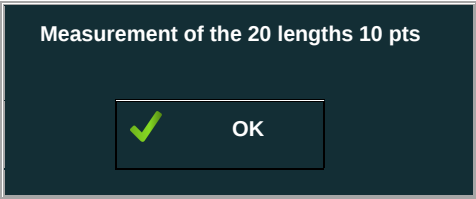
Dialog boxes can be validated or cancelled using mouse or pressing a long time (about 1 second) on the arm buttons.

RA7	RA8	Touch screen*	AP21 (AS1)	
				Left: Use a long-left press on button (B3S / BP0) to cancel a window
Left Button	B3S Left	Swipe left	“A”	
				Right: Use a long-right press on button (B3S / BP2) to validate a window
Right Button	B3S Right	Swipe right	“D”	

*: RA8 v2 7-axis

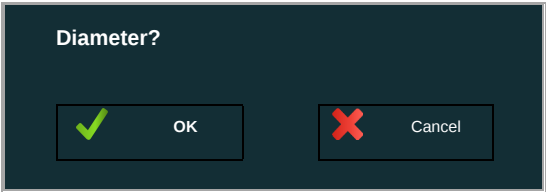
Message Box

Message boxes are displayed to give information or recommendations to the user.



Input Box

According to the artefact referenced by the script, some details are asked to user. In example below, user must fill out the real length bar value. Be aware that these values are saved in destination Data Collection file.



By pressing “Cancel”, script execution is aborted.

5.3.4 Artefact Selection Box

When running a script, artefacts values can be memorized and stored in the computer. A dialog box appears to select the appropriate artefact and modify the values.

When RDS displays the artefact selection box, a drop-down list of artefacts is available. This list contains all the memorized artefacts, fitting with the type of selected script (“Cone bar” for compensation or calibration with cone bar, “Ball bar” for calibration with ball bar, ...).

Select an Artefact

Choose the artefact in the list and check / modify the values.

Artefact

Ball Bar.artefact

Physical properties

Property	Value	Unit	Λ
L_01_02	100.000	mm	
L_01_03	200.000	mm	
L_01_04	300.000	mm	
L_01_05	400.000	mm	
L_01_06	500.000	mm	V

Other properties

Property	Value	Λ
Description	29 Balls	
calibration date	01/01/2015	
Modification date	03/07/2015	
Serial number	0	V

i

By default, one memorisable artefact is available for each type of artefact:

“Cone Bar – Default.artefact”

“Step Bar – Default.artefact”

“Ball Bar – Default.artefact”

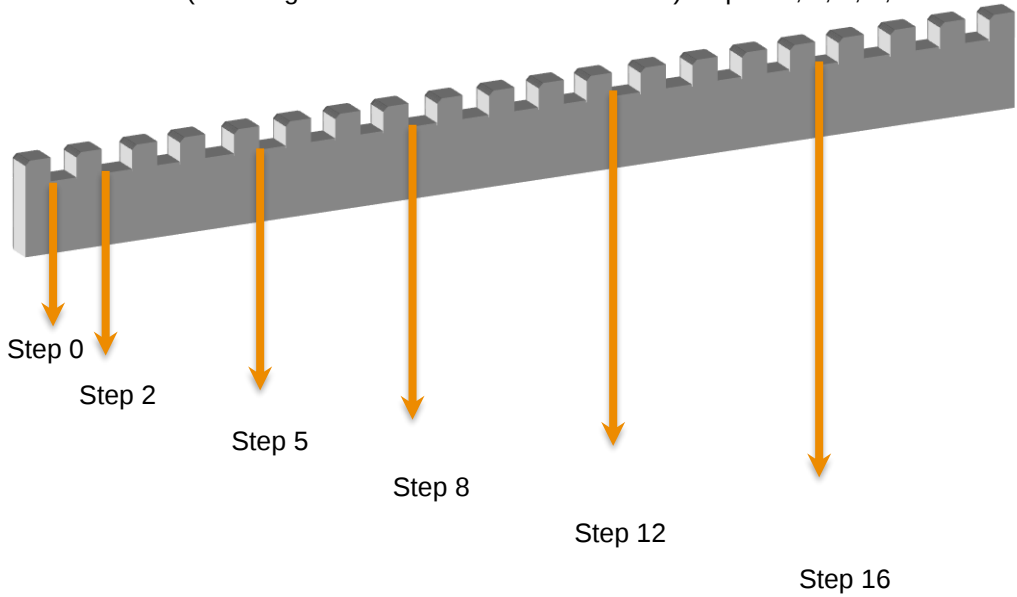
“TBar – Default.artefact”

All other available artefact (“Cone Bar.artefact”, “Step Bar.artefact”, “Sphere Bar.artefact”, “TBar.artefact”) are only temporary artefacts and are overwritten each time a script is run.

Number of Used Lengths

The standard artefacts allow entering up to 30 distances: even if the calibrations need only 5 lengths, it is possible to enter all 30 lengths, RDS automatically use the correct length.

Example: The step gage below has 20 steps, but only 6 are necessary to run a VDIVDE calibration. The user decides to use (following the standard recommendations) steps N0, 2, 5, 8, 12 and 16.



Solution

1 Only consider the 5 used lengths and miss the other ones.

Artefact Step Bar - Default.artefact

Physical properties

Property	Value	Unit
L_01_02	100	mm
L_01_03	400	mm
L_01_04	700	mm
L_01_05	1100	mm
L_01_06	0	mm
L_01_07	0	mm

2 Consider all the lengths, RDS will detect automatically the correct values.

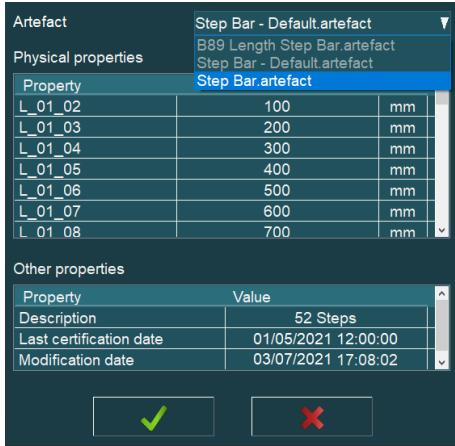
Artefact Step Bar - Default.artefact

Physical properties

Property	Value	Unit
L_01_02	100	mm
L_01_03	200	mm
L_01_04	300	mm
L_01_05	400	mm
L_01_06	500	mm
L_01_07	600	mm

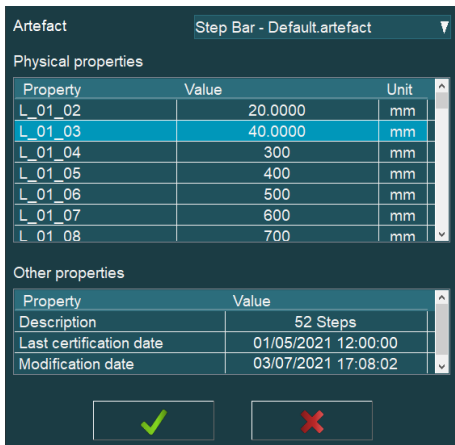
How to Create and Memorize a New Artefact

1. Run the appropriate script, to get the correct type of artefact.
2. At the prompt of the artefact selection box, select the temporary artefact ("Cone Bar.artefact", "Step Bar.artefact" or "Sphere Bar.artefact").



Artefact		
Step Bar - Default.artefact		
B89 Length Step Bar.artefact		
Step Bar - Default.artefact		
Step Bar.artefact		
Physical properties		
Property	Value	Unit
L_01_02	100	mm
L_01_03	200	mm
L_01_04	300	mm
L_01_05	400	mm
L_01_06	500	mm
L_01_07	600	mm
L_01_08	700	mm
Other properties		
Property	Value	
Description	52 Steps	
Last certification date	01/05/2021 12:00:00	
Modification date	03/07/2021 17:08:02	

3. Enter the real lengths.



Artefact		
Step Bar - Default.artefact		
B89 Length Step Bar.artefact		
Step Bar - Default.artefact		
Step Bar.artefact		
Physical properties		
Property	Value	Unit
L_01_02	20.0000	mm
L_01_03	40.0000	mm
L_01_04	300	mm
L_01_05	400	mm
L_01_06	500	mm
L_01_07	600	mm
L_01_08	700	mm
Other properties		
Property	Value	
Description	52 Steps	
Last certification date	01/05/2021 12:00:00	
Modification date	03/07/2021 17:08:02	

4. Press OK
5. Access the artefact folder (C:\Users\Public\Documents\ROMER\RDS\Artefacts\) and save the chosen artefact under new name (make a copy of the file and rename the copy)
The new name must contain the type of artefact ("cone", "step" or "sphere")
For example: "Hexagon Step Bar N1.artefact"



Always keep the original temporary artefact file ("Cone Bar.artefact", "Step Bar.artefact" or "Sphere Bar.artefact").



Each default artefact proposes 30 lengths (31 points): for advanced customization, see in appendix [A-3.3 How to Create a Customized Artefact](#).

5.3.5 Capturing Mode

Capturing mode is used to generate collected data files. Be aware that existing files will be updated if you capture points in this mode.

For Service profile, to check if you are in capturing mode or analyse mode, look at the “Analysis mode” button.

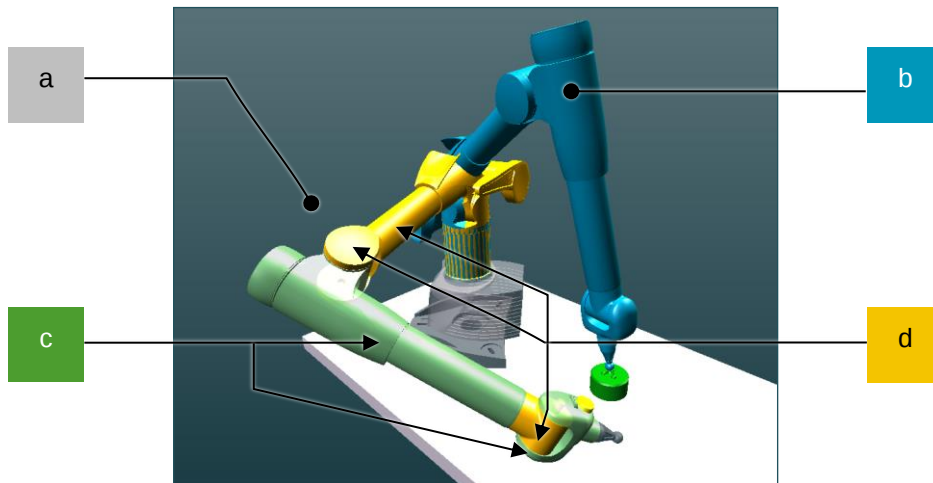
Once a script is open, the user can execute all, step by step, or from one selected step.

Probing Points Capture (arm)

Points capture is the most important action; it allows generating data collection files that will be used to compensate an arm, align a probe, generate a certificate, and so on.

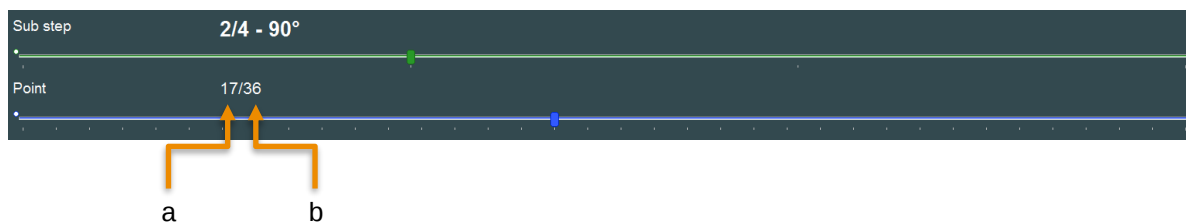
In this mode, several things happen:

- Real-time arm representation is enabled.
- If reference angles are stored in script files, reference arm is displayed. This blue-coloured arm shows for every point what the optimal position to capture point is.



- Phantom real-time arm
- Position arm to reach
- Axes have a correct angle
- Axes have an incorrect angle

Contextual bottom area has been updated, it contains now current point index and wanted number of points. In current example, we need to capture 17 points for sub-step, then 36 points before completing action.

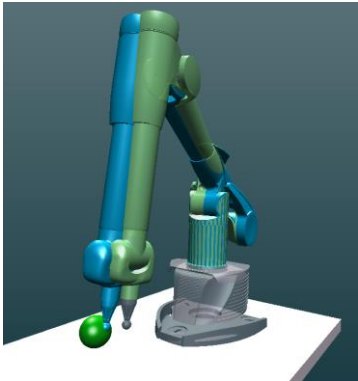
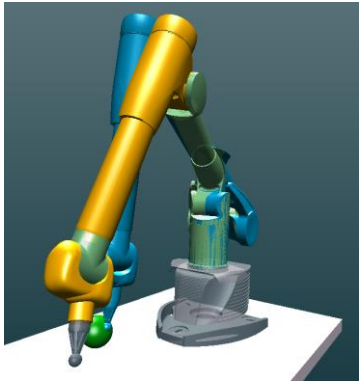


- Current point index
- Wanted amount of points

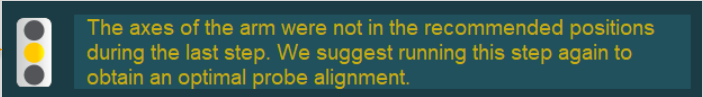
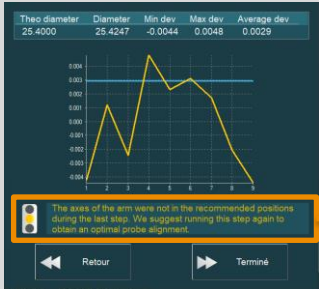
Points capture automatically ends up when wanted number of points is reached.

Positioning the Arm (arm)

The objective will be to capture points by following displayed blue arm. To help user, real-time arm aspect, changes depending on its position. Indeed, an axis will appear in green colour if correctly positioned, in orange colour if not.

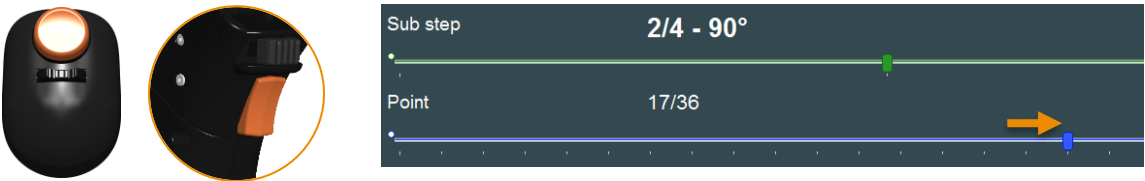
Example of a Correct Position	Example of a Wrong Position
	
All axes are green.	Some axes are yellow. (D and F axes incorrect)

If the reference positions have not been respected, a warning will be displayed on the results window.



Take a Point (arm)

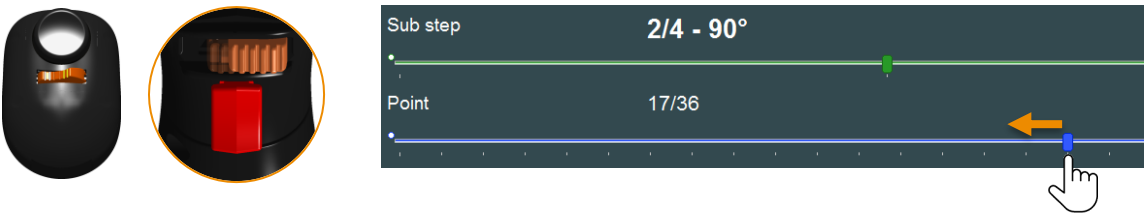
Press the Trigger Button (BT / BP1) to take a point. Current point index is updated in contextual area.



Cancel a Probed Point

If you want to cancel a point to retake it for instance, press the 3-State button – B3S to the left (or press left arm button -BP0).

Moreover, you can use scrollbar located below 3D representation area to go directly to an already taken point.



To cancel all points for the actual step, do a long press on left arm button (BP0) or move completely back the scrollbar.



The touch screen can also be used to cancel one point by swiping to the left.



Digitize with a Laser Scanner

To take stripes of scan with Hexagon scanners, depending on the settings on Control Panel, press and hold main button to scan, and release it to stop, or press once to start and a second time to stop. Several sequences can be performed before validating the cloud. Then a scan can be started and stopped, started again and stopped again, as many times as you want.

To validate the cloud, press “Next” button or press the right button (BP2) on portable measuring arms.

	RA7	RA8	AP21 (AS1)	LAS / LAS-XL
Start-Stop				
Scan				
	Trigger button			
Cancel				
	Left Button	B3S - Left	“A”	“Back” button
Validate				
	Right Button	B3S - Right	“D”	“Next” button



The validation cannot be done until the scan is not stopped.

Guided Scanning

For scanner alignment operations, the measurement is guided: a window guides you to place the laser at the correct position.

The scan can be started before or once the laser is inside the window: the stripes are kept only when the laser is inside the window.

5.3.6 Calculations

During script execution, some calculations are done, and results displayed to user. The objective is to help the user having the best alignment or compensation.

Results shown, and interpretation depends on calculation asked (refer to corresponding script chapter). Below, you'll find the example of a “cone” calculation.



At this step, you've got two possibilities:

- Validate the results,
and continue in script execution by pressing “Validate” button or by using a long middle arm button pressure.
- Reject the results,
and re-execute current step by pressing “Re-execute step” or by using a long right arm button pressure.

5.3.7 Artefact Temperature Compensation (arm)

A temperature compensation of the calibrated artefact can now be applied when performing probing or scanning quick checks or ISO calibrations in RDS Data Collector, on

- Length Checks
- Sphere checks



The Thermal compensation cannot be applied on the B89 scripts.

5.3.7.1 Use the Thermal Expansion

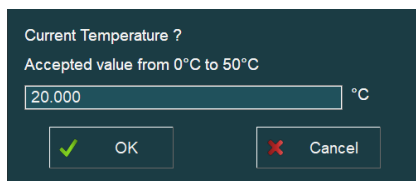
When executing a quick check or calibration script in RDS Data Collector, inputs are now required to enable the compensation of the temperature.

- Coefficient of temperature expansion of the material.
- Temperature of the artefact

Current temperature

- Manual input: enter the real temperature of the artefact to be used for the compensation.

The acceptable values must be within $0^{\circ}\text{C} \leq T^{\circ}\text{C} \leq 50^{\circ}\text{C}$.




*By typing values outside this range, the closest acceptable value will be taken into account.
Ex: typing -3°C , 0°C will be considered.*

NOTICE

The temperature entered manually is used for the entire calibration, thus it's the user's responsibility to ensure a stable temperature of the artefact all along the measurements.

CTE Value

The Coefficient of Thermal Expansion depends on the material of the artefact used.

- On Quick checks, the CTE must be entered manually when prompted.
- On ISO 10360-12, several artefact files can be saved to automatically recall the appropriate properties (dimensions and CTE).

Defaults thermal expansion coefficients have been implemented (for all other artefacts, the default value is set to zero):

Artefact	Used in	Material	Default CTE ($\mu\text{m.m}^{-1}.\text{°C}^{-1}$)
“AS1-XL alignment sphere”	AS1-XL scanner alignment - sphere with referenceISO 10360-8 Annex D - AS1-XL - Arms	Aluminium (mat grey sphere 90mm)	23.0
“B89 Length Cal Bar”	Probing - quick check	Steel (Std Verification Bar)	11.5
“B89 Sphere”	Contact probe alignment - Sphere with reference Contact probe alignment - Sphere Probing - quick check	Steel (shiny sphere 25.4mm)	11.5
“Cone Bar – Default”	All ISO 10360-12 Cone Bar	Silicon Carbide (multi-lengths artefact)	4.4
“Cone Bar”	All ISO 10360-12 Cone Bar	Silicon Carbide (multi-lengths artefact)	4.4
“ISO Sphere”	All ISO 10360-12 All ISO 10360-2	Steel (shiny sphere 25.4mm)	11.5
“Scanner alignment sphere”	Laser scanner alignment - sphere with reference Laser scanner alignment – sphere	Tungsten carbide (matt grey sphere 25.4mm)	5.5
“Scanner verification sphere”	Scanner - Quick check ISO10360-8 Annex D	Tungsten carbide (matt grey sphere 25.4mm)	5.5
“Simple Length Bar”	Probing - Quick check	Steel (Std verification bar)	11.5

5.3.7.2 Result Using Thermal Compensation



No thermal compensation will be used in the following cases:

- Temperature = 20° (nominal temperature of calibration for artefacts)
- CTE = 0 $\mu\text{m}.\text{°C}^{-1}.\text{m}^{-1}$

When displaying the results, new information is provided.

Calibrated [mm]	Nominal [mm]	Measured [mm]	Deviation [mm]
25.4000	25.4005	25.3901	-0.0104

CTE [$\mu\text{m}/\text{°C}/\text{m}$]	Temperature [°C]
5.500	23.626

 Back

Next 

Calibrated value	Dimension given with the artefact (calibrated value at 20°C).
Nominal value	Compensated dimension of the artefact (calibrated value with the thermal compensation).
Measured	Dimension measured with the instrument.
Deviation	The error is now calculated between the current measurement and the compensated value.
CTE	Reminder of the entered coefficient of thermal expansion.
Temperature	Temperature used for the thermal compensation.

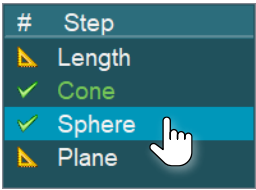
5.3.8 Export

When a script is done, all the measured points (for probing) or clouds (for scanning) are memorized in RDS files. Those files can be exported in special file formats, to be opened or imported by other software.

Format	File extension	Probed points	Digitized cloud
PolyWorks point cloud	*.psl	x	✓
ScanWorks point cloud	*.swl	x	✓
Ascii space separated point cloud	*.asc	x	✓
Ascii ‘,’ separated point cloud	*.csv	x	✓
Ascii ‘;’ separated point cloud	*.csv	x	✓
XYZ point cloud	*.xyz	x	✓
XYZ probed points	*.xyz	✓	x

Process

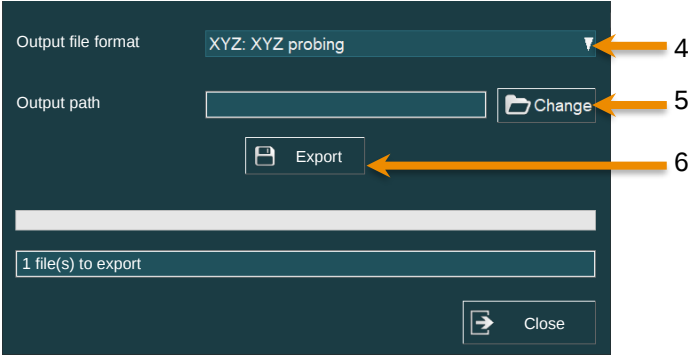
1. Select the script step(s) to export.



2. Click on the Export Button



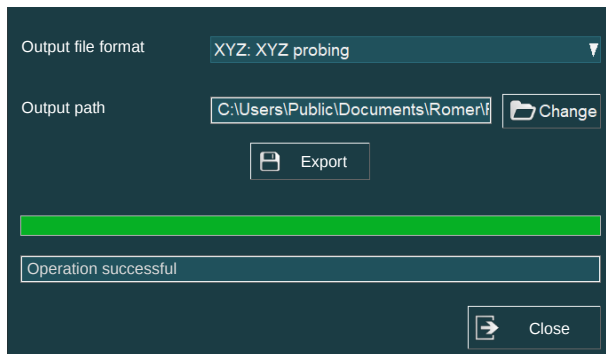
3. The export window appears:



4. Select the type of file to export.
5. Select the destination path.

6. Click on “Export” Button

7. Once the progress bar is over and the message “Operation successful” displayed, the file is ready.



Format of Export Files

- PolyWorks Point Cloud (*.psl)
- ScanWorks Point Cloud (*.swl)

```
1 → 1.000000 CR13
ScanPass0 → 1 → 4067 CR13
Hexagon_Scanner CR13
Hexagon_Scanner → 1 → 981 → 0 → 0 → 0.000000 → 0.000000 → 0.000000 → 0.000000 → 0.000000 → 0.000000 CR13
411.790253 → 407.381775 → 110.880409 CR13
411.793823 → 407.428070 → 110.814781 CR13
411.795044 → 407.467316 → 110.721733 CR13
411.792694 → 407.479156 → 110.647804 CR13
411.795349 → 407.520264 → 110.562294 CR13
411.795441 → 407.531921 → 110.488716 CR13
411.801117 → 407.574524 → 110.410309 CR13
411.801819 → 407.585663 → 110.334618 CR13
411.807953 → 407.627350 → 110.252983 CR13
```

- Ascii Space Separated Point Cloud (*.asc)

```
411.790253 407.381775 110.880409 CR13
411.793823 407.428070 110.814781 CR13
411.795044 407.467316 110.721733 CR13
411.792694 407.479156 110.647804 CR13
411.795349 407.520264 110.562294 CR13
411.795441 407.531921 110.488716 CR13
411.801117 407.574524 110.410309 CR13
411.801819 407.585663 110.334618 CR13
411.807953 407.627350 110.252983 CR13
```

- Ascii ',' Separated Point Cloud (*.csv)

```
411.790253,407.381775,110.880409 CR13
411.793823,407.428070,110.814781 CR13
411.795044,407.467316,110.721733 CR13
411.792694,407.479156,110.647804 CR13
411.795349,407.520264,110.562294 CR13
411.795441,407.531921,110.488716 CR13
411.801117,407.574524,110.410309 CR13
411.801819,407.585663,110.334618 CR13
411.807953,407.627350,110.252983 CR13
```

- Ascii ';' Separated Point Cloud (*.csv)

```
411.790253;407.381775;110.880409 CR13
411.793823;407.428070;110.814781 CR13
411.795044;407.467316;110.721733 CR13
411.792694;407.479156;110.647804 CR13
411.795349;407.520264;110.562294 CR13
411.795441;407.531921;110.488716 CR13
411.801117;407.574524;110.410309 CR13
411.801819;407.585663;110.334618 CR13
411.807953;407.627350;110.252983 CR13
```

- XYZ Points (Cloud or Probed) (*.xyz)

```
LH1 CR13
411.790253 ; 407.381775 ; 110.880409 CR13
411.793823 ; 407.428070 ; 110.814781 CR13
411.795044 ; 407.467316 ; 110.721733 CR13
411.792694 ; 407.479156 ; 110.647804 CR13
411.795349 ; 407.520264 ; 110.562294 CR13
411.795441 ; 407.531921 ; 110.488716 CR13
411.801117 ; 407.574524 ; 110.410309 CR13
411.801819 ; 407.585663 ; 110.334618 CR13
411.807953 ; 407.627350 ; 110.252983 CR13
```

5.3.9 Analysis Mode (administrator profile)

Introduction

In a normal way of using RDS Data Collector, when a script is executed, capturing mode is used: when a point must be taken, the user must take a point with the measuring instrument.

With Level 1 installation, it is possible to use the previous taken points instead of new points, and then see one by one the previous points. This mode has been realized to help user understanding results. Analysis mode allows replaying an already done script without modifying original files.

It means that points don't need to be remeasured. Even Arm connection is not necessary.

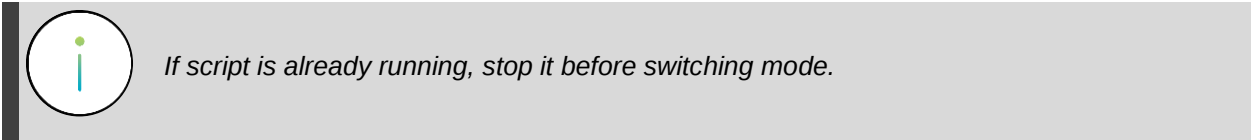
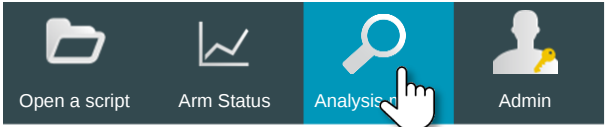
For Example: B89 verification has been done and shows that the arm needs a re-compensation. Once the re-compensation has been done, new configuration files have been generated then it is possible to reedit the B89 test without remeasurement: all measurements have been already memorized and can be used to get results after the re-compensation.

Any measurement step can be simulated, using the previous data (previous axis information).

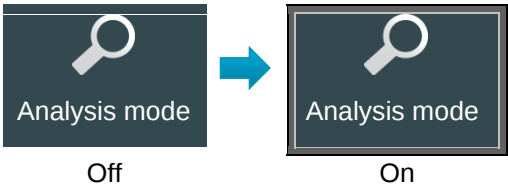
This mode is also useful to check if measurement positions have been correctly taken, by checking the colour of the axes for each position.

Switch to Analysis Mode

User switches to analysis mode by pressing the magnifying glass button.



To check if you are in analysis mode, look if the button is on or not.



Also, on the description zone, a warning reminds that the analysis mode is active:

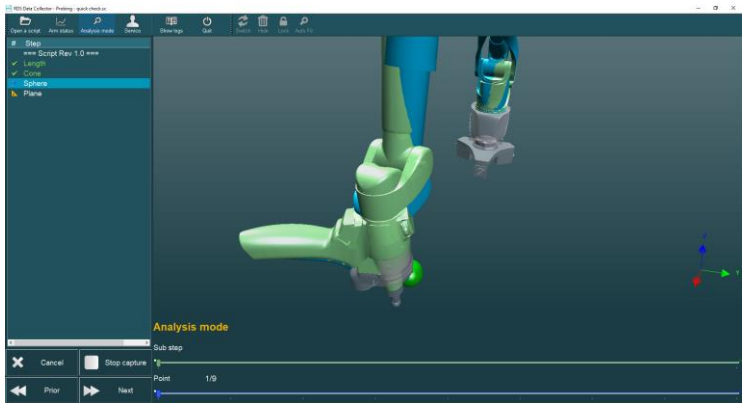


Press once again this button to switch back to capturing mode.

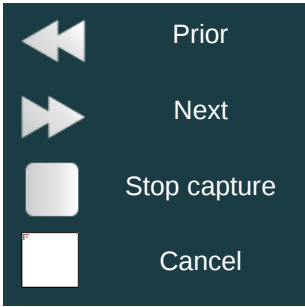
Process

The process is the same as for Capture mode: the choice between Capture mode and analysing mode only depends if the button is on or off.

- 1. Select and simply open the script.
- 2. Click on  to choose Analysis mode: the real-time arm disappears from 3D view.
- 3. Then execute one or all steps: RDS Data Collector will read the memorized file corresponding to current position.
- 4. Then use the same way as “capture mode” to simulate taking or cancel points: instead of real time points, 3D display will show memorized position.



In execute buttons



- Can be used to jump to previous step
- Can be used to jump to next step.
- Can be used to stop simulation and shows directly result with previous measurements and new compensation.
- Can be used to stop and cancel the process

To navigate between taken points, use the bottom scrollbar below the 3D representation.

- Go to forward points:



- Go to backward points:



5.4 Contact Probe Alignment (arm)

5.4.1 Description

Contact Probe Alignment Overview

To obtain accurate measurement results, each probe must be aligned with the arm it is being used on. Each unique set of probe alignment data is stored in the memory on the arm. The arm checks each time when a probe was changed. If the new probe has not previously been aligned with this particular arm, the user will be prompted to proceed with the probe alignment procedure described below.

If the probe has been already aligned, when the operator connects the probe, RDS simply selects the correct probe file.

For Contact Probe Alignment, Several Methods are Available:

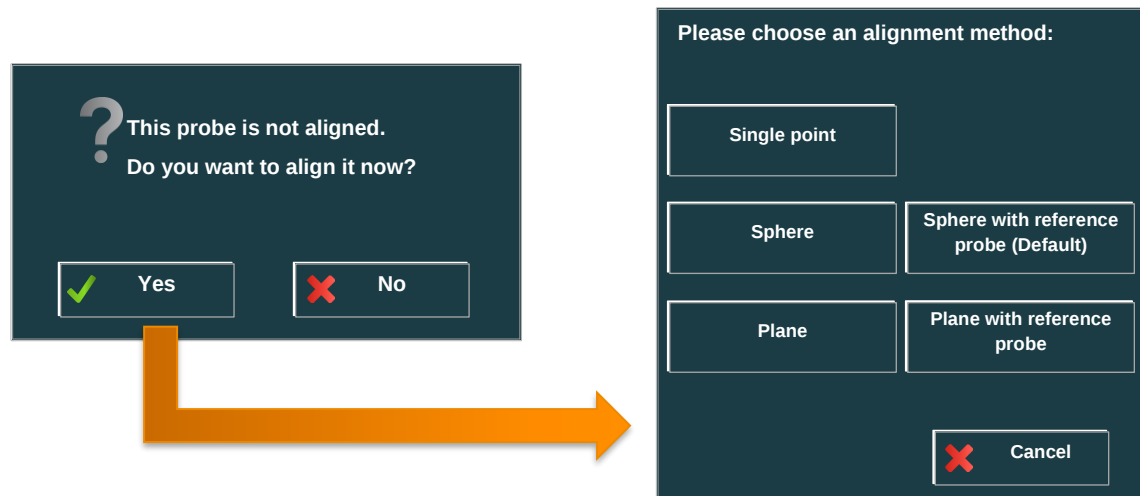
Sphere	Consists of measuring a calibrated sphere with the probe to align in different orientations.
Sphere with reference	Same as sphere, but the sphere is first measured with the reference probe (15mm). Whenever possible, we recommend the “Sphere with reference” alignment method to be used for optimal measurements.
Plane	Consists of measuring a levelled plane with the probe to align in different orientations.
Plane with reference	Same as plane, but the plane is first measured with the reference probe (15mm).
Single point	Consists of taking points, keeping the ball probe in a seat (cone).



In case of specific customized probe, a specific probe alignment script can be done. Contact your local agent.

New Probe

When a probe is connected to the arm for the first time, RDS requests its alignment, and shows the available process. Then RDS Data Collector automatically opens, starting the selected probe alignment process.



Single point method cannot be used with a Touch Trigger Probe



In case of bad accuracy, or change of sensor, it is possible to realign a probe already aligned, using RDS Data Collector



If the diameter of the final stylus has changed, then first access to RDS Control Panel to edit and modify the diameter of the probe (read RDS Service Manual).

Access the Probe Alignment Script

There are different reasons and ways to access to the probe alignment:

- **Probe is new**, then RDS automatically propose and give choice of the method, then the script is run automatically.
- **Probe has been already aligned**, but has been damaged or gives bad results: user should access to desired script.
- **Stylus of the probe has been changed** and the diameter is no longer the same: user should enter RDS control panel to edit the diameter, then access to the desired script.
- Access to a script can be done directly **from the application software**, asking for probe alignment.
- Access to a script can be done from the **RDS Agent**, clicking on “Align” button in Probes tab.
- Access to a script can be done from **RDS Control Panel**, clicking on “Align” in Probes tab.

5.4.2 Contact Probe Alignment – Sphere Methods

The process is the same for both methods, however “Sphere” doesn’t use reference probe measurement.

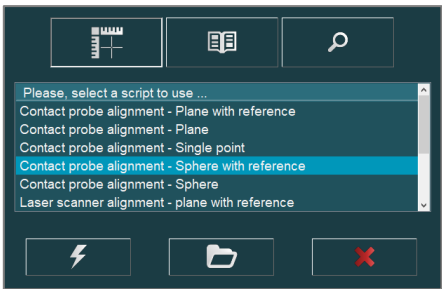
Principle

Probe alignment needs a calibrated artefact sphere (included in the arm case) and contains 3 steps:

	Measurement of the sphere with reference probe (15mm Probe #1) (only “Sphere with reference” method)
	Measurement of the sphere with the probe to align
	Calculation and validation

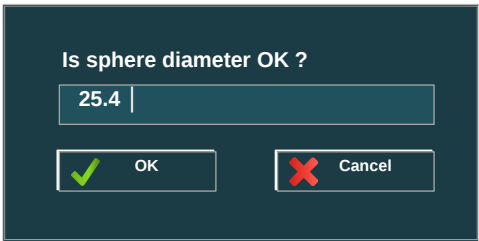
Start up (Step1)

1. Select the script, and then run.



The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. Enter the alignment sphere size, in millimetres, in the box provided. The size of the sphere should be noted on the stem of the artefact. Click OK to continue.

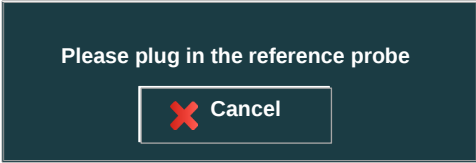


3. The Reference Sphere should be placed so that the forearm and the wrist point straight down at the pole of the sphere, as shown below.



Measurement with reference probe (Sphere_with_reference method only) (step2)

4. When prompted, insert the 15mm steel reference probe (the prompt automatically closes when the probe is plugged in).



5. Take nine (9) points on the upper hemisphere of the artefact. The graphic shows the location of the points to be used.

- 4 points on equator, equally distributed
- 4 points at 45° latitude, equally distributed, 45° rotated from equator points
- 1 point on top

Note the orientation of the wrist, the button side of the wrist should be pointing toward the base of the arm.

6. Once the 9 points have been taken, the deviations of the reference points will be shown.

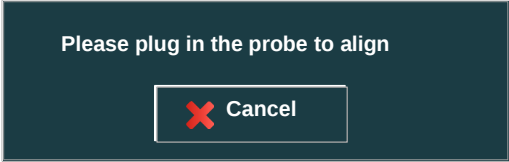


Incidental errors, with a few measurements significantly higher or lower than the rest, could be the result of improper probing: i.e. trigger pressed when probe was not in contact with the alignment sphere, or too much pressure applied on the probe shaft. Please re-execute the measurement.

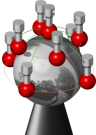
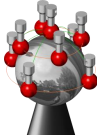
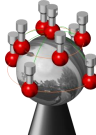
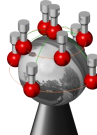
Systematic error, consistence over or under size measurement, may be a result of the wrong parameters having been entered for the alignment sphere size. Restart the probe alignment and confirm that the correct sphere diameter was entered.

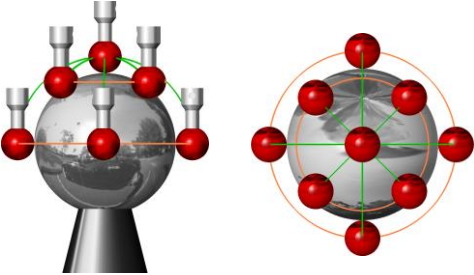
Measurement with the probe to align (step3)

- Click on Finished to continue.
- At the following prompt, remove the reference probe and insert the probe to be aligned (the prompt will automatically close when the probe is plugged in).



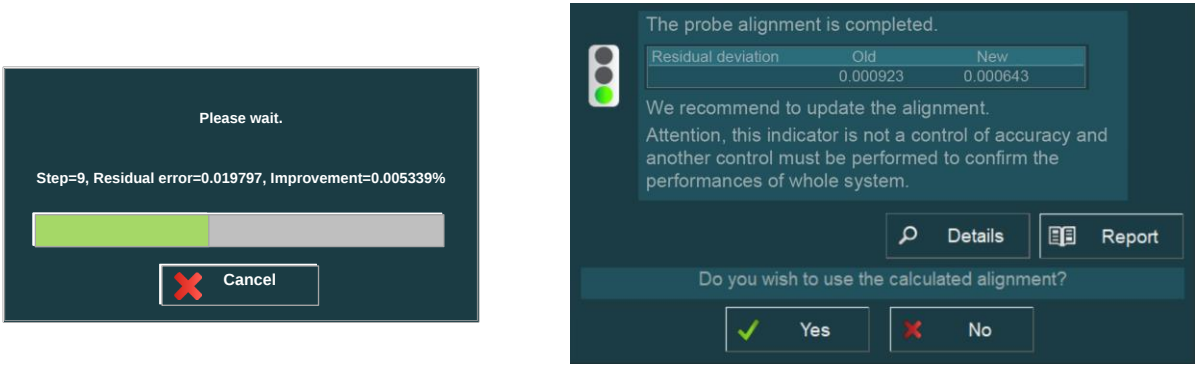
- At this stage, 4 sets of the 9 points-pattern would need to be measured with the new probe. Each set represents a 90deg twist on the wrist. Please follow closely the wrist orientation display on the screen. A total of 36 points are needed.

			
Buttons toward the arm	90° on E	90° on E	90° on E
			
9 points	9 points	9 points	9 points

9 points pattern	
	4 points on equator, equally distributed
	4 points at 45° latitude, equally distributed, 45° rotated from equator points
	1 point on top

Calculation (step4)

10. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared (press on “Details”):



The alignment result is correct, updating the alignment is allowed:
click on Yes to memorise the new alignment or No to cancel this calculation.

The alignment result is insufficient, updating is not possible and performing a new alignment is required.
(Check the arm accuracy, the correct mounting of the arm and the artefact...)

Old or custom probes may not show the traffic light. The choice to validate or not the alignment can then be made based on the alignment value.

Residual deviation value for Sphere with reference method is:

$$\frac{\text{Best-fit} + \text{deviation diameter} + \text{deviation centre}}{3}$$

Residual deviation value for Sphere without reference method is:

$$\frac{\text{Best-fit} + \text{deviation diameter}}{2}$$

11. Once the “Yes” button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.

?

What is the name of the probe ?

6mm Probe

✓ OK

✗ Cancel

?

Specs will now be updated. Do you want to continue?

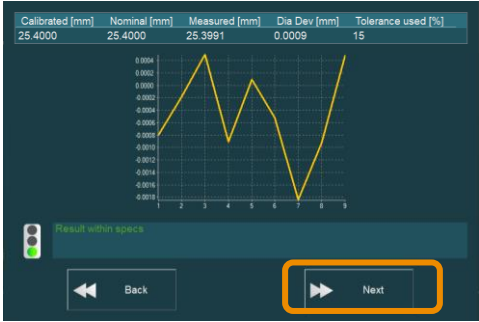
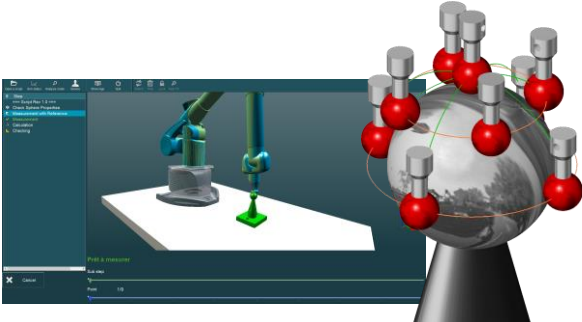
✓ Yes

✗ No

⚠ Specs have been correctly updated.

✓ OK

12. Perform a Sphere checking: measure again the sphere respecting the shown orientations of the probe, to check the quality of the alignment.



5.4.3 Contact Probe Alignment – Plane Methods



The process is the same for both methods, “Plane” doesn’t use reference probe measurement

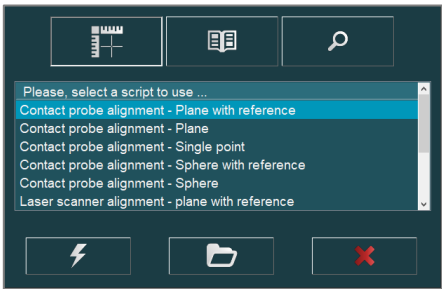
Principle

Probe alignment needs a levelled artefact plane (some cm2) and contains 3 steps:

	Measurement of the plane with reference probe (15mm Probe #1) (only “Plane with reference” method)
	Measurement of the plane with the probe to align
	Calculation and validation

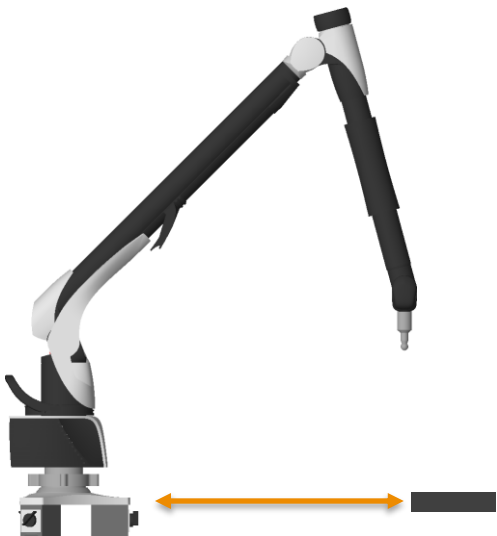
Start up (step1)

1. Select the script, and then run.



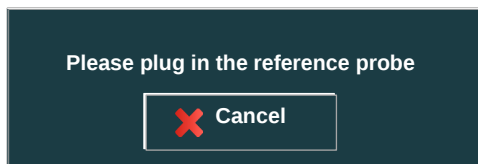
The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. The Reference Plane should be placed so that the forearm and the wrist point straight down at the centre of the plane, as shown below.



Measurement with Reference Probe (Plane_with_Reference Method only) (step2)

- When prompted, insert the 15mm steel reference probe (the prompt is automatically validated as soon as the probe is plugged).

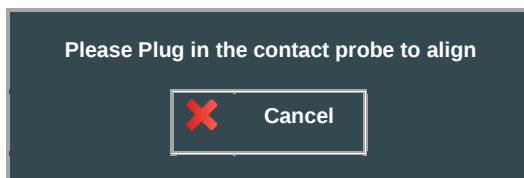


- Take 3 points on equilateral triangle on the plane. The graphic shows the location of the points to be used.

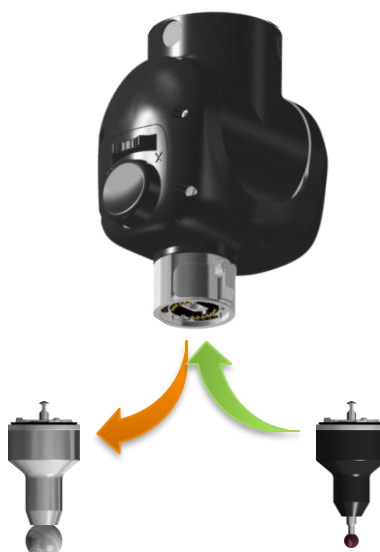


Probe-to-Align Measurement (Plane and Plane with Reference Methods) (step3)

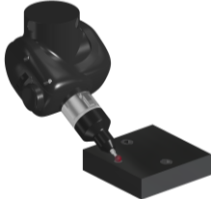
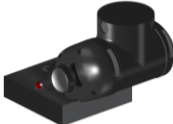
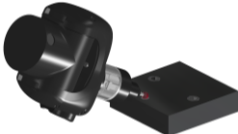
- The following message appears.



- At this prompt, remove the reference probe and insert the probe to be aligned (the prompt is automatically validated as soon as the probe is plugged).

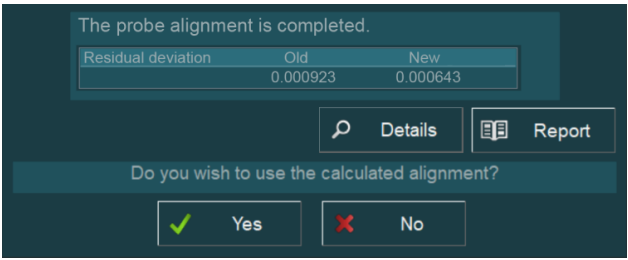
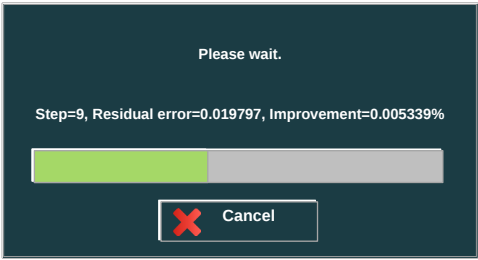


7. Then 5 sets of the 3-points pattern would need to be measured with the new probe. Please follow closely the probe orientation display on the screen (buttons side toward the base of the arm). A total of 15 points are needed.

Orientation		
1		(3 points): probe is vertical
2		(3 points): probe is inclined 45°, buttons up (plane made by probe axis and F arm axis is normal to the artefact plane).
3		(3 points): probe is inclined 45°, buttons down (plane made by probe axis and F arm axis is normal to the artefact plane).
4		(3 points): probe is inclined 45°, F axis open (F arm axis parallel to the artefact plane)
5		(3 points): probe is inclined 45°, F axis closed (F arm axis parallel to the artefact plane)

Calculation (step4)

8. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared:



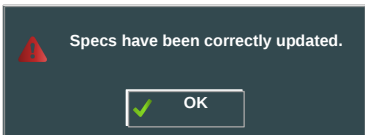
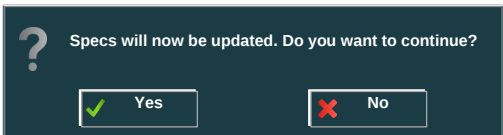
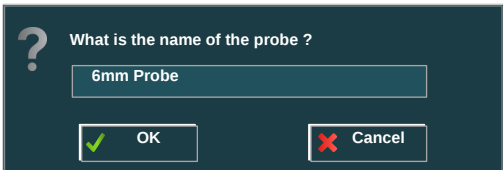
Residual deviation value for Plane with reference method is the maximum deviation between all the points and the reference plane.



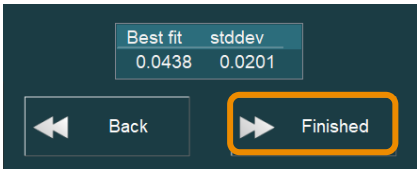
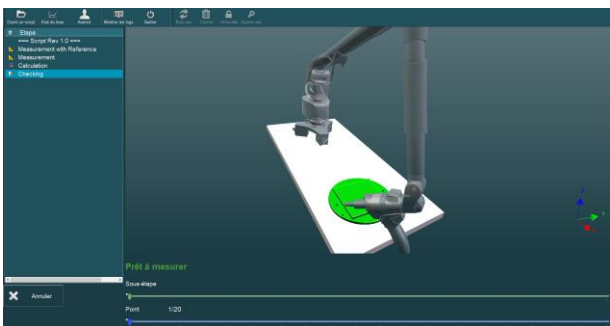
Residual deviation for Plane without reference is the standard deviation between all the points and the least-square calculated plane.

If this value is more than 1.0, probe is notified as “badly aligned”.

9. Once the “Yes” button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.



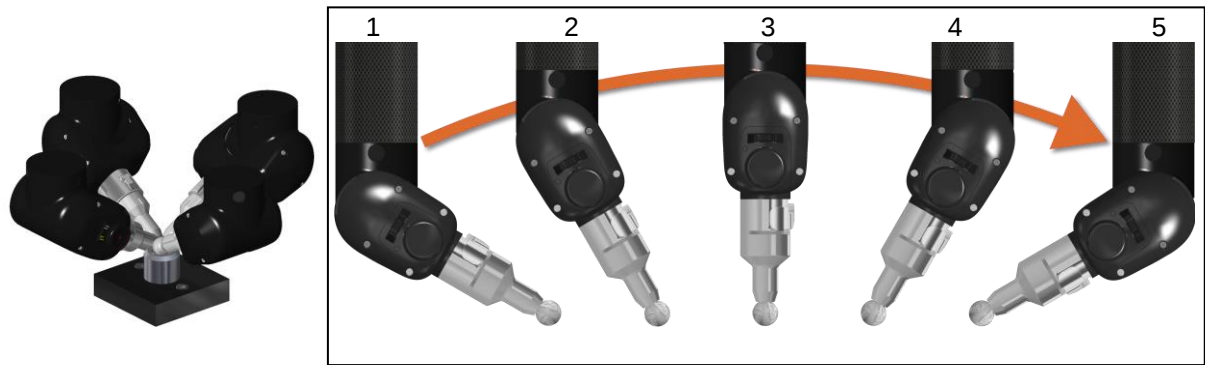
10. Perform a plane checking: measure again the with various orientations of the probe, to check the quality of the alignment.



5.4.4 Contact Probe Alignment – Single Point Method

Principle

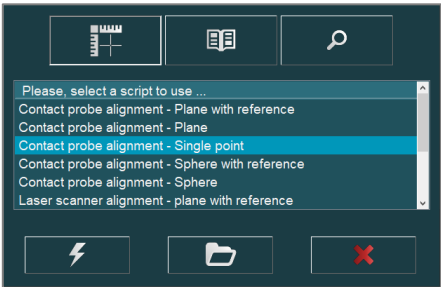
This process is using a seat (cone or corner) in which the ball of the probe is positioned. Then 20 points are measured in this hole (“wrist” measurement) turning the wrist axes:



	Measurement of seat with the probe to align
	Calculation and validation

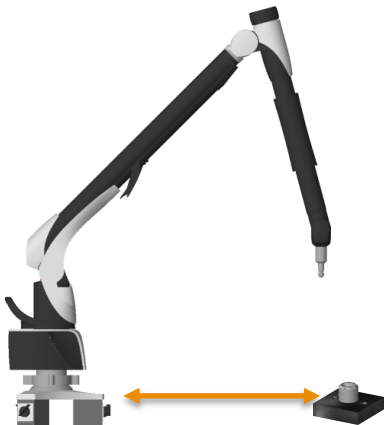
Start up (Step1)

1. Select the script, and then run.



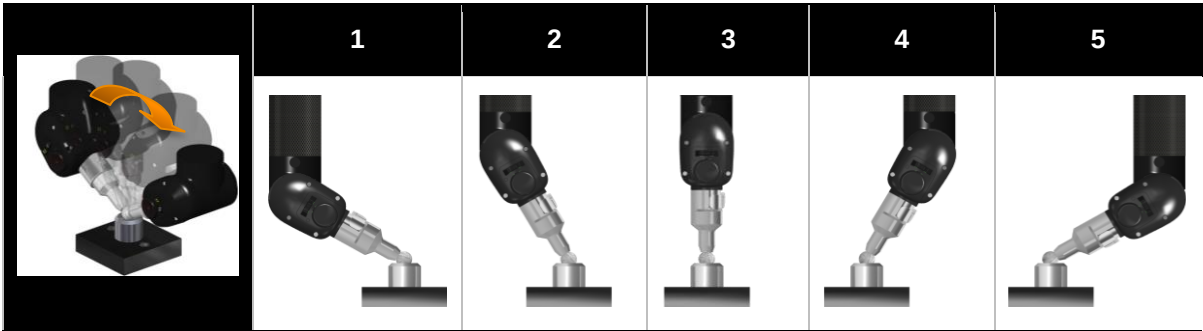
The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. The reference seat should be placed so that the forearm and the wrist point straight down at the seat, as shown below.



Wrist Measurement (step 2)

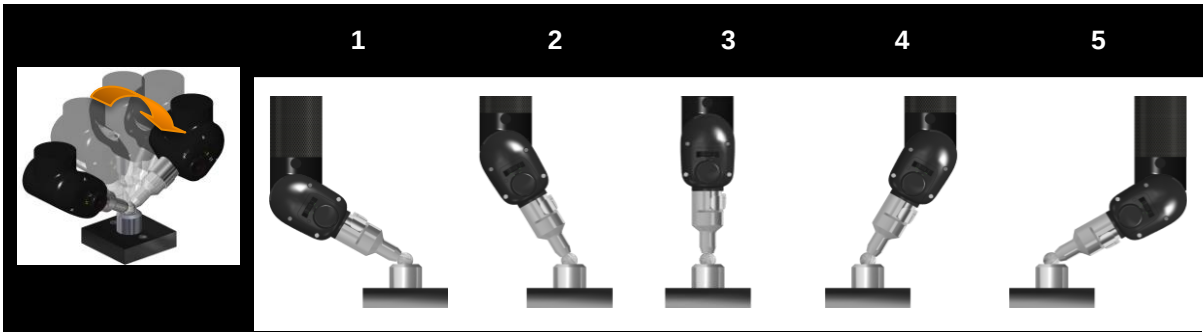
3. The elbow is vertical ("12 O' Clock"), and 20 points are taken, moving only E and F Axes:
5 points, Buttons on the left, turning F axis.



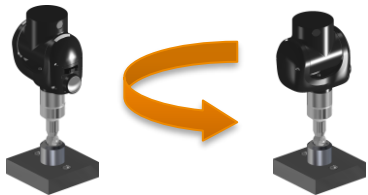
Then turn E axis with 90° (buttons opposite to the base)



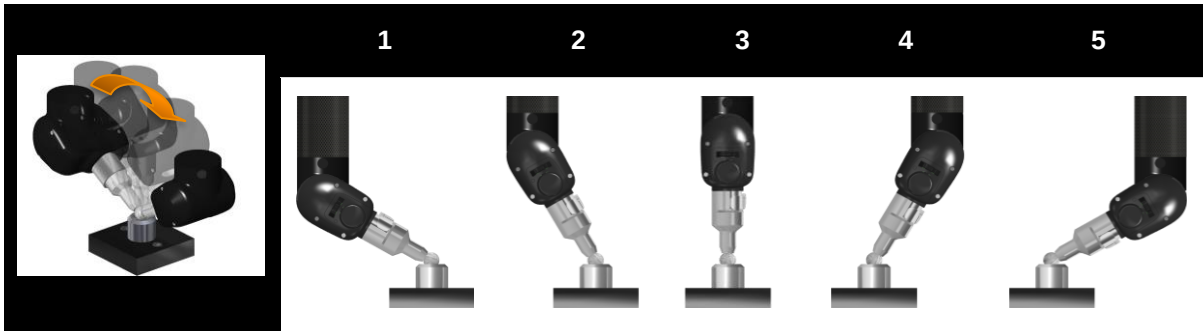
4. Measure 5 points, turning only F axis.



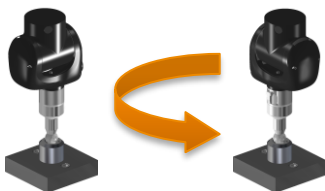
Then turn once again E axis 90° (buttons on the right)



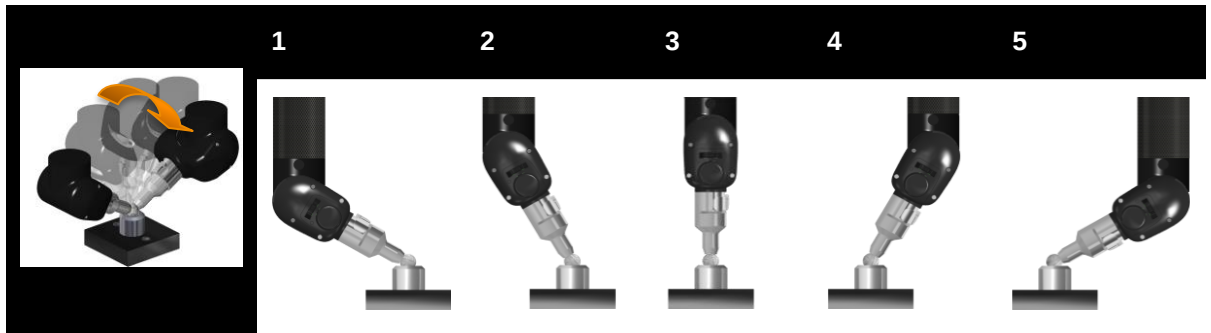
5. Take 5 points, turning only F axis.



Turn again E axis 90° (buttons face to the base)

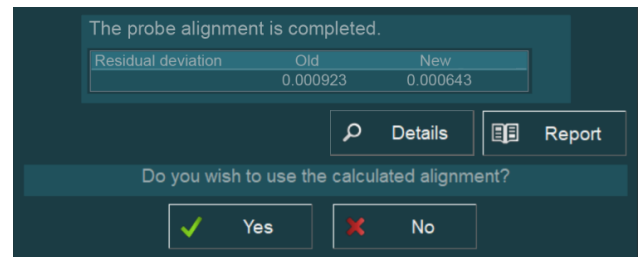
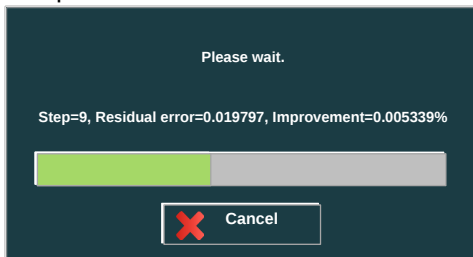


6. Take 5 points, turning only F axis.



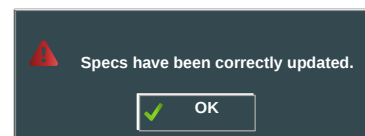
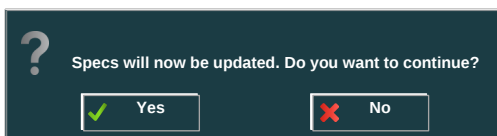
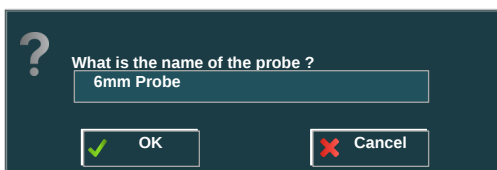
Calculation (step3)

11. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared:

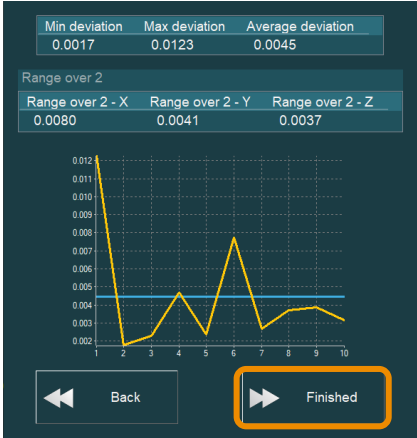
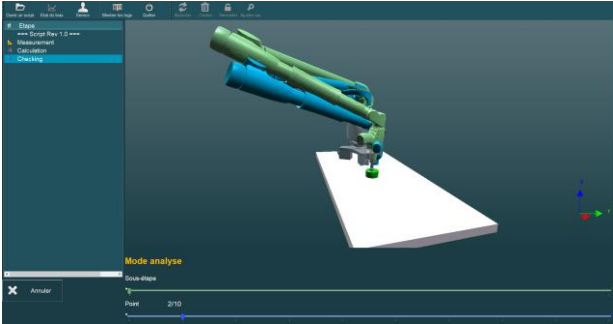


Residual deviation value is the best-fit value (=maximum deviation) between all the points and the calculated middle point.

7. Once the "Yes" button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.



8. Perform a single point checking: measure again the seat respecting the shown orientations of the probe, to check the quality of the alignment.



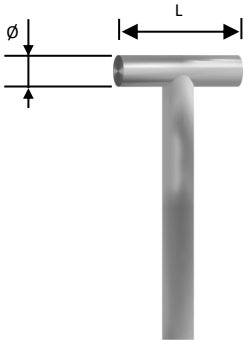
5.5 Non-Contact Tube Probe Alignment (arm)

This script must be used to align a tube non-contact probe.

5.5.1 Description

Non-contact Tube probes (NCP) are aligned on a tube artefact.

Tube probes (NCP) must be aligned on a T-tube artefact, perfectly straight, with a constant and known diameter, with ends perfectly perpendicular to the axis of the cylinder, and with a known horizontal length.



Probe size	Recommended artefact diameter	Recommended artefact length
12.5 mm	6.35 mm (¼ ")	100 mm
25 mm		
50 mm	12.7 mm (½ ")	100 mm
75 mm		
100 mm	25.4 mm (1 ")	100 mm
150 mm		

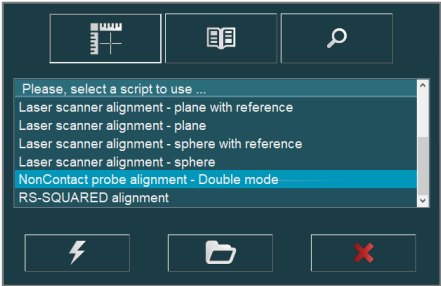
Non-contact Tube probe process consists by measuring points on several sections and ends of the artefact, from different orientations of the probe.

5.5.2 Script

Select “Non-contact-probe alignment.sc” script, then play all.

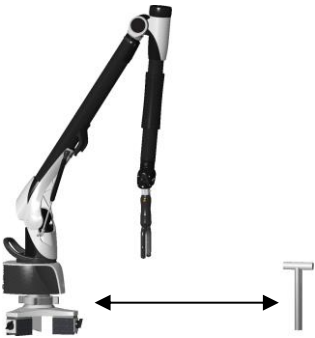
Start up (Step1)

- 1. Select the script, and then run.

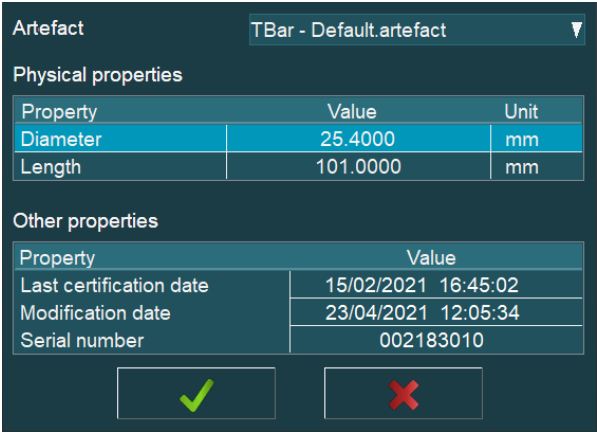


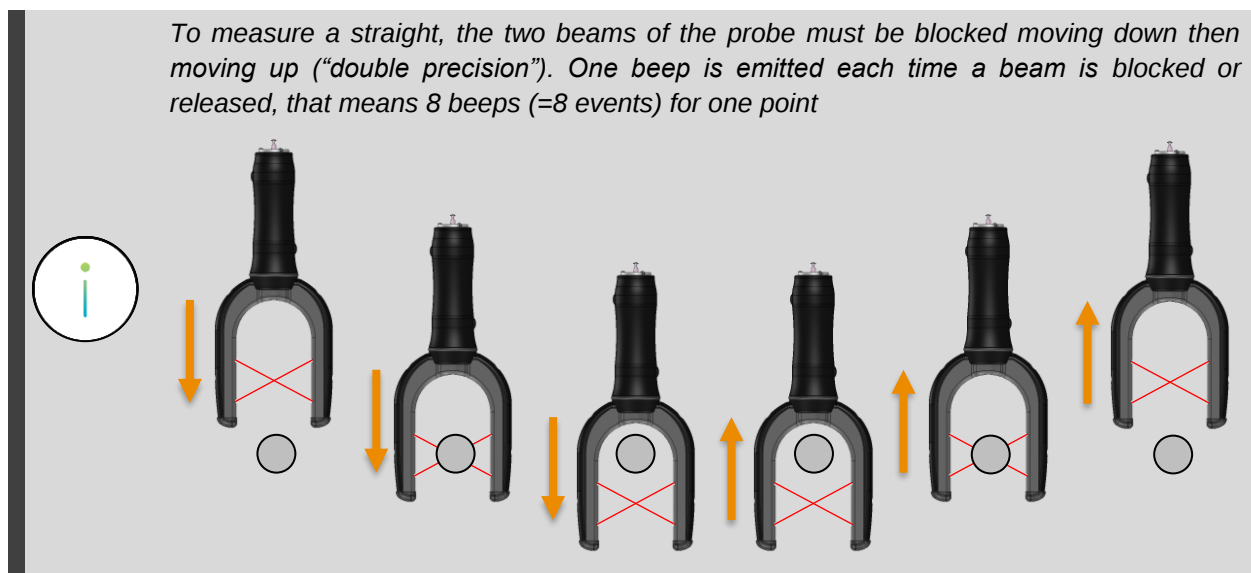
The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

- 2. Place and fix the tube artefact in front of the arm, keeping the known length part of the tube in horizontal position.



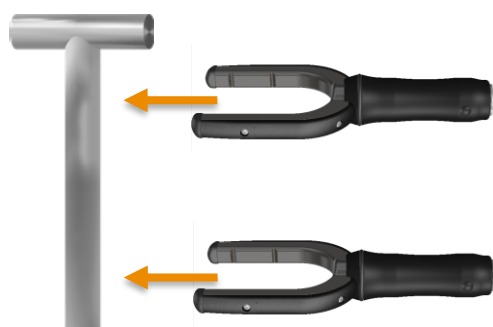
- 3. RDS ask for the artefact: Select the correct artefact if it has been memorised, or enter the diameter and length, then press “select”.



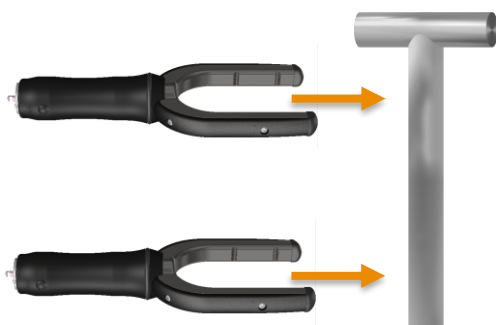


Vertical Tube Measurement

4. Measure one point (8 beeps = 8 steps) on the high section of the vertical tube from the right side of the tube, then one point (8 beeps = 8 steps) on the low section. Keep the probe as perpendicular as possible to the tube.



5. Measure one point (8 beeps = 8 steps) on the high section of the vertical tube from the left side of the tube (opposite to previous measurement), then one point (8 beeps = 8 steps) on the low section. Keep the probe as perpendicular as possible to the tube.



Horizontal Tube Measurement

6. Measure one point (8 beeps = 8 steps) on the right-end section of the horizontal tube, keeping the probe button toward the arm (INSIDE), then one point (8 beeps = 8 steps) on the left-end section, still with the probe button INSIDE. Keep the probe as perpendicular as possible to the tube.

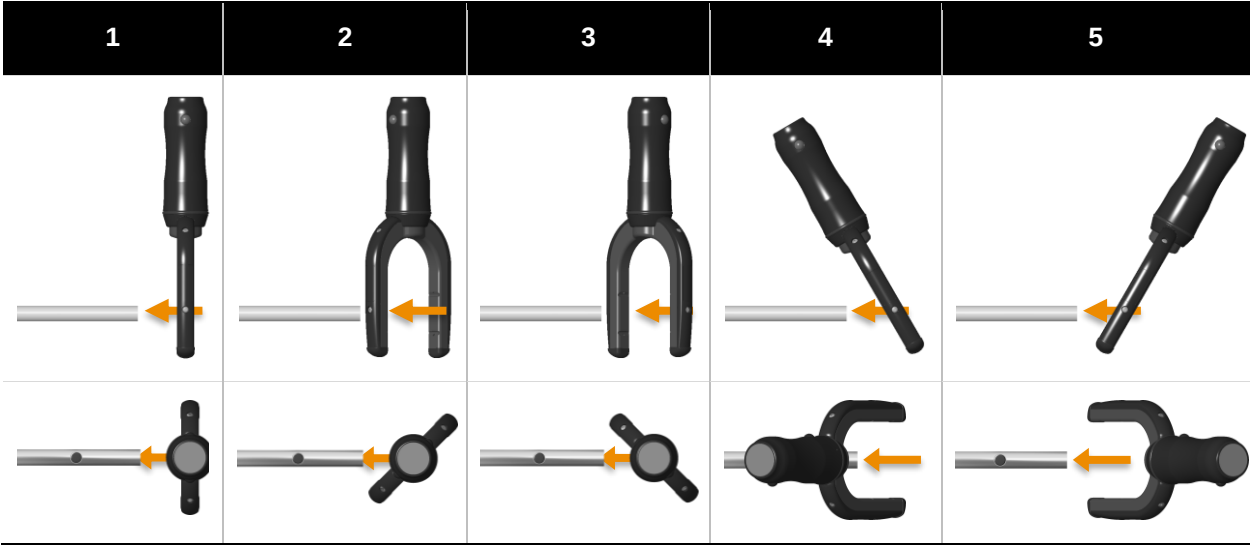


7. Measure one point (8 beeps = 8 steps) on the right-end section of the horizontal tube, keeping the probe button opposite from the arm (OUTSIDE), then one point (8 beeps = 8 steps) on the left-end section, still with the probe button OUTSIDE. Keep the probe as perpendicular as possible to the tube.

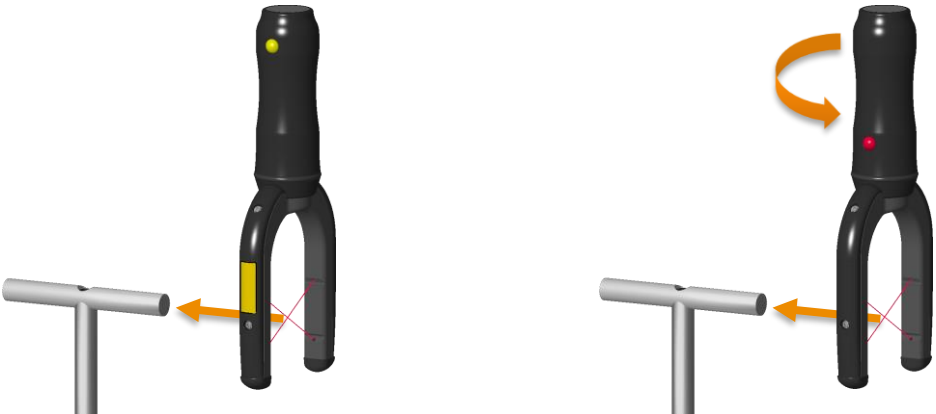


Horizontal Tube Right Extremity Measurement

For each measurement, the extremity of the tube must be measured 5 times, giving different orientations of the probe:



8. Measure 5 times the RIGHT extremity of the horizontal tube, giving different angles for each of the 5 times. Do the measurement keeping the probe button on the RIGHT then turn the probe 180° and do the measurement keeping the probe button on the LEFT.

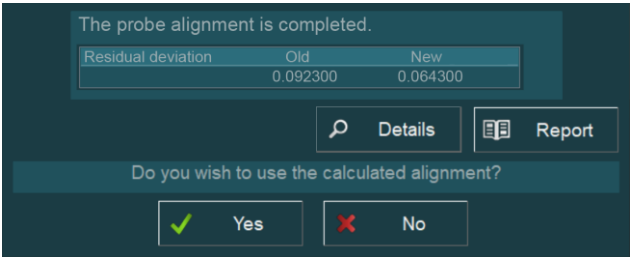
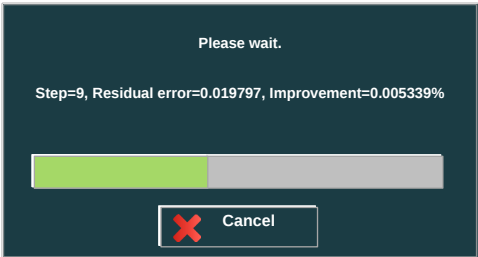


9. Measure 5 times the LEFT extremity of the horizontal tube, giving different angles for each of the 5 times. Do the measurement keeping the probe button on the RIGHT then turn the probe 180° and do the measurement keeping the probe button on the LEFT.

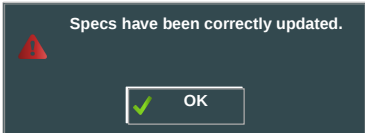
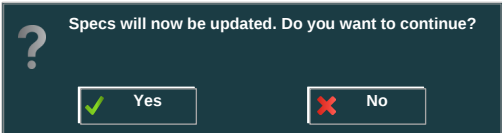
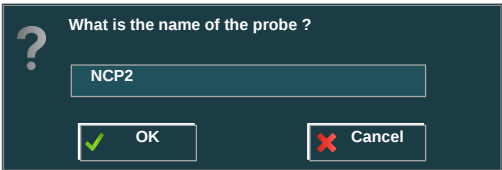


Calculation

10. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared (press on “Details”):

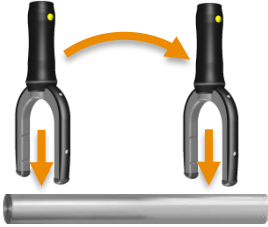


11. Once the “Yes” button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.



Alignment Verification

12. Once the data saved, perform a tube probe verification:

Measure the 1st side of the straight then the 2nd side	Measure the 1st end of the tube.	Measure the 2nd end of the tube.
		

13. RDS displays the measured length: check the deviations according to the specifications.

#	Measured length	Theoretical length	Deviation
1	241.9189	241.9640	- 0.0451


 Back


 Finished

5.6 Scanner Alignment

5.6.1 Description

HP-L-8.9, AS1, AS1-XL, RSx, LAS and LAS-XL scanners must be aligned on the measuring instrument. This operation must be done in case of arm re-compensation, or if a new scanner is mounted on the machine, or also if the scanner itself has been repaired or recompensated.



For Non-Hexagon Scanners, please refer to the appropriate documentation.

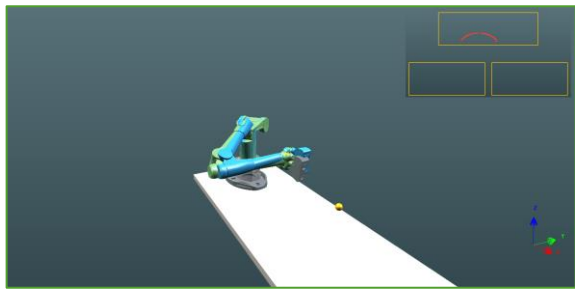
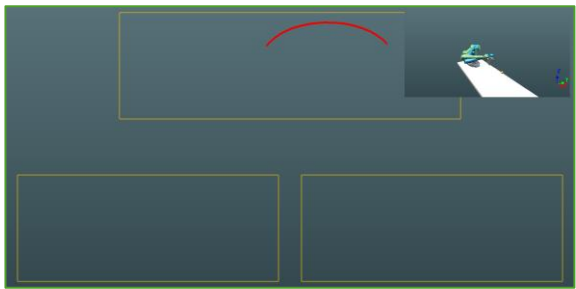
New Scanner (arm)

If a new scanner is mounted on the arm, then once plugged, RDS recognizes it as a new mounted scanner, and may ask for a few questions:

- Type of probe: RDS recognizes a new probe and asks for the type: RS2, 3 or 4 or other type of scanner (excepted AS1, AS1-XL, RS5, RS6 and HP-L-8.9).
- RDS proposes to align it and several methods may be available:
 - Plane method.
 - Plane_with_reference method (measuring ref plane with Reference probe).
 - Sphere method
 - Sphere_with_reference method (measuring ref sphere with Reference probe).

Graphic View

The graphic view shows the orientation and position of scanner to reach. When approaching the target position, then RDS switches the main graphic view and the scan auxiliary graphic view, to help in detail the zone to scan, and shows the scan lines.

	
Focus on the main view: RDS shows how to orientate the arm.	RDS Detects scanning lines and switches to the scan view.



It is possible to switch manually and lock the focus on the scan view.

Open a script

Advanced

Show logs

Quit

Switch

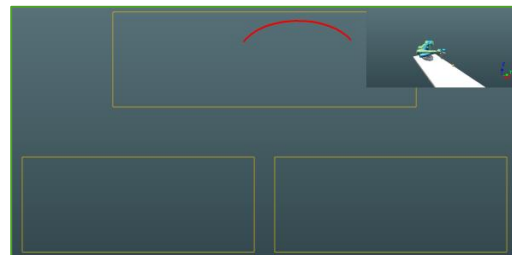
Hide

Lock

Auto Fit

Get Scan Lines Inside the Target Zone

To obtain the best alignment result, the artefact digitizing needs to cover a sufficient range. RDS ensure this requirement by defining alignment zones, represented on the graphic view by rectangles.

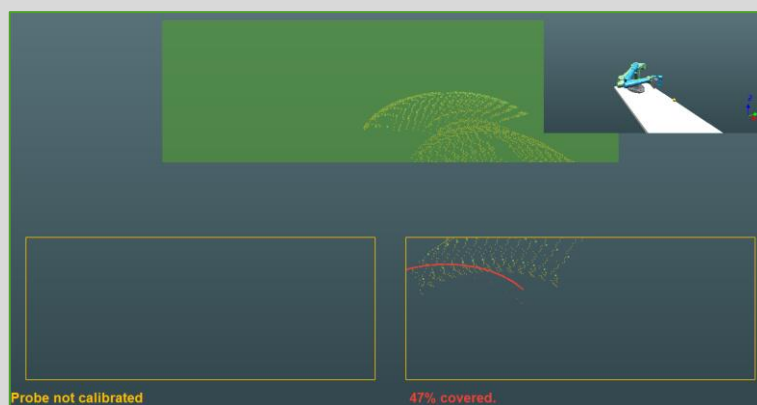


- While digitizing, RDS detects the scanning lines inside the target squares (highlighted in green) and indicates to the user the percentage of target coverage reached.

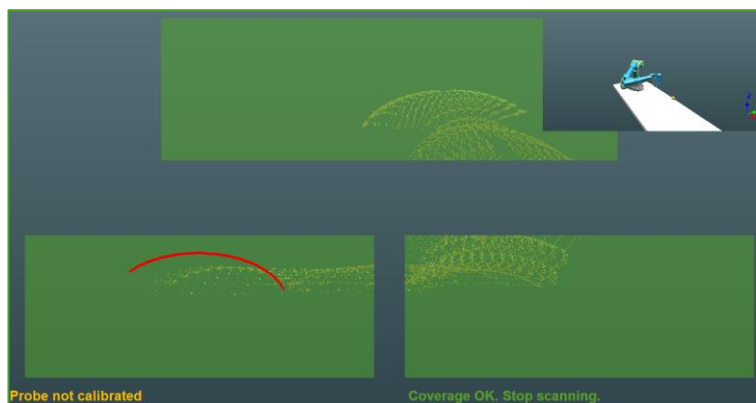
As soon as one target square is completed, it becomes green.

On the following example, the centred “top” target has been digitized enough (filled green), now the scanner is capturing scanning lines on the right “bottom” target, but not enough lines have been captured yet in it to validate it.

Only 47 % of the required zone have been reached, the user cannot go forward.



- Once all the target squares are completed (=green), the coverage is OK. RDS automatically stops the acquisition and asks the user to stop the scanner to go to the next step of alignment.



With the Leica scanner, no need to press on the button: as soon as the coverage is completed, RDS stops the acquisition and jump to next step of the alignment

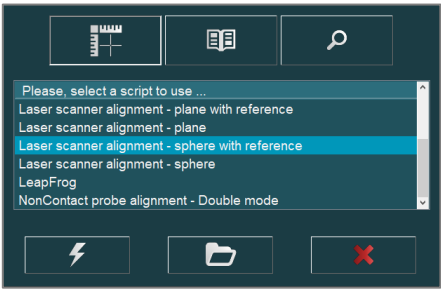
5.6.2 Laser Scanner Alignment – Sphere Methods (Arm)

These methods consist by measuring a reference artefact sphere with reference probe (only for Sphere_with_reference method), then by scanning it from 5 orientations of the scanner, 3 set of stripes must be taken:

	Measurement of the sphere with reference probe (15mm Probe #1) (only “Sphere with reference” method)
	Scan of 3 sides of the sphere, covering the field of view of the scanner to align
	Scan of the whole sphere.
	Calculation and validation

Start up (Step1)

1. Select the script, and then run.



The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. When prompted, enter the diameter value.



3. The alignment sphere should be placed at 50% of the measurement volume.

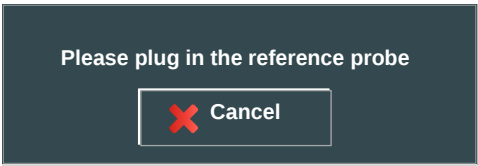


NOTICE

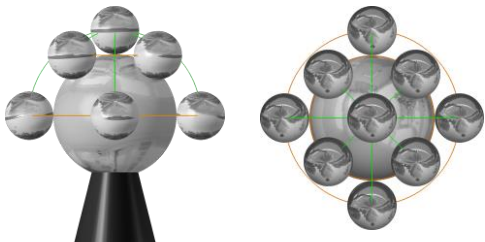
Do not use other artefact sphere than the provided one; it has been designed to give optimal results.

Reference Sphere (Sphere_with_Reference method only) (step2)

4. Insert 15mm Ref Probe

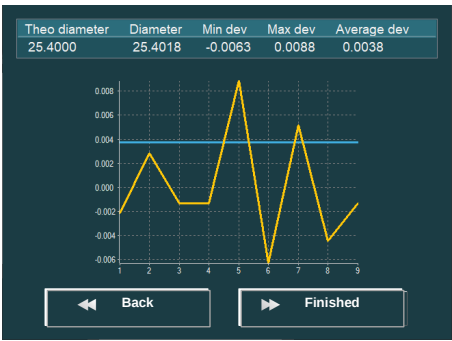


5. Measure 9 points on the upper hemisphere with the 15mm probe, as followed:



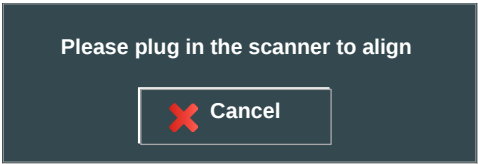
- 4 points on equator, equally distributed
- 4 points at 45° latitude, equally distributed, 45° rotated from equator points
- 1 point on top

6. After the last point, RDS Data Collector calculates and show deviations. Check the reference sphere results and press “Finished”.

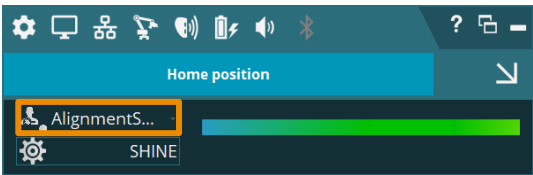


Use the Scanner

7. Mount the scanner to align or simply remove the reference probe (RS5 / AS1).



8. Wait for the scanner to be ready: RDS automatically select an “alignment” scanning profile with the appropriate settings for the scanner alignment sphere.



Field Measurement (steps 3-5)

For each of the 3 orientations of the scanner, scan the sphere to cover the target squares:

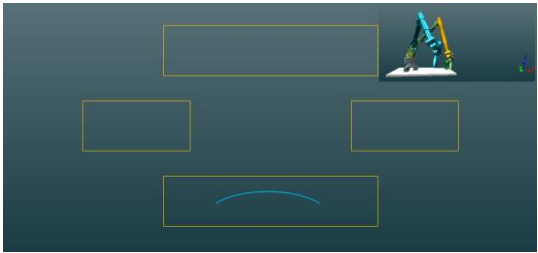
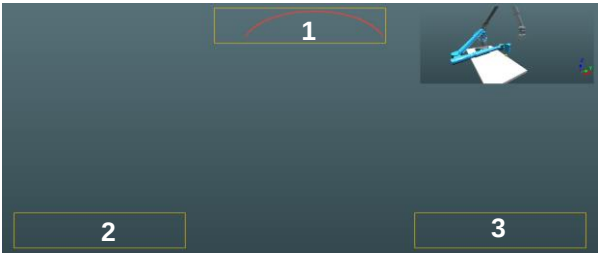
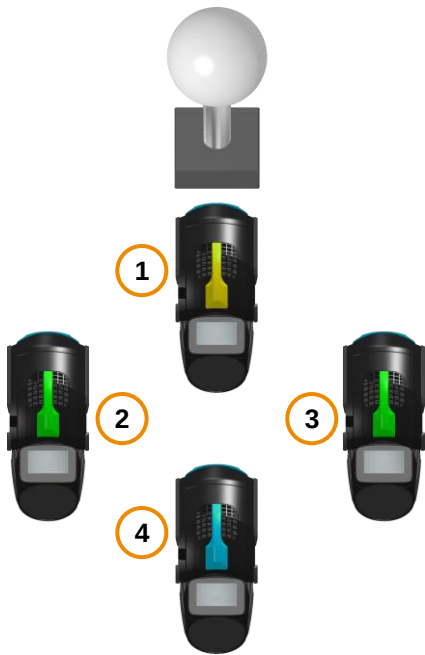
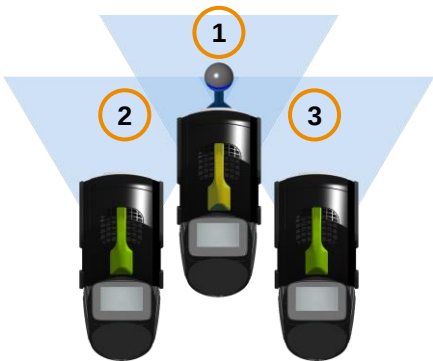
RS5 / AS1

3 targets

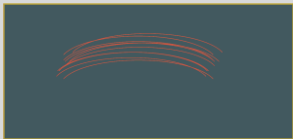
- 1 near centred position (#1)
- 1 far left position (#2)
- 1 far right position (#3).

4 targets

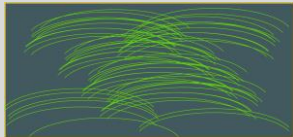
- 1 near centred position (#1)
- 2 mid positions (left #2, right #3)
- 1 far centred position (#4)



The scan lines must cover the target square:



x

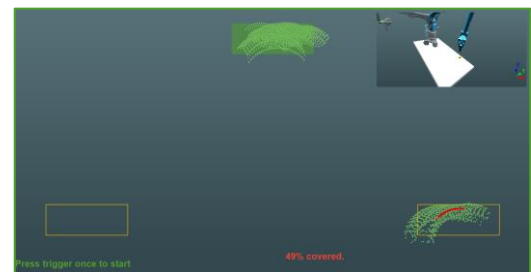


✓

The 3 wrist positions are the following: 3 positions, at 90° each other (X, Y and Z orientations)



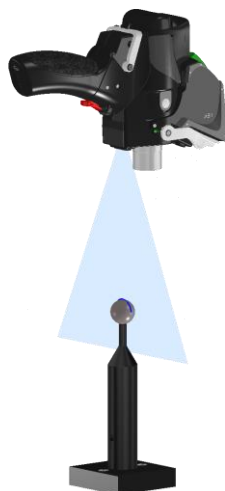
9. Position the scanner horizontally, at 0°, and scan, covering the target squares.
Validate by stopping the acquisition (main button).



10. Position the scanner horizontally, at 90°, and scan, covering the target squares.
Validate by stopping the acquisition (main button).

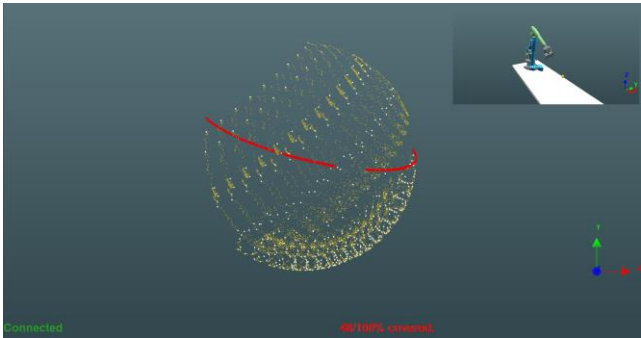


11. Position the scanner vertically, at 0°, and scan, covering the target squares.
Validate by stopping the acquisition (main button).



Global Sphere Measurement

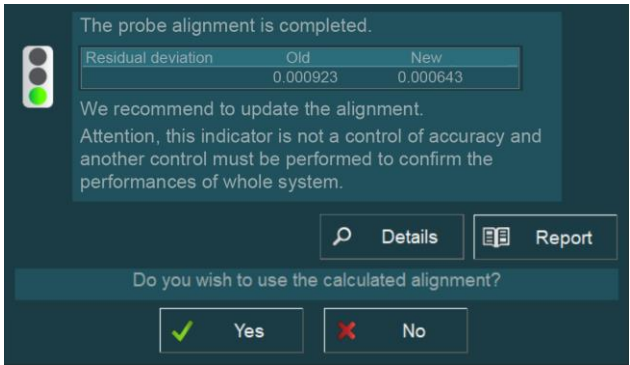
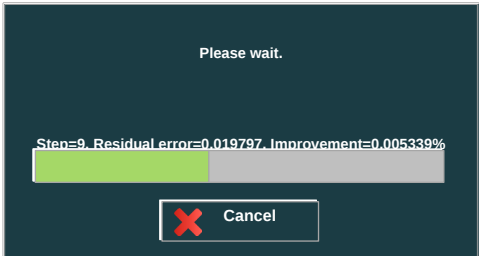
12. Digitize the whole sphere with the scanner: wait for the 85 % coverage at least to stop digitizing.
Validate by pressing to the right.



It is still possible to continue scanning even once the covered is completed, to enhance the quality of alignment, however, the calculation may be longer.

Calculation

13. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared (press on “Details”):



The alignment result is correct, updating the alignment is allowed:
click on Yes to memorise the new alignment or No to cancel this calculation.



The alignment result is insufficient, updating is not possible and performing a new alignment is required.
(Check the arm accuracy, the correct mounting of the arm and the artefact...)

Old or custom probes may not show the traffic light. The choice to validate or not the alignment can then be made based on the alignment value.



The probe alignment is completed.

Residual deviation	Old	New
	0.000923	0.000643

 Details  Report

Do you wish to use the calculated alignment?

 Yes  No



The residual error is Least Squares value of distances divided by data set number of points (to have a comparable value independent of number of points).

The report details are memorized in a “Probe Alignment Report.txt” file on C:\Users\Public\Documents\Romer\RDS\CalibData.

For more details, please contact your local agent.

14. Once the “Yes” button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.

 What is the name of the probe ?

RS5 Scanner

 OK  Cancel

 Specs will now be updated. Do you want to continue?

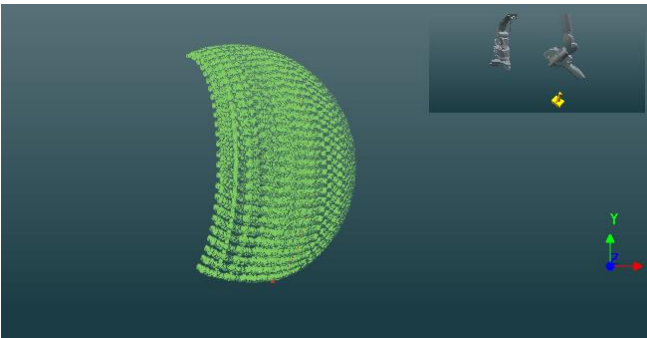
 Yes  No

 Specs have been correctly updated.

 OK

Checking

After the validation of the calculation, RDS proposes to do a checkout on the artefact sphere: scan stripes over the alignment sphere and validate with the right button or click on “Next”.



Then deviations are displayed:

Global sphere							
X	Y	Z	Max	stddev	Theo Diameter	Diameter	Deviation
675.5533	-72.2824	208.3068	0.0711	0.0208	25.4014	25.4984	0.0970

Sub-spheres quality						
Max	stddev	Theo Diameter	Diameter	Deviation	Rejected %%	
0.0711	0.0208	25.4014	25.4984	0.0970	0.0000	

◀◀ Back

▶▶ Finished

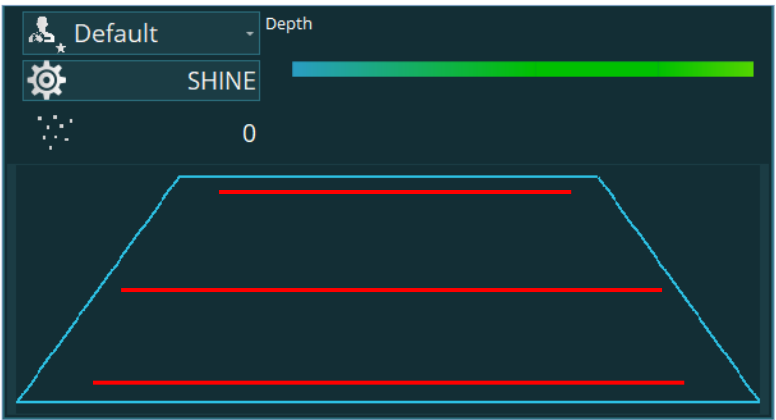
	▼ Results on the global sphere, using all sub spheres together		
	▼ Results on each sub sphere alone		
X;Y;Z	✓		Coordinates of the digitized sphere
Max	✓	✓	Maximum error to the digitized sphere
Stddev	✓	✓	Standard deviation of all the errors
Theo Diameter	✓	✓	Nominal diameter of the artefact
Diameter	✓	✓	Calculated diameter of the digitized sphere
Deviation	✓	✓	Error of the diameter value
Rejected %		✓	% of the points rejected for the calculation (points digitized not on the artefact)

In the present case, there is only one sub sphere, thus global sphere and sub sphere are identical.

5.6.3 Laser Scanner Alignment – Plane Methods (Arm)

These methods consist by measuring a reference artefact plane with reference probe (only for Plane_with_reference method), then by scanning it moving the scanner around the plane, 3 stripes must be taken:

- 1 near position
- 1 middle position
- 1 far position.



NOTICE

A low-quality plane may result in bad alignment.
Do not use another artefact plane than the provided one.

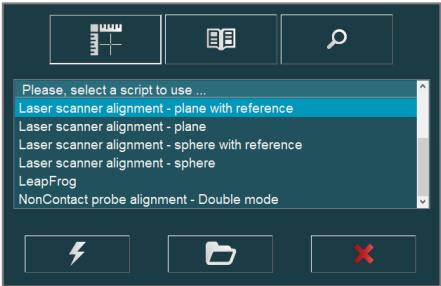
Principle

The scanner alignment needs a flat plane (not provided) and contains 3 steps:

	Measurement of the plane with reference probe (15mm Probe #1) (only “Plane with reference” method)
	Scan of the plane with the scanner to align
	Calculation and validation

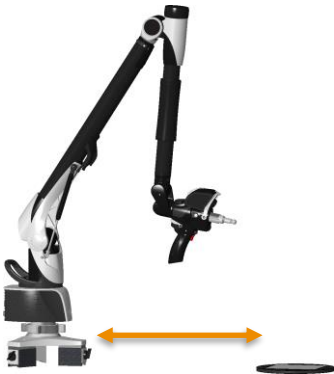
Startup (step1)

1. Select the script, and then run.



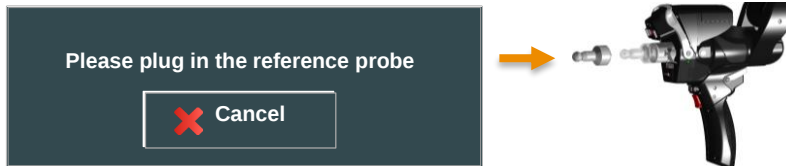
The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

- The plane should be placed so that the forearm and the wrist point straight down at the pole of the plane, as shown below.



Reference Plane (only for Plane_with_Reference Method)

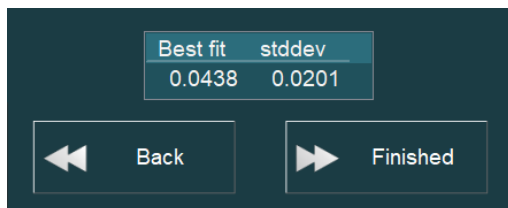
- Insert 15mm reference probe (no need to remove the scanner).



- Take 5 points on plane with 15mm ref probe.

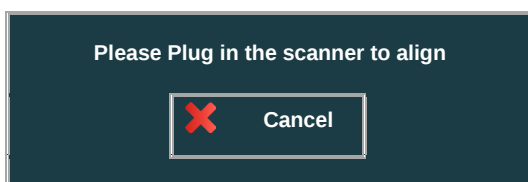


- Check reference plane results and "Validate".

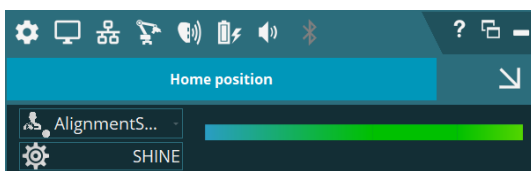


Use the Scanner

- Mount the scanner to align or simply remove the reference probe (RS5 / AS1).

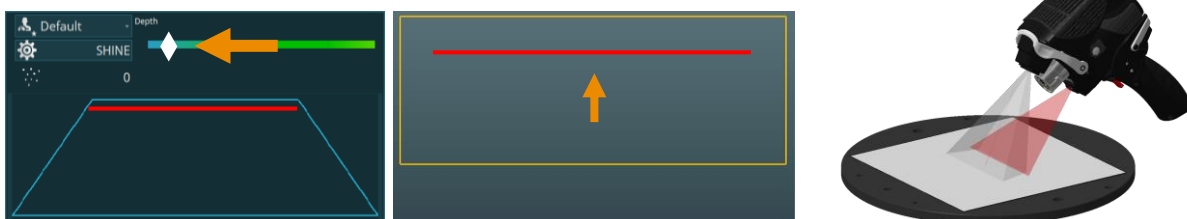


- Wait for the scanner to be ready: RDS automatically select an “alignment” scanning profile with the appropriate settings.

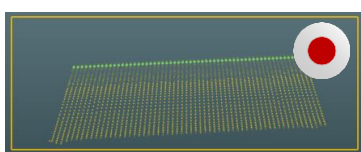


Take Low Position Scan Stripes

- Position the scanner at about 45° to the plane, in low position (close to the plane)



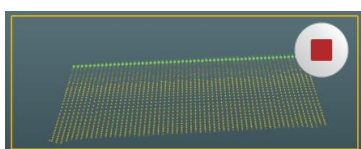
- Start acquiring stripes.



Rotate the scanner 360° around the plane, keeping low position.

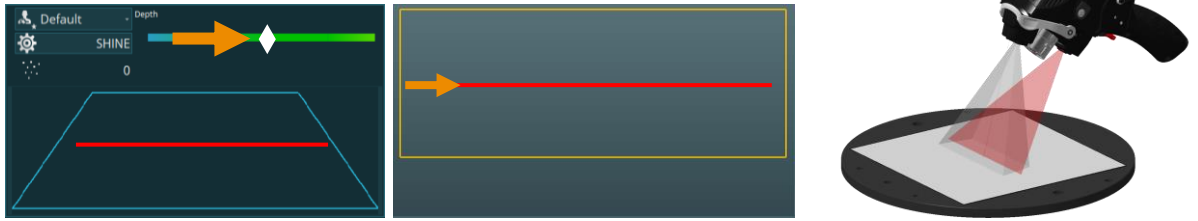


- Only once the coverage is 100%, stop acquiring stripes to validate and jump to next step.

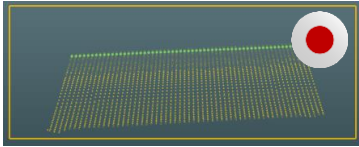


Take Middle Position Scan Stripes

11. Position the scanner at about 45° to the plane, in middle position (mid distance from the plane)



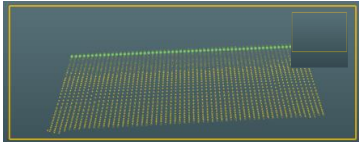
12. Start acquiring stripes.



Rotate the scanner 360° around the plane, keeping middle position.

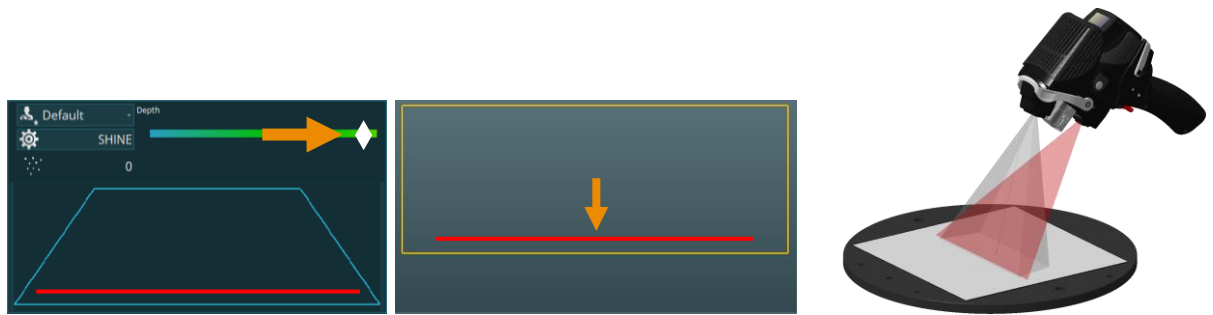


13. Only once the coverage is 100%, stop acquiring stripes to validate and jump to next step.

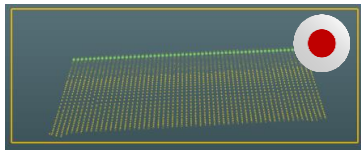


Take Far Position Scan Stripes

14. Position the scanner at about 45° to the plane, in far position (high distance from the plane)



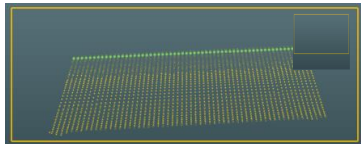
15. Start acquiring stripes.



Rotate the scanner 360° around the plane, keeping middle position.

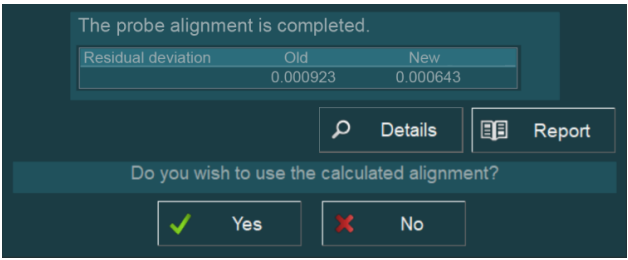
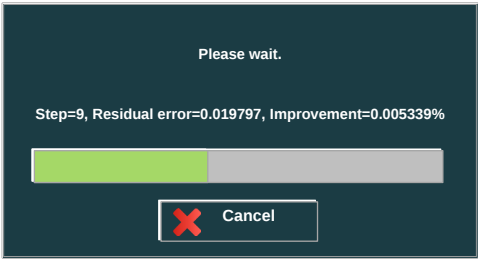


16. Only once the coverage is 100%, stop acquiring stripes to validate and jump to next step.



Calculation

17. Then the calculation starts: at the end of the calculation, the previous and new alignment result are compared:



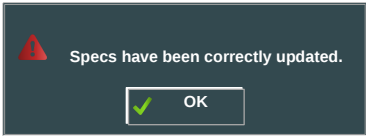
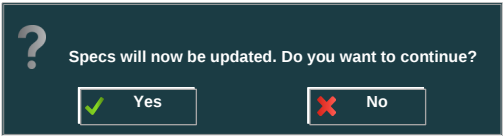
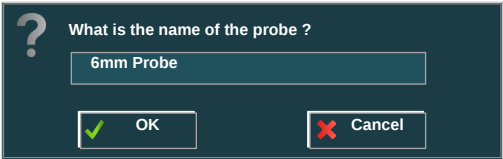


The residual error is Least Squares value of distances divided by data set number of points (to have a comparable value independent of number of points).

The report details are memorized in a "Probe Alignment Report.txt" file on C:\Users\Public\Documents\Romer\RDS\CalibData.

For more details, please contact your local agent.

18. Once the "Yes" button is clicked, RDS asks for the name to give to the probe: enter then the name to give to the probe and validate both next prompts to save the new alignment data into the memory of the arm.



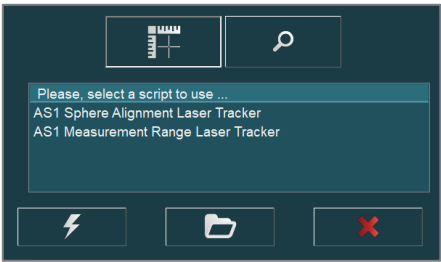
5.6.4 AS1 / LAS-XL Measurement Range (Trackers)

Prior and independently from the scanner alignment, Z-Scaling alignment can be operated. The alignment method consists by scanning a plane at 3 heights:

	Scan the plane from 3 heights (near, mid-range, far)
	Calculation and validation

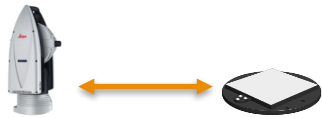
Startup

1. Select the script, and then run.



The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. The alignment plane that must be used should be placed between 3m and 5m from the tracker.



Plane Measurement

3. From the same orientation of the scanner, scan the plane to cover the 3 target squares:

- 1 near position (#1)
- 1 mid-range position (#2)
- 1 far position (#3).

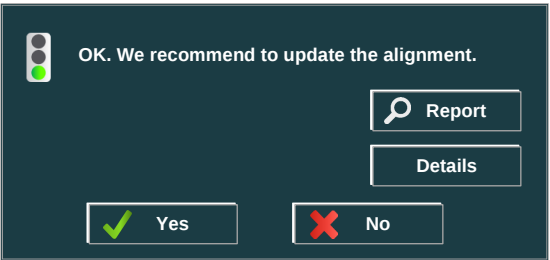
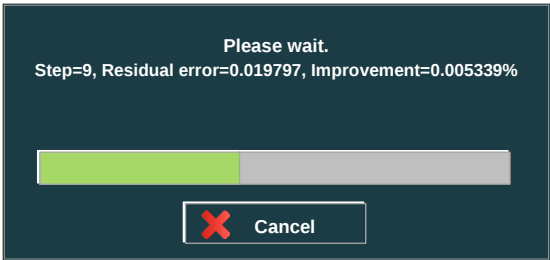


Once the coverage is completed in the background a verification of the plane quality and overlapping is done.

- If the check is passed, the calculation could be started.
- If the check failed the LAS-XL Data Validation dialog will be present showing the results of the check and providing the option to go back and remeasure the 3 planes.

Calculation

After all the measurements, the calculation automatically starts. When finished, RDS shows the status.



The details button shows the deviations details before and after calculation.

	The alignment result is correct, updating the alignment is allowed: click on Yes to memorise the new alignment or No to cancel this calculation.
	The alignment result is insufficient, updating is not possible and performing a new alignment is required.

5.6.5 Laser Scanners Alignment (tracker)



This script can be applied for the AS1, LAS, and LAS-XL laser scanners on the trackers.

As the scanner contains several faces, each face must be aligned independently from the others. The user can decide to align one face only or several faces. In this second case, the alignment script must be played once for each face.



This script is available for any face excepted the LAS-XL back face.

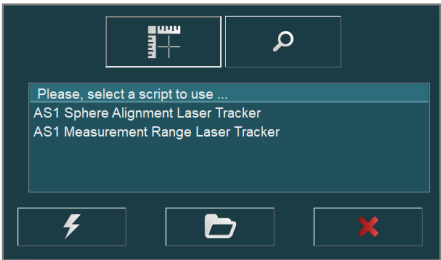
Once the process is started with one face, only this face can be used to complete the alignment.

The alignment method consists by scanning a sphere:

	Scan of one side of the sphere, covering the field of view of the scanner to align
	Scan of the whole sphere.
	Calculation and validation

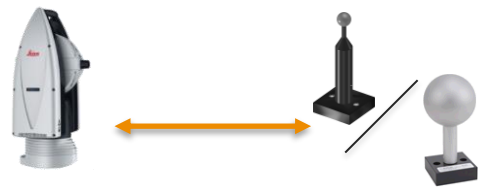
Startup

1. Select the script, and then run.

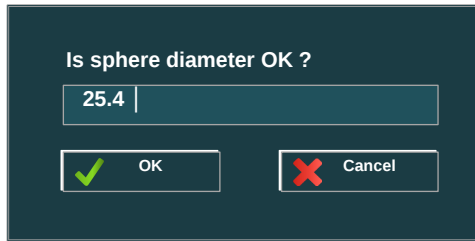


The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. The alignment sphere that must be used should be placed between 3m and 5m from the tracker.



3. When prompted, enter the diameter value.

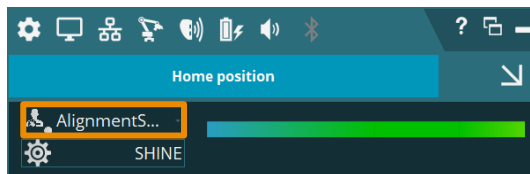


NOTICE

Do not use other artefact sphere than the provided one; it has been designed to give optimal results.

Use the Scanner

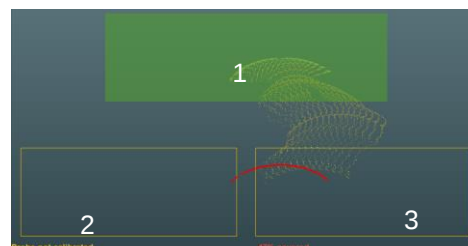
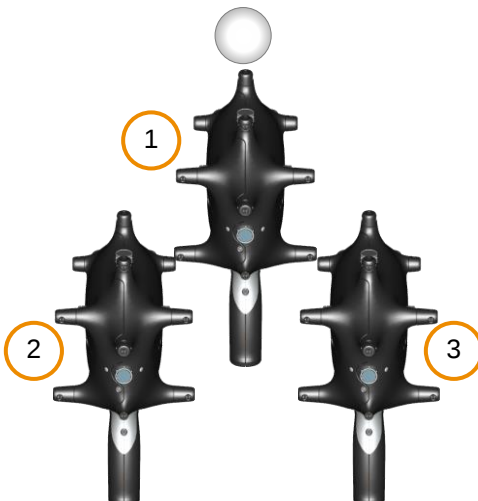
4. Wait for the scanner to be ready: RDS automatically select an “alignment” scanning profile with the appropriate settings for the scanner alignment sphere.



Any face of the scanner can be used, however, once the process started with one face, only this face becomes available.

Field Measurement

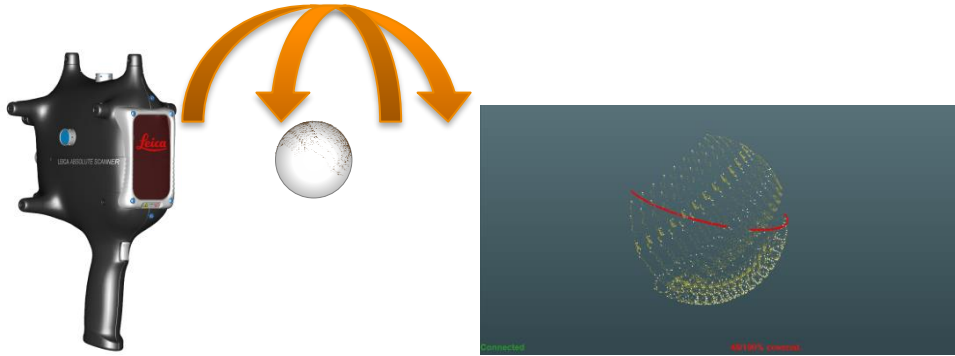
5. From the same orientation of the scanner, scan the sphere to cover the 3 target squares:
 - 1 near centred position (#1)
 - 1 far left position (#2)
 - 1 far right position (#3).



Once the coverage is completed and the button released, the script automatically jumps to the next step.

Global Sphere Measurement

6. Digitize the whole sphere with the scanner: wait for the 80 % coverage at least to stop digitizing.
Once the coverage is completed, press “Next” to validate the acquisition.



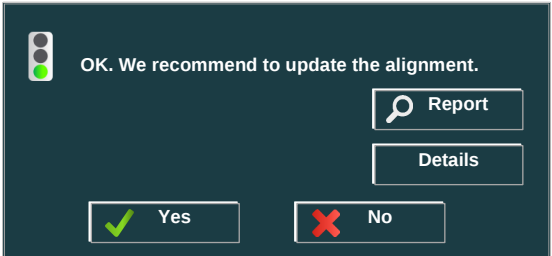
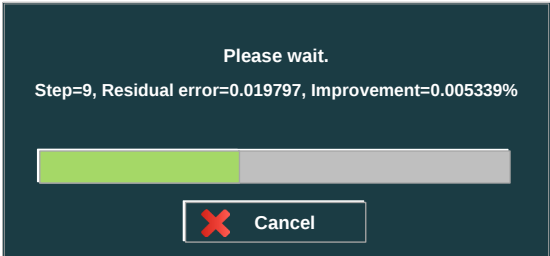
It is still possible to continue scanning even once the covered is completed, to enhance the quality of alignment, however, the calculation may be longer.

Also, the alignment will be enhanced if the entire scanline and the entire working range are used for the sphere measurement.

Calculation

After all the measurements, the calculation automatically starts.

At the end of calculation, RDS shows the status.



The details button shows the deviations details before and after calculation.



The alignment result is correct, updating the alignment is allowed:
click on Yes to memorise the new alignment or No to cancel this calculation.



The alignment result is insufficient, updating is not possible and performing a new alignment is required.



The residual error is Least Squares value of distances divided by data set number of points (to have a comparable value independent of number of points)

The report details are memorized in a “Probe Alignment Report.txt” file on C:\Users\Public\Documents\Romer\RDS\CalibData.

For more details, please contact your local agent.

5.6.6 LAS-XL Alignment – Back Face (tracker)

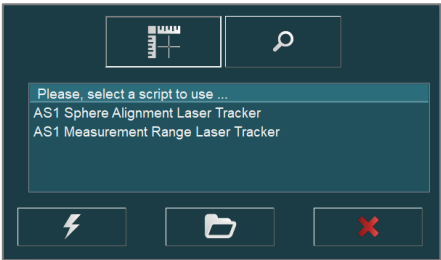
The back face of the LAS-XL requires a specific script for its alignment.

The alignment method is similar as for the other faces, but a preliminary step consists by scanning the artefact sphere with the other faces (sides and top) to get a reference sphere:

	Reference Scan of the sphere (any face of the scanner except back face)
	Scan of one side of the sphere, covering the field of view of the scanner to align (back face of the scanner only)
	Scan of the whole sphere (back face of the scanner).
	Calculation and validation

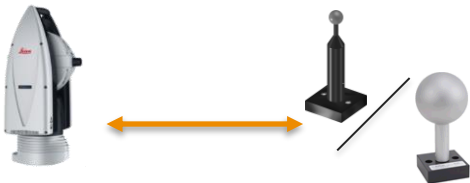
Startup

1. Select the script, and then run.

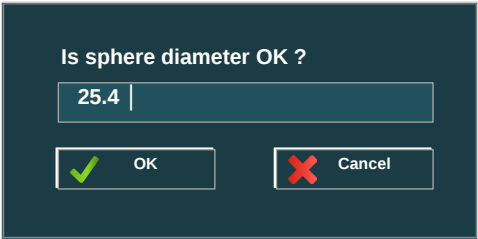


The System will prompt the user through each alignment step. Be sure to follow the instructions in each dialog box.

2. The alignment sphere that must be used should be placed between 3m and 5m from the tracker.



3. When prompted, enter the diameter value.

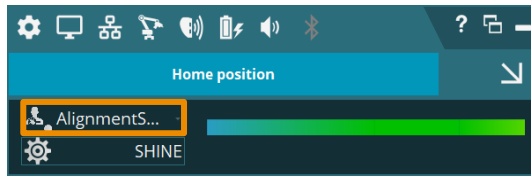


NOTICE

Do not use other artefact sphere than the provided one; it has been designed to give optimal results.

Use the Scanner

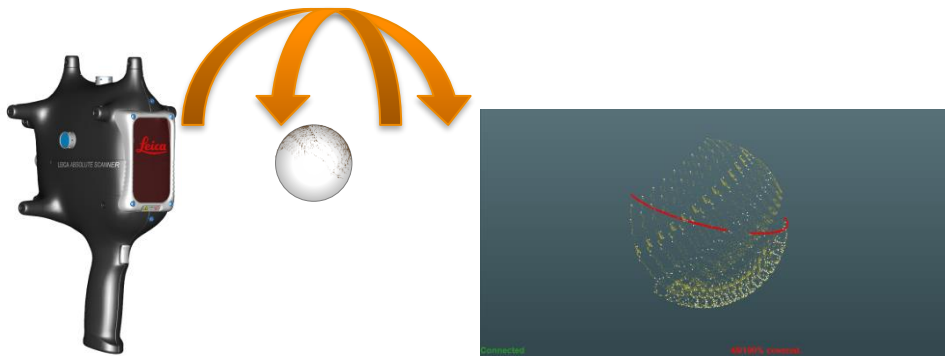
- Wait for the scanner to be ready: RDS automatically select an “alignment” scanning profile with the appropriate settings for the scanner alignment sphere.



Any face of the scanner can be used excepted the back face.

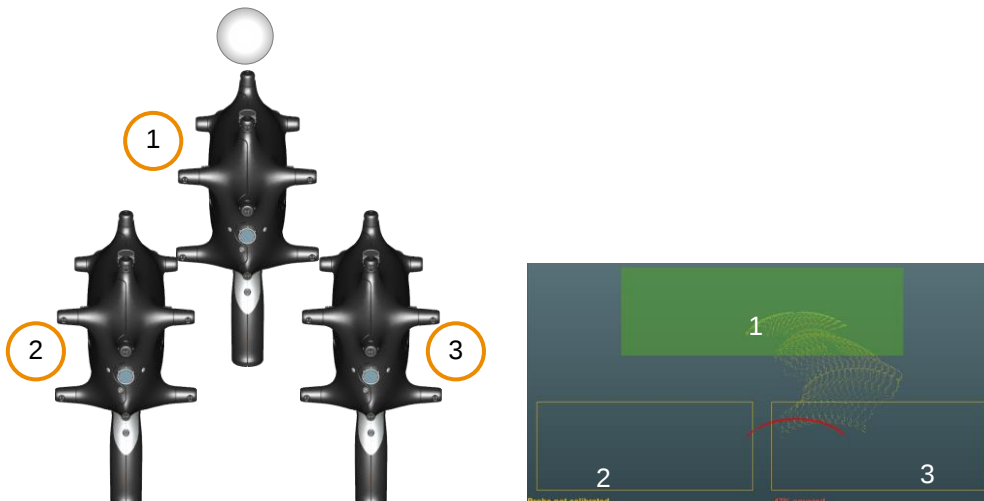
Reference Sphere Measurement

- Digitize the whole sphere with one of the sides or top faces of the scanner: wait for the 80 % coverage at least to stop digitizing. Once the coverage is completed, press “Next” to validate the acquisition.



Field Measurement with Back Face

- Use the back face: from the same orientation of the scanner, scan the sphere in order to cover the 3 target squares:
 - 1 near centred position (#1)
 - 1 far left position (#2)
 - 1 far right position (#3).

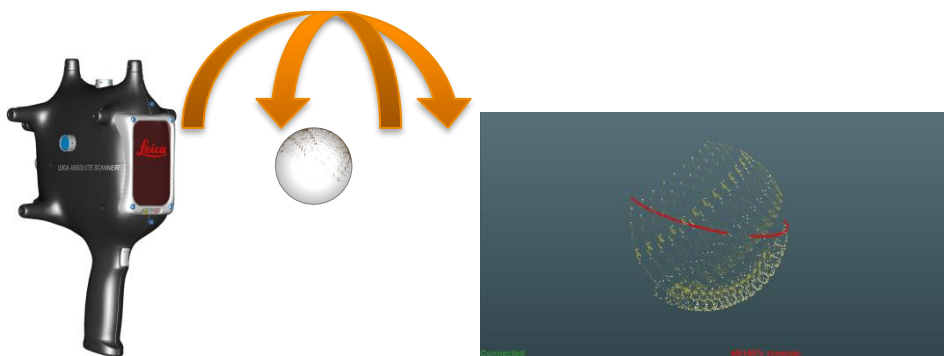


Once the coverage is completed and the button released, the script automatically jumps to the next step.

Global Sphere Measurement with Back Face

7. Keeping the back face, digitize the whole sphere with the scanner: wait for the 55 % coverage at least to stop digitizing.

Once the coverage is completed, press “Next” to validate the acquisition.

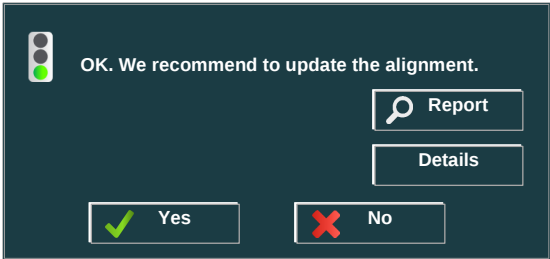
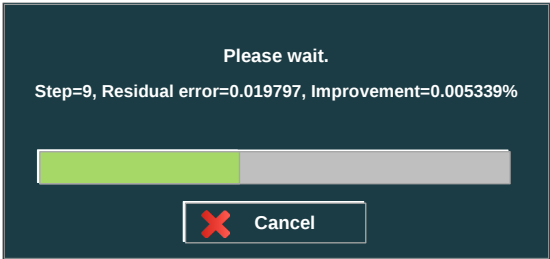


It is still possible to continue scanning even once the covered is completed, to enhance the quality of alignment, however, the calculation may be longer.

Calculation

After all the measurements, the calculation automatically starts.

At the end of calculation, RDS shows the status.



The details button shows the deviations details before and after calculation.

	The alignment result is correct, updating the alignment is allowed: click on Yes to memorise the new alignment or No to cancel this calculation.
	The alignment result is insufficient, updating is not possible and performing a new alignment is required.



The residual error is Least Squares value of distances divided by data set number of points (to have a comparable value independent of number of points)

The report details are memorized in a “Probe Alignment Report.txt” file on C:\Users\Public\Documents\Romer\RDS\CalibData.

For more details, please contact your local agent.

5.7 Leapfrog (arm)

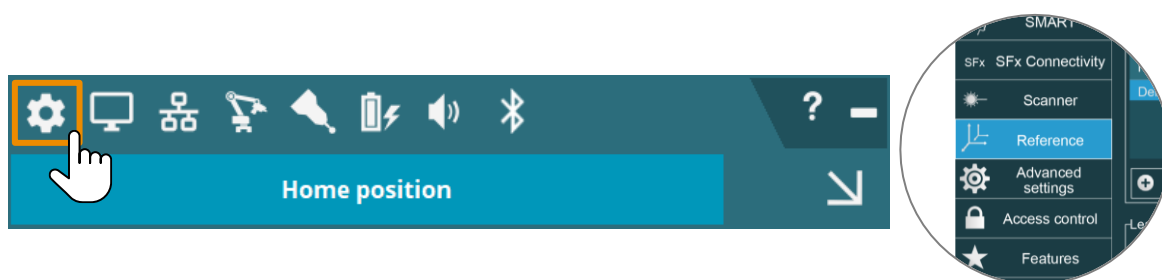
RDS Service can manage a leapfrog utility to be able to move the arm, keeping the memory of the original position. RDS Data Collector is used to calculate the displacement of the arm with a leapfrog.

The Leap-Frog script consists by measuring 3 points before moving the arm, then the same three points after moving the arm.

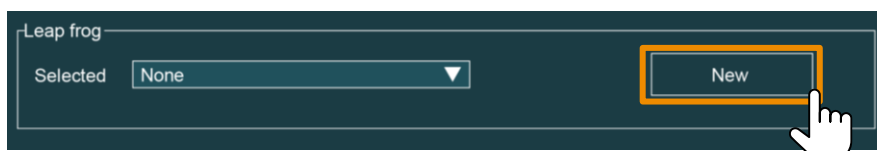
Method

In RDS Control Panel, access to new Leapfrog.

1. Open the RDS Control Panel > Tab Reference.

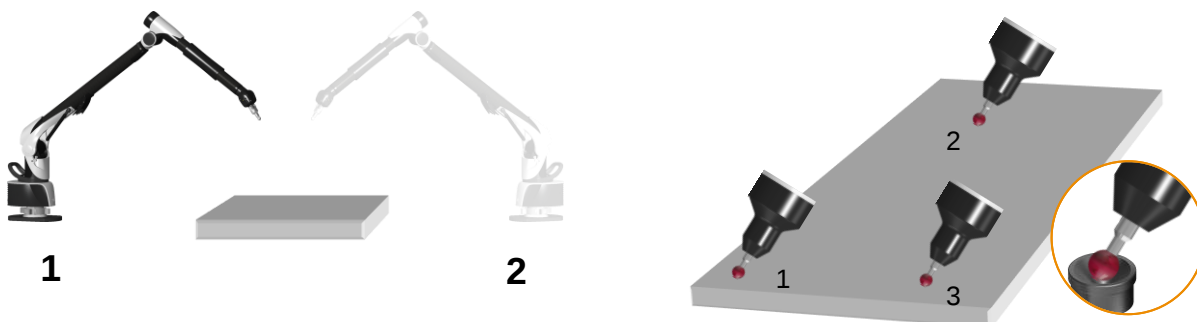


2. On the Leapfrog section, click on "New".

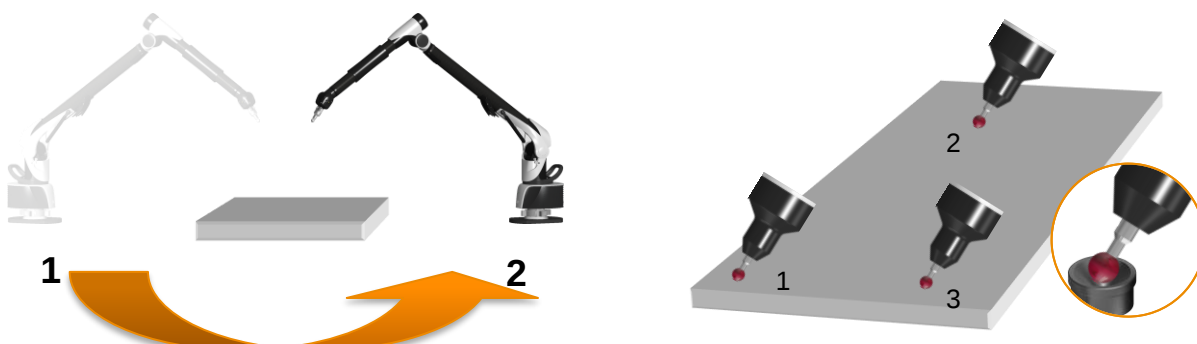


3. Place or correctly choose the points to probe: those points must be accurate points (cones, seats ...), not aligned and as distant as possible.

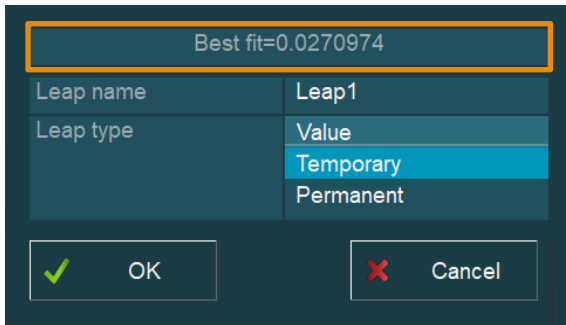
4. Probe the three points from the first position (notice the order).



5. When all points are probed, move the arm to the target position, (make sure it is correctly fixed) and probe again the points IN THE SAME ORDER.



6. Once all points are measured, RDS Data Collector calculates the displacement and provides a best-fit value. This value represents the loss of precision generated by this displacement.

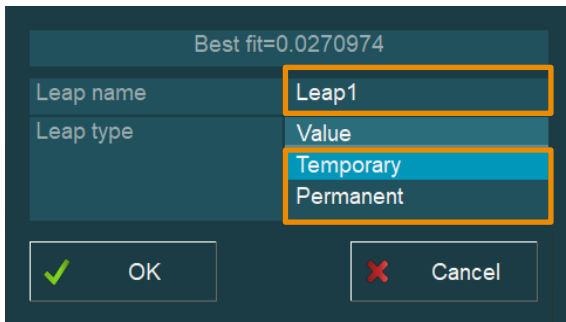


Best fit=0.0270974

Leap name	Leap1
Leap type	Value
	Temporary
	Permanent

☒ OK
 ☐ Cancel

7. Enter a name for this displacement and select if it is a temporary or permanent reference.



Best fit=0.0270974

Leap name	Leap1
Leap type	Value
	Temporary
	Permanent

☒ OK
 ☐ Cancel

8. Click on OK: it's over.



A second displacement is possible by the same way, then third ...however, a loss of accuracy may happen each time.

5.8 Calibrations Scripts (arm)

5.8.1 Overview

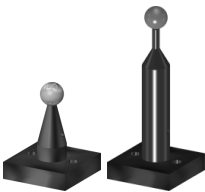
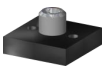
RDS provides a list of scripts for a recalibration of the instrument.
Main standard for articulated arms can be operated, but also specific scripts for scanner calibration.

	RA7	RA8	1.2	MG	
ISO 10360-12		✓			Probing size & form error: 20 points on a sphere (x2) Articulated location errors: 5x5 points on a sphere (x2) Length measurement errors: 3x5 distances on a length artefact (x7)
ISO 10360-2			✓	✓	Probing error: 20 points on a sphere (x1) Length measurement errors: 3x5 distances on a length artefact (x7)
ISO 10360-8 Annex D	✓	✓	✓		Calibration for scanners on a sphere.
ASME B89.4.22	✓	✓	✓		Single point articulation test: 10 points on a cone (x3) Effective diameter performance test: 9 Points on a sphere (x3) Volumetric performance test: 1 distance on a length artefact (20)

In the following chapters are briefly described the processes for the above standards. For more details, please refer to the standard itself.

Artefacts

Specific artefact may be needed for the calibrations:

Sphere artefact	
Seat (or cone)	
Steps bar	
Ball bar	
Cone bar	

5.8.2
 ISO 10360-12 Calibration

The ISO 10360-12 standard consists by 3 steps:

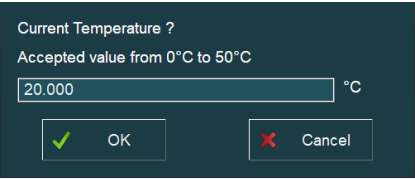
- Length measurement errors test ($E_{UNI,MPE}$): 5 distances measured 3 times on a length artefact. This operation is repeated 7 times at different locations.
- Probing size ($P_{FORM,Sph.1x25}$) and form errors ($P_{FORM,Sph.1x25}$) tests: 25 points measured on a sphere. This operation is repeated twice on 2 specific locations.
- Articulated location errors test ($L_{DIA,5x5,Art,MPE}$): 5 points are measured 5 times on a sphere with different orientations of the wrist. This operation is repeated twice on 2 specific locations.

An optional test (ISO 10360-12 Annex D) is proposed:

- Single point articulation test (SPAT): 10 points measured on a seat (cone) moving the elbow. This operation is repeated 3 times on 3 specific locations.

5.8.2.1
 Artefact Temperature

To compensate the [thermal expansion of the artefact](#), the current temperature of the artefact must be entered ($0^{\circ}C \leq T^{\circ}C \leq 50^{\circ}C$). To skip the compensation, simply leave 20°C and press OK.

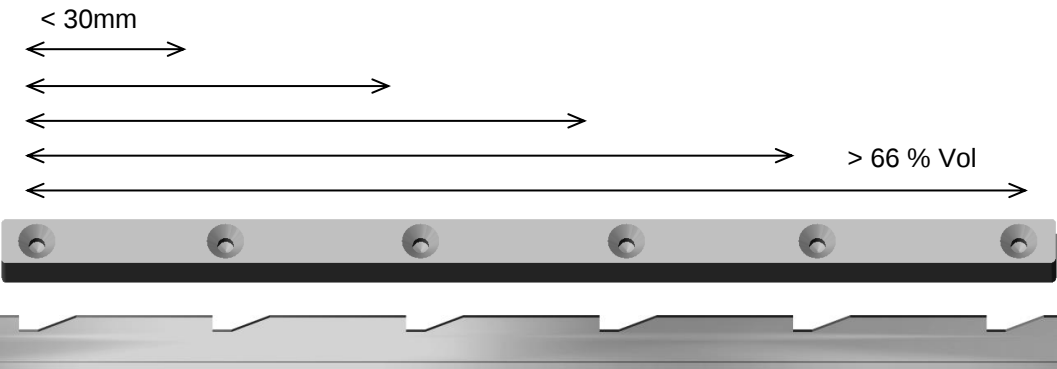


5.8.2.2
 Nominal Values of the Artefacts

2 artefacts must be used, and their nominal dimensions must be entered.

Length bar

The length artefact must contain 6 features (cones, spheres or steps), giving 5 lengths. The shortest length must be less than 30mm, the greatest at least 66% of useful measurement range.



Size of arm	Shortest length	Recommended Greatest length
1200	< 30mm	792 mm
1500		1000 mm
2000		1400 mm
2500		1700 mm
3000		2000 mm
3500		2400 mm
4000		2700 mm
4500		3000 mm

When prompted, select the artefact and enter the 5 distances.

Artefact

Step Bar - Default.artefact

Physical properties

Property	Value	Unit
L_01_02	20.0000	mm
L_01_03	40.0000	mm
L_01_04	300	mm
L_01_05	400	mm
L_01_06	500	mm
L_01_07	600	mm
L_01_08	700	mm

Other properties

Property	Value
Description	52 Steps
Last certification date	01/05/2021 12:00:00
Modification date	03/07/2021 17:08:02

✓

✗

Sphere (10mm < Ø < 51mm)

Enter the diameter of the sphere.

ISO 10360-12 : Sphere Diameter

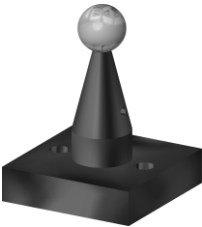
Min = 10mm

Max = 51mm

25.4000

✓ OK

✗ Cancel



5.8.2.3 Length Measurement Errors Test

Description

For each location, the 5 lengths of the length bar artefact are measured 3 times.

For the 7 measurements of the 5 lengths, all the combinations of elbow orientations must be used. However, for each of the 3 measurements of a length on one location of the bar, the same orientation must be used.

See example below.

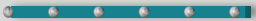
Lg	Incorrect			Correct			Rule
	M1	M2	M3	M1	M2	M3	
1	◀◀	◀◀	◀◀	◀◀	◀◀	◀◀	Each of the 3 repeat measures uses the same orientation, but successive lengths must be different
2	◀◀	◀◀	◀◀	◀▲	◀▲	◀▲	
1	▶◀	▶◀	▶▶	▶◀	▶◀	▶◀	The 3 repeat measures of a length must use the same orientation.
2	◀▶	◀▶	▶▶	▲▶	▲▶	▲▶	

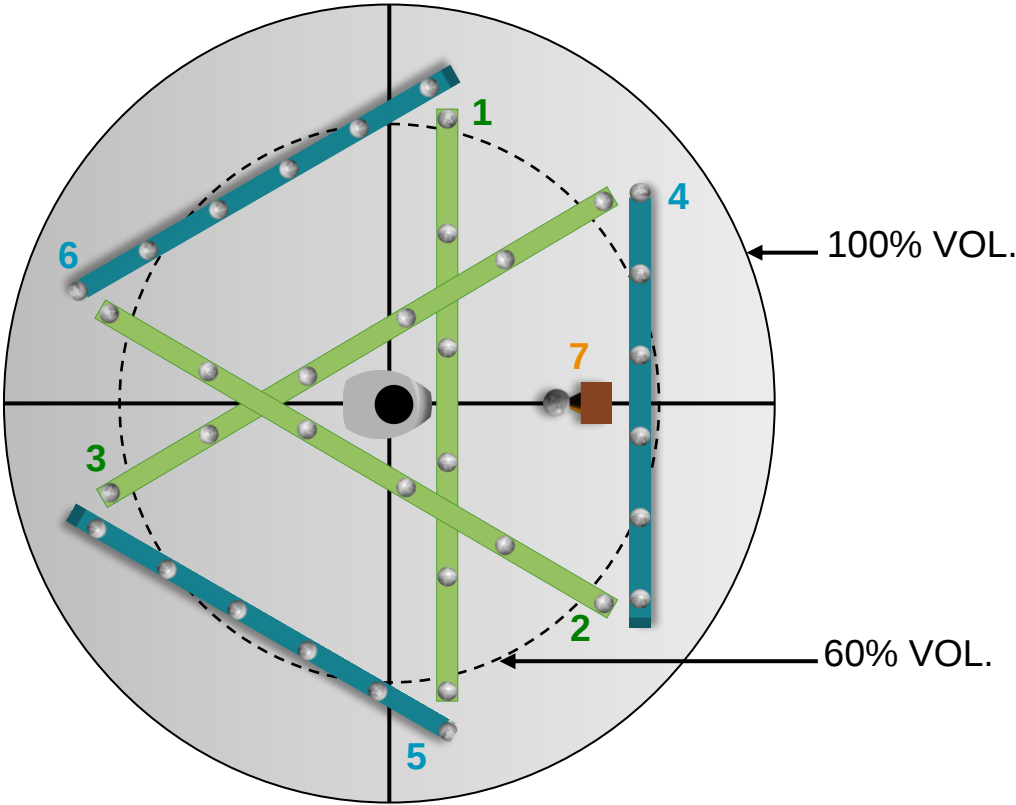
Mx: Measurement N°x | ◀: Elbow left | ▲: Elbow Overhead | ▶: Elbow right



The scripts in RDS Data Collector show the appropriate orientations, always ensure to respect the RDS recommendations.

The length artefact is measured on 7 locations around the arm, respecting the description below.

	Pos.	Bar inclination	Distance from Arm	Height
	1	Horizontal	Near	Low
	2	Horizontal	Near	Low
	3	Horizontal	Near	Low
	4	45°	Medium	Mid
	5	45°	Medium	Mid
	6	45°	Medium	Mid
	7	Vertical	Medium	Mid

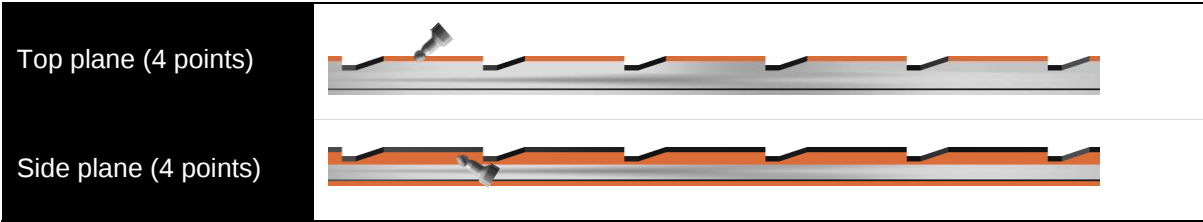


Remeasuring: maximum 5 of the 35 sets of 3 repeated measurements may have one of the 3 values outside the acceptance criteria. Each such failed measurement shall be remeasured 3 times at the relevant position. All the remeasured values must respect the acceptance criteria.

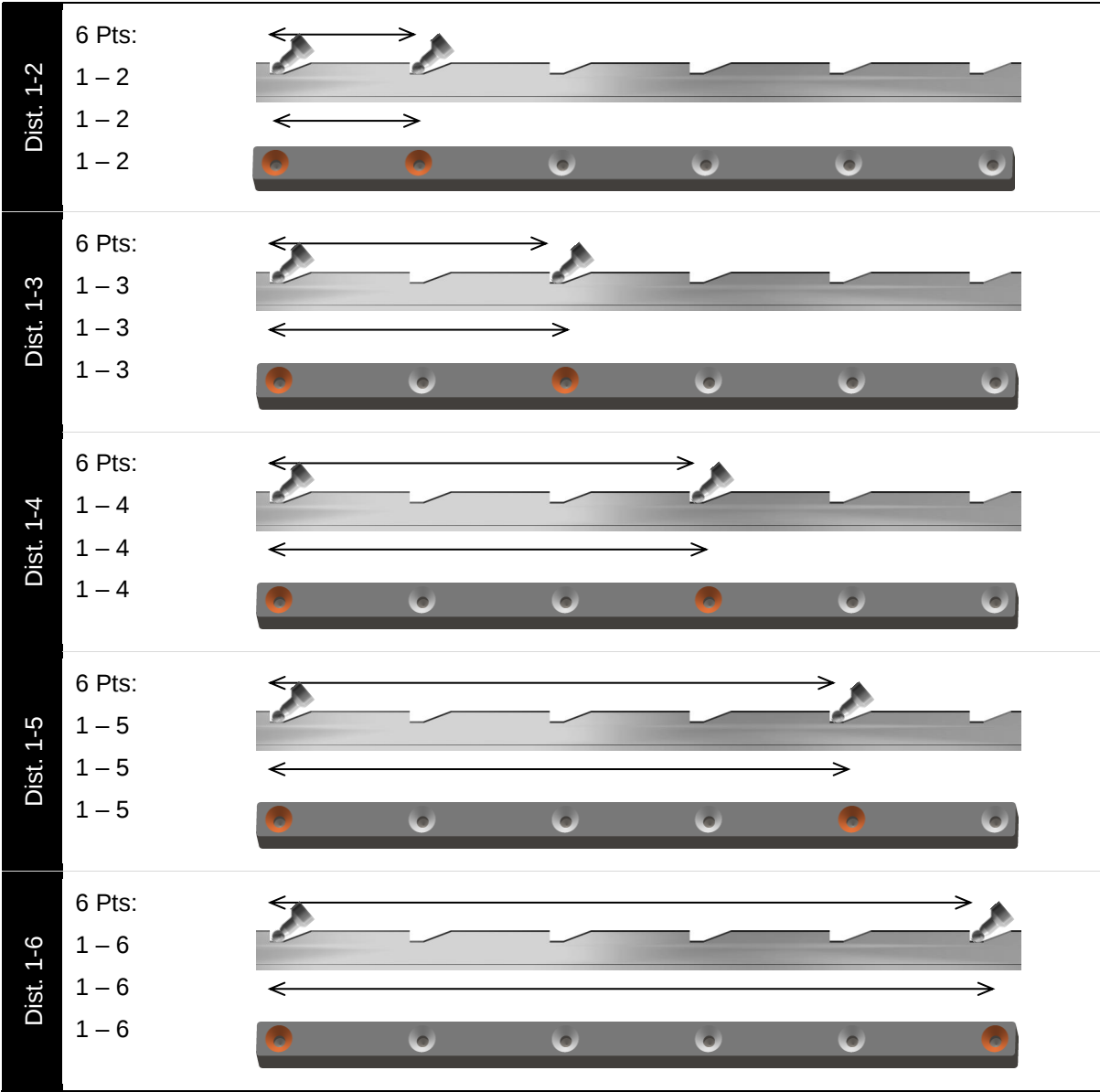
Measurement

Measure the 7 sets of 5 lengths: for each:

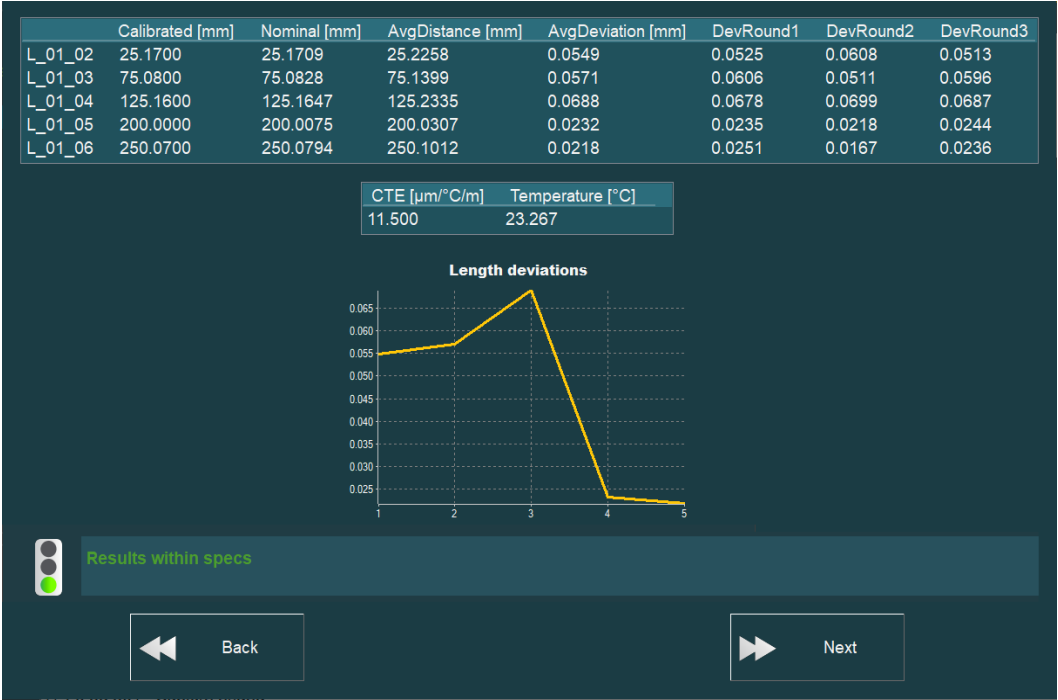
1. Measure first Top and Side planes (Step bar only)



2. Then measure the 5 distances 3 times:



3. At the end of each position, RDS Data Collector shows the deviations.



Calibrated value	Dimension given with the artefact (calibrated value at 20°C).
Nominal value	Compensated dimension of the artefact (calibrated value with the thermal compensation).
Average distance	Measured average distance from the 3 measurements on the 2 steps of the artefact.
Average deviation	Difference between the average measured distance and the theoretical distance.
DevRound (1/2/3)	Details of the 3 deviations between the measurement and theoretical values.
Highlighted	Out of specs values are highlighted.
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
Graphic	Shows the 5 average deviations.
	According to the specifications of the instrument, RDS shows whether the step passed or not. (hidden if no specifications are available)

4. Press “Next” to go to next step, or “Back” to rerun the step.

5.8.2.4 Probing Size and Form Errors Test

2 locations: the artefact sphere (10mm < Ø < 51mm) is located in front of the instrument at short-range of the measuring volume, and then at long-range.



For each location, 25 Points must be measured on the sphere (without rotating the stylus or changing the direction of the stylus) following the rules below.

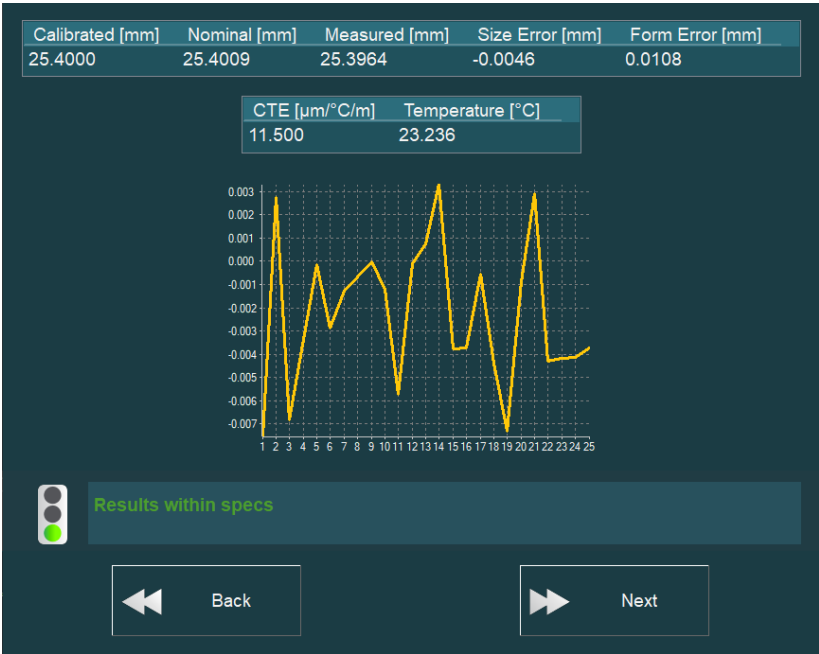
1 Pt on Pole	
4 Pts 22.5° below Pole	
8 Pts 45° below pole and rotated 22.5° from previous group	
4 Pts 67.5° below pole and rotated 22.5° from previous group	
8 Pts on equator, and rotated 22.5° from previous group	



The probe tip must always be moved out from the artefact sphere for each point. Do not take the points by gliding the tip on the artefact sphere.

Process

Measure the sphere with the 25 specified points for both locations.
At the end of the step, RDS Data Collector shows the deviations.



Calibrated value	Dimension given with the artefact (calibrated value at 20°C).
Nominal value	Compensated dimension of the artefact (calibrated value with the thermal compensation).
Measured	Measured diameter (least square)
Size Error	Error of the diameter value (P_{size})
Form Error	Extreme deviations from the 25 measured points (P_{form})
Highlighted	Out of specs values are highlighted.
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
Graphic	Shows the deviations of the 25 points.
	According to the specifications of the instrument, RDS shows whether the step passed or not. (hidden if no specifications are available)

Press “Next” to go to next step, or “Back” to rerun the step.

Remeasuring: if the performance of probing form error or probing size error is not verified for both locations of the test, the relevant test shall be repeated once only at both locations of the test.

5.8.2.5 **Articulated Location Errors Test**

2 locations: the artefact sphere (10mm < Ø < 51mm) is located in front of the instrument at short-range of the measuring volume, and then at long-range.



For each location, points must be measured on the sphere from 5 sides of the sphere. For each side, 1 point on the pole plus 4 points on the equator, distributed at 90° each other.

From top	From X-	From Y-	From X+	From Y+
5 points	5 points	5 points	5 points	5 points

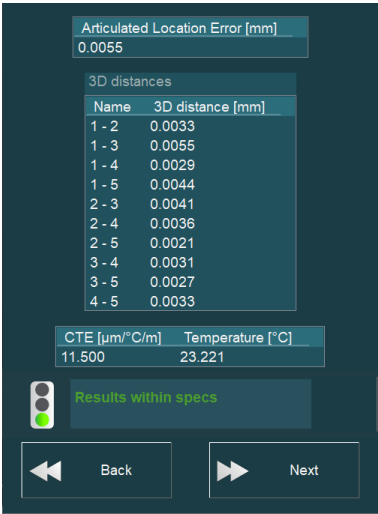


The probe tip must always be moved out from the artefact sphere for each point. Do not take the points by gliding the tip on the artefact sphere.

Process

Measure the 5x5 points on the sphere with 5 specified orientations of the wrist. Proceed on both locations (near / far).

At the end of each step, RDS Data Collector shows the deviations.



Articulated Location Error	Error between the centres of spheres (L_{DIA} – diameter of the sphere made from the centres of the 5 spheres).
3D distances	Details of the sphere-to-sphere distances.
Highlighted	Out of specs values are highlighted.
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
	According to the specifications of the instrument, RDS shows whether the step passed or not. (hidden if no specifications are available)

Press “Next” to go to next step, or “Back” to rerun the step.



Remeasuring: if the performance of articulated location error is not verified for both locations of the test, the relevant test shall be repeated once only at both locations of the test.

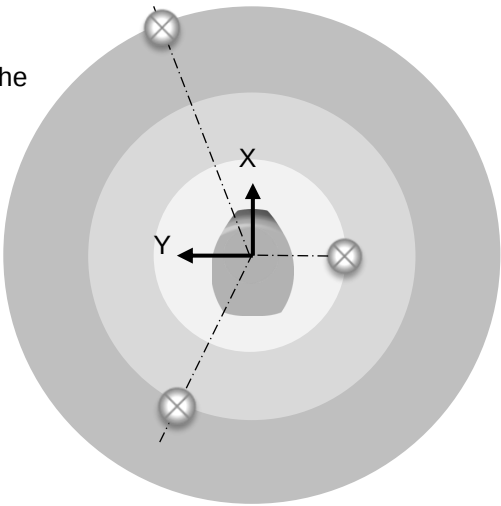


Check if all results are fitting with the specifications of the measuring system. If they do not, please contact your Service Centre.

5.8.2.6 **Single Point Articulation Test (Annex D – optional)**

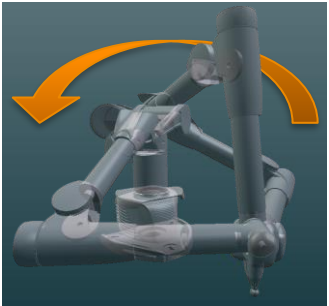
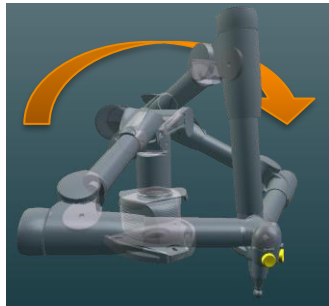
10 points are measured on a seat (e.g. a cone), articulating the axes of the arm. This operation is repeated on 3 different locations:

- 20% Vol – 0° rotation
- 50% Vol – 120° rotation
- 80% Vol – 240° rotation



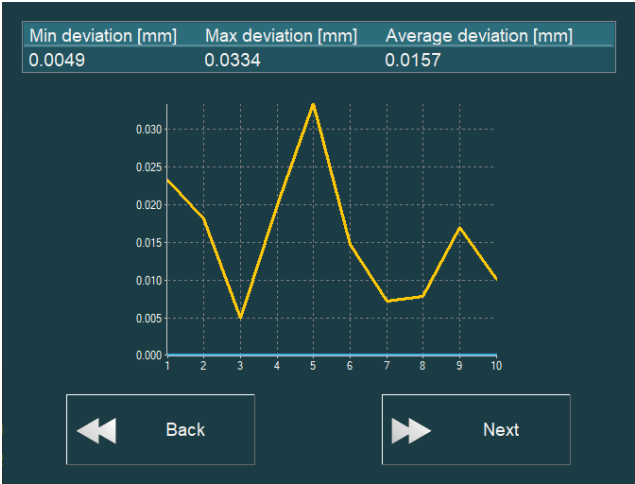
For each location, 10 points are measured:

Point	
Pt 1	Elbow left down
Pt 2	Elbow left up
Pt 3	Elbow overhead
Pt 4	Elbow right up
Pt 5	Elbow right down
Twist wrist 180° then same positions	
Pt 6	Elbow right down
Pt 7	Elbow right up
Pt 8	Elbow overhead
Pt 9	Elbow left up
Pt10	Elbow left down



Process

Measure the 10 points. At the end the step, RDS Data Collector shows the deviations.



Min / Max deviations	Extreme deviations from the 10 points and the middle point
Average deviation	Mean value from the 10 points to middle point
Graphic	Shows the deviations of all the 10 points, and mean value.

Press “Next” to go to next step, or “Back” to rerun the step.

5.8.2.7 **Results**

At the end of the process, RDS generates a report including the results.

On this report, are shown:

Probing size and form errors	
P _{Form.Sph.1x25}	Form error
P _{Size.Sph.1x25}	Deviation on the measurement of the diameter.
Articulated location errors	
L _{Dia.5x5:Art}	Max centre error of the 5 sub-spheres for each location
Length measurement errors	
E _{Uni}	

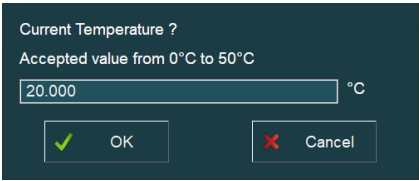
5.8.3 ISO 10360-2 Calibration (1.2 Arm)

The ISO 10360-2 standard can be used for 1.2 size arms and consists by 3 steps:

- Length measurement errors test ($E_{UNI,MPE}$): 5 distances measured 3 times on a length artefact. This operation is repeated 7 times at different locations.
- Probing size ($P_{FORM,Sph.1x25}$) and form errors ($P_{FORM,Sph.1x25}$) tests: 25 points measured on a sphere.

5.8.3.1 Artefact Temperature

To compensate the [thermal expansion of the artefact](#), the current temperature of the artefact must be entered ($0^{\circ}\text{C} \leq T^{\circ}\text{C} \leq 50^{\circ}\text{C}$). To skip the compensation, simply leave 20°C and press OK.



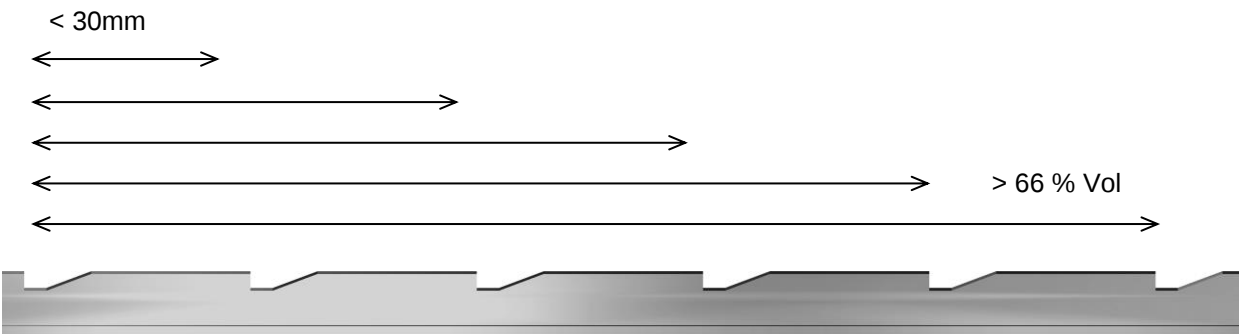
5.8.3.2 Nominal Values of the Artefacts

2 artefacts must be used, and their nominal dimensions must be entered.

Length bar

The length artefact must contain 6 features (steps), giving 5 lengths.

The shortest length must be less than 30mm, the greatest at least 66% of useful measurement range.



Cone bar cannot be used for an ISO 10360-2 calibration

Size of arm	Shortest length	Recommended Greatest length
1200	< 30mm	792 mm
1500		1000 mm
2000		1400 mm
2500		1700 mm
3000		2000 mm
3500		2400 mm
4000		2700 mm
4500		3000 mm

When prompted, select the artefact and enter the 5 distances.

Artefact
Step Bar - Default.artefact

Physical properties

Property	Value	Unit
L_01_02	20.0000	mm
L_01_03	40.0000	mm
L_01_04	300	mm
L_01_05	400	mm
L_01_06	500	mm
L_01_07	600	mm
L_01_08	700	mm

Other properties

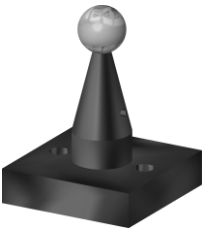
Property	Value
Description	52 Steps
Last certification date	01/05/2021 12:00:00
Modification date	03/07/2021 17:08:02

Sphere (10mm < Ø < 51mm)

Enter the diameter of the sphere.

ISO 10360-12 : Sphere Diameter

Min = 10mm
Max = 51mm



5.8.3.3 Length Measurement Errors Test

Description

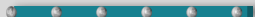
For each location, the 5 lengths of the length bar artefact are measured 3 times.

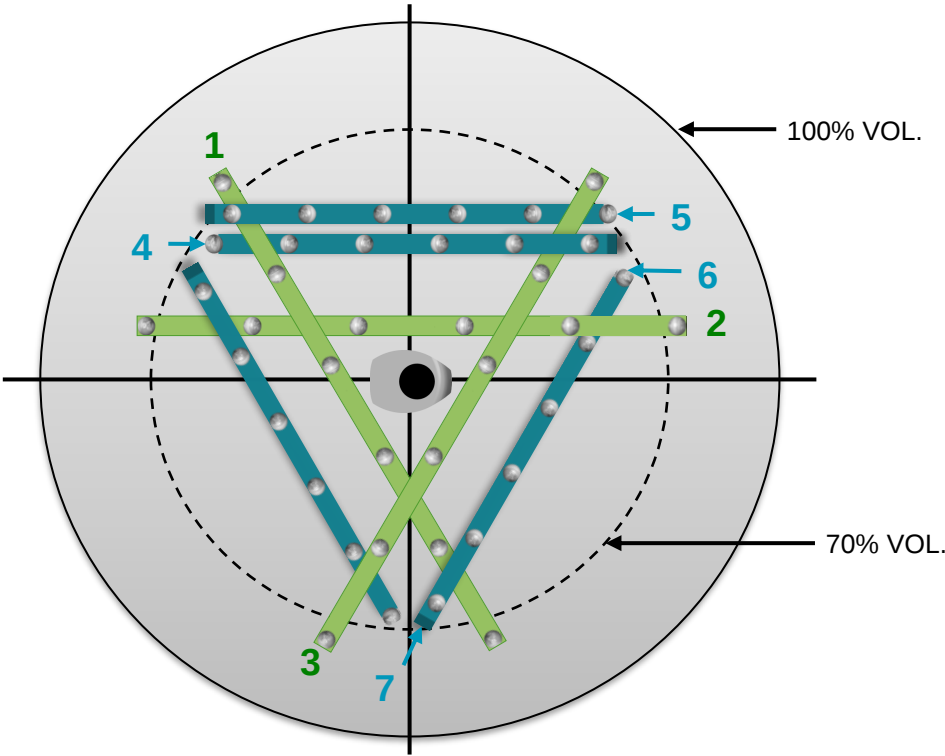
	1st Side	2nd Side
1 st measurement	Elbow Left	Elbow Right
2 nd measurement	Elbow Right	Elbow Left
3 rd measurement	Elbow Left	Elbow Left



The scripts in RDS Data Collector show the appropriate orientations, always ensure to respect the RDS recommendations.

The length artefact is measured on 7 locations around the arm, respecting the description below.

	Pos.	Bar inclination	Distance from Arm	Direction	Height
	1	Horizontal	Near	Tangent	Low
	2	Horizontal	Near	Tangent	Low
	3	Horizontal	Near	Tangent	Low
	4	45°	Medium	Tangent	Mid
	5	45°	Medium	Tangent	Mid
	6	45°	Medium	Tangent	Mid
	7	45°	Medium	Tangent	Mid




Remeasuring: maximum 5 of the 35 lengths may have one of the 3 values out of specs and then shall be remeasured 10 times. All the remeasured values must respect the acceptance criteria.

Measurement

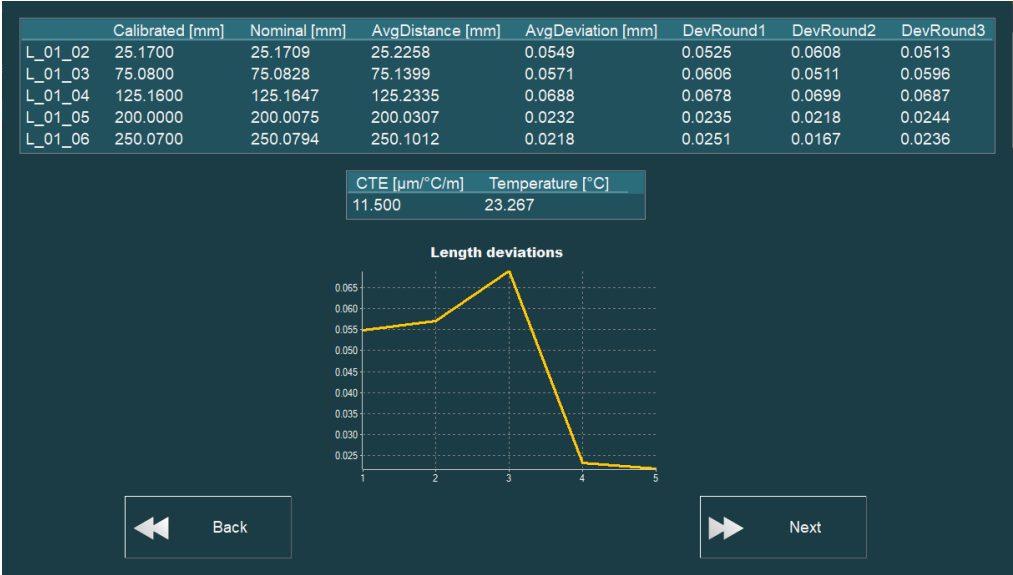
Measure the 7 sets of 5 lengths: for each:

- 1. Measure first Top and Side planes.

Top plane (4 points)	
Side plane (4 points)	

2. Then measure the 5 distances 3 times:

Dist. 1-2	1 – 2	
	1 – 2	
	1 – 2	
Dist. 1-3	1 – 3	
	1 – 3	
	1 – 3	
Dist. 1-4	1 – 4	
	1 – 4	
	1 – 4	
Dist. 1-5	1 – 5	
	1 – 5	
	1 – 5	
Dist. 1-6	1 – 6	
	1 – 6	
	1 – 6	



Calibrated value	Dimension given with the artefact (calibrated value at 20°C).
Nominal value	Compensated dimension of the artefact (calibrated value with the thermal compensation).
Average distance	Measured average distance from the 3 measurements on the 2 steps of the artefact.
Average deviation	Difference between the average measured distance and the theoretical distance.
DevRound (1/2/3)	Details of the 3 deviations between the measurement and theoretical values.
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
Graphic	Shows the 5 average deviations.

3. Press “Next” to go to next step, or “Back” to rerun the step.

5.8.3.4 Probing Size and Form Errors Test

1 location: the artefact sphere (10mm < Ø < 51mm) is located in front of the instrument at mid-range of the measuring volume.



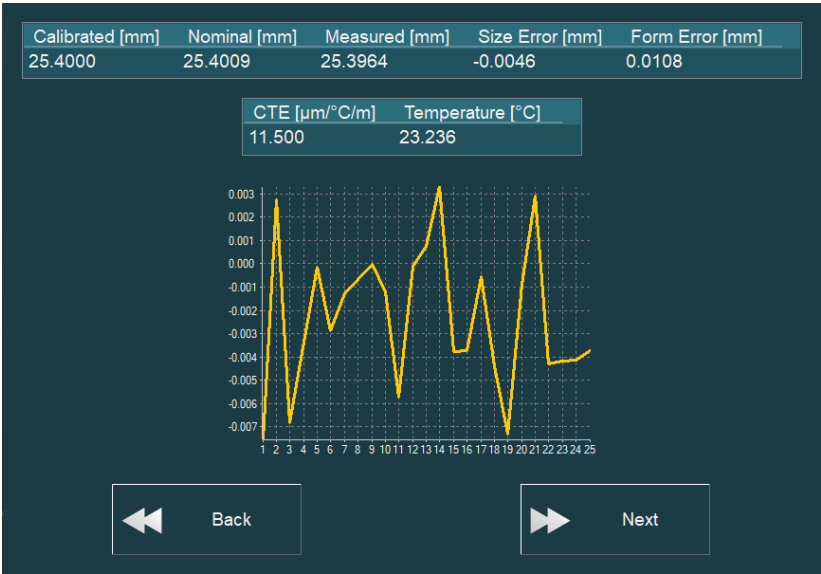
For each location, 25 Points must be measured on the sphere (without rotating the stylus or changing the direction of the stylus) following the rules below.

1 Pt on Pole	
4 Pts 22.5° below Pole	
8 Pts 45° below pole and rotated 22.5° from previous group	
4 Pts 67.5° below pole and rotated 22.5° from previous group	
8 Pts on equator, and rotated 22.5° from previous group	



The probe tip must always be moved out from the artefact sphere for each point. Do not take the points by gliding the tip on the artefact sphere.

At the end of the step, RDS Data Collector shows the deviations.



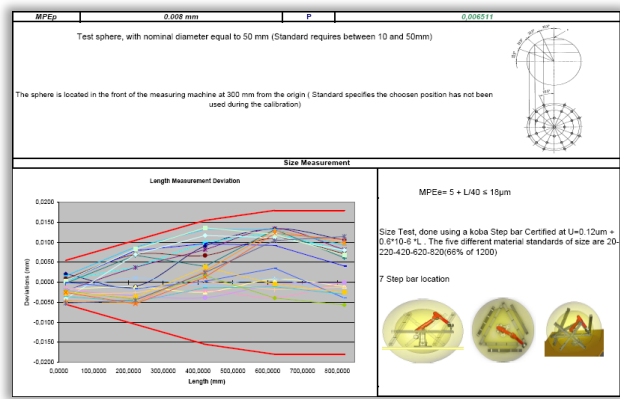
Calibrated value	Dimension given with the artefact (calibrated value at 20°C).
Nominal value	Compensated dimension of the artefact (calibrated value with the thermal compensation).
Measured	Measured diameter (least square)
Size Error	Error of the diameter value (P_{SIZE})
Form Error	Extreme deviations from the 25 measured points (P_{FORM})
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
Graphic	Shows the deviations of the 25 points.

Remeasuring: if the performance of probing form error or probing size error is not verified for both locations of the test, the relevant test shall be repeated once only at both locations of the test.

Press “Next” to go to next step, or “Back” to rerun the step.

5.8.3.5 Results

At the end of the process, RDS generates a report including the results.



5.8.4

 B89 Calibration

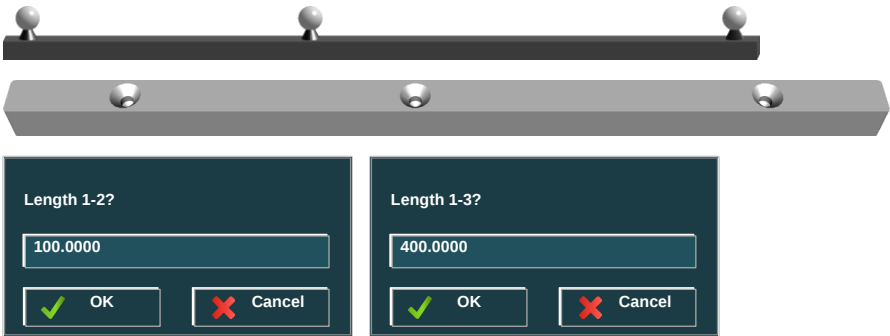
The ASME B89.5.22 standard consists by 3 steps:

Single point articulation test	10 points measured on a seat moving the elbow of the arm. This operation is repeated 3 times at different locations.
Effective diameter performance test	9 points measured on a sphere. This operation is repeated 3 times.
Volumetric performance test	1 distance measured on a length artefact at 20 different locations. Short or long distance depending on the location.

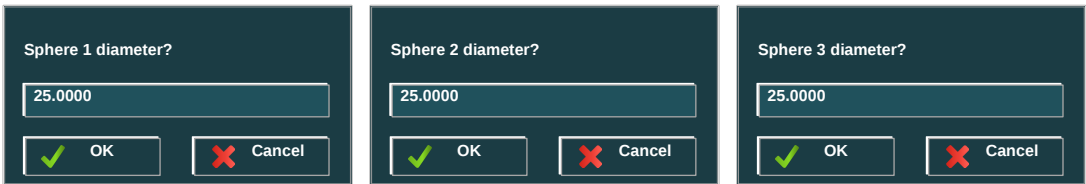
5.8.4.1

 Nominal Values of the Artefact

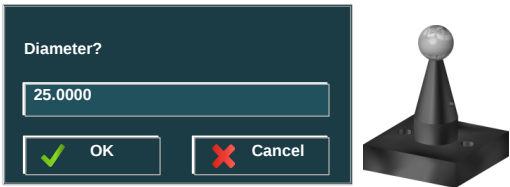
1. Enter the 2 lengths values that will be used.



2. Ball bar: enter the diameter of the spheres.



3. Enter the diameter of the Diameter test sphere.

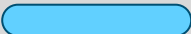


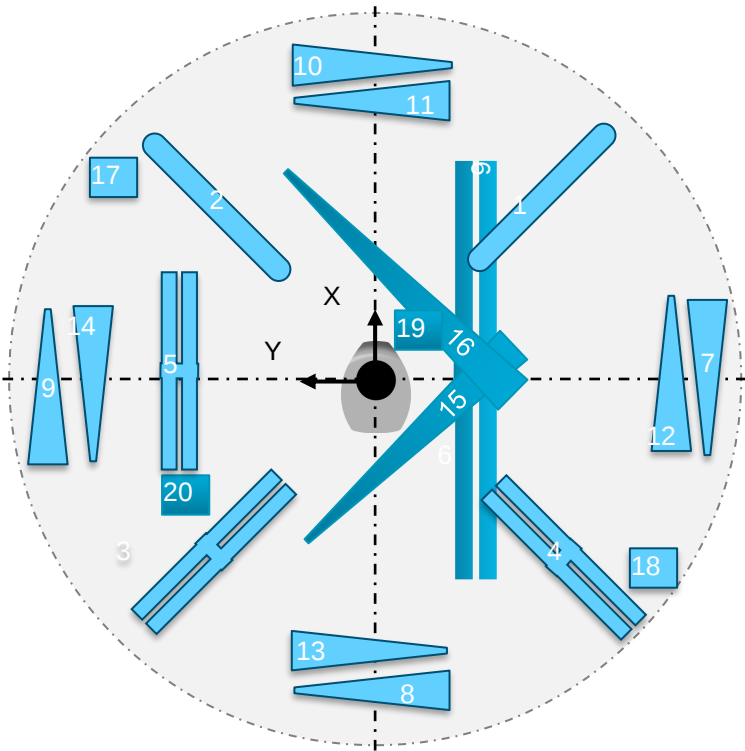
5.8.4.2 Volumetric Performance Test:

A set of 20 lengths are measured in the measurement volume of the arm. Depending on the position, a short or a long length must be used.

	Short (between 50% and 75% of radial length of Arm)
	Long (between 120% and 150% of radial length of Arm)

Either a single artefact with both needed lengths, either 2 different artefacts can be used. Cone bar or Step bar can be used.

20 locations of measurement (1 length measurement only for each, short or long)							
		Length	Incline	Distance	Height	Direction	Quadrant
	1	Short	Horizontal	Near	Low	Radial	8
	2	Short	Horizontal	Near	Low	Radial	5
	3	Short	Horizontal	Near	High	Radial	2
	4	Short	Horizontal	Near	High	Radial	3
	5	Short	Horizontal	Far	High	Tangent	1&2
	6	Long	Horizontal	Near	High	Tangent	3&4
	7	Short	45°	Far	Medium	Tangent	4&7
	8	Short	45°	Far	Medium	Tangent	6&3
	9	Short	45°	Far	Medium	Tangent	1&6
	10	Short	45°	Far	Medium	Tangent	1&8
	11	Short	45°	Far	Medium	Tangent	5&4
	12	Short	45°	Far	Medium	Tangent	5&2
	13	Short	45°	Far	Medium	Tangent	2&7
	14	Short	45°	Far	Medium	Tangent	3&8
	15	Long	45°	Near	Medium	Tangent	2&8
	16	Long	45°	Near	Medium	Tangent	1&7
	17	Short	Vertical	Far	Medium	Tangent	1&5
	18	Short	Vertical	Far	Medium	Tangent	7&3
	19	Long	Vertical	Near	Medium	Tangent	2&6
	20	Long	Vertical	50%	Medium	Tangent	4&8



Process

Measure the 20 lengths: for each, measure both spheres or cones of the artefact with 5 points each. At the end of the step, RDS Data Collector shows the deviations.

The probe tip must always be moved out from the artefact sphere for each point. Do not take the points by gliding the tip on the artefact sphere.

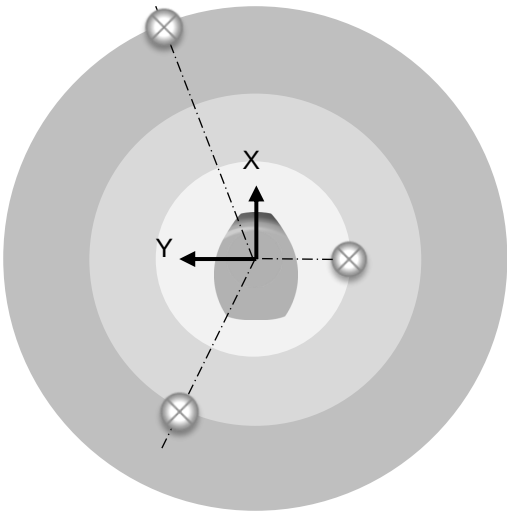
Best-fit on each sphere	Maximum deviation from the 5 points to the mean sphere. (Ball bar only)	
Theoretical distance	Value entered on step1	
Average distance	Measured distance from the centre of the 2 mean spheres.	
Deviation	Error between the Average distance and the Theoretical distance.	

Press “Finished” to go to next step, or “Back” if a mistake has been done.

5.8.4.3 Single Point Articulation Test

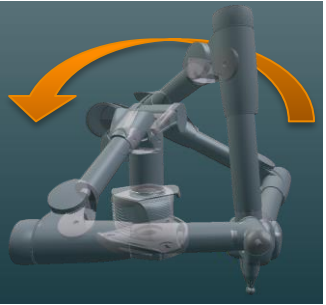
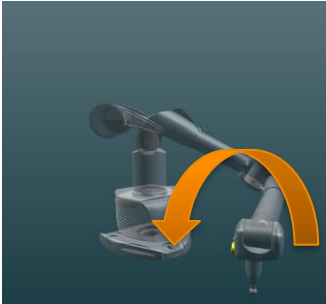
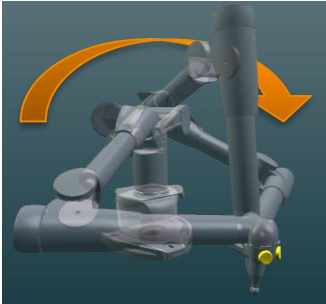
10 points are measured on a seat (e.g. a cone), articulating the axes of the arm. This operation is repeated on 3 different locations:

- 20% Vol – 0° rotation
- 50% Vol – 120° rotation
- 80% Vol – 240° rotation



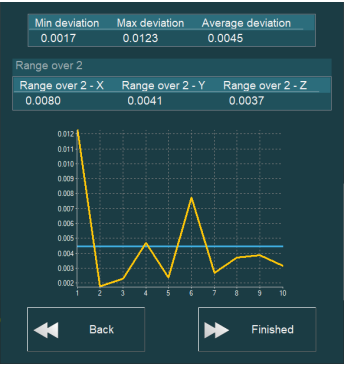
For each location, 10 points are measured:

Point	
Pt 1	Elbow left down
Pt 2	Elbow left up
Pt 3	Elbow overhead
Pt 4	Elbow right up
Pt 5	Elbow right down
Twist wrist 180° then same positions	
Pt 6	Elbow right down
Pt 7	Elbow right up
Pt 8	Elbow overhead
Pt 9	Elbow left up
Pt10	Elbow left down



At the end of the step, RDS Data Collector shows the deviations.

Min / Max deviations	Extreme deviations from the 10 points and the middle point
Average deviation	Mean value from the 10 points to middle point
Range	Range between min and max
Graphic	Shows the deviations of all the 10 points, and mean value.



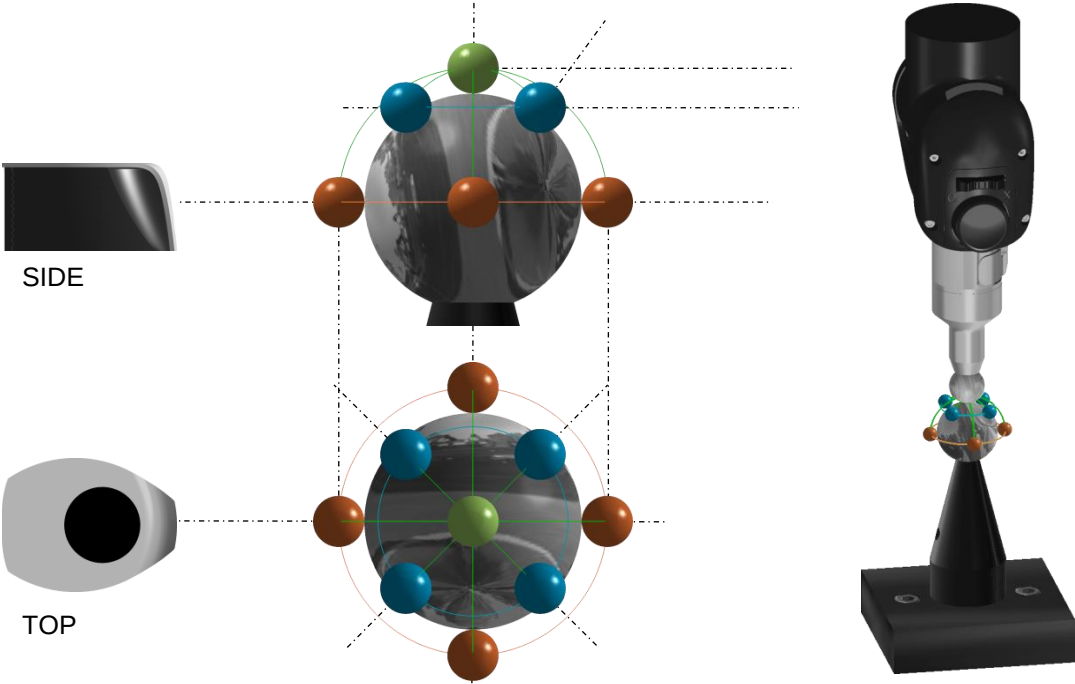
Press “Finished” to go to next step, or “Back” if a mistake has been done.

5.8.4.4 Effective Diameter Performance Test

A sphere artefact is measured 3 times at the same location (50% of measurement capacity).

9 points for each measurement

- 4 points on Equator equally distributed
- 4 points at 45° latitude, equally distributed, 45° rotated from Equator points
- 1 point on top



The probe tip must always be moved out from the artefact sphere for each point. Do not take the points by gliding the tip on the artefact sphere.

Measure the sphere 3 times at the same place, with 9 points for each sphere.

At the end of the step, RDS Data Collector shows the deviations.

Theoretical diameter	Value entered on step1	
Diameter	Diameter of the measured sphere (least squares)	
Min / Max deviations	Extreme deviations from the 9 points and the theoretical diameter (based on the calculated best-fitted sphere centre)	
Graphic	Shows the deviations of all the 9 points, and mean value.	

Press “Finished” to go to next step, or “Back” if a mistake has been done.



Check if all results are fitting with the specifications of the measuring system. If they do not, please contact your Service Centre.

5.8.4.5 Package Creation

Once all the steps have been played, RDS asks if a package should be created for Hexagon Server.



At the end of the Length test, a result file is created in the Data Collections folder: "B89 lengths report.txt".

Arm ID	17				
Generated by	RDS Data Collector v6.2.0				
Generation date	2021/09/22 12:19:18				
Volumetric performance Test					
	LReal	LTheo	Dev	Dev ²	
1	380.061227		380.05816	0.00306698	9.4064E-06
2	380.058819		380.05816	0.00065916	4.3449E-07
3	380.067791		380.05816	0.00963135	9.2763E-05
4	380.079741		380.05816	0.02158138	0.00046576
5	380.057451		380.05816	0.00032316	5.0252E-07
6	800.080774		800.087573	-0.00654771	4.6225E-05
7	380.058483		380.05816	-0.00137491	1.0443E-07
8	380.051612		380.05816	0.00417557	4.2872E-05
9	380.056785		380.05816	0.00252183	1.8904E-06
10	380.062336		380.05816	0.00367906	1.7435E-05
11	380.060682		380.05816	0.00162056	6.3596E-06
12	380.061839		380.05816	-0.00128998	1.3535E-05
13	380.059781		380.05816	-0.00967752	2.6262E-06
14	380.05687		380.05816	-0.01094185	1.664E-06
15	800.077895		800.087573	0.00832515	9.3654E-05
16	800.076631		800.087573	0.00771158	0.00011972
17	380.066485		380.05816	0.01349986	6.9308E-05
18	380.065872		380.05816	-0.0003814	5.9468E-05
19	800.101073		800.087573	0.00306698	0.00018225
20	800.087191		800.087573	0.00306698	0.00018225
Max Dev	0.0215838				
Range	0.0325223				
2 RMS	0.0132358				

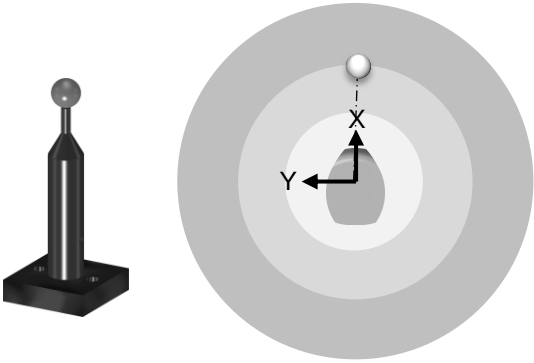
5.8.5 ISO 10360-8 Annex D

5.8.5.1 Description

RDS Data Collector provides a script to perform the Scanner+Arm calibration on a sphere according to the ISO 10360-8 Annex D standard.

The script consists by scanning an artefact sphere at a mid-range location in front of the arm with 5 orientations of the elbow and 5 orientations of the scanner.

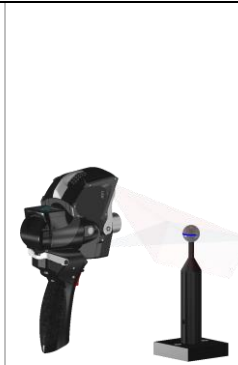
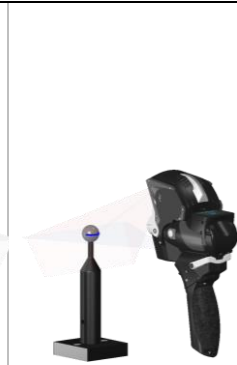
- 1 location: 50 % of the measurement volume of the arm



- 5 measurements must be done, according to 5 orientations of the elbow of the arm:

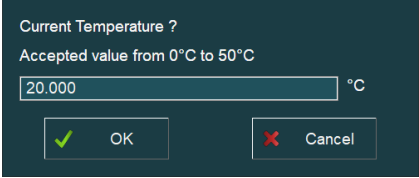
				
Left down	Left up	Up	Right up	Right Down

- For each elbow orientation (for #1 to #3), 5 orientations of the scanner:

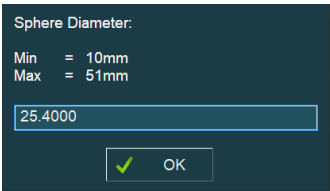
				
From 3 sides			From the top, at 90° each other.	

5.8.5.2 Process

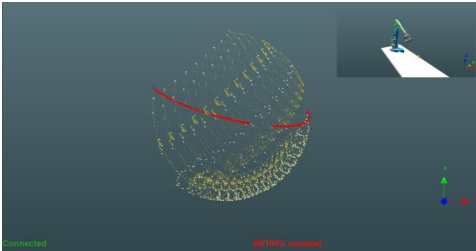
- 1. Run calibration script “ISO 10360-8 Annex D.sc”.
- 2. To compensate the [thermal expansion of the artefact](#), the current temperature of the artefact must be entered ($0^{\circ}\text{C} \leq T^{\circ}\text{C} \leq 50^{\circ}\text{C}$). To skip the compensation, simply leave 20°C and press OK.



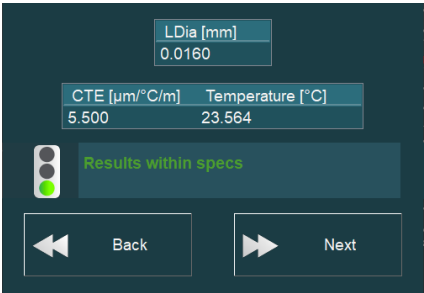
- 3. Enter the nominal diameter of the artefact.



- 4. Scan the sphere from the 5 angles of the scanner for each of the 5 orientations of the elbow. Validate (right button) for each orientation of the arm (5 sub-spheres).



- 5. At the end of the measurement, RDS Data Collector shows the deviations.



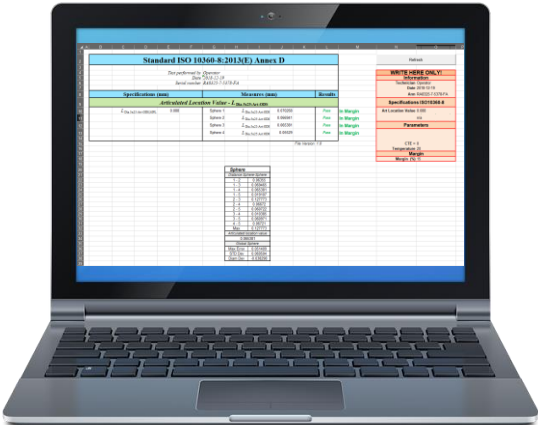
LDIA	Error between the centres of spheres (LDIA – diameter of the sphere made from the centres of the 5 spheres).
CTE / Temperature	Reminder of the thermal compensation value and the current temperature used for the compensation. (hidden if not used)
	According to the specifications of the instrument, RDS shows whether the step passed or not. (hidden if no specifications are available)



Remeasuring: if the performance of probing form error or probing size error is not verified for both locations of the test, the relevant test shall be repeated once only at both locations of the test.

Press “Next” to go to next step, or “Back” to rerun the step.

6. Run the Excel report and fill-in the system and operator information (orange area).





The Excel macros must be enabled to run the report.

5.9 Accuracy Diagnostic Scripts

This script tab is used to quickly check the arm without doing a complete calibration.

Notice that the result given by a diagnostic cannot be used as a checking report. This is only used to diagnose quickly. These tests should be interpreted by the user.

3 types of scripts are available:

- Quick checks, to quickly diagnose if the probe, scanner or Non-Contact Tube probe are accurate
- 3 Planes distance, for a diagnostic of the scanner
- Digitize: to simply scan a part and export the point cloud.

5.9.1 Probing Quick Check (arm)

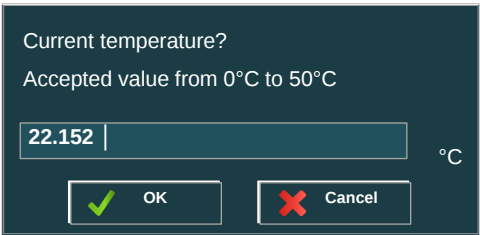
The purpose of this script is to check the accuracy of the system using B89 concept: 3 steps are used:

- one length measurement using a verification bar (volumetric test)
- one cone measurement (single point test)
- one sphere measurement

Preliminary Step: Current Temperature

To check the accuracy with the best way, the thermal expansion of the artefact used can be considered.

1. Enter the current temperature.



Current temperature?
Accepted value from 0°C to 50°C

22.152 °C

OK Cancel

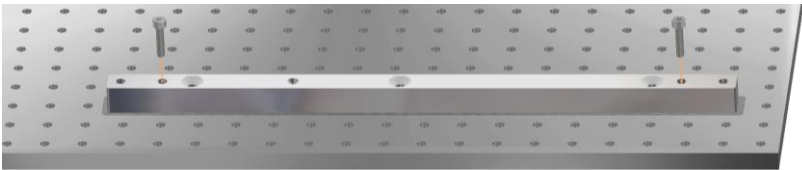


If the current temperature or the coefficient of expansion are unknown, keep the default temperature (20°C), then no compensation will be applied.

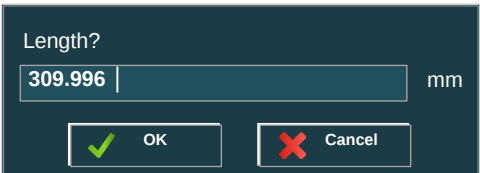
Step 1: Volumetric Performance Test:

2. Fix the verification bar, respecting the following conditions:

- Flatness of the support: 50µm max
- Tightening: 4N on each fixation holes.



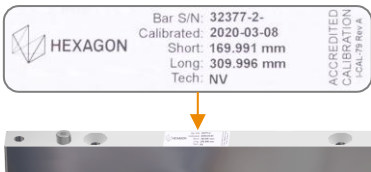
3. Enter the length value that will be used.



Length?

309.996 mm

OK Cancel



4. Enter the coefficient of thermal expansion of the artefact. If the coefficient is unknown, then 0 µm/°C/m shall be used to not apply any compensation.

Coefficient?
 $\mu\text{m}/^{\circ}\text{C}/\text{m}$

✓ OK

✗ Cancel

5. Measure 5 times the length bar, moving each time the elbow of the arm.

Mes1: Elbow left	Mes2: Elbow up	Mes3: Elbow right	Swap the Wrist	Mes4: Elbow right	Mes5: Elbow left
					

6. After the last point, RDS Data Collector calculates and show deviations.

Name	Calibrated [mm]	Nominal [mm]	Measured [mm]	Deviation [mm]	Tolerance used [%]
0	309.9600	309.9600	309.9644	0.0044	23
1	309.9600	309.9600	309.9686	0.0086	45
2	309.9600	309.9600	309.9681	0.0081	42
3	309.9600	309.9600	309.9668	0.0068	36
4	309.9600	309.9600	309.9660	0.0060	31

CTE $\mu\text{m}/^{\circ}\text{C}/\text{m}$ Temperature $^{\circ}\text{C}$

11.500 20.000

Result within specs

◀ Back

Next ▶

Check the traffic light to see if the arm is withing its specifications. Press “Next” to go to next step, or “Back” to rerun the step.

Step 2: Single Point Articulation Test

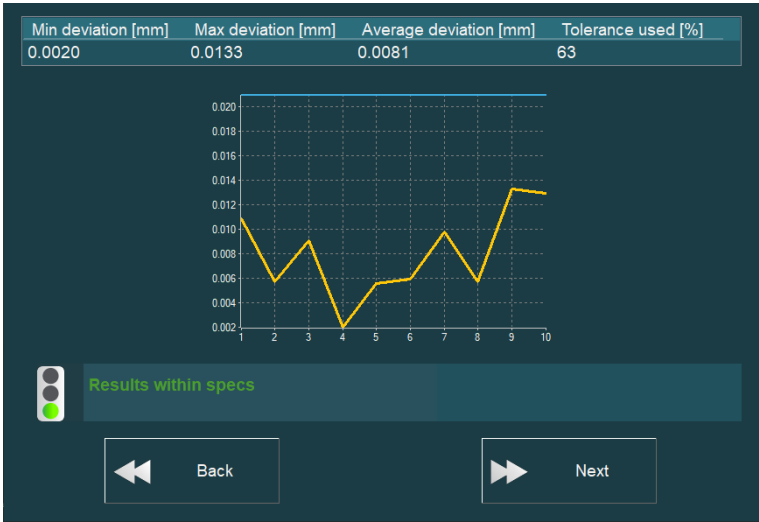
1. Fix a seat (cone) or use the cone available on the verification bar (option).



2. Measure the 10 points on the seat moving the axes of the arm as following:

Point	
Pt 1	Elbow left down
Pt 2	Elbow left up
Pt 3	Elbow overhead
Pt 4	Elbow right up
Pt 5	Elbow right down
Twist wrist 180° then same positions	
Pt 6	Elbow right down
Pt 7	Elbow right up
Pt 8	Elbow overhead
Pt 9	Elbow left up
Pt10	Elbow left down

3. After the last point, RDS Data Collector calculates and show deviations.



Check the traffic light to see if the arm is withing its specifications. Press “Next” to go to next step, or “Back” to rerun the step.

Step 3: Sphere Diameter Test

1. Fix a calibrated sphere (delivered with the arm) at mid-distance of the measuring range.



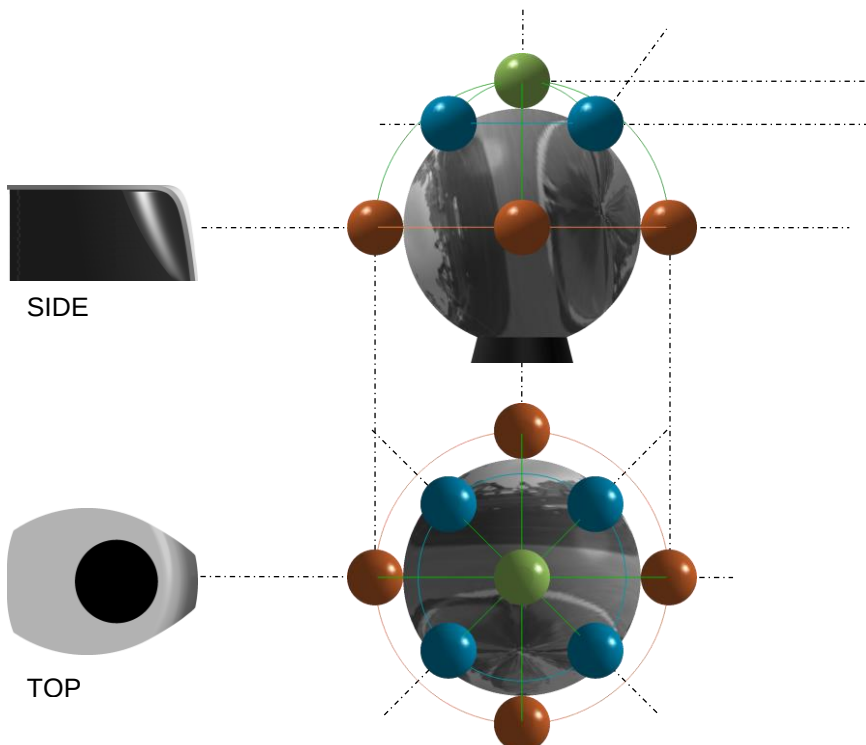
2. Enter the diameter of the sphere.

Diameter ?

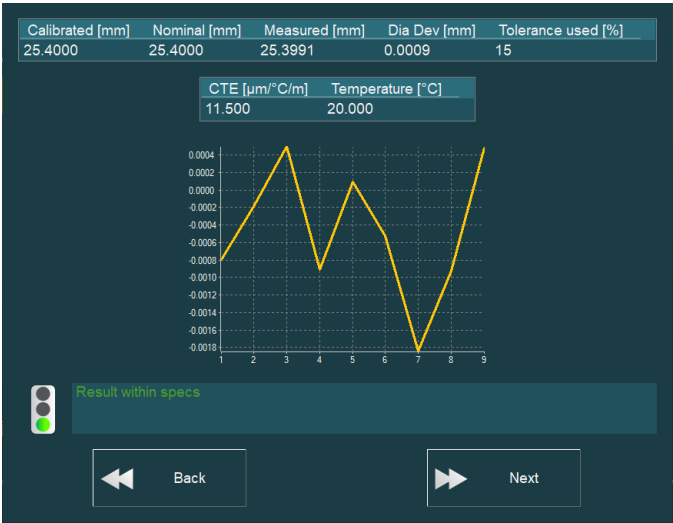
✓ OK
✗ Cancel

3. Measure 9 points on the sphere as followed:

- 4 points on Equator equally distributed
- 4 points at 45° Latitude, equally distributed, 45° rotated from Equator points
- 1 point on top



7. After the last point, RDS Data Collector calculates and show deviations.



Check the traffic light to see if the arm is withing its specifications. Press “Next” to go to next step, or “Back” to rerun the step.

5.9.2 Scanner Quick Check

These diagnostic scripts can be used to combine Plane, Sphere, and Distance tests on a scanner.

Scanner		Script	Plane test	Sphere test	Distance test
AS1 / AS1-XL / RS6 RS2-5 HP-L-8.9		'Scanner-Quick Check'	✓	✓	✓
AS1		'AS1 Sphere Check'		✓	
AS1-XL		'AS1-XL Sphere Check'		✓	
LAS		'LAS Sphere Check'		✓	
LAS-XL		'LAS-XL Sphere Check'		✓	

Preliminary Step: Current Temperature

To check the accuracy with the best way, the thermal expansion of the artefact used can be considered.
Enter the current temperature.

Current temperature?
Accepted value from 0°C to 50°C

22.152

°C

✓ OK

✗ Cancel



If the current temperature or the coefficient of expansion are unknown, keep the default temperature (20°C), then no compensation will be applied.

5.9.2.1
 Plane Test (arm)

Take stripes on the artefact plane, giving several orientations to the scanner,



Then RDS gives these deviations of the single plane.

Plane	Best fit	StdDev	X	Y	Z	I	J	K
1	0.0696	0.0119	676.0842	559.8974	13.1950	0.0000	0.0010	1.0000

◀◀
 Back

▶▶
 Finished

5.9.2.2 Sphere Test (arm)

- 1. Use the calibrated artefact, provided with the scanner and place it at 50% of the measurement volume.



- 2. Enter the calibrated diameter and the coefficient of thermal expansion (when known) of the artefact sphere.

Diameter?

25.4000

✓ OK

✗ Cancel

Coefficient?

5.5

✓ OK

✗ Cancel

- 3. Then scan the sphere, giving several orientations to the scanner.



- 4. RDS Data Collector calculates and show deviations.

Calibrated [mm]	Nominal [mm]	Measured [mm]	Deviation [mm]
25.4000	25.4005	25.3901	-0.0104

CTE [µm/°C/m]

5.500

Temperature [°C]

23.626

Result within specs

⏪ Back

⏩ Next

Check the traffic light to see if the arm is withing its specifications. Press “Next” to go to next step, or “Back” to rerun the step.

5.9.2.3 Sphere Test (tracker)

1. Enter the nominal diameter of the artefact sphere.

Diameter?

25.4

OK

Cancel

2. Then scan the sphere, giving several orientations to the scanner.



3. RDS shows the errors, and each value is checked and highlighted according to the scanner specifications:

Face	RadDev (mm)	2σ-STD (mm)	X	Y	Z	Coverage (%)
Left	0.177	0.263	-4716.043	1409.885	-122.492	55
Top	-0.571	0.406	-4715.937	1410.150	-122.298	61
Back	0.165	0.198	-4716.007	1410.453	-122.442	49
Right	0.115	0.233	-4715.701	1410.183	-122.337	61
All Faces	-0.136	0.488	-4715.782	1410.165	-122.233	87

Finished

Face	Used face of the LAS	
DiaDev	Error of the diameter value	
2σ-STD	Standard deviation of all the errors	
X;Y;Z	Coordinates of the digitized sphere	
Coverage	Percentage of the sphere digitized	
	No highlight	Coverage is fine
	Yellow	Coverage below the recommendations
Values check	On RadDev and 2σ-STD	
	No highlight	Inside specs
	Yellow	Out of specs: repeat the check or realign the scanner from the faulty face.

5.9.2.4 Distance Test (arm)

1. Use a calibrated ball bar.
2. Enter the calibrated distance between the spheres, their diameter and the coefficient of thermal expansion of the length.

Length?

☒ OK
 ☐ Cancel

 mm

Sphere 1 diameter?

☒ OK
 ☐ Cancel

 mm

Sphere 2 diameter?

☒ OK
 ☐ Cancel

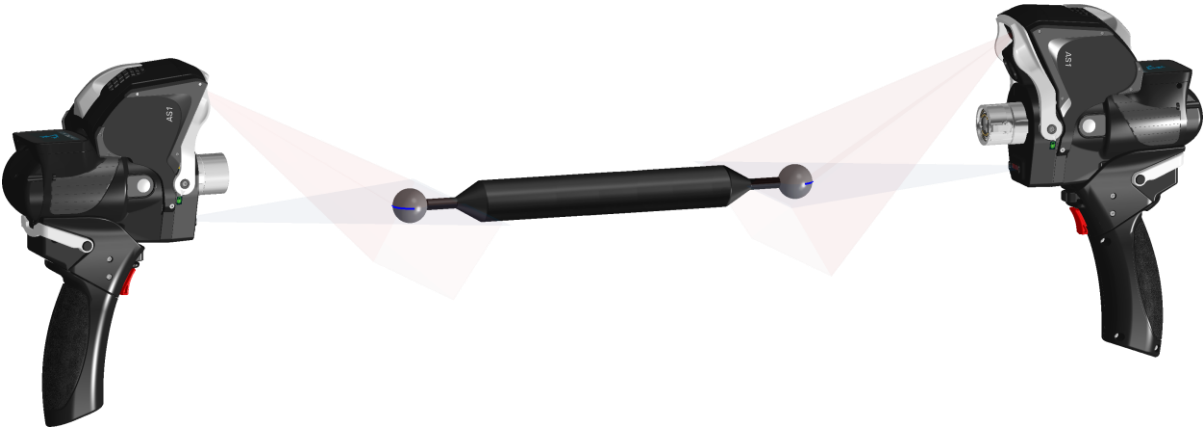
 mm

Coefficient?

☒ OK
 ☐ Cancel

 1000/C/m

3. Then scan both spheres (don't forget to validate each sphere with the right button).



4. RDS shows the errors on the length and on each sphere.

Length						
TheoLength	Length	Deviation				
299.9750	299.9412	0.0338				

Spheres quality						
Sphere#	Max	Average	StdDev	TheoDiameter	Diameter	Deviation
1	0.1671	0.0475	0.1231	50.0000	50.0267	0.0267
2	0.2446	0.0762	0.0775	50.0000	50.0345	0.0345

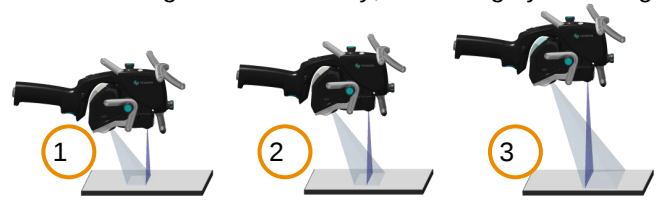
◀ Back

▶ Finished

5.9.3 Scanner – 3 planes distance

A deeper test for scanners can be used to investigate on scanning loss of accuracy, consisting by scanning an artefact plane 3 times:

- 1 middle position
- 1 near position
- 1 far position.



1. Select and run the script.
2. Digitize the plane, keeping the scanner at a mid-range distance from the plane, with one orientation only. Press Next or use left button on the arm (BP2 / B3S) to proceed next sub-step.



3. Digitize again the plane, keeping the scanner near the plane, with the same unique orientation as before. Press Next or use left button on the arm (BP2 / B3S) to proceed next sub-step.



4. Digitize again the plane, keeping the scanner far from the plane, with the same unique orientation as before. Press Next or use left button on the arm (BP2 / B3S) to proceed next sub-step.



1. Once the 3 planes are digitized, RDS shows the errors of each plane and the deviations between each plane and the global one.

Step	BestFit	StdDev	Gap (mm)	Angle (°)
All Planes	0.084	0.031		
0	0.055	0.009	0.019	0.018
1	0.044	0.005	0.029	0.016
2	0.044	0.009	-0.034	0.004

 Back

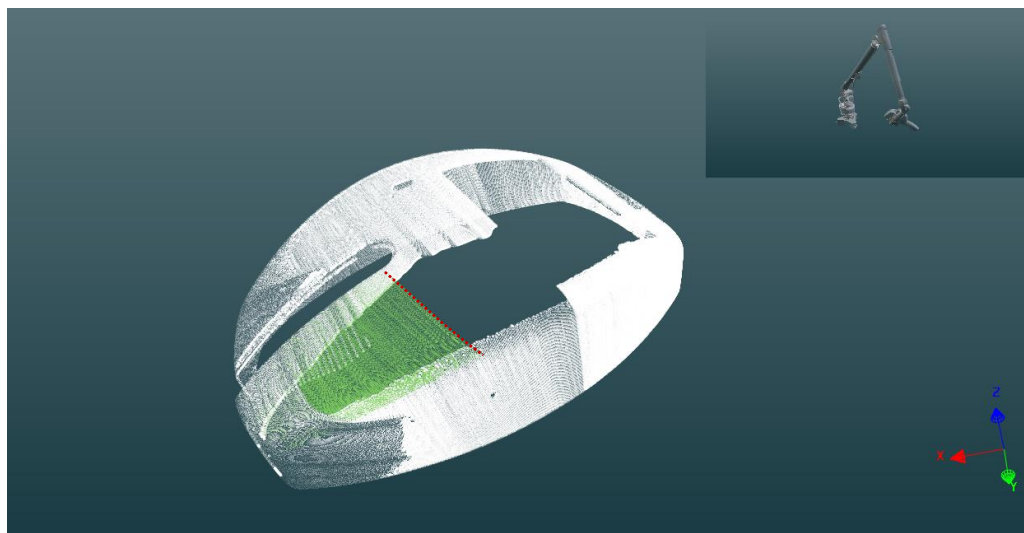
 Finished

No highlight	Inside specs
Yellow	Out of specs: repeat the check or realign the scanner from the faulty face.

5.9.4 Scanner – Digitize (arm)

In case the measurement software doesn't contain any RDS plug-in to scan directly in, or if the final software is not available, the digitizing can be performed inside RDS Data Collector: a special script is available for simply digitize and export a cloud of points.

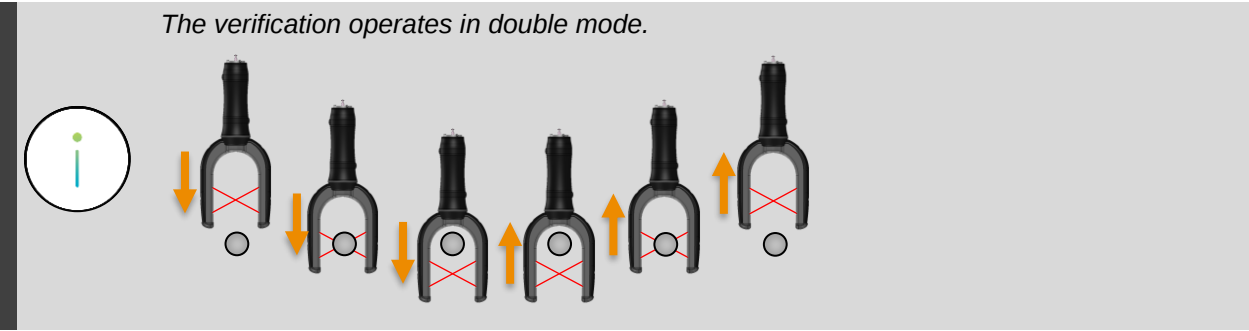
Simply run the script then proceed with the scan.



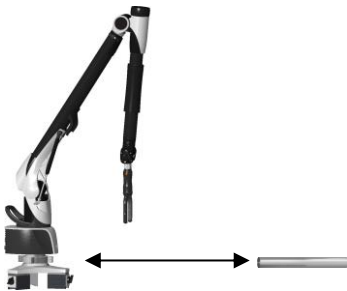
A second execution of the script overwrites the existing data. Only end the scan once you are certain not to forget data or export the existing data before running again.

5.9.5 Non-Contact Probe Quick Check (arm)

This simple checkout consists by checking the length of a straight tube.



1. Place and fix the tube artefact in front of the arm.



2. Select the artefact and / or enter the diameter and length of the T-bar.

Artefact TBar - Default.artefact

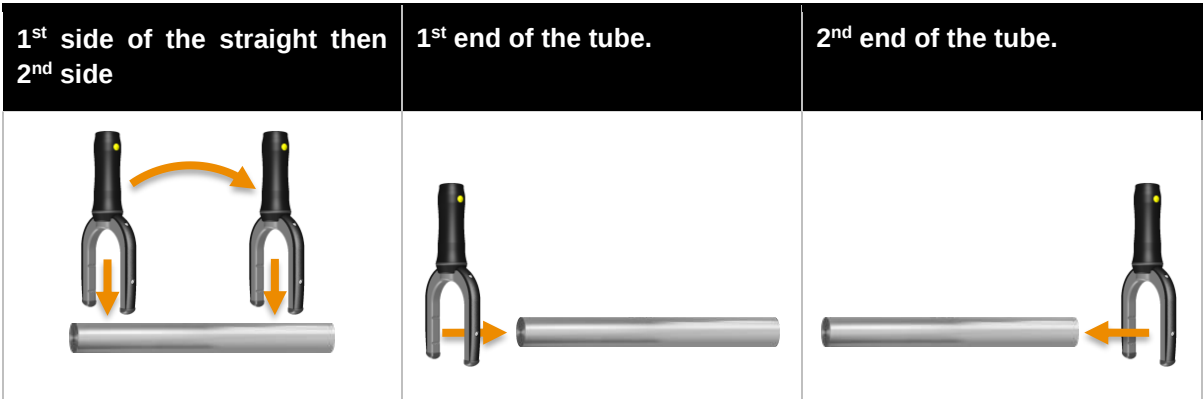
Physical properties

Property	Value	Unit
Diameter	25.4000	mm
Length	101.0000	mm

Other properties

Property	Value
Last certification date	15/02/2021 16:45:02
Modification date	23/04/2021 12:05:34
Serial number	002183010

3. Measure both sides of the straight and then both extremities.



4. RDS displays the measured length.

#	Measured length	Theoretical length	Deviation
1	241.9189	241.9640	- 0.0451


Back

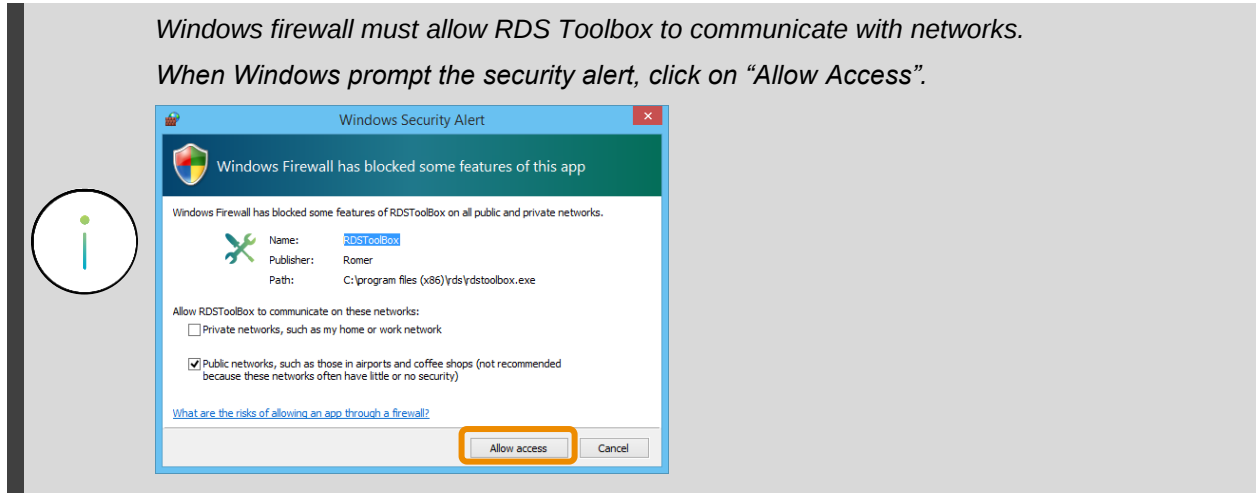

Finished

Then press “Back” to measure again or “Finished” to proceed with the next step.

6 RDS Toolbox

6.1 Presentation

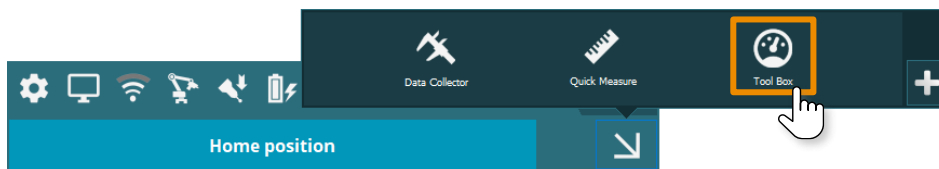
Windows firewall must allow RDS Toolbox to communicate with networks.
When Windows prompt the security alert, click on “Allow Access”.



RDS Toolbox is a part of RDS package and is globally dedicated to the maintenance of the arm.

Open RDS Toolbox

To access RDS Toolbox, open the RDS Agent (RDS icon on the notification bar) and select “RDS Toolbox” in the links.



RDS Toolbox can be also opened from “start menu > Programs > RDS > RDS Toolbox”.

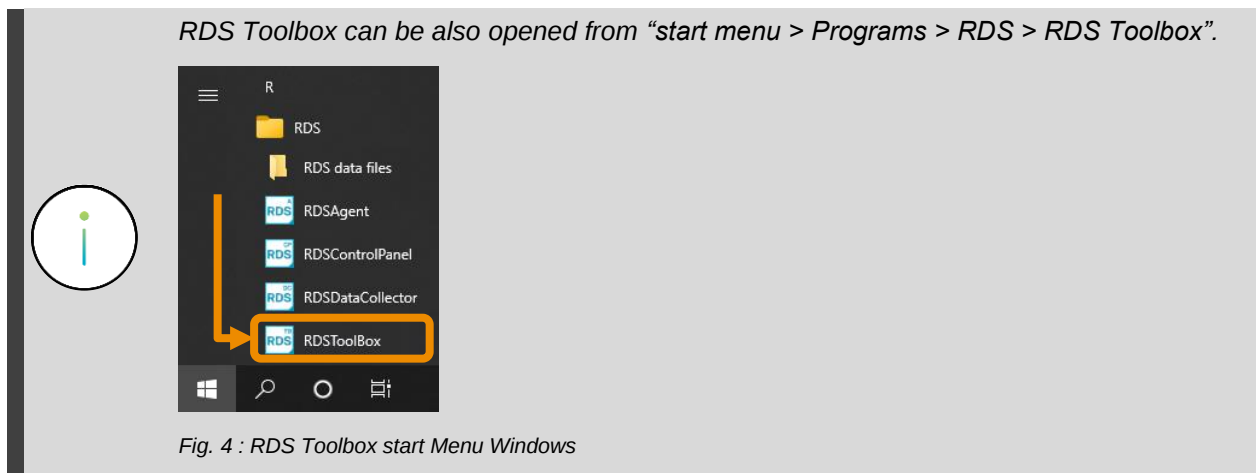


Fig. 4 : RDS Toolbox start Menu Windows

Components of RDS Toolbox

RDS toolbox provides 5 main usages:

Publications	Publication of various news and links
Control Panel	Access to the configuration of the arm
SMART	Powerful survey system to prevent or diagnose any issue
Vault	Management of saved data (including SMART data), synchronized with a server.
Maintenance	Maintenance and analyse tools, using direct connection to the arm or using the packages from the Vault.

3 groups of tiles give access to the different function panels

- News tiles: RDS Toolbox can collect news and information from Hexagon Server database (internet connection required) to give advices to the user.
- Main arm configuration, Vault and SMART tiles.
- Other maintenance tiles: specific programming, diagnose and analyse functions.

User Profiles

Depending on the RDS User profile, RDS Toolbox provides 2 levels of tools.

RDS Profile			
 User	Standard	Standard tools	(default)
	Advanced		
	Support		
 Technician	Service	Advanced tools for service	(requires a valid activation code).

This manual only describes the End-User profile.



For all the specific functions for Service profile, please read RDS Technician manual.

News & Links (arm)

To facilitate the routing of useful news regarding the instrument, the application, tips, ... RDS Toolbox receives and provides news and links to the user.

Arm Status (arm)

This tool is a quick view of the current status of the connected arm.

Control Panel

RDS Control Panel is dedicated to the configuration of the instrument.

Vault (arm)

RDS collects data from compensations or calibrations processes, as well as many indicators in real time from the instrument (see after). RDS Vault is the exchange module, which synchronizes those packages of data to the Hexagon Portable arms server and allows downloading them for expertise goal. In RDS Toolbox, the Vault is the tool to manage the packages download and use.

SMART (arm)

SMART is one of the main items of RDS Toolbox: SMART collects information from the instrument, and through the vault synchronizes them with the Hexagon Portable Arms database. Then that information can be consulted at any time in RDS Toolbox, on the same computer, or even on any other computer via a download.

One first aim is to let the user of the maintenance people checking and analysing indicators of the arm, then to locate any issue or to survey the good health of the arm.

A second application is to warn the user in any case of potential damage. When an indicator goes outside the reasonable limits, RDS Toolbox shows immediately a warning.

Maintenance

RDS Toolbox contains a large part of maintenance tools. Used for programming components, surveying in real time the behaviour of electronic signals, consulting Log files, ...

Arm Selection (arm)

By default, RDS Toolbox always refers to the currently connected arm: the arm status shows the currently connected arm, SMART, shows information regarding the same connected arm, ...

However, as RDS Toolbox can collect and memorize information from arms previously connected or even from other arm through the vault import, it is possible to view information regarding another arm. That is why a list of arms is available.



The legacy arms (Multi Gage, Infinite, Infinite2 and Stinger) are not supported by RDS Toolbox.

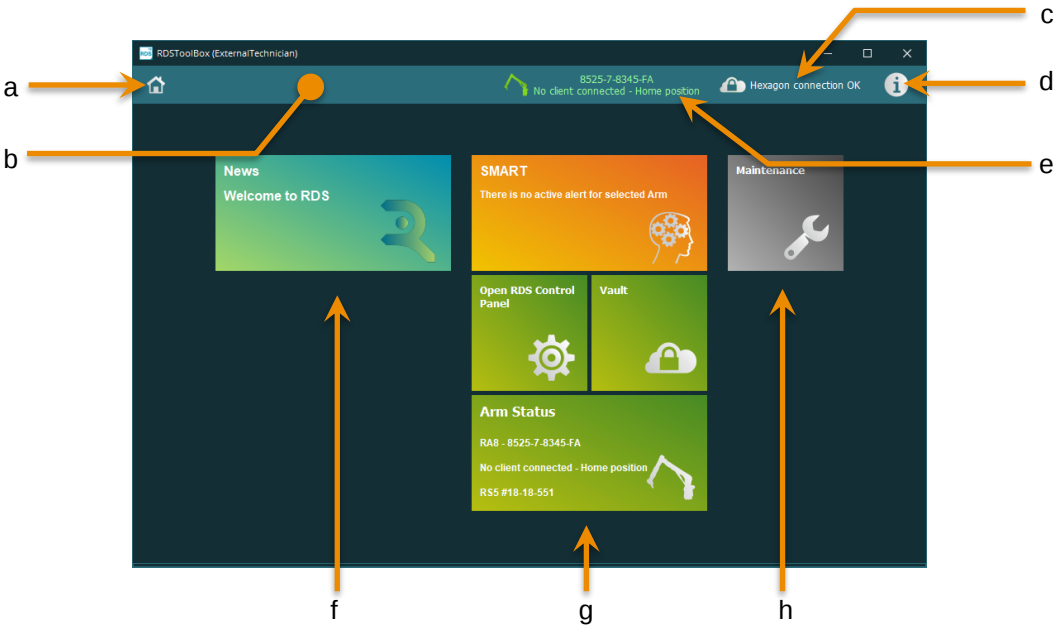
6.2 RDS Toolbox Description

6.2.1 Main Panel Description

Main Panel for Arms

When entering RDS Toolbox, the main panel appears. It is mainly composed by 3 groups of tiles:

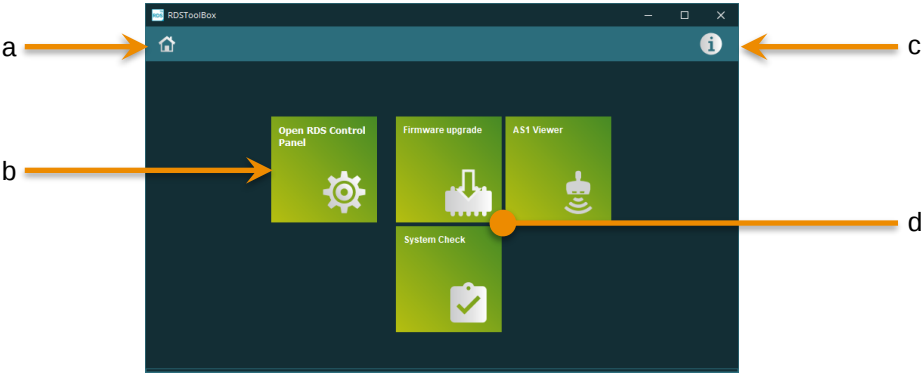
- News and links tiles
- Main tools
- Maintenance tiles
- 2 buttons at the top right can be used to select the arm and view the connection status.



a	Menu Control	Shows the current menu.
b	Ribbon	Displays the choice of arm...
c	Connection status	Shows if the computer is currently connected to the Hexagon Server.
d	Help	Button to display a tooltip about the current screen.
e	Arm selection	Shows the current arm and gives the ability to select another arm in the memory.
f	News & links tiles	Information tiles: contains all the received news and several official links.
g	Main tools tiles	Heart of RDS Toolbox: contains the main functions such as the current status of the arm, the access to RDS control panel, the management of the vault, and the management of SMART.
h	Maintenance tiles	Deployment of all the maintenance tiles.

Main Panel for Trackers

When entering RDS Toolbox, the main panel appears.



a	Menu Control	Shows the current menu.
b	RDS Control Panel	Direct link to open the RDS Control Panel
c	Help	Button to display a tooltip about the current screen.
d	Maintenance tiles	Group of maintenance tiles.

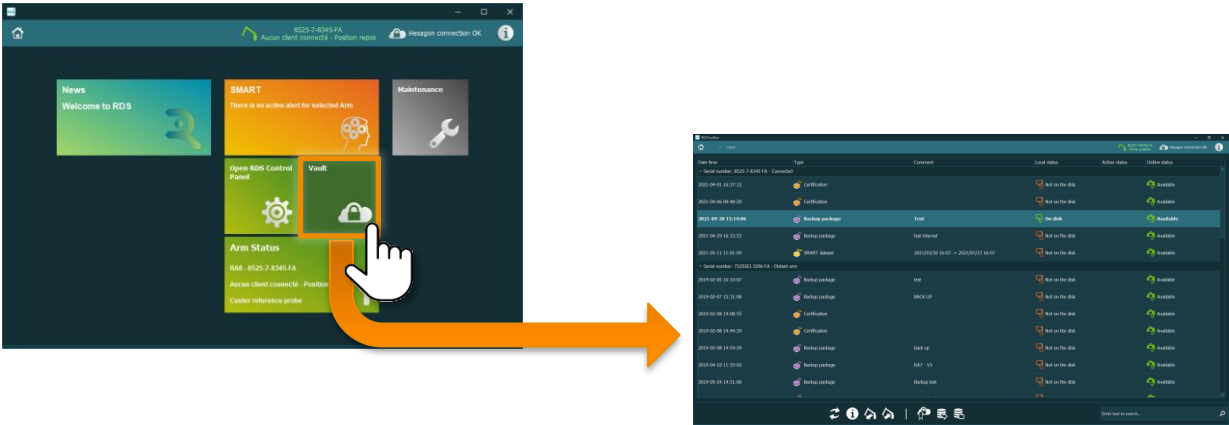
6.2.2 Menu Navigation

Quick Navigation Guide

Open a panel	Click on the tile	
	Click on the Action line button	
Go back to the upper level	Click on the Exit button on the Action line	
Go back to the Home panel	Click on the Home button on the Ribbon	

Use Tiles

In RDS Toolbox, to open a panel, or activate a link, simply click on the desired tile.



Depending on the resolution of the screen, RDS Toolbox panels may go over the screen. In such case, shift the panel from right to left by dragging it with the mouse (click outside the tiles).

Ribbon

On the top of the screen, the current menu is displayed.



- a. Home: returns to the home panel (no ribbon choice)
- b. Menu levels
- c. Current panel: simply remind the current menu (no ribbon choice)

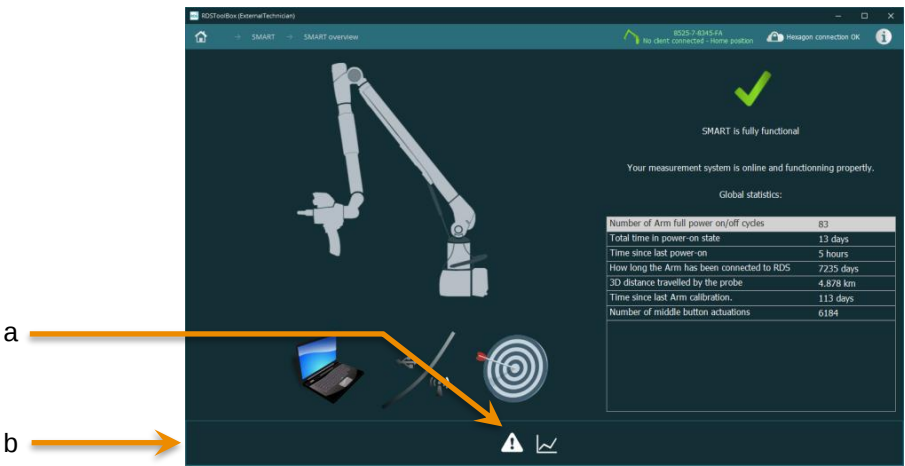
Click on Home to display the home panel and use the tiles.

To go back to the main panel, simply click on the Home button.



Action Line

On most of the panels, is located a band that contains the action buttons. RDS Toolbox automatically shows the useful buttons.



- a. Action buttons
- b. Action line

6.2.3 Local and Distant Arms

RDS Toolbox doesn't manage only the currently connected arm but stores the history of all the connected arms on the computer. Thus, it is possible to get information of any arm that has been previously connected to the computer. All these "historic" arms constitute the local arms database.

However, the other arms ("Distant arms") can still be managed by downloading their data from the Hexagon Server.

Type	Level		Sub-type	
Local arms			Connected arm	Currently connected arm
			Off-line arms	Arms that have been previously connected.
Distant arms			Arms that have never been connected to the computer	

6.2.4 Maintenance Connection (arm)

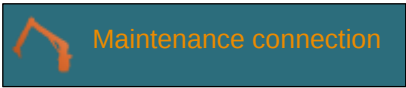
Some tools of RDS Toolbox require a special connection: when using those tools, the arm enters in a "Maintenance connection status" and the connection with RDS service itself is temporary hung on.

The tools that are using this maintenance connection are:

Type	Level			
Upgrade of Firmware				
Configure Wi-Fi chipset				
Program probe				
System Check				
Arm Dashboard				

: only for CP-C / CP-B / CP-W

When the arm is under "Maintenance connection, the Arm selection shows:



Once the maintenance process is finished or cancelled, the arm goes back to a normal connected status.

6.3 Panels Common Features

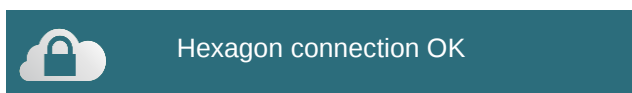
6.3.1 Status of the Connection (arm)

To be able to synchronize the Vault packages and the news, RDS Toolbox needs to be connected to the Hexagon Portable Arms Server ("Hexagon Server"). A simple standard internet connection is needed.

When the computer is not connected to internet, the SMART data and all the new Vault packages are stored locally on the computer, to be synchronized as soon as the computer gets a connection.

Once the computer is connected to internet, RDS Toolbox automatically synchronize the Vault content (packages up and down) and collects and displays any new publications.

On the top right corner of RDS Toolbox, is shown the status of the connection to the Hexagon Portable Arms server.



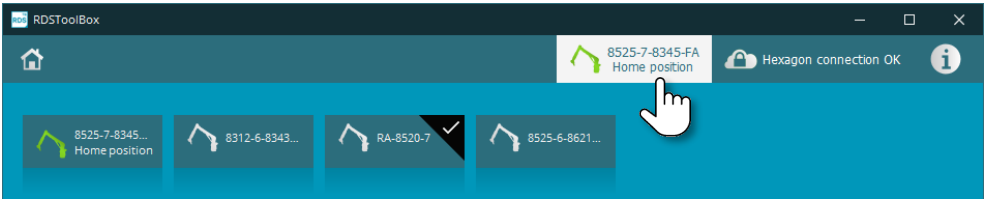
6.3.2 Arm Selection (arm)

RDS Toolbox is not limited to the currently connected arm but can be used to survey any local arm.

RDS Toolbox by default displays the information for the currently connected arm.

Especially for SMART purpose, RDS Toolbox memorizes all the previously connected arms, and can display information on those Off-line arms.

On the top right of the screen, an arm selection can be done: click on the Arm selection button: the ribbon shows all the available arms in memory.



Depending on the status of the selected arm, the icon colour changes:

	The Arm is connected and ready
	The Arm is connected, but a warning is currently displayed (Rest position, error, alert...) about it or Maintenance connection is in use.
	The Arm is Off-line



The selection of Off-line arms can be used only for SMART and Arm status functions, all other Panels are not accessible.

Once an arm is selected, RDS Toolbox panels will display the information of this arm.



If the serial number of the local arm is not recognized, it is replaced in the list by the type and size of the arm, as it appears in the Arms selection list.

 RA-8520-7

6.3.3 Spreadsheets Management – Search (Ctrl+F)

All over RDS Toolbox panels, items are displayed in a list. All the lists are managed the same way, and provide some tools to find easily the desired item:

- Sort by list
- Filtering
- Show / Hide

Lists Filtering

On most of the tables displayed in RDS Toolbox, filters can be applied to reduce it: place the pointer over the column header and click on the filter symbol.

Date time	Type	Comment	Local status
2021-04-06 09:48:20	Certification	ISO 10360-12 Ok	Not on the disk
2021-04-28 15:14:06	Backup package	Test	On disk

Then select in the list the wanted filter.

Available values

Values

Numeric Filters

Enter text to search...

☐ (All)

☐ Not on the disk

☒ On disk

Clear Filter

Close

Customized filtering

Values

Text Filters

Between

From 2012-10-01 15:57:18

To 2021-07-20 16:36:36

Clear Filter

Close

At the bottom of the screen, is displayed the current filter, with possibilities to select, edit and remove.

Date time	Type	Comment	Local status	Action st...	Online status
Serial number: 8525-7-8345-FA - Connected					
2021-04-01 16:37:12	Certification	B89 OK	Not on the disk		Available
2021-04-06 09:48:20	Certification	ISO 10360-12 Ok	Not on the disk		Available
2021-04-28 15:14:06	Backup package	Test	On disk		Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk		Available
2021-05-11 11:01:09	SMART dataset	2021/03/30 16:03 -> 2021/07/...	Not on the disk		Available
[Type] In (Backup package, 'Certification', 'SMART dataset')					

Once a filter is activated, the filter symbol appears on the column header:

Lists Sorting

On some of the tables displayed in RDS Toolbox, the lists can be sorted by each item:

Click on the column header that has to be used to sort, a symbol on the column header (▼ / ▲) shows which column and which order is used.

Search (Ctrl + F)

As numbers of software, a quick search function can be used with the shortcut Ctrl + F. Even if no “Search” area is visible, Ctrl + F will provide a search function by keyword.

Any time the filter symbol is present, the search function can be activated:

1. On the keyboard press Ctrl + F: a search area appears.

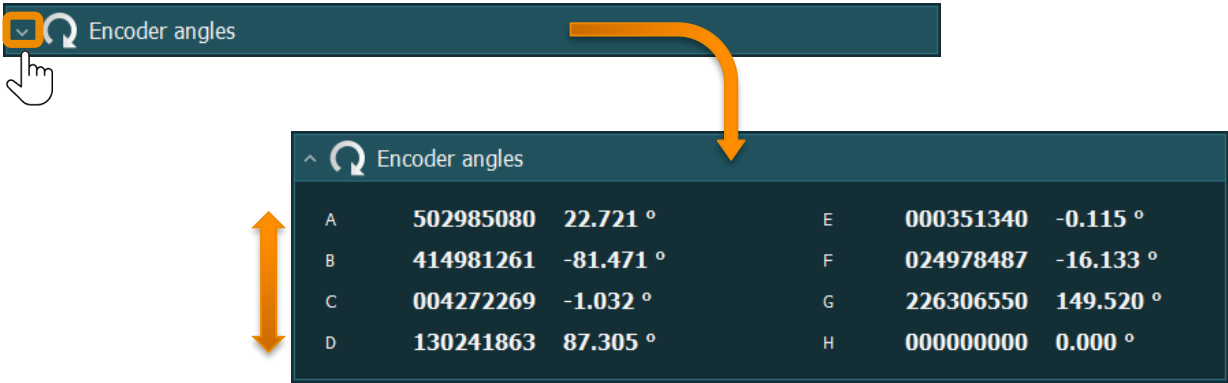


2. Enter the keyword: the list is automatically reduced.



Groups Expand / Reduce

In some panels, the information is grouped (ex: Arm status). In such case, it is possible to expand or hide the content of a group by clicking on the arrow on the left.



6.4 RDS Toolbox Information Tiles (arm)

RDS Toolbox provides various information for the user:

- News& links about ROMER products, new versions of software, possible hardware retrofits...
- Currently connected arm information

6.4.1 News & Links Publications

News Notifications

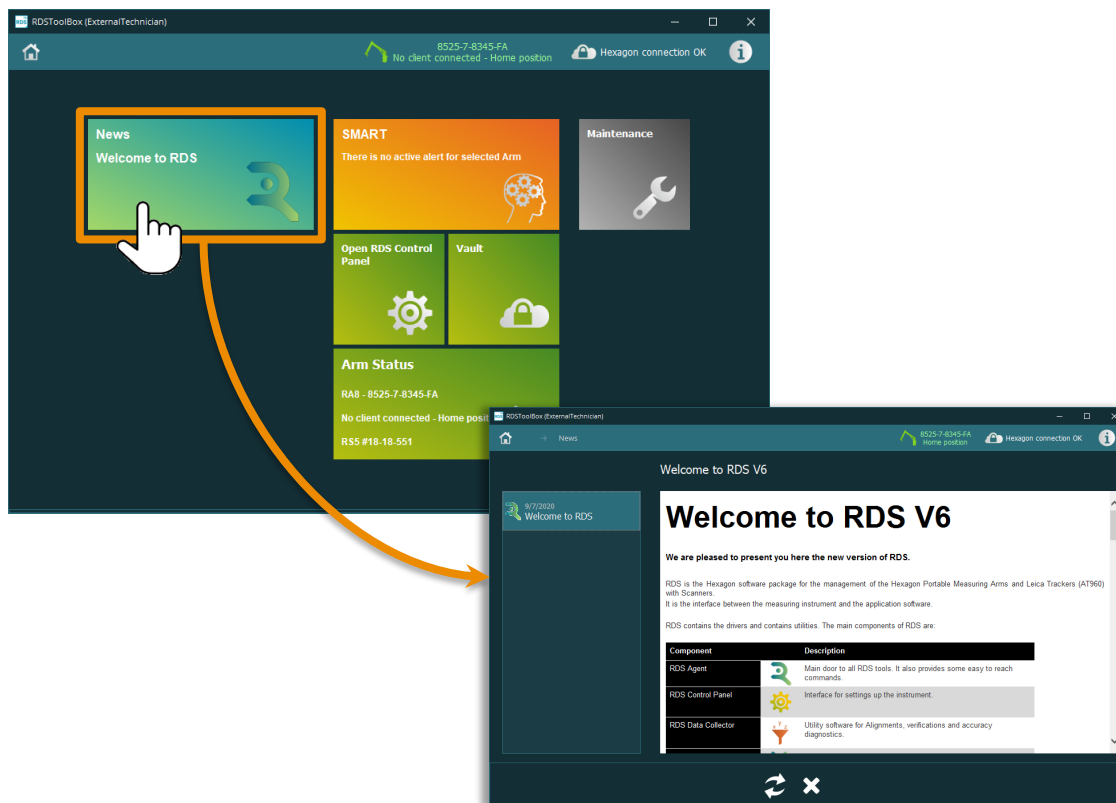
When the computer is connected to Internet, RDS Toolbox can receive publications of news. As soon as a new publication is received, a notification appears on the bottom right of the screen.

Click on the open button to see the details of the publication. (See §Notifications for more details)



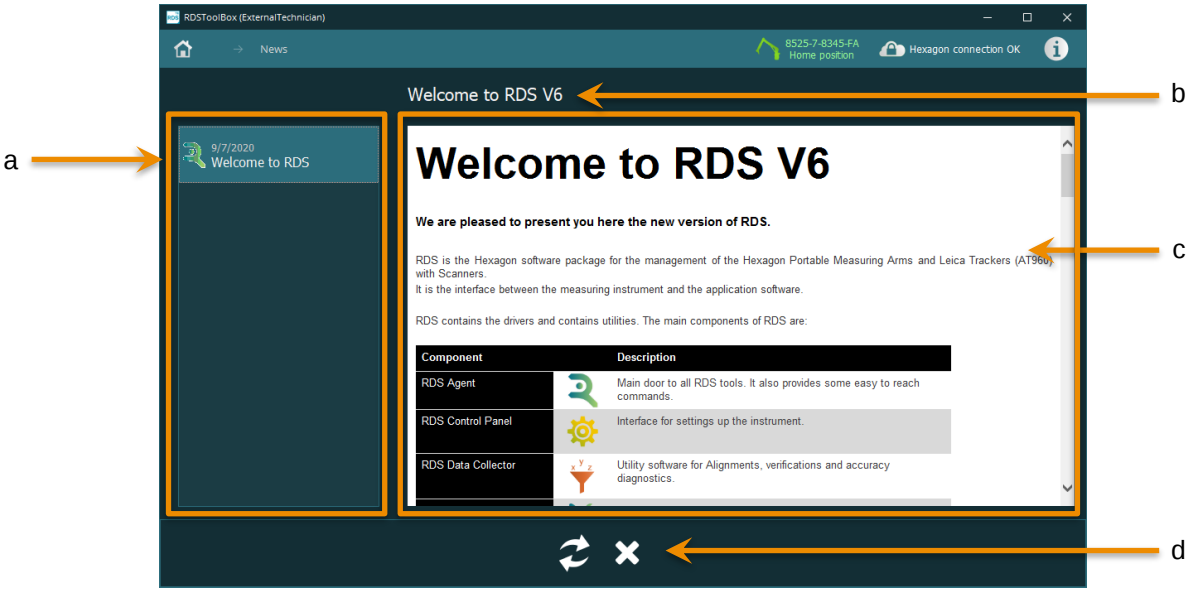
RDS Toolbox Home Panel

On the RDS Toolbox home panel, one tile is dedicated to the news: all the latest news titles are scrolling. Click on the tile to open the Publication panel (see after)



Publications Panel

From the Home panel, click on the News tile to open the publications screen:



Here are shown all the news and links publications.

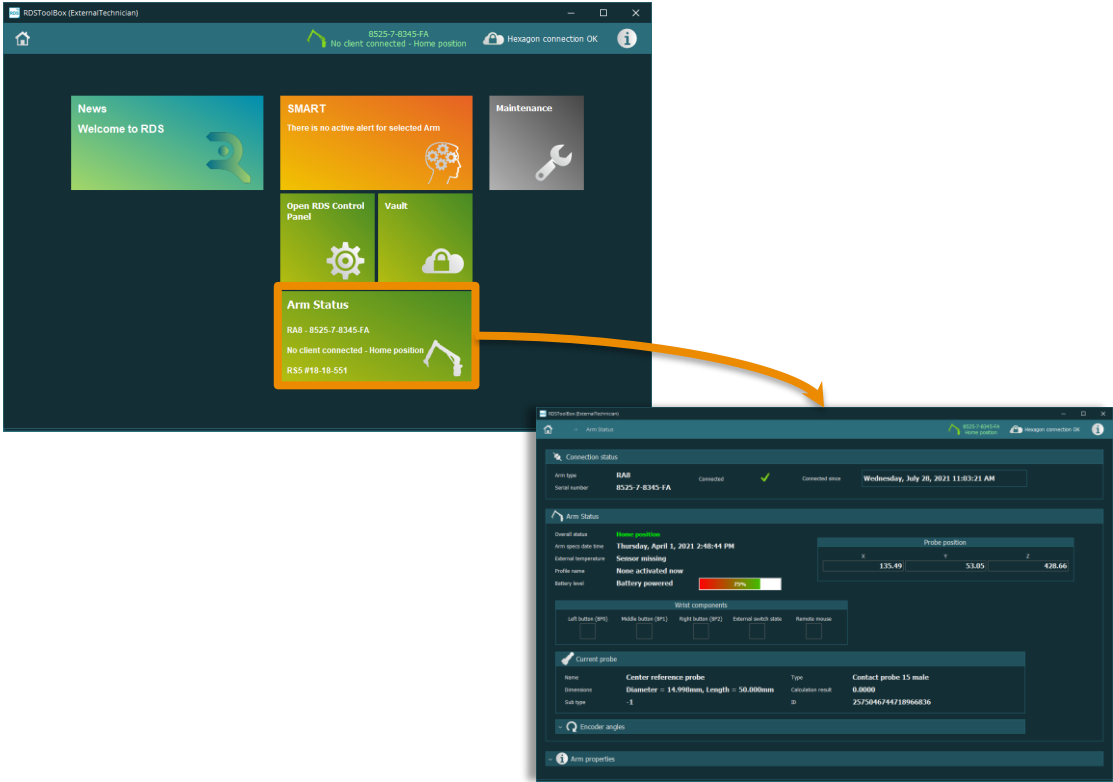
- a. List of publications
- b. Tittle of the current publication
- c. Publication window
- d. Pages control buttons (Action line)

The list of news is sorted by publication date. Click on the news to display in the publication window.

The publication window behaves like an internet browser, the publications are html pages, with text, pictures and eventually internal or external internet links. For example, a publication may contain a link to the Hexagon web site.

	Return to previous web page
	Go again to the next page
	Refresh the current page
	Stop the scrolling

6.4.2 Arm Status



Click on the Arm status tile: this screen shows information about the selected arm.



The Arm Status can be used both for the currently connected arm  and for an Off-line arm .

The displayed information is grouped by categories:

6.4.2.1 Standard Information



Connection Status

Arm type		Type of system (NCA), connection (USB / Wi-Fi), and arm (RA7 / RA7SE / RA7SI)
Serial number	 	Unit identification number of the arm (only once it is identified by the Hexagon Server) (see manual of the arm for the description)
Connected	 	Shows if the arm is connected (☒) or not (☐)
Connected since		Date and time of the establishment of the current connection.
Seen last time on		Date and time of the end of connection of the Off-line arm.



Arm Status

Overall status		Information about connection and status (ex: Rest position)
Armspecs date time		Date and time of last arm compensation
Profile name		Arm profile in use.
External temperature		Temperature measured by the arm (see arm manual for sensor location)
Battery level	 100%	On power supply / on Battery + % of the full charge
Position		XYZ Coordinates of the probe centre point
Wrist state buttons		Show if the button is pressed (☒) or released (☐) for BP0, BP1 and BP2.
Remote mouse		Shows if the arm mouse is active (☒) or not (☐)
Video capture		Shows if the wrist camera is on (☒) or not (☐)
Head light		Shows if the wrist head light is on (☒) or not (☐)

**Current Probe**

Name		Designation of the current probe
Type		Hard contact, trigger, scanner, or NC-Tube probe
Dimensions		Diameter and length of the probe
Calculation result		Precision of the probe: residual error of the last probe alignment
Sub type		
ID		Identification number of the probe

**Axes (deploy)**

A to H		Raw value and angle (radians) of each encoder
--------	---	---

6.4.2.2 Arm Properties (deploy)



Arm Properties (deploy)

Serial number	 	Identification of the arm (see manual of the arm for the description)
Type	 	Type of arm (RA7 / RA7SE / RA7SI / RA8-6 / RA8-7...)
Connected first time on	 	Date and time of the first connection of the selected arm on the computer.
Performance level	 	Level of equipment and accuracy of the arm (71 / 73 / 75 / 77 ...)
Brand	 	(Hexagon / Romer / Cimcore)
Volume	 	Measurement volume of the arm in mm
Revision	 	Version of arm

Advanced Properties (deploy – Technician only)

Factory	 	(Montoire / Oceanside)
Assembly ID	 	
Version	 	Version of arm (see the arm manual for details)

Components

Component set	 	Steps of the history of arm: each time the hardware or firmware of one component is changed, a new set is made.
Type, address ...	 	Properties of each electronic component of the arm



For more details about the components properties, refer to the RDS Technician manual.

6.5 RDS Toolbox Vault – Secured Area (arm)

RDS Toolbox contains a security system that permits to create security packages in a vault.

This system permits to save arm compensation data, calibrations or arm compensation measurement (from RDS Data Collector), but also all the survey indicators memory (SMART) into such packages.

Those packages are in a first step stored locally on the computer, in order to be sent to the Hexagon Portable Arms server (Hexagon Server Database) through an internet connection. The synchronization of the data is automatic, no set-up to do.

In return, packages are available for download from the Hexagon Server to a local computer. The vault of RDS Toolbox displays so the list of available packages for all the local arms. For that, the arm has to be added in the list of the available arms, then all the packages of this arm become available (but downloaded only when necessary).

To access, from the main menu of RDS Toolbox, click on the Vault tile.



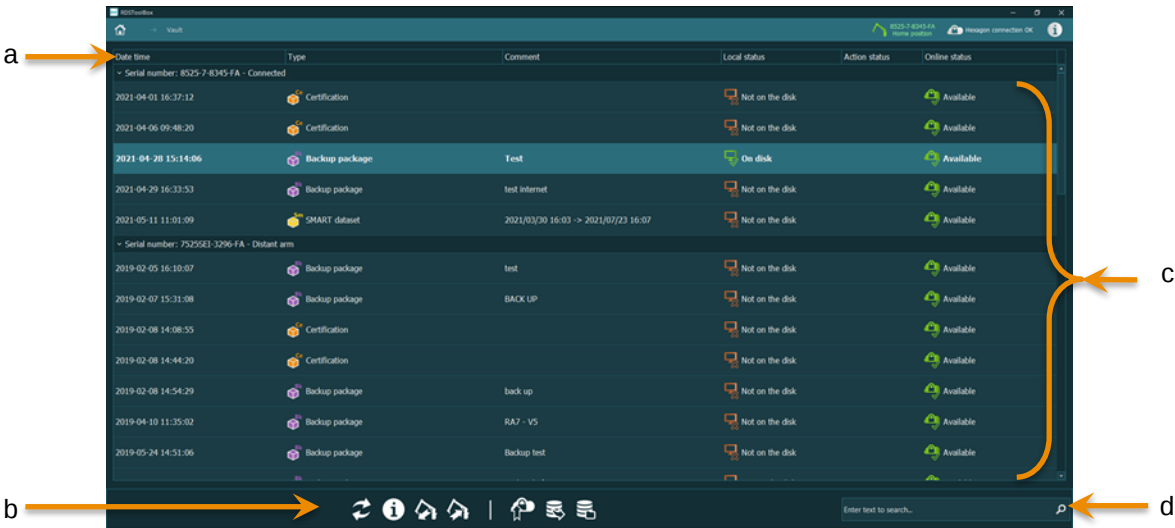
6.5.1 Vault Screen Description



Some items may be available only for Technician profile. Please refer to the Engineer manual.

When entering the vault, RDS toolbox shows the list of all the packages for the available arms. All the packages are grouped by arm. By default, only the local arms (connected or off-line) are displayed. And only the selected arm is deployed.

However, the technician profile () gives the possibility to add any distant arm in the list of the vault.



- a. Header of the list – filters by column
- b. Action buttons
- c. List of available packages grouped by arm
- d. Search filter (Ctrl+F) for available arms

Columns Description

Serial number	Serial number of the arm in the package
Date time	Date and time of creation of the package
Type	Type of package (Armspecs / Calibration / Profile / Diagnosis ...see after)
Comment	Comment entered at the creation of the package
Local status	Shows if the package is present or not locally on the computer: if not on the disk, RDS Toolbox simply notifies that the package is available on Hexagon Server and can be downloaded. The package is downloaded only is necessary.
Action status	Notification about the packages locally present on the computer (Downloaded / Created / Synchronized...)
Online status	Only displayed when RDS Toolbox is online. Shows if the package is available or not on Hexagon Server database

Buttons Description

	Refresh	Refreshes the current list of packages for all the current arms												
	Package information	Gives details about the package ID and location (= right click on the package line) <table><tr><td colspan="2">Package information</td><td>^</td></tr><tr><td>Package name</td><td colspan="2">03da015e-cbd3-4aa4-9e58-fde1ab2ba317.pck</td></tr><tr><td>File size</td><td colspan="2">5 Ko</td></tr><tr><td>Locate on disk</td><td colspan="2">C:\Users\Public\Documents\Romer\RDS\Vault\03da015e-c...</td></tr></table>	Package information		^	Package name	03da015e-cbd3-4aa4-9e58-fde1ab2ba317.pck		File size	5 Ko		Locate on disk	C:\Users\Public\Documents\Romer\RDS\Vault\03da015e-c...	
Package information		^												
Package name	03da015e-cbd3-4aa4-9e58-fde1ab2ba317.pck													
File size	5 Ko													
Locate on disk	C:\Users\Public\Documents\Romer\RDS\Vault\03da015e-c...													
	Add Arm													
	Remove Arm	 Used to remove manually the selected DISTANT arm from the list.												
	Download	Download the selected package locally on the computer												
	Backup	Create a backup of the memory of the connected arm												
	Restore	Restore the memory of the arm with the selected package												
	Extract content	 Extract the content of the package into RDS Data Collector environment.												
	Open Report	Opens the calibration report												
	Switch SMART database to	Switch RDS Toolbox in Database mode with the selected Dataset package												
	Upload SMART dataset	Does a manual upload of the SMART dataset to the Hexagon Server (on the request of a Hexagon technician)												
	Dump SMART dataset	Retrieve and compress the local SMART dataset and main Log files to a zip file, which can be sent to a Service centre.												
	Open SMART dataset	 Opens a SMART dataset (from a direct SMD dataset file or from a zip file)												

6.5.2 Types of Packages

A package (extension *.pck) is a group of files that can be backup, stored, uploaded, downloaded, restored. It can contain compensation data, armspecs, ... for any maintenance purpose.



The Memory of the arm is composed by 2 blocks:

- A UserSpecs block (default used data)
- A Backup specs block (Last Service Centre compensation data)

In case the UserSpecs block is damaged or not readable, RDS will try to use the Backup specs (and will prompt a warning).

In case of wrong operation on the UserSpecs, the Backup Specs can be restored into the UserSpecs block and restore the memory as it was after the last compensation by the Service Centre.

If the complete memory is damaged, it is possible to download the package and restore it.

	Type	Description
Co	 Compensation	 RDS Data Collector raw data + Armspecs
Ac	 Accessory	 RDS Data Collector raw data from sensor alignment + Armspecs
Cal	 Calibration	RDS Data Collector Raw data + Armspecs
Op	 Optimization	 RDS Data Collector Raw data + Armspecs
Bk	 Backup	 Backup specs block of the arm
Pr	 Tune-up / Profile	
Fa	 Factory specs	  Original Backup + User specs blocks
Tc	 Temp compensation	
Sm	 SMART Data set	All SMART indicators for one period.

 : Technicians only



Some other types of packages can be used only in Technician profile. Please refer to the RDS Technician manual.



Backup Package

A backup package is only manually created by the user in RDS Toolbox through the vault panel. It can be created at any moment, by end-user or by Technician profile.

A backup package contains only the user specs blob of the arm memory.



SMART Data Set Package

The SMART Data set packages can be considered as a complete backup of the whole system (Arms + computers) for a defined period. It may contain all the survey information for the arm.

It means that SMART collects data from the arm and from the computer. On a first step, the data are store on the memory of the arm and on the computer, then after the synchronization with the Hexagon Server, all the data concerning the arm (that may come from several computers) are merged into a SMART DATA SET package. One SMART DATA SET package refers to a period; Once the current SMART DATA SET package has reached a maximum size, a new package is automatically created, to collect new SMART data.

It means that for one arm, several SMART DATA SET Packages may be available, one per a certain period.

Period	Depending on the quantity of information
Arm concerned	Only the selected arm
Computer information	The package may contain information from several computers if the arm has been connected to several ones.
Arm information	All the SMART indicators

6.5.3 Status and Information of a Package

6.5.3.1 Action Status

Each package has a status flag. When a package is created on the vault, a “Not synchronized” status is given, until RDS automatically send it through internet. Then the status switches to “Synchronized”.

Local status	Explanation
 Not on disk	The package is available online but is not currently downloaded. To be able to use it, it must be downloaded.
 On Disk	The package is currently on the local computer (downloaded or created on the computer) and can be used.

Online status	Explanation
 Available	The package is ready to be downloaded.
 Not online	

Action status	Explanation
 downloaded	The package has been successfully downloaded and can be used.
 uploaded	The created package has been successfully uploaded to Hexagon Server
 error download / upload	Last try to download / upload failed

Local status	Action status	Online status	Explanation
 Not on disk		 Available	The arm has been added to the list, and the package is available for download to be used.
 On Disk	 uploaded	 Not on line	The package has been created on the computer and has been successfully synchronized with Hexagon Server but has not been yet implemented.
 On Disk	 uploaded	 Available	The package has been created on the computer, synchronized with Hexagon Server and implemented for availability.
 On Disk	 downloaded	 Available	The package has been successfully downloaded from Hexagon Server and is currently ready to be used locally.

6.5.4 Create and Synchronize a Package

A package can be created from several operations, depending on its nature.

6.5.4.1 Manual Backup

 Armspecs Backup

This manual operation can be used at any moment to make a security backup of the arm, in order to restore later the arm in the same configuration.

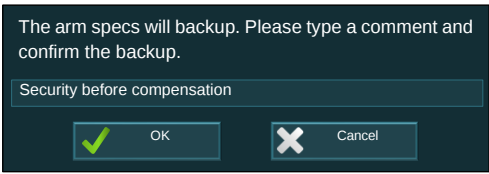
- 1. Ensure first that the arm is correctly connected.



- 2. Click on the Backup button.



- 3. At the prompt, enter a comment.



- 4. Press OK: the new “Backup” package appears in the list.



Date time	Type	Comment	Local status	Action status	Online status
Serial number: 8525-7-8345-FA - Connected					
2021-04-01 16:37:12	Certification		Not on the disk		Available
2021-04-06 09:48:20	Certification		Not on the disk		Available
2021-04-28 15:14:06	Backup package	Test	On disk		Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk		Available
2021-05-11 11:01:09	SMART dataset	2021/03/30 16:03 -> 2021/07/23 16:07	Not on the disk		Available
2021-07-28 15:42:54	Backup package	Security before calibration	On disk	Uploaded	
Serial number: 75255EEI-3296-FA - Distant arm					
2019-02-05 16:10:07	Backup package	test	Not on the disk		Available
2019-02-07 15:31:08	Backup package	BACK UP	Not on the disk		Available
2019-02-08 14:08:55	Certification		Not on the disk		Available

6.5.4.2 Other Automatic Packages

 **Compensation,**  **Calibration,**  **Optimization** and  **Tune-up / Profile packages**

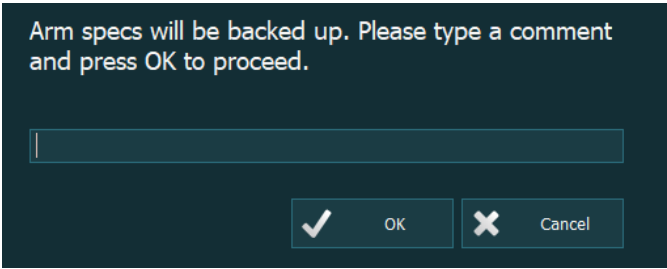
A Compensation package (and calibration, optimization...) is generated automatically by RDS Data Collector, at the end of a script. Once the calculation or the calibration is finished, RDS Data Collector is asking the user if a package must be created or not. A comment is also asked.

 **SMART Data Set Package**

A SMART Data set package is automatically created periodically. It collects all the SMART indicators and computer information for the concerned period. The Smart Dataset packages appear only once the periodic set has been uploaded and implemented on the Hexagon Server.

6.5.4.3 Comment

When a package is created, RDS (Toolbox or Data Collector) may ask to add a comment to easily identify the purpose of the package; this comment will be displayed in the list of packages.

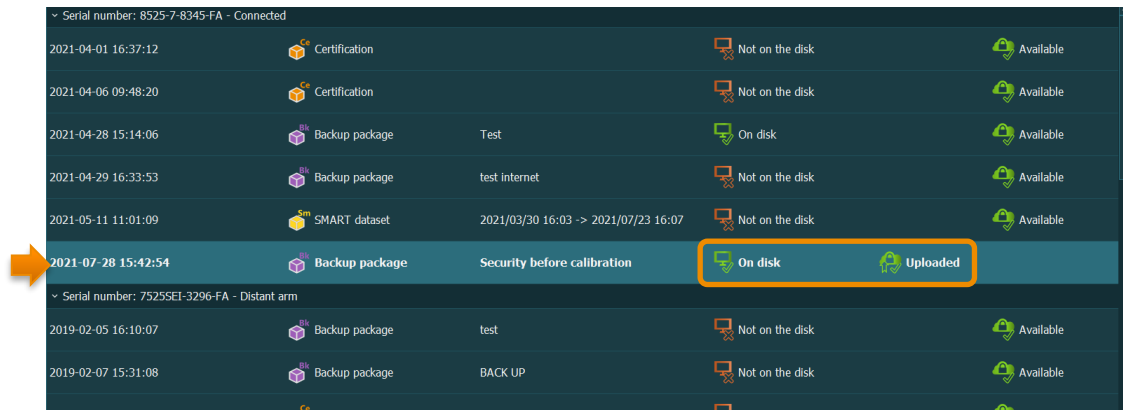


6.5.4.4 Synchronization

Synchronization of the Created Packages

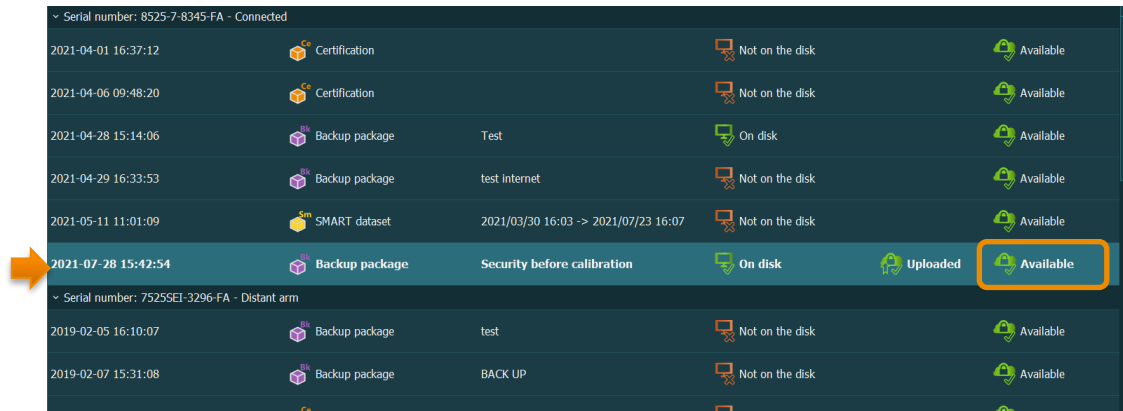
- Once a package is created, it appears in the list on the vault as “On disk” in the Local status.
 - Forthwith RDS Toolbox tries to synchronize the package with Hexagon Server database.
- If the computer is connected on internet, RDS Toolbox uploads the package securely on Hexagon Server.
- If no internet connection is available, the package is kept locally pending for a connection to Hexagon Server.

The package becomes notified as “Uploaded” in the Action status.



Serial number: 8525-7-8345-FA - Connected				
2021-04-01 16:37:12	Certification		Not on the disk	Available
2021-04-06 09:48:20	Certification		Not on the disk	Available
2021-04-28 15:14:06	Backup package	Test	On disk	Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk	Available
2021-05-11 11:01:09	SMART dataset	2021/03/30 16:03 -> 2021/07/23 16:07	Not on the disk	Available
2021-07-28 15:42:54	Backup package	Security before calibration	On disk	Uploaded
Serial number: 7525SEI-3296-FA - Distant arm				
2019-02-05 16:10:07	Backup package	test	Not on the disk	Available
2019-02-07 15:31:08	Backup package	BACK UP	Not on the disk	Available

- After a security check-out, the package becomes available (for any RDS Toolbox user on any computer).



Serial number: 8525-7-8345-FA - Connected				
2021-04-01 16:37:12	Certification		Not on the disk	Available
2021-04-06 09:48:20	Certification		Not on the disk	Available
2021-04-28 15:14:06	Backup package	Test	On disk	Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk	Available
2021-05-11 11:01:09	SMART dataset	2021/03/30 16:03 -> 2021/07/23 16:07	Not on the disk	Available
2021-07-28 15:42:54	Backup package	Security before calibration	On disk	Uploaded
2021-07-28 15:42:54	Backup package	Security before calibration	On disk	Available
Serial number: 7525SEI-3296-FA - Distant arm				
2019-02-05 16:10:07	Backup package	test	Not on the disk	Available
2019-02-07 15:31:08	Backup package	BACK UP	Not on the disk	Available

Synchronization of the List of Packages

When a new arm is added to the list of the vault (new connected arm or manually added distant arm), RDS Toolbox automatically synchronizes the list of available packages with the Hexagon Server.

In case of a synchronization issue, a “Refresh” button (↺) permits a new manual synchronization.

6.5.5 Download a Package from Hexagon Server

6.5.5.1 Listed Arms - Refresh

In End-User Profile, only the packages of the local arms can be seen and used.

Once the Vault panel opened, the list of packages for the available arms is synchronized and displayed.

(The packages are available but not locally downloaded).



Refresh the Vault

The list of packages of an arm may get newer items (new compensations, new periodic SMART Data sets ...). Thus, the list in RDS Toolbox needs to be updated. This operation is normally done automatically, however, if a new package has just been synchronized from another computer, it is possible to refresh manually the list, to make the new package online available.

This can be used as well if a package has been removed from the local list.

6.5.5.2 Download a Package

To be used, a package needs to be “Locally On disk”. It means that the package needs to be downloaded from the Hexagon Server if it is not yet on the computer.



Once the package is downloaded, it stays available On-disk even if the computer is no longer connected to Hexagon Server.



Download

Select the package.

2013-04-29 11:12:15		BackupArmSpecs	tests rds 3.6.1		Not on disk		Available
2013-04-29 11:44:05		Diagnosis	rds 3.6.1 tests		Not on disk		Available
2013-07-11 09:07:15		BackupArmSpecs	probe calib		Not on disk		Available
2013-07-11 09:24:26		Diagnosis	F analysis		Not on disk		Available
2013-09-06 14:56:20		Optimization	Arm specs recalculation for TP		Not on disk		Available



Download

click on “Download”

or



2x

Double click on the package

Its status becomes.

Date time	Type	Comment	Local status	Action status	Online status
{Date}	{type}	{Comment}	 On disk	 Downloaded	 Available

And the package becomes locally available to be used.



Several packages can be downloaded at the same time.

6.5.6
 Use a Package

The purpose of the packages is to be able to reproduce a previous situation to analyse, or safely restore a status of the arm...

Depending on the profile, usage is available or not:

Button			
	Refresh		Restore
	Package information		 Extract content
	 Add Arm		Open Report
	Remove Arm		Switch to Smart database
	Download		Close
	Backup		

 : Technicians only

6.5.6.1 Display the Information – Get the Package

RDS Toolbox can display the information of any package in the vault, whatever it is “On disk” or not.

Moreover, for the “On Disk” packages, a button gives a direct access to the location folder of the packages files, so that it is possible to get back the package file and send it by E-Mail in case the computer cannot be connected to internet.



The vault can be accessed also directly on C:\Users\Public\Documents\ROMER\RDS\Vault.

Select the package

Date time	Type	Comment	Local status	Action status	Online status
- Serial number: 8525-7-8345-FA - Connected					
2021-04-01 16:37:12	Certification		Not on the disk		Available
2021-04-06 09:48:20	Certification		Not on the disk		Available
2021-04-28 15:14:06	Backup package	Test	On disk		Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk		Available



click on “Package Information”

Do a right click on the package

Date time	Type	Comment	Local status	Action status	Online status
- Serial number: 8525-7-8345-FA - Connected					
2021-04-01 16:37:12	Certification		Not on the disk		Available
2021-04-06 09:48:20	Certification		Not on the disk		Available
2021-04-28 15:14:06	Backup package	Test	On disk		Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk		Available

Depending on the type of package and its Local status, the following information can be found:

Package Information (all packages)

Package name	 	Identification number of the package
File size		
Locate on disk		When clicking on this line, a link to the folder becomes available.  : opens the browser on the vault folder and pre-selects the package file

Compensation Report (Compensation packages)

		Opens the complete compensation report text file
spat, min,		Mean, min and max values for the spatial errors.
rep, min,		Mean, min and max values for the repeatability errors.
stat, min,		Mean, min and max values for the static errors.

6.5.6.2 Restore the Arm Data

If an error has been done on an alignment, or in case of a trouble, it is possible to restore a previous status of the memory of the arm. Any package contains the Arm data memory of the arm.


Restore

Select the package that contains the desired Arm data status.

Date time	Type	Comment	Local status	Action status	Online status
- Serial number: 8525-7-8345-FA - Connected					
2021-04-01 16:37:12	Certification		Not on the disk		Available
2021-04-06 09:48:20	Certification		Not on the disk		Available
2021-04-28 15:14:06	Backup package	Test	On disk		Available
2021-04-29 16:33:53	Backup package	test internet	Not on the disk		Available

Click on “Restore” button



If the package doesn't fit with the arm (the structure of the arm doesn't fit with the arm data), RDS Toolbox displays a message.

6.5.6.3 Switch to SMART Dataset

To visualize the SMART data from a SMART dataset package, once the package is downloaded, simply use the action “Switch to SMART dataset”: RDS Toolbox then prompt a confirmation message and activate the selected package.

For more details, please refer to chapter 6.6.4.2 Local and Distant Arm - Database Mode.

6.5.7 Remove a Package / an Arm

Periodic Package Removals

By default, the packages “On disk” are automatically removed from the computer after 2 weeks. But they still remain available in the list of the vault.

Local status	Action status	Online status
 On disk	 Downloaded	 Available

 2 weeks later:

Local status	Action status	Online status
 Not on disk		 Available



Packages are only removed from the local computer, not from Hexagon Server data base

Manually Remove an Arm

To clean the list of packages in the Vault, a distant arm can be manually removed from the list.

 Remove

Select the arm to remove.

2021-04-29 16:33:53	 Backup package	test internet	 Not on the disk	 Available
2021-05-11 11:01:09	 SMART dataset	2021/03/30 16:03 -> 2021/07/23 16:07	 Not on the disk	 Available
2021-07-28 15:42:54	 Backup package	Security before calibration	 On disk	 Uploaded  Available
Serial number: 7525SEI-3296-FA - Distant arm				
2019-02-05 16:10:07	 Backup package	test	 Not on the disk	 Available
2019-02-07 15:31:08	 Backup package	BACK UP	 Not on the disk	 Available
2019-02-08 14:08:55	 Certification		 Not on the disk	 Available



A local arm (connected or offline) cannot be removed from the list. RDS automatically removes it periodically if the arm hasn't been connected during the period.

6.5.8 SMART Dataset Manual Upload

NOTICE

A manual upload should be done only on the request of a Hexagon technician

In a standard way, RDS Toolbox automatically uploads the SMART dataset flow once a day.

However, on the request of a Hexagon technician, for a specific survey or diagnosis purpose, it may be necessary to provide the dataset to the technician.

- By uploading prematurely, the SMART dataset flow
- By creating a virtual image of the local SMART dataset into a zip file

6.5.8.1 Manual Upload of SMART Dataset

The period of synchronization (upload) of the SMART dataset to the Hexagon Server is 24h.

If an issue occurs, the Technician of the Hexagon Service Centre may have the need to investigate the situation and then to be able to consult the SMART dataset package before the term of 24 h.

An action button is available in the Vault panel to anticipate this periodic synchronization.

1. Enter the Vault and click on the action button “Extract and upload SMART dataset”.



2. Then the SMART dataset is sent to the Hexagon Server.



When uploading manually, the automatic daily synchronization is anticipated, and the current time is set as the new daily upload time



To avoid overloading the Hexagon Server activity, a minimum delay of 10mn is set between 2 successive uploads.

6.5.8.2 Dump SMART Dataset

In case the computer cannot be connected to internet (no available connection, IT policy, ...), the SMART Dataset can still be sent by E-Mail, within a zip file.

1. Select the arm for which the SMART dataset needs to be sent.
2. Enter the vault and click on the action button “dump SMART Dataset and Log file”.



3. Confirm the creation by clicking on “Yes”.
4. Then a zip file is created on “Public documents\ROMER\RDS\Temp” and the folder is open, pointing on the created file.
5. Copy the dump file on a removable support (USB memory, CD, ...) and send the file to the Hexagon technician.

The dump file contains the following data:

Current SMD	Content of the whole local SMART dataset (including all the local arms)
Rds.log RDSLocalDBDLL.log RDSToolbox.log RDSToolboxDLL.log	Log files that can help the investigations (only for last 5 days)
SystemInfo.xml	System information (Windows version, memory,...)

6.5.8.3 Open a SMART Dataset

To be able to read a SMART dataset (from a dump file for example), a button is available in the vault:

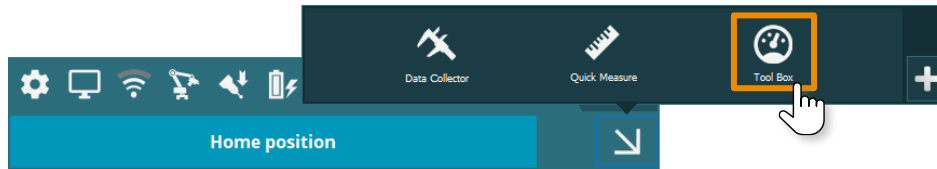
1. Unzip the dump file.
2. Enter the Vault and click on the action button “Open SMART dataset”.
3. RDS Toolbox then switches in a “SMART dataset” mode (see SMART chapter) to simulate the distant computer.
4. All the SMART information of the arms on the distant computer can be displayed and analysed.

6.5.9 Quick Vault Guide

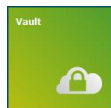
6.5.9.1 How to ... Find a Package

Find a Package with a Keyword

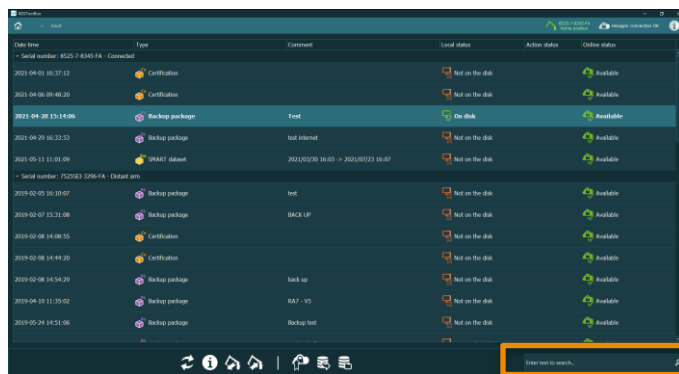
1. Open RDS Toolbox



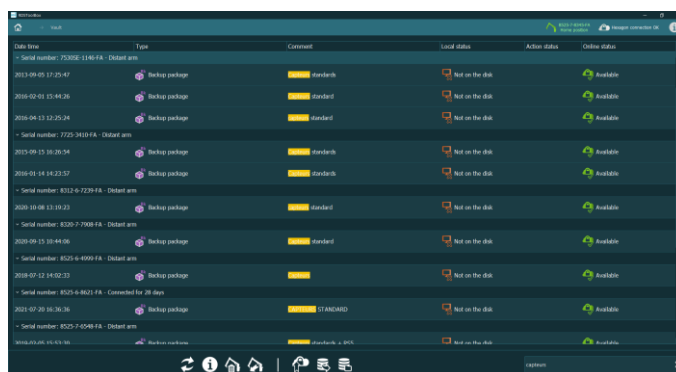
2. Select "Vault"



3. In the search window (Ctrl+F), type key words (e.g.: arm S/N, type of package, comment, date...)

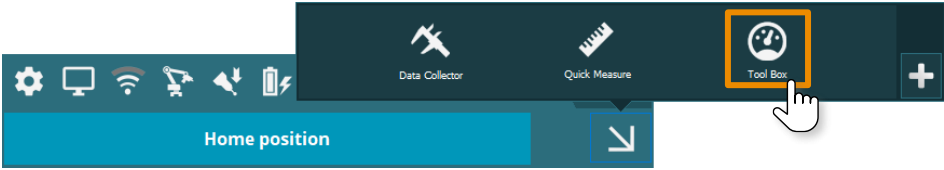


4. RDS Toolbox automatically reduces the list to the packages that contain the keywords, highlighting them.



Find a Package with a Filter

1. Open RDS Toolbox



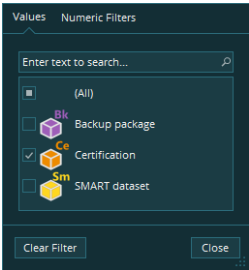
2. Select “Vault”



3. On the header of the column where to apply a filter, click on the filter icon (top left corner)



4. Select the desired value (or choose “Custom” for advanced filter)



5. RDS Toolbox automatically reduces the list to the packages that fits with the filter.

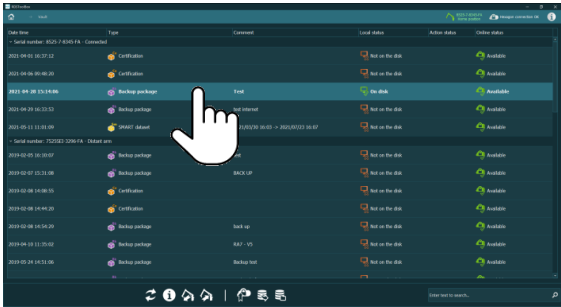
Date time	Type	Comment	Local status	Action status	Online status
Serial number: 8525-7-8345-fA - Connected					
2021-04-01 16:37:12	Certification		Not on the disk		Available
2021-04-06 09:48:20	Certification		Not on the disk		Available
Serial number: 7525SEI-3296-FA - Distant arm					
2019-02-08 14:08:55	Certification		Not on the disk		Available
2019-02-08 14:44:20	Certification		Not on the disk		Available
Serial number: 7525SEI-3400-FA - Distant arm					
2015-09-04 08:57:14	Certification		Not on the disk		Available
2015-12-07 09:13:12	Certification		Not on the disk		Available
2016-01-14 10:03:51	Certification		Not on the disk		Available
2016-01-20 10:28:47	Certification		Not on the disk		Available
2016-05-12 13:43:39	Certification		Not on the disk		Available
2019-10-22 08:49:22	Certification		Not on the disk		Available
2020-09-17 09:06:46	Certification		Not on the disk		Available

6.5.9.2 How to ... Get a Package File

In a standard way (computer connected to internet), when a package is created, it is immediately uploaded to the Hexagon Server, and becomes available for a service aim.

In case the computer cannot be connected to internet, the package can be got back as a file, to be sent to a service centre by E-Mail.

- 1. Select the package.



- 2. Download it.



- 3. Use the Information action button.



- 4. In the information window, notice the package identification name.

Package information	
Package name	03da015e-cbd3-4aa4-9e58-fde1ab2ba317.pck
File size	5 Ko
Locate on disk	C:\Users\Public\Documents\Romer\RDS\Vault\03da015e-c...

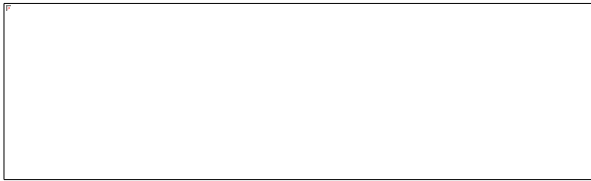
- 5. Select the line “Locate on disk” and click on the magnifying glass.



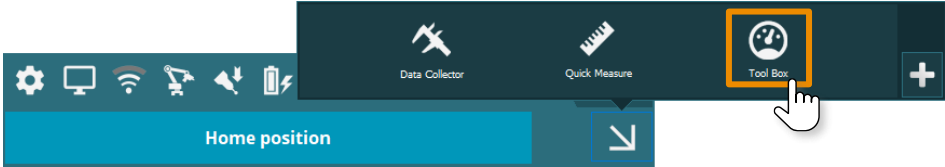
- 6. In the opened browse window, select the package with its identification name and copy it on a removable support.

6.5.9.3 **How to ... Save the Arm Data**

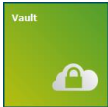
1. Establish a wired connection to the arm (Ethernet or USB).



2. Open RDS Toolbox.



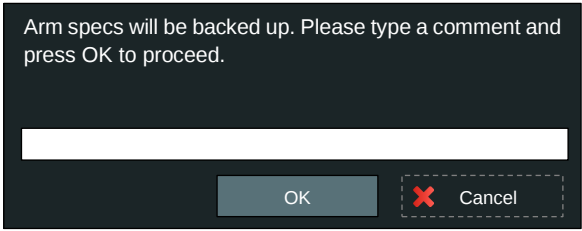
3. Select “Vault”.



4. Click on “Backup”.



5. Enter a comment.



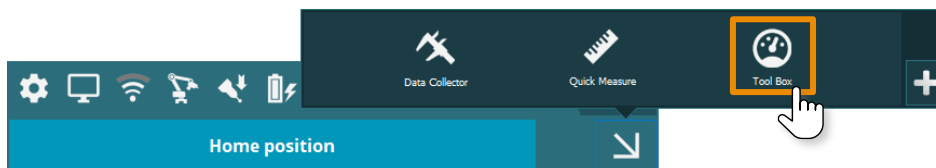
6. Press OK.

6.5.9.4 How to ... Restore the Arm Data

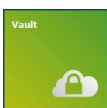
1. Establish a wired connection to the arm (Ethernet or USB).



2. Open RDS Toolbox.

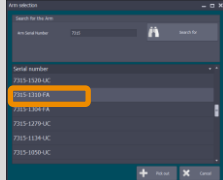


3. Select "Vault".



4. In the list of packages, select the package to restore (Backup, Compensation, Calibration).

If the arm is not present in the list, a Technician profile is necessary:

- Click on "Add An arm"
 
- Enter the serial number
 
- Click on "Search for"
 
- Select the wanted arm
 
- Click on "Pick out"
 

5. Click on "Download".



6. Click on "Restore".



7. Restart the arm.



6.6 SMART (arm)

6.6.1 SMART Presentation

6.6.1.1 What is SMART

RDS software includes a new monitoring system for Hexagon arms named SMART (Self-Monitoring, Analysis and Reporting Technology). By collecting various indicators from the Arm and the computer, this system will help anticipating failures and loss of performances. The strength of this feature is based on the consolidation by Hexagon and the process of information coming from all Hexagon Arms. Thanks to this centralized knowledge, thresholds are adjusted to improve the detection and prediction of potential failures and loss of performances.

NOTICE

SMART main purpose is to prevent from any breakdown or issue. Thus, it is important to let RDS Toolbox communicate the data to the Hexagon Server.

6.6.1.2 What type of Information does Hexagon collect?

RDS software gathers and stores into the host computer on periodic basis information below:

Standard computer information	Operating system version, CPU, RAM size, hard disk, graphical card, network adapters, version of RDS installed and your regional and language settings.
-------------------------------	---

This information is generally not personally identifiable and is similar as the information your browser sends to each website you visit.

Configuration of your arm	Identifiers, firmware versions, some properties coming from arm data as its type and its measuring volume.
---------------------------	--

Various indicators allowing detecting potential failures and loses of performance. There are ordered into different categories:

General statistics	How many times arm did a full power on/off cycle, total time in power-on state, how long the arm has been connected to RDS, temperature measured in the base, 3D distance travelled by the probe
Encoders	Information as temperatures, working status, count of errors and warnings, voltage
Accuracy	Time passed since the last compensation, time passed since the last probe alignment, result of last quick check and probe alignment
USB/WLAN communication	Information as how long the arm has been connected using USB or WLAN, count of communication warnings or errors
Battery	How many times the battery charger started, time this battery has been used, health of the battery, current charge level
Scanner	Time spent scanning, how long laser was on, how many stripes have been dropped while scanning
Wrist components	Information as time spent using the integrated camera and head light, how many times each button has been actuated
Environment	Measurements retrieved by SMART modules
RDS	Count of RDS Toolbox, RDS Data Collector and RDS Control Panel activations

Hexagon doesn't collect or process any personal data or any information which could be used to identify any individual. It certainly will not contain any personal or contact information about you (such as your name, address, or phone number).

No data about measurement activities is either collected by SMART.

6.6.1.3 How does Hexagon use the Collected Information?

Collected information will be used by Hexagon in different ways.

Firstly, all collected information will be used to tune the thresholds allowing the detection of potential failures and losses of performances. Adjusted thresholds are regularly sent to the field.

If potential problems are detected, one of our affiliates or subsidiaries (i.e. service centres) may contact your company to help you avoiding a complete breakdown of your system. Hexagon will provide those companies only the information they need to deliver the service. They are required to maintain the confidentiality of this information and are prohibited from using it for any other purpose.

Collected information is also used to propose you interesting [news](#) from Hexagon. These news are related to your system settings (Arm type, accessories mounted on the Arm, operating system language...). News are never sent to a specific customer but to a group or all of them.

Statistic reports will be generated. They will be used by Hexagon only to know how our products are used. It could lead to improvements of existing products and design of new ones.

6.6.1.4 Privacy Protection

Hexagon is committed to protect your privacy. Hence, we are not collecting or processing any personal data or information. This user information statement explains how Hexagon uses and protects the data and information we collect.

We may disclose collected information to affiliate partners (i.e. service centres) when we judge necessary to inform you about a possible failure or the need of maintenance services on our behalf.

We do not rent, sell or otherwise disclose collected information with unaffiliated third parties.

Hexagon has implemented reasonable physical, technical and administrative security standards to protect collect information from loss, misuse, alteration or destruction.

Our service providers and agents are contractually bound to maintain the confidentiality of collected information and may not use the information for any unauthorized purpose.

6.6.1.5 Deactivation

By default, the possibility to collect the above-mentioned information is enabled. You are entitled and able to disable this function at any time.

To disable this function and discontinue your participation as well as to enable, or to select participation at a later stage, please refer to chapter 3.5 [RDS Control Panel > SMART](#).

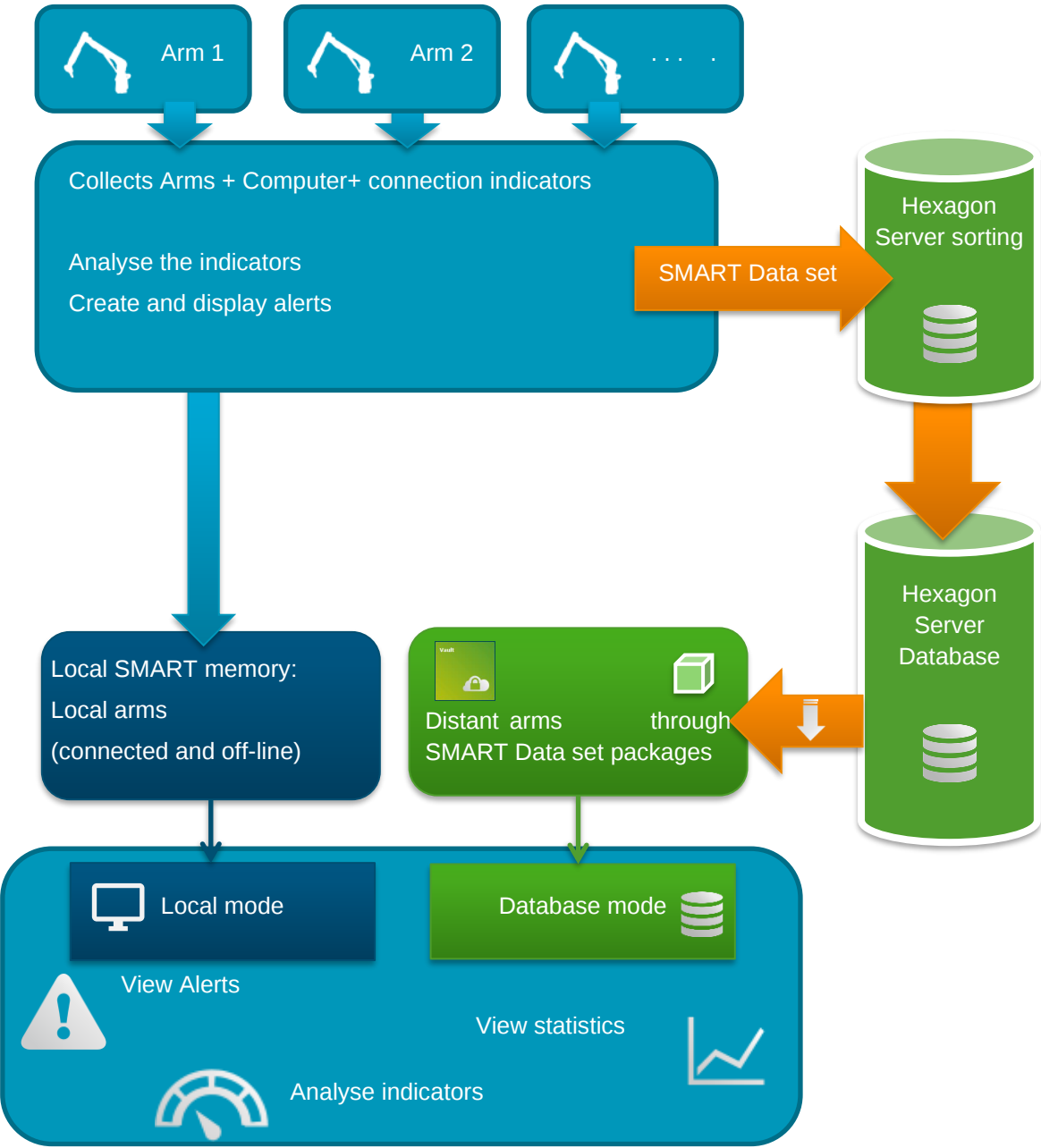
NOTICE

Disabling transmission of SMART data to Hexagon is not advised. If you do this, it will make difficult diagnosing potential problems with your equipment. This could increase machine downtime.

6.6.2 SMART Process

RDS collects all the SMART information every time an arm is connected to the computer. Thus, it is possible to have a look on the detailed status of all the previously connected arms (including the currently connected one) and components. This includes several indicators and possible alerts if some indicators overpass specified limits.

Several indicators get information from sensors on the arm; even when the arm is not connected, the sensors collect data. The data are synchronized with Hexagon Server through the computer (SMART Data set packages) as soon as the arm is connected to the computer.



6.6.3 Communication with the Hexagon Server

By default, when installing RDS, SMART establishes automatically the communication with the Hexagon Server, to send SMART data and receive news.

It is possible to deactivate this communication, as well as the popups. Refer to the RDS Control Panel > [SMART](#).

The whole SMART Data flow stored on the computer is uploaded automatically once a day, however, it is possible to upload manually through the [Vault > Dump SMART Dataset](#). Also, if the computer cannot be connected to internet, at the request of a Hexagon technician, it is possible to create a manual zip file that can be sent to the Hexagon Service Centre.

For the manual upload and zip file creation, please refer to chapter § Vault.

6.6.4 Arm Selection: 2 Possibilities

6.6.4.1 Local Arm - Standard Mode

By default, provides the survey of all the arms that have been connected to the computer. This is the standard mode that uses the local memory.

Connected Arm

RDS Toolbox collects SMART indicators and information any time an arm is connected to the computer. All the previous SMART data in the memory of the arm are downloaded onto RDS Toolbox. Then, the data are periodically synchronized with Hexagon Server.

The SMART information from the currently connected arm is then directly accessible.

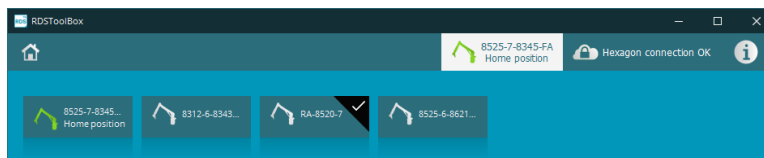
By default, SMART tile gives access to the current arm.

Off-line Arms

As RDS Toolbox collects and keep in memory all the SMART indicators of each arm that has been connected to the computer, it means that not only the currently connected arm can be surveyed, but also all the previously connected arms.

In fact, there is no difference between the connected arm or an Off-line arm, both are local arms.

To select the arm to survey, use the Arm selection button on top right of the screen.



The selection of the arm can be done before or after the selection of the SMART tile.



To survey old SMART Dataset, it becomes necessary to download and use the corresponding SMART package. See next chapter.

6.6.4.2 Local and Distant Arm - Database Mode

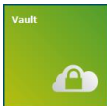
To survey a local arm (connected or Off-line) at a previous period than the available dataset, it is possible to use SMART packages.

By the same way as local arms, it is possible to survey a distant arm that has never been connected to the computer, by adding it in the Vault list and downloading SMART Data set packages (Technician profile only).

All the SMART Data set packages are used through a separate “Database mode”: RDS Toolbox switches from the standard “Live” mode to a SMART Package Database.

By using the Database Mode, all the SMART Data Set Packages “On Disk” can be surveyed.

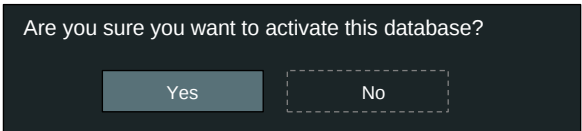
1. Open the Vault.



2. Select the wanted SMART Data Set Package and click on “Use database”.



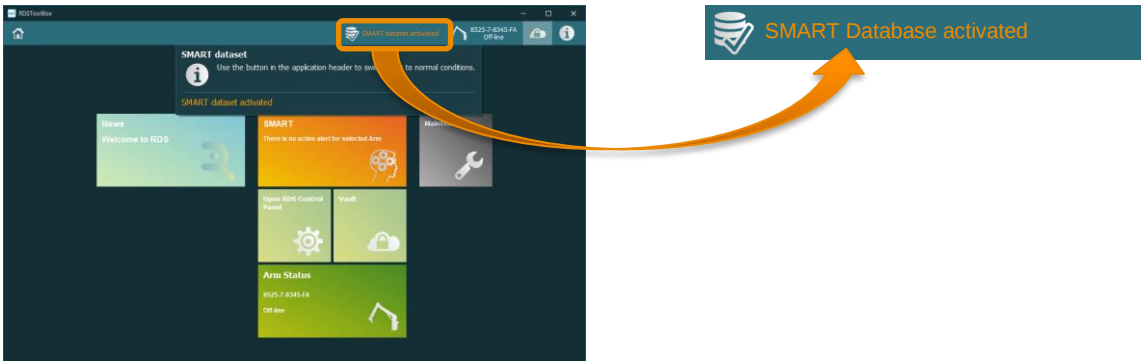
3. A prompt is asking you for confirming the use of the selected database: answer “Yes”



4. Then RDS Toolbox switches into a “Database Mode”: RDS Toolbox doesn’t use anymore the local memory, but only the database coming from the SMART Data set package.



5. Then a “SMART dataset activated” notification appears beside the arm selection. Press on it to return to the standard mode.



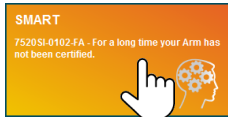
In the Database mode, only the SMART functions are available. Switch back to the standard local mode to enable the other tiles.

6.6.5 SMART Overview Panel

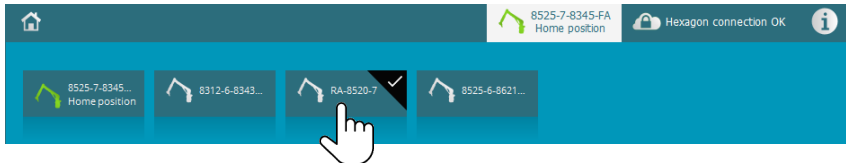
SMART Tile

In case of any important alert regarding any of the arms in the memory of the computer, notifications will be displayed alternatively on the SMART Tile itself.

1. Click on the Tile to open the SMART Overview Panel.



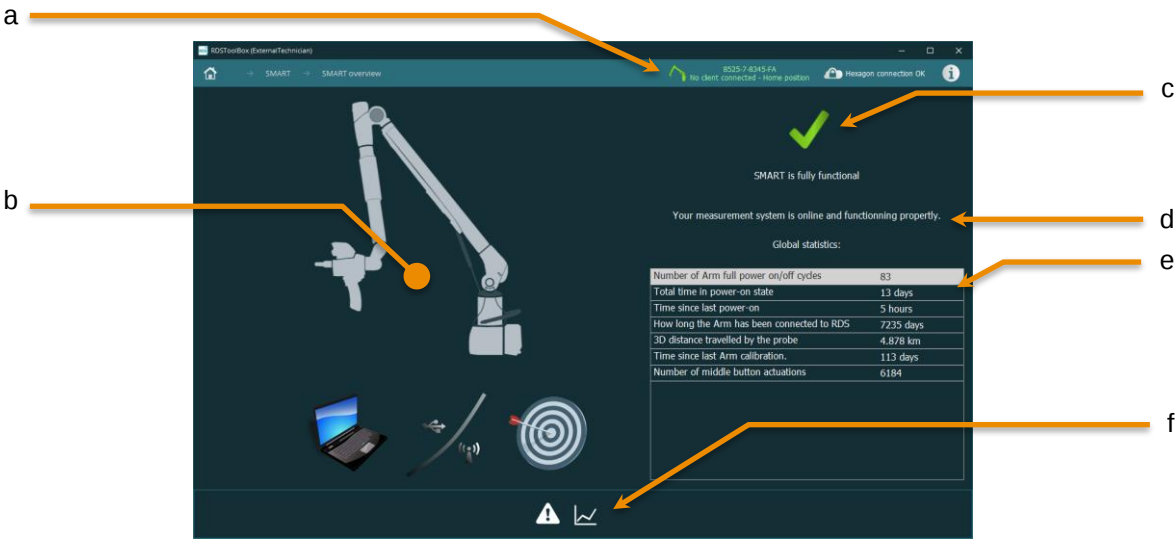
2. Select the arm to monitor.



To survey a distant arm, before opening the SMART panel, open the Vault panel, download the SMART Data set package of the arm for the desired period, and click on "Use the database".

The overview panel of SMART appears: it shows a global graphic view of all the components of the system, and some statistics and information about the status and use of the system.

Description

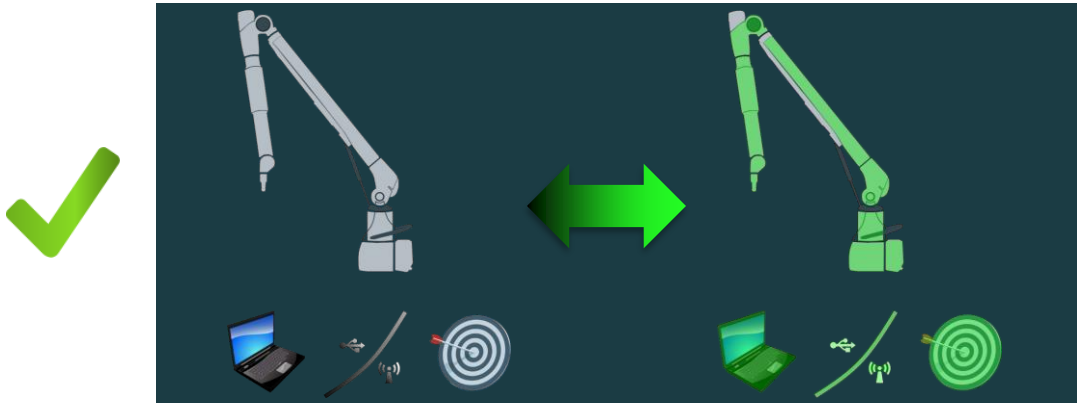


a		Database mode	Reminds when the database mode is used.
b		Arm selection	Local mode: Permits to select which arm (connected or Off-line) in the local mode to survey Database mode: reminds which arm is displayed.
b		Components graphic view	Shows each component and highlight whether they are OK (green) or not (red).
c		Global status of the system	Shows very quickly if the system is OK or if one component requires an attention.
d		SMART status	Shows if SMART functionality is activated.
e		Statistics area	Several indicative statistics or short description of the alert on one component
f		Display alerts	Opens the list of alerts for the selected arm
		Analyse indicators	Opens the indicators screen for the selected arm.

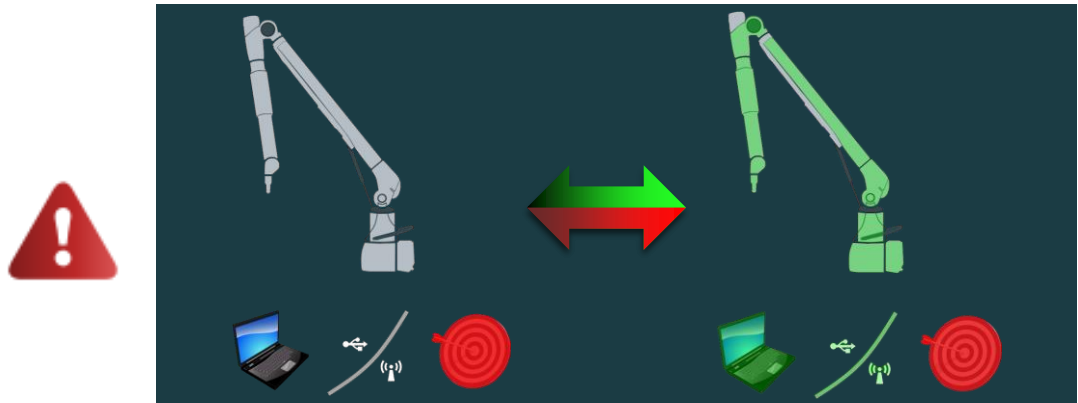
6.6.5.1 SMART Components Graphic View

The graphic view of the arm and accessories allows quickly locating an issue on one component.

- In a normal situation without any alert, each component is slowly flashing green.



- If RDS Toolbox gets a SMART alert from the system, the concerned component is shown red



In the present case, 1 warning is shown: the Target (=accuracy).

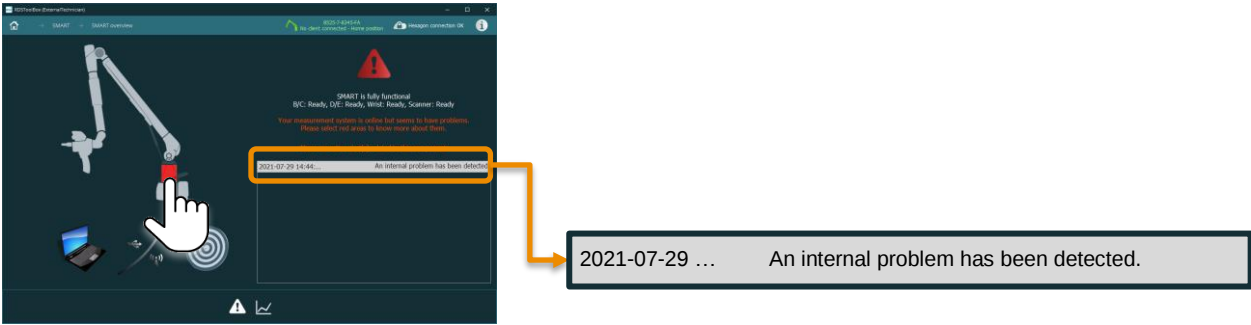
By Pointing the Component

The description of the component and its status are displayed on it

On a green component	On a red component
Component is working properly	Component presents an alert

By Clicking on a Component

Some statistics (for green components) or the alert(s) (for red components) related to the component are displayed in the statistics area.



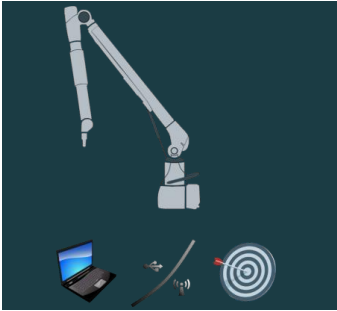
6.6.5.2 SMART Overview Components Description

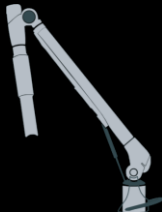
In the SMART overview, a sample of typical statistics can be displayed, depending on the selected component.

If an indicator of one component gets outside its limits, an alert is generated and displayed in the same statistics area instead of the statistics.



A complete list of statistics can be consulted through the “analyse Indicators” button.



Example of statistics		
No selection		Number of Arm full power on/off cycles
	Accuracy	Time since last compensation
	Computer	Number of RDS Control Panel activations
	Comm_Link	Times and duration of connection
	Comm_USB	Times and duration of connection Count of errors
	Comm_Wi-Fi	
	Control / Feature Pack	Battery level
	Arm Base	Duration of use Temperature of the base
	A encoder B encoder C encoder D encoder E encoder F encoder G encoder	Encoders temperatures
	Wrist	Number of trigger button actuations
	Probe	Number of ran probe alignments

6.6.6 Alerts

Once the SMART indicators are collected, RDS Toolbox compares the values to warning and critical limits. As soon as one SMART indicator exceeds a limit, an alert is generated and shown by RDS itself. Then several actions are operated:

On the screen of the computer	A notification of the alert is displayed regularly on the bottom right of the screen
On the Home panel of RDS Toolbox	The alert is displayed on the SMART tile itself
On the SMART Overview panel	The faulty component becomes red The global status icon switches to  A short description of the alert is displayed when clicking on the faulty component
On the SMART Alerts panel	The description of the alert is added to the list of active alerts.

Purpose of an Alert

The aim is to warn the user that a problem occurs, a component may be damaged or may be about to be damaged. In any case, an alert must be checked to avoid a major issue. It can be also a reminder for a late operation (too old compensation for example).

What to do When an Alert is Generated

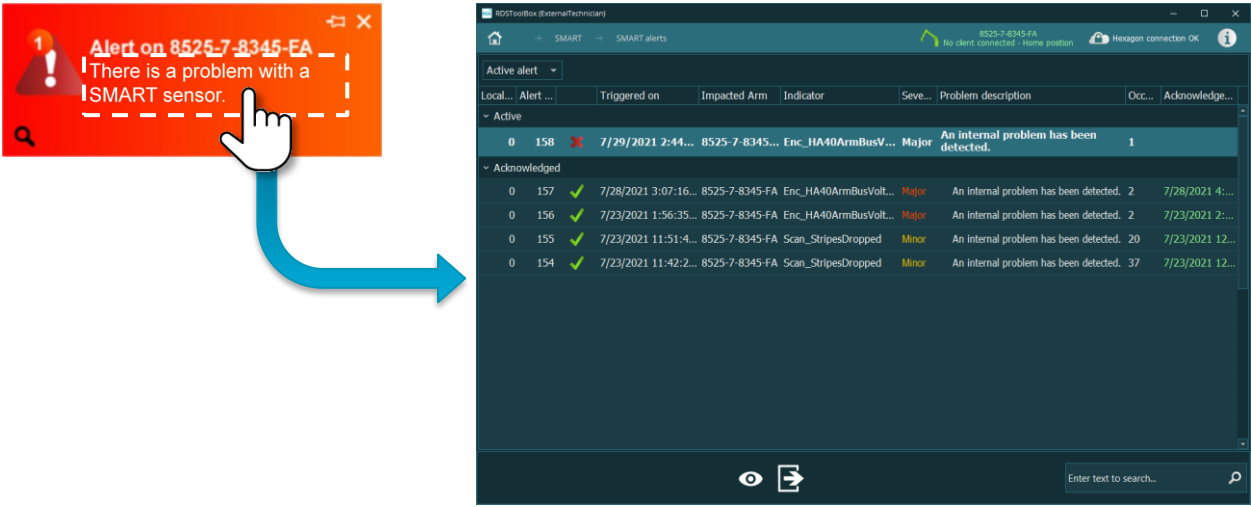
When an alert is generated, a notification is displayed several times, in sort of ensure that the user can see it. In case it has not been seen, the user can still check in SMART Overview Panel the status of the arm. In any case, it is important to display the description of the alert, to see the criticality, and get a suggestion to solve it.

Depending on the criticality and the impact of the issue, several solutions:

- The alert can be postponed if the arm still needs to be used, but the user wants to be reminded.
- The alert can be validated, if the problem is minor, and doesn't represent a real danger, or if the problem has been solved.
- The faulty component can be analysed in detail, to diagnose.

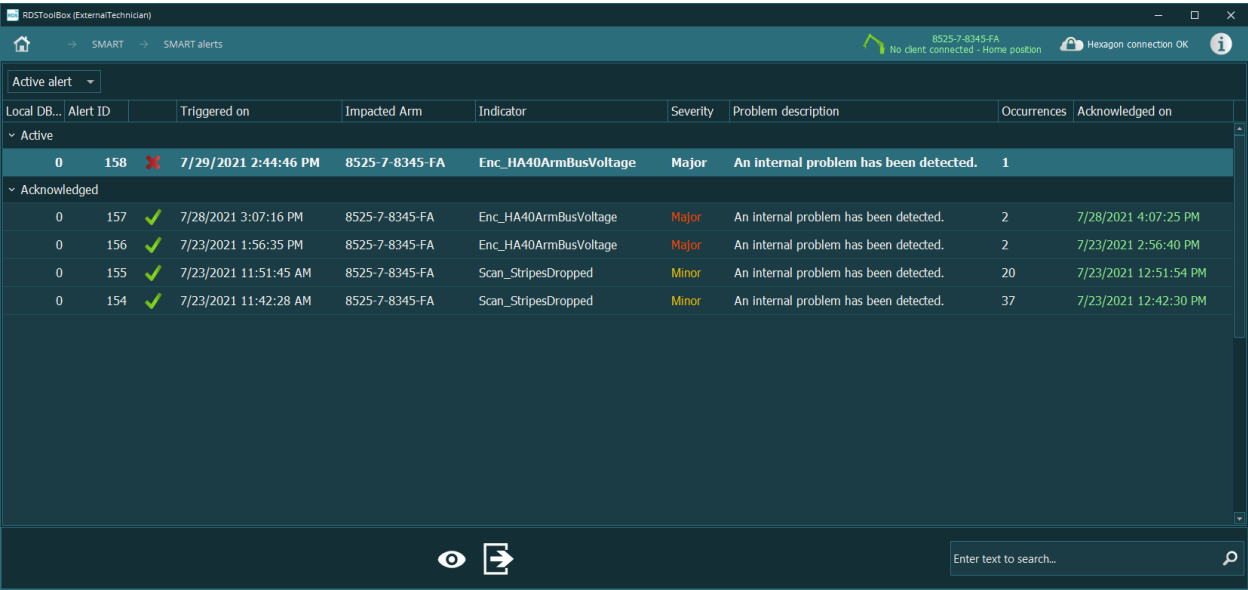
6.6.6.1 Alert Notifications

As soon as RDS generates an alert, a notification is displayed on the bottom right of the screen:
Click on the alert to view the details in the SMART Alerts panel.



6.6.6.2 SMART Alerts Panel

By opening on a notification or through RDS Toolbox > SMART > Display alerts (and select the arm), the list of all the alerts concerning the selected arm appears:



Active alert	Button to sort or filter the list by the active or validated status of the alert
Alert ID	Identification number of the alert
Triggered on	Data and time of the alert
Impacted Arm	
Criticality	(Warning / Major / Critical): importance of the alert. Critical alerts appear in red.
Problem description	Short description
Occurrences	Number of times
Acknowledged on	Date and time of validation of an alert
 View alert	Button to open the full details of the selected alert
 close	Closes this panel and return to the SMART overview panel.

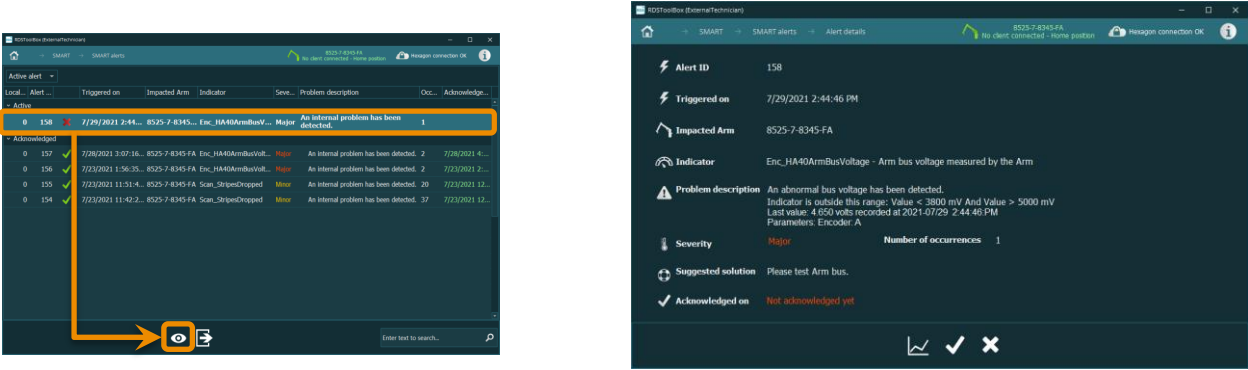


The “Warning” criticality does not generate an “alert” (no notification or alert in the SMART overview panel).

6.6.6.3 Alert Details

To view the details of one alert, select the alert and click on “View alert” or double click on the alert.

From the SMART overview panel, a click on a faulty component displays the list of alerts on the selected component, and then a click on one alert directly opens the details of the selected alert.



Information

	Triggered on	Date and time of the generation of the alert
	Impacted Arm	Identification of the arm implied by the problem
	Indicator	Exact SMART indicator of the faulty component - name and description
	Problem description	Description and values of the indicator error.
	Criticality	Minor / Major / Critical
	Suggested solution	Suggestion of checking, repair, contact... to try to solve or avoid the problem.
	Acknowledged on	Date and time of the validation of the alert

Actions

	Analyse: To go deeper in the analyse of the problem, access to all the SMART indicators, graphs, and values.
	Acknowledge: (for active alerts) once the problem is solved, repaired, or to dismiss the alert, button to validate the alert.
	Postpone: (for active alerts) button to keep a survey on the indicator. The alert is changed to standby mode, during a certain time the notification is suspended.
	Exit: close the Alert details panel.

6.6.7 Analysing Indicators

SMART monitoring is composed by several indicators about all the components of the arm, connection, computer, use of the system, or accuracy. The global status of those components is graphically displayed in the SMART overview screen. To go deeper in the analyse of those indicators, a complete panel provides the display of one or several SMART indicators, their current values and time graph. To give the best possibilities, the display is customizable.

From the SMART overview panel, or from the details of an alert, click on “Analyse indicators”.



From SMART Overview, ‘Analyse’ panel opens automatically the templates tab.
From Alerts details, ‘Analyse’ panel automatically focuses on the faulty indicator.

6.6.7.1 Description of the Panel



a	User tabs:	
	Templates	Displays the saved templates to use them
	Available	Displays the list of all the available indicators and details to add the chart manually
	Displayed	Shows the current indicators used in a chart
b	Content of the tab	
c	Action line	
d	a. Chart 1 b. Chart 2	... Up to 4 charts can be displayed
e	Zoom	Graphic control of the time range

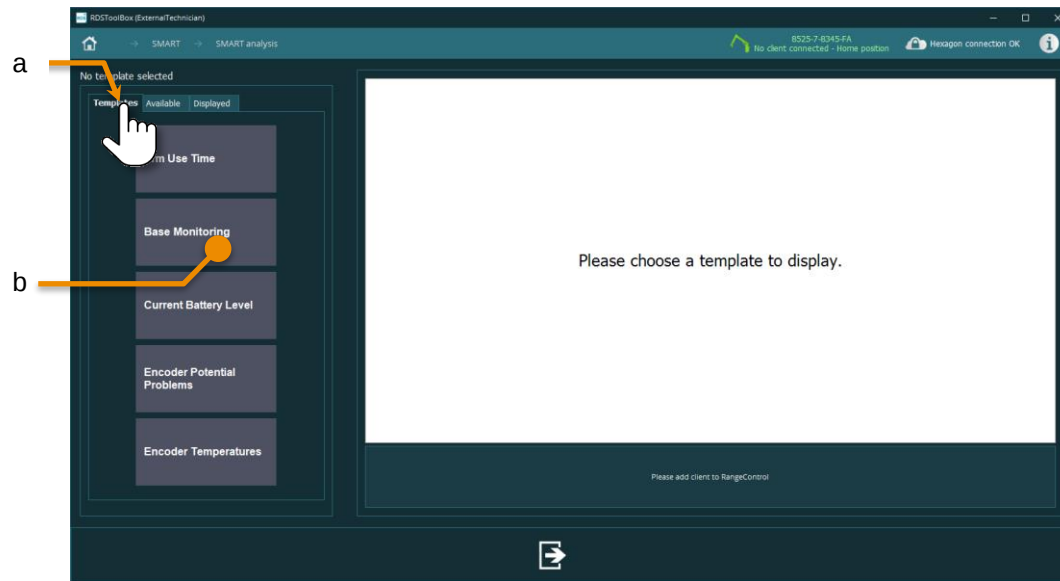
Actions

	Adds the current indicators selection on a new chart (up to 4 charts)
	Adds the current indicators selection on the existing chart Nb1 / 2 / 3 or 4
	Displays all the alerts on the charts
	Displays all the events on the impacted chart
	Exports the values of each graph into a separate excel file
 	Saves the current workspace as a new template
	Removes all the charts and clear all the workspace
	Refits the charts to the entire time range
	Closes the panel and goes back to SMART Overview panel

: Service profile only

6.6.7.2 Use a Template

When arriving in the SMART analysis panel, templates are proposed.



When installed, RDS Toolbox provides default predefined templates, which represent useful indicators. To use them, simply select the tab “Templates” (a) and click on the graph to display it (b).



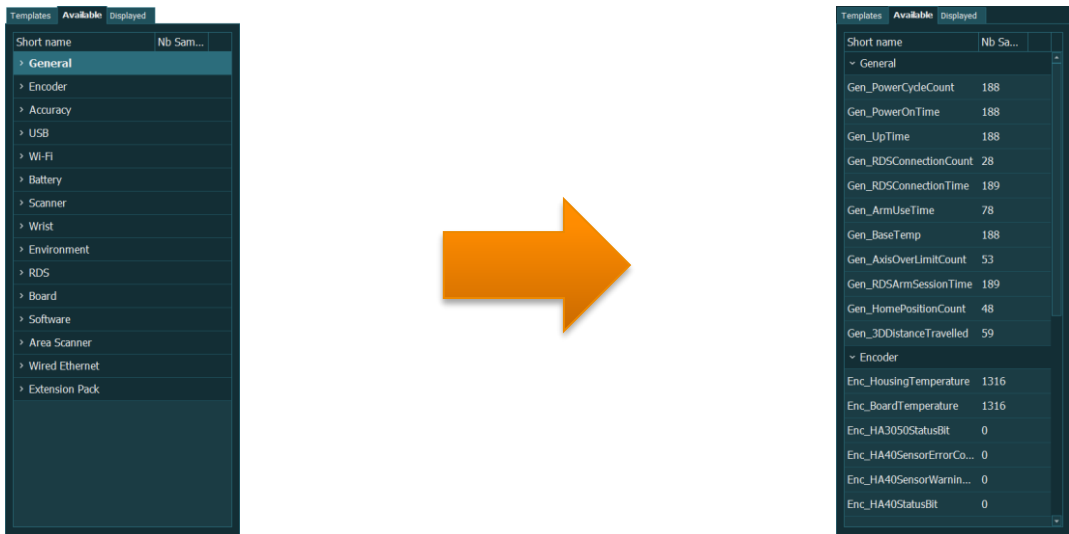
If one or several graphs were already displayed, the whole view is overwritten with the new graph from the template.



It is possible to get more templates. Ask your Service Centre.

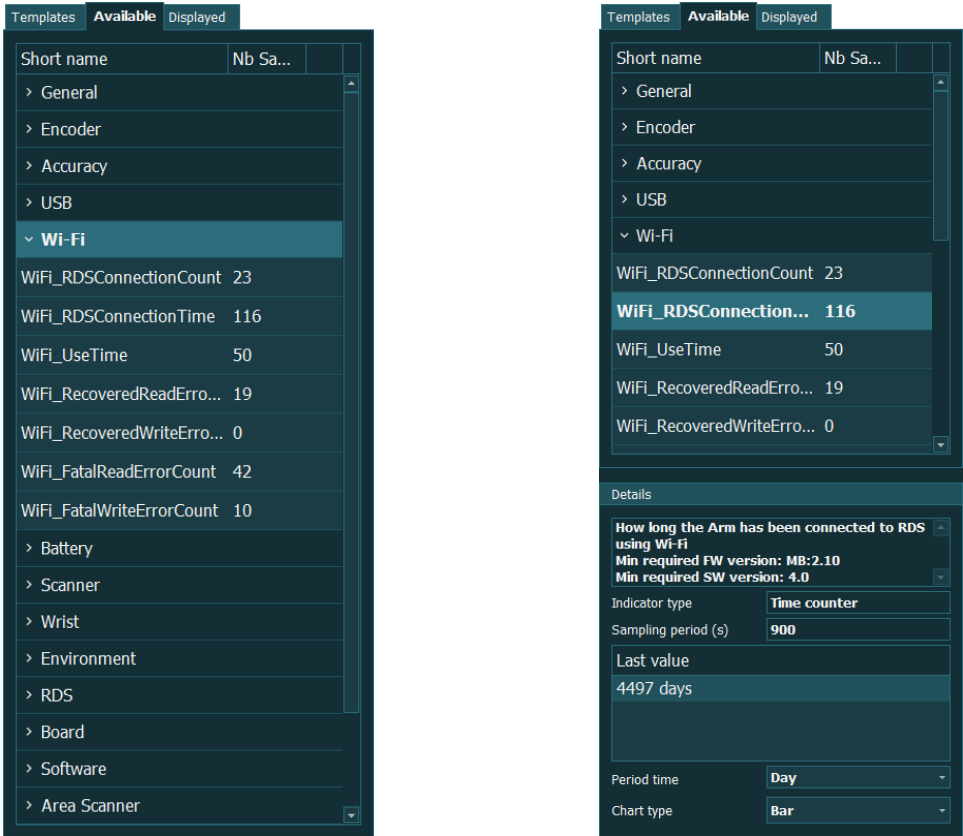
6.6.7.3 Select an Indicator

Select the “Available” tab to display the list of indicators. The list can be reduced or deployed by clicking on each expand button. (►)



As soon as one indicator is selected, its details appear below the list:

1. Deploy the group
2. Click on the indicator

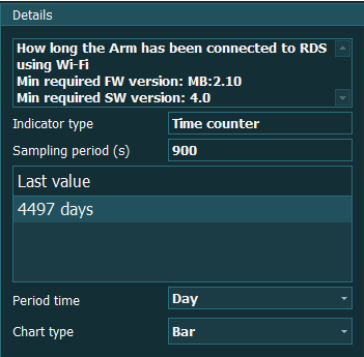


The search by keyword function can be used with Ctrl+F. (click first on the header of the column).

6.6.7.4
 Details of an indicator

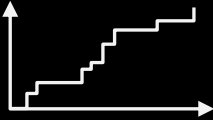
The details zone gives descriptions about the selected indicator.

Descriptions



Type of Indicator

Several types of indicators may be found

Type	Default Chart	
Counter 	Bar	A counter evaluates a number of occurrences or a distance.  A counter is increased only each time the SMART sensor is actuated.  The name usually ends by “Count” The last value (details zone) represents the overall total. The chart can represent sub totals per hour, per day per month. The chart may also represent the overall total evolution (Period time = “None”)
Time counter 	Bar	A Time counter evaluates duration.  A Time counter is increased in real time as soon as the SMART sensor is active.  The name usually ends by “Time” The last value (details zone) represents the overall total. The chart can represent sub totals per hour, per day per month. The chart may also represent the overall total evolution (Period time = “None”)
Immediate 	Line	An immediate indicator evaluates an instant value that can be measured at any moment: a temperature, a size, a voltage, a value (alignment result), a percentage (of loading) ...  An immediate value is automatically periodically measured by the SMART sensors.

Event	Line	An event memorizes specific unexpected or abnormal occurrences (shocks...)  An event is memorized only when the occurrence occurs, when one sensor exceeds a limit.  The name usually ends by “Event”
On demand	Line	

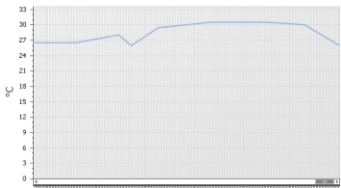
Indicator Index

Some indicators may provide not only one value but several indexes.
Indexes of an indicator may concern encoders indexes, probes indexes, ...

In such cases, several indexes can be selected and displayed at the same time (using Ctrl or ⬆ keys).
For example, the indicator “Enc_BoardTemperature” provides one value for each encoder.

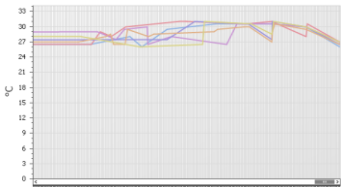
Encoder	Last value
A	26.0 °C
B	27.0 °C
C	27.0 °C
D	26.0 °C
E	26.0 °C
F	28.0 °C
G	29.5 °C
Period time	None
Chart type	Line

Only A is selected, the graph shows only one curve



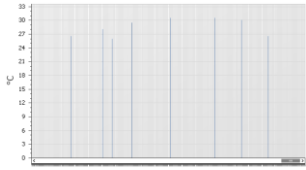
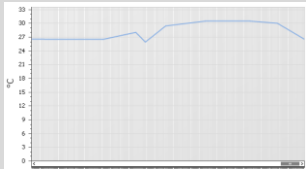
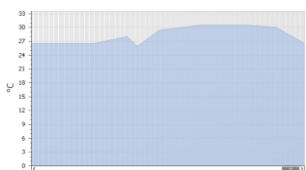
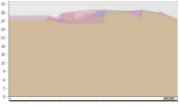
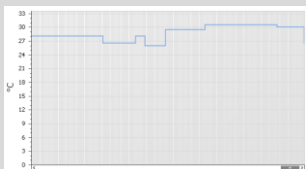
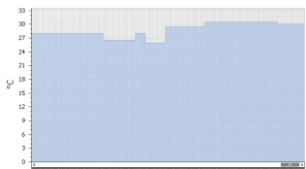
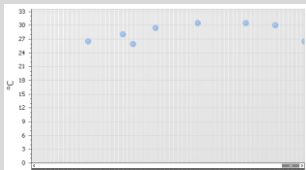
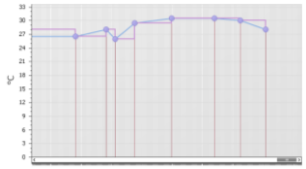
Encoder	Last value
A	26.0 °C
B	27.0 °C
C	27.0 °C
D	26.0 °C
E	26.0 °C
F	28.0 °C
G	29.5 °C
Period time	None
Chart type	Line

A, B, C, D, E and F are all selected, the graph shows 6 curves.



6.6.7.5 Type of Charts

Different kinds of graphs can be chosen: all are based on the points of the indicators; the difference is located on the way to link them.

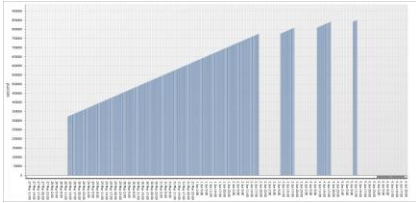
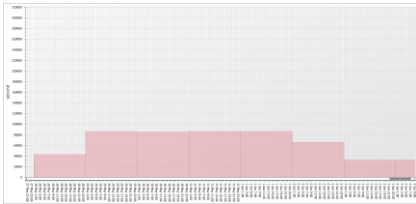
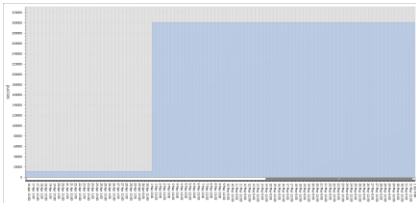
Bar		Pikes are displayed only on the points of the graph. This is useful for indicators to show abnormal occurrence such as shocks.
Line		All the points are linked by a straight segment. This is the typical way to represent immediate values (temperatures for example).
Area		Area is based on the Line chart, but all the area under the line is filled. It is useful to better see the graph, but not recommended for multiple lines on same graph. 
Step line		All the points are linked through steps. This is more convenient for counters and time counters.
Step area		As for Area based on Line, Step area is based on Step line, and the field under the steps is filled. Here again the purpose is to better see the graph, but it is not advised for multiple steps on same graph.
Spline		
Spline area		
Point		Point chart is the basic mode, the points are simply displayed as dots and not linked.
		Several types can be displayed on the same graph by adding them one by one on an existing graph



The Range graph is always displayed as “Line”.

6.6.7.6 Period Time (counters only)

For the counters and the time counters, the values can be displayed per period.

None	 (Bar graph)	The graph shows the complete incrementing of the indicator in real time.
Hour		The graph shows the total counter value per hour
Day	 (Step area graph)	The graph shows the total counter value per day
Month		The graph shows the total counter value per month

6.6.7.7 Add an Indicator to a Chart

To analyse an indicator, it must be added on a chart, either a new or existing one.

Preliminary Selections

Before any display, the following selections or settings are necessary:

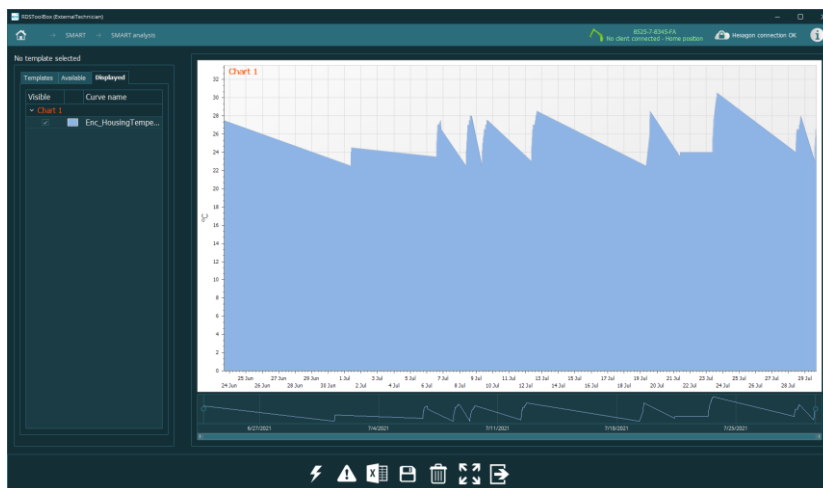
1. In the Available tab, select the wanted indicator
2. In the details of the indicator, select one or several indexes
3. For counters, choose the period time
4. Choose the type of chart

Display the Chart

5. Once the preliminary choice is done, add the selected indicator:

-  On a new chart
-  On an existing chart

6. Then the graph is displayed



On the left side, the “Available” tab is replaced by the list of indicators on each chart.



It is possible to add an indicator to an existing chart only if the type of graph is the same.



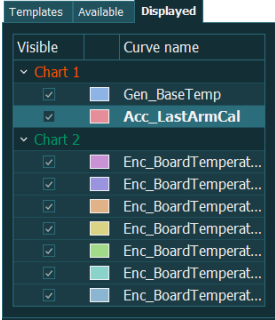
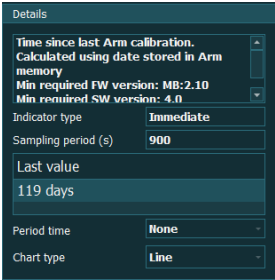
It is possible to add an indicator to a new chart by double clicking on it.

6.6.7.8 **Display a Graph – Details**

“Displayed” Tab

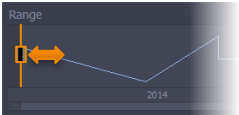
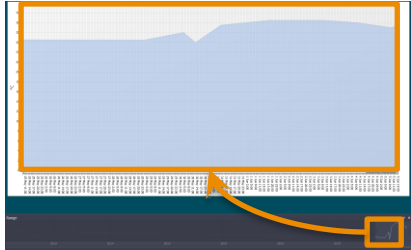
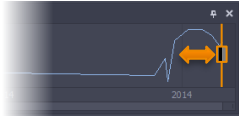
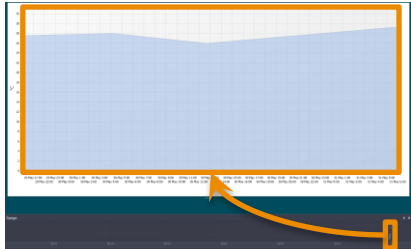
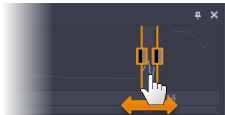
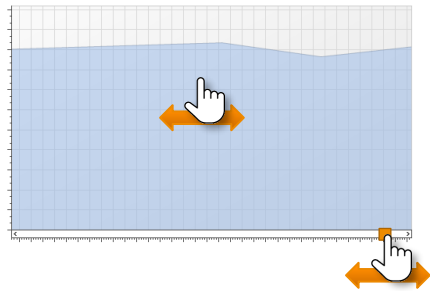
Once an indicator has been added to a chart, the tab switches to “Displayed” tab. This shows the current charts and indicators.

As for the “Available” tab, the window is split:

List	List of the charts and indicators: the colours of the charts and graphs are reminded here	
☒	A check box permits for each indicator to be hidden or displayed	
▶ / ▲	The list can be reduced or deployed	
Details	Details of the selected indicator: it reminds the description of the indicator and the chart type and period.	

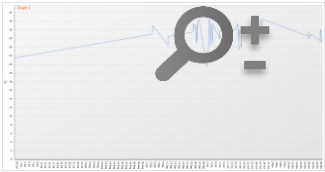
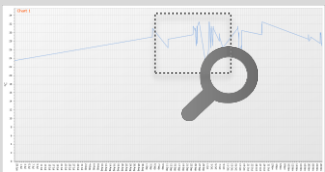
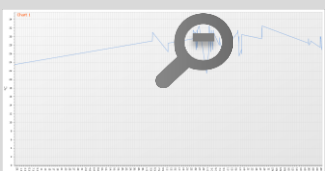
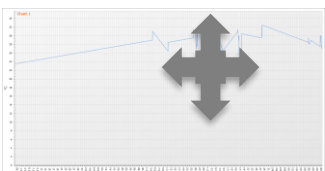
Refine the Time Range

RDS Toolbox displays the data for all the date and time range available in the memory.
 To reduce the time range, use the left and right cursors on the “Range” graph, or click on a position to zoom on it.

Left cursor 	Move it to adjust the lower limit of the graph.	
Right cursor 	Move it to adjust the upper limit of the graph.	
Click on a position 	Click on a specific time position to reduce and zoom the graph to this position.	
Translate the range 	To translate the time position, Pan the selection on the range graph Use the horizontal lift at the bottom of the chart Pan the chart itself	
View all 	Refit the graph to all range	

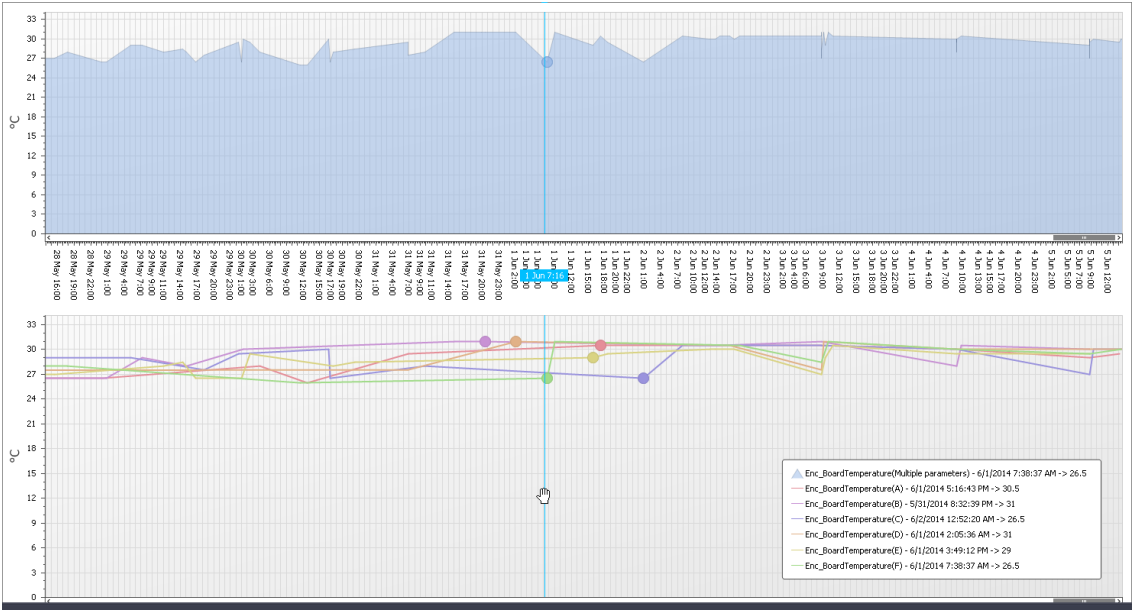
Zoom the Chart

In addition to the available cursors to control the time range, the mouse wheel can be used to zoom the chart, on X and Y axis. Then the middle button (wheel button) can be used to pan the graph.

	Mouse wheel Zoom on X and Y axis scales on the pointer location	
	Shift key + Pan Left button Zoom in a box	
	Shift key + Left click Zoom in on the pointer location	
	Alt key + Left click Zoom out on the pointer location	
	Mouse middle button Pan the zoom on X and Y axis	
	Action button Refit to all the graph	

Check the Values

Whatever one or several indicators are displayed on one or several graphs, to survey the graphs values, just place the pointer over the graph at the desired time position. A line shows the current position, and the nearest graph points are shown. A small window beside the pointer displays the values of all the curves for the current position.



Display the Alerts and Events on the Chart

Over the chart, it is possible to show the SMART alerts, and events, to get a better understanding of why the event occurred.

	Displays the events	All the events such as the start of a session are displayed on all the charts, to locate them and do a link between the indicators that may explain the cause of the alert.
	Displays the alerts	All the alerts notified for the current arm are displayed on the chart, to locate them.

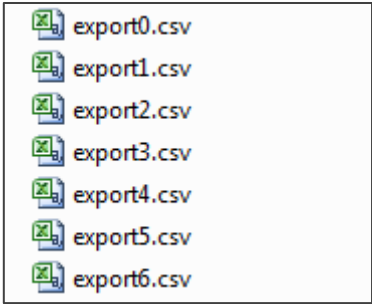
6.6.7.9 Export the Values

For the displayed charts, each indicator set of values can be exported into a separate Excel file.



	Once the wanted charts displayed, click on “Export to file”.	
	Select the column separator	, (comma) ; (semicolon) (tabulation)
	Select or enter the file folder and name	
	Validate the export	

The target folder is displayed, showing as many CSV-Excel files as number of indicators.



6.6.8 Quick SMART Guide

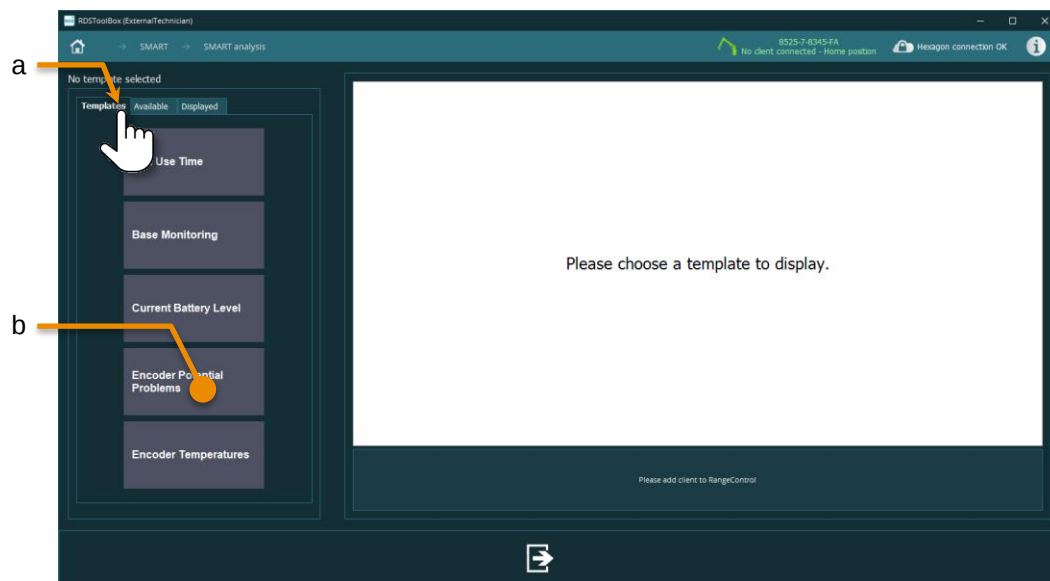
6.6.8.1 Quick Display: Use a Template

Analysing indicators can be done using templates. Default templates can be automatically proposed, and user templates can be created.

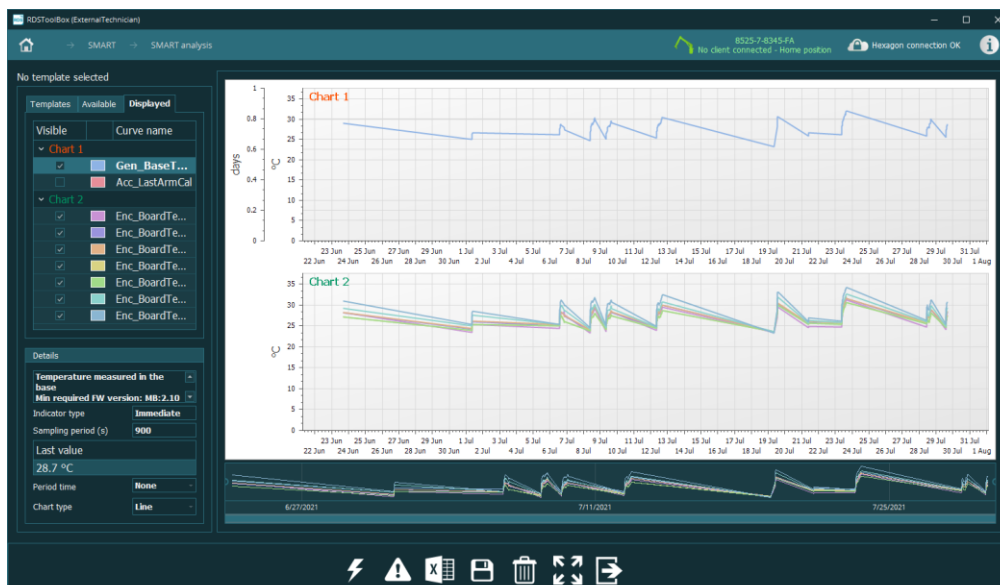
1. Open the SMART analysis panel



2. When entering the Analyse panel from the SMART Overview one, the templates are automatically displayed. Otherwise, click on the “Templates” tab.



- a. Templates tab
 - b. List of templates
3. Select the wanted template, the graph(s) is (are) automatically displayed with the updated values.

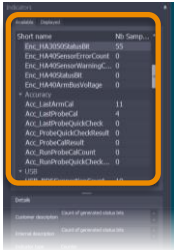


6.6.8.2 How to Add an Indicator Diagram to a Graph

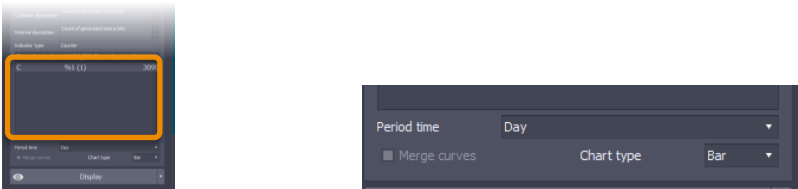
- 1. Open the SMART analysis panel



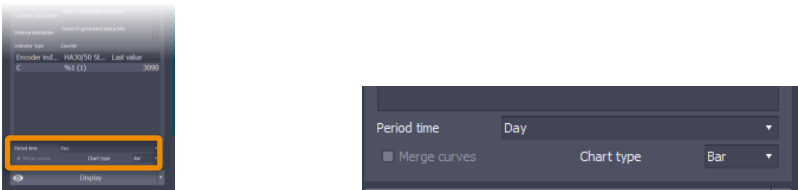
- 2. In the list of available indicators, select the wanted item.



- 3. In details zone, select the index(es) of the selected indicator (encoder index, probe index, ...):



- 4. In details zone, select the type of graph:



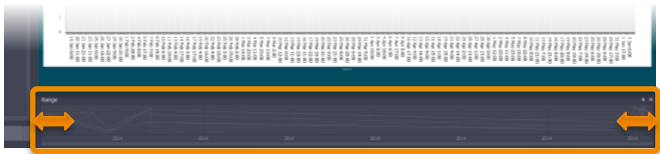
Period time (None / Hour / Day / Month)

Chart type (Bar / Area / Line / Step line / Step area / Spline / Spline area / Point)

- 5. Click on a graph button to choose to add on a new graph or an existing one



- 6. On the Control of the time range, scroll the left and right sides to define the start and end time

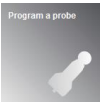


7 RDS Toolbox Maintenance

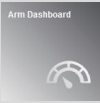


Arm: the maintenance tiles are hidden by default. Click on the Maintenance tile to deploy all the tiles (the number depends on the profile).

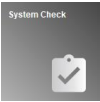
Opt°.



Tool to reprogram a probe.



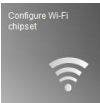
Panel to survey in real time the components of the arm (encoders values, voltage, temperature, buttons, boards...).



Auto-diagnostic for Arm and AS1/RS6 laser scanner



When the assigned artefact plate must be changed on the RS-SQUARED



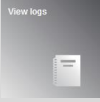
Tool to configure the arm Wi-Fi component.



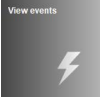
Tool to automatically update all the boards of the arm and scanner.



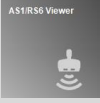
Tool to program the electronic boards of the arm or the scanner.



Displays the RDS Toolbox Log file.



Tool to display all events registered.



Viewer of raw data for the AS1 / RS6 laser scanner

: Advanced user profile or upper | : Technician profile only

7.1 System Check

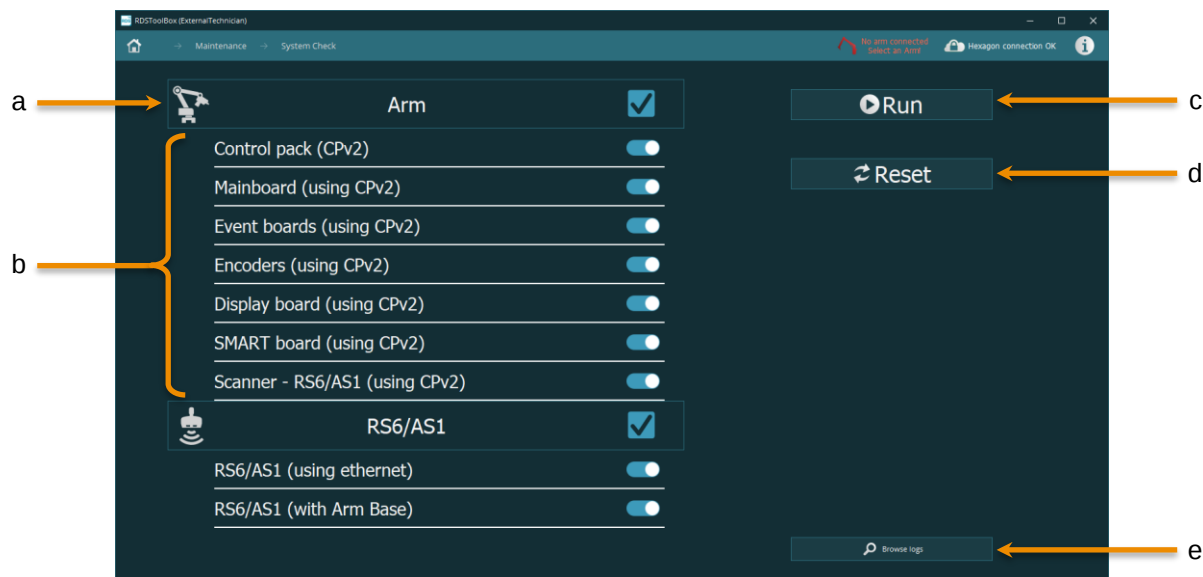
7.1.1 Description

RDS Toolbox provides an auto-diagnostic tool for the system.

It operates a check-up of the selected component, to detect potential failure.

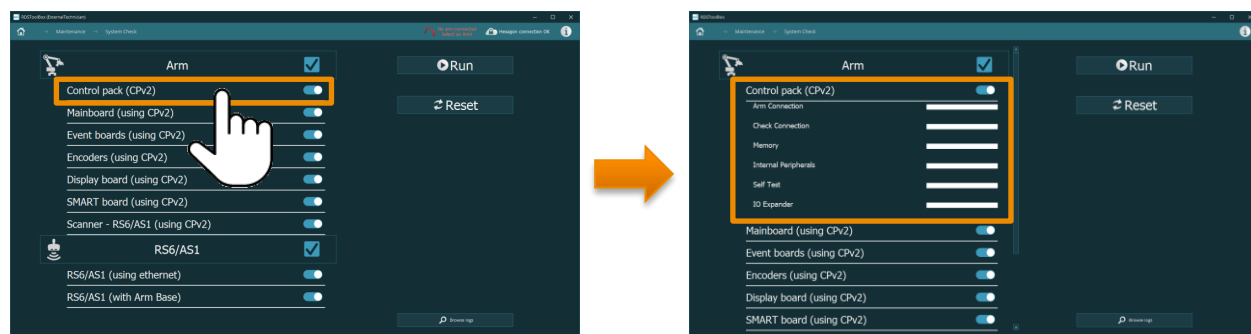


Not all indicators of the selected components are checked. Certain type of issues may not be detected by the system check.



- Main component
- Sub-categories test
- Run / stop the auto-diagnostic
- Reset the settings
- Display the logs

For each component to test, one or several sub-categories of test can be done. Click on the sub-category to view the details of the test.



7.1.2 Available diagnostics

Arm

Test for RA7 and RA8.



Ensure that the selected tests fit with the connected hardware (version of arm, Control Pack...)

Mainboard	• Arm connection • Configuration • Sounds • Bluetooth • LEDs • SD Card Memory • FRAM Memory • ASiD • Log File • Temperature
Event board	Status (versions, statuses, components, probe file)
Display board	Status
Encoders	For each axis: • Events • SMART (shocks) • Firmware and hardware versions • voltage, temperature
SMART boards	For each board (CP, BC, DE and Wrist) • Voltage, temperature and accelerometer
Vibration Tilt board	On the base of the arm: • vertical level, stability
Control Pack	• Arm connection • Check connection • Memory • Internal peripherals • Self-test • IO expander
AS1 / AS1-XL on arm	• Arm connection • Check connection • IO expander

AS1 / AS1-XL

Tests on the scanner for the arm and the tracker

AS1 / AS1-XL (using ethernet)	• Check connection (TCP/IP, firmware) • Read serial number • Check sensor (components temperature, fan speed, laser brightness) • Check sensor compensation specs
AS1 / AS1-XL with arm base	• Scanner SMART board (voltage, temperature, accelerometer)

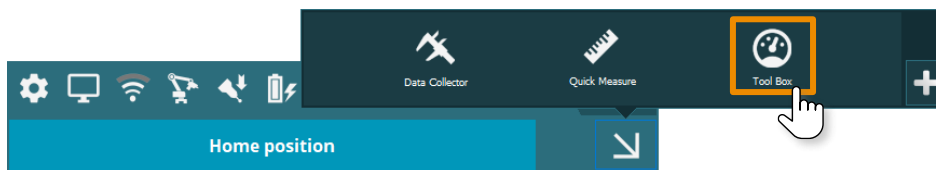
Advanced Checks (arm)

Tests that require manual intervention from the user (press buttons...).

Wrist	Press on each button as required.
Encoders	Rotate all axis and press “Continue”
Vibration & Tilt	Move the B axis down until the requested angle (horizontal position). 

7.1.3 Process

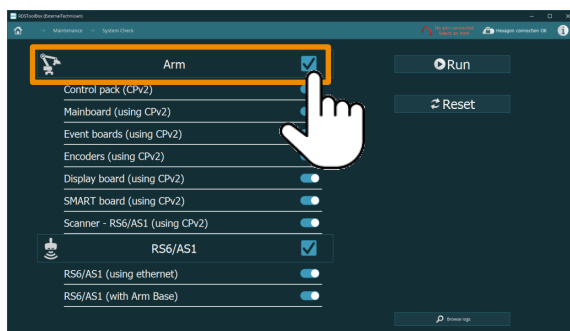
1. Open RDS Toolbox



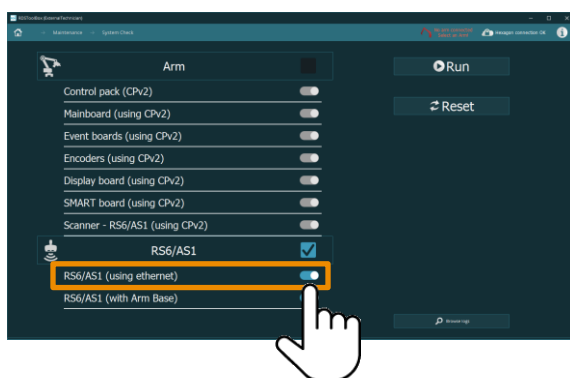
2. Select Maintenance > System Check



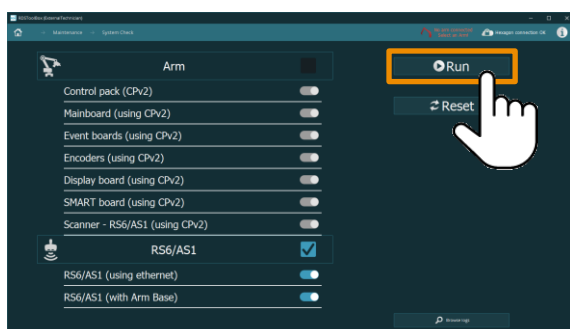
3. Check / uncheck the main component(s) to test



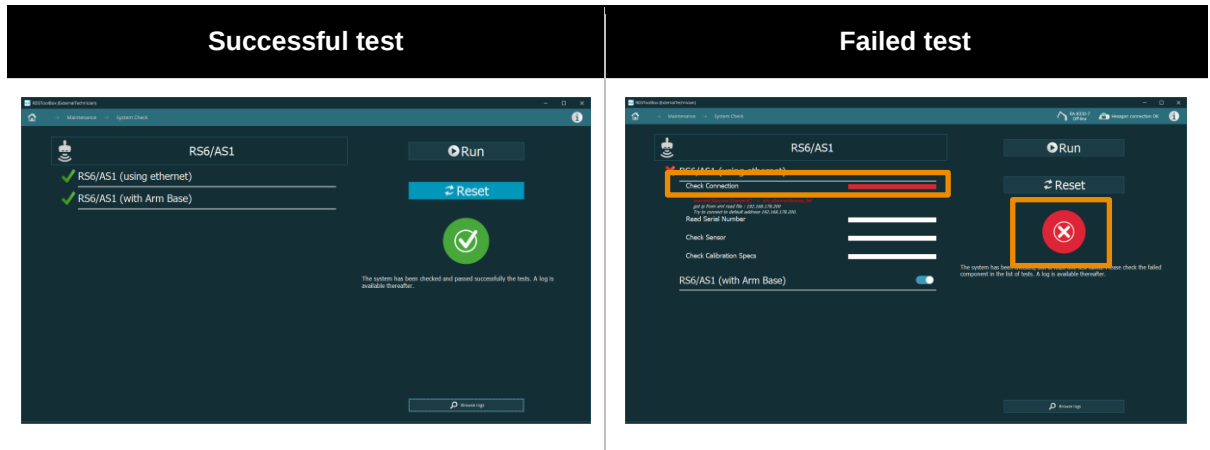
4. Select the tests to operate on the component(s)



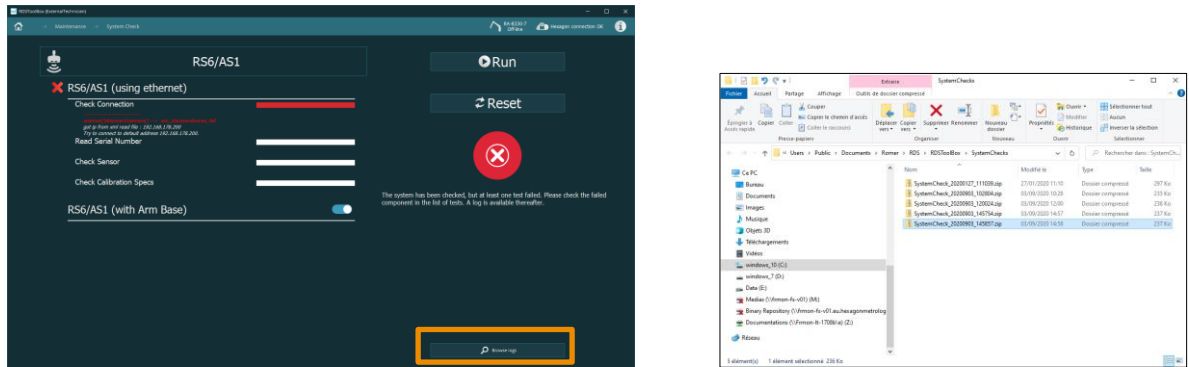
5. Run the auto-diagnostic



6. For Advanced tests, do manually the requested action (press button, rotate axis)
7. When finished, the test result is shown on the right side. If a failure occurs, the details of the test are displayed.



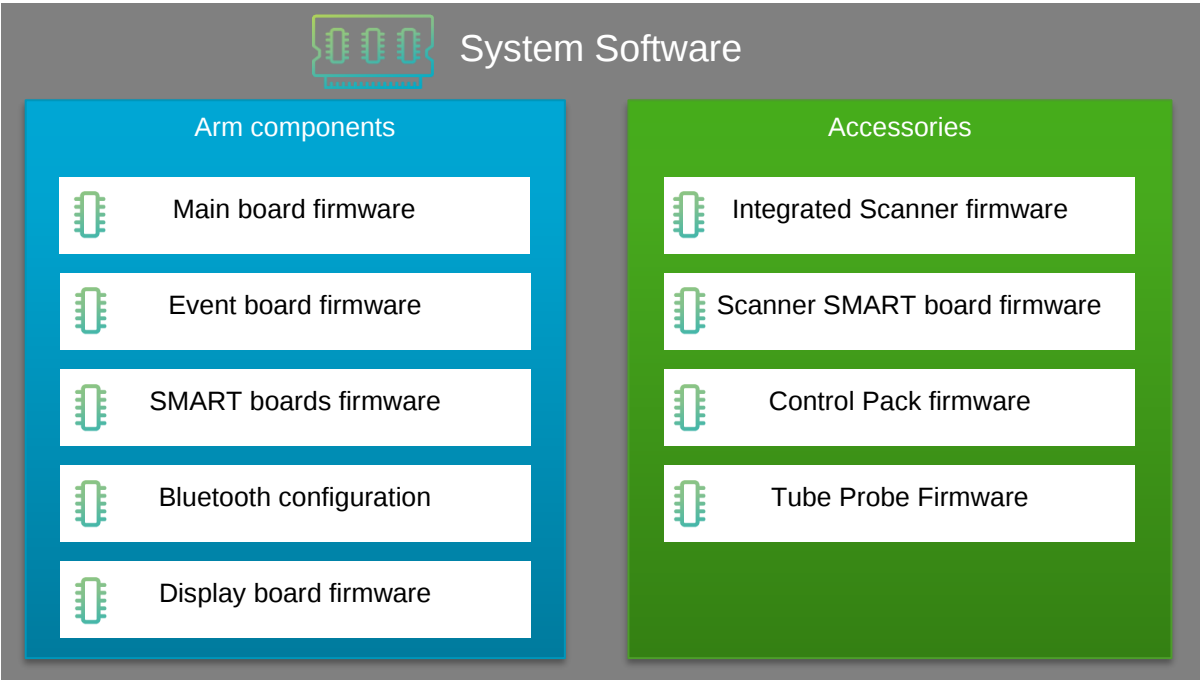
8. A set of logs becomes available: press "Browse Log". The corresponding files are grouped in a zip file (current date and time). Transmit the log file to the local service centre.



7.2 System Software Update (RA8)

The RA8 system software is the set of all firmware on its electronic boards. RDS provides a system software file, which contains tested and compatible firmware.

Even if each board can be updated individually, the whole system software can be updated in once. It is highly advised to update a complete system software as it provides a set of compatible firmware.



The System Software can be checked and updated through “System Software Update” tool in RDS Toolbox.



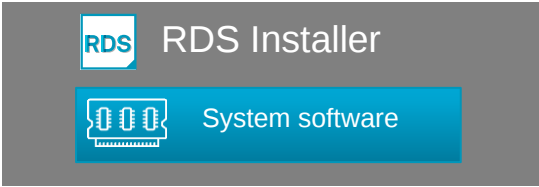
All system software functions only concern the RA8.

7.2.1 How to get a System Software file

From version 6.2, RDS software package embeds the fitting system software in its installation.

Once RDS is installed, the appropriate system software is also automatically installed, no need to worry about it.

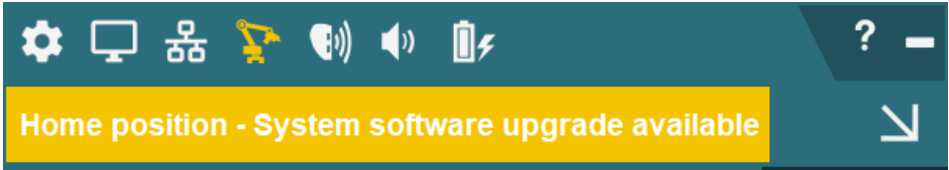
When a new system software becomes available between 2 RDS versions, then the technician can upload it manually as for any usual firmware.





Complete system software and individual firmware must be copied onto C:\Users\Public\Documents\Romer\RDS\Firmwares.

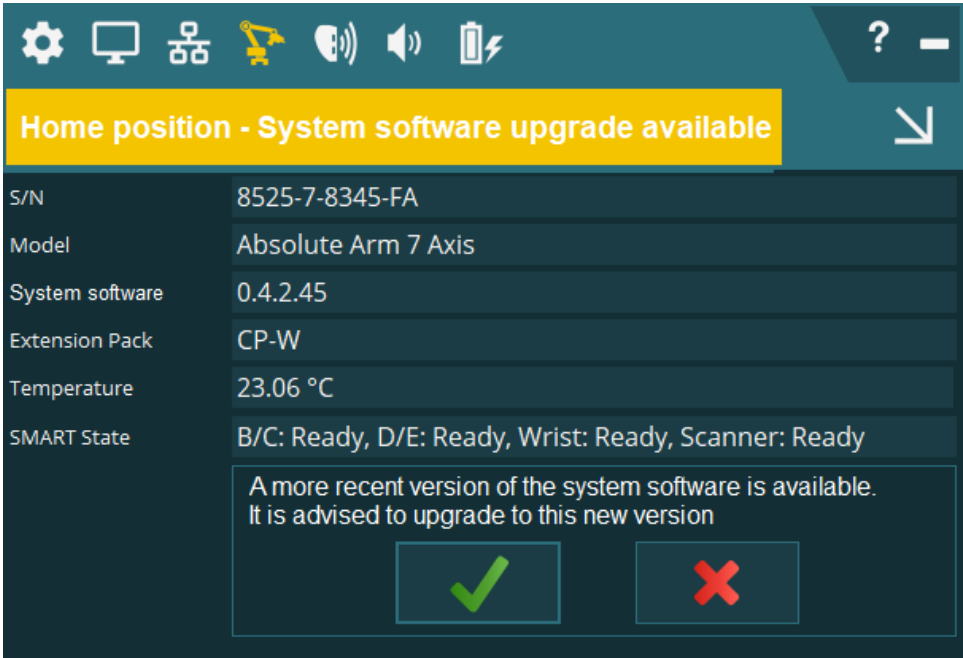
7.2.2 System Software Notifications



When connecting to the arm, RDS checks the current system software for any mismatch and if it is up to date. RDS will warn by a notification on the Agent in case of:

- The version of system software is up to date, but one component does not match
- All components match with the system software, but a new version of system software is available.

Then by opening the instrument tab on the RDS Agent, the user can choose between opening RDS Toolbox to update the system software or postpone the notification (1 week).





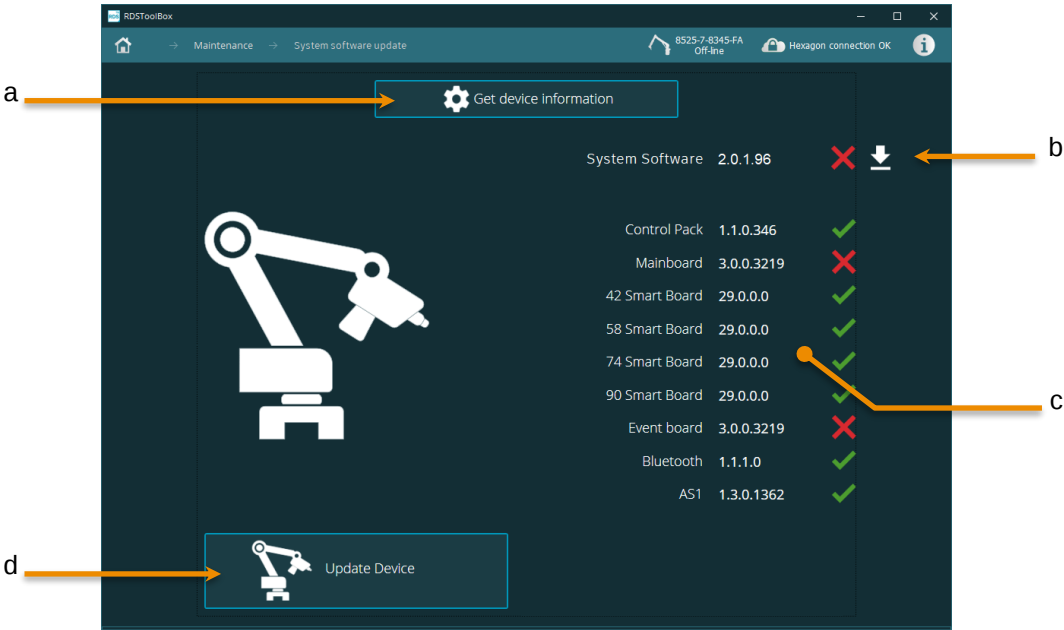
Open RDS Toolbox to update the system software.



Postpone the notification one week.

7.2.3 System Software Update

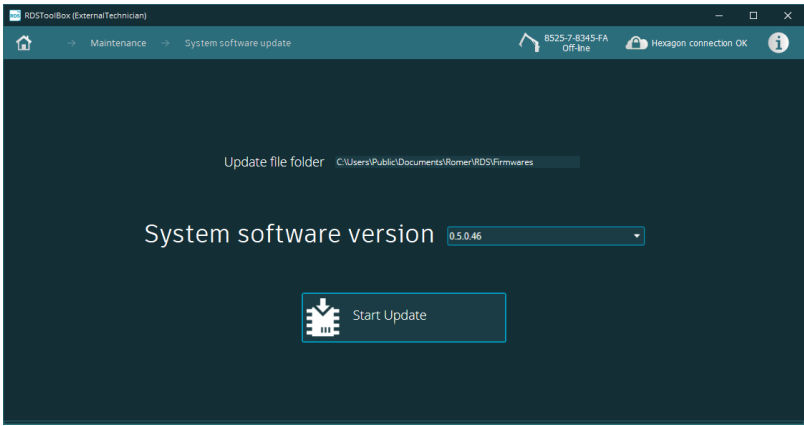
To update securely the system software, open RDS Toolbox > Maintenance > System Software Update. RDS then checks the current system software and each component.



- a. Rerun the detection of components
- b. System software status
- c. Detailed components of the system
- d. Fast system software update

✓	The current system software is compatible	The component match with the current system software
✗	The current system software contains non compatible components	The component does not match with the current system software
↓	The current system software is not up to date, a new one is available	

Simply press the button “Update device”, select the version of system software to upload on the arm and start.



The update may automatically restart the arm several times. Don't stop it.

7.3 Program a Probe (arm)

NOTICE

IP54 contact probes cannot be programmed with a ROMER Absolute Arm (RA7).

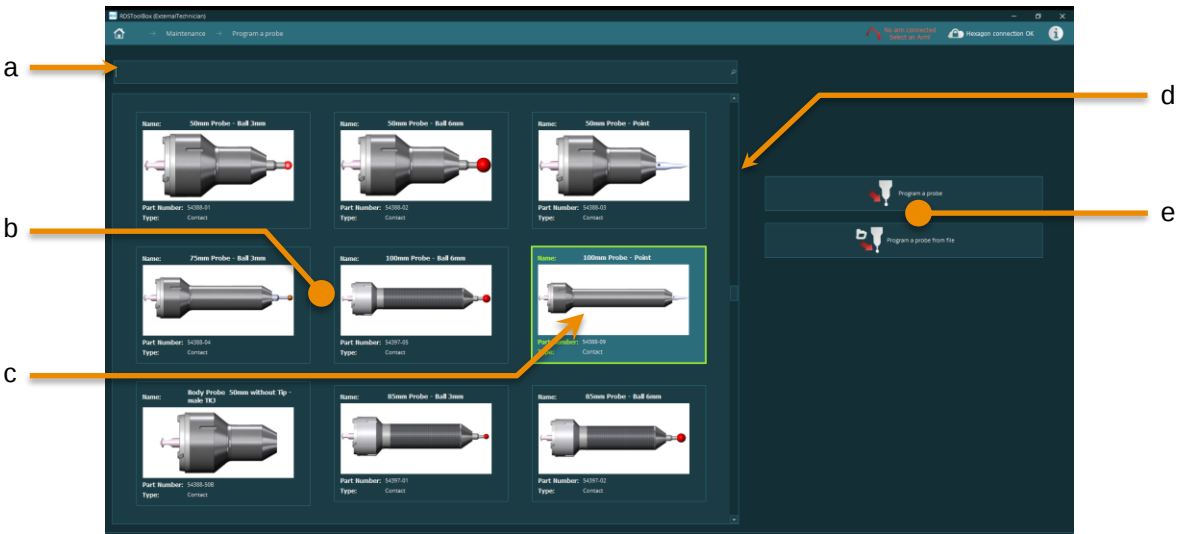


This panel shall be used to program or reprogram a probe in case of a programming problem: it defines in its memory the type of probe (contact, diameter, non-contact, ...).

The probes database is automatically updated as soon as the computer is connected to internet (synchronization with Hexagon Server database).



On first launch after the installation, the list of probes is empty, until the computer is connected to internet to update it.



- a. Search tool
- b. List of probes
- c. Selected Probe program (highlighted blue)
- d. Lift to scroll the probes
- e. Action buttons

- Start programming process
- Program from a file



This tool needs a wired connection and arm plugged on power supply. Wi-Fi connection and battery-power not supported.



7.3.1 Probe Details

All the probes are described in a tile containing some information:



Name	Complete name of the probe file. The name contains the necessary information: Tip diameter Tip material Type of probe Length of the probe Type of arm (Absolute / Multi Gage) Angle (if not straight) Gender of TKJ
Picture	
Part Number	Refer to your catalogue to get the part number
Type	Type of probe: Hard contact probe Tube non-contact probe Touch trigger Probe

7.3.2 Find a Probe

To find easily the correct probe, RDS Toolbox provides several options:

Use the Search Box (Ctrl+F)



This tool permits to reduce the list of probes with a research text.
Simply enter a part of the Name or the Part Number in the search box.



The list is automatically reduced to the search criteria.
✕ : Cancels the text filter

Use the Filters on the Probes Tiles.

For each of the details on the probes tiles, tools are available to filter or sort the list by the selected detail:
Move the pointer over one detail, two symbols appear:



	Filter	Click on it to reduce the list of probes to the selected type of detail.
	Sort by	Click on it to sort the list of probes by the selected type of detail (increasing). Click a second time to reverse the order (decreasing)

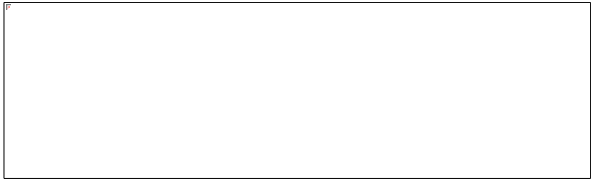
7.3.3 Program a Probe from a File

For special custom probes, standard probe programs may not be available.
Probe files provided by Hexagon can then be used.

Directly press the button “Program a probe from file” and select the probe file provided by Hexagon.

7.3.4 How to ... Program a Probe

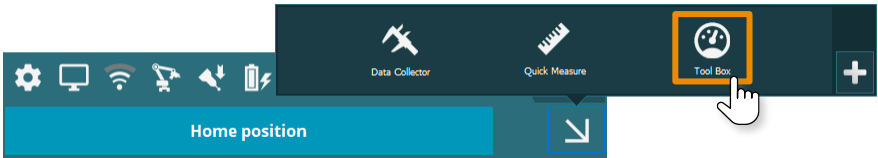
1. Establish a wired connection to the arm (Ethernet or USB).



2. Plug the probe through the TKJ connector



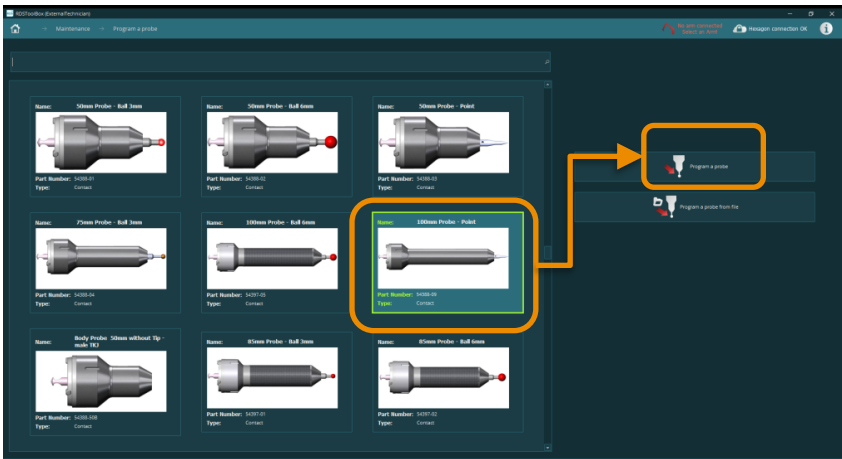
3. Open RDS Toolbox



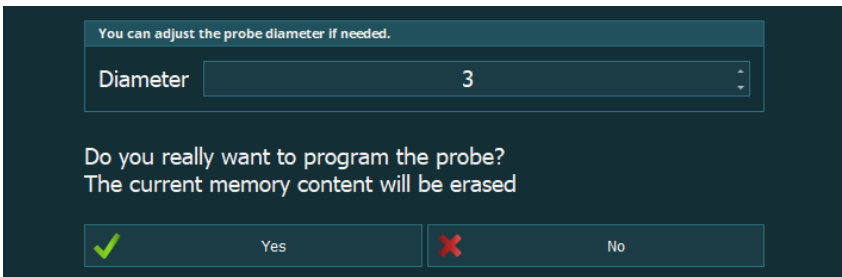
4. Select Maintenance > Program a probe



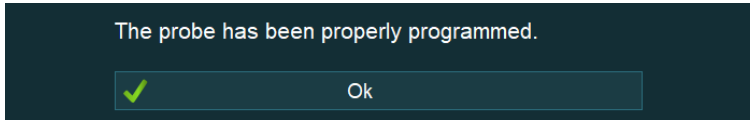
5. In the list of probes, select the appropriate one and click “Program a probe” button.



6. Adjust the real diameter and confirm.



7. RDS displays the information message:



8. Once the message is validated, the probe is added to the list of sensors in the memory of the arm, and its alignment is requested.



The probe programming affects the memory of the probe itself, not the memory of the arm: if the probe was already in the memory of the arm, delete it to be recreated with the new programming.

7.4 Connectivity Configuration

The configuration of the Control Pack can be changed, to meet customer's criteria, improve the efficiency or for dual use on a same computer.

This can be done on RDS Toolbox ► Connectivity configuration maintenance tool.



7.4.1 Network Address Configuration

The following network parameters can be set.

	Default value	Restrictions
IP Address	192.168.178.1	In case of DHCP, limited from X.X.X.1 to X.X.X.9 with a 24 bits mask (255.255.255.0).
Subnet mask	255.255.255.0	Last byte = 0 (X.X.X.0) for scanner connection.
Gateway	-	The gateway must be in the range of the subnet mask and IP address.
DHCP Server	☒	DHCP Client not supported

NOTICE

To avoid any issue with the connection to the scanners, it is recommended to

- Use different IP ranges for each arm
- IP last byte ≠ 200; 201 (reserved to the scanner)
- Mask last byte = 0 (X.X.X.0)

(ex 192.168.178.1 and 192.168.177.1 with mask = 255.255.255.0)



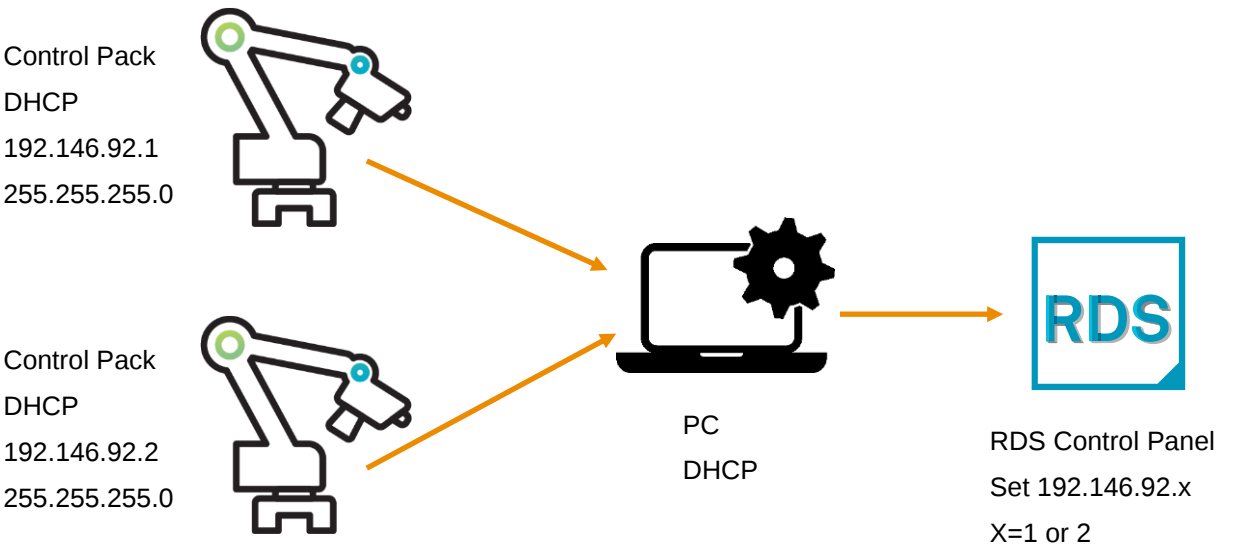
The network configuration requires System Software v2.1 or higher.

NOTICE

Scanning is a network intense case. Over a company network, performance issues can be encountered when using the system with its maximum performance settings.

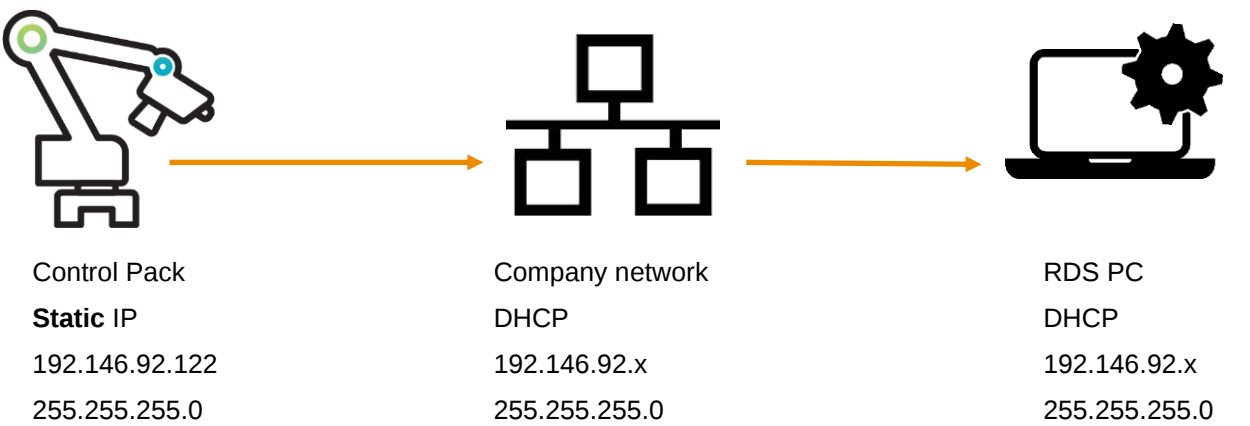
Multi arms connection

By setting several arms with different network configurations (for example simply different IP addresses), it is possible to keep all the arms connected and powered at the same time on the same PC. To switch from an arm to another one, you just need to indicate the new network configuration to RDS.



Connection through a company network

Using DHCP, the arm cannot be connected to the PC via the company network. However, using a static configuration (“DHCP Server” unchecked), this type of indirect connection can be used.

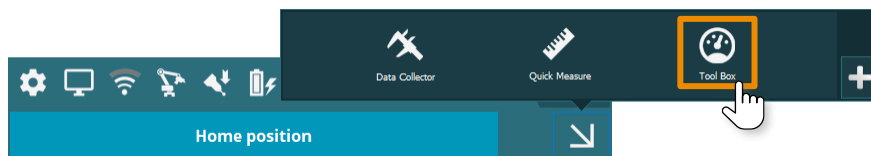


Process

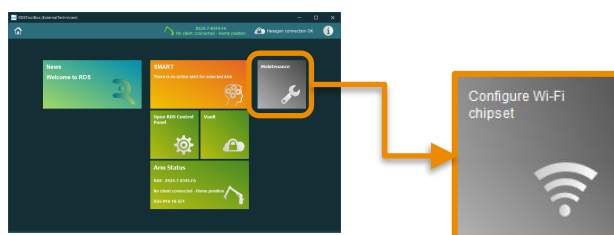
1. Establish a connection to the arm.



2. Open RDS Toolbox.



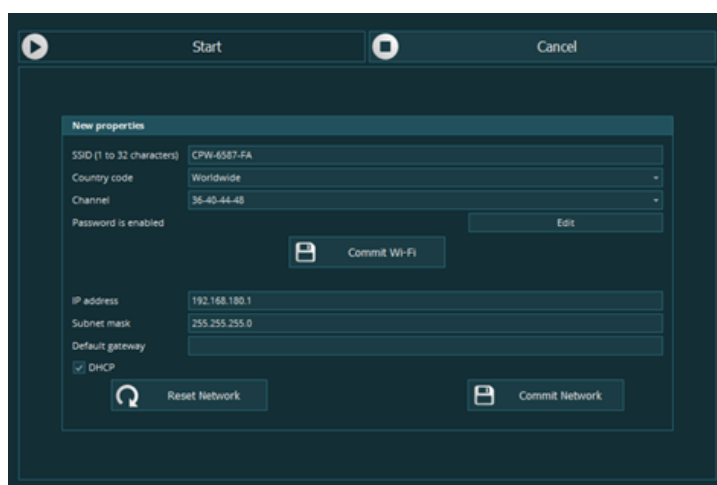
3. Select Maintenance > Connectivity configuration.



4. Click on "Start".



5. Enter the values for each feature and press "Commit Network".



6. Wait for the arm to be ready with the new settings.



When the network address has been customized, the Ethernet and Wi-Fi pictograms appear briefly orange during the initialization.



If the customized network configuration has been lost, a reset can be done:

- 1. Power on the arm.*
- 2. Once initialized, press 3 times on the power button: the Ethernet and Wi-Fi pictograms turn to orange.*
- 3. Again, press 3 times on the power button to reset the network configuration (if no action has been done before 10 seconds, the process is aborted).*
- 4. The arm then will restart.*

7.4.2 Wi-Fi Chipset Configuration

The Wi-Fi network of the arms (Wireless Pack – CP-W) can be changed, to meet the customer’s Wi-Fi criteria, improve the efficiency by changing the channel, or increase the security by using a password key.

Here are all the options that can be used and setup through RDS Toolbox:

	Default value	Change Chipset
SSID	“CPx-UN-FF” CPx: type of Control Pack UN: serial number of the Control Pack FF: Factory	- Free (1 to 32 char.)
Country code		Select the appropriate country
Channel	Auto	According to the country code - 1 > 165
Password	CP2-3: none CP-W: “AbsoluteArm”	- Free (WPA2 - 8 to 63 char.)

NOTICE

The selection of the country is fundamental for the available allowed channels. It is the responsibility of the user to select the right choice according to his country regulation.



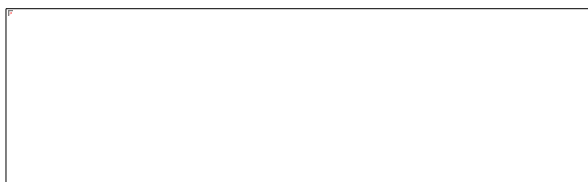
The configuration of the FP2+ and FP3+ must be operated through RDS Mobile.



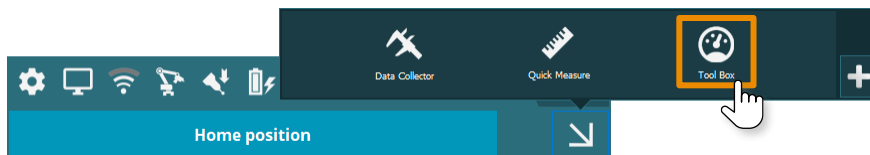
This tool needs a wired connection and arm plugged on power supply. Wi-Fi connection and battery-power not supported.



1. Establish a wired connection to the arm.



2. Open RDS Toolbox.



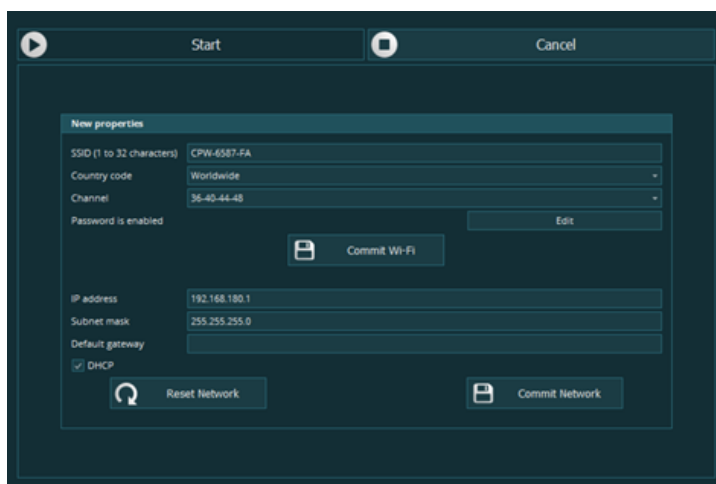
3. Select Maintenance > Connectivity configuration.



4. Click on "Start".



5. Enter the values for each feature and press "Commit Wi-Fi".



6. Wait for the arm to be ready with the new settings (Wi-Fi base pictogram steady).

7.5 Upgrade Firmware (RA7)

This tool can be used to reprogram the firmware of an electronic board. It mainly concerns the Absolute Arm, Extension Pack (FP / CP), or the scanners.

The electronic boards firmware should always be up-to-date, as a new version is always compatible with old boards.

Main / Mother board	*.iic	Check the latest version with your local Hexagon Service Centre.
Mother board PIC	*.fw	
Event board	*.fw	
Control / Feature Pack	*.gz	
SMART Board		
RS1-5 Scanner	*.swu	
AS1 / RS6		
RS-SQUARED	*.hex	



This tool needs a wired connection and arm plugged on power supply. Wi-Fi connection and battery-power not supported.



7.5.1 Check the Versions of the Firmware

- 1. Establish a wired connection to the instrument.



- 2. Run RDS Toolbox and select “Upgrade Firmware”.



- 3. Wait until the list of components is displayed

Address	Board Type	Serial Number	Hardware version	Boot version	Version	Action
0	Mainboard		22	2.0.1.1466	3.1.0.3233	Upgrade firmware
11	Event board		13	3.0.0.3219	3.1.0.3233	Upgrade firmware
42	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
58	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
74	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
12	Display board		1	3.0.0.3219	3.1.0.3233	Upgrade firmware
	Control Pack	CPW-0009-FA			2.0.0.365	Upgrade firmware
	R55					Get more information
	Bluetooth				1.1.1.0	Configure Bluetooth module
	Embedded images				3.1.0.3233	Write images

The list can be refreshed by clicking on “Check Firmware”

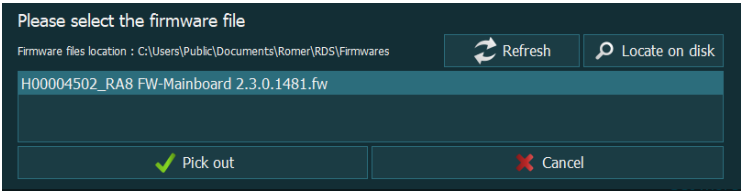
- 4. Check the list, check the versions or send the list to the Hexagon technician.

7.5.2 Upgrade the Firmware (Arm & Pack)

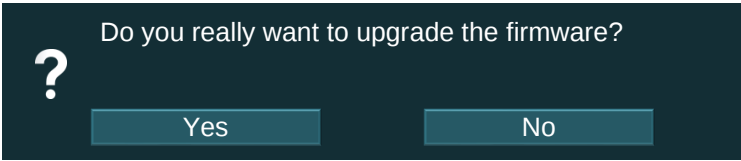
1. Copy the new firmware on C:\Users\Public\Documents\Romer\RDS\Firmwares.
2. Proceed with a Check Firmware (see previous page)
3. Ensure that the upgrade is valid and press “**Upgrade firmware**” on the appropriate line.

Address	Board Type	Serial Number	Boot version	Version	Progress
0	Mainboard		1.0.0.0	2.15.0.0	Upgrade firmware

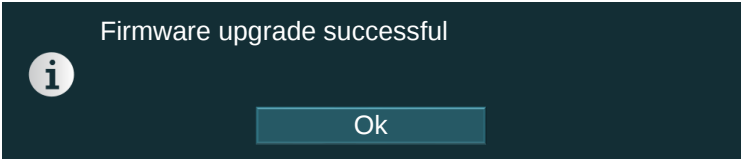
4. In the list select the new firmware and press “Pick out”.



5. Validate both confirmation prompts



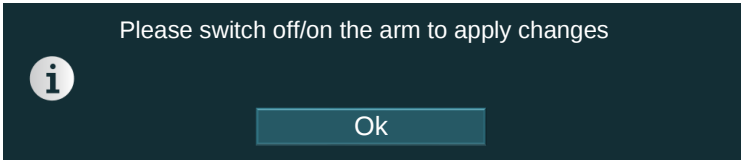
6. Wait until the end of the upgrade, then validate the message



NOTICE

The upgrade may be long depending on the board. Don't switch off the arm before the end of the download.

7. The arm then automatically reboots (if not, switch off then on again to reboot the arm with the new firmware).



NOTICE

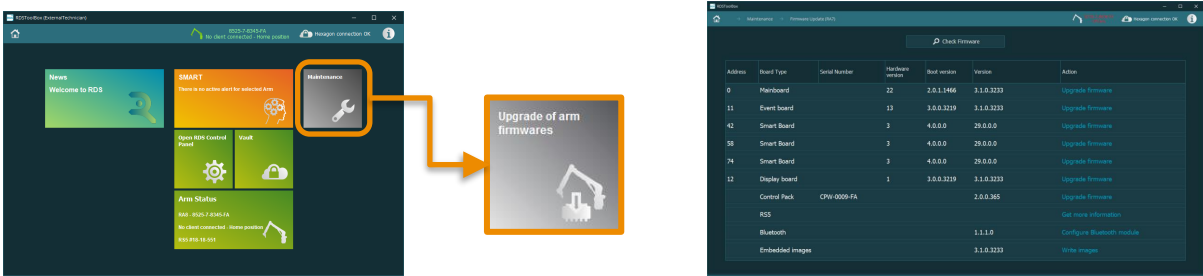
RA8: in case of issue when programming the Mainboard firmware, a boot on Safe mode is possible:

- *Press the Power button and then press again 4 times the button: the arm boots in a safe mode.*
- *Then proceed again with the firmware load operation.*

7.5.3 Upgrade the Scanner

Always ensure that the requirements are respected according to the version of Scanner (Motherboard, Event Board, PIC firmware ...)

1. Proceed with a Check Firmware (see previous pages)



NOTICE

The Scanner must not be in use: select or move the probe switch to the contact probe position.

2. Press “**Get more information**”, the serial number and version of the scanner are displayed: if not done yet, communicate the information to the Hexagon representative.

Address	Board Type	Serial Number	Hardware version	Boot version	Version	Action
0	Mainboard		22	2.0.1.1466	3.1.0.3233	Upgrade firmware
11	Event board		13	3.0.0.3219	3.1.0.3233	Upgrade firmware
42	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
58	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
74	Smart Board		3	4.0.0.0	29.0.0.0	Upgrade firmware
12	Display board		1	3.0.0.3219	3.1.0.3233	Upgrade firmware
	Control Pack	CPW-0009-FA			2.0.0.365	Upgrade firmware
	RS5					Get more information
	Bluetooth				1.1.1.0	Configure Bluetooth module
	Embedded images				3.1.0.3233	Write images

3. Press “**Upgrade firmware**”.

4. In the browse window, select the new firmware file.

5. Once the scanner is upgraded, as prompted, restart the scanner to apply the changes.

6. RS2-3 only (arm): In RDS Control Panel, Probes tab, remove the RSx probe (move the probe switch to the contact probe location, then delete the scanner).



To correctly restart the scanner, shut down the arm and unplug the power cable

NOTICE

It is necessary to delete the existing RSx “probe” from the memory of the arm and add it again with the correct data.

7.6 Update the RS-SQUARED Plate

When aligning or compensating the RS-SQUARED, the plate artefact provided with the unit must be used. The compensation files of the plate are memorized in the sensor itself, thus the sensor and the plate units are associated.

If the artefact plate associated with the RS-SQUARED unit must be changed, then the compensation files of the new plate must be loaded into the sensor. This operation must be done in RDS Toolbox.

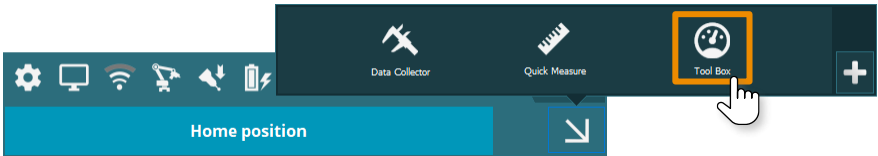
- 1. Get the compensation files for the new artefact plate to be associated with the sensor and copy it on the folder {C:\Users\Public\Documents\Romer\RDS\RS_SQD\CalibrationData}.
- 2. Establish a wired connection to the arm (Ethernet or USB+Ethernet).



- 3. Connect the RS-SQUARED



- 4. Open RDS Toolbox



- 5. Select Maintenance > RS-SQUARED plate.



- 6. Wait for the current associated plate number to be displayed.

Fetch current artefact plate information

0112

Upload new artefact plate data

Day	Residual	Alignment	Temperature
2020-03-24	0.002	N/A	20.1



If the current plate number reading fails, a new check can be done by pressing “Fetch current artefact plate information”.

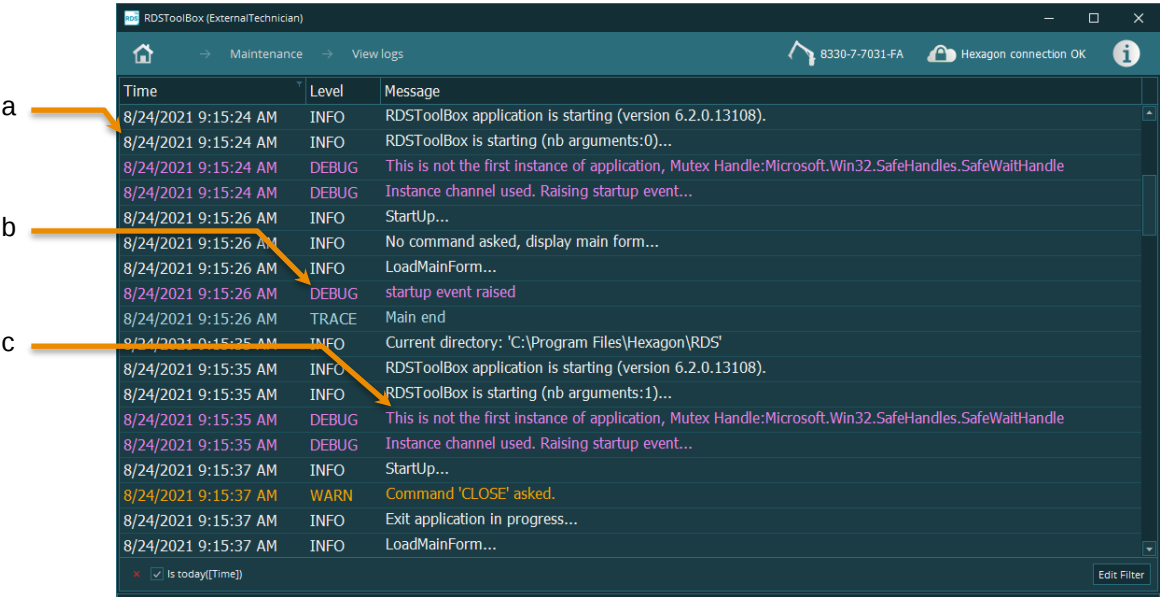
7. Press “Upload new artefact plate data”.

		Fetch current artefact plate information	0112
Upload new artefact plate data			
Day 2020-03-24	Residual 0.002	Alignment N/A	Temperature 20.1

8. Browse to {C:\Users\Public\Documents\Romer\RDS\RS_SQD\CalibrationData} and select the compensation file of the new plate.
9. Wait until the end of the upload.

7.7 View Logs

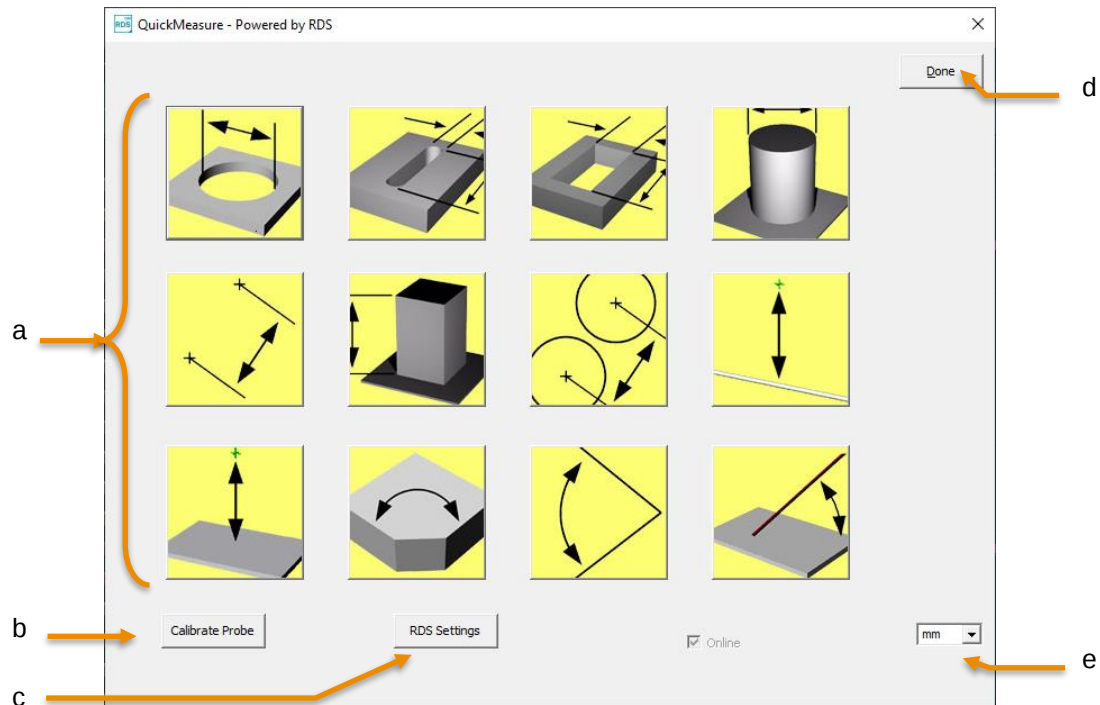
Each event in RDS Toolbox is notified in a log file; thus, it is possible to consult the list of the latest events. The events are classified by type and levels. For convenience, a default predefined filter is set when opening the panel.



a	Date	Date and time (local) of the event (default = Today)	
b	Level	Level of details event	INFO DEBUG WARN ERROR
c	Message	Description of the event itself	

8 RDS Quick Measure (arms)

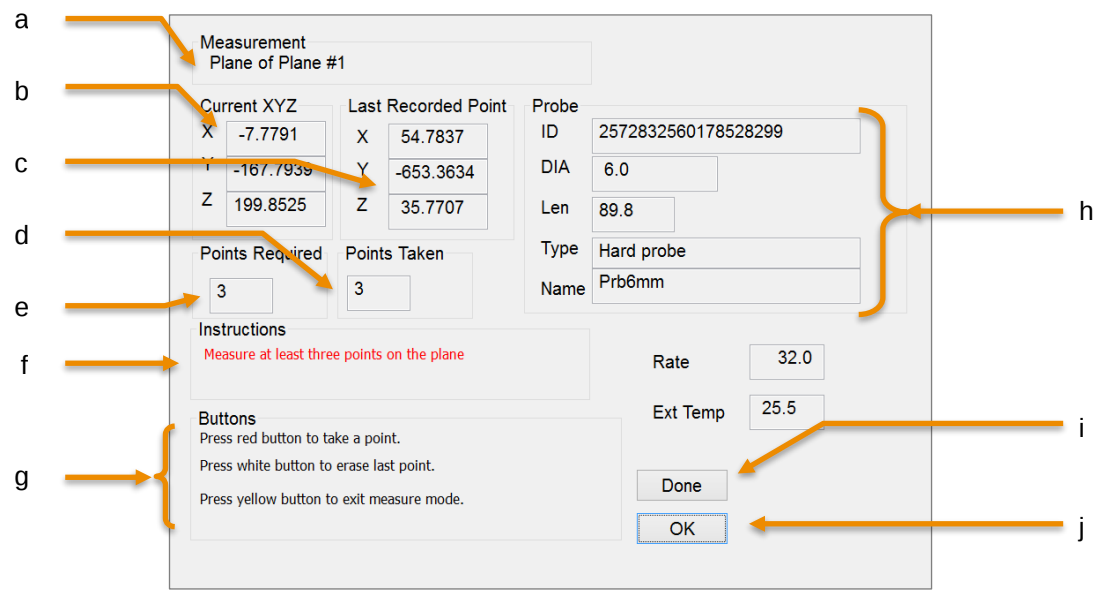
RDS Quick measure is a little tool to allow the user to very quickly measure simple dimensions:



- a. Available features to measure
- b. Access probe alignment (see RDS Data Collector manual)
- c. Access to RDS Control Panel
- d. Exit Quick Measure tool
- e. Choose the units (mm / inch)

8.1 How to Do a Quick Measure

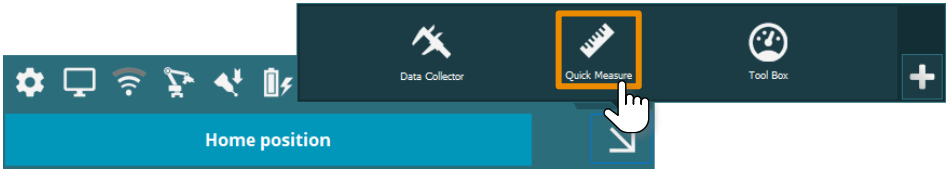
8.1.1 Description of the Measurement Window



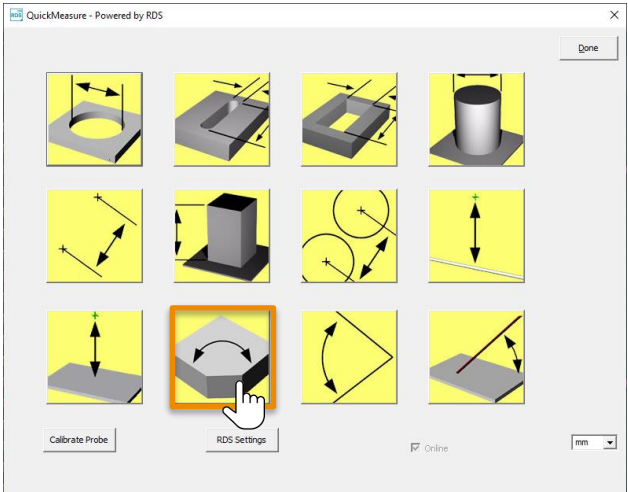
a	Type of measurement
b	Real time coordinates of the probe
c	Coordinates of the last probed point
d	Number of taken points: this must be at least equal to the minimum before validating the element.
e	Minimum number of points
f	Instructions to follow
g	Reminder of the buttons functions
h	Mounted probe specifications
i	Validate the measured element (= yellow BP2) or exit this menu
j	Cancel: delete last probed point
	OK: validate the element

8.1.2 Measurement Procedure

1. Access to Quick Measure



2. Select the desired measurement.



3. Follow the instructions:

Hit the points (respect the required number of points) for each feature and validate each measured feature (except single point).

Measurement
Plane of Plane #1

Current XYZ		Last Recorded Point		Probe	
X	-7.7791	X	54.7837	ID	2572832560178528299
Y	-167.7939	Y	-653.3634	DIA	6.0
Z	199.8525	Z	35.7707	Len	89.8

Points Required	Points Taken	Type
3	3	Hard probe

Name: Prb6mm

Instructions
Measure at least three points on the plane

Buttons
Press red button to take a point.
Press white button to erase last point.
Press yellow button to exit measure mode.

Rate: 32.0
Ext Temp: 25.5

Done
OK

4. After last measurement, the result is displayed.

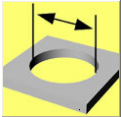
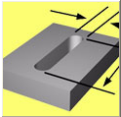
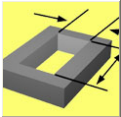
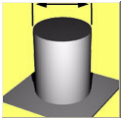
Angle between planes is:

110.6670 deg.

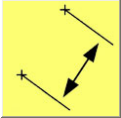
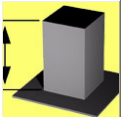
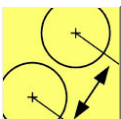
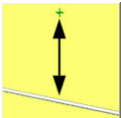
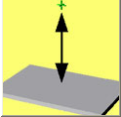
OK

8.2 Available Features

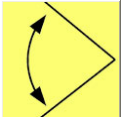
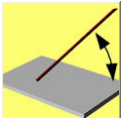
8.2.1 Dimensions

Icon	Measurement	Features to measure	Min Nb of Pts
	Diameter of a hole circle	Plane (projection)	3
		Circle	3
	Width and length of a slot	Plane (projection)	3
		Slot	6 <i>(3 on each ½ circle)</i>
	Width and length of a rectangle	Plane (projection)	3
		Rectangle	5 <i>(2 Pts on major side, 1 on others)</i>
	Diameter of a shaft circle	Plane (projection)	3
		Circle	3

8.2.2 Distances

Icon	Measurement	Features to measure	Min Nb of Pts
	Distance between 2 single points (not compensated)	Single point 1 (auto validation)	1
		Single point 2 (auto validation)	1
	Distance between 2 planes	Plane 1	3
		Plane 2	3
	Distance between 2 circles	Plane 1	3
		Circle 1	3
		Plane 2	3
		Circle 2	3
	Distance between a line and a point	Plane 1 (projection for line)	3
		Line	2
		Plane 2 (projection for point)	3
		Single point (auto validation)	1
	Distance between a plane and a point	Plane 1	3
		Plane 2 (projection for point)	3
		Single point (auto validation)	1

8.2.3 Angles

Icon	Measurement	Features to measure	Min Nb of Pts
	Angle between 2 planes	Plane 1	3
		Plane 2	3
	Angle between 2 lines	Plane 1 (projection for line 1)	3
		Line 1	2
		Plane 2 (projection for line 2)	3
		Line 2	2
	Angle between a plane and a line	Plane 1	3
		Plane 2 (projection for line)	3
		Line	2

Appendix

A-1 Advanced Installation

For industrialization purposes, arguments can be used with the RDS installer within a command line.

/qn	Silent mode
APPDIR=<your path>	Specific path installation

- 1. Open a command prompt in administrator mode.
- 2. Run your installer by specifying the wanted argument(s) (*/qn* or *APPDIR=<your path>*)

Example `"RDS Installer_x64.exe" /qn APPDIR=C:\temp\RDSAPI`



Running the installer without administrator privileges, the underlying msixec.exe process will run but will stay stuck, waiting for user elevation answer:

	msedgewebview2.exe	46292	Running	Jean-Paul ...	00	13,684 K	x64	Microsoft Outlook - W...
	msedgewebview2.exe	35844	Running	Jean-Paul ...	00	10,080 K	x64	Microsoft Outlook - W...
	msixec.exe	39520	Running	Système	00	4,156 K	x64	Windows® installer
	MsMpEng.exe	7284	Running	Système	00	245,288 K	x64	Antimalware Service E...
	MsSense.exe	7204	Running	Système	00	123,724 K	x64	Windows Defender Ad...

A-2 Configuration for End-Software

The ABSOLUTE ARM can be used with the following measurement software.

Ensure the appropriate version is installed.

Some software need special configuration. Please read carefully the corresponding section.

Software	V° Min.					Required license	Settings
PC-DMIS	2011*	✓		✓		“Portable”	
Inspire	V1.0	✓		✓	✓	No	Add Absolute Arm interface
Bending Studio				✓			Select Absolute Arm
REcreate	2022	✓		✓	✓		No configuration
SpatialAnalyzer	2011. 10.20	✓		✓			Select Absolute Arm
TubeShaper	v1.0	✓	✓			No	No configuration
Quindos	Q7	✓					
Visi	2018 R2			✓			
Cyclone 3DR (3DR Meteor)	v6.3	✓		✓		“RDS”	Install RDS plug-in
Apodius Explorer 3D	v1.1	✓		✓			
GPad / GTube		✗	✗			ROMOSOFT is not supported by the RA8	
Docs		✗	✗			Docs is no longer supported	
PolyWorks	12.0.7	✓		✓	✓	No	Select “Absolute Arm”
Metrolog	Xg13	⊙		⊙		“ROMER Arm”	Select “ROMER RDS”
Verisurf	X5	⊙		⊙			
3DTubeCAD		⊙					
Aberlink	v30.30	⊙					

Software	V° Min.					Required license	Settings
ArcoCAD		⊙					
AxelSystems		⊙					
BuildIT		⊙					
Calypso	v6.0	⊙					Select "ROMER->Absolute Arm"
CappsDMIS		⊙					
DezignWorks		⊙					
Geomagic	v11.0	⊙		⊙			Install "Absolute" plugin
Inca3D		⊙		⊙			
MCosmos	v3.2	⊙					
Metaio		⊙					
Metride		⊙					
Metromec		⊙					
Metrosoft		⊙					
Pema		⊙					
Point2CAD		⊙					
PowerInspect	2012	✓		✓		"Hexagon RDS"	Select "Hexagon RDS" interface
PowerShape	2013	⊙		⊙			Select "Hexagon RDS"
Quartis	R2020-2	⊙					Add "Hexagon RDS" machine
Rapidform		⊙					
Reverseengineering.com		⊙		⊙			
RevWorks		⊙					
Rhino	v5.0	⊙					Use "ROMER digitizer"

Software	V° Min.					Required license	Settings
ScanWorks	v5.5	⊙					Select “Absolute”
Tezet		⊙	⊙	⊙			
TopMes		⊙					
TopSolid	v7.7	⊙					
TouchDMIS		⊙					
TubeExpert		⊙					
VTube-Laser				⊙			

✓ : Certified by Hexagon | ⊙ : Implemented but not certified by Hexagon.

Table 1: application software.

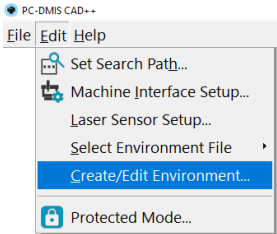


*: PC-DMIS 2019R2 or upper is required for the AS1/RS6 Scanner.

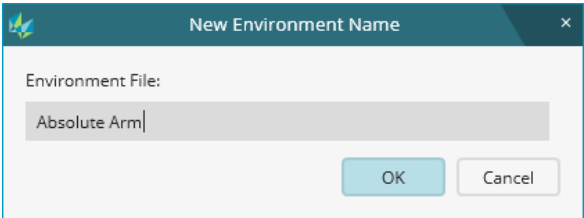
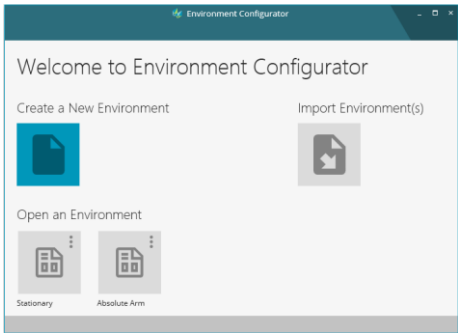
A-2.1 PC-DMIS

Instrument Setup (PC-DMIS 2023 and upper)

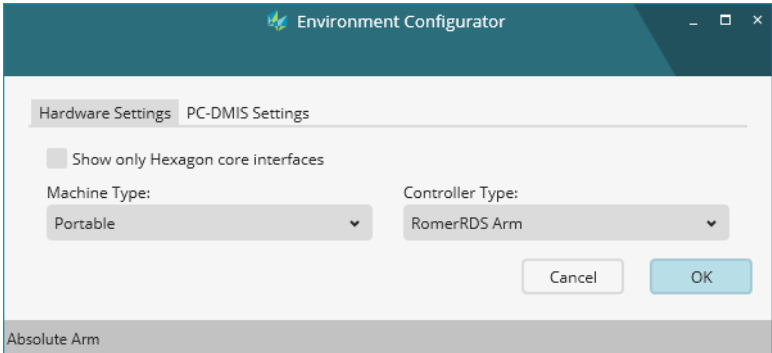
1. Run PC-DMIS (do not run any program) and select “Edit ► Create/Edit Environment”.



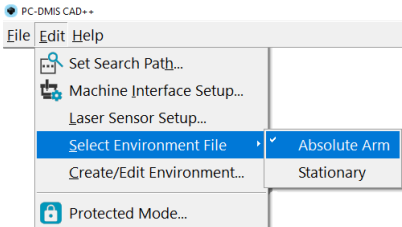
2. In the environment configurator, select “Create a New Environment” and enter a new name.



3. Select “Portable” for the machine type and “RomerRDS Arm” for the controller type.

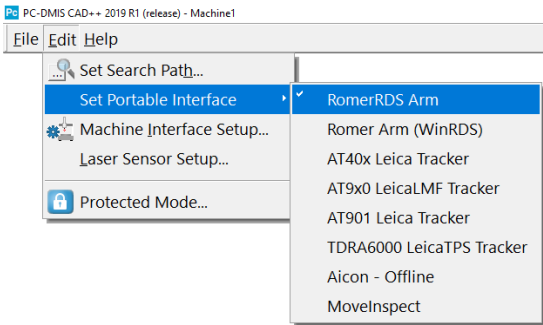


4. Close the configurator and select the created environment.



Instrument Setup (PC-DMIS 2019 to 2022)

- 1. Run Pc-Dmis (do not open any program) and select “Edit ► Set Portable Interface ► RDS Arm”.



Probes configuration

Probes configuration: all sensors (probes / scanners) are automatically created in PCDMIS. Any time a new probe is mounted on the arm, PCDMIS selects the probe and receives all information about it from RDS.

Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Pt. / Scan*	Delete Point. / Cancel	Validate / OK
Long	Burst Pts / Scan*		

*: depends on start/stop mode in RDS

Using the RA8-7 Wrist Display with PC-DMIS

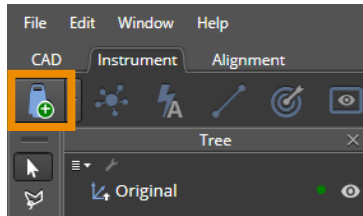
When measuring with an Absolute Arm 7-axis, instructions and results are directly available on the wrist display. No need to have a look at the computer, the measurement goes faster (no setup is needed).

Instructions	Results
	

A-2.2 Inspire

Instrument Setup

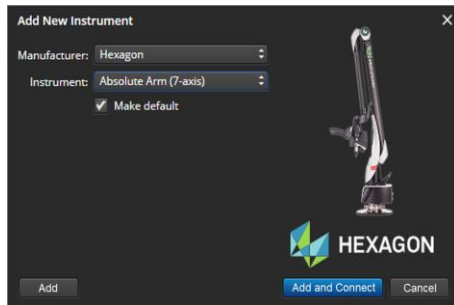
1. Run Inspire and select Instrument > Add.



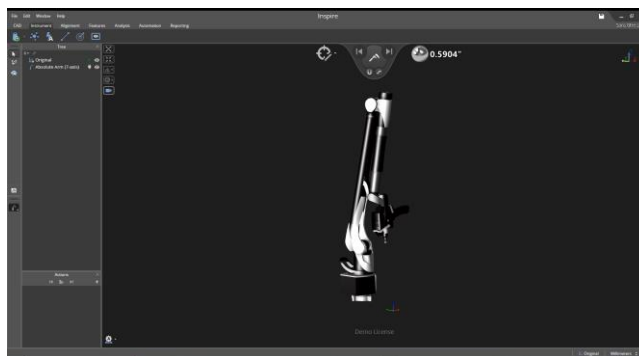
1. Choose “Portable CMMs > Hexagon” and select the appropriate instrument: Absolute Arm or Leica AT960 Laser Tracker.



2. Tick “Make default” and validate by pressing “Add and Connect”. (the instrument can be connected later by pressing “Add”).

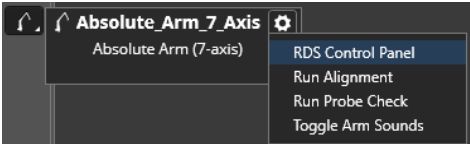


3. Now the arm can be displayed/hidden, connected/disconnected and use all the instrument tools embedded in Inspire.



Configuration

The following configuration can be done by pressing on the instrument button on the left toolbar:



RDS Control Panel	Opens RDS Control Panel for the arm configuration
Run Alignment	Runs the probe alignment in RDS Data Collector
Run Probe Check	Runs the quick check in RDS Data Collector
Toggle Arm Sounds	Enable / Disable the feedback arm sounds when scanning

Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point. / Scan*	Delete Point. / Cancel	Validate / OK
Long	Burst Points / Scan*	Delete all points Cancels the feature	

**: depends on start/stop mode in RDS*

Using the Wrist Display

When measuring with an Absolute Arm 7-axis, instructions and results are directly available on the wrist display. No need to have a look at the computer, the measurement goes faster (no setup is needed).



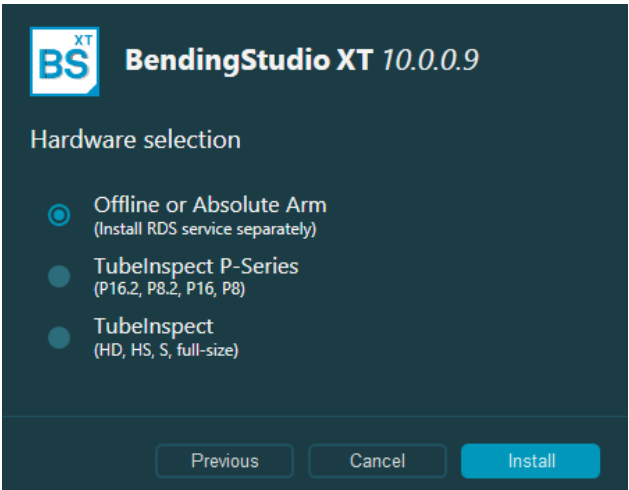
A-2.3 Bending Studio



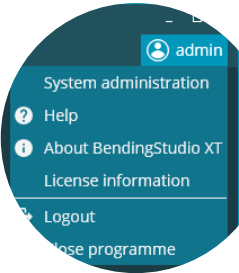
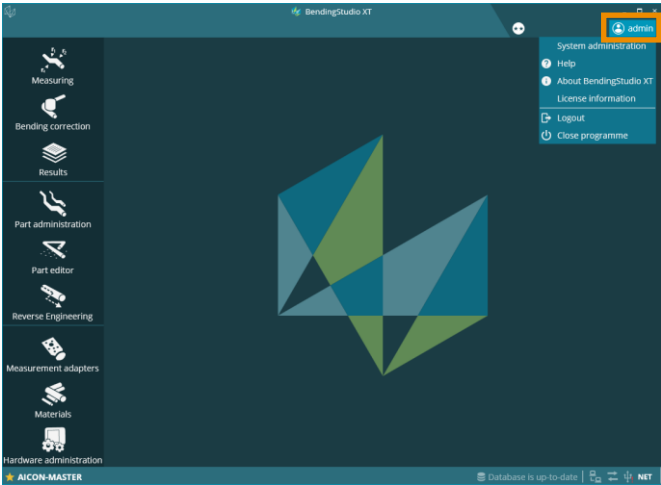
Only the RS6 and AS1 scanners are supported by Bending Studio.

Setting up the Absolute Arm

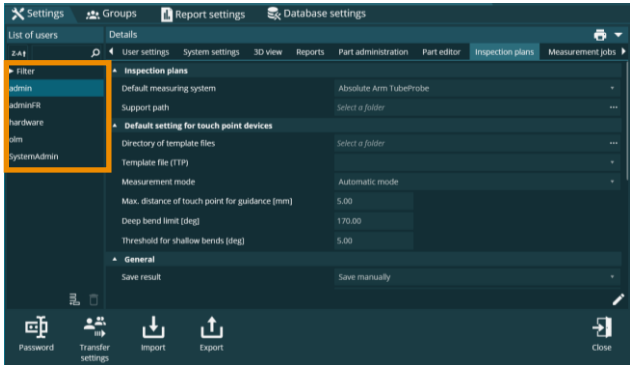
1. During the installation of the software, select “Absolute Arm”.



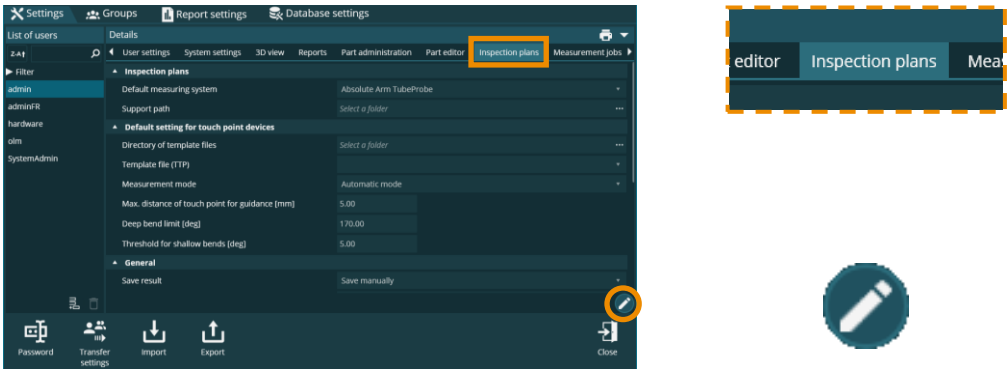
2. Click on the user button (left click) and select “System administration”.



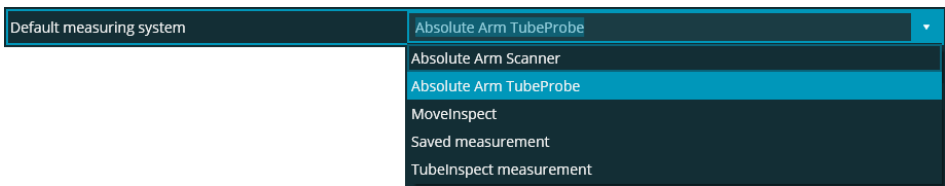
3. Select the user profile.



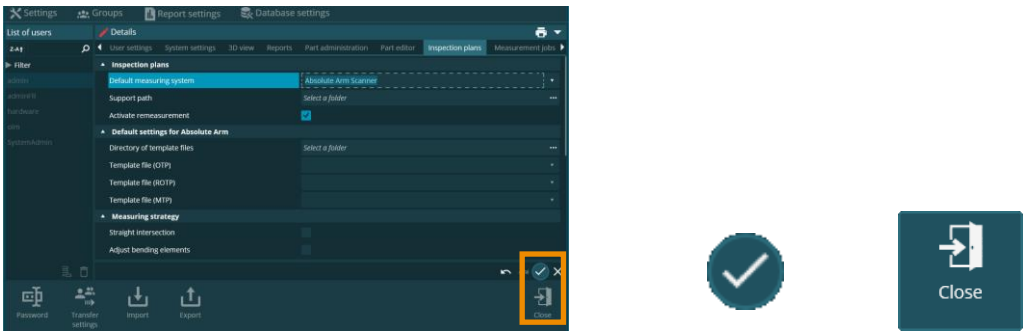
4. Display the tab “Inspection” and click on “Edit”.



5. Select the line “Default measuring system” and choose “Absolute Arm” in the drop-down list.



6. Click on “Validate” and exit the system administration menu.



Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Scan*	Cancel the pass	Validate / OK
Long	Scan*		

*: depends on start/stop mode in RDS

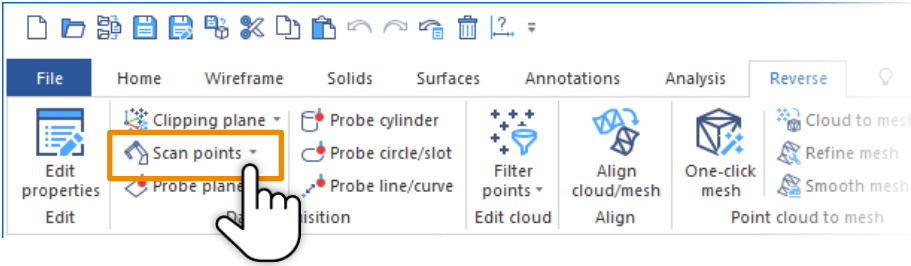
A-2.4 Recreate

Setting up the Absolute Arm

Once installed, the Absolute Arm is directly available, no setup is necessary.

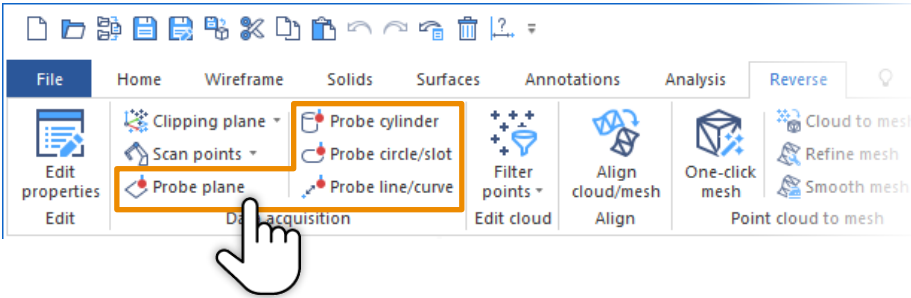
Scanning

On the ribbon, tab “Reverse”, select “Scan Points” on the “Data acquisition” group.



Probing

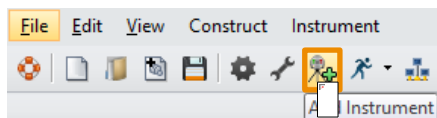
On the ribbon, tab “Reverse”, select “Probe plane” (or cylinder, circle... according to the needs) on the “Data acquisition” group.



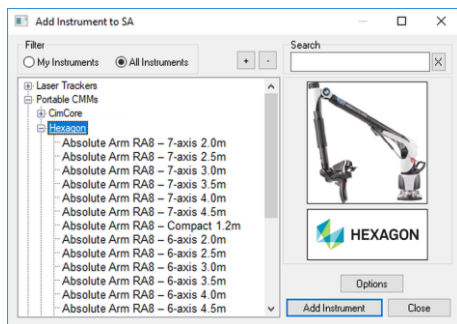
A-2.5 Spatial Analyzer

Instrument Setup

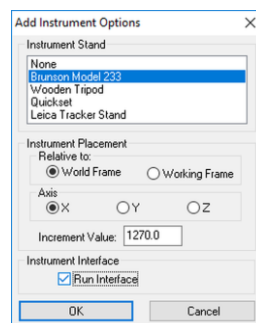
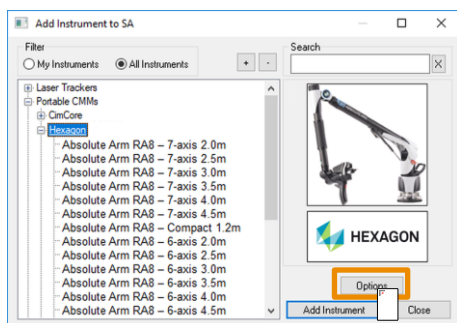
1. Run SA and select Instrument > Add.



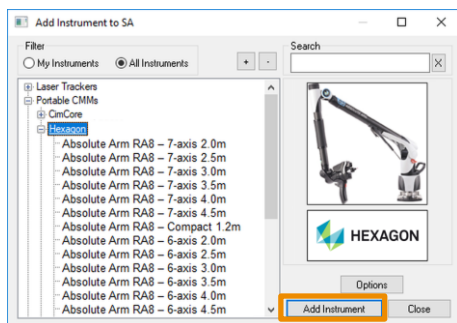
2. Choose Portable CMMs > Hexagon > Absolute Arm RA8 (select the appropriate arm (6-axis / 7-axis / Compact)).



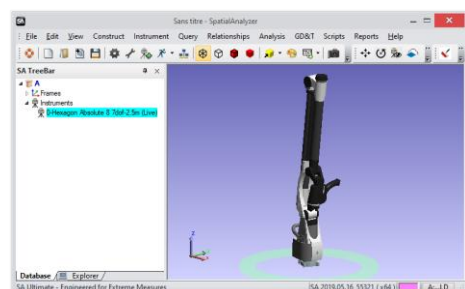
3. Click on "Options" and select the mounting base (tick "Run interface" to connect directly).



4. Validate by pressing "Add Instrument".



5. Now the arm can be displayed/hidden, connected/disconnected and use all the instrument tools embedded in Inspire.



Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point. / Scan*	Delete Point. / Cancel	Validate / OK
Long	Burst Points / Scan*	Delete all points Cancels the feature	

**: depends on start/stop mode in RDS*

A-2.6

TubeShaper

Instrument Setup

TubeShaper is totally dedicated to RDS instruments. No setup is necessary.

Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point.	Del Pt. / Cancel	Validate / OK
Long	Measurement menu		

A-2.7 Quindos7

Configuration

Upon Quindos/IppServer-startup the configuration menu is shown for arm settings, (for example the speaker volume). To make the new settings effective, press the SAVE-button and exit the configuration menu.

	Trigger button	3-State button - Left	3-State button - Right
Short	Take a probing point	Equivalent to POS-button on Leitz jogbox	Execute actual line
Long	Take burst probing points until released	DELR (Del record).	END (Execute all following lines up to the end of the list)

Probing Scan

Only scanning of unknown contours is currently implemented.
The result points are sent to Quindos at the end of the scan or when a certain number of points is measured
Scanning ends when a point is reached that fulfils the stop condition.
Scanning also ends, when the red (main) button is released. This feature can be switched on and off with the registry entry “EndScanOnButtonUp” in the “Driver”-section of the working environment.

Probe naming:

The probe names in Quindos and RDS will differ due to different naming conventions:

RDS:	“Centre reference probe”,	“6mm”,	“3mm”
Quindos:	“_Centre_reference_probe”,	“_6mm”,	“_3mm”

(The name conversion is automatic)

Probe Alignment:

If the realignment of one probe is needed, the user can execute the Quindos command ReQualifyTool; for detailed usage of the command, please see the Quindos user manual.
Please avoid renaming of probes during alignment. Use the predefined names!

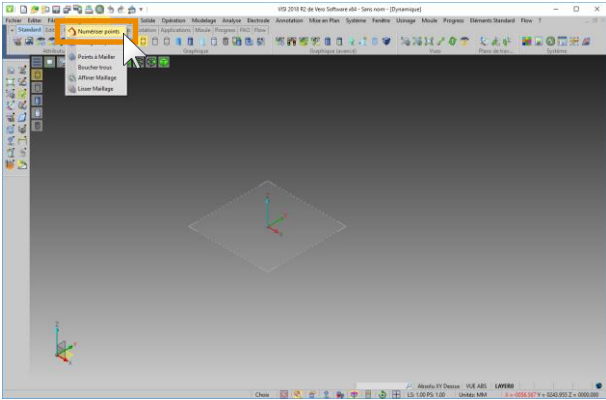
A-2.8 Visi

Instrument Setup

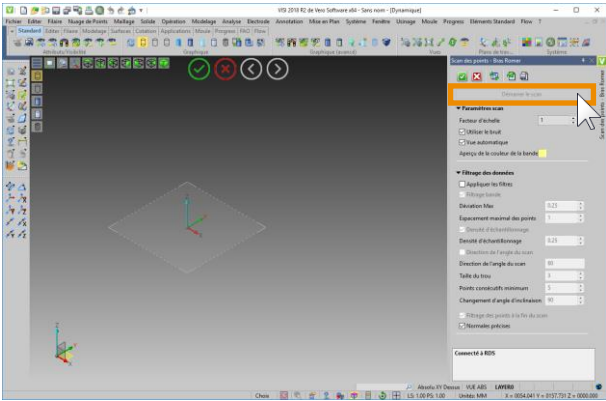
No specific preliminary setup is needed.

Run Scanning

- 1. In Visi menu, select “Cloud of Points” > “Digitize points”.



- 2. Then a specific Digitize window is displayed: set the wanted parameters and press “Start Scan”.



- 3. The system checks the connections with RDS and becomes ready to digitize.

Buttons Assignment

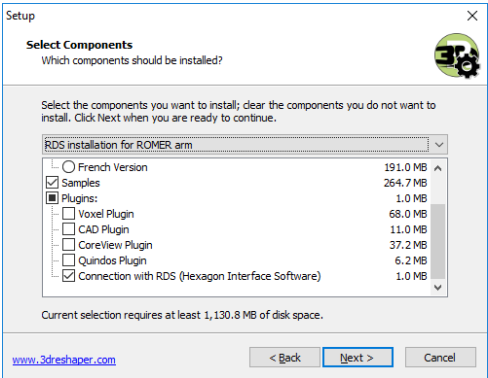
	Trigger button	3-State button - Left	3-State button - Right
Short	Scan*	Cancel last pass	Validate
Long	Scan*		

*: depends on start/stop mode in RDS

A-2.9 Cyclone 3DR (3DReshaper Meteor)

Instrument Setup

During the 3DReshaper installation, select the RDS plug-in (for legacy versions, install the 3DReshaper RDS Plug-In).



Configuration



The Settings button gives access to the RDS Control Panel, the sound activation/deactivation and other settings depending on the sensor.

Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point. / Scan	Del last patch	Validate
Long	Burst Points / Scan		



The Start/Stop mode selected in 3D Reshaper Meteor scanning options is retroactive on RDS.

A-2.10 Apodius Explorer 3D

Instrument Setup

No specific preliminary setup is needed.

Run Scanning and Carbon Inspection

Simply set the scanner on the arm and start scanning.

Mesh the 3D scan to add carbon texture with the HP-C-V3D vision sensor.

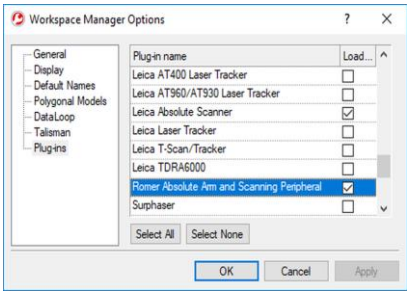
A-2.11 PolyWorks

Instrument Setup

1. In the Workspace Manager, access the options.



2. In the Plug-ins tab, select only “Absolute Arm and Scanning peripheral” or “Leica Absolute Scanner”.

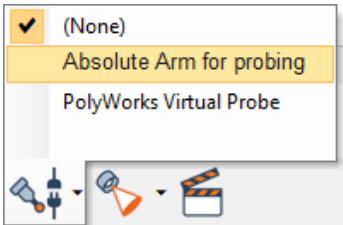


Contact Probing

1. Start PolyWorks, then Inspector

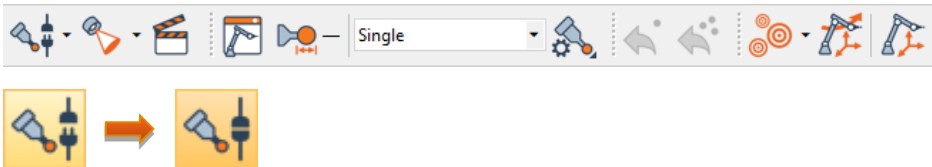


2. In Inspector “Devices toolbar”, select “Absolute Arm”.

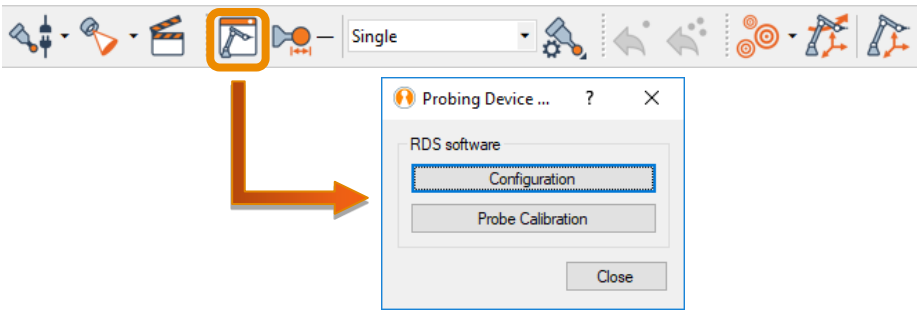


3. Select and validate “Tools > Save User configuration” to memorise as default instrument.

4. Click on the connection button to connect to the Arm.



5. In “Probing toolbar”, click on the Device properties button:

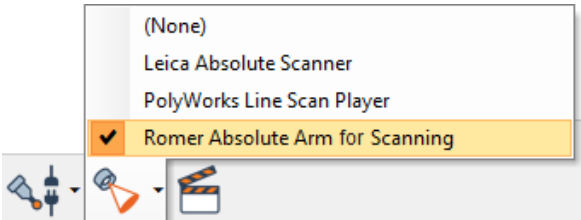


Scanning

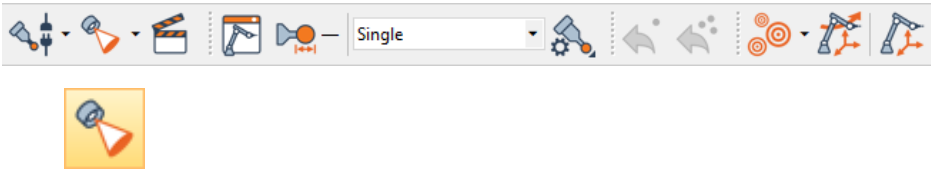
1. Start PolyWorks, then Inspector



2. In Inspector “Probing toolbar”, select “Absolute Arm Scanning Peripheral” or “Leica Absolute Scanner”.



3. Select and validate “Tools > Save User configuration” to memorise as default instrument.
4. Click on the scanner button to connect it.



The Start/Stop mode selected in PolyWorks scanning options is retroactive on RDS.

Arm Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point. / Scan*	Delete last Point. / Scan patch	Validate
Long	Burst Points / Scan*	Delete all points	

*: depends on start/stop mode in RDS

Arm Buttons Use for Message Boxes:

When a message box appears, the arm buttons can be used to make a choice in the box:

- A short press on any button (BT, B3S), switches to the next choice.
- A long press on any button validates this choice.

A-2.12 Metrolog

The following setup is effective for all the software of Metrolog suite (Metrolog, µ-Log, Silma X4).

	Trigger button	3State button - Left	3State button - Right
Short	Hit Pt. / Scan	Validate	Validate
Long	Burst Pts		

Configuration for Contact Probe

Once Metrolog is installed, run Metrolog configuration program (in case it doesn't start automatically, go to: Start Menu > All Programs > Metrolog > Configuration Assistant).

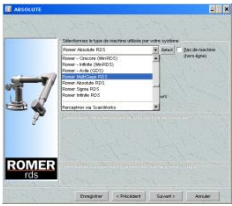
1. Enter user name and password then Next.



2. Skip following window by "Next".



3. On next window, select "type of machine": "Absolute RDS" and check "Automatically recall last probes file" then click on "Next".



4. Finish the configuration by clicking on "Save".



5. Run Metrolog software, the probe is automatically recognized and activated, and the system is ready to use.

Configuration for Hexagon Scanners

Once Metrolog is installed, run Metrolog configuration program (in case it doesn't start automatically: Start Menu > All Programs > Metrolog > Configuration Assistant).

1. Enter your user name and password then Next.



2. Skip following window by "Next".



3. On next window, select the appropriate "type of machine", tick "Automatically recall last probes file" and then click on "Next".



4. Finish the configuration by clicking on "Save".



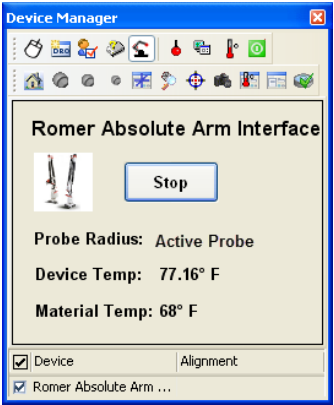
5. Run Metrolog software, probe is automatically recognized and activated, the system is ready to use.

A-2.13 Verisurf

Device Setup & Start

The Verisurf Device Manager typically opens on the right side of the Verisurf program. It may be accessed as well using the DRO tool button on the Measure Manager Toolbar.

The RDS Arm must be connected to the Verisurf Device Manager, using the “Start” button in the Device Manager once the initial Device Setup has been completed.



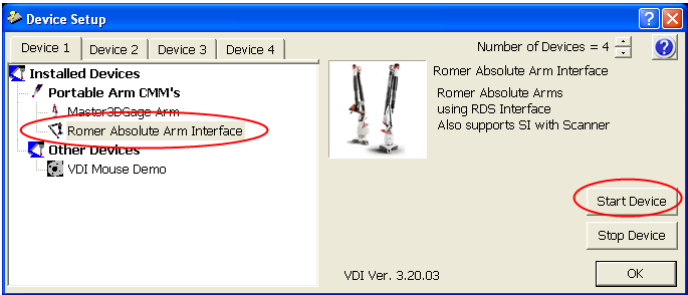
On the first start of Verisurf, prior to measurement, the RDS arm must be assigned to the Verisurf Device Manager and started. Device Setup is accessed from the Device Manager Toolbar.

1. On the Device Manager Toolbar, choose the Device Setup button: Device Setup window opens.
2. Select the number of devices.
3. On the tab of the Device (Device1, Device2 ...) that must be allocated to the RDS arm, select the appropriate RDS arm.

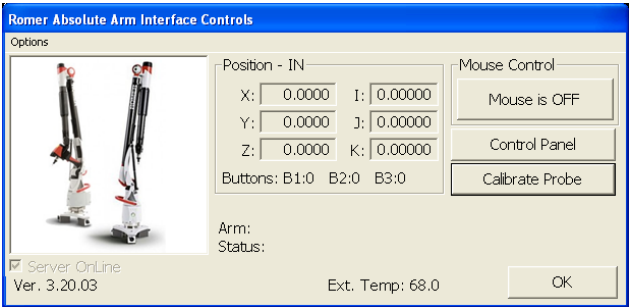


The primary instrument should be assigned to Device 1, it is not necessary to select more instruments than you have

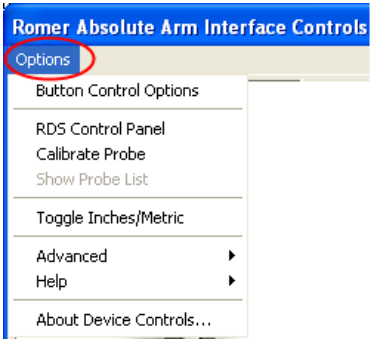
4. Start Device – launch the “Device” directly from the “Device Setup” using the Start Device button.



5. When selecting “Start Device”, the Absolute Arm Interface Controls dialog box appears.



6. In this dialog (right), the Options menu provides access to controls for the ROMER RDS Arms.



The same controls can be quickly accessed by selecting the Buttons available in the Absolute Arm Interface Controls dialog.

There are two methods for Starting the connection:

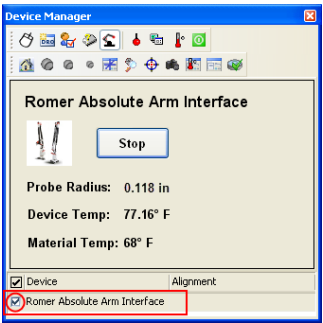
- Select the Start button in the control area.
- On the Device List, right-click on the device that you want to activate, and then choose Start Device from the speed menu (right).

Verisurf starts the device.

Activating a Device

Starting a device doesn't mean make it active. As several devices can be started, it is necessary to activate the one to use.

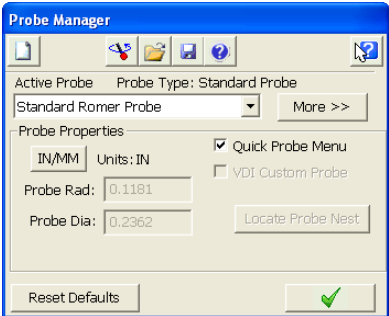
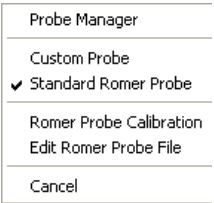
In the list of devices, check or uncheck the one to activate or not.



Probe Management

The Probe Manager allows the operator to create and manage Custom Probes. (Edit, duplicate, rename, align ...).

From the Device Manager select the Probe Icon  to open the Probe Manager quick menu, and then select Probe Manager to access the Probe Manager dialog.



	Create/Probe	Creates a new probe based on the current one. Simply rename it.
	Renaming a Probe	Available for Custom Probes only. All the probes must have a unique name.
	Deleting a Probe	Available for Custom Probes only. Delete cannot be undone.
	Align Probe	Opens RDS Data Collector.
	Loading Probe Sets	To recall a saved Probe set (*.prb file).
	Save a Probe Set	Used to save the current Probe Set to an ASCII File (*.prb file). This is useful to backup or archive your probes for loading or restoring later.
	Help	

A-2.14 Geomagic

	Trigger button	3State button - Left	3State button - Right
Short	Hit Pt. / Scan		Validate / OK
Long			

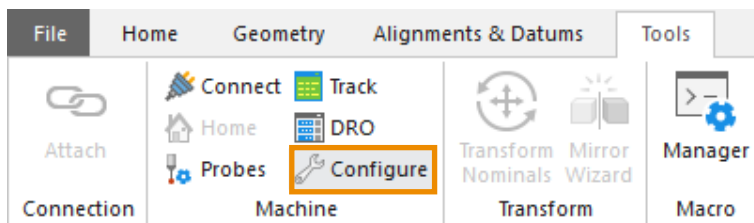
Configuration for Probing or Hexagon Scanners

After Geomagic installation, install “Absolute Probing” and “Absolute Scanning” plug-ins.
In Qualify or Studio, “material” tab, select “Hexagon Absolute Probing” or “Hexagon Absolute Scanning”.

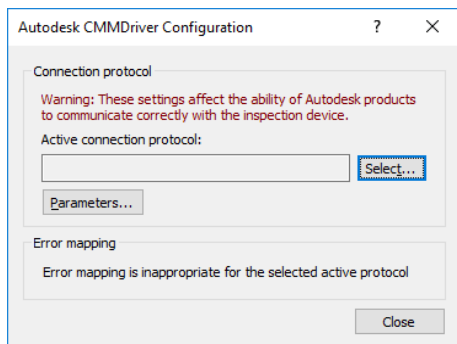
A-2.15 PowerInspect

Instrument Setup

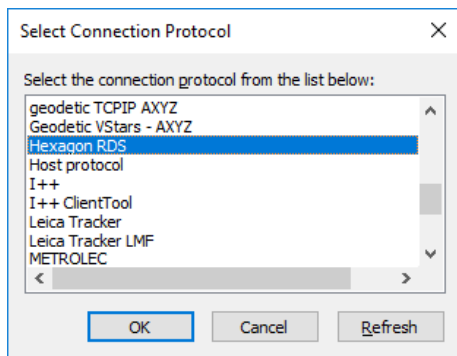
1. Run PowerInspect
2. Menu > tab “Tools”, select “Configure”.



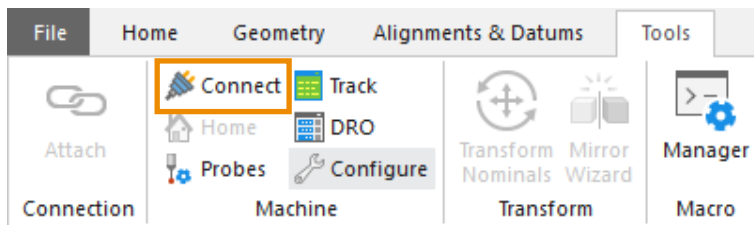
3. Open the list of protocols by clicking on “Select...”



4. In the list of protocols, choose “Hexagon RDS”, and validate both windows.



5. Press “Connect”: **Machine OK** is shown on the status bar.



Arm Buttons Assignment

	Trigger button	3-State button - Left	3-State button - Right
Short	Hit Point. / Scan*	Delete last Point. / Cancel	Validate
Long	Burst Points / Scan*	Delete all points	

**: depends on start/stop mode in RDS*



Wait few seconds after press buttons to start first scan.

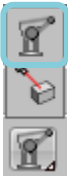
A-2.16 PowerShape

	Trigger button	3State button - Left	3State button - Right
Short	Hit Pt. / Scan	Del Pt. / Cancel	Validate / OK
Long	Burst Pts / Scan		

Configuration for Contact Probes

Basic version of PowerShape can be used with contact probes.

After PowerShape installation (V2013 minimum), install the CMM driver provided by Autodesk. Once PowerShape is run, click on the Arm connection button on the bottom toolbar. The system is ready.



Configuration for Scanners

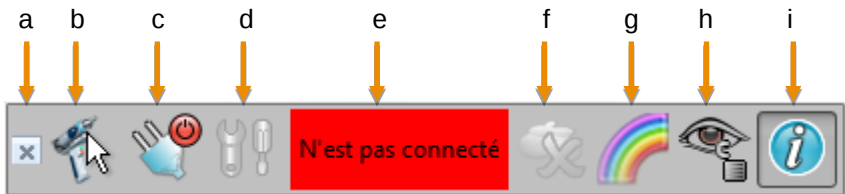
PowerShape Pro is necessary to be used with Hexagon scanners.

After PowerShape installation (V2013 minimum), install the CMM driver provided by Autodesk. Once PowerShape-Pro is run, click on the Arm connection button for Probing or on the laser button for scanning. The system is ready.



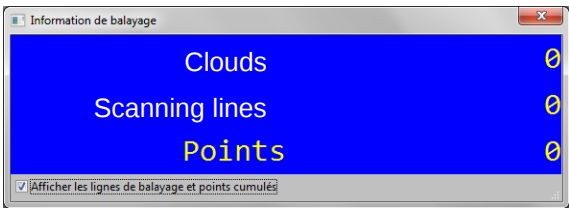
CMM Toolbar

Once the arm (contact probe) or scanner are connected, a toolbar is available:



- a. Close the toolbar
- b. Open the Autodesk driver CMM selection box
- c. Connect to the arm
- d. Access probe alignment
- e. Arm status
- f. Cancel last scan cloud
- g. Give a new colour for each new scan cloud
- h. Lock the 3D view
- i. Display the status window for the scan

The status window for the scan Shows the stripes information in real time:

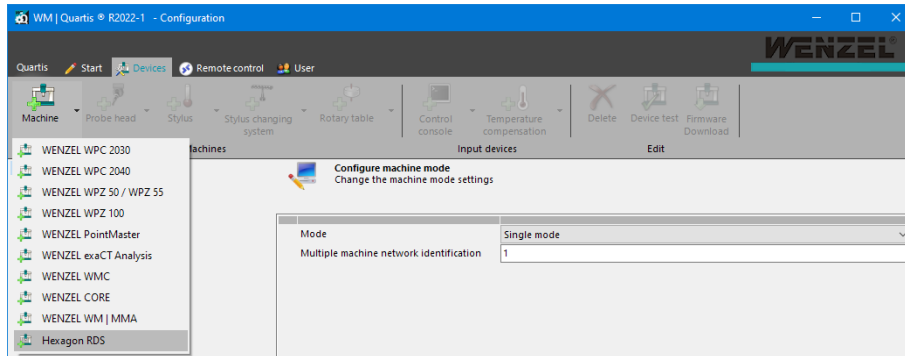


- Number of clouds
- Total amount of stripes
- Total amount of scan points for the current cloud

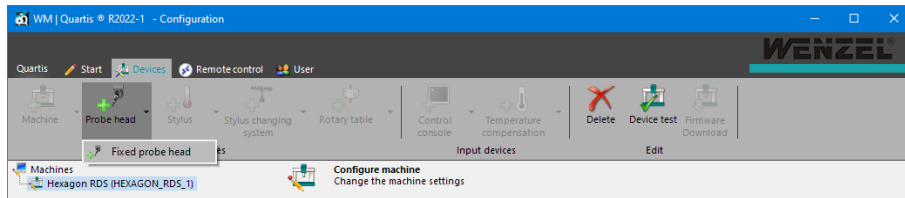
A-2.17 WM | Quartis

Instrument setup

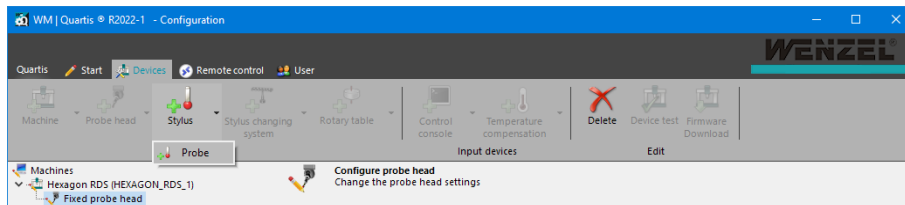
1. Run WM | Quartis – Configuration program.
2. On Tab Devices, add the machine.



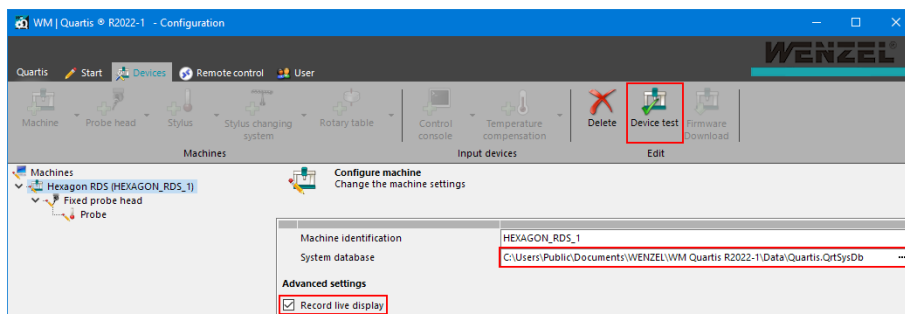
3. Select the machine and add a probe head.



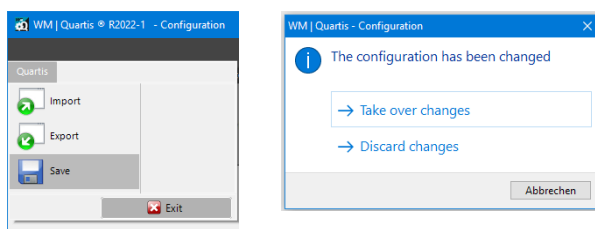
4. Select the created probe head and add a stylus.



5. Select the machine and define the settings.



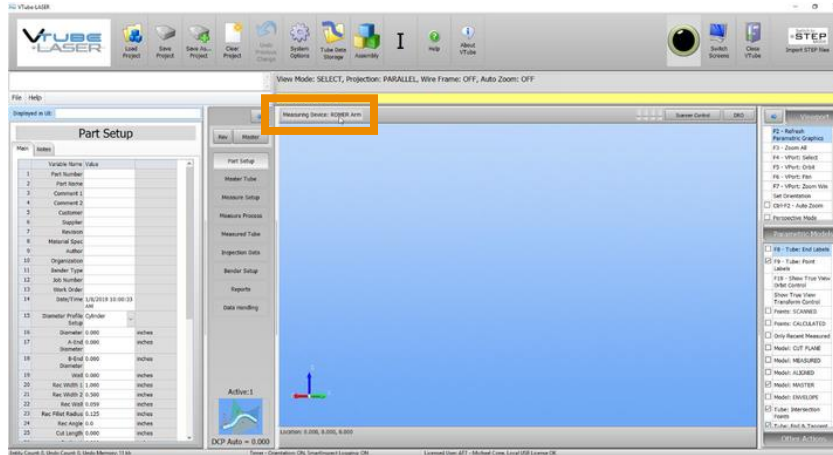
6. On "Quartis" tab, save the configuration.



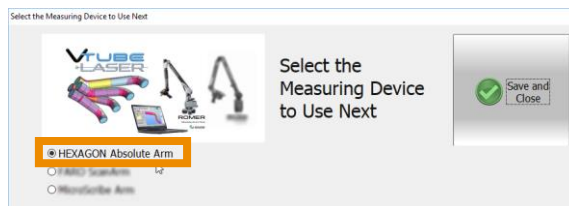
A-2.18 VTube-Laser

Instrument Setup

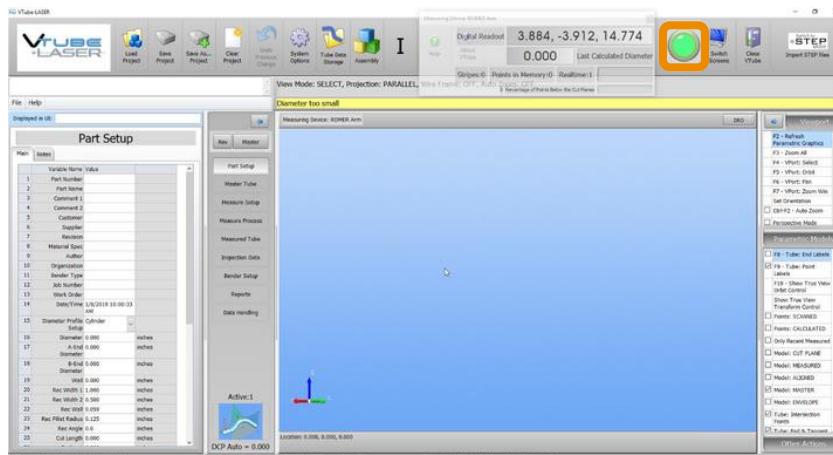
1. Ensure to use “setup_vtube_laser_vx.x.x_hexagon.exe”.
2. Click on the measuring device button.



3. Choose “Hexagon Absolute Arm and save.



4. Click on the LED to connect the arm.



A-3 Customize an Artefact (arm)

In RDS Data collector, it may be useful to create customized artefacts to easily get the calibrated values of the artefact.

A-3.1 Available Artefacts

To access the artefact files, browse to C:\Users\Public\Documents\Romer\RDS\Artefacts and find the wanted artefact with the following table.

Category	Script	Artefact
Alignment	AS1-XL scanner alignment - sphere with reference	"AS1-XL alignment sphere"
	Contact probe alignment – Sphere	"B89 Sphere"
	Contact probe alignment - Sphere with reference	
	Laser scanner alignment – sphere	"Scanner alignment sphere"
	Laser scanner alignment - sphere with reference	
Calibrations	All B89	"B89 Sphere"
	All B89 Cone Bar	"B89 Length Cal Bar"
	All ISO 10360-x	"ISO Sphere"
	All ISO 10360-x Cone Bar	"Cone Bar – Default"
	All ISO 10360-x Step Bar	"Step Bar – Default"
	ISO 10360-8 Annex D - AS1-XL	"AS1-XL alignment sphere"
	ISO 10360-8 Annex D	"Scanner verification sphere"
Diagnostics	Probing - quick check	"B89 Length Cal Bar"
		"B89 Sphere"
		"Simple Length Bar"
	Scanner - Quick check	"B89 Length Ball Bar"
		"Ball Bar"
		"Scanner verification sphere"

A-3.2 Change Default Parameters

If most of the values (diameters, lengths...) contained in the artefact files can be set directly when executing a script, some need to be edited inside the text file (ex: certification date, CTE...).

To do so, simply open the appropriate artefact file and adjust the wanted parameter.

A-3.3 Create a Customized Artefact

Some scripts in RDS Data Collector permit to choose the artefact to use. ISO 10360-12 or Tube probe alignment are such scripts.

The step for artefact properties displays a selection window in which the user can

- Select the artefact within the list of available ones
- Modify some properties

In addition to the default artefacts, it is possible to add personal artefacts, and then get a list of all the artefacts.

Naming conventions

When giving a name to the new artefact, some rules must be respected so that it can be correctly listed by RDS Data Collector.

Type of artefact	The name must contain	Used by	Rules
Sphere	“Sphere”	ISO 10360-x calibrations <i>Internal</i>	1 diameter only
Cone bar	“Cone Bar”	ISO 10360-12 calibration	5 lengths min
Step bar	“Step Bar”	ISO 10360-x calibrations	5 lengths min
Tube artefact	“TBar”	Non-contact probe alignment Non-contact probe quick check	1 diameter only 1 length only
Tube gage	“ZBar”	Non-contact probe Z check	3 diameters 4 points (X, Y, Z)
Compensation bar	“Cal Bar”	Arm compensations	2 lengths

Dimensions

For cone and step bars, used for the ISO 10360-x calibrations, the number of lengths can be adapted to the real artefact.

Example:

```
<RDSArtefact v0.1>
3DObjectFile = Step Bar (600).elt
CTE = 11.50000000
Description = 6 Cones
L_01_02 = 25.17000000
L_01_03 = 75.08000000
L_01_04 = 125.16000000
L_01_05 = 200.00000000
L_01_06 = 250.07000000
Last certification date = 01/01/2012 00:00:00
Modification date = 06/06/2023 13:40:21
Serial number = 0
User name = Jean-Pierre Durand
```

In the above example, 5 lengths are set. Additional lengths can be used.

Simply add new lines “L_01_xx = yyyy.yyy”

xx	Index of the cone or step
yy	Value of the length in millimetres (= length from cone or step 01 to xx)

Example:

```
<RDSArtefact v0.1>
3DObjectFile = Step Bar (600).elt
CTE = 9.23
Description = Carbid Bar N°2 - 10 Cones
L_01_02 = 25.17000000
L_01_03 = 50.23640000
L_01_04 = 75.06420000
L_01_05 = 99.93400000
L_01_06 = 150.03200000
L_01_07 = 200.01920000
L_01_08 = 249.95300000
L_01_09 = 300.04200000
L_01_10 = 350.01320000
Last certification date = 06/04/2023 00:00:00
Modification date = 27/07/2023 13:40:21
Serial number = 32377-2
User name = Jean-Pierre Durand
```

Metadata

Several parameters can be set for the artefact.

Field	Explanation	Format
[CTE]	Coefficient of thermal expansion.	in $\mu\text{m.m}^{-1}.\text{°C}^{-1}$
[Description]	Field to describe the artefact.	Free text
[Last certification date]	Date used by RDS to warn if it exceeds one year.	dd/mm/yyyy hh-mm-ss
[Modification date]*	Date of last modification.	dd/mm/yyyy hh-mm-ss
[Serial number]	Field to show the serial number of the artefact.	Free text
[User name]*	Name of the user who modified the artefact.	Free text



The modification date and user name are automatically modified when the dimensions are modified in RDS Data Collector.

How to create a customized artefact

1. Open an existing artefact with a text editor: according to the [available artefacts](#), use the appropriate one.
2. Apply the customization: add or remove the wanted fields, set the wanted values...
3. Save the file under a new name, respecting the naming conventions, on the same folder.

A-4 TCP ports and Redistributable

A-4.1 TCP Ports

RDS components are using some TCP and UDP ports for data transmission.

To avoid any issue, the following ports need to be open to RDS:

#		Direction	Component		
ICMP	Ping	In		Control Pack	Allow CP to detect if connection between CP and PC is established.
TCP	443			RDS Toolbox	Exchange with servers
UDP	137-138 1900 4210-4214 4310-4312 8881-8882 9881-9882 59266	In/out		RDS Service RS-SQD	Request / Response
TCP	4001 - 4002	Out		ArmLib (RA8)	CP_WIRED_TCP_PORT
TCP	4011	In/out		ServiceBus	Request / Response
TCP	4012	In/out		ServiceBus	Publish/subscribe
TCP	4020	In		RDS Agent	
TCP	4021	In		RDS Toolbox	
TCP	4022	In		Simulator	Arm simulator UI App
TCP	5150-5151	In/Out		Simulator	Arm simulator request/response
UDP	65280-65286	Out		AS1 scanner	
UDP	65520-65526	In		AS1 scanner	
TCP	5160	In/Out		RDS Core	
TCP	5161	In/Out		RDS.Jobs	Native router / Dealer pattern
TCP	8023	Out		ArmLib (MG)	DPAC_DP551_TCP_PORT
TCP	22430-22530	In		LMF (tracker)	Ports to attach a remote logger to several instances of LMF running on the same PC.

TCP	27370-27469	In	 LMF	Ports to attach a remote Tracker Scope to several instances of LMF on the same PC.
UDP	714	In	 LMF	Tracker discovery broadcast request and wait for response.
TCP	27570-27669	In	 LMF	Remote tracker scope to several instances of LMF.IO connections running on the same PC.
TCP	820, 920		LMF	Standard GCOM connection to AT960 and CB21.

: Firewall rule needed

NOTICE

All firewall exception rules must be set for domain, private and public profiles.

NOTICE

Ensure that no other layer of security stops the needed ports.

A-4.2 Digital Certificates

GlobalSign Root R6	Download Certificate (Binary/DER Encoded)
GlobalSign Secure Mail Root R45	Download Certificate (Binary/DER Encoded)

A-4.3 Redistributable and Libraries

The following tools are required for RDS. During the installation, RDS will install the missing one(s).

Tool	Min. version		
Sentinel System Driver	7.6.0	Safenet	LOK dongle
Visual C++ for Visual Studio 2015-2019	14.25.28508	Microsoft	
Visual C++ 2013 Redistributable x64	12.0.21005	Microsoft	
.NET Framework	4.7.2	Microsoft	
.NET Core Runtime x64	3.1.10	Microsoft	
Spinnaker Drivers x64	1.20.15	Flir	RS-SQUARED
PGR GeniCam x64	1.20.15		RS-SQUARED
Universal Updater x64	1.4	Hexagon	
Newtonsoft.Json			
Microsoft Xaml Behaviours Wpf			
Unity IoC Container		Apache	ArmSimulator RDS Control Panel
Ceres Solver		Google	RS-SQUARED
AsyncIO		Mozilla	
Boost		Boost	SMART
gflags.dll			RS-SQUARED
glog.dll		Google	RS-SQUARED
Magick++		ImageMagick	ArmSimulator
Xaml.Behaviors.Wpf		Microsoft	
NetMQ		GNU	
NaCl.Net		Mozilla	
Newtonsoft.Json			Control Pack
OpenCV			RS-SQUARED ArmSimulator

Tool		Min. version	
POCO C++		Control Pack	
tbb.dll		Apache	AS1

NOTICE

The licences for the libraries can be found in C:\Users\Public\Documents\Romer\RDS\Licenses.

A-5 Troubleshooting

RDS cannot install	Check that no firewall prevents from installing RDS.
“No valid licence” message after an upgrade	The previous version was not uninstalled properly: reinstall the previous version of RDS, make sure that no arm is physically connected and uninstall again.
The scanner connection fails	• If the arm is connected in USB mode, check that a correct fixed IP address has been set. • Check that TCP ports are open
The scanner stopped working	Scanners have a security against excessive temperatures. If the scanner becomes too warm, its lasers are stopped to preserve from potential damage.
Computer slow down very often	If the computer is very slow each time RDS Data Collector or any other 3D software are used, check if the driver of the graphic card is correct. (for ex if the driver display “VGA card”, then you should search for a better driver).
RDS cannot be uninstalled “Could not find RDS install Log”	Access the registry. “HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Windows\CurrentVersion\Uninstall\RDS” and delete the RDS folder. Then RDS can be reinstalled properly.
In RDS Toolbox, maintenance functions can’t connect the arm	Most of the maintenance functions can be used only in wired connection mode and on mains power. If the current connection is Wi-Fi, use the Ethernet (or USB) cable to connect the arm to the computer.
Buttons, or texts are cropped	Check that Windows font size is set to 100%. Deactivate the Windows customized scaling.
The firmware update of the mainboard failed.	Try again to load the firmware. RA8: in case of issue when programming the Mainboard firmware, a boot on Safe mode is possible:
The RA8 arm cannot start after a firmware update	Press the Power button and then press again 4 times the button: the arm boots in a safe mode. Then proceed again with the firmware load operation.
Alignment process gives very high errors	Check the regional settings: group separator must be “space” character and decimal symbol must be a dot.

Contact or Touch Trigger Probe alignment gives a bad result	Check that the diameter of the stylus is correct.
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<i>“Cannot create or upgrade the database”</i> appears when launching RDS Toolbox	The database local file may be corrupted. Delete the file <i>“C:\Users\Public\Documents\Romer\RDS\RDSToolBox\RDSToolBox.smd”</i> and restart.
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Contact Us

In case the problem could not be solved using the above help, please contact your regional agent with the following information:

- The following page filled out
- RDS.log file (on C:\Users\Public\Documents\Romer\RDS\LogFiles)

Machine	Type	☐ Multi Gage	☐ Absolute arm	☐ Tracker
	Serial Number			
	Your Company name			
Connection	Type	☐ USB	☐ Wi-Fi	☐ Ethernet
	CPU TCP/IP@	____.____.____.____		____.____.____.____
	RDS TCP/IP @	____.____.____.____		____.____.____.____
	SSID			
Accessories	Scanner			
	CPU IP@ for Scanner	____.____.____.____		____.____.____.____
	LEDs status			
Boards versions	Mother Board			
	MB PIC			
	Event Board			
	Feature / Control Pack			
	Sounds			
	Status of the LEDs			
Diagnostic information	Tests with different hardware			
	Ping answer			
	Other information			
	Operating system	☐ Windows10	☐ 32 Bits	☐ 64 Bits



Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

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User Manual, RDS Software

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