



TELEDYNE
CETAC TECHNOLOGIES
Everywhereyoulook™

Oils 7400 and Oils 7600 Homogenizing Autosampler



IQ/OQ Guide

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Introduction

Qualification testing is required for laboratories in some industries with Good Laboratory Practices (GLP) or Good Manufacturing Practices (GMP) requirements. Even in unregulated laboratory environments, these tests can provide an extra degree of confidence that the autosampler will work as expected.

Installation qualification (IQ) and operational qualification (OQ) for this autosampler are typically performed by the user. IQ demonstrates that the autosampler was shipped, unpacked, and installed correctly. OQ demonstrates that the measurement system (typically consisting of the autosampler, the host computer, the analytical instrument, and other equipment) performs as required by the experimental method.

This guide covers the following Teledyne CETAC products:

- Oils 7400 4-rack homogenizing autosampler
- Oils 7600 6-rack homogenizing autosampler

Basic Verification

Even if you do not plan to complete the full IQ procedure, you should verify the following two items:

- Ensure that the communications interface between the autosampler and the host computer is working.
- Ensure that the sample probe and stirrer function properly.

This can be done using your ICP-MS or other instrument control software, or with the provided ASX-7x00 Dashboard software.

Installation Qualification (IQ)

IQ verifies that the autosampler was shipped, unpacked, and installed correctly.

Qualification consists of the following:

- Inventory of supplied equipment
- Operating environment checklist
- Visual inspection
- Installation checklist
- Communication test
- X/Y/Z movement and alignment test
- Peristaltic pump test

An IQ checklist is provided on page 7.

Inventory of Supplied Equipment

1 Verify that the following items are present:

- Autosampler
- Power cord with the appropriate connector
- Sample probe of appropriate type
- Stirrer paddle of appropriate type
- Spacer block which matches the spacing of the racks which will be used
- Tubing kit
- Software and documentation CD

- 2 Verify that all other items on the included packing list are present.
- 3 Verify that all standard components are present. See Chapter 1 in the *Operator's Manual*.

Operating Environment Checklist

- 1 Verify that the requirements in “Installing the Autosampler: Choosing a Location” in the *Operator's Manual* have been met.

Visual Inspection

The following autosampler components may be damaged during shipping or installation: the sample probe, the peristaltic pump tubing, and the rinse station and tubing. It is important that you check these components for damage before you operate the autosampler. To do so, complete the following steps:

- 1 Shut down and unplug the autosampler.
- 2 Visually inspect the sample probe, peristaltic pump tubing, and rinse station and tubing for leaks or signs of damage.
- 3 Visually check for moisture condensation which may have occurred during shipment.

If you detect a leak or other damage to an autosampler component, you must replace it. For more information, see the appropriate section in the “Maintaining the Autosampler” chapter of the *Operator's Manual*.

Installation Checklist

- 1 Mount the Z-drive and connect tubing and cables, following the instructions in the *Operator's Manual*.

Communication Test

If the communications interface between the autosampler and the host computer is not established correctly, the autosampler will not function.

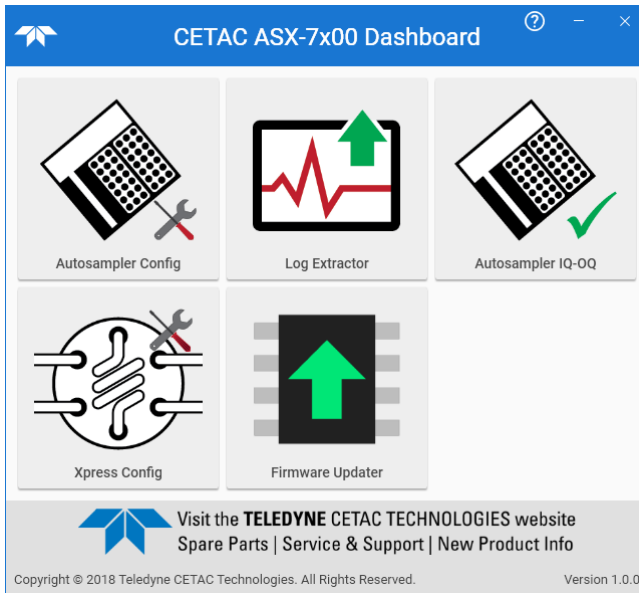
- 1 Remove all vials, racks, and standards from the autosampler tray.

CAUTION

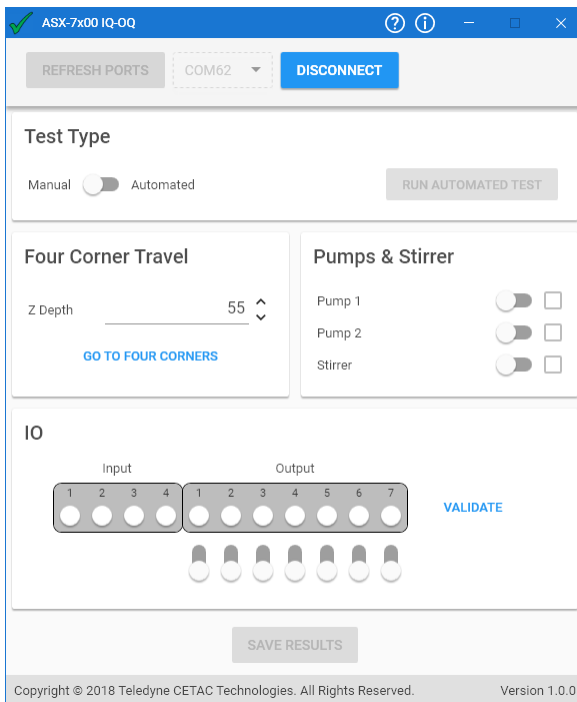
Remove everything from the autosampler tray. The "4 Corners" test will lower the sample probe at the edges of the autosampler range of motion. If vials or racks are present, the probe may be damaged.

- 2 Check that the communication cable (USB or serial) is properly attached between the host computer and the autosampler.
- 3 Turn the autosampler power switch on and verify that the LED power indicator lamp is on.
- 4 If you have not already done so, install the ASX-7x00 Dashboard software on the host computer.
- 5 Start the ASX-7x00 Dashboard software.

6 From the ASX-7x00 Dashboard, click **Autosampler IQ-OQ**.



If properly connected, the autosampler will appear on the list of available autosamplers at the top of the window.



ALTERNATIVE:

From the ICP-MS or other instrument control software, command the autosampler to go to the HOME position.

X/Y/Z Movement and Alignment Test

The sample probe must descend into the center of each sample vial to ensure satisfactory sample uptake. Shipping or rough handling can disturb the autosampler's cabinet-to-base alignment. If it is incorrectly aligned, the sample probe will not function properly. It is therefore important to test the sample probe before you actually run samples with the autosampler.

NOTE:

Before testing the sample probe, ensure that you have installed all autosampler components correctly. Also, ensure that you have securely tightened all thumbscrews and connected the communications cable from the host computer to the autosampler.

Testing the sample probe involves observing the operation of the sample probe. To do so, complete the following steps:

- 1 In the Autosampler IQ-OQ utility, select the **Manual** test type.
- 2 If any obstacles remain on the tray or base of the autosampler which cannot easily be removed, set the **Z Depth** so that the sample probe will not collide with anything when it is lowered.
- 3 Click **Go To Four Corners** to move the sample probe to the four corners of the sample tray.
- 4 Observe the motion of the autosampler and verify that the sample probe descends at each of the four corners of the autosampler.

ALTERNATIVE:

Use the instrument control software on the host computer, command the autosampler to move to the sample positions at the left rear, left front, right rear, and right front of the sample tray.

Peristaltic Pump Test

- 1 From the Autosampler IQ-OQ utility, toggle **Pump 1** on then off. Visually verify that the pump turns on and off.
- 2 From the Autosampler IQ-OQ utility, toggle **Pump 2** on then off. Visually verify that the pump turns on and off.
- 3 Move the rinse station to the other position and verify that the color of the status LED changes.

Stirrer Test

- 1 From the Autosampler IQ-OQ utility, toggle **Stirrer** on then off. Visually verify that the stirrer rotates.

Saving the Test Record

- 1 From the Autosampler IQ-OQ utility, click **Save Results**.

Include the generated report in your IQ test records.

Clearance Inspection

- 1 Turn the autosampler off.
- 2 Load the standards vials into the autosampler tray.

- 3 Load the racks with sample vials and place them on the tray.
- 4 Visually check that the tops of all the vials are below the bottom of the Z-drive, and below the bottom of the sample probe and stirrer when it is in its highest position.
- 5 Visually check that there are no obstructions which might block movement of the autosampler arm or which might tangle the sample transfer tubing as the autosampler moves.

Operational Qualification (OQ)

The autosampler is typically an element of a larger measurement system. Furthermore, the autosampler has no operational parameters which can or should be calibrated. Therefore, OQ should be performed for the measurement system as a whole rather than for the autosampler by itself.

Where OQ is needed for the autosampler as a part of the larger measurement system, commonly used tests might include:

- Tests of communication and timing between the autosampler and other system components.
- Replicate measurements of samples with two distinct concentrations, to check that carryover is within the limits required by the experimental method.
- Measurements using blanks, to check for contamination of the sample flow path.
- Measurements using the full range of dilutions which will potentially be used by the experimental method.
- Measurements of sample flow rate or volume.
- Tests to ensure that mixing is adequate for the experimental method.
- Tests to ensure that the instrument control software is directing the autosampler to draw samples from the correct locations.

Where OQ is needed for the autosampler by itself, the tests are typically a subset of the IQ tests:

- Operating environment checklist
- Visual inspection
- Communication test
- X/Y/Z movement and alignment test
- Peristaltic pump test

The OQ report should include information about the configuration of the autosampler. See the sample OQ checklist on page 10.

Autosampler IQ Checklist

Instrument Identification

Autosampler model _____
Autosampler serial number _____
Location of installation _____
IQ performed by _____
Date _____

Inventory of Supplied Equipment

Description	Pass	Fail	N/A	Comment
Autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power cord with the appropriate connector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample probes of appropriate type (oils and coolants)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stirrer of appropriate type	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Spacer block which matches spacing of the racks which will be used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Software and documentation CD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other items listed on packing list	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Operating Environment Checklist

Description	Pass	Fail	N/A	Comment
Space adequate for autosampler, no mechanical interference for moving parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5 cm clearance for cable egress and power switch access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sturdy work surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Provisions for liquid waste routing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power outlet has protective ground connection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power outlet accessible for rapid disconnection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Temperature is 50–95 °F (10–35 °C)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Humidity is 20–70% non-condensing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Excessive flammable or corrosive vapors are not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sources of strong electromagnetic interference are not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Visual Inspection

Description	Pass	Fail	N/A	Comment
No visible leaks in sample tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible leaks in peristaltic pump tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible damage to sample probe or rinse station	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible moisture condensation in/on body of autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Installation

Description	Pass	Fail	N/A	Comment
Z-drive mounted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Z-drive cable plugged in securely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample probe installed on Z-drive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stirrer installed on Z-drive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample tubing secured to Z-drive cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Source of rinse solution routed to peristaltic rinse pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rinse station tubing routed to waste container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power supply connected to autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Communication cable connected between host computer and autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Communication Test

Description	Pass	Fail	N/A	Comment
LED power indicator lamp is on when power switch is on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Autosampler appears in ASX Dashboard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

X/Y/Z Movement and Alignment Test

Description	Pass	Fail	N/A	Comment
"Go To Four Corners" moves to all four corners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Peristaltic Pump Test

Description	Pass	Fail	N/A	Comment
Peristaltic pump 1 runs upon "Pump 1 On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 1 stops upon "Pump 1 Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 2 runs upon "Pump 2 On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 2 stops upon "Pump 2 Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
LED changes color when rinse station is moved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Stirrer Test

Description	Pass	Fail	N/A	Comment
Stirrer runs upon "Stirrer On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stirrer stops upon "Stirrer Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Clearance Inspection

Description	Pass	Fail	N/A	Comment
Height of all standards vials below bottom of sample probe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Height of all sample vials is below bottom of sample probe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No obstructions for movement of autosampler arm or sample transfer tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Autosampler OQ Checklist

OQ should be performed for the measurement system as a whole; this checklist shows autosampler-related items which could be incorporated into OQ.

Instrument Identification

Autosampler model _____

Autosampler serial number _____

Location of autosampler _____

OQ performed by _____

Date _____

Instrument Configuration

Autosampler personality, if changed from manufacturer's default _____

X-Y axis movement speed _____

Z axis movement speed _____

Peristaltic pump speed _____

Stirrer speed _____

Sample probe type _____

Sample probe tubing length _____

Rinse pump configuration Gravity drain Pump drain
 Other _____

Rinse solution(s) in use _____

Rinse tubing material _____

Operating Environment Checklist

Description	Pass	Fail	N/A	Comment
Space adequate for autosampler, no mechanical interference for moving parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5 cm clearance for cable egress and power switch access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sturdy work surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Provisions for liquid waste routing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power outlet has protective ground connection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power outlet accessible for rapid disconnection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Temperature is 50–95 °F (10–35 °C)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Humidity is 20–70% non-condensing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Excessive flammable or corrosive vapors are not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sources of strong electromagnetic interference are not present	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Visual Inspection

Description	Pass	Fail	N/A	Comment
No visible leaks in sample tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible deterioration of tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No kinks in sample tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible leaks in peristaltic pump tubing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
No visible damage to sample probe or other components	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Installation

Description	Pass	Fail	N/A	Comment
Sample probe is of appropriate type for sample matrix and desired flow rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Tubing is of appropriate type for sample matrix and desired flow rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample tubing is free of mechanical interferences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Source of rinse solution(s) routed to peristaltic rinse pump	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rinse station tubing routed to waste container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Bottom of rinse station waste tube is above liquid surface in waste container	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Power supply connected to autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Communication cable connected between host computer and autosampler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Communication Test

Description	Pass	Fail	N/A	Comment
LED power indicator lamp is on when power switch is on	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Autosampler appears in ASX-7x00 Dashboard or host software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

X/Y/Z Movement and Alignment Test

Description	Pass	Fail	N/A	Comment
"Go To Four Corners" moves to all four corners	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Peristaltic Pump Test

Description	Pass	Fail	N/A	Comment
Peristaltic pump 1 runs upon "Pump 1 On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 1 stops upon "Pump 1 Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 2 runs upon "Pump 2 On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Peristaltic pump 2 stops upon "Pump 2 Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
LED changes color when rinse station is moved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Stirrer Test

Description	Pass	Fail	N/A	Comment
Stirrer runs upon "Stirrer On"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stirrer stops upon "Stirrer Off"	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

System Tests

Description	Pass	Fail	N/A	Comment
Method-specific and system tests performed as needed to confirm performance of the system as a whole (timing, accuracy, precision, carryover , etc. – see page 6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	