

# Teledyne CETAC Accessory Guide

Featuring Particle Counting, Sample Introduction Products, Sample Prep, and more



Supporting the Laboratory  
2019–2020



Save time and money  
by performing two  
techniques at the same  
time! (look inside)



# TABLE OF CONTENTS

ASX-560 4-Rack Autosampler. . . . .	5
ASX-280 2-Rack Autosampler. . . . .	6
ASX-280 Oils Autosampler. . . . .	7
XLR-860 8-Rack Autosampler. . . . .	8
ENC-560 DC Autosampler Enclosure. . . . .	9
ENC-280 DC Autosampler Enclosure. . . . .	9
ENC-860 DC Autosampler Enclosure. . . . .	9
APS-1650 Automated Prep Station. . . . .	11
Oils 7400 Homogenizing Autosampler. . . . .	12
Oils 7600 Homogenizing Autosampler. . . . .	12
<i>PARTICLE XPRESS</i> Precision Sample Introduction . . .	13
<i>ASXPRESS PLUS</i> Rapid Sample Introduction. . . . .	14
U5000AT+ Ultrasonic Nebulizer. . . . .	16
U6000AT+ USN w/ Membrane Desolvator. . . . .	17



For a complete listing of Teledyne CETAC consumables and spare parts, please refer to the Consumables and Supplies catalog. Contact your sales representative for details.

## ASX-560 series Autosamplers

More features and improved performance define the latest generation of autosampler from Teledyne CETAC Technologies.



## DC Autosampler Enclosures

Protect samples from environmental impurities to maintain sample integrity and ensure reliable results. Various sizes fit every autosampler.



## APS-1650 Automated Prep Station

Eliminate time consuming manual dilution and human error with this high throughput sample dilution system.



## Oils 7400 & Oils 7600 Autosamplers

One autosampler for two matrices. Go between oils and coolants analysis without changing equipment.



## *PARTICLE XPRESS* AND *ASXPRESS PLUS* Sample Introduction Systems

More options to enhance ICP analysis.

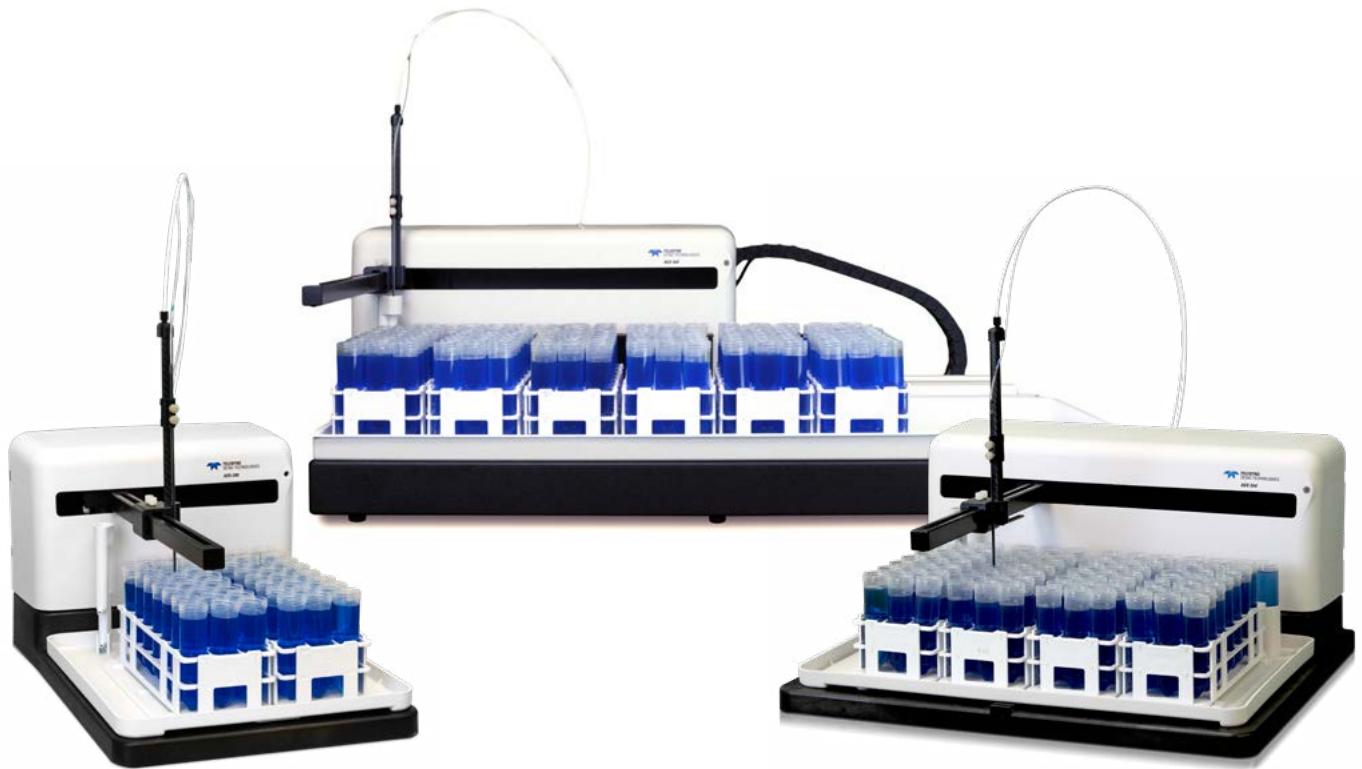


## Ultrasonic Nebulizer Systems

Lower detection limits and reduce solvent-based interferences with this highly efficient and easy to use accessory.



# RELIABLE LAB AUTOMATION



More features and improved performance define the next generation of autosampler from Teledyne CETAC Technologies. The ASX-560 family of autosamplers build upon the reliable mechanics of the ASX-520 with latest generation electronics, improved accessory interfaces, enhanced pumping capabilities, easier serviceability and a sleek new design!

## Constructed with Inert Materials

- Plastic cover, base and tray
- Carbon fiber arm and Z-drive
- No exposed metal parts
- Ensures a clean sample environment

## Robust Mechanics

- Lead-screw driven XY movement, just like its predecessors
- Select XYZ acceleration and speeds to match your application
- High resolution positioning to ensure probe accuracy

## Improved Pumping and Rinsing

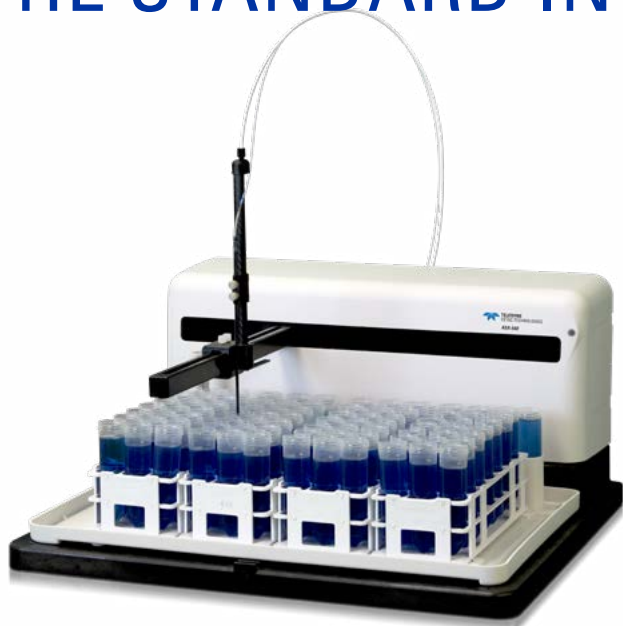
- Configurable rinse flow rates to meet your application (range of 0.1 – 80 mL/min)
- Virtually noiseless operation
- Optional dual rinse station

## A Wide Range of Applications

- Environmental: 200.7, 200.8, 6010, 6020
- Pharmaceuticals
- Clinical
- Mining
- Wear Metals and Oils
- Semiconductor
- Soils

The autosampler for your application: environmental, clinical, pharmaceutical, semiconductor, you name it.

# THE STANDARD IN EFFICIENCY



ASX-560 4-Rack Autosampler

## Technical Specifications

### Dimensions

Height (w/ probe)	62 cm (24.4")
Width	58 cm (22.5")
Depth	55 cm (21.6")
X-Axis	42.0 cm (16.54")
Y-Axis	30.0 cm (11.81")
Z-Axis	15.5 cm (6.10")
Weight	11.7 kg (26 lbs)

### Speed

Axis	Min	Max
X	100 mm/sec	330 mm/sec
Y	73 mm/sec	411 mm/sec
Z	164 mm/sec	476 mm/sec

Description	Part No.
ASX-560 Autosampler (aqueous)	N0782035

Includes:

- 4 each 60 position sample racks with full set of 15 mL vials
- 10 standard locations with 50 mL vials
- 0.5 mm I.D. carbon fiber supported sample probe
- Interface connect cables (DB9 and USB)
- Miscellaneous tubing for hookup
- Power supply with US, UK and European plugs

### Pump

0 – 80 mL/min

### Tray Capacity

4 rack

### Communication Interface

2 Serial (RS-232) ports  
USB (virtual COM port)

### Utilities

Autosampler Configuration tool to set  
XYZ speed and pump speed  
Firmware Update Utility  
IQ/OQ and Log Extractor Utilities

### Power Requirements

100-240 VAC, 47-63 Hz, 1.9A

### Options

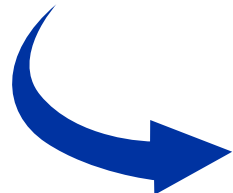
HEPA filtration  
ENC-560 DC Dust Cover/Enclosure  
ASXPRESS® PLUS Rapid Sample  
Introduction System

### Warranty

2 year limited (by manufacturer)

The reliable workhorse autosampler for everyday operation on medium to high sample throughput.

One sample,  
two analyses





# VERSATILE AND SPACE SAVING



ASX-280 2-Rack Compact Autosampler

## Technical Specifications

### Dimensions

Height (w/ probe)	62 cm (24.4")
Width	35.5 cm (14")
Depth	55 cm (21.6")
X-Axis	22.2 cm (8.74")
Y-Axis	30.0 cm (11.81")
Z-Axis	15.5 cm (6.10")
Weight	8.1 kg (17.8 lbs)

### Speed

Axis	Min	Max
X	100 mm/sec	330 mm/sec
Y	73 mm/sec	411 mm/sec
Z	164 mm/sec	476 mm/sec

Description	Part No.
ASX-280 Compact Autosampler, Aqueous	N0782036

#### Includes:

- 2 each 60 position sample racks with full set of 15 mL vials
- 10 standard locations with 50 mL vials
- 0.5 mm I.D. carbon fiber supported sample probe
- Interface connect cables (DB9 and USB)
- Miscellaneous tubing for hookup
- Power supply with US, UK and European plugs

### Pump

0 – 80 mL/min

### Tray Capacity

2 rack

### Communication Interface

2 Serial (RS-232) ports  
USB (virtual COM port)

### Utilities

Autosampler Configuration tool to set  
XYZ speed and pump speed  
Firmware Update Utility  
IQ/OQ and Log Extractor Utilities

### Power Requirements

100-240 VAC, 47-63 Hz, 1.9A

### Options

ASXPRESS® PLUS Rapid Sample  
Introduction System  
ENC-280 DC Dust Cover/Enclosure

### Warranty

2 year limited (by manufacturer)

**Ideal for low or medium sample throughput—5 to 120 per day—where bench space is limited.**

# COMPACT OILS SAMPLING



ASX-280 Autosampler for Oils  
(CETAC 80 position rack pictured)

## Technical Specifications

### Dimensions

Height (w/ probe)	62 cm (24.4")
Width	35.5 cm (14")
Depth	55 cm (21.6")
X-Axis	22.2 cm (8.74")
Y-Axis	30.0 cm (11.81")
Z-Axis	15.5 cm (6.10")
Weight	8.1 kg (17.8 lbs)

### Speed

Axis	Min	Max
X	100 mm/sec	330 mm/sec
Y	73 mm/sec	411 mm/sec
Z	164 mm/sec	476 mm/sec

Description	Part No.
ASX-280 Compact Autosampler for Oils	N0780825

#### Includes:

- 1 each 80 position sample rack with full set of 15 mL vials
- 10 standard locations with 50 mL vials
- Filtered stainless steel sample probe
- Interface connect cables (DB9 and USB)
- Miscellaneous tubing for hookup
- Adapter plate for PE OE4 rack and 80 position CETAC rack
- Power supply with US, UK and European plugs

### Pump

0 – 80 mL/min

### Tray Capacity

2 rack

### Communication Interface

2 Serial (RS-232) ports  
USB (virtual COM port)

### Utilities

Autosampler Configuration tool to set  
XYZ speed and pump speed  
Firmware Update Utility  
IQ/OQ and Log Extractor Utilities

### Power Requirements

100-240 VAC, 47-63 Hz, 1.9A

### Options

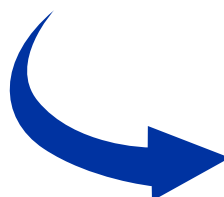
ASXPRESS® PLUS Rapid Sample  
Introduction System  
ENC-280 DC Dust Cover/Enclosure

### Warranty

2 year limited (by manufacturer)

**Configured for low volume wear metals analysis labs and additive manufacturing where mixing is not required.**

This new accessory is a  
game changer for the lab



# INCREASED SAMPLE CAPACITY



ASX-8<sub>60</sub> Extended 8-Rack Autosampler

Description	Part No.
XLR-8 <sub>60</sub> High Throughput Autosampler	N0780826

#### Includes:

- 8 each 60 position sample racks with full set of 15 mL vials
- 10 standard locations with 50 mL vials
- 0.5 mm I.D. carbon fiber supported sample probe
- Interface connect cables (DB9 and USB)
- Miscellaneous tubing for hookup
- Power supply with US, UK and European plugs

#### Pump

0 – 80 mL/min

#### Tray Capacity

8 rack

#### Communication Interface

2 Serial (RS-232) ports  
USB (virtual COM port)

#### Utilities

Autosampler Configuration tool to set  
XYZ speed and pump speed  
Firmware Update Utility  
IQ/OQ and Log Extractor Utilities

#### Power Requirements

100-240 VAC, 47-63 Hz, 1.9A

#### Options

ASXPRESS® PLUS Rapid Sample  
Introduction System  
ENC-860 DC Dust Cover/Enclosure

#### Warranty

2 year limited (by manufacturer)

## Technical Specifications

### Dimensions

Height (w/ probe)	62 cm (24.4")
Width	112 cm (44")
Depth	55 cm (21.6")
X-Axis	2x 42.0 cm (16.54")
Y-Axis	30.0 cm (11.81")
Z-Axis	15.5 cm (6.10")
Weight	20.4 kg (45 lbs)

### Speed

Axis	Min	Max
X	100 mm/sec	330 mm/sec
Y	73 mm/sec	411 mm/sec
Z	164 mm/sec	476 mm/sec

Great for applications such as mining, soils analysis, environmental monitoring or anything demanding high sample throughput.



# WE'VE GOT YOU COVERED



ENC-560DC for ASX-560 and 4-rack autosamplers

Description	Part Number
ENC-560 DC Autosampler Enclosure	N0811931



ENC-280DC for ASX-280 and 2-rack autosamplers

Description	Part Number
ENC-280 DC Autosampler Enclosure	N0811930



ENC-860DC for XLR-860 and 8-rack autosamplers

Description	Part Number
ENC-860 DC Autosampler Enclosure	N0811932

## Technical Specifications

### Dimensions

	ENC-560DC	ENC-280DC	ENC-860DC
Height	65 cm (26")	65 cm (26")	98 cm (39")
Width	60 cm (24")	43 cm (17")	111 cm (44")
Depth	58 cm (23")	58 cm (23")	67 cm (27")
Weight	11 kg (25 lb)	8 kg (17 lb)	22 kg (49 lb)

### Materials

polycarbonate frame  
silicone and polyethylene plugs  
nylon fittings

ENC series DC Autosampler Enclosures protect your samples, your employees, and your peace of mind.

### DC Autosampler Enclosure Features

- Save bench space with an enclosure sized to fit your autosampler (see below)
- Flat pack design for inexpensive shipping
- Shatter-proof polycarbonate construction
- Quickly evacuates harmful fumes and protects samples from contamination
- Prevents contamination and corrosion
- Easy access to samples and autosampler components through front and rear
- Chemical resistant materials
- Multiple configuration possibilities for vent and fan
- Multiple ports for tubing and power cords
- Can be used without the fan and filter to function as a convenient dust cover
- Multiple models, compatible with CETAC ASX-130, ASX-260, ASX-280, ASX-520, ASX-520HS, ASX-560, EXR-8, XLR-8, and XLR-860 autosamplers and more!

### Exhaust

4" fume hood exhaust attachment

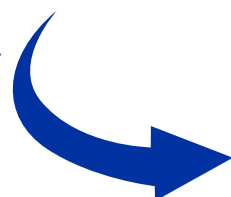
### Optional Accessories

HEPA filter  
Positive pressure fan  
Gas flow meter (up to 5 L per minute)  
Rigid base for irregular surfaces

### Warranty

1 year limited (by manufacturer)

Reduce manual labor  
and laboratory hours



# OILS ANALYSIS FROM START TO FINISH

Teledyne CETAC and PerkinElmer provide all the tools needed to create the complete oils analysis package.



## Pre-analysis

The APS-1650 Automated Preparation Station prepares 1:10 off-line sample dilutions fast and accurately in a small footprint saving time and laboratory bench space.



## Sample Mixing

The new Oils 7400 and Oils 7600 Homogenizing Autosamplers are designed to prevent sample settling by mixing each sample prior to analysis. These autosamplers also boast a sliding rinse station fed by dual peristaltic pumps to quickly change between oil and coolant testing on demand.



## Rapid and Precise Sample Introduction

The *PARTICLE Xpress* and *ASXpress PLUS* sample introduction systems are each designed to take sample analysis to the next level with enhanced speed and accuracy. Turn to page 13 and 14 for more information.



# AUTOMATED OIL SAMPLE PREPARATION



APS-1650 Automated Preparation Station

Pre-analysis preparation of oil samples is achieved via a relatively simple dilution process; however these dilutions are time consuming and carry the potential for human error.

The APS-1650 Automated Preparation Station addresses the need for an automated process solution for the preparation of diluted oil samples. The system is designed to ensure fast, accurate sample dilutions in a small footprint saving time and laboratory bench space.

Description	Part No.
APS-1650 Automated Prep Station	N0777177

Includes:

- Sample rack options: \*Please specify with your order
  - 80 and 90 position pour off racks
  - OR-
  - 45 position using 2 or 4 oz bottle rack
- Collection rack options\*:
  - 60 and 80 position rack using 15mL vial
  - OR-
  - 90 or 96 position CETAC rack using 8mL vial

NOTE: After sample dilution into collection rack, the rack is moved to the ICP autosampler for analysis.

- Rinse pump: 3-channel Peristaltic pump
- Stainless Sample probe
- Syringe pumping module
- Software
- Miscellaneous tubing used for operation
- Power supply with US, UK & European plugs

**Pull Sample → Dispense → Add Diluent → Mix → Ready for ICP**  
**All Automated**

## Technical Specifications

### Autosampler Dimensions

Height	70 cm (27.5")
Width	110 cm (43.3")
Depth	70 cm (27.5")
Weight	30 kg (66 lbs)

### Syringe Module Dimensions

Height	26.7 cm (10.5")
Width	14 cm (5.5")
Depth	20.3 cm (8")
Weight	4.5 kg (10 lbs)

### Viscosity Range

up to 700 centistokes (cSt)

### Computer/Hardware Interfaces

RS-232, USB

### Power Requirements

AC 100V-240V, 3.2A

### Sample Rack Options

45 position 2 oz and 4 oz bottles;  
 80 and 90 position 2 mL cups

### Collection Rack Options

80 position 15 mL (17 mm x 100 mm)  
 90 position 8 mL (13 mm x 100 mm)

### Computer Requirements

Windows Vista or higher  
 1 GB RAM.

Video resolution of 1024 x 768  
 2 open COM or USB ports

Adobe® Acrobat® Reader is  
 required to read the manuals that  
 accompany the software.

Internet Explorer 6 or higher must  
 be installed for system to function  
 properly

### Warranty

2 year limited (by manufacturer)

# ADVANCED OIL SAMPLE HANDLING



Oils 7400 Homogenizing Autosampler



Oils 7600 Homogenizing Autosampler

The new Oils 7400 and Oils 7600 Homogenizing Autosamplers have been designed to meet the rigorous demands of oils analysis in the rapidly evolving oils testing industry. This automation marries together sample mixing capability with speed and eliminates cross contamination with improved design drip capture. The oils autosamplers boast a sliding dual segregated rinse station fed by two separate peristaltic pumps to change between oils and coolants testing on demand.

Description	Part Number
Oils 7400 Autosampler (no racks included)	N0810894
Oils 7400 with 80 position racks	N0810895
Oils 7400 with 60 position racks	N0810896
Oils 7400 with 96 position racks	N0810897

Includes:

- 10 standard locations with 50mL vials included
- Filtered stainless steel sample probe (Oils samples)
- Sample Probe Carbon 0.5mm ID (Coolant Samples)
- 2 x 2-channel dual pumps
- Interface connect cables (DB9 & USB)
- Miscellaneous tubing for hook up
- Power supply with US, UK & European plugs

Description	Part Number
Oils 7600 Autosampler (no racks included)	N0810908
Oils 7600 with 80 position racks	N0810909
Oils 7600 with 60 position racks	N0810910
Oils 7600 with 96 position racks	N0810911

Includes:

- 15 standard locations with 50mL vials included
- Filtered stainless steel sample probe (Oils samples)
- Sample Probe Carbon 0.5mm ID (Coolant Samples)
- 2 x 2-channel dual pumps
- Interface connect cables (DB9 & USB)
- Miscellaneous tubing for hook up
- Power supply with US, UK & European plugs

## Technical Specifications

Dimensions	Oils 7400	Oils 7600
Height	49 cm (19.3")	49 cm (19.3")
Width	57 cm (22")	81 cm (31.9")
Depth	54 cm (21")	54 cm (21")
Weight	23 kg (50 lbs)	35 kg (77 lbs)
Capacity	4 rack	6 rack

### Rack Options

Gilson, Bel-Art, CETAC/Bohdan, JANUS

### Hardware Interfaces

RS-232 and USB

### Power Requirements

100-240 VAC, 47-63 Hz, 1.9 A

### Computer Requirements

Microsoft Windows® 7 operating system or newer  
1 Free COM or USB port

Adobe® Acrobat® Reader is required to read manuals

### Warranty

2 year limited



# PARTICLE COUNTING

The *PARTICLE XPRESS* Precision Sample Introduction System is an add-on for the Oils 7400 Autosampler and the PPS Particle Counter for conducting automated particle counting. Adding automated particle counting to your laboratory workflow will save on manual labor and free up personnel for other vital tasks. The system is available as an online package for conducting both particle counting and ICP analysis from a single sample or as an offline package for particle counting only.

- Perform faster analysis
- Consume less sample
- Use less rinse solvent
- Get more reproducible results
- Eliminate tedious manual labor



*Particle XPRESS* Precision Sample Introduction System

Description	Part Number
<i>Particle XPRESS</i> Online Introduction System	N0810898

Includes:

- *PARTICLE XPRESS* control Module
- Valve module with 6 port oils valve
- Pump module with 10 mL Syringe
- 1.5 mm stainless steel sample probe with filtered tip
- Sample and buffer loops
- Valve mounting bracket and screws
- Particle size sensor mount
- General tubing and completion kit
- Interface connect cables (DB9 & USB)
- Power supply with US, UK & European plugs

Description	Part Number
<i>Particle XPRESS</i> Offline Introduction System	N0810902

Includes:

- Pump module with 10 mL Syringe
- 1.5 mm stainless steel sample probe with filtered tip
- Particle size sensor mount
- Tubing and completion kit
- Interface connect cables
- Power supply with US, UK & European plugs

Description	Part Number
<i>Particle XPRESS</i> Offline-to-Online Upgrade	N0810918

## Technical Specifications

Dimensions	Syringe Module with Valve	Electronics Module
Height	36.5 cm (14.4")	25.4 cm (10.0")
Width	7.5 cm (3.0")	8.3 cm (3.3")
Depth	38 cm (15.0")*	20.0 cm (7.9")*
Weight	3.7 kg (8.2 lbs)	1.4 kg (3.0 lbs)

\*depth includes additional space to accommodate sample loops and cables.

### Hardware Interfaces

RS-232 and USB

### Power Requirements

100-240 VAC, 47-63 Hz, 1.9 A

### Warranty

2 year limited (by manufacturer)

Here it is!  
Add particle  
count to your  
ICP analysis



# MORE THROUGHPUT IN LESS TIME



ASXPRESS PLUS Rapid Sample Introduction System

The ASXPRESS PLUS is a simple sample injection accessory that dramatically increases sample throughput to an ICP-OES or ICP-MS. The ASXPRESS PLUS features a metal-free, 6-port injection valve and inert, high-speed vacuum pump to rapidly load a sample loop for introduction to the nebulizer. A simple software system controls ASXPRESS PLUS parameters (ex. load time); all system parameters are stored in the ASXPRESS control module.

## Simple & Reliable

- No third party software required during operation
  - Eliminates computer and software lockups
  - Compatible with Windows® 7 and up.
- Minimal additional communication and power cables required
  - Simple setup and operation

## ASXPRESS PLUS Upgrade Kits

### Aqueous version

Description	Part No.	Includes
ASXPRESS PLUS for ASX-260 / ASX-280 / ASX-510 / ASX-520 / ASX-560 / EXR-8 / XLR-8 / XLR-8 <sub>60</sub> (Aqueous)	N0777789	<ul style="list-style-type: none"> <li>• 1.0 mm I.D. carbon fiber supported sample probe</li> <li>• Sample loops: 1 each 2.0mL &amp; 4.0mL</li> <li>• ASXPRESS Software</li> <li>• Interface connect cables (DB9 &amp; USB)</li> <li>• General tubing and completion kit for operation</li> <li>• Power supply with US, UK, &amp; European plugs</li> </ul>
ASXPRESS PLUS for PerkinElmer S10 / AS93+ (Aqueous)	N0777791	
ASXPRESS PLUS for Oils 7400/7600 (Coolants)	N0810899	

### Oils version

Description	Part No.	Includes
ASXPRESS PLUS for ASX-260/280/510/520/560 (Oils)	N0777790	<ul style="list-style-type: none"> <li>• 1.0 mm I.D. stainless steel sample probe</li> <li>• Sample loops: 1 each 1.02mL, 1.36mL &amp; 2.00mL</li> <li>• ASXPRESS Software</li> <li>• Interface connect cables (DB9 &amp; USB)</li> <li>• General tubing and completion kit for operation</li> <li>• Power supply with US, UK, &amp; European plugs</li> </ul>
ASXPRESS PLUS for ASX-1400 / ASX-1600 (Oils)	N0777793	
ASXPRESS PLUS for Oils 7400/7600 (Oils)	N0810900	
ASXPRESS PLUS for Oils 7400/7600 (Oils and Coolants)	N0810901	



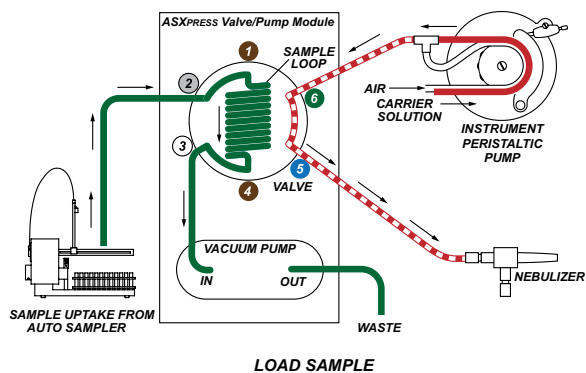
**NOTE: ASX-1400 and ASX-1600 include diaphragm vacuum pump used to supply rinse solution**

## Technical Specifications

Valve/Pump Module		Electronics Module		Hardware Interfaces	Sample Load Loops
Height	12.8 cm (5.0")	Height	25.4 cm (10.0")	RS-232 to autosampler	Available in multiple sizes
Width	5.8 cm (2.3")	Width	8.3 cm (3.3")	RS-232 and/or USB to PC	for varying applications from
Depth	21.7 cm (8.5")	Depth	20.0 cm (7.9")	External pump connector	0.7 mL to 8.00 mL
Weight	1.30 kg (2.8 lb)			<b>Power</b>	<b>Warranty</b> 2 year limited
				100-240 VAC ~ 47-63 Hz 1.9A	(by manufacturer)

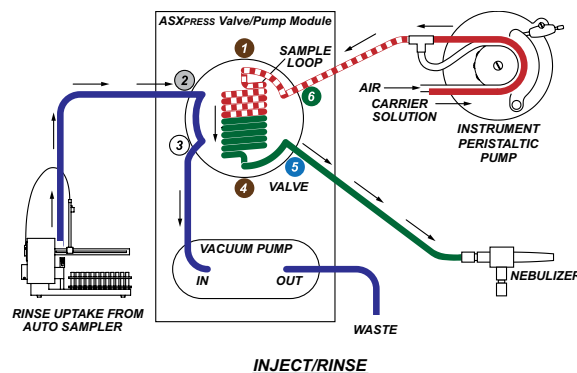
## Analysis with ASXPRESS PLUS Technology

The ASXPRESS PLUS utilizes a high speed vacuum pump in addition to the ICP-OES/ICP-MS peristaltic pump. The 6-port valve allows the use of both pumps simultaneously (illustrated below) significantly reducing total sample analysis time.



### Load Position

The vacuum pump rapidly fills the sample loop (green path), while the ICP-OES or ICP-MS peristaltic pump simultaneously transports carrier solution, keeping the plasma stable (red path).



### Inject/Rinse Position

The loaded sample is then pushed into the nebulizer for analysis via the carrier solution flowing through the ICP-OES or ICP-MS peristaltic pump (red/green path). Simultaneously, the autosampler probe is moved to the rinse station and the uptake flow path is flushed with rinse solution via the vacuum pump.

## ASXPRESS PLUS Before and After

The Teledyne CETAC ASXPRESS® PLUS saves laboratories valuable time and money. Here are a few examples.

Market	Location	Method	Before (s)	After (s)	Savings (s)	Savings %	Time savings per 100 samples
Environmental	US Lab (OH)	ICP 6010	345	146	<b>199</b>	<b>58%</b>	5.5 hours
Environmental	US Lab (OH)	ICP 200.7	320	144	<b>176</b>	<b>55%</b>	5 hours
Environmental	US Lab (CA)	ICP 200.8	300	110	<b>190</b>	<b>63%</b>	5.2 hours
Environmental	US Lab (IL)	ICP 6020	275	145	<b>130</b>	<b>47%</b>	3.6 hours

Market	Location	Method	Before (s)	After (s)	Savings (s)	Savings %	Time savings per 1000 samples
Soil	US Lab (NE)	Soil Method	46	26	<b>20</b>	<b>43%</b>	6 hours
Mining	US Lab (NV)	ICP-Method	70	24	<b>46</b>	<b>66%</b>	13 hours
Mining	Australian Lab	ICP - Method	86	29	<b>57</b>	<b>66%</b>	15.8 hours
Oil/Wear Metal	Canadian Lab	ASTM D5185	87	27	<b>60</b>	<b>69%</b>	16.6 hours
Oil/Wear Metal	US Lab (IN)	ASTM D6130	67	23	<b>44</b>	<b>66%</b>	14 hours

# ENHANCED SENSITIVITY



U5000AT+ Ultrasonic Nebulizer

Description	Part Number
U-5000AT+ Ultrasonic Nebulizer 100/115V	N8120140
U-5000AT+ Ultrasonic Nebulizer 220/240V	N8120141

The U5000AT+ Ultrasonic Nebulizer offers detection limits up to 10x lower for ICP-AES and ICP-MS. Samples are introduced onto a piezoelectric transducer, providing greater analyte transport efficiency to the ICP. An integrated desolvation system with electrothermal cooling removes excess sample aerosol solvent and ensures stable ICP operation.

## Technical Specifications

### Sample Uptake Rate

0.5 to 2.5 mL/min

### Nebulizer Gas Flow

0.5 to 1.5 L/min

### Heater Temperature

120°C to 160°C

### Cooler Temperature

-20°C to +10°C

### Voltage

100-120 VAC, 50/60 Hz, 4.5A  
220-240 VAC, 50/60 Hz, 2.5A

### Dimensions

Height	25.4 cm (10")
Width	35.6 cm (14")
Depth	34.9 cm (13.75")
Weight	12.3 kg (27 lbs)

### Warranty

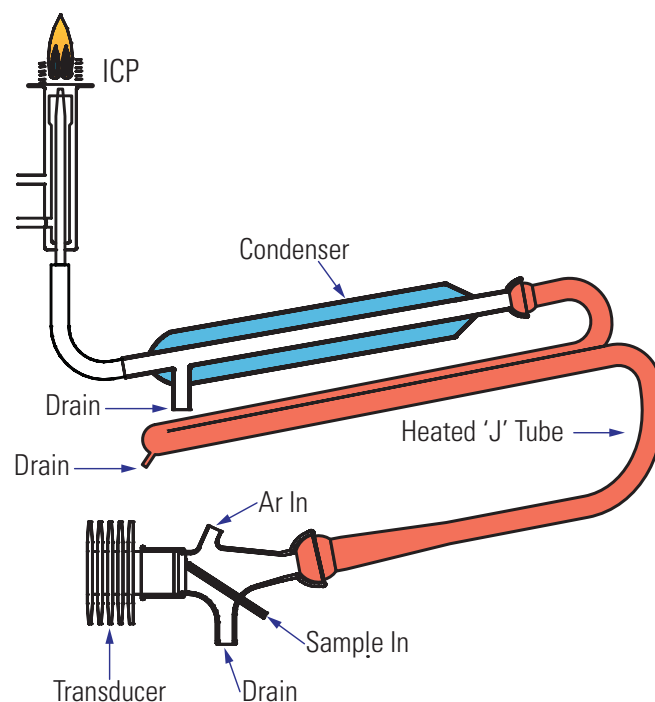
12 month limited

## Principle Of Operation

A peristaltic pump introduces liquid sample across an oscillating piezoelectric transducer. The oscillations disperse the sample into a fine aerosol, which is swept out of a spray chamber by a flow of argon gas from the host ICP-AES or ICP-MS instrument.

The aerosol passes through a heated tube and an electrothermally cooled condenser. An integrated drain pump removes the condensed sample solvent and any excess sample liquid from the spray chamber.

After passing through the condenser, the dried aerosol particles are swept by the nebulizer gas to the ICP instrument for analysis.



Schematic of U5000AT+

# LOWER DETECTION LIMITS



U6000AT+ Ultrasonic Nebulizer/Membrane Desolvator

Description	Part Number
U-6000AT+ USN/Membrane Desolvator 100/115V	N0691709
U-6000AT+ USN/Membrane Desolvator 220/240V	N0691710

## Principle Of Operation

After passing through the ultrasonic nebulizer, dried aerosol particles are swept by the nebulizer gas to a membrane desolvator module consisting of a porous fluoropolymer tube placed inside a heated oven. The high temperature of the oven (160° C) maintains the sample solvent as a vapor. A second counter-current flow of argon gas (the sweep gas) flows outside the porous membrane wall and removes any volatile solvent vapor to vent. Nonvolatile sample components do not pass through the membrane wall and continue to the ICP-AES or ICP-MS.

The membrane is chemically inert and can remove water vapor and both polar and non-polar volatile organic solvents. The membrane desolvator unit incorporates a dedicated gas control unit for the Ar sweep gas, which can be easily teed from the main ICP Ar supply.

The U6000AT+ combines the efficiency of the U5000AT+ USN with a membrane desolvation unit for reduced sample solvent loading to the ICP. The U6000AT+ is used primarily with ICP-AES for improved analysis of volatile organic solvents. It can alleviate serious problems such as loss of plasma, plasma instability, high carbon emission background, and carbon buildup on the ICP torch.

For ICP-MS, the U6000AT+ can be used for both volatile organics and aqueous samples (reduction of oxides and hydrides). Analyte signal enhancement is typically 2 to 5 times greater, for both ICP-AES or ICP-MS, versus a standard pneumatic nebulizer.

## Technical Specifications

See facing page for Ultrasonic Nebulizer specifications

**Sweep Gas Flow**  
0 to 5.0 L/min

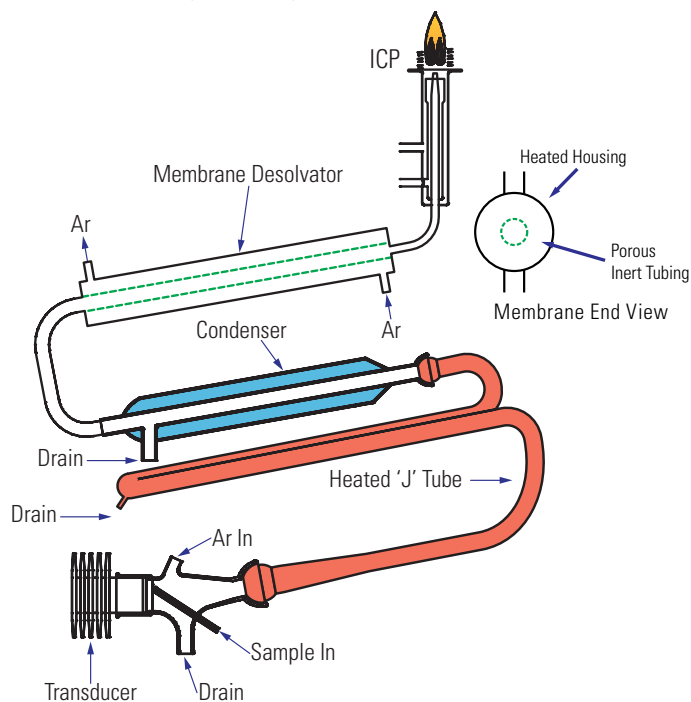
**Membrane Oven Temp**  
80 °C to 160 °C

**Membrane Voltage**  
100-240 VAC, 50/60 Hz, 4A/2A

### Combined Dimensions

<b>Height</b>	38.7 cm (16.25")
<b>Width</b>	35.6 cm (14")
<b>Depth</b>	34.9 cm (13.75")
<b>Weight</b>	13.6 kg (29.9 lbs)

**Warranty**  
12 month limited



Schematic of U6000AT+







