Cavro® Air Displacement Pipettor (ADP)

A compact pipetting solution for OEM instrumentation

In today's fast-paced environment, time-to-market is a major consideration for any instrument designer. Accelerate your instrument development by selecting proven off-the-shelf components.

The Cavro ADP is a fully programmable pneumatic pipetting module designed for integration into instruments where space is at a premium. It is compatible with disposable tips (DiTis) for situations where washing tips between samples is ineffective or impractical. The Cavro ADP uses air rather than liquid displacement to aspirate and dispense fluids. Its slender design allows the Cavro ADP to be mounted in automated applications with narrow 18mm spacing between devices.

The Cavro ADP offers excellent pipetting performance, comparable to advanced manual pipettors, using a range of disposable tip sizes. The Cavro ADP is factory calibrated to ensure the most accurate air displacement and to minimize pump to pump variability. The pipettor's validated design will simplify your development project, while its excellent reliability will ensure uninterrupted operation of your instrument.

The maintenance-free design of the Cavro ADP represents a cost effective, compact automated pipetting solution to simplify system integration. The pneumatic pipetting mechanism includes onboard liquid level detection and diagnostics to monitor correct operation. Integrate the Cavro ADP with any z-axis to fit your system architecture.

One way to simplify validation of your instruments is to use OEM components that have already been extensively tested and approved. Tecan Cavro brand components are all constructed to meet ISO13485 and ISO9001 requirements, as well as national and regional compliance, such as Europe's 2006 RoHS Directive or the US FDA's QS regulations.

Technical features

Liquid level detection

The Cavro ADP features built-in pressure monitored liquid level detection (pLLD), with user configurable detection settings. Data from the pressure sensor can also be streamed in real-time to enable other pressure monitoring tasks, via a host computer. In addition, the Cavro ADP is compatible with external capacitive liquid level detection (cLLD) technologies, ensuring maximum flexibility for your instrument design (cLLD sensor board available separately). For maximum process security, the configurable hybrid liquid level detection mode (hLLD) utilizes pLLD together with cLLD.

Tip ejector

An optional disposable tip ejection mechanism is incorporated into the design of the Cavro ADP, allowing tips to be ejected by a single command. The ejector uses the same drive mechanism as the plunger, minimizing weight and further simplifying integration.

Tip sensor

The pipettor features an optional integrated disposable tip sensor to support requirements for sample integrity and process security. The Cavro ADP's firmware can determine if a disposable tip has not been picked up or has fallen off the probe, flagging and logging any errors.

Design and maintenance

The Cavro ADP is designed to be maintenance-free, with pre-programmed air volume calibration and use of high-quality long-life components. If necessary, the probe assembly can be removed for washing, autoclaving or replacement.

The Cavro ADP is a UL recognized component and bear the UL designation label.
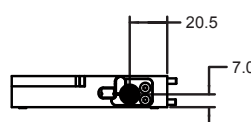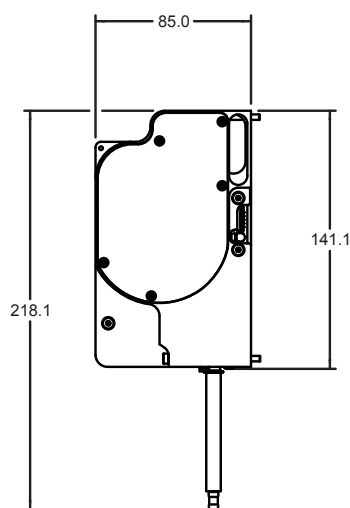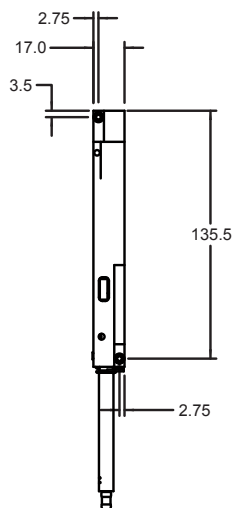
Product ordering information

Description	Material number
PUMP ADP 1mL FULL CONFIG (includes pLLD and DiTi eject)	30041734
PUMP ADP 1mL BASE CONFIG	30055878

Specifications

Pipetting range	< 5 – 1000 µl
Resolution	25 nl/increment (40,000 increments for 1000 µl)
Plunger drive	Stepper motor gear driven piston, integrated encoder for step loss detection
Tip compatibility	Tecan disposable tips (DiTis) 10, 50, 200, and 1000 µl
DiTi process security	DiTi presence sensor (optional) DiTi eject mechanism (optional)

Pipetting performance

DiTi (µl)	Volume (µl)	Dispense	Point accuracy (A)	Precision (CV)
10	1	Single*	≤ 5 %	≤ 6 %
10	5	Single*	≤ 2.5 %	≤ 1.5 %
10	10	Single*	≤ 1.5 %	≤ 1 %
50	5	Single*	≤ 5 %	≤ 2 %
50	10	Single*	≤ 3 %	≤ 1 %
50	50	Single*	≤ 2 %	≤ 0.75 %
200	10	Single*	≤ 5 %	≤ 2 %
200	50	Single*	≤ 2 %	≤ 0.75 %
200	200	Single*	≤ 1 %	≤ 0.75 %
1000	10	Single*	≤ 7.5 %	≤ 3.5 %
1000	100	Single*	≤ 2 %	≤ 0.75 %
1000	1000	Single*	≤ 1 %	≤ 0.75 %
1000	100	Multi**	≤ 3 %	≤ 2 %

*Single dispense conditions: Clean DiTi with each dispense, DI water, 21-25 °C (uncontrolled), single non-contact dispense with blowout air volume (contact dispense for 1 µl)
**Multi dispense conditions: Clean DiTi with each test, DI water, 21-25 °C (uncontrolled), multi dispense includes excess and conditioning volumes, no more than 6 dispenses per aspiration
Point accuracy (A): Defined as deviation of each data point from the average of the group
$A = |x_{avg} - x_i| / x_{avg}$ x 100 %, where x_{avg} = mean value and x_i = individual data point
CV: CV = (standard deviation)/(average)

Dimensions	141 mm x 85 mm x 17 mm (body), ~100 mm probe + DiTi length
Multiple device spacing	18 mm
Device mounting	Two mounting screws (front accessible), precision alignment pin hole & slot
Weight	< 400g
Power requirement	24 VDC ± 10 %, 500 mA peak, 250 mA nominal
Firmware	Volume-based pipetting commands, DiTi detection and ejection, tunable LLD parameters, user programmable speeds, device diagnostics, error logging
Liquid level detection (LLD)	Pressure-based detection with tunable parameters (pLLD, optional) Compatibility and configurability for external capacitive detection (cLLD)
Pressure data	Up to 1000 data points per second are available as streaming pressure data via CAN or RS-485
Communication and control	RS-485 (OEM and DT protocols), CAN
Selectable baud rates	RS-485: 9600, 38400, 115200 (default) CAN: 100, 125, 250, 500 KB (default), 1 MB
Device addressing	Address selector supports up to 8 devices on a single communication bus
Regulatory	UL recognized component, file number E164638, IEC 61010-1:2004 EMC: EN 55011, Class B ESD: EN 61000-4-2 EMI: 61000-4-3
Operating conditions	15–35 °C (59–95 °F), 20–85 % RH (non-condensing)
Storage conditions	-20 to 70 °C (-4°–158 °F), ≤ 85 % RH (non-condensing)

Specifications are subject to change without notice.

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