# Automatic Isokinetic Sampler ST5 Evo


dado lab

# Automatic Isokinetic Sampler **ST5 Evo**


The ST5 Evo is evolved version of the ST5 isokinetic sampler, developed to be even more efficient, easy to use, practical, cost/time-saving.
The perfect companion for stack testers.

The instrument is composed by two units, the Control Unit and the Pump Unit. The Evo version is designed to allow the user to take up on the sampling point only the the light Control Unit (6 kgs) while the heavy Sampling Unit can be left down on the ground.

All the electronic boards and measuring sensors are placed inside a robust steel box, making it a practical device to be taken on the stack and reducing the risk of damages

Differently from other manufacturer's solutions, the Pump Unit includes only the pump.
The reason of this choice is to save costs of long, expensive connection cables. To connect the CU to the PU, only a suction tube and a power cable are needed.

The expensive umbilical cable, taking all the signals and temperature control from the probe to the CU can be now very short because the connection with the SU can be done with inexpensive tubes and power cable.

**Moreover, in case of pump failure, the CU can work with a spare Dado PU unit or with any pump capable to supply the needed flowrate, allowing to complete the job without the need to send the instrument to maintenance.**


This solution allow to save money and time thanks to faster startup, stack libraries, possibility to sample unattended for longer periods (e.g. for pcdd/pcdf or heavy metals). All those characteristics reduce the risk of compromising the operation or losing data.

Superior protection against liquids, the ST5 Evo has a built-in water sensor that "feels" the presence of liquids passing through the inlet, in this case, it goes automatically in stand-by preventing any internal damage.

Precise isokinetic condition measure thanks to mass flow meter real time flowrate measure, which allows the faster correction resulting in a flow velocity entering the nozzle asymptotic to the stack gas velocity.

The ST5 integrates four pressure sensors to measure differential pressure, in stack an the mass flow, static and barometric pressure, to determine, with high accuracy, velocities, densities and stack conditions.

Having dp, barometric and static pressure measured, along with temperatures, allow to certify even the velocity determination.

Higher quality of the data due to automated parameters control which also grants high accuracy and compliance to the most diffused standard, especially when sampling micropollutants in low concentrations.

**Bigger LCD color display with cycling screens reporting each the essential data to keep the sampling operation under control.**


The ST5 Evo can work with all Pitot tubes and thermocouples, it's possible to enter the information related to Pitot tubes in the internal library.

Powerful pumps, the ST5 Evo Pump Unit is available with a 4.5m³/h, standard or corrosion proof version, or with a 8.5m³/h pump.

All those features make the ST5 Evo the best tool for stack sampling, allowing at the same time a high degree of traceability to make your life easier with quality procedures.

With the ST5 Evo, additional thermocouples input, thermoregulators for heated devices, water presence sensor, water collection tank and carrying case are not an option, they are included in the price.

## Main Characteristics

Split automatic isokinetic sampler for the pollutants evaluation in stack emission.

Since the pump is separated, no cooling fan is needed on the control unit, reduce dramatically the dust entering the unit and thus the required cleaning and related problems.

6 kgs

Only the light Control Unit (8 kgs) has to be taken on the sampling point, the heavier Pump Unit can be left on the ground, reducing risks for technicians and making their life easier.

360°

Velocity and flowrate determination in ducts in accordance with UNI EN16911-1 method ,including swirl angle evaluation and WAF correction.

Fast Isokinetic condition through mass flow sensor. Meets and exceeds the requirements defined in the sampling methods such as UNI EN 13284, EN1948-1, EN 14385, EN 13211 and US EPA M2, M5, M17
Grants high standards of accuracy and traceability of measurements and calibrations.

Built-in water presence sensor and collection tank to grant maximum protection against liquids, responsibles for the most common maintenance operation and lost working days.

Easy to transport on the stack sampling point and fast to setup and operation thanks to stacks and Pitot libraries.

The pump is now easy to replace in case of failure, even on the field, a spare unit or another compatible pump can be used to restore, in no time, the operativity.
The advanced software allows the Evo to continue the operations even with in case of DGM malfunctioning. A warning will notify the user about the problem and give the option to continue the operation using the mass flow only. In the report a red note will appear warning the user about the calculated volume.
The umbilical cable can now be very short. The connection cable between Control and Sampling Unit is composed by a simple and cheap pneumatic and power cable.
Thoses feature, along with many other solutions, allow to save money and reduce the downtime of the instrument.

Easy to use and possibility of integration with PC, smarthphones and tablet
Download of the sampling, calibration and traceability data to all operative systems and computers.
The ST5 Evo is equipped with a standard USB2.0 port and wireless connectivity for the Dadolab Companion App.

Future firmware updates can be quickly applied through the USB port.

## Calibration, Accuracy and Traceability

The ST5 Evo is supplied by DadoLab with traceable calibration report made with internal Accredia certified references and including data related to nominal and actual values, deviation errors of all instrument sensors.

For all measured parameter is possible to enter multi-point correction curves freely programmable by the user through Dadolab's utility.

The ST5 Evo features a user friendly interface. Setup and operation are fast and easy, without the need of complicated procedures.

## Rugged design and attention to details

Ergonomy was also considered during development. ST5 Evo is protected by rubber profiles with rounded angles. Display and keyboard are protected by transparent and shocks resistant polycarbonate cover.

Thermocouples connectors are made with different colors to easy the connection.
Protection filter is located behind a transparent, easy to remove cover.

Power is protected by interchangeable fuse, replaceable easily without opening the instrument.

Every detail of the ST5 Evo is designed to make it the best work companion for stack testers.

## Integrated Functions

- **Operative Modes**
  - Duct velocity
  - Constant flow operation
  - Isokinetic sampling
  - PMx sampling

- **Utilities**
  - Sampling nozzle determination
  - Automatic leak test
  - Density calculations
  - V'a and Ta constant
  - "Point" or "Continuous" mode
  - Sampling line auto-purge

- **Libraries management**
  - Sampling reports
  - Measures log
  - Alarms log
  - Frequently visited stacks
  - Pitot terminals
  - Stack thermocouples

- **Calibration Manager**
  - Temperature measurement
  - Dry gas meter check
  - Mass Flow check

- **Alarms Management**
  - Thermocouples
  - Pump
  - Presence of liquid
  - Dry Gas Meter
  - Mass Flowmeter
  - Isokinetic Deviation
  - Pressure Sensors

- **Automatic restart after**
  - Power failure
  - Duct velocity alarm
  - Isokinetic deviation alarm

- **Automatic creation of the sampling reports**
  - Full measure report
  - Weighted average of the duct parameters
  - Evaluation of the sampling compliance criteria in accordance with ISO 10780 and EN13284

## ADS-1 Automatic Derived Sampler

EN methods for micropollutants sampling such as heavy metals, mercury or acids offer the possibility to realize the isokinetic sampling line with the “side sampling” solution, where a second gas stream is extracted using a constant flow pump and pollutants are captured in a dedicated impingers train.

Actually, the side sampling flowrate, which must kept at a fixed ratio with the isokinetic flow, is set manually.

Dado lab realized the first world fully automated sampler for the side sampling applications.
The ADS-1 totally automates the side sampling operation and works in combination with the ST5 sampler.

Once the derived flowrate is set on the ADS-1, all the process is then controlled by the ST5 sampler, which measures the isokinetic condition and set consequently the flowrate on the ADS-1 in order to keep the ratio between the two flows constant.

Thanks to its advanced pneumatic line, the working flowrate on the ADS can be set even with the derived line closed. This greatly reduces the risks of losing the adsorbing solutions because of the unbalanced pressures between the lines.
To increase protection from liquids, the ADS-1 is equipped with a protection filter and tank which will water presence.

101 101 1200 Automatic Derived Sampler mod. ADS-1

**ADS-1 Technical Characteristics**

| | |
|---|---|
| **Flowrate range:** | 0,25 ÷ 5 l/min |
| **Flowr regulation:** | Electronic with OM |
| **Sample conditions:** | Dehydrated, max temp. 45°C |
| **Gas inlet:** | with protection filter for particulate and liquids |
| **Connection:** | with quick connectors |
| **Operation conditions:** | -20 ÷ 40°C 95% UR |
| **Stock conditions:** | -10 ÷ 50°C 95% UR |
| **Connection Port:** | Dedicated for ST5 Samplers |
| **Power supply:** | 220 Vac ± 10% 50/60Hz |
| **Materials:** | Steel/Aluminum |
| **Pump:** | Single head diaphragm pump |
| **Dimensions:** | 330 x 310 x 360 mm (W x D x H) |
| **Weight:** | 9 kg |

## Dadolab Companion App

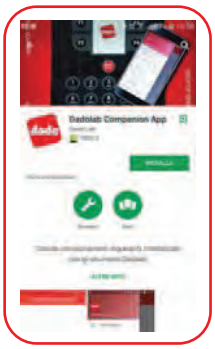
The Dadolab Companion App was developed to help technicians with the isokinetic sampling setup and calculations.

The app can calculate the best nozzle for the stack conditions or calculate the resulting pump flowrate but allows also to create libraries for stacks and Pitot tubes which can be recalled when needed.

The Dadolab Companion App can also connect to the ST5 and ST5 Evo and mirror the display, download data, upload configurations.

More and more features will come in the next future.

101 101 5001 Comm Activation for the Dado lab App
101 101 5002 Comm Activation Dado lab App w/ smartphone



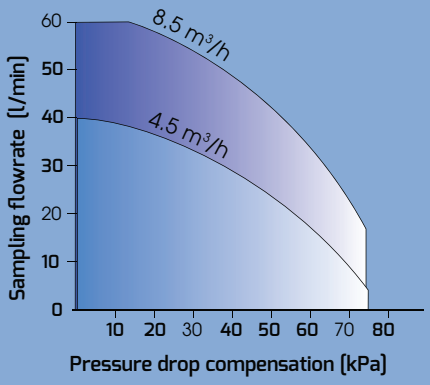
**QR Code** to dowload the app
or search **Dadolab** on google play

# Technical Characteristics

**ST5 Evo:**

| | |
|---|---|
| **Flowrate operative range:** | 5 ÷ 60 l/min |
| **Sampled gas conditions:** | Dehydrated, max temperature 45°C |
| **Gas inlet:** | with protection filter for particulate and liquids |
| **Connection:** | with quick connectors |
| **Operation conditions:** | -20 ÷ 40°C 95% UR |
| **Stock conditions:** | -10 ÷ 50°C 95% UR |
| **Display:** | 3.5" Graphic Color |
| **Data Port:** | USB 2.0 |
| **Internal Memory:** | 16GB |
| **Power supply:** | 220 Vac ± 10% 50/60Hz |
| **Materials:** | Steel/Aluminum combined structure |
| **Keyboard:** | Polycarbonate, tactile effect keys |
| **Dimensions:** | CU : 390 x 264 x 386 mm (W x D x H)<br>PU : 330 x 217 x 180 mm |
| **Weight:** | Control Unit : 6 kg<br>Pump Unit (4.5 $m^3$/h): 10 kg |

**Pumps operative range**




**Characteristics and accuracy of the measures**

**Sampled Volume**

| | |
|---|---|
| Gas Meter Class: | Dry Gas Meter, class G4, certified 2004/22/CE, in compliance to EN 1359 |
| **Flowrate range:** | 0.4 $m^3$/h ÷ 6.0 $m^3$/h |
| Accuracy: | 2% |
| Encoder resolution: | 0.02 liters |

**Sampling flowrate**

| | |
|---|---|
| Device: | Orifice meter in compliance with UNI EN ISO 5167-2 |
| **Range:** | 5 ÷ 60 l/min |
| Resolution: | 0.01 l/min |
| Accuracy: | ± 1% |

**Differential Pressure**

| | |
|---|---|
| dP Pitot: | -100 ÷ 1000 Pa (-10÷100 $mmH_2O$) |
| Hysteresis and Linearity: | 0.25 % F.S |
| Accuracy: | Better than 1% (± 2Pa) |
| Resolution: | 0.05 Pa (0.005 $mmH_2O$) |
| Burst Pressure: | max. 30 kPa (3000 $mmH_2O$) |

**Absolute Pressure**

| | |
|---|---|
| Static and barometric: | 10 ÷ 105 kPa (1050 mBar) |
| Hysteresis and Linearity: | 0.25 % F.S |
| Resolution: | 0.01 kPa (0.1 mBar) |
| Accuracy: | Better than 1% (± 0.25 kPa) |

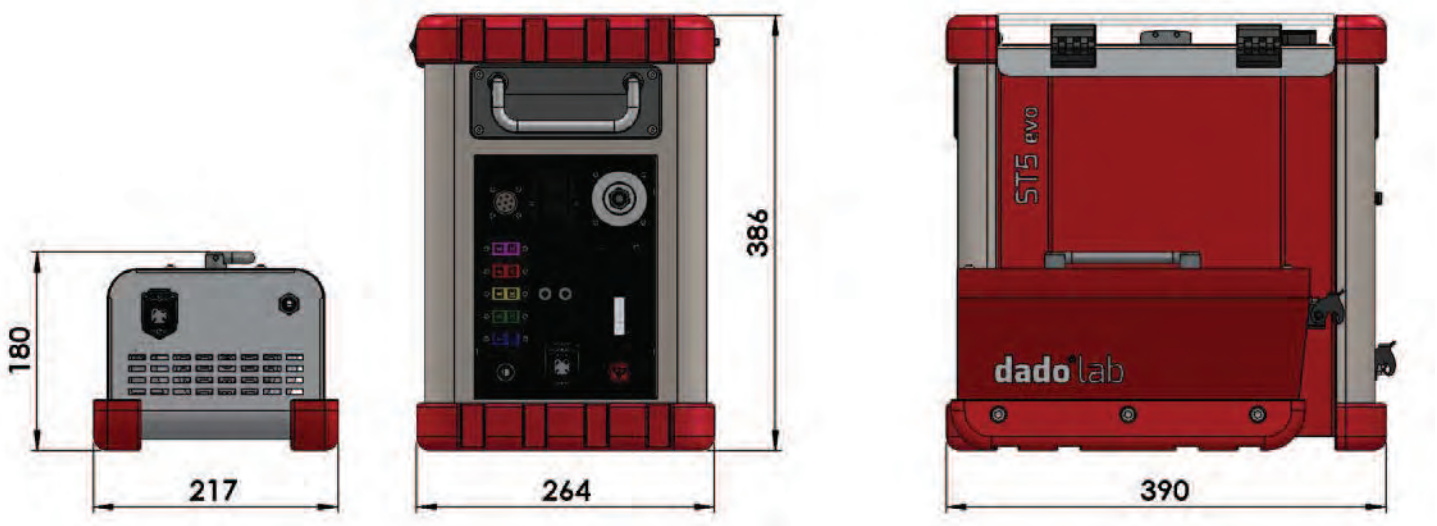
**Thermocouples input (std programmed curve type "K" as per ITS 1990)**

| | |
|---|---|
| Range: | 0 ÷ 1200 °C |
| Resolution: | 0.01 °C |
| Accuracy: | 1% (± 0.4 °C) |

**DGM Temperature (Pt100 sensor)**

| | |
|---|---|
| Range: | -20 ÷ 100 °C |
| Resolution: | 0.01 °C |
| Accuracy: | 1% (± 0.2 °C) |

**ST5 Evo Dimensions**



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## Models, accessories and spare parts

**101 101 1100** **ST5 Evo Control Unit standard supply**
- Heated units control
- Liquids Protection of the inlet
- Inputs for 5 thermocouples
- Test and Calibration report
- USB key
- Power cable
- User Manual
- Transport Case

**101 101 2001** **Zero dp Sensor**
Integrated module for the Pitot tube auto-zero without disconnecting it.


**101 101 1101** **Pump Unit V4.5 w/ 4.5 $m^3$/h corrosion proof pump**

**101 101 1102** **Pump Unit V8.5 w/ 8.5 $m^3$/h corrosion proof pump**

**101 101 2100** **Connection cable, 5 meters**
- Suction tube complete with quick connectors
- 4 thermocouples
- Heated units cables
- Pitot pneumatic signals

**101 101 2110** **Connection cable, 10 meters**
**101 101 2120** **Connection cable, 15 meters**
**101 101 2130** **Connection cable, 20 meters**
**101 101 2140** **Connection cable, 25 meters**
**Other lengths available on request.**

**101 101 4100** **CU-PU Connection cable, 5 meters**
- Suction tube complete with quick connectors
- Power Cable

**101 101 4110** **CU-PU Connection cable, 10 meters**
**101 101 4120** **CU-PU Connection cable, 15 meters**
**101 101 4130** **CU-PU Connection cable, 20 meters**
**101 101 4140** **CU-PU Connection cable, 25 meters**
Other lengths available on request.

**101 101 3010** **Sampled gas protection filters**
Set of 10 pieces.