Simplifying lab connectivity: Vendor-agnostic instrument integration with AP Connect

Universal integration: Instrument adapter for AP Connect offers seamless connection of instruments from other vendors

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Addressing the challenge of data transfer

Laboratories today face significant challenges in transferring data from a diverse range of instruments, each with its own format and communication protocol. The variety of data formats and interfaces across different vendors complicates integration, often requiring custom solutions and highly skilled IT staff. This fragmentation of data flows delays data availability, increases the risk of errors, and adds operational costs, all of which hamper efficient laboratory operations.

Manual transcription of sample metadata is another frequent pain point. Entering metadata directly on instrument touchscreens increases the risk of human error and leads to operational inefficiencies. This manual process not only consumes valuable time but also compromises data accuracy, delaying further analysis and decision-making.

Adding to the complexity, data often remains isolated within individual instruments, making it difficult for laboratories to access information when and where it's needed. The lack of centralised data access results in inefficiencies and lost productivity.

Together, these challenges increase costs, reduce data integrity, and complicate laboratory workflows, hindering efficiency and slowing down critical processes.

Anton Paar's AP Connect Lab Execution Software

AP Connect, Anton Paar's comprehensive lab execution solution, addresses these challenges by serving as the critical link between laboratory instruments and data management systems such as LIMS. By integrating all instruments – regardless of manufacturer – into a single, unified system, AP Connect eliminates data silos, automates key data handling processes, and improves traceability. This seamless integration not only reduces inefficiencies and errors, but also significantly improves laboratory productivity and industry compliance. AP Connect enables laboratories to manage their data more effectively, ensuring that all information is securely stored, easily accessible, and ready for analysis.

AP Connect increases efficiency, quality and productivity. It improves quality by eliminating transcription errors, achieves vendor-independent digitisation of laboratory instruments, creates a unified, secure and centralised repository for all instrument data, harmonises instrument interfaces, and reduces the complexity of instrument integration into the data management system. Users can start measurements and create sample lists in AP Connect to control the tasks of the instruments (Standard Edition). Compliance is ensured via tracking of all activities in a single audit trail (Pharma Edition)

Regulated industries

AP Connect is particularly useful in regulated industries, as it offers a single raw data storage place for all data related to a measurement (result-, meta-, setting data) from all connected instruments.* Users can operate the review and approval process in a single application. And they can perform a combined review of measurement data on the instrument* and in AP Connect. Most importantly, all instruments* send an audit trail to AP Connect, and there is a single place for the audit trail review.

** Instruments from other vendors might differ due to their capabilities*

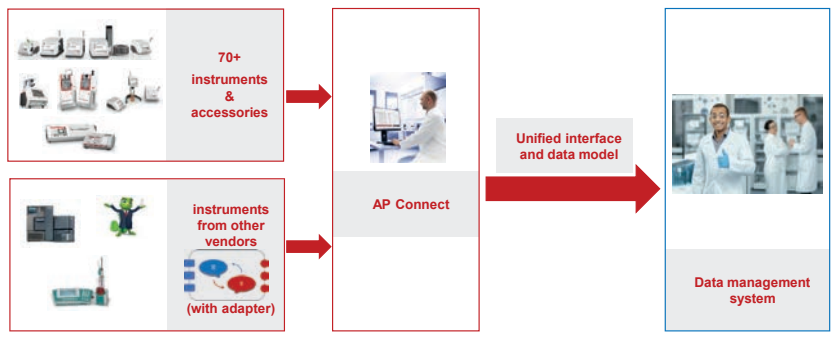

Figure 1: Streamlined instrument connectivity - efficient data path to DMS via AP Connect

Instrument Adapter for AP Connect

Laboratories work with instruments from various manufacturers. The instrument adapter for AP Connect is an independent Windows software which is the link between an instrument and AP Connect. In addition to supporting more than 70 instruments from Anton Paar, it interfaces with instruments from different vendors, providing a unified data plattform. Data normalisation and standardisation ensures consistency across instruments. Moreover, efforts for integration of instruments into leading data management systems e.g. LIMS are minimised as the number of interfaces is reduced to one.

The instrument adapters convert data from laboratory instruments into a format that AP Connect can process natively. This translation works via configuration of the adapter for the respective instrument. No programming is needed.

The instrument adapter for AP Connect allows users to work with various forms of data output from their laboratory environment.

Supported interface types, data harmonisation

- File-based adapters (generic table and generic report: instruments or instrument software provide file-based reports in clear text format (.CSV, .TXT)).
- REST API: An instrument provides an internal web-based interface (http, https) for direct communication
- Serial interface: The instrument provides data via a serial interface (RS-232 or USB).
- Programmatic interfaces (Generic XML/JSON): Structured instrument data can be picked up from files or via a REST interface endpoint.

Mapping

Once the instrument adapter for AP Connect is trained with an instrument's output, the user can easily mix and match labels to the respective sections within AP Connect. The configuration can be carried out by end users, product specialists or within lab productivity systems (LPS) or by Anton Paar as a service. Configurations can be shipped easily via email.

Configuration and adding instruments to AP Connect

Once the connectivity is given, the configuration of an instrument adapter can start. The user can determine, how information from measurements and calibrations is transferred into AP Connect. This configuration is achieved in an accessible way via drop-down buttons and entry fields.

After applying the configuration, the finished instrument adapter can be added as an instrument to AP Connect. Communication between the adapters and AP Connect is established via the network (TCP/IP). This allows independent installations of the instrument adapter software on any Windows PC based on the location of connected instruments.

Working in AP Connect

All instruments, regardless of the manufacturer, benefit from the features of AP Connect. A powerful list view for data comparison allows users to put measurements in context. Filtering and sorting of data provides a way to visualise needed data with a few clicks. The search field allows the user to look for specific sample names or content of custom data fields (e.g. batch numbers or LIMS IDs). The task list is the way to start and queue measurements of connected instruments* within AP Connect. There is active support directory for Windows user administration via existing users and user groups. The workflow reviews and audit trails increase the level of compliance in regulated environments.

** Instruments from other vendors might differ due to their capabilities*

Solution overview

Instruments are connected via serial cable, ethernet or file server. By using a native digital instrument interface, all different datasets are translated into a unified data structure. As a result, lab experts are empowered to transfer data from the instrument to the DMS. This eliminates the involvement of IT departments or DMS experts, leading to cost and resource savings. Moreover, this solution ensures that unified datasets and audit trail information relating to each instance of analysis can be transmitted to the lab specialist for review. Full control of the data flow to the DMS means transferal of all results of reviewed analysis to a leading DMS utilising a single interface with a unified data structure. Taken together, this ensures streamlined integration into the DMS, since a single interface serves all connected instruments.

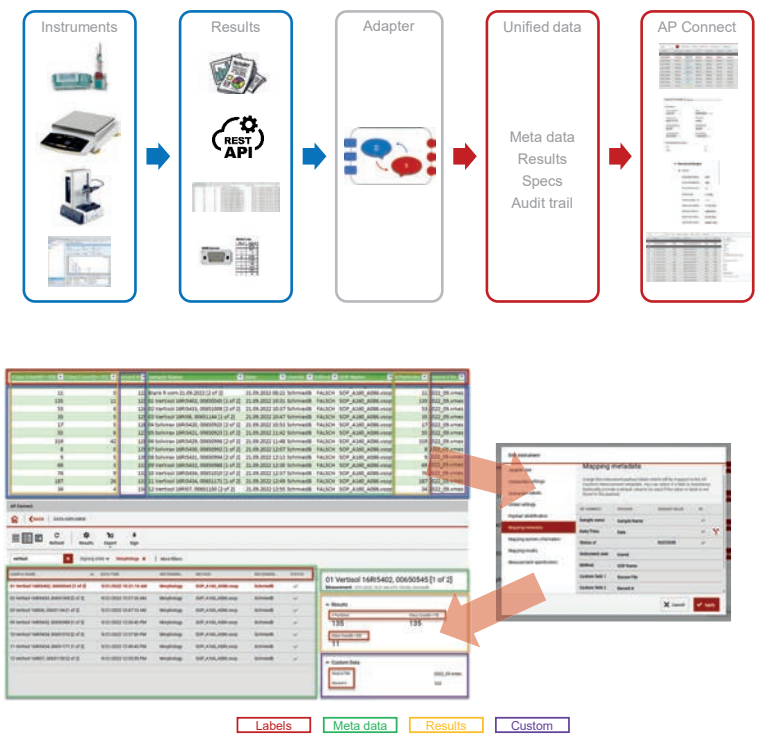

Figure 2: Instrument adapter maps data - from instrument output to AP Connect

Typical workflow of new instrument integration

The typical integration of an entire lab bench with instruments from various vendors begins with an assessment of the instrument, data and software setup on the premises of the customer. This process is guided by Anton Paar product specialists. The IT department of the customer then installs AP Connect and the adapter environment. A lab expert subsequently configures the adapter for specific instrument types (this service can also be provided by Anton Paar). The same applies to the configuration of the export of results to a leading DMS. Implementation of a single process for importing data from APC into DMS is performed by a DMS expert.

Supported instrument types	
Instrument type	**Manufacturer**
Liquid Particle Counter	Beckman Coulter
pH Meter	Metrohm, Mettler Toledo, Horiba
Balances	Sartorius
ICP-MS	Perkin Elmer
Osmosmeter	Advanced Instruments
Particle Size Analyser	Malvern Panalytical, Entegris
Material Testing	ZwickRoell
Quality Testing	Gradient, REA VERIFIER
Titration	Metrohm, Nittoseiko
Polarography	Metrohm
Spectroscopy	Foss, Thermo Scientific, Hunterlab, Perkin Elmer, Malvern Panalytical, Bühler
Moisture analyser	CEM
Chromatography	Thermo Fischer
TOC Analysser	Shimadzu
Oil tester	Baur
Turbidity meter	Hach
Climate measurement	Testo

** Anton Paar has tested and validated the integration of the software with the listed third-party instruments to ensure functionality and compatibility. However, the integration has not been certified by the respective third-party instrument manufacturers.*

Many more instruments can be supported as the instrument adapter for AP Connect allows a generic approach of configuration for data parsing.

Get in touch with support-apc@anton-paar.com for further information and technical consulting on device integration.

Advantages of implementation

Unifying the structure of measurement data provided via heterogenous instrument interfaces reduces the complexity of data handling in lab environments. Configurable translation during data unification gives back control of data handling to the lab expert. The introduction of middleware for data transfer enables the lab expert to review measurement results in the context of the original analysis before transmitting the completed analysis to the leading DMS. Furthermore, lab experts are empowered to handle data transfer without IT support, and GAMP category 5 installations are transformed into GAMP category 4 installations, which drastically reduces the complexity of instrument qualification. A further benefit is the fact that lab experts can control the data flow to the DMS, secure data storage is a backup in the middleware, and users can add sample names to data from simple instruments - like pH meters - via the AP Connect task list.

Conclusion

The instrument adapter for AP Connect provides an efficient solution for seamless integration of laboratory instruments into LIMS or DMS systems, overcoming the common challenges of data fragmentation and manual transcription errors. Compatible with both Anton Paar instruments and instruments from other vendors, it ensures that all your instruments communicate effectively with your data management system through AP Connect. By automating data handling and improving connectivity, the instrument adapter reduces manual intervention, minimises errors and supports a more cohesive and productive laboratory environment. With the instrument adapter for AP Connect, you can confidently streamline your processes, ensure data integrity and maximise productivity.