KAYE
SUBSIDIARY OF AMPHENOL

Validator® AVS

ADVANCED VALIDATION SYSTEM

Advanced Validation Technology

The Kaye Validator AVS (Advanced Validation System) is a state-of-the-art validation system designed to meet current regulatory requirements for Thermal Validation and Data Integrity. The Validator AVS combines high accuracy measurements, automated sensor calibration, intuitive metro style user interface, and extensive reporting to simplify the complete validation process. The Validator AVS is the successor of the widely recognized Kaye Validator 2000, the accepted standard in wired validations systems for over 20 years.

- Hardened, dedicated validation console
- Asset centric data management concept
- Intuitive metro-style user interface
- Portable validation console – pre-loaded software
- Dedicated to validation tasks
- Simplified compliance and easy validation
- Data Integrity and 21 CFR Part 11 Compliant

- Direct connection via docking mechanism / Wi-Fi and Ethernet
- Console can be used to interface with multiple AVS units

- Stand-alone operation
- Reliable data safety by smart redundancy concept
- Battery backup 3 hours
- Enhanced connectivity
- Increased scan speed

LIFTING VALIDATION TO THE NEXT LEVEL

The Kaye Validator AVS System is a unique design and concept combining a stand-alone Validator AVS along with a Validator AVS Console. The AVS console is a rugged hardened console dedicated to interfacing with your Kaye Validator AVS. It is pre-loaded with the Kaye AVS software and a core load that is dedicated to validation tasks only. This concept greatly simplifies software validation and dependency on continuously changing PCs, operating systems, and core loads.
The Kaye Validator AVS offers easy, dedicated and reliable validation. The AVS is intuitive, efficient, and easy to operate – allowing you to focus on the validation, not the technology.

Applications – Challenges – Solutions

APPLICATIONS

- Steam Sterilizers (Autoclaves)
- Dry Heat Sterilizers
- Steam in Place (SIP)
- Water Cascade/Fall Sterilizers
- Incubators
- Stability Chambers
- Freezers
- Freeze Dryer/Lyophilization
- Vessels

CHALLENGES

- Pharmaceutical industries are faced with increasing operational challenges
- IT environment
  - Increased IT security and lock down on portable data
  - Continually changing operation systems: Hardware compatibility and complex software operation
- Validation
  - Diverse evolution of technologies in validation: Data backward compatibility
- Complex and time consuming data organization
  - Cost and time of validation and re-validation

SOLUTIONS

- Kaye Validator AVS Console dedicated for validation
- OS, core load, and AVS software pre-loaded and tested for maximum reliability and efficiency
- Eliminates IT control
- Powerful and flexible data backup/restore capabilities to meet IT and Data Integrity requirements
- Simplified validation
- Asset centric data management concept
- Data Integrity/21 CFR part 11 compliant

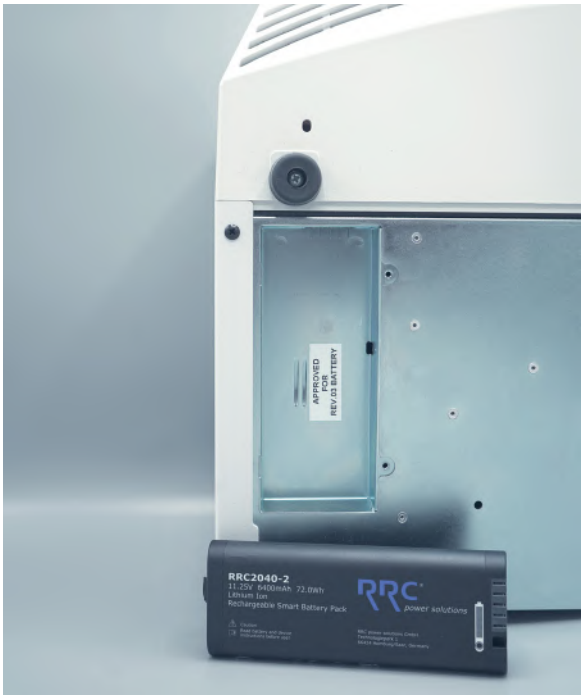
Validator AVS

AVS SYSTEM

A Kaye Validator AVS system consists of the Validator AVS and the Validation Console. The console can be docked directly to the Validator AVS and is used as the operator interface to the Validator AVS. Selectable input capacity (1 to 4 SIMs) up to 48 total inputs.

ROBUST DESIGN

- Robust industrial design with two handles
- Chemical resistant ABS housing
- Dedicated Validation Console for improved user interface
- On-board docking station for Kaye Validation Console
- Battery backup with field replaceable battery pack (3 hours)

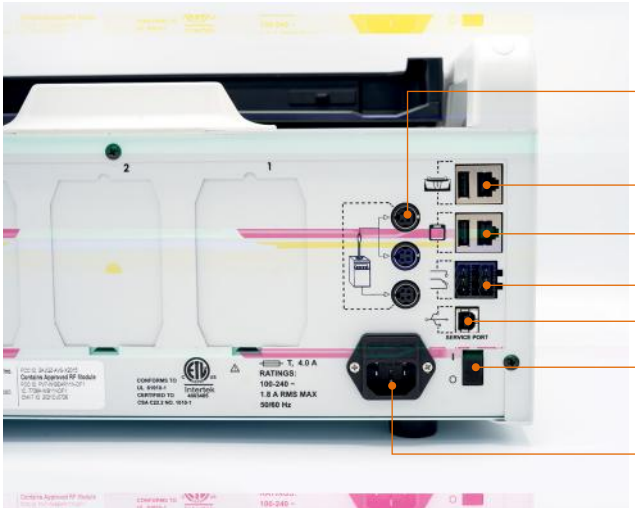


DATA SECURITY VIA SMART REDUNDANCY CONCEPT

- Standalone operation of Validator AVS – console connection not needed
- Validator AVS internal memory
- Second independent mirrored memory card for data redundancy
- Data download to validation console
- Manual download of study and audit data to USB
- Backup and restore – synchronization of console data with server and other consoles

HARDWARE CONNECTIVITY

The Kaye Validator AVS comes complete with improved robust connections for IRTD and calibration baths. The Validator AVS is backward compatible with all existing IRTD and Kaye baths for automatic calibration. Two relay outputs are also available to be activated via qualification events.



Mini Din Ports for IRTD & Bath

USB/Ethernet AVS

USB/Ethernet AVS Console

Relay Posts

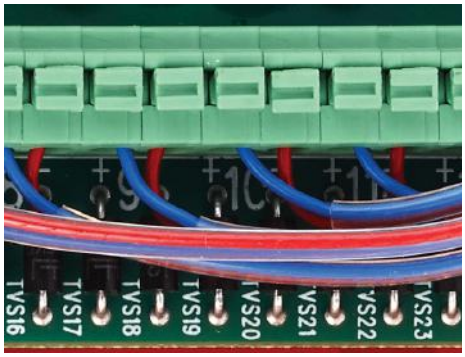
USB Device for ICAL

On/OFF Switch

AC Power Input

SENSOR INPUTS

- Up to 4 SIMs 48 channel capacity
- Scan speed of 48 channels per second
- SIMs for TCs, 4-20mA, 0-10V and RTDs
- Improved sensor connectivity (quick-fix & lock connectors)
- Accepts a wide range of thermocouple types (T, T premium, J, K, E, B, R, N, S)



Kaye Validation Console

A NEW FLEXIBLE APPROACH TO VALIDATION

The Kaye Validator AVS Console is a state-of-the-art, portable and rugged console dedicated to the programming, displaying, reporting, and storage of Validator AVS data. The console comes pre-loaded and configured with the Kaye AVS software and is customized to specific validation tasks. The console offers direct docking and Wi-Fi connectivity with the Validator AVS; it brings about a new approach to tackling your software validation.

VALIDATION CONSOLE SPECIFICATIONS

Operating System / Processor / Memory
- Microsoft Windows 10 Enterprise LTSC (64 bit)
- 8th Generation Intel® Core™-i5 Processor
- 8 GB RAM

Durability IP65 Rated
- Military grade durability with improved thermal management
- Maximum protection against dust, dirt, and water ingress
- Drop-tested from 4 feet
- Temperature-tested from -20°F to 145°F (-29°C to 62°C)

Display
- 11.6-inch, FHD 1920 x 1080
- 1000 Nit outdoor-readable
- Anti-glare, anti-smudge, polarizer
- Glove-capable touchscreen

System Storage
- 256GB M.2 Solid State Drive (SSD)

Integrated Communications
- Intel® Wireless-AC 9560
- 802.11ac with Bluetooth 5.0

Separate Docking Station Available

I/O Ports
- Docking Connector
- 1 - USB 3.1 Type-A with power delivery
- 1 - USB 3.0 Type-C port with DisplayPort Alt Mode / PowerShare
- 1 - Combo mic / headphone jack
- 256GB M.2 Solid State Drive (SSD)

Embedded I/O
- On-board camera capability of taking pictures with console
- 5 MP RGB + IR FHD webcam with privacy shutter / 8 MP rear camera with flash and dual microphone

Dimensions / Weight[1]
- 7.99 in x 12.29 in x 0.96 in (203 mm x 312 mm x 24.4 mm)
- 2.93 lbs (1.33 kg)[1]

Battery
- Battery life up to 6 hours[2]

Backwards Compatibility
- Can run with Kaye Validator and Kaye ValProbe Software

1. Weight represents approximate system weight measured with a 34WHr battery. Actual system weight may vary depending on component and manufacturing variability.
2. Battery life varies by configuration, applications in use, utilized features, and operating conditions. Maximum battery capacity decreases with time and use.

Two ways to Connect the Validation Console to the Validator AVS

1. DOCKING MODE (STAND-ALONE)

The console sits in the docking station of the Validator AVS and connects directly. The Validator AVS offers a fully functional docking station with direct access to the ports located on rear of the unit. Console battery is charged while docked.

2. NETWORK MODE

The Validator AVS and the console can connect to a local network by using ethernet or Wi-Fi connection. The Validation Console can be used to communicate to any connected AVS.

The Kaye Validator AVS system can establish wireless connections* by utilizing any kind of available Wi-Fi infrastructure like in-house Wi-Fi access points or simply set up a smartphone as a hotspot. This feature simplifies your daily routine work. You can access the live data wirelessly on the console screen while the Validator is wired on the other side of the autoclave. You can start or stop studies and read the live data from a Kaye Validator AVS in a cleanroom without entering the room.

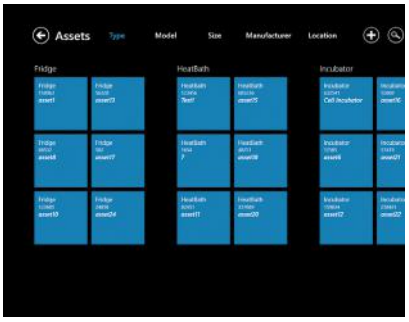
* This feature is not available in some countries. Please contact your local Kaye support for details.

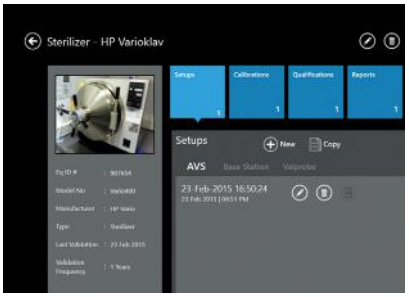
Validator AVS Software

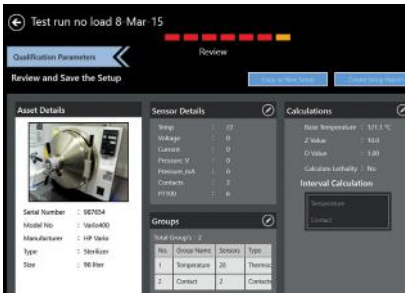
ASSET CENTRIC DATA MANAGEMENT

The Kaye Validator AVS includes an intuitive Asset Centric Data Management concept which allows you to store and access your data faster and more efficiently.

Each individual process that you validate whether an autoclave or freezer etc. can be setup and defined as an asset. All files and data related to this asset, like setups, calibrations, or study files, are organized and accessed in one single screen around the basic asset data. It is even possible to upload additional documents like standard operation procedures or certificates and associate it with the asset. Assets can be sorted and searched by type, location, manufacturer etc. for easy access.

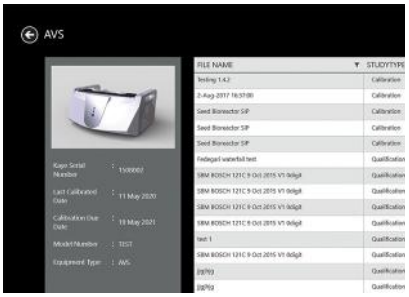






EQUIPMENT ASSETS

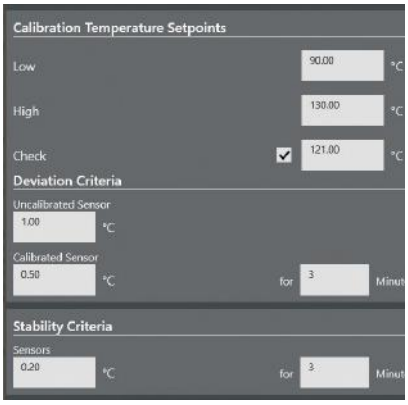
The Kaye Validator AVS also allows you to define assets for each piece of Kaye validation equipment. Data such as serial number and calibration due dates can be defined. The software will automatically notify user when calibrations are due.
The equipment search function uses the Kaye serial number, that is automatically retrieved as part of the study file*, to find related files. With just one fingertip you get a list of qualification studies where the equipment asset was used.

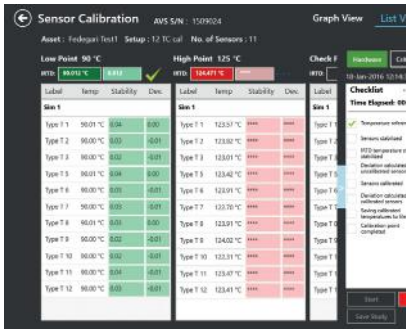


* not for Temperature bath product line

SENSOR CALIBRATION/ VERIFICATION

Kaye, the original creator of the Automatic Sensor Calibration/ Verification feature has included enhancements eliminating manual methods of sensor calibration/ verification resulting in better accuracy. The Kaye Validator AVS is backward compatible to existing Kaye IRTD and calibration baths. The automatic calibration/ verification feature minimizes training and ensures accurate, and repeatable calibrations optimized for your Kaye calibration equipment.
Define the temperature setpoint as well as criteria for stability and deviation.



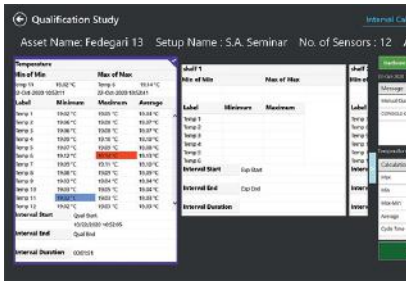


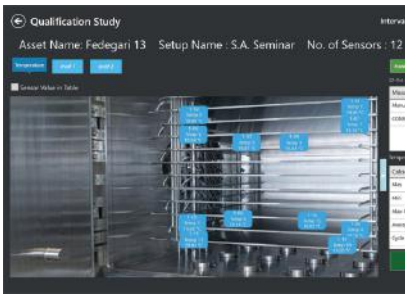
The Console shows the entire calibration process on one screen. Data fields change color to show the progress of stability and deviation for each sensor. A status screen lists each step and indicates where the system is in the process.

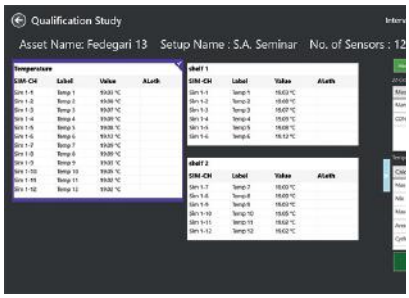
QUALIFICATION STUDY

During the Qualification study real-time data can be displayed in multiple formats to easily view and analyze process performance. Views include group-based data, calculations and system messages. Graphical and wiring overlay displays provide additional perspective.

Since the AVS controls the measurement, calculations, and data storage, it is not necessary to have the console connected during the entire study. Users can disconnect the console to go execute a calibration on another AVS. At any time they can return and re-connect the console to the AVS. All of the live and historical information from the AVS can be displayed and analyzed.







Common Reporting Tool: Simplifying AVS Qualification Reports

DOCUMENT CRITICAL VALIDATION STUDIES

The Common Reporting Tool software, a complete reporting utility seamlessly integrated with the Kaye Validator AVS 2.0 software. This adaptable tool allows you to easily generate comprehensive reports from AVS Qualification study files, documenting your validation study results with precision. It can be used to document your Validation studies, as well as provide pass/fail criteria analysis to save hours of manual efforts.

Safe Data Security: Be assured knowing that all your reports are generated from secure, encrypted Qualification data files. These files can only be accessed and understood by our Reporting Tool software, ensuring your data remains confidential and protected. Reports are neatly organized under the corresponding assets, allowing for easy viewing and reprinting.

Broad Reporting Options: The Common Reporting Tool offers a collection of reporting options to meet your unique needs:

- Setup Report: Get an overview of the setup details.
- Qualification Report: Comprehensive information on qualification data.
- Interval Calculations Report: Gain insights into interval calculations.
- Pass & Fail Report: Quickly identify pass and fail criteria.
- Audit Trail Report: (if audit trail data is imported) for thorough auditing.
- Graph Reports: Visualize your data with graphs.
- Raw Data Export (.xlsx): Export raw data for advanced analysis in Excel.

Customize Your Reports: Modify your qualification reports with ease. You have the flexibility to:

- Include or Exclude Statistical Calculations: Choose what's most relevant for each group.
- Edit Groups: Customize your report groups to suit your preferences.
- Exclude Sensors: Omit specific sensors as needed.
- Edit Calculation Parameters: Fine-tune calculation settings.
- Export to Excel: Seamlessly export qualification

REPORTING

- Raw Data Report
- AVS Wiring Layout
- Setup Report
- Calibration Report
- Verification Report
- Graph Report
- Summary Report
- Detailed Report:
  - Statistical
  - Lethality
  - Saturation
  - MKT
- Spreadsheet Report
- Audit Trail Report
- Pass/Fail Criteria Report

Validator AVS Sensor Calibration Report

Printed on 19-Jan-2016 at 13:14:19 by VolkerL

Calibration on 19-Jan-2016 11:38:13 by VolkerL

Low Calibration Point: 90.0 °C

Stability Evaluation of Uncalibrated Sensors

Start time 11:38:13 — Time of stability 11:57:30 — Elapsed time 00:19:17

Temperature Standard 90.037°C

Temperature standard change 0.011°C

Maximum Change: 0.03°C

Loc	Temp	Chg	Loc	Temp	Chg	Loc	Temp	Chg	Loc	Temp	Chg
1-01	89.65 °C	0.03 °C	1-02	89.67 °C	0.02 °C	1-03	89.58 °C	0.02 °C	1-05	89.62 °C	0.03 °C
1-06	89.74 °C	0.03 °C	1-07	89.58 °C	0.03 °C	1-08	89.73 °C	0.02 °C	1-09	89.74 °C	0.03 °C
1-10	89.53 °C	0.03 °C	1-11	89.61 °C	0.02 °C	1-12	89.62 °C	0.03 °C			

Deviation Evaluation of Uncalibrated Sensors

19-Jan-2016 11:57:30 — Temperature Standard 90.037°C — Maximum Deviation: -0.51°C

Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev
1-01	89.65 °C	-0.39 °C	1-02	89.67 °C	-0.37 °C	1-03	89.58 °C	-0.46 °C	1-05	89.62 °C	-0.42 °C
1-06	89.74 °C	-0.30 °C	1-07	89.58 °C	-0.46 °C	1-08	89.73 °C	-0.31 °C	1-09	89.74 °C	-0.30 °C
1-10	89.53 °C	-0.51 °C	1-11	89.61 °C	-0.43 °C	1-12	89.62 °C	-0.42 °C			

Corrected Results - Low Calibration Temperature Point

19-Jan-2016 11:58:00 — Temperature Standard 90.036°C — Maximum Deviation: -0.02°C

Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev
1-01	90.03 °C	-0.01 °C	1-02	90.02 °C	-0.02 °C	1-03	90.03 °C	-0.01 °C	1-05	90.02 °C	-0.02 °C
1-06	90.04 °C	0.00 °C	1-07	90.03 °C	-0.01 °C	1-08	90.04 °C	0.00 °C	1-09	90.03 °C	-0.01 °C
1-10	90.03 °C	-0.01 °C	1-11	90.03 °C	-0.01 °C	1-12	90.04 °C	0.00 °C			

19-Jan-2016 11:58:30 — Temperature Standard 90.034°C — Maximum Deviation: 0.01°C

Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev
1-01	90.04 °C	0.01 °C	1-02	90.02 °C	-0.01 °C	1-03	90.03 °C	0.00 °C	1-05	90.03 °C	0.00 °C
1-06	90.04 °C	0.01 °C	1-07	90.03 °C	0.00 °C	1-08	90.03 °C	0.00 °C	1-09	90.03 °C	0.00 °C
1-10	90.03 °C	0.00 °C	1-11	90.03 °C	0.00 °C	1-12	90.03 °C	0.00 °C			

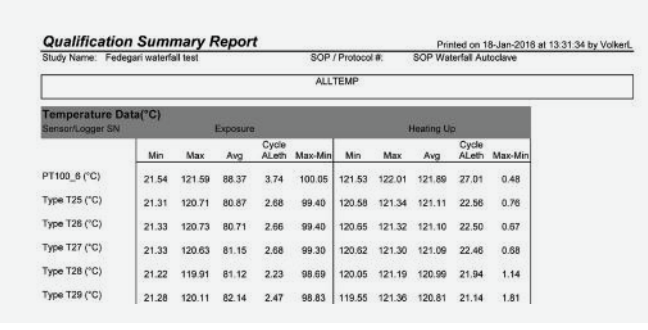
19-Jan-2016 11:59:00 — Temperature Standard 90.032°C — Maximum Deviation: -0.02°C

Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev
1-01	90.02 °C	-0.01 °C	1-02	90.01 °C	-0.02 °C	1-03	90.03 °C	0.00 °C	1-05	90.02 °C	-0.01 °C
1-06	90.03 °C	0.00 °C	1-07	90.03 °C	0.00 °C	1-08	90.03 °C	0.00 °C	1-09	90.02 °C	-0.01 °C
1-10	90.02 °C	-0.01 °C	1-11	90.02 °C	-0.01 °C	1-12	90.03 °C	0.00 °C			

19-Jan-2016 11:59:30 — Temperature Standard 90.032°C — Maximum Deviation: -0.02°C

Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev	Loc	Temp	Dev
1-01	90.02 °C	-0.01 °C	1-02	90.01 °C	-0.02 °C	1-03	90.03 °C	0.00 °C	1-05	90.02 °C	-0.01 °C
1-06	90.03 °C	0.00 °C	1-07	90.03 °C	0.00 °C	1-08	90.03 °C	0.00 °C	1-09	90.02 °C	-0.01 °C
1-10	90.02 °C	-0.01 °C	1-11	90.02 °C	-0.01 °C	1-12	90.03 °C	0.00 °C			

Calibration Report



Qualification Summary Report

Printed on 18-Jan-2016 at 13:31:34 by VolkerL

Study Name: Fedegari waterfall test — SOP / Protocol #: SOP Waterfall Autoclave

ALLTEMP

Temperature Data(°C)

Sensor/Logger SN	Exposure					Heating Up				
	Min	Max	Avg	Cycle ALeth	Max-Min	Min	Max	Avg	Cycle ALeth	Max-Min
PT100_6 (°C)	21.54	121.59	88.37	3.74	100.05	121.53	122.01	121.89	27.01	0.48
Type T25 (°C)	21.31	120.71	80.87	2.68	99.40	120.58	121.34	121.11	22.56	0.76
Type T26 (°C)	21.33	120.73	80.71	2.66	99.40	120.65	121.32	121.10	22.50	0.67
Type T27 (°C)	21.33	120.63	81.15	2.68	99.30	120.62	121.30	121.09	22.46	0.68
Type T28 (°C)	21.22	119.91	81.12	2.23	98.69	120.05	121.19	120.99	21.94	1.14
Type T29 (°C)	21.28	120.11	82.14	2.47	98.83	119.55	121.36	120.81	21.14	1.81

Qualification Report

data to an Excel spreadsheet for further in-depth analysis, all while preserving the security of your original data.

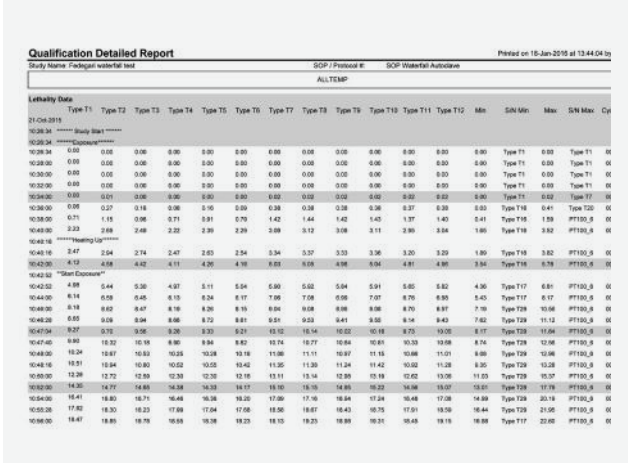
Preserve Data Integrity: Rest assured that any changes made to the Edit Groups or Calculations won't impact the raw encrypted Qualification file. These revisions are exclusive to the report and are strictly documented in the Detailed Report for your convenience.

Designed for Kaye Validator AVS Systems: The Kaye Common Reporting Tool fully supports raw encrypted Qualification files generated by the Kaye Validator AVS system, ensuring a seamless and consistent user experience. In addition, the Common Reporting Tool software is available on Windows PCs.

Sensor Mapping Table

Number	Sensor Name	Description
1	Type T1	Type T
2	Type T2	Type T
3	Type T3	Type T
4	Type T4	Type T
5	Type T5	Type T
6	Type T6	Type T
7	Type T7	Type T
8	Type T8	Type T
9	Type T9	Type T
10	Type T10	Type T

Wiring Diagram



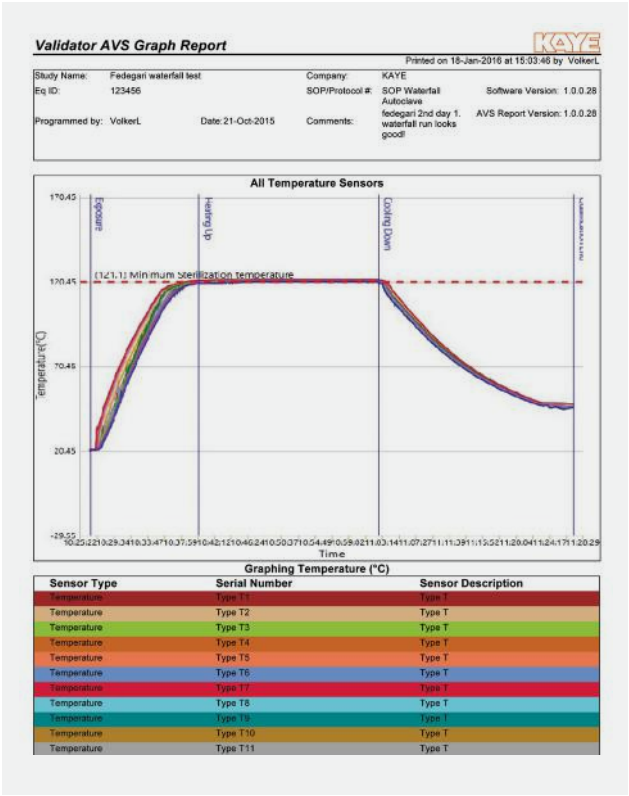
Qualification Detailed Report

Detailed Lethality Report

Pass Fail Criteria Report

Sensor Details

Pass / Fail Report



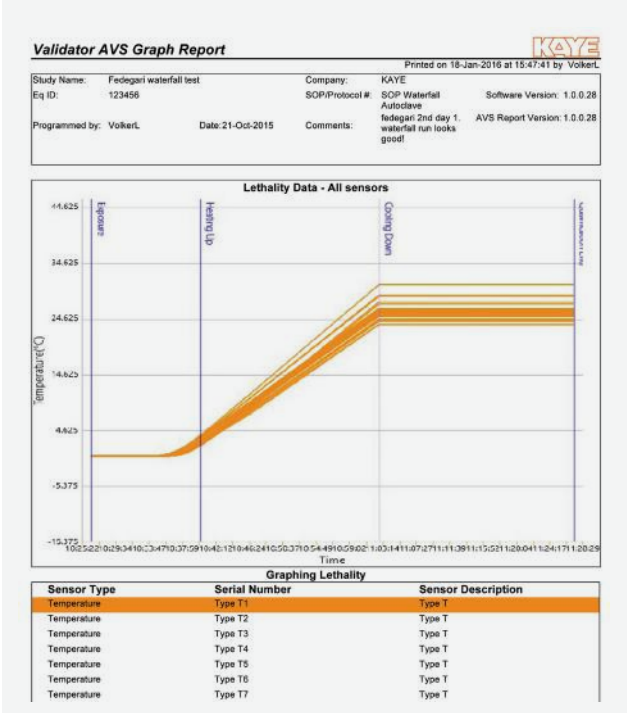
Validator AVS Graph Report

All Temperature Sensors

Graphing Temperature (°C)

Sensor Type	Serial Number	Sensor Description
Temperature	Type T1	Type T
Temperature	Type T2	Type T
Temperature	Type T3	Type T
Temperature	Type T4	Type T
Temperature	Type T5	Type T
Temperature	Type T6	Type T
Temperature	Type T7	Type T
Temperature	Type T8	Type T
Temperature	Type T9	Type T
Temperature	Type T10	Type T
Temperature	Type T11	Type T

Graph Report



Validator AVS Graph Report

Lethality Data - All sensors

Graphing Lethality

Sensor Type	Serial Number	Sensor Description
Temperature	Type T1	Type T
Temperature	Type T2	Type T
Temperature	Type T3	Type T
Temperature	Type T4	Type T
Temperature	Type T5	Type T
Temperature	Type T6	Type T
Temperature	Type T7	Type T

Graph Lethality Report

Pass/Fail Report

When performing a qualification study and collecting raw data, one of the most time consuming tasks is the post-analysis of the data to ensure the study meets all of the required criteria.

For many customers this entails exporting the raw data to excel and using customized pivot tables or macros to analyze the data and create the final report. While this method has been widely used for years, regulatory and validation issue such as 21 CFR and Data Integrity have brought about additional concerns and effort.

To eliminate many of these concerns the AVS software now includes a powerful and flexible Pass/Fail Report which provides immediate indication of study success or failure based on user defined criteria. This report is an efficient and simple way to analyze if a process is within specification while saving hours of post analysis time.

An added benefit to the report is that the complete analysis is done within the AVS software in a secured validated environment. The software directly collects data from the raw encrypted qualification file eliminating the transfer of unprotected files to outside programs.

The Pass/Fail report has also undergone extensive testing and validation by Kaye, eliminating the need to validate separate spreadsheets.

Users can select from a list of over 17 different criteria to customize the report to their specific needs and process. The available criteria are based on years of experience as well as numerous regulatory guidelines (i.e. EN285 for sterilization).

In a few easy steps, this tool allows you to define the specific cycle or time period where the data is going to be evaluated. Once you define the time period, users can customize which criteria is applicable for the process and set the criteria parameters.

After the parameters are defined, you can save it as a template, saving you time in your future studies. Multiple templates can be set up and saved for different processes and applications.

After setting criteria parameters, users are able to choose which group of sensors the defined criteria should be applied to.

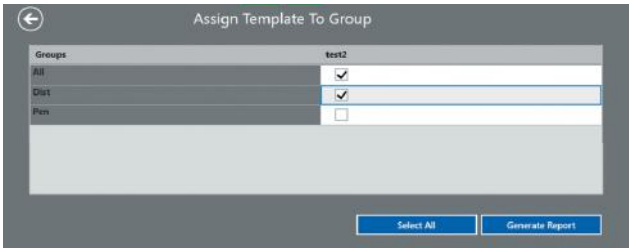
Finally, generate the report and you are immediately provided all the information required for a decision at a glance. All of the information is presented in the validated environment, which saves time, effort, and any additional risk. Having this customizable capability is a huge leap forward in Kaye's enhanced analytics and is just the first phase in our work to streamline the reporting step for our users.

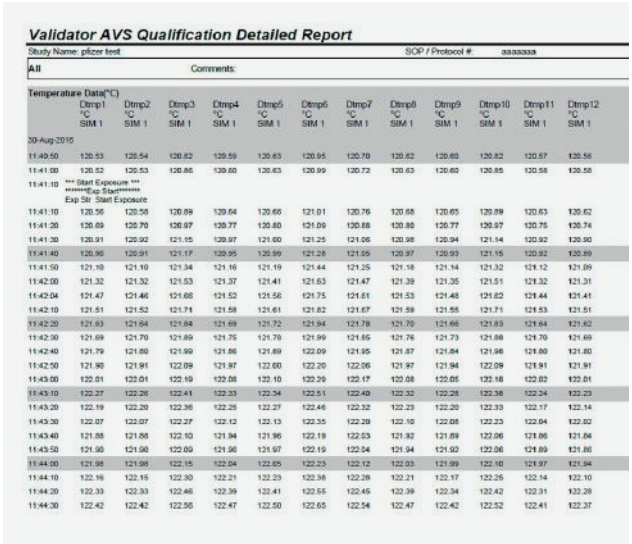
PASS/FAIL REPORT ANALYSIS

The Pass Fail Report is instantly generated and includes the listing of the selected criteria. For each criteria the report includes the name of the criteria, the criteria defined, the calculated value from the analysis as well as the result "Pass/Fail." Additional information given includes the sensor responsible for failure and, if applicable, the time of occurance. From this report the user gets a comprehensive analysis of the study.

PASS/FAIL REPORT BENEFITS

- Immediate indication of qualification success/failure
- Eliminate hours of post analysis
- Provide results in validated software environment
- Flexibility for customer to select and specify criteria based on process, group, and company/regulatory requirements

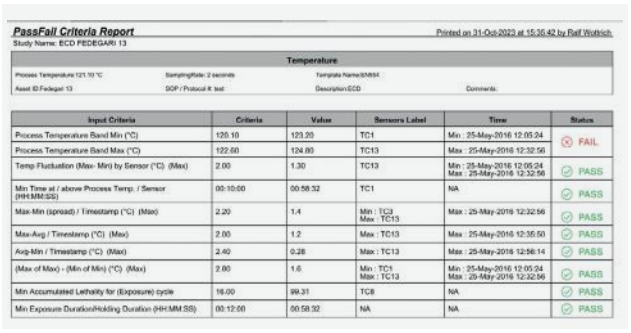




CRITERIA FOR REPORTING

The following criteria are available for selection and setting the specifications for the pass / fail decision:

- Process Temp Band
- Temperature Fluctuation (Max - Min) per Sensor
- Temperature at / above or at / below Process Temp per Sensor
- Group Max - Min (spread) per Timestamp
- Group Max - Average per Timestamp
- Group Average - Min per Timestamp
- Group (Max of Max) – (Min of Min)
- Accumulated lethality
- Temperature – Saturation Temperature Band per Timestamp
- Pressure – Saturation Pressure Band per Timestamp
- Time of Sterilization
- Equilibrium Duration
- Exposure duration / Holding Duration



Data Integrity / 21 CFR Part 11 Compliance

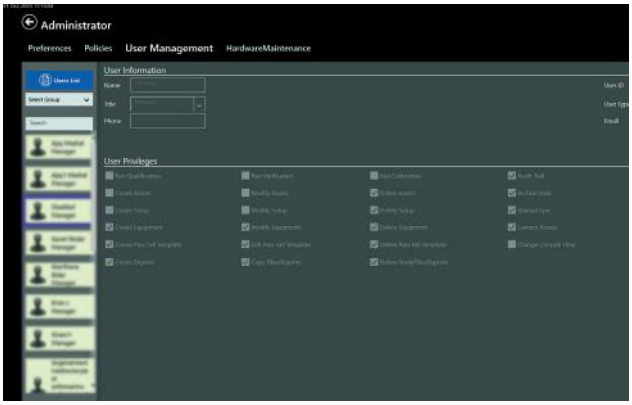
The Validator AVS was designed to meet the current regulatory guidelines for data integrity and 21 CFR Part 11. From the design of the validation console which minimizes operator access to files to the automated Sync functions to provide secure back up of the files. The system was designed to provide ease of use while in the background providing the data management and security to meet regulatory guidelines. All of these functionalities are fully documented in our Data Integrity and 21 CFR Part 11 Assessment documents. The Kaye Validator AVS is specifically designed to enable compliance with FDA 21 CFR Part 11. All recorded data, including calibration offsets, set-up parameters, and administrative tasks are saved in secure, encrypted, tamper-proof electronic records in a format accessible only through the system software.

ACTIVE DIRECTORY

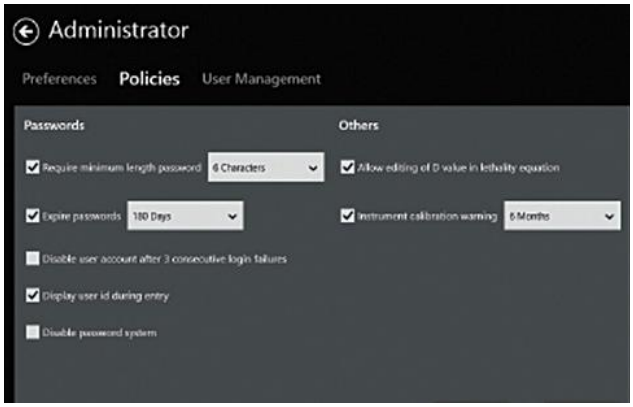
The AVS incorporates Active Directory for user management. Active Directory, developed by Microsoft for Windows domain networks, permits efficiently managing users, computers, and resources within a networked environment.

Centralized Organization: Active Directory stores and organizes information about all network objects, such as users, groups, and computers, in a directory tree. This smart architecture makes discovering and managing objects across your network quick and easy.
User-Friendly Access: One of Active Directory's key benefits is its centralized authentication and authorization service. This means that users can log in to any computer on the network using a single set of credentials.
Enhanced Control: For administrators, Active Directory offers precise control over network resource access. You can define user permissions and group policies to ensure the right people have access to the correct resources.

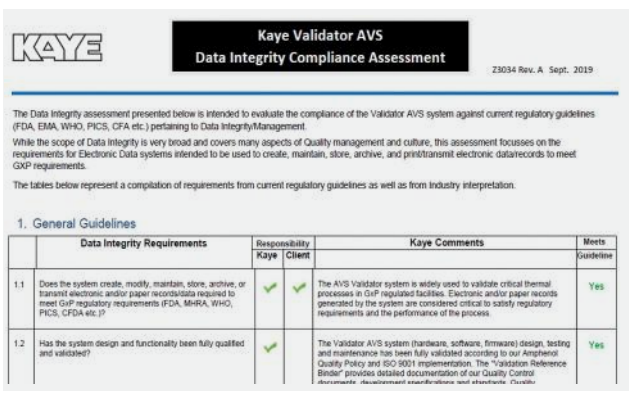
With data synchronization to a shared folder it is possible to exchange configuration and data files like your assets, setups and study files with other Kaye validation consoles. It also allows you to synchronize the user database but also merge the audit trails of several consoles enabling sorting, searching and printing of department-wide audit trails.



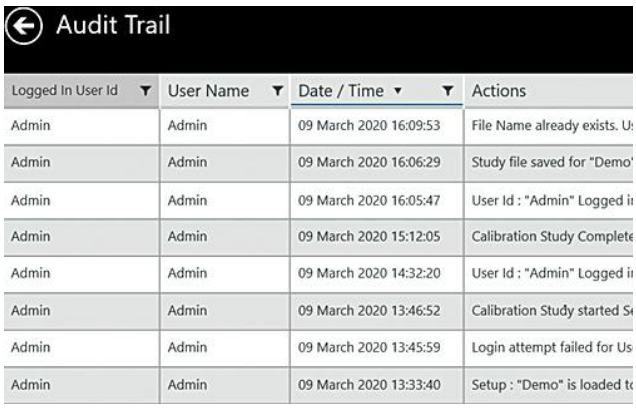
User Management



Policies



Data Integrity Compliance



Audit Trail Report

Calibration / Verification

HIGH ACCURACY REFERENCING

Kaye's temperature calibration equipment is designed specifically to maximize overall system accuracy. Calibration equipment includes temperature references with superior uniformity for sensors, traceable intelligent RTD standards, and validation software to communicate with the hardware.

INTELLIGENT RTD STANDARD

The IRTD Temperature Standard (IRTD-400) is a NIST-traceable instrument that is calibrated over the range of -196°C to 420°C. It is accurate to ±0.025°C over the entire operating range.

The IRTD-400 is a completely self-contained measurement system, containing the electronics for calibration and temperature conversion.

Communicating directly with the Validator AVS, the IRTD-400 eliminates the potential for human error, assuring accurate and traceable measurements.

FAST / ACCURATE REFERENCES

Kaye offers a complete range of baths and dryblocks to cover your sensor calibrations / verifications from -90°C to 420°C. The dry blocks are designed to offer fast heat up and cool down times, along with unmatched stability and accuracy. Additional features such as capacity to hold 48 TCs as well as specially designed TC holders, and inserts ensure maximum uniformity and minimize errors from stem conduction.

WThis coupled with the Automatic Calibration software utility ensures unparalleled accuracy and repeatability while minimizing random errors.

IRTD-400 (-196°C to 420°C) temperature standard

LTR-150 (-30°C to 150°C)
up to 48 Thermocouples

LTR-200 (-50°C to 200°C)
up to 24 Thermocouples

HTR-420 (30°C to 420°C)
up to 48 Thermocouples

LTR-90 (-90°C to 150°C)
up to 25 Thermocouples

CTR-80 (-80°C to 30°C)

Accessories

Kaye offers a wide range of accessories to support your validation needs. From ultra-premium thermocouple sensors to feedthrus, pressure transducers and much more, our goal is provide you will all the accessories, tools, documentation and services to simplify your efforts.

The Kaye product range is relied upon by the world's leading pharmaceutical and biotechnology companies to validate and monitor critical sterilization processes as required by governing regulatory bodies.

THERMOCOUPLES

Kaye thermocouple wire is manufactured with the highest purity and uniformity available to the industry. Quality control and testing of every wire spool and thermocouple probe ensures consistent measurement results. Each spool of wire includes a Certificate of Conformance — your guarantee that it meets the accuracy specifications. Each Teflon® Thermocouple is leakage vacuum tested.

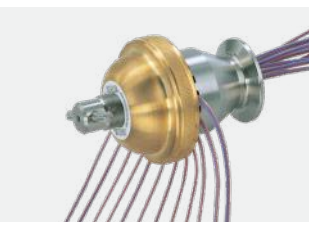
- Thermocouples for autoclaves
- Thermocouples for dry heat tunnels
- Thermocouples: stainless steel
- Thermocouples with stainless steel tip

KAYE KEYBOARD WITH DOCKING CAPABILITY

The Kaye Console Keyboard, the ideal mate for your Validator AVS Tablet Console. This versatile accessory includes an integrated touchpad that cleverly transforms into a removable RF mouse, doing away with the need for any extra devices. It's not just about fancy features; this keyboard guarantees durability and a secure, stable connection to your Kaye Tablet Console. Ideal for everyday use, it simplifies report generation, particularly when the console is used remotely from the AVS.

FEEDTHRU FOR AUTOCLAVE APPLICATIONS

Easy way to seal the autoclave port when introducing thermocouples into the chamber. Standard 1.5" TRI-CLAMP® process connection. Installation is simple with out the need of any tools, fitted with safety release mechanism.



FEEDTHRU KIT

Ideal set for qualifying an autoclave with ex. one 1.5" TRI-CLAMP validation port but there is need for more than 18 Thermocouples and / or connections of a pressure transducer.

PRESSURE TRANSDUCER FOR AUTOCLAVES

Comply with current standards to measure pressure in parallel to temperature when qualifying autoclaves. The pressure sensor is optimized to work with autoclaves and the Validator® AVS.

SHIPPING CASE

Protect your Validator AVS during transfer and shipping and store it safely when not being used.

System Documentation

QUALITY CONTROL DOCUMENTS
Kaye's quality policy, the ISO 9001 implementation and certificate, and document control standard operating procedures (SOPs)

DEVELOPMENT PROCEDURES
Design control and project management SOPs, and functional specifications

QUALITY ASSURANCE PROCEDURES
Test plan and test case procedures

RELEASE DOCUMENTS
Quality assurance certification and product release notices

QUALITY ASSURANCE TEST DOCUMENTATION
Quality assurance test plan and test cases

IQ/OQ PROTOCOL
The Installation Qualification/Operational Qualification Protocol defines a set of procedures to ensure that the Kaye Validator AVS system is properly installed and operated according to Amphenol recommendations, and is adequately documented and controlled according to cGMP requirements. The documents are provided in hard copy and on CD, allowing users to modify the documentation to suit specific organizational requirements.

The IQ/OQ Protocol includes the following:
- Installation Qualification document
- Operational Qualification document – AVS
- Operational Qualification document – AVS Report
- Standard Operating Procedures document

If you prefer to have IQ/OQ executed by qualified Kaye technicians we also provide Validation IQ/OQ on-site execution.

VALIDATION REFERENCE
The Kaye Validator AVS system is supported with documentation that verifies a fully validated system, including software, hardware and firmware. The Validation Reference Binder provides a comprehensive overview of the Amphenol Quality Policy, description of ISO 9001 implementation and support procedures, and standards for the development, testing, and maintenance of hardware and software. quality control documents, development procedures, quality assurance procedures, release documents, and quality assurance test documentation are all included.

The Validation Reference is a serialized document, ensuring that registered users automatically receive notification and updates to keep documentation current. The result is a summary of information you would obtain by conducting an audit at Amphenol's facility – complete, well organized, neatly packaged, and immediately accessible.

Additional Services

- Factory/On-Site System Calibration
- Annual Service Contract
- Rentals

System Specifications

TOTAL SYSTEM SPECIFICATIONS

When you use specifications to compare equipment, be sure to establish an error budget that accounts for all possible measurement uncertainty. Sensor calibration is an integral part of validation, and total system accuracy should include potential error from the recorder, as well as the temperature reference and traceable standard.

Since all component errors are additive to the total system, every potential error is significant. A summary of the error budget for an Amphenol validation system after sensor calibration with type T thermocouples, used at steam and dry heat, is listed below. These specifications are guaranteed under worst case conditions. Under typical operating conditions, you can expect significantly better accuracy.

Kaye Validator AVS (resolution and short term stability)	0.017°C	k=1
IRTD Temperature Standard	0.01°C	k=1
Temperature Reference	0.051°C	k=1
Total System Uncertainty	0.078°C	k=1

Kaye Validator AVS Specifications

Analog Input	Up to 48
Thermocouples	Type T, J, K,E,B,R,N,S: 0.1°C; T+ limited range 0.01°C resolution
Scanning Speed	48 channels/sec
Internal Memory	4 gb for data collection
Input Impedance	10KΩ. Source greater than 10KΩ produces open circuit indication
Common Mode Rejection	160 db (8 inputs/sec) @ line frequency 145 db (12 inputs/sec) @ line frequency 140 db @ DC
Max. Common Mode Voltage	100V pk ch-to-ch350V pk ch-to ch to frame ground
Normal Mode Rejection	82 db @ 60 Hz (8 inputs/sec) 69 db @ 60 Hz (12 inputs/sec)
Voltage Input	0 to 10 VDC
Voltage Input Accuracy	30 days: ±(0.003% of reading + 2 counts + 4 microvolts) 1 year: ±(0.006% of reading + 2 counts + 4 microvolts
Sensitivity	0.5 microvolts/count on most sensitive range
Voltage Temp. Coef.	±(0.1 microvolts + 0.001% reading)/°C
Compensator Temp. Coef.	±0.01°C per °C
Input Terminal Temperature Non-uniformity	±0.1°C from calibrated terminal
Input Ranges	-6 to 30mV, -12 to 60mV, -60 to 300mV, -2 to 10V
Environmental	Temperature: 0 to 50°C (32 to 122°F) Relative humidity: 95% non-condensing
Power	90 to 250 VAC, 50/60 Hz
Fuse Rating	4A Slow Blow
Size	190H X 411W X 381 mm D (457 mm with SIM) 7.5 in H x 16.2 in W x 15 in D (18 in with SIM)
Weight	10.60 kg (23.4 lbs)
Battery	Lithium ion with minimum 3 hours of battery backup

Visit our website:
www.kayeinstruments.com

Kaye representative contact:
www.kayeinstruments.com/en/contact

Request a demo:
www.kayeinstruments.com/en/demo

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