

MINI 96, VIAFLO 96 and VIAFLO 384 CALIBRATION SPECIFICATION STATEMENT

INTEGRA's Method for Calibrating MINI 96, as well as VIAFLO 96 and VIAFLO 384 Pipetting Heads

INTEGRA uses a hybrid gravimetric/photometric method of calibration for the MINI 96, as well as VIAFLO 96 VIAFLO 384 pipetting heads (based on ISO 8655-7:2022 Annex D). One channel is tested gravimetrically (3 test volumes, 5 measurements each). INTEGRAs hybrid calibration method laid out the basis for ISO 8655 part 7 Annex D. At INTEGRA, once this channel is determined to be within the accuracy and precision specifications, it is used as a reference channel. All channels are then measured using a photometric method and compared to the reference channel. Calculated accuracy and precision for the entire pipetting head must be smaller than or equal to INTEGRA stated specifications. The precision (CV) is defined as channel-to-channel variation within the pipetting head.

All channels of INTEGRA's pipetting heads (24, 96, and 384) are individually measured and assessed, and no outliers are allowed.

Other Methods for Calibrating 24, 96, 384 Channel Instruments

While there are other methods used to calibrate 24, 96, or 384 channel instruments, many manufacturers use methods which rely on gravimetric-only measurements. For example, all 24, 96, or 384 wells are filled with a target volume, and the entire plate is weighed. An average volume is then calculated for each well – this process may be repeated multiple times to obtain a precision (CV) value. An average of these dispenses is calculated to determine if the system is within specification or not.

Others will perform a similar gravimetric-only method, based on randomly selected channels – often between 5 and 20 channels. Again, an average of these dispenses is calculated to determine if the system is within specification or not.

Why the INTEGRA Calibration Method is Preferable to Others

The disadvantage of weighing a full or partially full plate and simply calculating an average dispense per well is that outliers, such as defective channels, are not identified or detected. The INTEGRA method gives more information about the pipetting head and each individual channel, as data is obtained for every channel. This method is therefore better at identifying channels which perform poorly, and the calibration pass/fail decision is based on both the whole plate and individual channel results.

In addition, the INTEGRA method can be considered closer to results expected in laboratories, since photometric measurements mimic real lab working conditions – mixing liquids, working with two different types of liquids, etc. Gravimetric measurements are based on a dry dispense (dispensing into a dry plate). Therefore, the results of INTEGRA's calibration procedure will likely be closer to every-day results obtained in most labs.

MINI 96, VIAFLO 96 and VIAFLO 384 Specifications vs. Other Manufacturers of 24, 96, and 384 Channel Pipetting Instruments

INTEGRA specifications are designed to be achievable in most laboratories. Other manufacturers of 96/384 channel pipetting instruments may state superior specifications, but testing of those instruments in a typical lab setting has proven this to not always be achievable. Two VIAFLO 96 channel pipetting heads were tested for accuracy/precision, and two 96 channel instruments from other manufacturers were also tested.

The instruments were all tested in a non-climate controlled lab setting. The INTEGRA VIAFLO pipetting heads were tested according to the INTEGRA method, while the other manufacturers were tested both according to the INTEGRA method, as well the manufacturer's own gravimetric-only method.

VIAFLO Pipette Head Test:

Method: INTEGRA gravimetric/photometric hybrid, 10% of nominal volume

VIAFLO 96 with 300 µl channel head *(sn: 52902)

Volume (µl)	Tip Size (µl)	Manufacturer Accuracy Spec %	Measured Accuracy is within spec	Manufacturer Precision Spec % CV	Measured Precision is within spec
30	300	2.5	✓	1.5	✓

VIAFLO 96 with 12.5 µl channel head *(sn: 52868)

Volume (µl)	Tip Size (µl)	Manufacturer Accuracy Spec %	Measured Accuracy is within spec	Manufacturer Precision Spec % CV	Measured Precision is within spec
1.25	12.5	8	✓	3	✓

Result of VIAFLO Pipette Head Test: VIAFLO specifications have been made to be realistic and reachable by most pipetting personal and under normal laboratory conditions, and the results of the test prove this.

Calibration Specification Statement for 24, 96, 384 channel instruments



Other Manufacturer Test:

Method: INTEGRA's gravimetric/photometric hybrid

96 Channel Instrument: Other Manufacturer 1 (Nominal Volume: 300 µl)

Volume (µl)	Tip Size (µl)	Manufacturer Accuracy Spec %	Measured Accuracy is within spec %	Manufacturer Precision Spec % CV	Measured Precision is within spec
50	50	2	✓	3	✓
2	50	2	✗ (>10)	3	✓
1	50	2	✗ (>15)	3	✓

96 Channel Instrument: Other Manufacturer 2 (Nominal Volume: 300 µl)

Volume (µl)	Tip Size (µl)	Manufacturer Spec %	Measured Accuracy is within spec %	Manufacturer Precision Spec % CV	Measured Precision is within spec %
300	300	1	✓	1	✓
30	300	1.5	✓	1	✓
15	300	2	✗ (>7)	2	✓
5	300	5	✗ (>8)	5	✗ (>6)

Other Manufacturer Test:

Method: Manufacturer's gravimetric-only method

96 Channel Instrument: Other Manufacturer 1

Volume (µl)	Tip Size (µl)	Manufacturer Accuracy Spec %	Measured Accuracy is within spec %	Manufacturer Precision Spec % CV	Measured Precision is within spec
50	50	2	✓	3	✓
2	50	2	✗ (>10)	3	✓
1	50	2	✗ (>15)	3	✓

96 Channel Instrument: Other Manufacturer 2

Volume (µl)	Tip Size (µl)	Manufacturer Spec %	Measured Accuracy is within spec %	Manufacturer Precision Spec % CV	Measured Precision is within spec
300	300	1	✓	1	✓
30	300	1.5	✓	1	✓
15	300	2	✗ (>2)	2	✓
5	300	5	✗ (>7)	5	✓

Result of Other Manufacturer Test: The other manufacturer's instruments have defined a specification at low volumes which was not reached through testing. They promise a performance of the pipetting instrument which is very difficult to achieve, especially when pipetting low volumes using tips which contain a large amount of dead air space relative to the pipetted volume.

Conclusion

While only a small number of instruments were tested, similar results can and should be expected from other instruments – INTEGRA's, as well as other manufacturers' systems. The MINI 96, as well as VIAFLO 96 and VIAFLO 384 pipetting heads are manufactured using specifications which are attainable in labs with stable environmental conditions, and by lab personal following good pipetting practices. In addition, the results generated using the INTEGRA method gives more information about the pipetting head, and can be considered to be closer to daily-use results generated when compared to other, less descriptive methods (Gravimetric only, for example).

Questions You Should Ask About all 24, 96, 384 Channel Specifications:

Comparing specifications of different 24, 96, or 384 channel instruments can be a useful tool in beginning to understand the differences between the instruments. However, when comparing specifications, the following questions should be asked:

1. What is the method used by this manufacturer to determine if an instrument passes or fails calibration? Does the manufacturer use a method compliant with an international standard which produces results for individual channels? Be very wary of gravimetric-only methods, and methods which do not test every channel.
2. Do the manufacturer's specifications promise unrealistic expectations of everyday users?

Still Have Questions About Specifications?

Contact INTEGRA's Product Management Team for any questions regarding this theme:

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