

INTEGRA



SWITCH Pipettes

Operating Instructions



Declaration of Conformity

INTEGRA Biosciences AG – 7205 Zizers, Switzerland

declares on its own responsibility that the devices

Description	Models
SWITCH Pipettes	2011, 2012, 2013, 2015, 2016, 2018
Accessories	1200, 1201, 1202, 1203, 2205, 2215, 2216, 2217, 2218

comply with:

EU Provisions	Scope
2014/35/EU	Low voltage directive (LVD)
2014/30/EU	Electromagnetic compatibility (EMC)
2012/19/EC	Waste electrical and electronic equipment (WEEE)
2011/65/EC	Restriction of hazardous substances (RoHS)
2023/1542/EC	Battery directive
1907/2006	Registration, evaluation, authorisation and restriction of chemicals (REACH)
2019/1782	External power supply efficiency
1103/2010	Capacity labelling of portable batteries
EN 9001:2015	Quality Management
EN 61010-1:2020	Safety general laboratory equipment
EN 61326-1:2013	Electromagnetic compatibility laboratory equipment
EN 60950-1:2013	Safety information technology equipment
EN 62368-1:2021	Safety information technology equipment
EN 62133-2:2017	Batteries containing non-acid electrolytes
EN 61000-6-3:2007 + A1:2011	Electromagnetic compatibility (EMC)
EN 61000-6-2:2005	Electromagnetic compatibility (EMC)
EN 61000-3-2:2014	Electromagnetic compatibility (EMC)
EN 61000-3-2013	Electromagnetic compatibility (EMC)

SWITCH Pipettes – Declaration of conformity

UK Provisions	Scope
S.I. 2016/1101	Electrical equipment safety
S.I. 2016/1091	Electromagnetic compatibility (EMC)
S.I.: 2008/2164	Batteries and accumulators regulations
S.I. 2013/3113	Waste electrical and electronic equipment (WEEE)
S.I. 2012/3032	Restriction of hazardous substances (RoHS)
BS 61010-1:2010	Safety general laboratory equipment
BS 62368-1:2020	Safety information technology equipment
BS 63000:2018	Restriction of hazardous substances (RoHS)

USA Provisions	Scope
FCC 47 CFR Part 15B	Electromagnetic compatibility (EMC)
10 CFR Part 430	External power supply efficiency (CEC VI)
17 CFR Parts 240 & 249b	Dodd frank “Conflict minerals”
27 CCR Parts 25102-27001	Proposition 65: The safe drinking water and toxic enforcement act
TSCA 40 CFR Part 751	Toxic substances control act
20 CCR Parts 1601-1608	CEC BCS, Battery charging efficiency
UL 61010-1:2012	Safety general laboratory equipment

CAN Provisions	Scope
CSA-C22.2 No. 61010-1	Safety general laboratory equipment
ICES-003:2023/2020	Interference-causing information technology

CHN Provisions	Scope
AQSIQ Order 5 /2001	Safety and electromagnetic compatibility (EMC)
Order 32/2016	Restriction of hazardous substances (RoHS)
GB17625.1-2022	EMC limits for harmonic current emissions
GB31241-2014	Safety for Lithium batteries
SJ/T 11364-2014	Restriction of hazardous substances (RoHS)

SWITCH Pipettes – Declaration of conformity

JPN Provisions	Scope
PSE (Denan) Law	Electrical appliance and material safety law

KOR Provisions	Scope
KC 61010-1	Safety general laboratory equipment
KC 62133-2:2020	Safety for Lithium batteries
KC 62368	Safety information technology equipment
KS C 9610-6-2:2019	Immunity of environments
KS C 9610-6-3:2017	EMC emission of environments
KS C 9610-3-2:2020	EMC of RF devices – current harmonics
KS C 9610-3-3:2020	EMC of RF devices – voltage fluctuations & flicker

AUS Provisions	Scope
AS 61010-1:2003	Safety general laboratory equipment
IEC 61326-1:2020	Electromagnetic compatibility laboratory equipment
EN IEC 61000-6-3:2021	Electromagnetic compatibility (EMC)
EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC)
EN IEC 61000-3-2:2019 + A1:2021	Electromagnetic compatibility (EMC)
EN 61000-3-3:2013 + A1:2019	Electromagnetic compatibility (EMC)

International Provisions	
ISO 8655-2	Piston pipettes
UN38.3	Lithium battery testing requirements

RoHS compliance statement

This product complies with Directive 2011/65/EU (RoHS) applying the exemption listed in Annex III, point 7(c)-I (lead in glass or ceramic, except dielectric ceramic in capacitors). The exemption is currently valid; an extension until 31 December 2026 has been announced but is not yet legally in force.

Additional information according to REACH (Article 33)

Electronic components of this product contain the following substances in a concentration above 0.1 % w/w:

- Lead (CAS 7439-92-1)
- 1,3,5-Triazine-2,4,6-triamine (CAS 108-78-1)
- Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide (CAS 75980-60-8)

Please follow standard precautions when handling.

California Proposition 65 notice

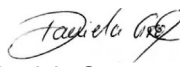
This product contains chemicals such as lead, nickel, nickel oxide, and carbon black, which are listed by the State of California under Proposition 65. Additional information about Proposition 65 is available at www.P65Warnings.ca.gov.

The design of this device is fully enclosed, and all electronic components containing these substances are completely integrated and not accessible during normal use. As a result, user exposure to these chemicals is not expected under typical operation.

Zizers, 2025-11-28



Urs Hartmann
CEO



Daniela Gross
Head of Corporate Quality

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1 Introduction

This operating instruction manual has part number 120950, the version is V01. It applies for INTEGRA SWITCH pipettes as of (see Toolbox - Device information):

Serial number	08000943 or higher
(Firmware) FW version	1.02 or higher

It contains all the information required for installation, operation and maintenance of the INTEGRA SWITCH pipettes. This chapter informs about the symbols used in these operating instructions, the intended use of the pipettes and the general safety instructions.

1.1 Symbols used

The operating instructions specifically advise of residual risks with the following symbols:

**WARNING**

This safety symbol warns against hazards that could result in injury. It also indicates hazards for machinery, materials and the environment. It is essential that you follow the corresponding precautions.

**CAUTION**

This symbol cautions against potential material damage or the loss of data in a microprocessor controller. Follow the instructions.

**NOTE**

This symbol identifies important notes regarding the correct operation of the device and labor-saving features.

1.2 Intended use

This is a general-purpose laboratory instrument for use in research only. Any use of this instrument in a medical or IVD setting is under the sole responsibility of the user.

This product may only be operated in a secure, protected network with validated, trustworthy clients. The operator must ensure that network security measures are always up-to-date and state-of-the-art. This product may not be directly exposed to the internet.

If the INTEGRA SWITCH pipettes are used in a manner not specified by INTEGRA Biosciences, the protection provided by the SWITCH pipettes may be impaired.

INTEGRA SWITCH pipettes are microprocessor controlled and motor driven air displacement pipettes to be used like manual, mechanic pipettes. They are used for aspirating and dispensing aqueous liquids in the volume range of 0.2–1000 µl using GRIPTIP pipette tips only.

1.3 Safety notes

SWITCH pipettes comply to the recognized safety regulations and are safe to operate. The pipettes should only be operated when in perfect condition and while observing these operating instructions.

The device may be associated with residual risks if it is used or operated improperly by untrained personnel. Any person operating the pipettes must have read and understood these operating instructions, and particularly, the safety notes, or must have been instructed by supervisors so that safe operation of the device is guaranteed.



WARNING

- Use only an original INTEGRA LiPo battery (#2205), mains adapter and Flex charging stand.
- *Old LiPo batteries may cause a safety risk. We recommend to replace the battery after 3 years of use. Also replace the battery if the charging intervals are unusually short or if the charging takes much longer than usual (4 hours or more). – These are indicators that the battery has reached the end of its life-cycle.*

If a LiPo battery is never deep discharged and is always stored and operated in the recommended temperature range and stored at 40-80% charge level during long standby periods, it may live much longer than 3 years. If it shows no signs of physical damage or change, see [5.1.3](#), it is a strong indication that you may continue to use the battery.

- *LiPo technology bears the risk of thermal runaway and cell rupture if the battery was damaged. Do not expose the battery to heat (> 60°C) and avoid mechanical stress. Batteries which were subject to deep discharges may develop internal short circuits, leading to an increased self-discharge rate and heating during battery charging. This may also result in thermal runaway and cell rupture.*



CAUTION

- *To extend the battery life-cycle, it is recommended to charge the battery every 2 months if the pipette is not used regularly. If the pipette is not used for more than 6 months, remove the battery.*

**WARNING**

- Do not use the SWITCH pipettes near flammable material or in explosive areas. Also, do not pipette highly flammable liquids such as acetone or ether.
- When handling dangerous substances, comply with the material safety data sheet (MSDS) and with all safety guidelines such as the use of protective clothing and safety goggles.
- Only use GRIPTIPS® brand pipette tips to ensure the proper function of the SWITCH pipettes and to comply with the general warranty conditions. Damage to the pipettes and risk to operator's health and safety may result from using non-specified pipette tips.

**CAUTION**

- Do not immerse the SWITCH pipettes in liquid. The fluid can damage internal parts. Avoid pipetting of liquids whose vapors could attack the materials PA (polyamide), POM (polyoxymethylene), FPM (fluor-rubber), NBR (nitrile-rubber), CR (chloroprene), silicone. Corrosive vapors could also damage metallic parts inside the device.
- Do not modify the SWITCH pipettes in any way. Repairs may only be performed by INTEGRA Biosciences or by an authorized after-sales service member.
- Parts may be replaced with original INTEGRA Biosciences parts only.

**NOTE**

Prolonged exposure of the SWITCH pipettes to UV-light can cause discoloration and/or yellowing of the pipette housing. However, this will not affect the performance of the device in any way.

Regardless of the listed safety notes, additional applicable regulations and guidelines of trade associations, health authorities, trade supervisory offices, etc. must be observed.

Please visit our website www.integra-biosciences.com on a regular basis for up to date information regarding REACH classified chemicals contained in our products.

2 Description of the device

2.1 Scope of delivery

- INTEGRA SWITCH pipette
- Rechargeable battery (located inside the pipette, LiPo, 3.7 V, 605 mAh)
- Bag of spare O-rings (200 µl and 1000 µl volume ranges only)
- O-ring removal tool (200 µl and 1000 µl volume ranges only)
- Certificate of performance
- Quick start guide

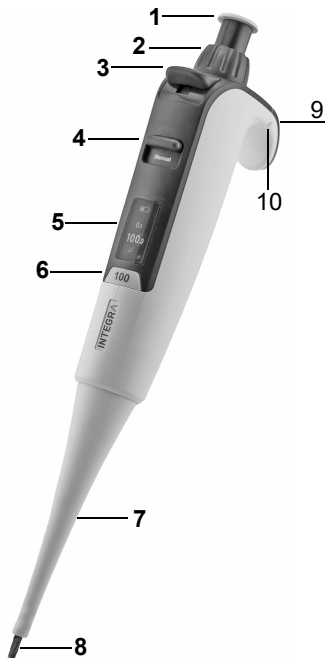


CAUTION

Verify the scope of delivery when unpacking the device and check for potential transportation damage. Do not operate a device that is damaged, instead contact your local INTEGRA representative.

2.2 Overview of the SWITCH pipettes

2.2.1 Pipette parts




- 1 **Plunger**, to turn on, pipette and confirm selection
- 2 Quick **set ring**, to set volume and to navigate
- 3 **Tip ejector**, to eject tips from the tip fitting
- 4 **Mode switch**, to switch between “Manual” and “Repeat Dispense”
- 5 **Display**, shows volume and settings
- 6 **Volume indicator**, color matches GRIPTIP rack insert
- 7 **Lower end**, containing piston
- 8 **Tip fitting**, to attach GRIPTIPS
- 9 Finger hook with **USB-C port**, for charging and firmware updates
- 10 **Charging contacts**, to charge on Flex charging stand

The 8-digit serial number as well as the conformity markings are printed on the back.


2.2.2 Display

The display shows all pipetting options.


Manual:

	Battery indicator
0.00	Recent volume
20.00 µl	Set volume

Repeat dispense:

	
START	
5.00 µl	Volume
4x	No. dispenses
Speed ••	Speed(s)

Settings:

	
SETTINGS	
Rep. Disp.	
ON Time	
Calibration	
Applica- tions	

2.2.3 Plunger

Push the **Plunger** (1) to initiate aspiration, dispense or purge, and to confirm settings.

The **Plunger** can be pushed down to two different stops:



- 1) Top position: piston is released.
- 2) First stop: Fixed calibrated position for aspirating and dispensing.
- 3) Second Stop: To blowout the residual liquid.

3 Installation

3.1 Operating environment

The SWITCH pipettes have been designed for use in a laboratory. They shall be operated in a dry and dust-free location with a temperature of 5–40 °C and a maximal (non-condensing) relative humidity of 80 %.

3.2 Charging the battery

All SWITCH pipettes are equipped with a rechargeable LiPo battery. Charge the battery completely before first use until the battery indicator shows a full battery on the display.

A full charge takes 2.5 hours and will provide approximately 1500 pipetting cycles or an average working day.

The battery charge status is displayed continuously from full to empty:

- Empty battery blinking: Battery is low and should to be recharged immediately.
- Empty battery on the entire screen: no operation possible, the pipette will turn off soon.

SWITCH pipettes has an integrated protection: it will not overcharge even if it is connected to power for indefinite time. To avoid unnecessary power consumption, it is recommended to unplug the mains adapter when the battery indicator is full.

**CAUTION**

To extend the battery life-cycle, it is recommended to charge the battery every 2 months if the pipette is not used regularly. If the pipette is not used for more than 6 months, unplug the battery.

**CAUTION**

Use only the approved INTEGRA battery, mains adapter or charging stand, see (“8.1 Accessories” on page 46). Use of an incompatible power transformer can damage the pipette.

3.2.1 Charging the battery on a stand

Use the Flex charging stand (#22xx) to charge the battery.



Plug the cable of the adequate mains adapter to the socket of the stand.

Hang the pipette on the stand. It is loaded via the two gold-colored loading pins of the stand.



CAUTION

Always use the correct mains adapter for the charging stand.

The pipette will turn on when placed on the stand and go to standby when the turn off time is reached. For disconnecting simply lift the pipette up from the stand.

3.2.2 Charging the battery with the mains adapter

With the optional mains adapter (#120x), you can use the SWITCH pipette while charging through the line cord.



Remove the cover of the **USB-C port (10)** and insert the mains adapter connector. Plug the mains adapter into a wall outlet.

The pipette will turn on when the line cord is connected.

If the pipette is idle while charging, the display will be shut off (see [“4.1 Turn on/off the device”](#) on page 19).

3.3 Exchanging the battery



To avoid damaging the housing or battery cover, use a small, flathead screwdriver with a tip width of approximately 2 mm. Push the screwdriver all the way into the slot until you feel it stop. Then, gently pry the battery cover off the device.

Remove the battery.



Completely remove the protective film from the new rechargeable battery (# 2205), ensuring that no residue remains on the six contact pads. Insert the battery into the pipette's socket and align it correctly. The two wings of the battery should fit neatly into the device's recess to ensure proper contact.

Reassemble the battery cover.

After exchanging the battery, a protective switch is active. The pipette can only be started after connecting it to the mains power supply.



WARNING

INTEGRA SWITCH pipettes use LiPo batteries, see [“1.3 Safety notes” on page 12.](#)

3.4 Updating firmware

Connect the pipette via the USB-C port (9) to the USB port of your PC. From the VIALINK software on your PC go to the “Firmware” tab and install the latest firmware.



NOTE

To communicate between the SWITCH and your PC you need a USB to USB-C cable. In case you do not have one, you can order one from USB-A to USB-C from INTEGRA (# 137904).

4 Operation

4.1 Turn on/off the device

Turn on:

Push and release the **Plunger** (1) to turn on the pipette.

The pipette performs a homing routine, ensuring the motor is in the run position.

The pipette will go into standby mode after 5 min of inactivity. This duration is configurable, see [“4.5 Settings menu” on page 23](#). Take the pipette or push the **Plunger** to start pipetting.

Turn off:

The pipette turn off after two hours in standby. It is not necessary to turn it off manually during your daily work routine, unless you want to save energy. In that case, select "Shutdown" in the Settings menu and press the plunger to confirm, see [“4.5 Settings menu” on page 23](#).

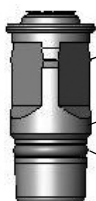
4.2 Attaching and removing GRIPTIP pipette tips



CAUTION

To ensure optimal performance of your SWITCH pipettes always use appropriate GRIPTIPS, see [“8.3 GRIPTIPS” on page 51](#).

The unique GRIPTIP system of INTEGRA pipettes reduces attachment and ejection forces, ensures a perfect fitting to prevent the tips from falling off and to provide a perfect seal.



A rim inside the GRIPTIPS snaps over the multi-lobes and ensures firm attachment of the tips.

A shoulder provides a positive stop to prevent over-tightening of the tips. Without hammering, the tip is either on or off but nothing in between.

The O-ring provides a forgiving and robust seal surface for the pipet tip.

Attach the GRIPTIPS:

When loading tip(s), push the pipette into the appropriate GRIPTIP(s) until you hear and feel a click indicating that a seal has been achieved. Once you feel the click, stop applying pressure.



CAUTION

If working with a 20 μ l pipette at full volume and requiring a filter tip, use LONG GRIPTIPS. Otherwise liquid may enter the filter.

Discard used GRIPTIPS:

If liquid is in the tips, empty them by pressing the **Plunger** to the second stop. Tips are easily ejected by pressing the **Tip ejector** (3).

4.3 Pipetting manually

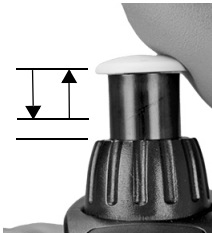
Move the **Mode switch** (4) to the upper position. The pipetting speed is controlled by the speed of the plunger movement.

4.3.1 Set volume

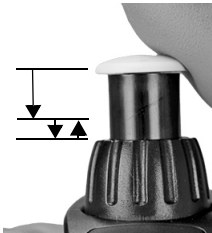
Enter the desired volume by rotating the **Set ring** (2). Turn the ring quickly for fast volume changes and slowly for step wise volume changes.

4.3.2 Aspirating and dispensing

To aspirate and dispense liquid, perform the following steps:

Aspirate

- 1) With a GRIPTIP attached, push down the **Plunger** to the first stop and hold it there.
- 2) Immerse the GRIPTIP in liquid.
- 3) Slowly release the **Plunger** and wait shortly until the liquid is aspirated. For higher volumes (>200 μ l), follow the liquid level by moving the pipette down.
- 4) Remove the GRIPTIP from liquid.

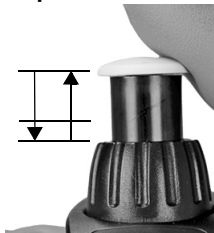
Dispense

- 5) Push the **Plunger** down to the first stop and wait 1-2 seconds.
- 6) Push the **Plunger** down to the second stop to expel any residual liquid.
- 7) Remove the GRIPTIP from the liquid, then release the **Plunger**.

4.3.3 Reverse pipetting

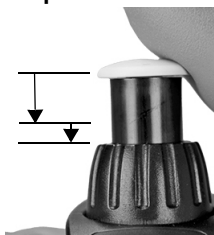
Viscous samples should be aspirated and dispensed at slower speeds and in reverse pipetting mode:

Aspirate



- 1) Fully push down the **Plunger** to the second stop and hold it there.
- 2) Immerse the **GRIPTIP** in the liquid, let the **Plunger** slowly release to the top position and wait shortly until the liquid is fully aspirated.

Dispense



- 3) To dispense, push the **Plunger** slowly down to the first stop and wait a few seconds to dispense the liquid.
- 4) Remove the **GRIPTIP** from the target vessel.
- 5) To expel the excess liquid, push the **Plunger** to the second stop.

4.4 Repeat Dispense mode

This mode can be used for fast reagent addition to microplates or tubes from one source container. You can dispense a large aspirated volume of liquid in multiple aliquots to multiple targets. Move the **Mode switch** (4) to the lower position. Unlike in manual mode, the plunger now functions in repeat dispense mode as a push button.

4.4.1 Set number of aliquots and speed



Rotate the **Set ring** (2) to enter the “SET” mode. The volume is blinking.

Enter the desired volume by rotating the **Set ring**.

Push the **Plunger** to confirm and to move to the next parameter. Enter the number of dispenses.

Select the desired speed by rotating the **Set ring**. Speeds can be set independently for each aspiration and dispense, if 2 Speeds are selected within settings, see [“4.5 Settings menu”](#) on page 23. There you can also set the number of pipetting speeds available, e.g. 3 or 10.

Set the pipetting speed from one (low), two (middle), or three (fast) dots. Alternatively, if the 10 Speeds are activated, select from 1 (low) to 10 (fast), see also [“7.4 Repeat Dispense mode”](#) on page 43.

**NOTE**

Viscous samples should be aspirated and dispensed at the slowest speeds to ensure accurate pipetting.

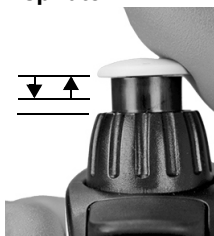
To dispense liquids with low viscosity and high vapor pressure, such as ethanol, use relative fast pipetting speeds and avoid prolonged pauses for aspiration.

Push the plunger to confirm the speed setting. Now you are in run mode indicated by "START".

4.4.2 Aspirating and dispensing

When START is indicated on the screen, perform the following repeat dispense steps:

Aspirate

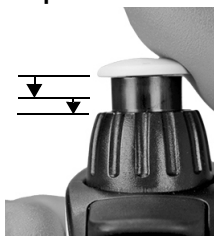


- 1) With a GRIPTIP attached, push down the **Plunger** to the first stop and hold it there.
- 2) Immerse the GRIPTIP in liquid and release the **Plunger** to aspirate. A pre-dispense (3-5 % of the nominal volume, to improve accuracy and precision, see [7.4.2](#)) is performed automatically. This is the standard setting.
If a manual, separated pre-dispense is enabled in the settings (see [4.5](#)), push and release the **Plunger** to discard the pre-dispense volume.

**CAUTION**

The pipette automatically aspirates additional pre- and post-dispense volumes which exceed the nominal volume to be pipetted.

Dispense



- 3) Push and release the **Plunger** to the first stop for every dispense. The number of steps taken recently is shown on the display.
- 4) The pipette beeps after the last dispense. The remaining post-dispense (3-5 % of the nominal volume, see [7.4.2](#)) is not part of the sample and can be discarded. Remove the GRIPTIP from the target vessel.
 - If "Standard" for post-dispense is active (see [4.5](#)), push the **Plunger** to the first stop to dispense the post-dispense. To start the blowout, push the **Plunger** down to the second stop.
 - If "Purge" is active, push the **Plunger** down to the second stop to dispense the post-dispense and to blowout any residual liquid.
- 5) Remove the GRIPTIP from vessel and release the **Plunger** (the piston returns to the initial position and aspirates a small amount of air).

**NOTE**

To abort the running repeat dispenses, push down the **Plunger** to the second stop. The liquid is purged directly. You can set a counted down delay of the purge, see “4.5 Settings menu” on page 23.

4.5 Settings menu

The settings menu (English only) is not required in the daily work routine. When the **Mode switch** is in upper position (to pipette manually), rotate the **Set ring** (2) to navigate below the minimum or above the maximum volume. The Settings menu is located between these volumes. Use the **Set ring** to highlight a function. Push the **Plunger** to access and confirm settings. Exit the menus with “Exit”.

Function	Description	
Rep. Disp.	Asp./Disp.	Select “1 Speed” for one pipetting speed or “2 Speeds” to allow different aspirate ▲ and dispense ▼ speeds.
	Pre-Disp.	Select “Automatic” or “Manual” pre-dispense (if required).
	Speed #	Select three (no. of dots) or ten (1-10) different dispensing speeds.
	Post-Disp.	Select “Standard” (first stop) or “Purge” (second stop) to define when the post-dispense should be discarded.
	Purge	Mode: Select “Direct” or “Delayed” purge. Speed: Select “Dispense” (defined repeat dispense speed) or “Maximum” speed.
ON time	Standby	Set a time of 5, 10 or 15 minutes for the device to remain switched on when not in use.
	Shutdown	Set a time of 30, 60, 120, 240 or 480 minutes for the pipette to turn off when in standby.
Calibra- tion	Pipet Fac.	The pipette factor currently in use is displayed. This factor must be adjusted in case a pipette performs out of specifications. Set the target volume you are interested. Enter the actual volume measured when dispensing the target volume. The pipette factor is adjusted automatically and used for neat transfers as well as for repeat dispensing.
	Reset	Resets the pipette factor back to the original factory setting.
Applica- tions	DNA Cycle	Special mode for DNA shearing applications: please refer to the corresponding application note.
Device Info		Infos about your pipette, such as pipette size, serial number, hardware (HW), firmware (FW) and bootloader (BL) version.
Exit		Returns to the main menu.

4.6 Recommendations for pipetting

INTEGRA Biosciences recommends the following techniques for enhancing pipetting results. These techniques are consistent with ISO standard 8655-2.

- It is best to immerse the GRIPTIPS just below the surface of the liquid (2–3 mm) to allow the desired volume to be aspirated. If the tip is immersed too deep, the risk of carry-over is increased due to liquid drops clinging to the outer surface of the tip. Due to the low plunger force and short plunger distance pipetting speeds may be faster compared to mechanic pipettes. Get yourself used to it.
- Push and release the plunger with consistent speed and smoothness.
- Always pre-wet GRIPTIPS. After loading tips onto your pipette, aspirate and dispense the full volume 2-3 times to coat the inside of pipet tips. Pre-wetting ensures that the liquid and air inside the tips are at equal temperature and the dead air space is humidified. Neglecting to perform a pre-wet can result in a smaller delivery volume in the first few dispenses.
- SWITCH pipettes are air displacement pipettes. To properly dispense liquids, ensure that the pipette tip is at a 0–20° angle. After each dispense, you must touch GRIPTIPS against the vessel wall or liquid. This process is referred to as “touching off” or “tip touch” and prevents liquid from clinging to the pipette tips.
- In Repeat Dispense mode, pre- and post-dispenses are performed. These two dispenses are not used and as they contain the accumulated pipetting errors.
- Air displacement pipettes show the best performance between 35% and 100% of the nominal volume.
- Viscous samples should be aspirated and dispensed at slow speeds to ensure accurate pipetting. In addition, reverse pipetting is recommended.
- For pipetting liquids with high vapor pressures (such as methanol or ethanol), pipet relatively fast and avoid prolonged pauses after aspiration.
- Calibrate based on fluid type. SWITCH pipettes are tested and calibrated at the factory for use with distilled water at room temperature. It may be necessary to re-calibrate your SWITCH pipettes if the liquid to be used has different physical properties (specific gravity and vapor pressure) than water.
- SWITCH pipettes are not calibrated out of the factory below 10% of their maximum volume. While it is possible to pipette below 10% of the maximum volume, it may lead to an undesirable precision and accuracy result. Therefore, if accuracy and precision are critical, it is recommended to work above 10% of the pipette’s maximum volume.



WARNING

Avoid pipetting for extended periods. To minimize the risk of repetitive strain injury, include pauses of several minutes.

Use filtered GRIPTIPS to pipette corrosive or biohazardous liquids. The filter prevents vapors and aerosols from corroding or contaminating the cylinder assembly.

4.7 Troubleshooting/FAQ

4.7.1 General

Problem	Probable cause	Remedy
Leakage.	<ul style="list-style-type: none"> • Tip incorrectly attached. • Foreign particles between tip and tip fitting. • Damaged colored O-ring. 	<ul style="list-style-type: none"> • Attach a new tip. • Clean tip fitting. Attach new tips. • Change the colored O-ring, see 5.5.2. • If leak persists, contact service.
Dispense results are inaccurate.	<ul style="list-style-type: none"> • Unsuitable calibration. • Improper pipetting techniques. 	<ul style="list-style-type: none"> • Recalibrate with the liquids in question. • Adjust aspiration and dispense speed depending on liquid: <ul style="list-style-type: none"> - High viscosity liquids may require calibration. - High vapor pressure liquids may require pre-wetting. - Refer to proper pipetting techniques section 4.6
Not dispensing/ aspirating.	<ul style="list-style-type: none"> • Piston stuck or not connected. • Motor not running. • Internal O-ring is damaged. 	<ul style="list-style-type: none"> • Contact service.
Droplets on the tips.	<ul style="list-style-type: none"> • Temperature of liquid differs from that of air inside the tips. • Liquid of low viscosity and high vapor pressure. • Touch off was not performed. 	<ul style="list-style-type: none"> • Pre-wet tips up to 3 times. • Increase dispensing speed. • Perform a touch-off (mandatory in Repeat Dispense mode).

4.7.2 Troubleshooting

Problem	Probable cause	Remedy
Device doesn't turn on or shows an empty battery symbol upon startup.	<ul style="list-style-type: none"> • Low or dead battery. 	<ul style="list-style-type: none"> • Re-charge the battery or use the INTEGRA mains adapter (#12xx) in order to resume pipetting operation. • Replace the battery after 3 years.
Battery charging indicator is not pulsing while on the stand. Pipette does not turn on when placed on the charging stand.	<ul style="list-style-type: none"> • Charge stand pins are out of place. 	<ul style="list-style-type: none"> • Check alignment of the pipette on the stand. • Make sure the charger is plugged in.
Error 3, Error 16	<ul style="list-style-type: none"> • Bad connection between battery and device 	<ul style="list-style-type: none"> • Open battery cover (see 3.3) and check the correct alignment of the battery. • Remove the battery and clean the contact pads with a lint-free cloth soaked in 70 % Ethanol.
Error 5	<ul style="list-style-type: none"> • Sluggish or blocked motor 	<ul style="list-style-type: none"> • Check that the lower end assembly is assembled and aligned correctly.
Error 10	<ul style="list-style-type: none"> • Motor controller undervoltage 	<ul style="list-style-type: none"> • Press the plunger and try again. • Charge the battery.
Error 17	<ul style="list-style-type: none"> • Motor is unable to reach its target position within a certain time frame 	<ul style="list-style-type: none"> • Check that the lower end assembly is assembled and aligned correctly.

Errors are displayed with a two-digit error number. Press the plunger to confirm the message. The device will then attempt to operate to check whether the error has been resolved. If the error persists, contact your local service technician and provide them with the error number.

5 Maintenance



WARNING

Pipette maintenance should be carried out on a clean and dust free workplace. Always turn off when carrying out maintenance work.

Pipettes are precision instruments, therefore a proper maintenance routine must be followed to ensure safe and reliable operation. Cleaning is recommended if the pipette has been contaminated or if it has come in contact with corrosive liquids.

5.1 Maintenance schedule

5.1.1 Daily

- Inspect the pipette for visual damages.
- Clean the outer surface of the pipette (see [5.2](#)).

5.1.2 Periodical

- In case the pipette is in daily use, perform a leak test every 3 months (see [6.3.3](#)).

5.1.3 Yearly Maintenance

- Perform a calibration at least once a year (see "[6 Calibration](#)").
- If you operate the battery beyond the recommended 3 year period, visually check the battery for signs of damage, e.g. extensive swelling, discoloration, unexpected stains.

5.2 Cleaning

The materials used on the exterior of the SWITCH Pipettes pipettes support regular cleaning intervals. Clean the external components with a lint-free cloth lightly soaked with mild soap solution in distilled water or with a 70 % dilution of Isopropyl or Ethanol. Never use Acetone or other solvents.



WARNING

Do not immerse the entire pipette into a cleaning solution or spray cleaning solution directly onto the exterior body of the pipette as this can potentially damage internal electronics.

If liquid ever enters the internals of the pipettes, please contact your service technician.

5.3 Sterilization

If the surface of the SWITCH pipettes have been in contact with biohazardous material, they must be decontaminated in accordance to good laboratory practice. Wipe the clean surface with a lint-free cloth, lightly soaked e. g. with the following disinfectants:

- Ethanol 70 %
- Microcide SQ 1:64
- Glutaraldehyde solution 4 %
- Virkon solution 1-3 %

Follow the instructions provided with the disinfectants. After cleaning with Glutaraldehyde or Virkon, wipe the clean surface again with a lint-free cloth, soaked with ethanol 70% to remove any residues.

The device may be decontaminated with H₂O₂ gas (maximal concentration 35 %) for 60 minutes.



WARNING

Do not autoclave the upper assembly of the SWITCH pipettes, as this will lead to permanent damages to the internal electronics and housing.

If autoclaving is required, only the lower assembly of the SWITCH pipettes can be autoclaved.

5.3.1 Autoclaving the disassembled components



WARNING

Service is required after autoclaving the SWITCH pipettes!

Do not autoclave the entire unit.

As-found calibration (measurement report, indicating “before” data) is not possible after autoclaving!

Place the disassembled components (see [5.4](#)) into steam autoclave in an autoclave pouch.

You may autoclave the components at 121°C, 1 bar overpressure for 20 minutes.

5.4 Disassembly and Assembly



WARNING

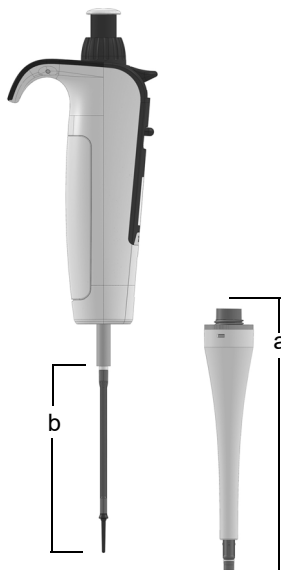
Only disassemble the pipette if the lower end must be autoclaved. Service and calibration is required after autoclaving.

Turn the pipette off and remove the battery before unscrewing the lower end. Never turn it on without the lower end attached. Otherwise, the pipette may be damaged.

5.4.1 SWITCH lower end

Disassembly

Disassemble the lower part of the pipette as follows:



Models of all sizes:

- 1) Unscrew the **cylinder assembly** (a) counter-clockwise and gently remove it from the pipette body.

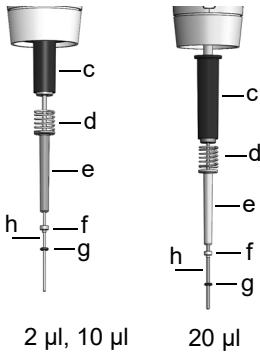
This exposes the **piston assembly** (b, models 2–100 μl) or **piston** with mounted **cup seal** (models 200–1000 μl).



WARNING

Do not pull the magnetic rod assembly out of the upper part with force, as this will permanently damage the pipette.

Piston assembly (b):



Models 2 µl, 10 µl and 20 µl:

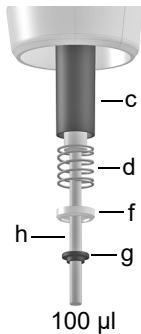
2) Slide the following components from the **piston (h)**:

- **O-ring (black, g) and seal/backer (f) assembly**
- **Pressure sleeve (e)**
- **Retainer spring (d)**
- **Retainer sleeve (c)**

Separate the **piston (h)** from the upper part of the pipette. It is held in place by a small magnet.

If the **O-ring and seal/backer assembly (f)** are still stuck in the Cylinder after the piston is removed, tap the top face of the Cylinder on the table.

Set these components aside or place them in an autoclave pouch.



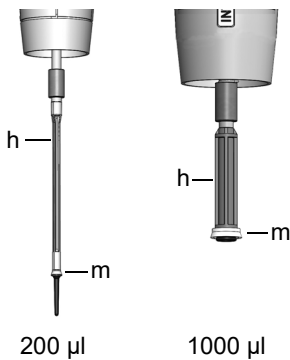
Model 100 µl:

3) Slide the following components from the **piston (h)**:

- **Seal (black, g) and flange (white, f) assembly**
- **Retainer spring (d)**
- **Retainer sleeve (c)**

Separate the **piston (h)** from the upper part of the pipette. It is held in place by a small magnet.

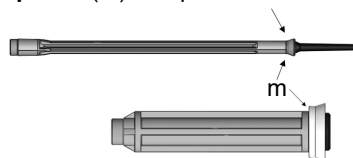
Set these components aside or place them in an autoclave pouch.



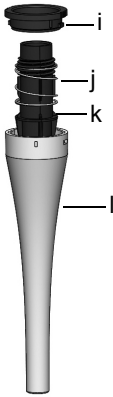
Models 200 µl and 1000 µl:

3) Separate the **piston assembly** from the upper part of the pipette. It is held in place by a magnet.

Slide finger nail under the smaller diameter of the **cup seal (m)** and push it off the Piston.



Set these components aside or place them in an autoclave pouch.


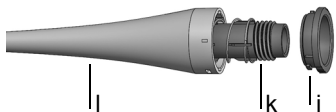
Cylinder assembly (a):**Models of all sizes:**

- 4) With the **cylinder assembly (a)** in hand, turn counterclockwise to remove the black **snap ring (i)**. Pull out the black **cylinder (k)** from the white **sleeve (l)**. Remove the **ejector spring (j)**. Set all components of the cylinder assembly aside or place them in an autoclave pouch.

Reassembly

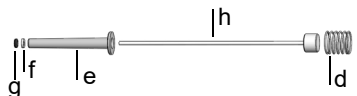
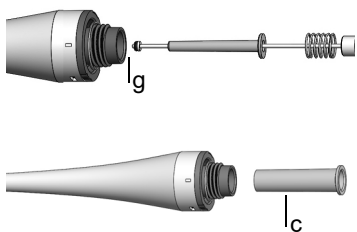
Before reassembling the pipette, check each component for lint or dust particles. It is recommended to replace the **O-ring** and **seal** or **cup seal**. Lightly lubricate the Piston, O-Rings and Seals (see [“5.5.3 Lubrication”](#) on page 34).

Models of all sizes:


- 
- 1) Slide the black **cylinder** (k) into the white **sleeve** (l). Rotate it until it falls into position. Press the **cylinder** down, and make sure it is sitting straight in the **sleeve**.
 - 2) Slide the **ejector spring** (j) onto the top of the **cylinder** (k).
 - 3) Position the black **snap ring** (i) over the **cylinder** (k) at the top of the **sleeve** (l). Turn the **sleeve** clockwise until the **snap ring** snaps into place and secures the **cylinder** in the **cylinder assembly**.
- 

Models 2 µl, 10 µl, 20 µl and 100 µl:

See [“Disassembly”](#) on page 29 for visual representations of all sized lower ends.

- 
- 4) Slide the **retainer spring** (d), the **pressure sleeve** (e; 2, 10, 20 µl only), the **seal** (f) and lightly lubricated **O-ring** (g) onto the **piston** (h). Be sure the black **O-ring** is securely slid into the white **seal/backer** (f; 2–10 µl and 100 µl only).
 - 5) With the **O-ring** (g) and **seal assembly** at the very end, gently place piston assembly into the **cylinder assembly**. Let the piston assembly fall into place without pushing it in, so as not to damage the thin pistons.
 - 6) Slide the large **retainer sleeve** (c) into the **cylinder assembly**. The extended lip faces the upper part of the pipette. The sleeve should be resting on the **ejector spring**.
- 

Models 200 µl, 1000 µl:

- 
- 4) Attach **cup seal** (m) to the **piston** (h). Insert the **piston** into the greased **cylinder assembly**.

Models of all sizes:

7) Attach and center the piston to the magnetic rod assembly of the upper end of the pipette.

8) Screw the **cylinder assembly** (a) clockwise to attach it to the body of the pipette.

Perform a leak test (see [“6.3.3 Leak test”](#) on page 38) and validate pipetting volumes after reassembly.

5.5 Servicing**5.5.1 Shipping to INTEGRA Biosciences**

For any service or repairs, please contact your local service technician.

**WARNING**

If working with infectious materials, e. g. human pathogens, the SWITCH pipettes need to be decontaminated before sending to service and the declaration on the absence of health hazards must be signed. This is necessary to protect service personnel.

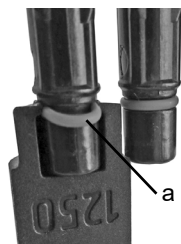
5.5.2 Changing O-rings of tip fittings

200 µl and 1000 µl SWITCH pipettes feature tip fittings with colored O-rings. This O-ring is used to seal against the inside wall of GRIPTIPS and provides a robust seal.

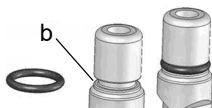
O-rings are made of durable silicone. If necessary, e.g. in case of a leakage due to damaged O-ring, you can replace these O-rings. A set of spare O-rings can be ordered separately, see [“8.2 Consumables”](#) on page 47.

**WARNING**

Avoid mechanical damage of the tip fittings.



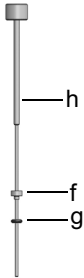
Choose the 300 side of the O-ring removal tool for 200 µl SWITCH or the 1250 side for 1000 µl SWITCH pipettes respectively. Slide the tool sideways onto the tip fitting until the O-ring (a) builds a loop. Remove the O-ring with fine plastic tweezers.



Slide a new O-ring over the tip fitting (b).

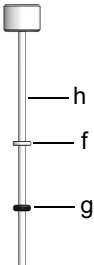
5.5.3 Lubrication

The internal seals and O-rings are subject to wear. An undamaged thin lubricant film is important to keep the seals tight. We recommend the lubricant Klueberalfa lube (#200153), see “6.2 Consumables” on page 33:



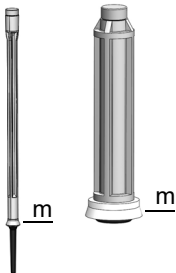
Models 2 µl – 10 µl:

Lightly lubricate the piston (h) without components (f, g) slid onto. Put a drop of grease onto your fingers, lubricate the black O-ring (g) and slide it over the white seal (f).



Models 20 µl and 100 µl:

Lightly lubricate the piston (h) without components (f, g) slid onto. Lightly lubricate outer ring of the O-ring seal (g).



Models 200 µl and 1000 µl:

Lightly lubricate the outer ring of the cup seal (m). Do not lubricate the bottom of cup seals.

5.6 Equipment disposal



The INTEGRA SWITCH pipettes must not be disposed of with unsorted municipal waste. Do not dispose of the pipettes in a fire.



INTEGRA SWITCH pipettes contain a LiPo battery. Do not modify the battery in any way. Dispose of the pipettes and the batteries separately in accordance with the laws and regulations in your area governing disposal of devices containing LiPo batteries.

In certain regions and countries, e.g. in EU member states, the distributor is obliged to take back this product free of charge at the end of life. Please contact your local distributor for more details.

6 Calibration

The SWITCH pipettes are factory tested and calibrated under environmentally controlled conditions using a gravimetric procedure in accordance with ISO 8655 standards. For the accuracy and precision specifications, see [“7.5 Pipette specifications”](#) on page 44.

For information regarding calibration service, please contact your local dealer.

6.1 Definitions

Blow-out: Discharges any residual liquid from the pipette tip.

Blow-in: After the blow-out, keep the plunger pressed, remove the tips from liquid and then release the plunger. The piston moves back into home position. This causes an intake of air.

Pre-wet: The action of pre-coating the inside of the liquid contacting parts with a thin film of the same liquid. Additionally, it equilibrates humidity of the air space inside tip and the pipette.

Touch off: Touching the pipette tip against the liquid surface or side of well-plate to release any sample liquids that might be on the end of the pipette tip.

6.2 Materials

- Precision balance with 0.01 mg readability
- ASTM Class 2 or OIML E2 test weights
- Evaporation trap for balance
- Weighing vessel (optimally the height-to-diameter ratio is at least 3:1)
- Measurement equipment for temperature, humidity and atmospheric pressure
- Distilled water (Grade 3 according to ISO 3696)
- New non-filtered GRIPTIPS matching the pipette volume (see section [6.2](#))
- 1 beaker with distilled water

6.3 Preparation

6.3.1 Test conditions and environment

Tests and calibrations should be performed in conditions and environment according to ISO 8655-6 standard.

- Temperature needs to be between 18–25 °C and remain constant (± 0.5 °C) throughout the calibration.
- Optimal relative humidity of the environment is >50% and around the dispensing position 80%.
- GRIPTIPS, pipettes and distilled water need to be in the calibration laboratory for at least 2 hours prior to calibration to reach temperature equilibrium with the environment.
- The balance must be validated using reference weights before and after a measuring series. A low and high volume weight should be used. E.g.:
 - 100 g (Mettler Toledo, #11119250)
 - 10 g (Mettler Toledo, #11119220)
 - 1 g (Mettler Toledo, #11119190)
 - 10 mg (Mettler Toledo, #11119130)



CAUTION

Always use new, pre-wetted GRIPTIPS for leak test and calibration.

6.3.2 Pre-wetting of tips

Pre-wet new GRIPTIPS three times prior to starting tests and calibrations. This is required every time a tip is changed.

- 1) Set the pipette to aspirate full volume.
- 2) Attach a new unused GRIPTIP which correspond to the volume range of the pipette directly from the rack without touching the tip by hand.
- 3) Use a separate waste container for pre-wet dispenses.
- 4) Push down the plunger to the first stop. Aspirate by releasing with medium speed.
- 5) Dispense: Keep the plunger pressed to the first stop until all liquid is expelled.

At the end of the third cycle push the plunger to the second stop, remove the tip from the liquid and then release the plunger to perform a two-step blowout.

6.3.3 Leak test

It is recommended to perform a leak test every 3 months or when errors occur.

- 1) Prewet the GRIPTIP as described above.
- 2) Set the pipette to aspirate full volume.
- 3) Push down the plunger to the first stop. Aspirate full volume by releasing with medium speed and verify liquid level is not decreasing during 10 seconds while the GRIPTIP is still in distilled water.
- 4) Remove the GRIPTIP from the liquid and hold the pipette at a 20° angle. Wait for 20 seconds.
Observe whether liquid droplets are forming at the end of the GRIPTIPS.
- 5) Immerse the GRIPTIP approximately 2 mm into distilled water and push and release the plunger to mix six times.
Observe whether air bubbles are forming when dispensing.
- 6) At the end push the plunger to the second stop and remove the tip from the liquid before releasing.

Signs indicating a leak

- 1) During the mix cycle in the leak test, the liquid level is decreasing.

**NOTE**

A decreasing liquid level at aspiration could be an indication of a slow leak. Performing a retest at 10 mixes may help identify a slow leak.

- 2) Liquid is left in a tip after the last dispense during the leak test.
- 3) The channel shows air bubbles during the mix cycle in the leak test.
- 4) Droplets are forming when holding the pipette in the air for 20 seconds, even if a pre-wet was performed.

If the pipette is leaking, change O-rings (see [5.5.2](#)) and lubricate pistons (see [5.5.3](#)) or contact your service technician.

6.4 Obtaining the actual volume

INTEGRA certifies the pipettes at 10% and 100% of the nominal value. For each volume 5 measurements are taken.

General

- 1) Always use new, unused GRIPTIPS, also when changing the test volume (e.g. from 200 µl to 20 µl).
- 2) Always pre-wet (section [6.3.2](#)) when using a new GRIPTIP. For a low volume measurement, first set the maximum volume for the pre-wet and then change to the volume to be measured.
- 3) After dispensing, perform a touch off to make sure no liquid remains on the tip.

Gravimetric testing

- 1) Write down the ambient temperature and air pressure.
- 2) Set the pipette to the high test volume.
- 3) Perform a pre-wet, see [6.3.2](#).
- 4) The first and second dispense to the balance should not be recorded. After each dispense re-tare the balance.
- 5) Aspirate the Target volume of water keeping the pipette in a vertical to 20-degree position while immersing the pipet tip 2–3 mm below the surface of the water. When withdrawing the tip from the liquid, gently wipe the tip against the side wall of the vessel to remove any liquid from the outside of the pipet tip.
- 6) Start the first measurement. Always pipet directly into the liquid of the weigh container on the balance. At the end push the plunger to the second stop and hold the plunger pressed until the pipette is removed from the weigh vessel to perform a 2-step blowout. Record the weight from the balance.
- 7) After completing the 5 high volume measurements, continue with the low and optionally with the mid test measurements by repeating steps 3–6.

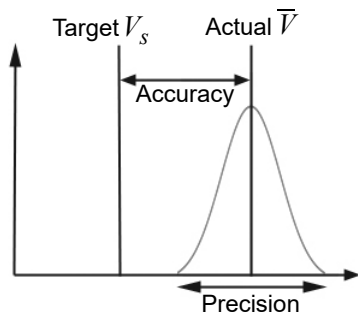
6.5 Calculation of accuracy and precision

Accuracy

The ability of a pipette to aspirate or dispense the exact volume desired. It indicates the proximity of measurement results to the true value. Accuracy is also known as systematic error and as the name indicates, can be corrected/calibrated.

Precision, coefficient of variation (CV)

Precision indicates the repeatability or reproducibility of the measurement. It is also called random error and is therefore an unpredictable error, which cannot be corrected/calibrated.



The following symbols are used throughout this text:

V_s = Selected test or target Volume

m_i = Measured Liquid Weight (g)

Z = Z factor, see 5.3

V_i = Converted Volume (ml or μ l)

\bar{V} = Actual mean Volume (ml or μ l)

n = Number of measurements

Conversion of the mass to volume

The values obtained by balance readings are in grams. These values need to be converted to micro liters using the Z correction factor. It takes into account the water density and air buoyancy during weighing at the corresponding test temperature. To determine the correct Z factor, find the intersection between temperature and air pressure in Table 5.3. Round up temperature and air pressure values.

Multiply each weight m_i obtained in 6.4 with the corresponding Z factor:

$$V_i = m_i \times Z$$

Add together the volumes V_i delivered, divide the sum by n (e.g. $n = 5$) to calculate the mean volume \bar{V} (in milliliters or micro liters) delivered at the test temperature, which is the Actual Volume:

$$\bar{V} = \frac{1}{n} \times \sum_{i=1}^n V_i$$

Calculation of systematic error (accuracy)

The systematic error e_s can be calculated using the following equation with V_s being the selected test volume:

$$e_s = \bar{V} - V_s$$

or in percent:

$$e_s = \frac{100 \times (\bar{V} - V_s)}{V_s}$$

Calculation of random error (precision %)

To calculate the random error as the repeatability standard deviation s_r , use the following equation:

$$s_r = \sqrt{\frac{\sum_{i=1}^n (V_i - \bar{V})^2}{n - 1}}$$

The random error can also be expressed as a percentage, by the coefficient of variation CV , using equation:

$$CV = 100 \times \frac{s_r}{\bar{V}}$$

If the pipette is properly calibrated, the Target volume V_s should equal the Actual volume \bar{V} within the accuracy specifications of the pipette.

6.6 Adjusting SWITCH pipettes

Compare the calculated accuracy and precision values with the corresponding pipette specifications given in section 5.2.

The industry standard is to test and present specifications using neat transfers. This is aspirating and dispensing the same volume.

In case a SWITCH pipette has not met the calibration specifications it needs to be adjusted, see 4.5.

**NOTE**

Validate the new volume set by repeating the gravimetric testing.

7 Technical data

7.1 Environmental conditions

	Operation
Temperature range	5–40 °C
Humidity range	Max. rel. humidity 80% for temperatures up to 31 °C, decreasing linearly to 50% rel. humidity at 40 °C.
Altitude range	<2000 m

7.2 Specification of the device

Dimensions and weight	Height: 260 mm, length: 70 mm, width: 30 mm Weight: 130 g
Battery	Type: rechargeable, LiPo, 3.7 V, 605 mAh Typical charging time: 2.5 hours Charging cycles: 500–1000 (when charging as indicated) Running time: approx. 1500 pipetting cycles (aspirate and dispense full volume), which relates to a normal day of work.
Electricity supply	Mains adapter input: 100–240 V, 50/60 Hz, 0.6 A Device input: 5 V, 3 A, 15 W
Pipetting channels	single
Pipetting speed	3 or 10 steps, see 7.4
Pipetting technology	Air displacement
User interface	Display, plunger, set ring, tip ejector, mode switch

7.3 Intellectual property

For patent and trademark information visit:

<https://www.integra-biosciences.com/patents-trademarks>.

7.4 Repeat Dispense mode

7.4.1 Pipetting speed

The table lists the time required for pipetting the full nominal volume of aqueous liquids.

Pipette size	2 µl	10 µl	20 µl	100 µl	200 µl	1000 µl
Speed	Pipetting time (s)					
• or 1	25.0	25.0	25.0	25.0	25.0	25.0
2	12.0	12.0	12.0	12.8	12.9	13.4
3	4.9	4.9	4.9	5.1	5.2	5.4
4	4.0	4.0	4.0	4.3	4.3	4.4
5	3.3	3.3	3.3	3.5	3.5	3.6
•• or 6	2.4	2.4	2.4	2.6	2.6	2.7
7	1.5	1.5	1.5	1.6	1.6	1.7
8	0.9	0.9	0.9	1.3	1.3	1.4
9	0.5	0.5	0.5	0.9	0.9	0.9
••• or 10	0.25	0.25	0.25	0.5	0.5	0.5

The speeds apply to firmware version 1.00 or higher.

7.4.2 Pre- and post-dispenses

To improve accuracy and precision, pre- and post-dispenses that are not to be used are performed by default in Repeat Dispense mode with the following volumes:

Pipette size	2 µl	10 µl	20 µl	100 µl	200 µl	1000 µl
% of nominal volume	5 %	5 %	5 %	3 %	3 %	3 %
Volume of pre- and post-dispenses	0.1 µl	0.5 µl	1 µl	3 µl	6 µl	30 µl

7.5 Pipette specifications

The specifications apply to neat transfers and repeat dispense mode when the instrument is used together with INTEGRA GRIPTIPS. INTEGRA can only ensure the proper function and performance of the instrument if GRIPTIPS® brand pipetted tips are used.

SWITCH Pipettes						
Part No.	Volume Range (µl)	Volume Increments (µl)	Mode (M/RD) ¹	Test Volume (µl)	Accuracy ² (±%)	Precision ³ (≤%)
2011	0.2–2	0.001	M	0.2	12.0	6.0
				1.0	3.0	1.6
				2.0	1.5	0.7
			RD	0.5	9.0	9.0
2012	1–10	0.01	M	1.0	5.0	1.5
				5.0	1.5	0.8
				10.0	1.2	0.5
			RD	1.0	6.5	6.5
2013	2–20	0.01	M	2.0	7.0	2.0
				10.0	1.6	0.5
				20.0	1.0	0.35
			RD	2.0	4.5	4.5
2015	10–100	0.1	M	10	3.5	1.0
				50	1.0	0.35
				100	0.8	0.2
			RD	10	3.5	3.5
2016	20–200	0.1	M	20	2.5	1.0
				100	1.0	0.3
				200	0.7	0.18
			RD	20	3.0	3.0
2017	100–1000	1	M	100	3.0	0.6
				500	1.0	0.3
				1000	0.8	0.2
			RD	100	2.0	2.0

1. M: Manual, RD: Repeat Dispense mode

2. Accuracy: systematic error

3. Precision: random error, coefficient of variation

7.6 Z Correction Factors

Temp. (°C)	Air Pressure (kPa)						
	80	85	90	95	100	101.3	105
18.0	1.0022	1.0023	1.0023	1.0024	1.0025	1.0025	1.0025
18.5	1.0023	1.0024	1.0024	1.0025	1.0025	1.0026	1.0026
19.0	1.0024	1.0025	1.0025	1.0026	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0027	1.0028	1.0028
20.0	1.0026	1.0027	1.0027	1.0028	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0029	1.0030	1.0030
21.0	1.0028	1.0029	1.0029	1.0030	1.0031	1.0031	1.0031
21.5	1.0030	1.0030	1.0031	1.0031	1.0032	1.0032	1.0032
22.0	1.0031	1.0031	1.0032	1.0032	1.0033	1.0033	1.0033
22.5	1.0032	1.0032	1.0033	1.0033	1.0034	1.0034	1.0034
23.0	1.0033	1.0033	1.0034	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0036	1.0037
24.0	1.0035	1.0036	1.0036	1.0037	1.0037	1.0038	1.0038
24.5	1.0037	1.0037	1.0038	1.0038	1.0039	1.0039	1.0039

Z values in microliters per milligram

8 Accessories

8.1 Accessories

Charging, communication and storage options		Part No.
Mains adapter (100-240 VAC, 50/60 Hz)	US/JP version: type A plug, 2-pole	1200
	EU/KR version: type C plug, 2-pole	1201
	UK version: type G "Commonwealth" plug, 3-pole	1202
	AU/CN version: type I, 3-pole	1203
Battery, LiPo		2205
Flex charging stand	US/JP version: type A plug, 2-pole	2215
	EU/KR version: type C plug, 2-pole	2216
	UK version: type G "Commonwealth" plug, 3-pole	2217
	AU/CN version: type I, 3-pole	2218
Wall mount for handheld pipettes		3205
Pipette rotary stand		3213
USB type A to USB type C cable		137904


Bases for reuse with ECO racks or GREEN CHOICE refills	Part No.
Small POPTOP base (for use with 12.5 µl, 125 µl and 300 µl GRIPTIPS)	3250
Large POPTOP base (for use with 300 µl long and 1250 µl GRIPTIPS)	3255
Small ECO base (for use with 12.5 µl, 125 µl and 300 µl GRIPTIPS)	3240
Large ECO base (for use with 300 µl long and 1250 µl GRIPTIPS)	3245

8.2 Consumables

Colored O-rings for tip fittings	Part No.
O-ring for 200/300 µl tip fittings, pack of 24	100-00027-50
O-ring for 1000/1250 µl tip fittings, pack of 24	100-00028-50
O-ring removal tool for 300 µl and 1250 µl pipettes (also suitable for 200 µl and 1000 µl pipettes)	161916


Grease for pipettes and O-rings	Part No.
Klueberalfa lube, 10 g, for single channel pipettes 2 µl – 1000 µl	200153

Reservoirs 10 ml, disposable inserts**Part no.**

	Reservoir base 10 ml, pack of 10	4306
SureFlo™, polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4370
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4371
	Sterile, pack of 200 (4 sleeves, 1 base)	4372
	Sterile, pack of 50	4373
Polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4330
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4331
	Sterile, pack of 200 (4 sleeves, 1 base)	4332
SureFlo™, polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4375
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4376
	Sterile, pack of 200 (4 sleeves, 1 base)	4377
Polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4335
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4336
	Sterile, pack of 200 (4 sleeves, 1 base)	4337

• SureFlo™ = anti-sealing array


Reservoirs 25 ml, disposable inserts**Part no.**


	Reservoir base 25 ml, pack of 10	4304
SureFlo™, Polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4380
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4381
	Sterile, pack of 200 (4 sleeves, 1 base)	4382
	Sterile, pack of 50	4383
Polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4310
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4311
	Sterile, pack of 200 (4 sleeves, 1 base)	4312

Reservoirs 25 ml, disposable inserts		Part no.
SureFlo™, polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4385
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4386
	Sterile, pack of 200 (4 sleeves, 1 base)	4387
polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4315
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4316
	Sterile, pack of 200 (4 sleeves, 1 base)	4317


• SureFlo™ = anti-sealing array

Divided reservoirs 25 ml, disposable inserts		Part no.
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	Reservoir base 25 ml, pack of 10	4304
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	Two compartments, 5 + 10 ml	
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SureFlo™, divided (5 + 10 ml), polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4350
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4351
	Sterile, pack of 200 (4 sleeves, 1 base)	4352
	Sterile, pack of 50	4353
SureFlo™, divided (5 + 10 ml), polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4355
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4356
	Sterile, pack of 200 (4 sleeves, 1 base)	4357
	Sterile, pack of 50	4358

	Twelve 3 ml compartments with 9 mm well spacing	
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SureFlo™, divided (12 x 3 ml), polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4360
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4361
SureFlo™, divided (12 x 3 ml), polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4365
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4366

SureFlo™ = anti-sealing array

Reservoirs 100 ml, disposable inserts**Part no.**

Reservoir base 100 ml, pack of 10	4305
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SureFlo™, polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4390
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4391
	Sterile, pack of 200 (4 sleeves, 1 base)	4392
	Sterile, pack of 50	4393
Polystyrene	Trial pack, sterile (3 reservoirs, 1 base)	4320
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4321
	Sterile, pack of 200 (4 sleeves, 1 base)	4322
SureFlo™, polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4395
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4396
	Sterile, pack of 200 (4 sleeves, 1 base)	4397
Polypropylene	Trial pack, sterile (3 reservoirs, 1 base)	4325
	Sterile, pack of 30 (30 individually wrapped, 1 base)	4326
	Sterile, pack of 200 (4 sleeves, 1 base)	4327

- SureFlo™ = anti-sealing array

8.3 GRIPTIPS

INTEGRA offers a wide range of GRIPTIPS for the SWITCH pipettes.



Visit the GRIPTIP Selector Guide (www.integra-biosciences.com/griptips) to find the correct GRIPTIPS and set a filter by available volumes, packaging and properties.

8.3.1 GRIPTIPS for handheld pipettes

SWITCH pipettes are compatible with GRIPTIPS for handheld pipettes.

8.3.2 Package options

- **ECO racks** (3xxx series): lightweight PET racks, environmentally friendly with 60% less plastic. They have a carbon footprint half the amount of standard racks. Most convenient experience when paired with the reusable ECO Base or POPTOP Base.
- **GREEN CHOICE** (44xx series): environmentally friendly refills reduce plastic waste by allowing the reuse of existing racks or can be inserted in the POPTOP Base.
- **Bulk packs**: tips in a resealable bag for hand loading.

If recycling is possible in your region, reuse the cardboard box your GRIPTIPS are delivered in for collection by a parcel service.

8.3.3 GRIPTIP properties

According to our cleanroom standards, all GRIPTIPS (non-sterile and sterile) comply with our VIAPURE claims. This states that all product are RNase, DNase, endotoxin and pyrogenic free.

- **Sterile** products are gamma irradiated within the minimum and maximum dosage range specified for INTEGRA sterile products. Racks are individually vacuum sealed in a bag and are considered sterile until opened. The entire case of 5 pre-sterilized GREEN CHOICE inserts are sealed.
- **Non-sterile** items are manufactured in the same cleanroom and packed in a carton case.
- **Long**: longer design allows easy access into deep laboratory vessels
- **Short**: shorter design allows easy access in 1536 well plates or improves ergonomics
- **Wide bore**: large opening at the tip end, reduces shear forces
- **Low retention**: low liquid retention, for liquids with low surface tension