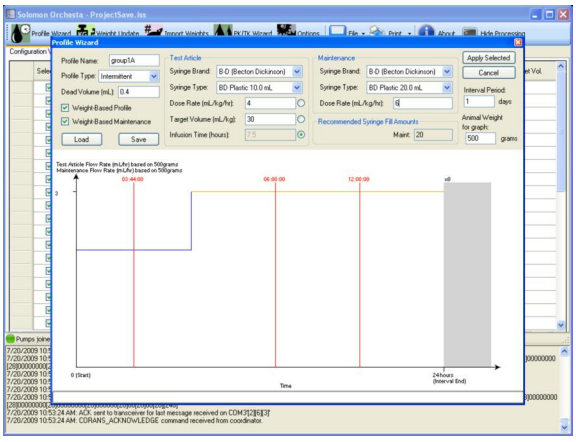
ORCHESTA™ INFUSION AUTOMATION

Instech's OrchesTA™ Infusion Automation system was developed over several years in close collaboration with CROs to automate preclinical infusion toxicology studies. Built not around pieces of hardware or software, but rather the processes of GLP infusion studies, the system comprises validated control and monitoring software, a simple but robust wireless network that can be run by animal technicians without IT experience, and clinical-grade pumps—either syringe pumps (typically for rodents) or ambulatory pumps (typically for large animals).

Small Animal (Syringe Pumps)

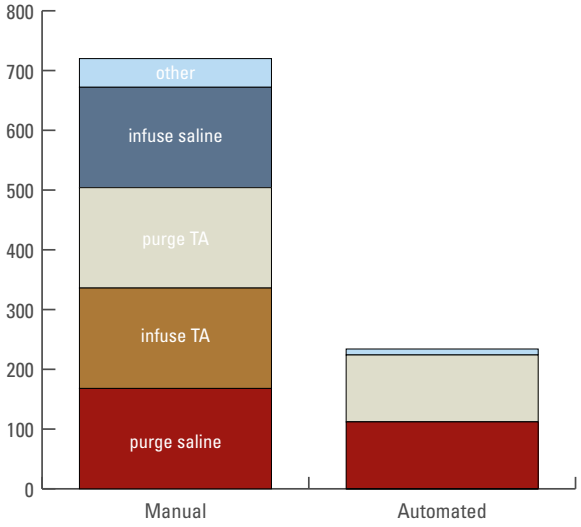
OrchesTA version D software controls and monitors a network model 100 syringe pumps to streamline and automate large-scale rodent infusion toxicology sutides.

Automated Programming. Pump programming for multiple dose groups takes less than twenty minutes at the PC during study setup. Flow rates are updated automatically by importing new weight tables. As a result, OrchesTA can increase productivity by more than 100%. Furthermore, since each manual keystroke is a chance for human error, it can reduce the opportunities for dosing and documentation errors by more than 99%.



LABOR SAVINGS

Total labor for a 200 animal, 28 day study with 1 intermittent dose/day (hours)



Alexander A (Covance Laboratories), "Use of an Automated Infusion Pump/Software System to mitigate challenges inherent to Preclinical Infusion Studies," presentation at ITO Conference, Barcelona, 15 Sep 2011; customer interviews.

ERROR REDUCTION

Total opportunities for errors in a 200 animal, 30 day study with 1 intermittent dose/day

	Manual	Automated
Software keystrokes	0	99
Pump keystrokes	114,000	0
Incorrect syringe loading	12,000	0
Incorrect animal ID	18,000	200
Dose spreadsheet	15,200	0
Documentation	48,000	0
Total	201,200	299
Reduction		99.85%

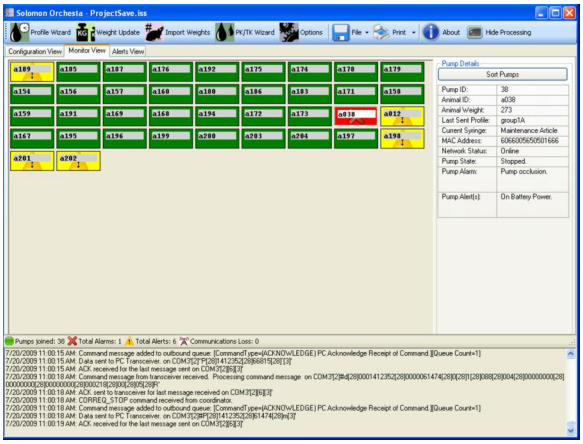
Agate J, Jacobson A (Solomon Scientific), "Dosing & Documentation Errors in Preclinical GLP Infusion Studies," Jan 2011.

Test Article Edge Tracking. This patented* feature of the OrchesTA software calculates and records the exact time that test article enters the animal and the time that the dose is complete when switching from saline to test article and back to saline, eliminating tedious manual calculations.

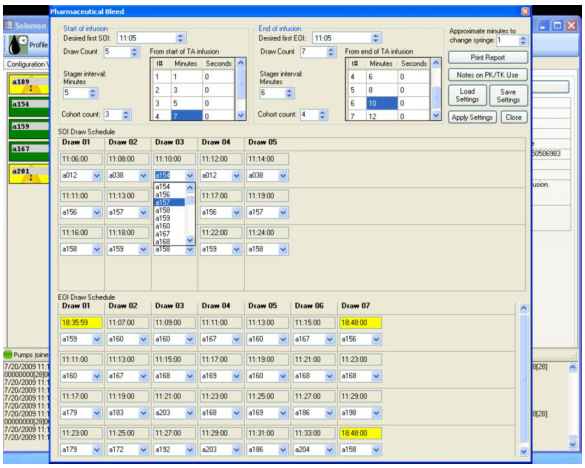
Multi-step Infusion Profiles. The software supports studies with loading doses and multiple infusion rates, even optional pauses.

Email or Text Message Alerts. Remote alarming reduces the amount of on-site monitoring required by valuable personnel. Sophisticated templates make sure the right staff member receives alerts in an appropriate timeframe.

Centralized Monitoring. All pumps are displayed real-time on a single PC monitor. Pump alarms are displayed on the monitor in red. Less serious alerts are displayed in yellow.



PK/TK Scheduling. OrchesTA™ simplifies complex planning of PK/TK blood samples by scheduling all samples and automatically adjusting saline purge rates so that test article is delivered to each animal at the intended time and at the prescribed rate.



Automated Documentation. Validated for GLP and Part 11 compatibility, the software records every PC and pump interaction and system event with time/date, user ID and user explanation data, replacing all handwritten documentation and creating a robust audit trail. The software compiles infusion study data into numerous formatted final reports.

Robust Wireless Network. OrchesTA™ uses a secure network designed specifically for the challenges of animal laboratories. The IEEE 802.15.4 standard is meant for a high number of small devices, low power consumption, low bandwidth and ease-of-use—exactly what is needed for a network of infusion pumps. By comparison, Wi-Fi is designed for high bandwidth and requires more power, and Bluetooth is meant for a small number of devices at close range.

Large Animal (Ambulatory Pumps)

Jacket courtesy of Lomir Biomedical

The OrchesTA™ version G software controls and monitors model 500 ambulatory pumps (p55) to deliver a number of benefits in addition to automated programming and documentation of large animal infusion studies.

Remote Start/Stop. Minimizing interaction with animals can be critical in telemetry, cardiology and addiction studies.

Variable Front-End Purge. The start time of test article administration is controlled precisely without having to prime test article to the catheter tip, improving patency and avoiding the risk of test article entering circulation earlier than planned.

Automatic Restart After Occlusion. If an occlusion occurs that resolves itself without human intervention (for example, the animal moves and unkinks tubing), the system will, optionally, restart ther pump automatically when the pressure falls to an acceptable range.

SPECIFICATIONS

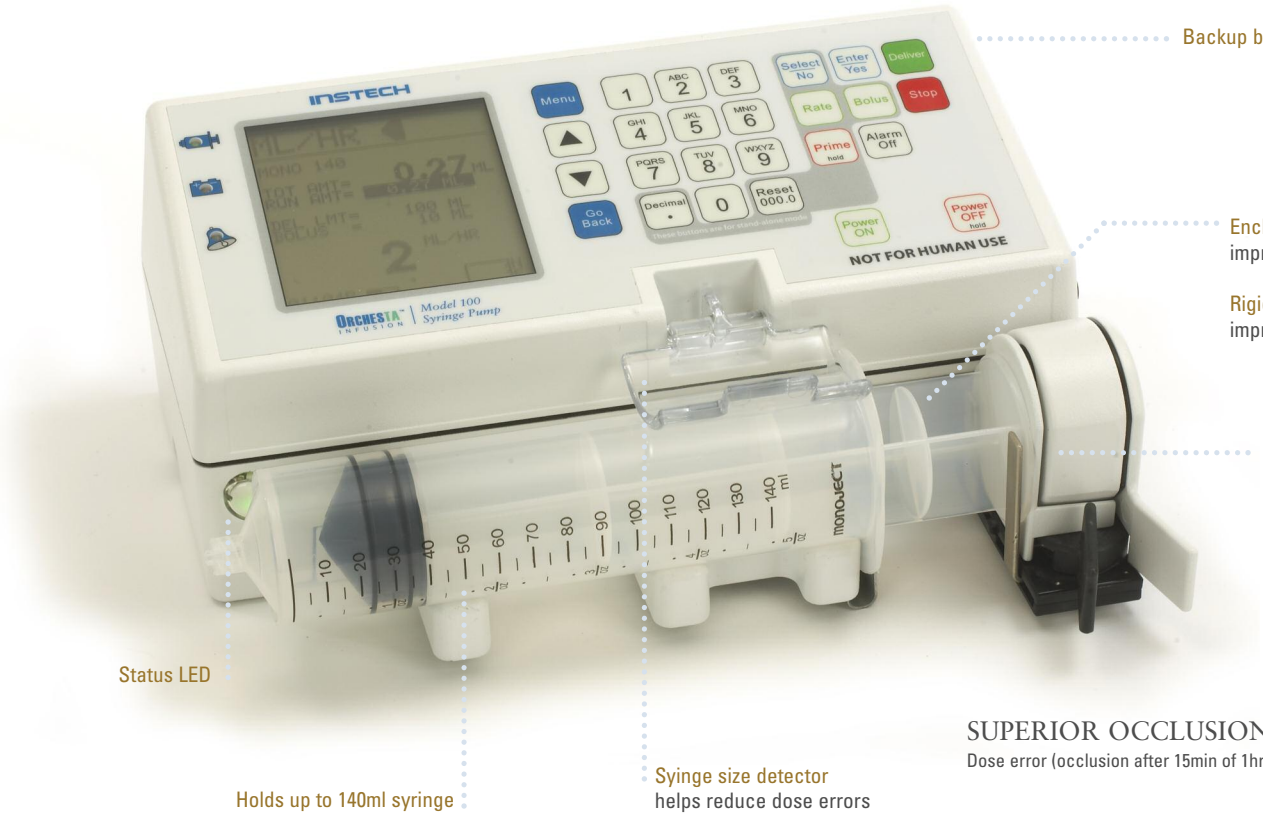
Operating System	Microsoft Windows® 7
Software versions	D – for model 100 syringe pumps G – for model 500 ambulatory pumps
Pumps per study	Up to 300
GLP compatible	Yes
21 CFR Part 11 compatible	Yes
Wireless network	IEEE 802.15.4
Wireless range	~30m (can be extended)
Channels	16
Encrypted	Yes

* US Patent no. 8,394,077

ORCHESTA™ SYRINGE PUMP

The OrchesTA model 100 syringe pump is a modern hospital pump with firmware that has been adapted for laboratory animal research. It can be used as a stand-alone pump or combined with an OrchesTA pump transceiver to create a network of pumps controlled by the OrchesTA™ Infusion Automation software.

Features that are most important for laboratory animal infusion include the ability to accept a 140ml syringe (it is the only clinical pump that can do this), superior performance when there is an occlusion in the line, a backup battery, and a lead screw that is not exposed to debris.



Backup battery

Enclosed lead screw improves reliability

Rigid metal construction improves accuracy

In-line force transducer senses occlusions faster than other pumps. Auto-backup on occlusion option reduces risk of unintended bolus when occlusion is cleared.

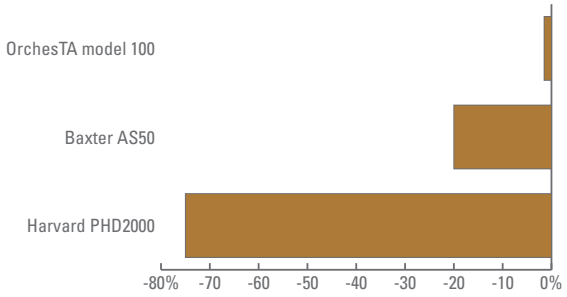
Status LED

Holds up to 140ml syringe

Syringe size detector helps reduce dose errors

SUPERIOR OCCLUSION PERFORMANCE

Dose error (occlusion after 15min of 1hr infusion, 2ml/hr, 3ml syr, rodents)[a]



SPECIFICATIONS

Accuracy	±3%, excluding syringe variations
Syringe sizes	1-140ml
Syringe detection	Automatic
Syringe types	Becton Dickinson (plastic and glass), Monoject, Terumo, Nipro, others
Flow rates	0.01 – 3,000 ml/hr (depends on syringe)
Backup battery	~12 hours
Occlusion sensor	In-line force transducer
Occlusion back off	Automatic
Dimensions	24x10x15cm
Weight	2.2kg
Power	120VAC, 115mA, 50/60Hz or 240VAC, 90mA, 50/60Hz
CE Mark	Yes

NOTE: The OrchesTA model 100 version of this pump is not approved for human use.

[a] J Sommers, Presentation at ITO Conference, Cologne Germany, September 2015.

Part No.	Description
OR-100-0001	OrchesTA model 100 syringe pump, 120V, US cord
OR-100-0002	OrchesTA model 100 syringe pump, 240V, UK cord
OR-100-0003	OrchesTA model 100 syringe pump, 240V, Euro cord
OR-100-0901	Pump clamp for round poles (2.2-2.9cm in diameter)
OR-100-0902	Pump clamp for square poles (2.2-2.5cm wide)
OR-100-1001	PT100 wireless transceiver for model 100 pump
OR-100-1080	PCT200 PC transceiver, for model 100 pumps

ORCHESTA™ AMBULATORY PUMP

Weighing only 180g, the OrchesTA model 500 pump (formerly Pegasus) is one of the most versatile pumps for ambulatory animal infusion. The peristaltic mechanism uses cost-efficient tube sets to deliver 0.1-100 ml/hr pulling from drug bags ranging from 50 to 300ml. The pumps are typically placed in the pocket of a Lomir jacket and the drug bag can be protected in a box.

Connect the model 500 pump with a cable to an OrchesTA pump transceiver and you can now control and monitor your infusion study remotely—limit human interaction with the animals, automate repetitive tasks and reduce the opportunities for programming and documentation errors.

Ideally suited for ambulatory infusion when placed in a jacket pocket. IV access is typically made through a subcutaneous port.

SPECIFICATIONS

Pump type	Linear peristaltic
Flow rates	0.1-100ml/hr
Accuracy	±5%
Pulse size	7µl
Alarms	Occlusion, bag empty, battery, others
Alarm mute	Yes
Battery	2 x AA
Battery life	~1000ml with 3000mAh lithium batteries
Dimensions	8.7x6.4x3.3cm
Weight	180g with batteries
CE Mark	Yes

NOTE: The OrchesTA model 500 version of this pump is not approved for human use.

Part No.	Description
OR-500-0001	OrchesTA model 500 peristaltic pump (PEGA® LAB; 0.1-100ml/hr)
OR-500-1000	OrchesTA model 500 peristaltic pump tube (PEGA® tube 10255)
OR-500-1205	OrchesTA model 500 drug bag, PVC, 50mL (PEGA® bag 14050)
OR-500-1210	OrchesTA model 500 drug bag, PVC, 100mL (PEGA® bag 14100)
OR-500-1215	OrchesTA model 500 drug bag, PVC, 150mL (PEGA® bag 14150)
OR-500-1230	OrchesTA model 500 drug bag, PVC, 300mL (PEGA® bag 14300)
OR-500-1405	OrchesTA model 500 plastic box for 50ml drug bag (PEGA® box 10405)
OR-500-1410	OrchesTA model 500 plastic box for 100ml drug bag (PEGA® box 10410)
OR-500-1415	OrchesTA model 500 plastic box for 150ml drug bag (PEGA® box 10415)
OR-500-1003	OrchesTA PT500 wireless transceiver for model 500 pump
OR-500-1080	OrchesTA PCT200 PC transceiver, programmed for model 500 pumps

Drug bags

Protective boxes attach to the bottom of the pump