METRON

lagu

2-channel Infusion Pump Tester

PRODUCT HIGHLIGHTS

- 2 independent measuring channels test 2 infusion pumps simultaneously
- High accuracy and resolution
- Simple to operate
- High sampling rate - Flow measurements every second
- Requires only 0.35µl to detect any sudden flow change
- Generates a user-defined back pressure to load the infusion pump during test
- Performs flow tests, bolus tests and occlusion alarm tests
- Measuring range: 0.10 ml/h -1000.0 ml/h
- Shows trumpet curve in accordance with IEC 601.2.24 via PRO-Soft ***lagu***
- User-defined test protocols via PRO-Soft ***lagu***
- RS-232c, Bar Code and Centronic printer interface.

OVERVIEW

lagu Infusion Pump Tester completes tests according to IEC 601.2.24 standard. This includes taking flow measurements every 30 seconds so that the measurements are independent of the infusion pump's flow rate. ***lagu*** is capable of detecting volume variations of 0.18 µl in a range of 0.10 ml/h - 1000.0 ml/h.

lagu is a true dual channel infusion pump tester. Each channel is operated independently using its own measuring system.

lagu can test all types of infusion pumps. It carries out flow tests, bolus tests and occlusion alarm tests.

PRO-Soft ***lagu*** software lets you to remotely control the tester from a PC. It allows you to create automated test sequences, run the tests, print the results, and/or store them to disk. With PRO-Soft ***lagu***, you may automatically test infusion pumps over long periods and against various loads. PRO-Soft is also designed to retrieve information from an equipment management database and update the database with test results.

lagu – Specifications

MEASUREMENTS

Infusion pump testers calculate flow rate from the measured time period to fill up a defined volume. If it takes 1 hour to fill up a defined volume of 10 ml, the flow rate is calculated to be 10 ml/h. This flow rate is called the *instant flow rate*. The *minimum volume detection* of this measurement is 10 ml, since it needs 10 ml to get the instant flow rate calculated. The next instant flow rate calculation may be done when an additional volume of 10 ml is delivered to the measuring device. When two or more instant flow rates have been obtained, the calculation of *mean flow rate* may be done by averaging the instant flow rates.

Sudden (not expected) flow change - importance of the *minimum volume detection.*

It is important to check out if the infusion flow is steady or not. It is important to detect any sudden (not expected) flow change. That's what infusion pump tests are all about!

Detection of sudden (not expected) flow changes requires detection of tiny infusion volumes. As flow measurements may only be calculated every time the defined volume is filled up. Ability to detect small infusion volume gives a short time between each measurement, hence a high flow-sampling rate. Ability to detect only larger infusion volume decreases the sampling rate and decreases the ability to detect sudden flow change. International standards describe flow-samplings to be done at every 30 sec. for all flow rates. This discloses any sudden (not expected) flow changes within 30 sec. to ensure a steady infusion from all types of infusion devices. To fulfil this requirement, minimum volume detection of the measuring device is critical.

Example:

To test the infusion pump against sudden (not expected) flow change at a flow rate of 10 ml/h with an accuracy of ± 2%, the following minimum flow detection is needed:

Expected flow:
10 ml/h = 166.7 µl pr. minute (divide by 60) = 83.3 µl pr. 30 sec. (divide by 2)

2% of expected flow:
83.3 µl pr. 30 sec. x 2% = 1.67 µl pr. 30 sec.

A volume detection of 1.67 µl is required to detect a 2% sudden (not expected) flow change from an expected flow rate of 10 ml/h within 30 sec.

***lagu* - Minimum volume detection.**

The minimum volume detection of ***lagu*** is 0.35 µl. That means less than 0,5 µl is needed for ***lagu*** to detect any sudden flow change in the range of 0.10 ml/h to 1000.0 ml/h.
lagu performs flow-samplings every second for all flow rates. We are proud to highlight this feature out of the many unique features of ***lagu***.

FLOW RATE

Flow range: 0.10 ml/h - 1000.0 ml/h
Min. volume detection: 0.35 µl

Display resolution: 0.01 ml/h

Theoretical time Interval to achieve ± % Accuracy of reading:

1000 ml/hr	Accuracy	Time
	0.5%	0.6 sec.
	1%	0.3 sec.
	1.5%	0.2 sec.

100 ml/hr	Accuracy	Time
	0.5%	6 sec.
	1%	3 sec.
	1.5%	2 sec.

10 ml/hr	Accuracy	Time
	0.5%	52 sec.
	1%	26 sec.
	1.5%	18 sec.

Back Pressure Generation:

Range: -200 to +600 mmHg

Accuracy: -200 to +200 mmHg: ±10 mmHg
+201 to +600 mmHg:±20 mmHg

Factory calibration:

The ***lagu*** unit is calibrated to following specification if not any other requirement is specified:

Flow: 2% of reading @ 0 mmHg
Pressure: 2% of reading or ±10 mmHg

OCCLUSION ALARM TEST

Measurement range: -400 to +1500 mmHg

Accuracy:
-400 to +500 mmHg: ±10 mmHg
+501 to +1500 mmHg: ±2 % of reading

Maximum input pressure: 2500 mmHg

BOLUS TEST:

Accuracy: ±20 µl

FOLLOWING FEATURES

The PRO-Softs ***lagu*** program provides the opportunity to test infusion pumps over long periods and with various loads. You can choose among several pressure units. It creates user defined test sequences for each type of infusion pump to be tested. With routine control, this program retrieves the relevant test sequence and caries out the test as per the previous control. The results are shown either graphically or numerically, and can be sent to file and/or printed directly from the analyzer. The graphical presentation is both as a flow vs. time graph and the trumpet curve.

GENERAL INFORMATION

TEMPERATURE REQUIREMENTS:

+15°C to +35°C while operating
0°C to +50°C for storage

DISPLAY:

Type: LCD graphic display
Alphanumeric format: 4 lines by 40 characters
Display control: 7 F-keys and a keypad

DATA INPUT/OUTPUTS (2):

Parallel printer port (1); Bi-directional RS-232C (1) for Computer control

POWER:

From 100 VAC to 240 VAC, 47/63 Hz

HOUSING: Metal case

DIMENSIONS: D x W x H:
245 mm x 235 mm x 135 mm
9.65 in x 9.25 in x 5.31 in

WEIGHT: 4.3 kg / 9.48 lb

STANDARD ACCESSORIES:

User/Service Manual ***lagu***

RECOMMENDED PRINTERS:

HP Desk Jet, Canon Bubble Jet or compatible.

lagu Infusion Pump Tester Ordering Information

Order no:

15000: QA-IDS/***lagu*** 1 channel Infusion Pump Tester
15500: ***lagu*** 2 channel Infusion Pump Tester

Accessories:

15100: Carrying Case
15512: PRO-Soft ***lagu***
15513: PRO-Soft ***lagu*** demo
15514: User Manual PRO-Soft ***lagu***
15510: User/Service manual ***lagu***