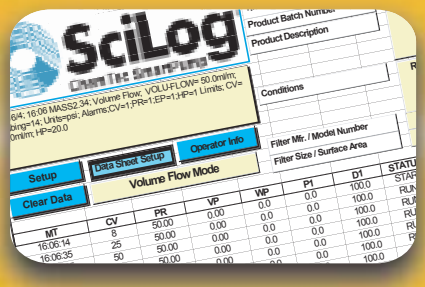
ChemTec™

Intelligent Metering System

- *Automated Feed Regulation with Cell Growth Monitor*
- *Programmed Linear or Exponential Feed by Weight or Volume*
- *Real-Time Data Collection and Graphing*
- *Programmable Control of Two 6-Port Rotary Valves*
- *Other Apps Include: Automated pH and Perfusion*
- *Automated Preparative Chromatography*
- *Monitor Remotely; Safe Walk-Away System Operation*

i n t e l l i g e n t m e t e r i n g s y s t e m s



SciLog®
Intelligent Metering Systems

www.scilog.com Ph: (800)955-1993

ChemTec™

Bioreactor and Fermenter Feeding

SciLog® Intelligent Metering Systems

The ChemTec™ Metering System includes on-board application software and hardware that automates, optimizes and documents high precision metering by weight or volume. The ChemTec™ System is an exclusive software-driven fluid delivery system that automatically regulates feed-rate based on user defined time schedule or feedback from sensors and detectors (e.g. Cell Growth Monitor).

Control External Devices (On/Off)
Four (4) Programmable TTL Switches

Monitor Biomass, pH, etc.
Just plug-in an input detector with a 4-20 mA signal

Meter By Weight!
High Precision & Accuracy.
Just plug in the Balance/Scale.

Control/Monitor pressure of your process! Uses Disposable Pressure Sensors, Pressure Range: 0-60psi

Monitor Temperature of your process! Temperature will be documented during your process!

Foot Switch Port for Remote Start/Stop Pump Control

1)Document your process on Excel spread sheets.

2)Document your process with SciLog's Printer, "real-time" printout of variables

Automated Liquid Handling, for serial chemical introduction, i.e. Automated Chromatography Use 1 or 2 SciLog 6-port Rotary Valves.

Easy Access to change a fuse. ChemTec™ is Double Fused

ON/OFF Power Switch

** US Patents:*
6,607,669; other patents pending

ChemTec™ Pump Head Options:


Peristaltic

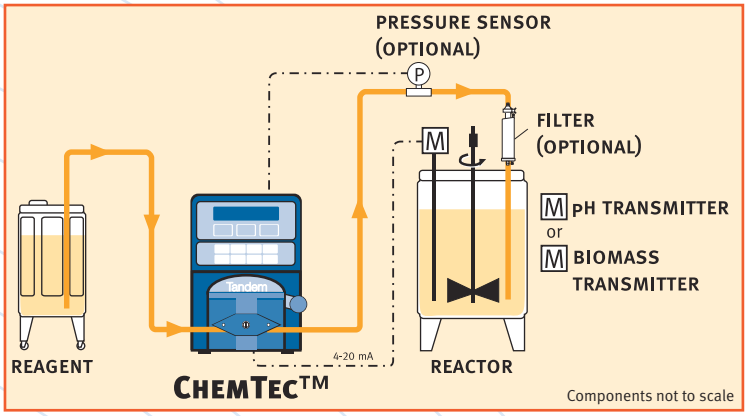

Piston Head


Magnetic Gear


"Piggy-Back Tandem"

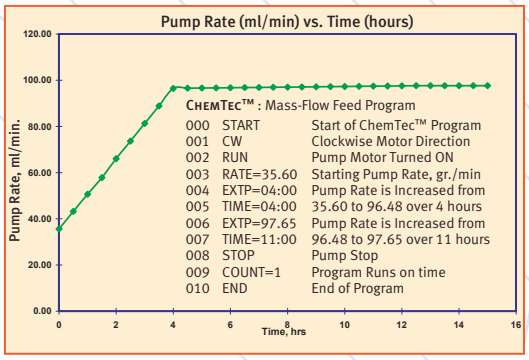

Q-Piston

1. Reactor Monitoring / Control: *Use of pH and Biomass Monitors*



Programmable Modes:

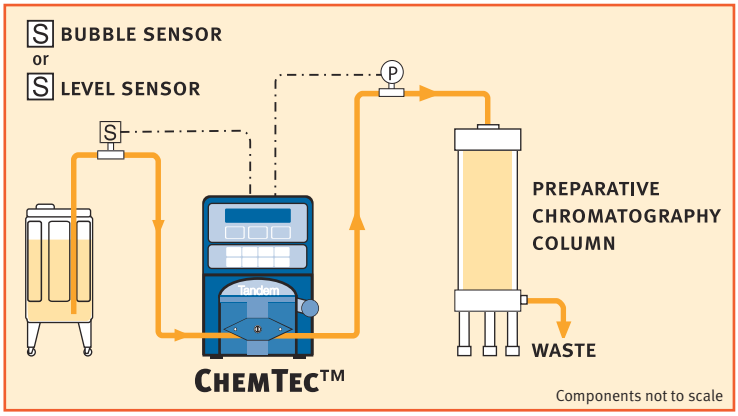
The ChemTec™ Smart Metering System provides user-definable bioreactor feeds either by volume or by weight. The "Tandem" two-channel peristaltic pump head allows simultaneous "feed and bleed", capable of maintaining a constant reactor volume. By connecting to an electronic scale, the ChemTec™ becomes a self-calibrating metering system. The feed rates are executed on a user-programmable time schedule. Linear and exponential feed gradients are readily implemented from the ChemTec™ front panel. More complex user-programs are prepared and stored in Note Pad (in your PC) and uploaded to the ChemTec™.



Biomass Monitoring Mode:

The ChemTec™ accepts 4-20 mA signals from sensors or detectors. Turbidity monitors such as those manufactured by Wedgewood Technology, Mettler–Toledo and others, provide a 4-20mA signal that is proportional to the reactor biomass. In the "Biomass Monitoring" mode, the ChemTec™ pump output is directly proportional to the signal received from the (turbidity) monitor. In this configuration, the ChemTec™ automatically provides the correct amount of nutrient solution to support biomass growth. Alternatively, a user-definable set-point maintains a constant turbidity level.

2. Preparative Chromatography: *Safe, Unattended Column Loading*



Summary:

When loading large, preparative chromatography columns, the loading pump rate must frequently be reduced from its initial setting, particularly, when solution constituents retained by the column cause an increase in column flow resistance. Thus, when operating at a constant pump rate, the column inlet pressure tends to increase over time. Significant operator time and attention must be paid to monitoring and adjusting the loading pump rate, in order to avoid excessive pressure build-up and column compaction. These issues are completely avoided when using the ChemTec™ with an in-line pressure sensor.

Features:

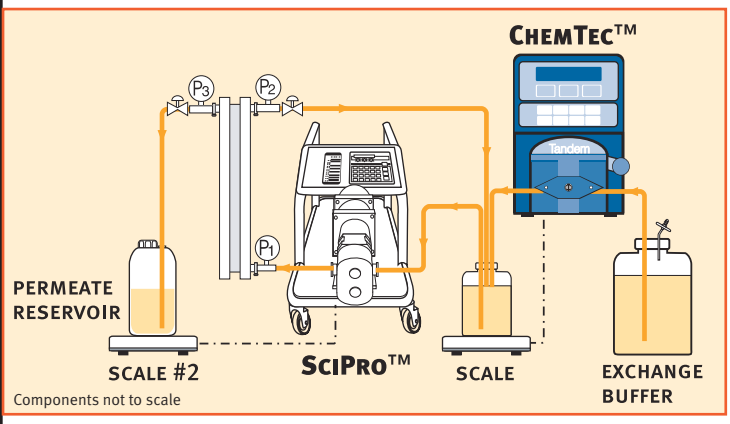
In the "Chrom-Loading" mode, the ChemTec™ provides user-defined pump rates while, simultaneously, monitoring the column back pressure. Once a safe, pre-set pressure limit has been exceeded, the ChemTec™ automatically switches from a constant rate delivery to a constant pressure delivery, thereby avoiding unsafe pressure build-up and column compaction. The ChemTec™ maintains a pre-set, constant pressure level by modulating the pump output. The ChemTec™ stops when a pre-set solution volume has been loaded onto the column. Alternatively, a bubble detector or level sensor, placed between the process reservoir and the ChemTec™, provides a pump-stop signal when the process reservoir has been emptied. The ChemTec™ provides a safe, hands-off column loading capability.

pH Control/Titrations Mode:

The ChemTec™ automates pH control as well as titrations in larger-volume reactor applications. In the pH control mode, the ChemTec™ is connected to a pH transmitter with a 4-20mA output. The ChemTec™ provides user-definable pH Set-Point, which the ChemTec™ will maintain by adding small increments of reagent. The pH Set-Point can be maintained indefinitely within 0.10 pH unit, i.e. the smallest selectable pH Bandwidth. For titration applications, the user-definable pH Set-Point represents the titration endpoint, e.g. pH Set-Point = pH 7.00 for a simple acid/base neutralization reaction.

p p l i c a t i o n s

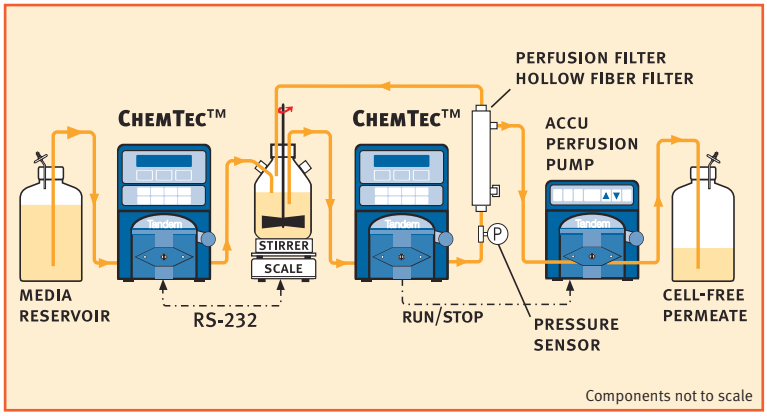
3. Diafiltration: *Use of Scale to Maintain Constant Retentate Volume*



Summary:
For automated diafiltration ("washing") of protein solutions, the ChemTec™ is connected to an electronic scale on which the retentate reservoir is located. In the "Diafiltration" mode, the ChemTec™ is programmed to maintain a constant retentate weight. The ChemTec™ automatically adds exchange buffer to the retentate reservoir to make up for the collected permeate. The ChemTec™ adds exchange buffer until a user-defined volume limit has been attained. The ChemTec™ also provides a Stop/Start control over the diafiltration system.

Features:
The SciPro has two filtration modes; diafiltration is carried out by constant pump rate or by constant trans-membrane pressure (TMP). The SciPro is a self-supervisory bioprocessing system that offers five (5) user-definable alarms. All alarm parameters, including TMP and pressures P1, P2 and P3 are continuously monitored and displayed. All pump parameters can be printed out or sent to your computer for data archiving.

4. Perfusion: *Continuous Protein Harvesting of Mammalian Cell Cultures.*



Summary:
The use of small-scale mammalian cell cultures maximizes the production of valuable protein and avoids the high capital costs associated with system scale-up. However, for a continuous protein harvesting system, components need to be selected that guaranty a failure-free system operations for days and weeks.

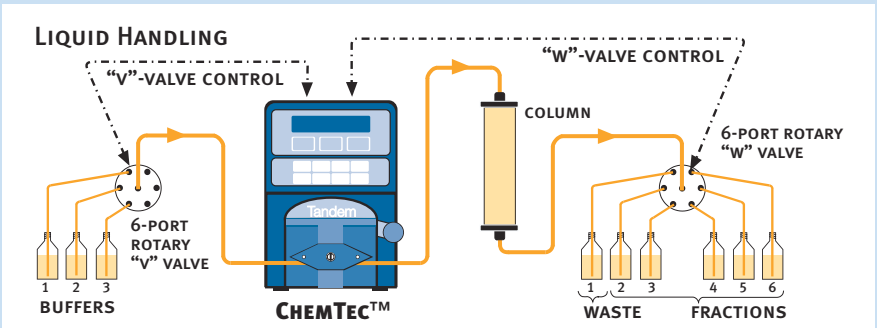
The ChemTec™ meets this performance standard. Problems of maintaining a constant bioreactor fluid level are frequently associated with level probes and sensors that become inoperable over time. Excessive solution foaming, as well as a general gumming up of level sensors, are the primary causes for system failures. These long-term performance issues are completely avoided when using the ChemTec™ with a scale.

Features:
In the "Perfusion" mode, the ChemTec™ (#1) automatically meters fresh media into the bioreactor in response to the continuous removal of cell-free permeate by the ACCU perfusion pump. The ChemTec™ displays and documents the bioreactor weight as well as the media volume that has been added to the reactor.

A second ChemTec™ (#2) is used as an automated recirculation pump that also controls the operation of the ACCU harvesting pump. The ChemTec™ (#2) will stop and alarm as soon as a user-defined pressure limit has been exceeded, simultaneously, the unit will stop the ACCU perfusion pump.

Automated Solution Handling

For example, controlling two (2) rotary valves simultaneously, the ChemTec™ automates the liquid handling of lab-scale preparative chromatography. The pump rates, as well as the port positions of the two rotary valves, are controlled on a user-programmable time schedule. Stored liquid handling programs can be uploaded or downloaded from the ChemTec™ using the PC Hyperterminal. No third-party software is required!



specifications

Dimension:	Width: 5.75 in (14.6cm); Height: 8.5 in (212.6); Depth: 11in (27.9).
Weight:	14 lbs (6.4kg).
Enclosure:	16 Ga, aluminum baked epoxy blue.
ChemTec™ Pump Head/ Motor Options:	**Peristaltic Models available with Tandem 1081 and/or 1082 heads:** Tandem 1081 uses Masterflex peristaltic pump tubing (thin-walled) sizes: #13, 14, 16, 25, 17 & 18. Tandem 1082 uses Masterflex peristaltic pump tubing (thick-walled) sizes: #15, 24 & 35. Tandem peristaltic heads can be piggyback to double flow range. ChemTec™ CP-8, max. 8 RPM, Flow Range with one Tandem head: 0.03 - 24 ml/min. ChemTec™ CP-120, max. 160 RPM, Flow Range with one Tandem head: 0.5 - 554 ml/min. ChemTec™ CP-200, max. 600 RPM, Flow Range with one Tandem head: 2 - 2258 ml/min. **Piston Models available mounted with different sized piston heads & choice of wetted parts, e.g. ceramic, 316SS, Kynar, Tefzel. Max pressure 25-100 psi depending on head choice:** ChemTec™ FM-420, max. 450 RPM, choice of RH piston head, Flow Range: 0.01 - 50 ml/min. ChemTec™ FM-520, max 3400 RPM, choice of RH piston head, Flow Range: 2 - 370 ml/min. ChemTec™ FM-200, max. 600 RPM, choice of Q piston head, Flow Range: 5 - 768 ml/min. **Magnetic Gear Models available mounted with different sized magnetic gear heads & choice of wetted parts, e.g. Ryton, Teflon, 316SS. Pulse-less flow. Max. pressure 40-70 psi depending on head choice:** ChemTec™ MP-320, max. 3400 RPM, choice of magnetic gear sized head, Flow Range: 5 - 3,700 ml/min.
Pressure Range: Tandem Head Pump	Maximum pressure output at tandem peristaltic pump head is 45 psi. Has single point recalibration feature, when used in volume metric mode. No calibration required when scale is hooked up.
Pressure Displayed:	Pressure displayed with a resolution of 0.1 psi; choice of bar, psi, kpa.
Pressure Sensors:	Accommodates SciLog™ disposable pressure sensors. The calibrated pressure range is 0-60 psi. Any point within this range can be re-calibrated using an external pressure reference source.
Power:	115/220-240 VAC, 60/50Hz, 75 Watts; double fused: T1AL 250V (CE: IR35A 250VAC)
Encoder:	100 pulses per motor revolution for 600 RPM motor. 120 pulses per motor revolution for 8 and 160 RPM motors. And 450 RPM and 3400 RPM motors
ChemTec™ Balance Options:	• Balance with capacity of 2,000 grams x 0.01 g and 8,100 g x 0.1 resolution are most popular. • Larger balance capacities up to 300 Kg available. *Ask Scilog*
ChemTec™ Software:	• Main menu with eleven operational modes including 6 user definable alarms. • Meter by weight or by volume at a constant rate, with linear ramps or with exponential ramps.
Documentation Software for PC:	• SciDoc™ interface software with custom macros for Excel® for data compilation. Sent to you ready to use. • Complete process analysis with graphing of data. • Real-time verification and documentation of process parameters.
Use Range:	4˚ to 40˚ C, 100% Humidity.
Motor:	Choice of five (5) motors: 8, 160, 600, 450 and 3400 RPM at 30VDC, 3.8 Amperes, Variable Pump Speed, optically encoded servo-controlled motors.
I/O Ports:	**1)** First serial port labeled “Balance”, Male DB9 connector for hook-up of electronic scale. **2)** Second Serial Port labeled "Printer", Female DB9; also used to interface to PC for data storage in an Excel® file in your PC. **3)** External I/O port, Female DB37 connector; Used for remote On/Off control of ChemTec™ via footswitch. **4)** Pressure Box: Phone plugs for three(3) optional pressure sensors.
Data Entry:	Membrane keyboard with auditory feedback.

Summary of SciLog® Products

- High precision.
- Real-time data collection and graphing.
- User-friendly.
  - Safe, walk-away system operation.

- Each one optimizes a particular type of application.
- Built-in alarms and multiple I/O ports for interfacing with other devices, e.g. pressure sensors, balances, valves, printers, PCs, etc.

Performance validations available for all SciLog® models.

SciLog® Intelligent Lab Systems

FilterTec™ Dead End Filtration (DEF) System
- Filterability Studies and Vmax Determination
- SciDoc, Real-Time Data Collection of 15 Filtration Parameters and Graphing
- Increased DEF Filter Utilization up to 35%
- 3 Pressure Sensor Hook-ups for Filter Trains
- Safe, Walk-away System Operation

LabTec™ Smart Dispenser System
- Rapid, High Precision Dispensing/Filling, ml to liters
- Dispense by Weight or by Volume
- In-Line Filter Sterilization – Senses Filter Plug-up
- Sample Weighing and Auto-Diluting – Weight Ratio Capability
- Performance Validation Sent with Each LabTec™
- GLP Documentation to Spreadsheet

ChemTec™ Bioreactor Metering System
- Automated Feed Regulation with Cell Growth Monitor
- Programmed Linear or Exponential Feed by Weight or Volume
- Real-Time Data Collection and Graphing
- Programmable Control of Two 6-Port Rotary Valves
- Other Apps include: Automated pH, Diafiltration and Perfusion

ACCU™ High Precision Digital Metering Pump
- High Precision Pump with Optically encoded Motor
- Proportional Pump Control: 4-20 mA or 0-5 VDC
- PC Interface Via Serial Port (RS-232); Footswitch Control
- Tachometer Output
- Available in Peristaltic, Piston and Magnetic Gear Models

PureTec™ CrossFlow Filtration System
- Ideal for Lab Scale CrossFlow, TFF, Protein Concentration, Diafiltration and Protein Washing
- Controls and Monitors TMP (TransMembrane Pressure)
- Filtration with Constant TMP/Constant Feed Rate
- SciDoc, Real-Time Data Collection of 11 Filtration Parameters and Graphing

SciDoc™ Real-Time Data Collection and Graphing Software
- Up to 15 Fluid Handling Parameters
- Data Collected and Compiled
- Real-Time Data Sent to Excel® File and Graphs
- Custom Spreadsheet with Macros
- User Defined Time Intervals for Data Collection
- Data Used to Characterize and Optimize your Application

SciLog® Intelligent Pilot Plant and Production Systems

Fill Master™ Smart Large Volume Dispenser
- Washdown, Mobile, Smart
- Rapid, High Precision Dispensing/Filling, liters
- Dispense by Weight or by Volume
- In-Line Filter Sterilization – Senses Filter Plug-up
- Automated Aseptic Fill into Multiple, Single Use Storage Bags

SciDoc™ Real-Time Data Collection and Graphing Software
- Up to 15 Fluid Handling Parameters
- Data Collected and Compiled
- Real-Time Data Sent to Excel® File and Graphs
- Custom Spreadsheet with Macros
- User Defined Time Intervals for Data Collection
- Data Used to Characterize and Optimize your Application

SciPure™ Automated TFF System
- Constant Flow Rate and Constant TransMembrane Pressure(TMP), Regardless of Viscosity Changes!
- Eliminates Operator Adjustment of Retentate Line Pressure During TFF
- Control, Monitoring and Documentation of TMP, Inlet Pressure, Retentate Line Pressure, Permeate Line Pressure, Permeate Quantity, Permeate Collection Rate, etc.
- SciDoc: Real-Time Data Collection and Graphing

SciPro™ Intelligent BioProcessing System
- Excellent Process Development Tool
- Programmable On-board Software for Purification and Chromatography
- Washdown, Mobile, Smart, High Precision
- 12 I/O ports to Interface with Scales, Sensors, PCs, Printers, etc.
- Pump Head Options: Peristaltic, Rotary Lobe, Magnetic Gear

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