WALLACE & TIERNAN®
CONTROLLERS & ANALYSERS
CHEMTRIM® DISINFECTION CONTROLLER

PRODUCT SHEET

INTRODUCTION

The ChemTrim® Disinfection Controller is a modern, dedicated controller incorporating the latest advanced electronics and process control application features.

The unit is designed to accurately maintain the optimum chlorine residual in water by the precise regulation of the dose of chlorine or sulphur dioxide, in chlorination/ dechlorination or chloramination.

It is suitable for use with gaseous chlorinators/sulphonators/ ammoniators. It can also be used for liquids using dosing pumps for commercially produced sodium hypochlorite or that derived from OSEC® Hypochlorite Generation System, Sodium Bisulphite or Ammonium Sulphate solutions.

The ChemTrim® Disinfection Controller provides a comprehensive and unrivalled list of features for manual or automatic control of simple borehole applications through to complex treatment work applications.

THE CHEMTRIM® CONTROL SYSTEM

The ChemTrim® control system has been designed with consideration to the practicalities of site installation and site operation. The ChemTrim® controller should ideally be located adjacent to the dosing apparatus.

MOUNTING OPTIONS

The ChemTrim® controller can be supplied in the following options;

- Wall mounted plastic enclosures to IP 67
- Panel mounting for use in customer's panel enclosure to IP 65
- Single wall mounted steel enclosures to IP 65

Key Benefits

- Built-in flexibility
- Choice of 6 control options
- Comprehensive list of features
- Simple to operate controller
- Variety of installation and mounting options
- Combined with Wallace & Tiernan® ChemWeb server or Wallace & Tiernan® OPC software, the system offers a wide range of remote communications options

CONTROL OPTIONS

Choice of 6 control options

A choice of control options to meet the most simple to the most demanding of applications:-

1. Manual Control

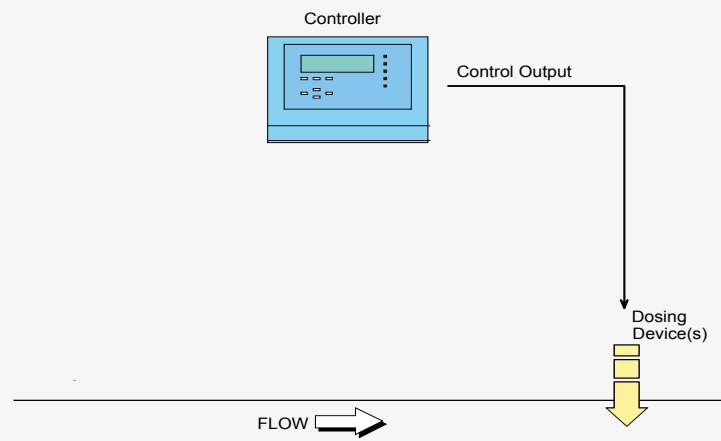Enables the operator to take full control in setting the dose rate to the required value.

Figure 1. Manual Control

2. Control in Response to Flow

A 0/4-20 mA or 0-10V signal from a flow transmitter is fed into the controller and the dosing equipment injects chemicals proportional to the treated water flow.

An option to accept two flow signals is also available, where the sum of the two signals is used for the calculation of the dose rate. If this option is selected the ChemTrim® controller will automatically detect the two flow signals and configure the flow control accordingly.
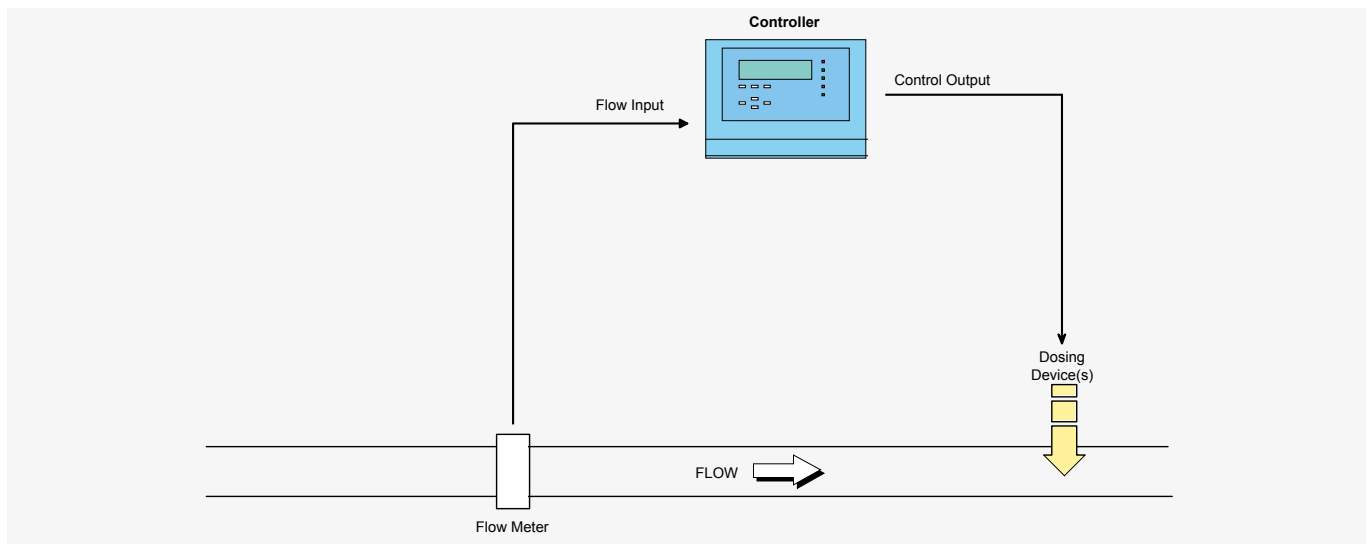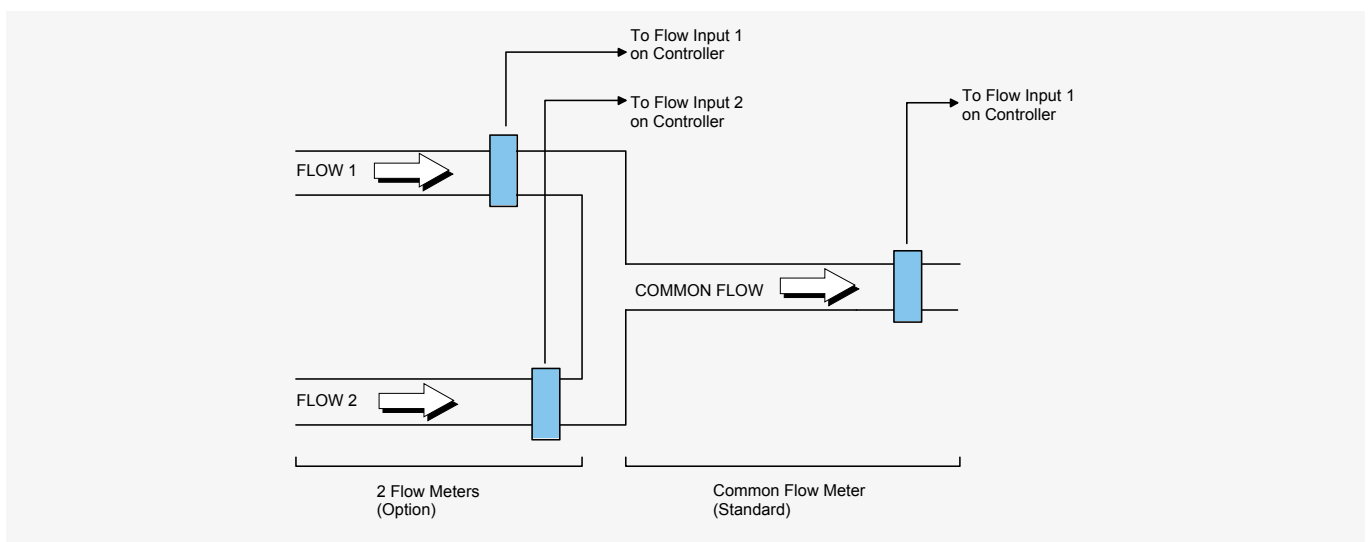

Figure 2a. Control in Response to Flow

Figure 2b. Control in Response to Flow

3. Dual Feed Forward Control (ratio control)

Offers the opportunity to feed an input signal from an ammonia monitor or chlorine analyser to provide a ratio adjustment to increase or decrease the chlorine dose rate. The advantage of this input signal is that it initiates an immediate response to the dosage calculation without waiting for process times. The additional use of a flow meter signal input is selectable.

This mode of control is used in the treatment of river water applications where a signal from an ammonia analyser will enable the controller to respond to varying ammonia levels that may necessitate significant adjustments to the chlorine dose rate. It may also be used in rechlorination schemes, enabling the controller to take into account existing varying chlorine levels arriving at the rechlorination point.
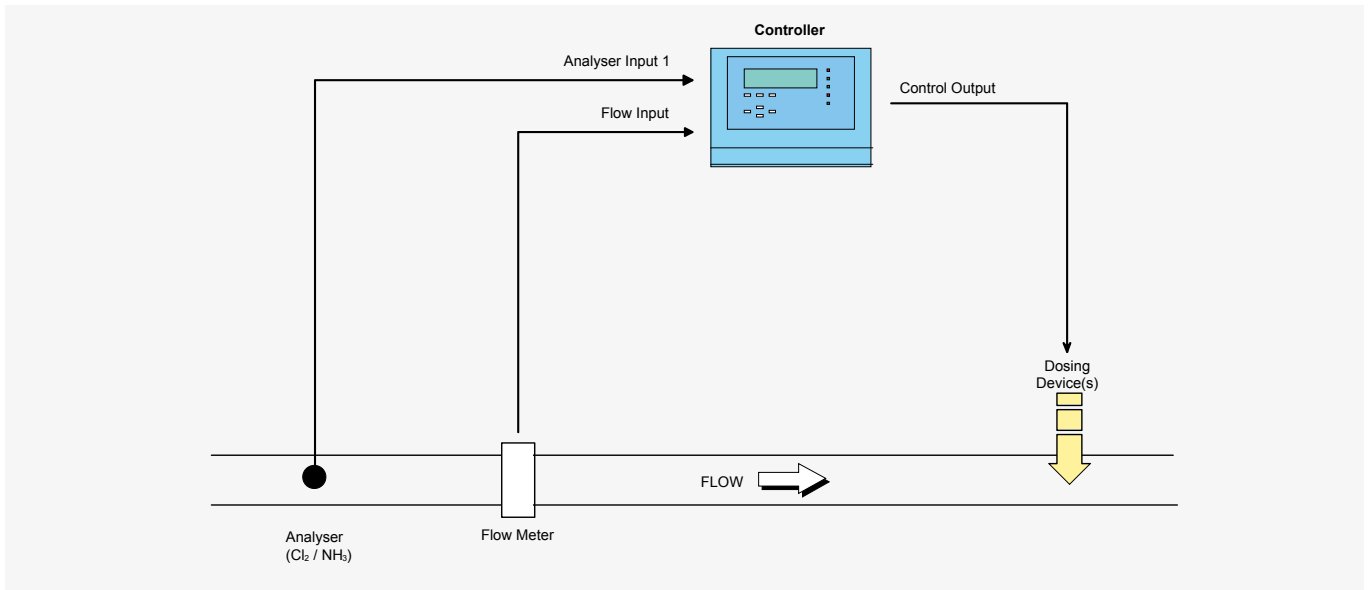

Figure 3. Dual Feed Forward Control

4. Residual Control

In this control mode, sample water is fed continuously to the analyser and transmitter which provides a 0/4-20 mA signal to the controller. The measured signal is compared with a pre-set residual, and any deviation from the control setpoint initiates a proportional/

integral correction to the chemical dosing device. Provides stable residual control where the quality of the water varies but the flow rate of the treated water is relatively stable.
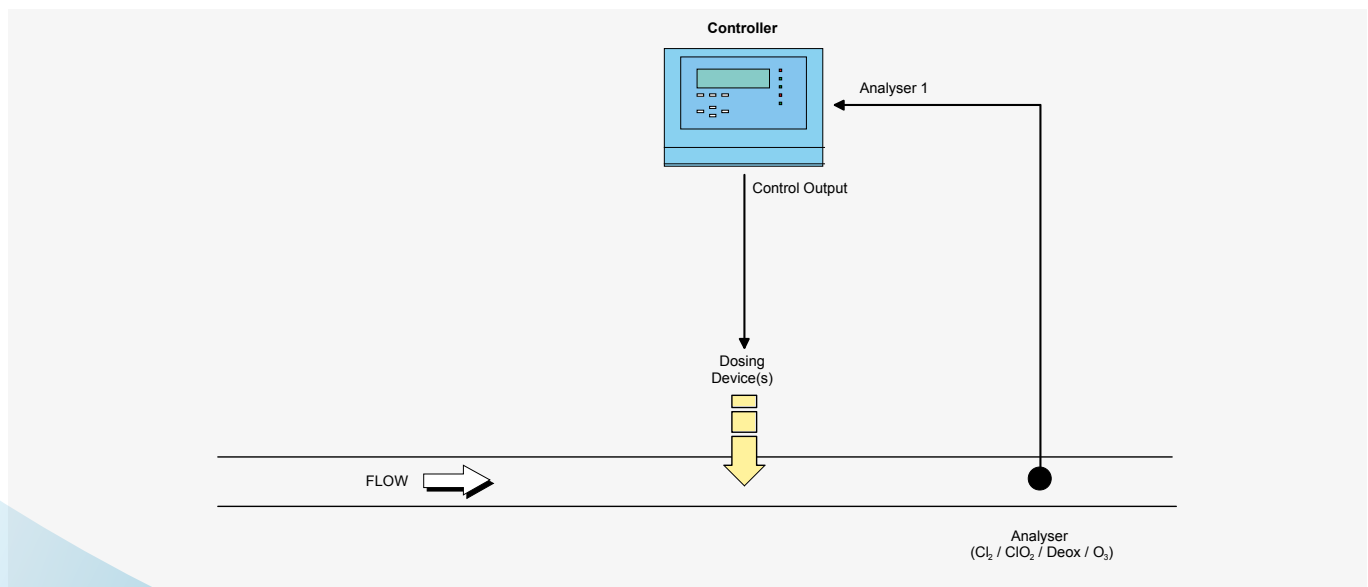

Figure 4. Residual Control

5. Control with Flow and Residual Control.
(Compound loop)

Provides stable residual control where both the water quality and flow rate are subject to variations.
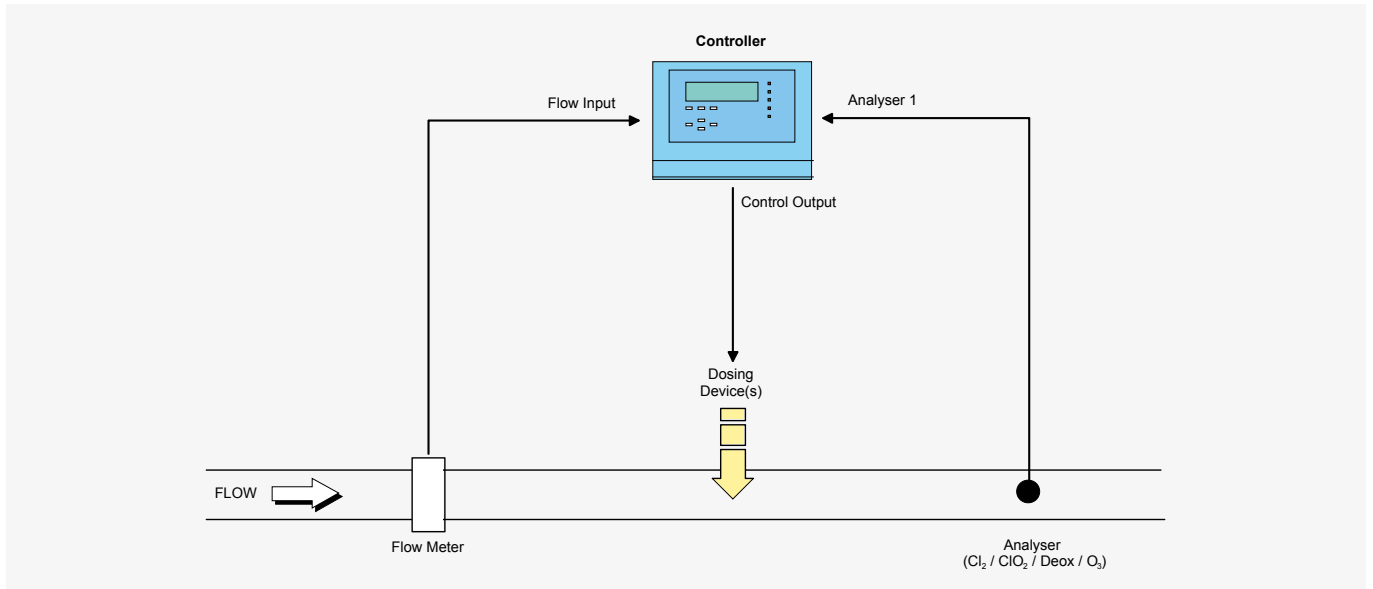

Figure 5. Control with Flow and Residual Control

6. Flow and Residual Control with Setpoint Trim

Provides primary control as per flow and residual control outlined above but with the added advantage of secondary control from a second analyser to compensate for any additional chlorine demand that may occur after a period of time.

Typically used in applications where responsive control is required prior to the inlet to a chlorine contact tank but there may be continuing demand within the contact tank. Considerations should be given to the duration of both process loops and Evoqua Water Technologies would be pleased to offer advice in this application.
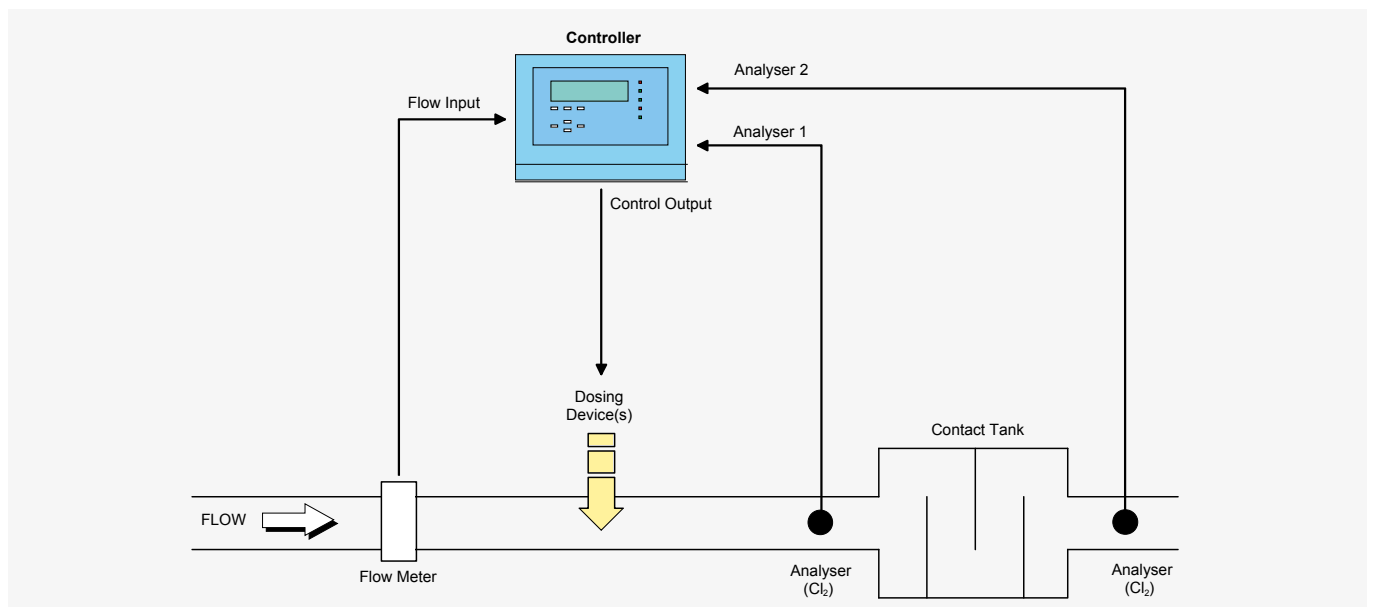

Figure 6. Control with Flow amd Residual Control with Setpoint Trim

CHEMTRIM® SYSTEM - FEATURES

The input/output connections to the
ChemTrim® controller are shown below:-

				CHOICE OF VOLTAGES 230V AC, 115V AC, 24V DC
		Option of terminal box to accept steel wired armoured cabling. Enclosure to IP 55	Plastic wall mounted Enclosure to IP 67	Mounting options
	Option of wall-mounted steel enclosure suitable for steel wire armoured cabling. Enclosure to IP 65	Panel mounted option for mounting in customer's own panel Enclosure to IP 65	Panel mounted	
		Status display options indicating values, bar graph, graphs, text, control algorithms and dosing machine information	Shown on a 240 x 64 back-lit LCD display	Information
	Option of moving alarms low & high alarms in relation to varying setpoints	2 low residual alarms and 2 high residual alarms	Indication of 21 alarm conditions. (The last 24 alarms are shown in the alarm history log)	
9 LED display, power on/off, system fault, alarm-when any alarm activated. relay 1, 2, 3, 4, activated	Relay 1, can be used for watchdog operation	Normally open or closed operation. Latched with acknowledge. Unlatched or latched with reset operation.	4 alarm relays. Each with front panel status LED. All alarms are mappable	
	Assignable 0-20mA or 4-20mA signals	Flow, flow 2, flow (total), analyser 1, analyser 2, setpoint, control output, chlorine demand. (Availability depends on control system selected)	3 analogue outputs	
	Data logging is fixed to 1 month of data at 2 minute intervals. Displayed on LCD screen in 8hr periods	Choice of output to measure 1 of the following:- Analyser 1, Analyser 2 or Flow (total), Control output (total). Viewed as a graph or downloaded via RS232 to laptop	Data logging	
	New alarms inhibited	Hardware fault CANbus error, Dosing interface fault	System fault	
	Options to select shut down or manual setting	When the 4-20mA signal falls below 3.1mA	Signal failure alarms	
		Low Flow alarm or analogue signal failure	Auto shutdown	
		Displays all analogue input status, control I/O status, software versions, reset setting to factory defaults	Comprehensive range of diagnostics	Communications
	Download data to laptop	Upload program into flash memory	RS232	
W&T® Chemweb Server	OPC compliant SCADA	Supporting W&T protocol	RS485	
	Input 2 mapped to shutdown or alarm inhibit	Input 1 mapped to control inhibit, alarm inhibit. control inhibit and output to 0%, or 50%, or 100%	2 Digital inputs	Operational features
	New alarms inhibited	Hardware fault, CANbus error	System fault	

CHEMTRIM CONTROLLER	Security. 2 passwords & 3 levels of access	Structure menu system. Only items selected are shown when appropriate. Everything else is hidden	Menu 1 for commissioning. Menu 2 for configuration. Control Mode enables quick changes to operational parameters			
Choice of control options		Control in response to flow	0/4-20mA or 0-10V from flow transmitter	2 Flow meter inputs and the sum used for calculations (Auto detection -plug & play principle)	Flow signals displayed as l/s or MLD, m³/h	
		Dual feed forward (ratio control)	0/4-20mA input from ammonia or chlorine monitor and 0/4-20mA or 0-10V from flow transmitter	Flow signal displayed as l/s or MLD, or m³/h		
		Residual control	0/4-20mA input from chlorine / chlorine dioxide, deox or ozone monitor			
		Flow & residual control	0/4-20mA or 0-10V from flow transmitter + 0/4 -20 mA residual input signal	Process time proportional to flow	Flow signals displayed as l/s or MLD, or m³/h	
		Residual setpoint trim	Secondary control from additional 0/4-20mA analyser input signal	Process time proportional to flow	Flow signals displayed as l/s or MLD, or m³/h	
		Manual control				
Choice of controlling devices		Dosing pumps	Increase /decrease (positioner) 1k or 5k feedback potentiometer which is auto detected & configured	Relay contact range of 30-122 pulses/min	0/4-20mA output signal	Increase / decrease + mA output control (even control on each)
		Gas feed - chlorinators, sulphonators, ammoniators	Increase /decrease (positioner) 1k or 5k feedback potentiometer which is auto detected & configured	0/4-20mA output signal		
System Options		Gas feed systems	Injector vacuum line relief			
		Liquid feed systems	Dosing pump vent option	Open solenoid valve and/ or boost pump to max speed	Adjustable frequency and duration settings	
		Control of injector operating water	Optional water solenoid valve or booster pump			

CHOICE OF OPERATIONAL FEATURES

The ChemTrim® controller is designed to provide continuous operation and selectable features for that added degree of security.

Automatic Control Inhibit and Auto Shutdown

Two Digital inputs are provided. Input 1 can be mapped to inhibit control, inhibit alarms or set control to 0%, 50% or 100%. This feature is used when residual inputs or flow measurement are unreliable for a short period of time such as during filter backwashing procedures.

Digital input 2 is provided for automatic shutdown and alarm inhibit.
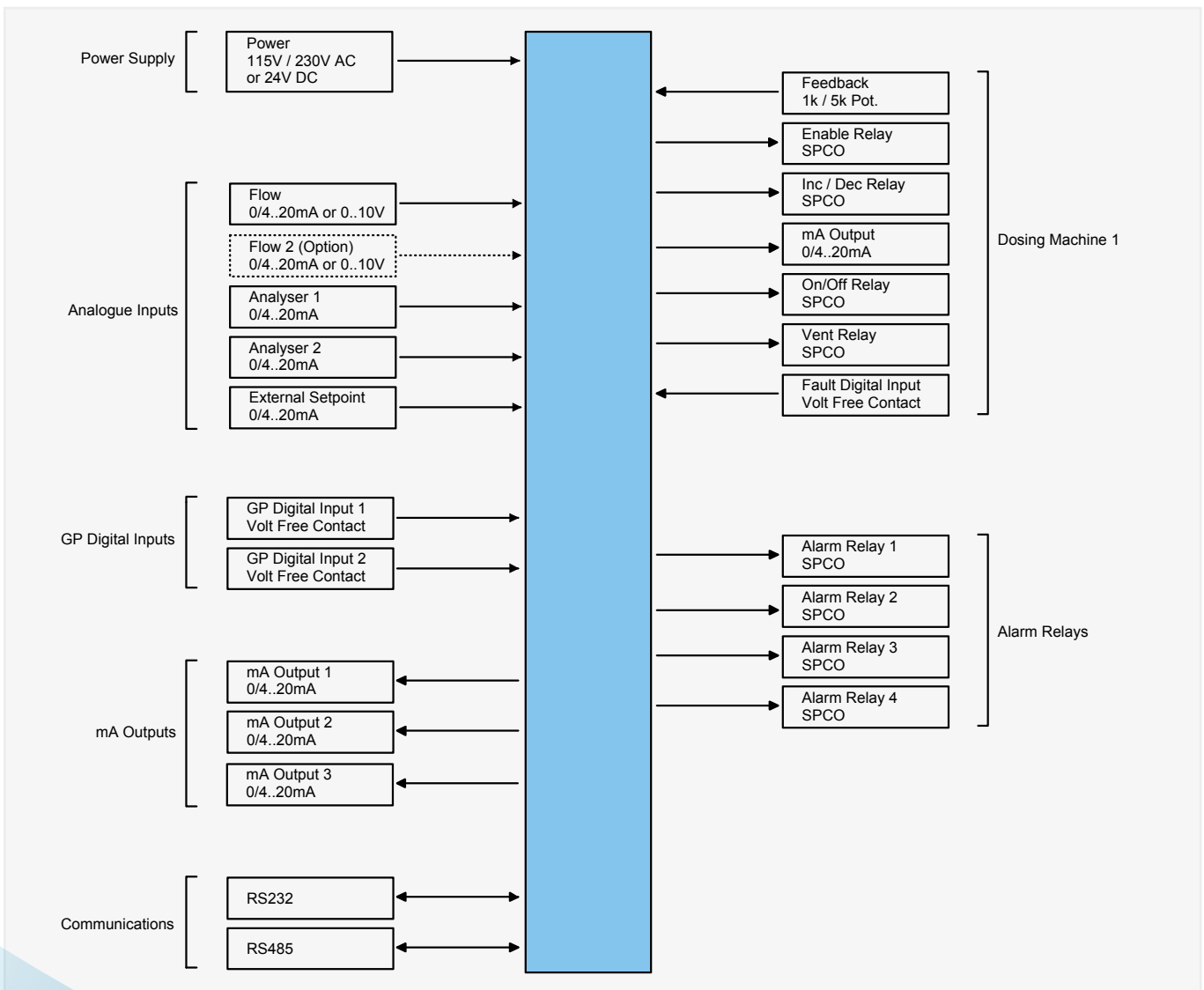
System Fault

The ChemTrim® controller is designed to detect a fault in the hardware of the controller.
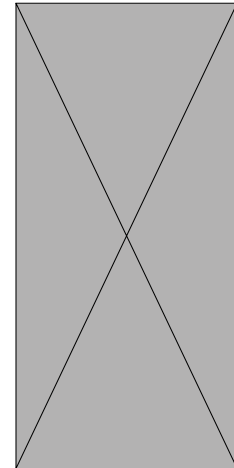
LED Display

CHEMTRIM® SYSTEM CONNECTION DIAGRAMS

The input/output connections to the ChemTrim® controller are shown below:-

COMMUNICATIONS AND SECURITY

User Operating and System Information

The ChemTrim® controller is designed to be easy to operate and a 240 x 64 LCD backlit display provides the user with access to system and process information.

User Friendly Operation

A user friendly menu structure is provided to enable easy and quick access to the information required. Access is via 3 soft keys. Up, down, left, right arrows and enter and escape buttons provide easy navigation to the information required.

Alarm Information

Provides indication of 21 alarm conditions. The last 24 alarms are shown in an alarm history log. There are 2 low residual alarms and 2 high residual alarms. The ChemTrim® controller also provides a selectable option to move low and high alarm 1 in relation to varying setpoints.

The Status Display

Options include the display of residual values, bar graphs, trending graphs and text.

Built-in Data Logging

Can provide the user with one of the following selectable values to record.

- Analyser 1
- Analyser 2
- Flow (total)
- Control Output (total)

The data logging is fixed to 1 month of data at 2 minute sampling times. The data is displayed in 8 hour periods providing the user with clearly visible information.

The data may be viewed as a graph on the controller display or downloaded to a laptop via the RS232 interface.
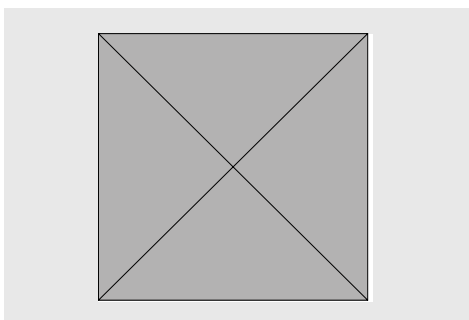
ChemTrim® controller key pad

COMMUNICATIONS AND SECURITY

RS232 Communications

The RS232 interface enables a standard laptop computer to be connected to the ChemTrim® controller. This interface may then be used to upload the main program into flash memory, or download the data logging data from the controller. It can then be imported into standard software programs such as Microsoft® Excel® spreadsheet software where the information can be displayed in any format.

RS485 Communications

An RS485 connection will allow remote access and transmission of data. When used in conjunction with the Wallace & Tiernan® ChemWeb server it offers a flexible choice of remote communications via modem/TCP IP and to OPC compliant SCADA systems using the Wallace & Tiernan® OPC software. All operation and commissioning parameters will be accessible using the RS485 interface and some additional variables to give status/alarm information.

Security

An inbuilt security system to the ChemTrim® controller is provided via 2 passwords and 3 levels of access.

1. System Password – allows access to the commissioning and operational menus

2. Menu 2 Password – allows access to the operational parameters only

3. Manual/Auto Parameters – Open access. The 3 levels of access correspond to the 3 menu systems using the soft keys
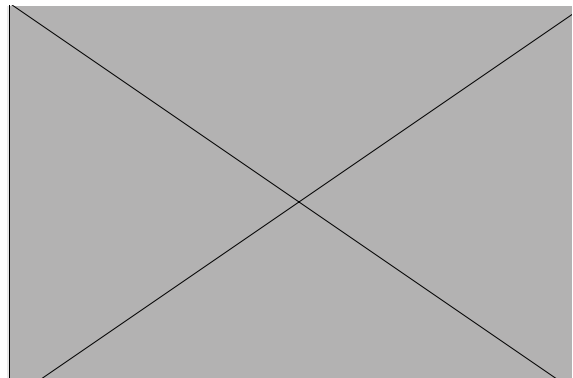
RS232 Connection to ChemTrim® controller

CHOICE OF SYSTEM OPTIONS

A number of customer selectable options are built into the ChemTrim® controller to enhance the operational efficiency of your dosing system.

Injector Vacuum Line Relief

(Gas feed devices)

The use of remote injectors is desirable when there are long distances between the gas feed device and the injection point. It reduces the system process time, enabling quick responses to water quality or flow variations.

The use of the injector vacuum line relief option is desirable to prevent excess vacuum forming that can occur in long injector vacuum lines.

TECHNICAL DATA

Electrical

Mains Supply:

(Voltage specified with order)
115V AC ±10%, 50-60Hz, 30VA
230V AC ±10%, 50-60Hz, 30VA
24V DC, 30W

Fuses F1 & F2:

115V / 230V AC 1A(T), 250V, TR5
24V DC 2.5A(T), 250V, TR5

Fuses FS1 & FS2:

(Steel enclosure only)

All voltages - 3.15A(T), 250V, 5 x 20mm

Safety:

BS EN 61010
Installation category II

EMC:

BS EN 61326

Physical

Plastic Enclosure Size:
273 x 316 x 167 (H x W x D)

Weight:
5 kg

Single Steel Enclosure Size:

600 x 435 x 279 (H x W x D)

Weight:
19 kg

Dosing Pump Vent Option

Certain liquids, such as Sodium Hypochlorite, can gas lock dosing pumps at low flows. Whilst many dosing pumps can be fitted with gas venting devices, the

ChemTrim® controller provides that added protection against this problem with the option to boost the pump speed at an adjustable frequency and duration or to open a solenoid valve and vent the gas back to the chemical storage tank.

Control of Injector Water Supply

The ChemTrim® disinfection controller will control the operation of a water solenoid valve or injector booster pump.

Panel Mounting
- Bezel Size:

210 x 280 x 25 (H x W x D)

Weight:
1 kg

- Base Unit Size:
273 x 316 x 115 (H x W x D)

Weight:
4 kg

Terminal Box Size:
200 x 300 x 120 (H x W x D

Weight:
4 kg

Environmental

Temperature Range:

Operation 0...50°C (max 90% RH, non condensing)

Storage –20...70°C

IP / NEMA Rating:

Plastic enclosure:

IP 67 / NEMA 4X

Steel enclosure:

IP 65 / NEMA 13

Panel mount bezel:

IP 65 / NEMA 13

Terminal box:

IP 55 / NEMA 12

Feedback Signals:

1KΩ or 5KΩ potentiometer (automatic detection)

Not isolated

RS232 Interface:

Supports Wallace & Tiernan® ChemWeb Server & OPC Software protocols

Not isolated

RS485 Interface:

Supports Wallace & Tiernan® ChemWeb Server & OPC Software protocols

Galvanically isolated from earth to 50V

Inputs/Outputs

Digital Inputs:

For use with volt free contacts only isolated voltage supplied by controller (15V DC nominal)

Relay Outputs:

Resistive rating:

5A, 250V AC, 1250VA max
5A, 220V DC, 150W max

UL/CSA Rating:

5A 1/6 HP 125,250 V AC
5A 30V DC 30W max
1A 30V DC to 0.24A 125V DC

Suppression with Schottky diodes

Analogue Inputs:

0...20 / 4...20mA and 0...10V

Input impedance 47Ω for mA signals

Accuracy 0.5% full scale

Galvanically isolated from earth to 50V

Analogue Outputs:

0...20 / 4..20mA

Accuracy 0.5% full scale

Maximum load 400Ω or 1KΩ (switch selectable)

Galvanically isolated from earth to 50V

Feedback Signals:

1KΩ or 5KΩ potentiometer (automatic detection)

Not isolated

RS232 Interface:

Supports Wallace & Tiernan® ChemWeb Server & OPC Software protocols

Not isolated

RS485 Interface:

Supports Wallace & Tiernan® ChemWeb Server & OPC Software protocols

Galvanically isolated from earth to 50V