Wallace & Tiernan® Instruction Manual
ChemTrim® Disinfection Controller

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Suite 3, 2nd Floor, One 60 London Road, Sevenoaks, TN13 1BT

Tel.: +44 1732 771777 Fax: +44 1732 771800 www.evoqua.com

Important Notice

Evoqua Water Technologies Instruction Manuals are the safety documents for their products. The information provided therein is in accordance with the best practices known at the time of issue and, if fully implemented, should enable the user to operate the plant in the safest possible manner. It is therefore most important that instructions be read and understood prior to the installation, operation or maintenance of the plant.

Notes

Where necessary, special instructions are provided and are quoted under the following headings:

WARNING: A warning is given in instances where failure to observe the instruction could result in injury to personnel.

CAUTION: Cautions are given where failure to observe the instruction may result in equipment damage, or pollution to an allied system.

NOTE: Notes are provided to give additional emphasis to particular points of detail.

The following recommendations are made to ensure safe and efficient operation:-

1 Only suitably qualified personnel should install, operate and maintain the equipment.

2 Only Evoqua Water Technologies manufactured or approved parts should be used.

3 The equipment should not be used for any purpose other than that for which it was supplied.

4 If equipment being supplied is being put into storage or not being commissioned immediately, or if the plant is being de-commissioned, Evoqua Water Technologies urge that they be contacted for detailed advice.

In an effort to make progressive improvements to products, changes in design may be incorporated from time to time, which may not be reflected immediately in the instruction manual. If in doubt, contact Evoqua Water Technologies quoting the equipment serial number; serial numbers are essential for effective communication and proper equipment identification.

The equipment described in this manual may be used with substances that themselves may be hazardous to personnel safety. It is essential that persons employed in the vacinity of such substances be aware of the appropriate safety practices and the location of suitable safety equipment. Provision of safety cards and codes of practice concerning hazardous substance should be made by the supplier of the substance.

Warranty

The equipment supplied is guaranteed against mechanical defect notified to the Seller within a period of 1 year from the date of delivery. For such guarantee to be valid the purchaser must notify the seller in writing immediately such defect becomes apparent. If the Seller so requires, the Purchaser shall return the defective equipment (at the Purchaser's expense) to the Seller. The Seller undertakes that it will, at its own option and its own expense, and by way of full discharge of its guarantee obligation hereunder, either repair, or supply a replacement for the defective equipment, or refund any purchase monies paid to it in respect of any such defective equipment, or portion thereof. If title to the defective equipment is at the time of such replacement or refund vested in the Purchaser, then title shall thereupon vest in the Seller. Replacement material situated outside the U.K. will be supplied F.O.B. U.K. Port. The guarantee given in this clause shall not be operative and enforceable if the equipment is not operated strictly in accordance with the sellers instruction, or in the respect of any defect arising from accident, deliberate act, misuse, neglect or from a breach from the terms of the following clause, or in respect of any defect arising through damage incurred while being transported after delivery of the equipment, or if the equipment has been altered or modified in any way by any person other than the seller, or in respect of any other cause whatsoever which lies beyond the Sellers control.

The Purchaser must comply with all user instructions and safety recommendations issued by the Seller, and must install, commission and maintain the equipment in accordance with good engineering practice, and under the supervision of suitably qualified personnel, and the Seller shall not be liable to the Purchaser for any loss suffered as a result of the Purchaser's breach of the terms of this clause.

Subject to this guarantee all conditions, warranties and representations, whether expressed or implied (by statute or otherwise) relating to the equipment, are hereby excluded in so far as they can be excluded without such exclusion being void or unenforceable at law.

International Contact Information

Area	Phone	email
Australia	+61 (0) 3 8720 6597	info.au@evoqua.com
Canada	+1 905 944 2800	canadainfo@evoqua.com
Germany	+49 8221 9040	wtger@evoqua.com
Singapore	+65 8630 7100	infosg@evoqua.com
U.S.A.	+1 856 507 9000	wtus@evoqua.com
U.K.	+44 (0) 1732 771777	info.uk@evoqua.com

INTRODUCTION

The Wallace & Tiernan Type Chemtrim disinfection controller has been designed to provide automatic control of disinfection and chemical treatment processes in both potable and industrial process applications. The Chemtrim can be selected to accurately control in one of the following five modes.

- Single feed forward
- Ratio (dual feed forward)
- Residual
- Flow & residual (compound loop)
- Setpoint trim

Where appropriate the control action may be selected between chlorination, pre-chlorination and de-chlorination.

This manual has been produced to enable the user to obtain the maximum service from the equipment and comprises installation, operating instructions, fault finding and spare parts information. Minor changes may be made to the equipment during production which may not be immediately reflected in this manual - if such a change appears to have been made to your equipment, contact Wallace & Tiernan for information.

Our guarantee is conditional upon the equipment being used in accordance with the instructions herein and we therefore recommend that they be read and fully understood before the equipment is placed in service.

Evoqua Water Technologies

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Drawings

SAFETY NOTES

Intended Use

The Chemtrim is exclusively designed for the control of treatment of potable water.

The Chemtrim may only be installed indoors and operated under the conditions described in the technical data.

The Chemtrim is not designed for any application other than that described in this manual.

Compliance with the intended use of this device also includes reading this operating manual and observing all instructions which it contains, particularly the safety instructions.

If the Chemtrim is not employed in accordance with its intended use, safe and reliable operation cannot be guaranteed.

The operator is solely responsible for any personal injury or damage to property resulting from employment of the device which is contrary to its intended use. The operator is obliged to keep the device in proper working order.

General Principles

The Chemtrim corresponds to the state of the art and recognised technical safety regulations. It contains inherent hazards for personnel and equipment. These hazards relate to live components or incorrect dosing of chemicals.

Always observe the safety instructions and hazard warnings.

Only use this device in accordance with its intended purpose.

Faults which can negatively affect safety must be remedied immediately.

Notes for the Operator and Operating Personnel

Notes for the operator
This operating manual and technical documentation must always be available at the installation site.

Always observe any supplementary, generally valid, legal regulations or other binding rules and ensure their compliance. These rules and regulations concern, for example:

Work safety
Accident prevention
Environmental protection
Hygiene
First aid

All personnel charged with installation, commissioning, operation, maintenance and repair of the Chemtrim must read and understand this manual, in particular the safety instructions.

Never attempt to perform any modifications, extensions or conversions to the device which would have an adverse affect on safety without written approval of the manufacturer.

Only use Wallace & Tiernan manufactured or approved spare parts.

Notes for operating personnel

Before starting operation of this device always read the instruction manual, in particular the safety instructions.

Never employ any working methods that could endanger safety.

Never deactivate any safety features.

During operation of the device there is a risk of unexpected incorrect functions resulting from failure or errors of the control system. In the event of such safety relevant changes in the operating performance of the device, switch it off immediately and remedy the fault or have it remedied immediately.

When the device is switched off external voltage may still be applied.

Safety Instructions During Specific Operations

Normal operation

Never employ any working methods which could affect safety.

Only run the Chemtrim when the housing is closed.

Inspect the Chemtrim at least once a day for externally visible damage and faults. Inform the person/authority responsible immediately of any detected changes (including any changes in the operating performance).

In the event of any functional faults always switch the device off immediately. Faults must be remedied immediately.

Installation and maintenance work

Always perform installation or maintenance work in accordance with this manual.

Secure the device against activation during installation and maintenance work.

Always retighten released screw connections.

Never use corrosive cleaning agents.

Ensure safe disposal of agents and replaced parts in accordance with environmental regulations.

Notes on Special Dangers

Electrical power

Only use original fuses with the prescribed current rating. In the event of a fault in the electrical power supply, switch the device off immediately.

Only qualified electricians or trained personnel supervised by a qualified electrician are permitted to perform any work on electrical components in accordance with valid electrotechnical regulations.

If stipulated, disconnect all parts of the device from the power supply before performing any inspection, maintenance or repair work. First test the disconnected components to ensure they do not carry any voltage.

Inspect/check the electrical system regularly. Remedy any faults immediately.

Connect disconnected cables in accordance with the wiring diagram.

TECHNICAL SPECIFICATION

Chemtrim Controller

ELECTRICAL

Mains Supply (voltage specified with order)	115Vac ±10%, 50/60Hz, 30VA 230Vac ±10%, 50/60Hz, 30VA 24Vdc ±20%, 30W
Fuses F1 & F2 (motherboard PCB)	115V/230Vac: 1A(T), 250V, TR5 24Vdc: 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

Dimensions	
Plastic enclosure	273 x 316 x 167 (H x W x D)
Steel enclosure	600 x 380 x 210
Panel mounting - bezel	210 x 280 x 25
Panel mounting - base unit	273 x 316 x 115
Terminal box	200 x 300 x 120

Weight	
Plastic enclosure	5 kg
Steel enclosure	19 kg
Panel mounting - bezel	0.5 kg
Panel mounting - base unit	4.5 kg
Terminal box	5 kg

ENVIRONMENTAL

Temperature Range	Operation 0 to 50°C (max 90% RH, non condensing) Storage -20°C to 70°C

IP / NEMA Rating	
Plastic enclosure	IP67 / NEMA 4X
Steel enclosures	IP 65 / NEMA 13
Panel mount bezel	IP 65 / NEMA 13
Terminal box	IP 55 / NEMA 12

INPUTS /OUTPUTS

Digital Inputs	For use with volt free contacts only. Isolated voltage supplied by the controller (15V dc nominal).
Relay Outputs	Resistive rating: 5A, 250Vac, 1250VA max. 5A, 220Vdc, 150W max. UL/CSA rating: 5A, 1/6 HP, 125/250Vac 5A, 30Vdc, 30W max. 1A, 30Vdc to 0.24A, 125Vdc Suppression with Schottky diodes
Analogue Inputs	0 to 20/4 to 20mA and 0 to 10V for flow signals Input impedance 47Ω for mA signals Accuracy 0.5% full scale Galvanically isolated from earth to 50V
Analogue Outputs	0 to 20/4 to 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 protocol. Not isolated.
RS485 Interface	Supports Wallace & Tiernan protocol. Galvanically isolated from earth to 50V.

1 GENERAL DESCRIPTION

The Chemtrim Disinfection Controller is a fully electronic module designed for the control of either a dosing pump or gas control unit used in water treatment installations.

The unit can be configured by the user, via the internal software, to drive various types of dosage equipment in different modes of control, depending upon the requirements of the particular installation.

1.1 Modes of Operation

The Chemtrim Disinfection Controller can operate in any of four different control modes depending upon the type of dosing pump or gas control unit being used.

Positioner - This mode is used if a variable stroke dosing pump with an electric positioner, or gas control unit with an automatic dosage regulator is used. The Chemtrim uses the incoming signal to compute the position at which the dosing machine should be set to achieve the required dosage rate. It then provides Increase or Decrease signals to the dosing machine or regulator to adjust the setting as appropriate. The variable stroke mechanism of the pump or regulator unit incorporates a potentiometer which connects back to the Chemtrim to provide a positional reference feedback so that it can determine when the correct position for the required output is achieved.

Pulse Pump -This mode is used to control solenoid type pumps whose output is controlled by the number of times per minute that the solenoid is operated (pulses/minute). The Chemtrim uses the incoming signal to compute the frequency of the pulses fed to the solenoid to achieve the correct dosage rate. The number of pulses/minute can be set between 30 and 122, but reference must be made to the pump specification to determine the maximum frequency the pump is capable of accepting over a long term without damage.

mA Output (Linear Output) - This mode is used particularly for pumps driven from variable speed drive units. The VSD unit may vary the speed of the pump either by varying the voltage fed to the pump motor (dc motors), or by varying the frequency of the supply voltage fed to the pump motor (ac motors) depending upon the type of VSD chosen. The Chemtrim uses the incoming signal to compute the level of the milliamp output signal fed to the variable speed drive unit to achieve the correct pump speed for the dosage rate required.

Positioner + mA Output - This mode is used for pumps not only equipped with variable stroke mechanisms set by electric positioners, but which also have the supply to their motors fed from variable speed drive units. The Chemtrim uses the incoming signal to compute the Increase/Decrease signals to the stroke positioner, and also provides a milliamp control signal to the variable speed drive unit to adjust the pump speed. In this way a greater turn-down ratio can be achieved, together with accurate lower dosage rates and finer control than can be effected by milliamp or positioner control separately.

1.2 Modes of Control

The Chemtrim Disinfection Controller can be set to any one of the following five types of control philosophy.

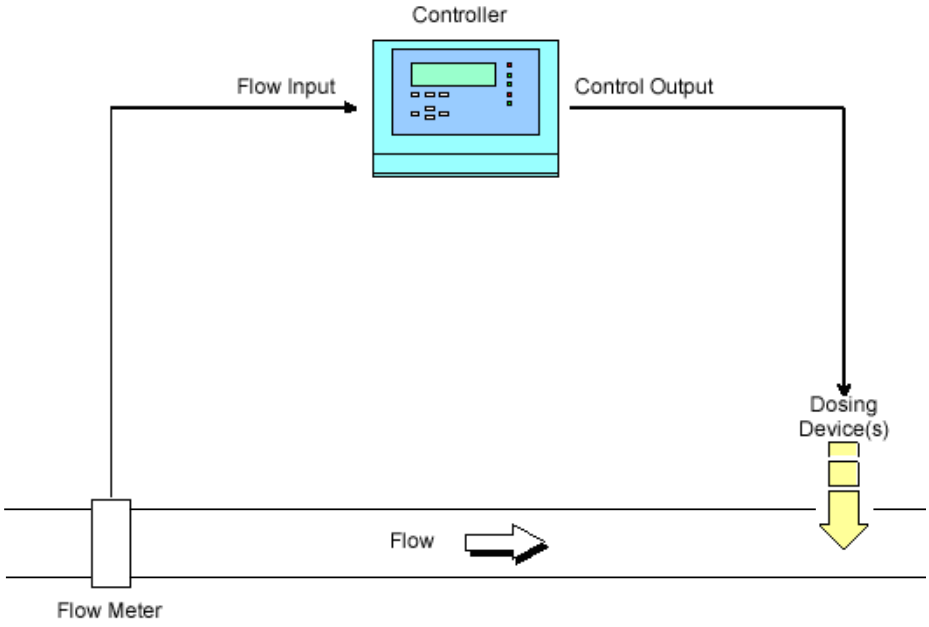
1.2.1 Feed Forward

The Feed Forward mode is applicable to installations where the quality of the water being treated is constant but the water flow rate is variable. In this mode the Chemtrim is fed with a flow signal from a flow transmitter monitoring the water. A dosage rate to achieve the correct residual is also set into the Chemtrim by the user. The disinfection controller uses the product of the flow and dosage rate to calculate the setting of the dosing machines necessary to effect the correct dosage for that flow. Any changes to the flow signalled to the Chemtrim will result in a percentage change to the dosing machine setting. The Chemtrim has provision to accept a optional second flow signal, used in instances, for example, where the water from two bore holes is being treated and the flow from each is variable. In this instance the Chemtrim summates the two flow signals.

The commissioning and operation parameters associated with feed forward mode are as follows:-

Commissioning Parameter	Range/Options	Refer to Section	Display No.
Signal type (flow meter 1)	0-20mA/4-20mA/0-10V	3.2.1	1.2.1
Resolution (flow meter 1)	0.01/0.1/1 l/s	3.2.1	1.2.1
Range (flow meter 1)	<49.99/<499.9/<30000 l/s	3.2.1	1.2.1
Range used (flow meter 1)	10 to 100%	3.2.1	1.2.1
Display flow as	l/s - MLD - m^3/h	3.2.1	1.2.1
Signal type (flow meter 2 option)	0-20mA/4-20mA/0-10V	3.2.1	1.2.2
Resolution (flow meter 2 option)	0.01/0.1/1 l/s	3.2.1	1.2.2
Range (flow meter 2 option)	<49.99/<499.9/<30000 l/s	3.2.1	1.2.2
Range used (flow meter 2 option)	10 to 100%	3.2.1	1.2.2

Operation Parameter	Range/Options	Refer to Section	Display No.
Dosage factor	10 to 500%	5.2.2	3.1



1.2.2 Ratio (dual feed forward)

When ratio mode is used the operator must also select between Normal Control Action and (Setpoint - Residual) Control Action.

Ratio mode with Normal Control Action is used typically in the treatment of river water applications where a signal from an ammonia analyser will enable the Chemtrim controller to respond to varying ammonia levels that may necessitate significant adjustment to the chlorine dose rate. The Chemtrim is fed with a water flow signal together with a milliamp residual signal from a residual measuring cell sampling the water. The Chemtrim is also programmed by the user with the dosage rate required. The Chemtrim uses the product of the flow and residual signals together with the dosage value to determine the setting of the dosing machine.

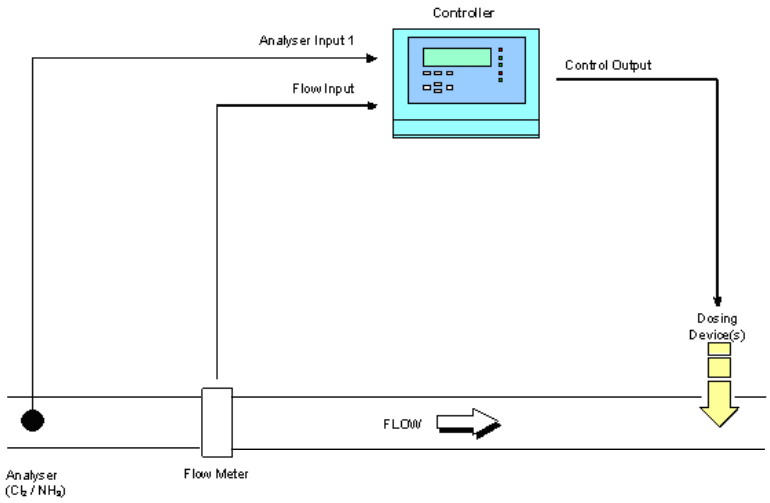
Ration mode with (Setpoint - Residual) Control Action is used typically for re-chlorination. The Chemtrim is fed with a water flow signal together with a milliamp residual signal from a residual cell sampling the water. The Chemtrim is programmed by the user with the dosage factor required, when no chlorine is present in the water, and the setpoint. The Chemtrim calculates the dosing machines setting to achieve the setpoint.

A change in the value of either flow or residual signal affecting the calculation greater than the sensitivity deadband (positioner only)setting will result in an instant change to the dosing machine setting to correct the dosing rate.

The commissioning and operation parameters associated with the ratio mode are as follows:-

Commissioning Parameter	Range/Options	Refer to Section	Display No.
Signal type (flow meter 1)	0-20mA/4-20mA/0-10V	3.2.1	1.2.1
Resolution (flow meter 1)	0.01/0.1/1 l/s	3.2.1	1.2.1
Range (flow meter 1)	<49.99/<499.9/<50000 l/s	3.2.1	1.2.1
Range used (flow meter 1)	10 to 100%	3.2.1	1.2.1
Display flow as	l/s - MLD - m^3/h	3.2.1	1.2.1
Signal type (flow meter 2 option)	0-20mA/4-20mA/0-10V	3.2.2	1.2.2
Resolution (flow meter 2 option)	0.01/0.1/1 l/s	3.2.2	1.2.2
Range (flow meter 2 option)	<49.99/<499.9/<50000 l/s	3.2.2	1.2.2
Range used (flow meter 2 option)	10 to 100%	3.2.2	1.2.2
Signal type (analyser 1)	0-20mA/4-20mA	3.2.3	1.2.3
Measurement (analyser 1)	Cl_2 / NH_3	3.2.3	1.2.3
Units (analyser 1)	µg/l / mg/l	3.2.3	1.2.3
Range (analyser 1)	1-999µg/l / 1-100mg/l	3.2.3	1.2.3
Control action	Normal/Setpoint - Residual	3.1.2	1.1.2

Operation Parameter	Range/Options	Refer to Section	Display No.
Dosage factor	10 to 500%	5.2.2	3.1
Setpoint	0 to analyser range mg/l	5.2.2	3.1



1.2.3 Residual Control

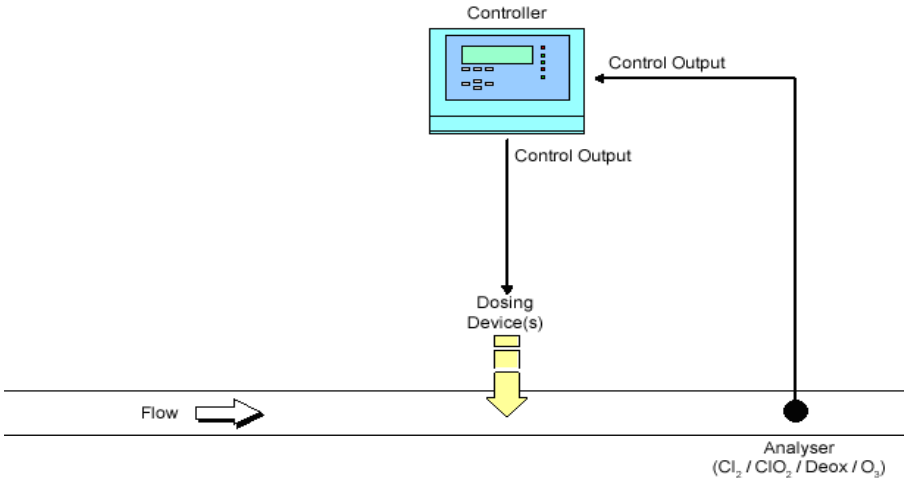
The Residual Control mode is applicable for installation where the flow rate of the water is constant but the quality of the water is subject to variation. The Chemtrim is fed with a milliamp chlorine residual signal from a residual measuring cell sampling the water after treatment. The controller is also programmed by the user with the chlorine residual setpoint required for the water.

The Chemtrim compares the incoming residual signal against the setpoint value. Should any deviation between the measured residual signal and setpoint exist that is greater than the user defined sensitivity deadband (positioner only), the Chemtrim will adjust the dosing machines output in proportion to the deviation. The percentage correction made will depend upon the proportional and integral gain values entered by the user during commissioning. The Chemtrim controller will maintain the new setting for the duration of the process time so that the effect of any change in dose registers at the measuring cell. It will then re-examine the size of the error and make any further correction that may be necessary.

The commissioning and operation parameters associated with the residual control mode are as follows:-

Commissioning Parameter	**Range/Options**	**Refer to Section**	**Display No.**
Signal type (analyser 1)	0-20mA/4-20mA	3.2.3	1.2.3
Measurement (analyser 1)	Cl_2 / NH_3	3.2.3	1.2.3
Units (analyser 1)	µg/l / mg/l	3.2.3	1.2.3
Range (analyser 1)	1-999µg/l / 1-100mg/l	3.2.3	1.2.3
Control method	Chlorinate / De-chlorinate	3.1.2	1.1.2

Operation Parameter	**Range/Options**	**Refer to Section**	**Display No.**
Setpoint	0 to analyser range mg/l	5.2.2	3.1
P Gain	0-300%	4.2.1	2.2.1
I Gain	0-300%	4.2.1	2.2.1
Deadtime T2	1-7199 seconds (1 - 01:59:59)	4.2.2	2.2.2
P Compensation	On/Off	4.2.1	2.2.1

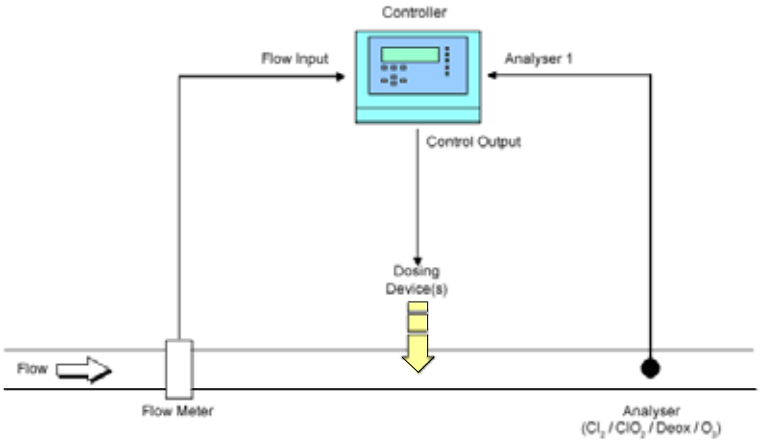


1.2.4 Flow and Residual (compound loop)

The Flow and Residual mode, sometimes referred to as compound loop, is applicable to installations where both the water flow and water quality are subject to variation. The Chemtrim is fed with a flow signal from a transmitter monitoring the water flow before the point-of-application and a chlorine residual signal from a measuring cell sampling the water after treatment. The controller is also programmed by the user with the

chlorine residual setpoint required. These signals are integrated together to determine the setting of the dosing machines.

The Chemtrim compares the incoming residual signal against the setpoint and generates an error value. The controller multiplies the error by the proportional gain setting and the flow signal to calculate the new setting of the dosing machine(s). If this new setting is greater than the sensitivity deadband (positioner only), the Chemtrim controller will change the dosing machine(s) setting. Thus any change in the flow or residual will result in a change to the dosing.



At the end of each process time any error is summed with the integral gain value to generate a total error. This is multiplied by the flow signal level to change the dosing machine(s) setting. This new setting is maintained for the total process time to allow any change in the dosage to register as a change in residual. The input signals are then re-examined again and further changes made to the dosage if necessary.

The commissioning and operation parameters associated with the flow and residual control mode are as follows:-

Commissioning Parameter	**Range/Options**	**Refer to Section**	**Display No.**
Signal type (flow meter 1)	0-20mA/4-20mA/0-10V	3.2.1	1.2.1
Resolution (flow meter 1)	0.01/0.1/1 l/s	3.2.1	1.2.1
Range (flow meter 1)	<49.99/<499.9/<50000 l/s	3.2.1	1.2.1
Range used (flow meter 1)	10 to 100%	3.2.1	1.2.1
Display flow as	l/s - MLD - m^3/h	3.2.1	1.2.1
Signal type (flow meter 2 option)	0-20mA/4-20mA/0-10V	3.2.2	1.2.2
Resolution (flow meter 2 option)	0.01/0.1/1 l/s	3.2.2	1.2.2
Range (flow meter 2 option)	<49.99/<499.9/<50000 l/s	3.2.2	1.2.2
Range used (flow meter 2 option)	10 to 100%	3.2.2	1.2.2
Signal type (analyser 1)	0-20mA/4-20mA	3.2.3	1.2.3
Measurement (analyser 1)	Cl_2 / NH_3	3.2.3	1.2.3

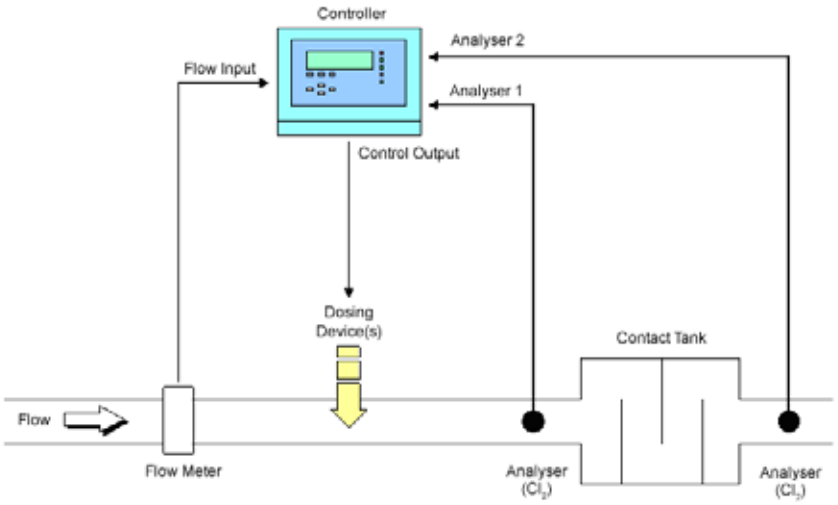
Units (analyser 1)	µg/l / mg/l	3.2.3	1.2.3
Range (analyser 1)	1-999µg/l / 1-100mg/l	3.2.3	1.2.3
Control method	Chlorinate/Pre-chlorinate/ De-chlorinate	3.1.2	1.1.2

Operation Parameter	**Range/Options**	**Refer to Section**	**Display No.**
Setpoint	0 to analyser range mg/l	5.2.2	3.1
P Gain	0-300%	4.2.1	2.2.1
I Gain	0-300%	4.2.1	2.2.1
Process time	Fixed / Flow prop	4.2.2	2.2.2
Deadtime T1	1-1799 seconds (1 - 29:59)	4.2.2	2.2.2
Deadtime T2	1-7199 seconds (1 - 01:59:59)	4.2.2	2.2.2
Deadtime T3	1-1799 seconds (1 - 29:59)		
P Compensation	On/Off	4.2.1	2.2.1

1.2.5 Setpoint Trim

Setpoint Trim provides residual control to a setpoint for systems that experience a loss of residual into supply due to a contact tank before the final output. Two analysers are used, one before the contact tank (primary loop) and one after the contact tank (secondary loop).

The operator enters one setpoint corresponding to the residual value required at the final output. The control equation uses a modified setpoint value, its initial value is the setpoint value entered by the operator.



The primary control loop operates in the same way as Flow and Residual control. At the end of each secondary process time, if the primary loop is stable (within 5% of setpoint), the second analyser signal is compared with the setpoint. The difference is multiplied by a setpoint change factor, and used to generate a new value for the modified setpoint. A

reset option is provided to reset the modified setpoint back to the value entered by the operator. The modified setpoint has a maximum limit set by the operator.

The commissioning and operation parameters associated with the setpoint trim control mode are as follows:-

Commissioning Parameter	Range/Options	Refer to Section	Display No.
Signal type (flow meter 1)	0-20mA/4-20mA/0-10V	3.2.1	1.2.1
Resolution (flow meter 1)	0.01/0.1/1 l/s	3.2.1	1.2.1
Range (flow meter 1)	<49.99/<499.9/<30000 l/s	3.2.1	1.2.1
Range used (flow meter 1)	10 to 100%	3.2.1	1.2.1
Display flow as	l/s - MLD - m^3/h	3.2.1	1.2.1
Signal type (flow meter 2 option)	0-20mA/4-20mA/0-10V	3.2.2	1.2.2
Resolution (flow meter 2 option)	0.01/0.1/1 l/s	3.2.2	1.2.2
Range (flow meter 2 option)	<49.99/<499.9/<30000 l/s	3.2.2	1.2.2
Range used (flow meter 2 option)	10 to 100%	3.2.2	1.2.2
Signal type (analyser 1)	0-20mA/4-20mA	3.2.3	1.2.3
Measurement (analyser 1)	Cl_2 / NH_3	3.2.3	1.2.3
Units (analyser 1)	µg/l / mg/l	3.2.3	1.2.3
Range (analyser 1)	1-999µg/l / 1-100mg/l	3.2.3	1.2.3
Signal type (analyser 2)	0-20mA/4-20mA	3.2.4	1.2.4
Measurement (analyser 2)	Cl_2 / NH_3	3.2.4	1.2.4
Units (analyser 2)	µg/l / mg/l	3.2.4	1.2.4
Range (analyser 2)	1-999µg/l / 1-100mg/l	3.2.4	1.2.4
Control method	Chlorinate/Pre-chlorinate/ De-chlorinate	3.1.2	1.1.2

Operation Parameter	Range/Options	Refer to Section	Display No.
Setpoint	0 to analyser range mg/l	5.2.2	3.1
P Gain	0-300%	4.2.1	2.2.1
I Gain	0-300%	4.2.1	2.2.1
Setpoint change	0-100%	4.2.1	2.2.1
Setpoint band	5-50%	4.2.1	2.2.1
Setpoint trim	On / Off	4.2.1	2.2.1
Process time	Fixed / Flow prop	4.2.2	2.2.2
Deadtime T1	1-1799 seconds (1 - 29:59)	4.2.2	2.2.2
Deadtime T2	1-7199 seconds (1 - 01:59:59)	4.2.2	2.2.2
Deadtime T3	1-1799 seconds (1 - 29:59)	4.2.2	2.2.2
Deadtime T4	1-64800 seconds (1-18:00:00)	4.2.2	2.2.2
Deadtime T5	1-1799 seconds (1-29:59)	4.2.2	2.2.2
P Compensation	On/Off	4.2.1	2.2.1

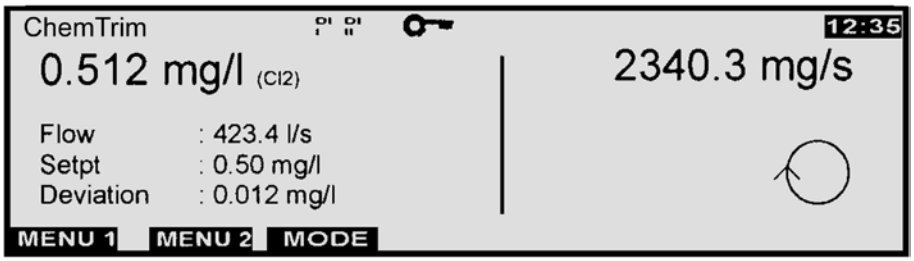
1.3 Features

The Increment ▲ and ▼ Decrement symbols (positioner only) are lit when ever a change to the dosing is being made and the symbol indicates the direction of change. Neither symbol is displayed when no change is being made.

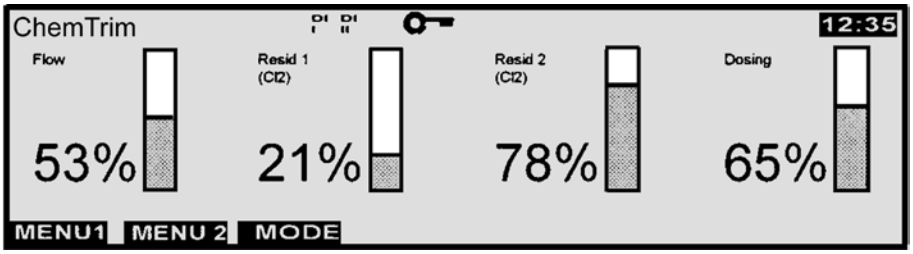
Below these symbols are two icons; a circular ring with an arrowhead; the other a hand symbol. The hand symbol is evident when the Chemtrim is in Manual mode and is not controlling the dosing machines in response to signal changes. The circular symbol indicates the Chemtrim is in the Automatic mode and is controlling the dosing machine in response to the incoming signals.

1.3.1 Graphic displays

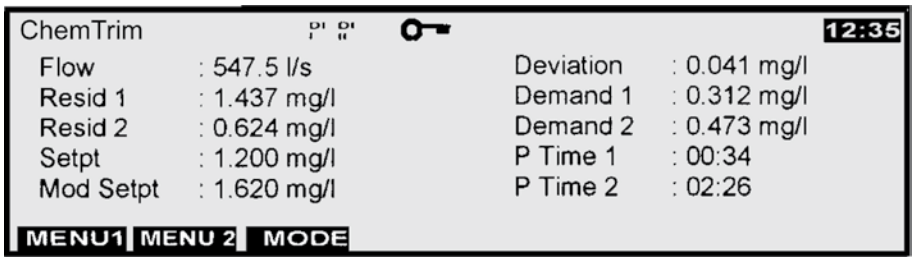
All information is shown on the graphic display. Pressing the ▲ or ▼ keys cycles through the following graphic displays.



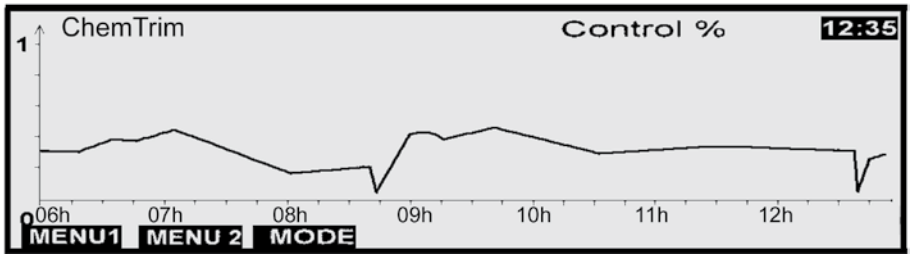
The above display varies in accordance with the control mode selected.



When feed forward is selected as the control mode only the flow and dosing bar graphs are displayed. If residual is selected as the control mode only the resid 1 and dosing bar graphs are displayed. When flow and residual is selected as the control mode the flow, resid 1 and dosing bar graphs are displayed. When setpoint trim is selected as the control mode all four bar graphs are displayed.



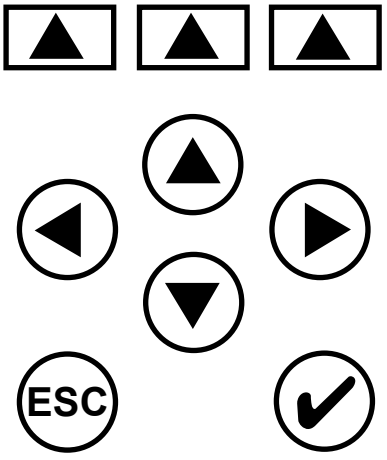
The above text display is only evident when either flow and residual or setpoint trim is slected as the control mode.



The above display provides a 7 hour graph which can display either flow, residual or control depending on the selection made in Section 4.4.2. The 7 hour graph can be scrolled back by up to one calendar month in 7 hour segments.

1.3.2 Operating panel

The Chemtrim is operated using nine keys. The top three keys the control the software function (softkeys).



Softkey
Activates the function shown on the graphic display

Up
Move up one level
Display the previous option
Increase the value

Down
Move down one level
Display the next option
Decrease the value

Left/right
Change menu column
Change the position in the displayed value

Escape
Cancel the entry without saving the new value
Move up one menu level

Save/acknowledge
Saves new values and acknowledges alarms

1.3.3 Indicating Elements

Chemtrim System name

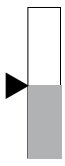
DI 1 **DI 11** Digital inputs 1 and 2 active
The symbols indicate that a function has been selected for the digital signal and that a signal is applied

Password active
In order to change a parameter entry of the password is required.

12.35 Time

"AUTO" operating mode active.
The control unit is running in the automatic mode and dosing is being performed automatically.

"MANUAL" operating mode active.
The dosage rate is set manually



Bar graph
This serves to indicate a measured value, the measuring range (column height) as well as the setpoint (▶).

1.3.4 Operational Notes

During operation observe the following points:

1 Double check any entries/modifications before exiting the menu.

2 Only press the keys with your fingers, never use hard or pointed objects such as pencils etc., as they will damage the sealed keypad.

2 INSTALLATION

2.1 Transport

During transport the Chemtrim must be handled carefully and should not be exposed to wet weather or moisture.

2.2 Unpacking

The equipment should be unpacked in a clean, dry area, preferably in the place in which the unit will be installed. All parts should be checked against the enclosed packing note before the packing materials are discarded.

2.3 Location

The Chemtrim should be located in a well lit, damp-free environment. It should not be mounted in direct sunlight. The enclosures are rated as follows:

Plastic enclosure	IP67 / NEMA 4X
Steel enclosures	IP 65 / NEMA 13
Panel mount bezel	IP 65 / NEMA 13
Terminal box	IP 55 / NEMA 12

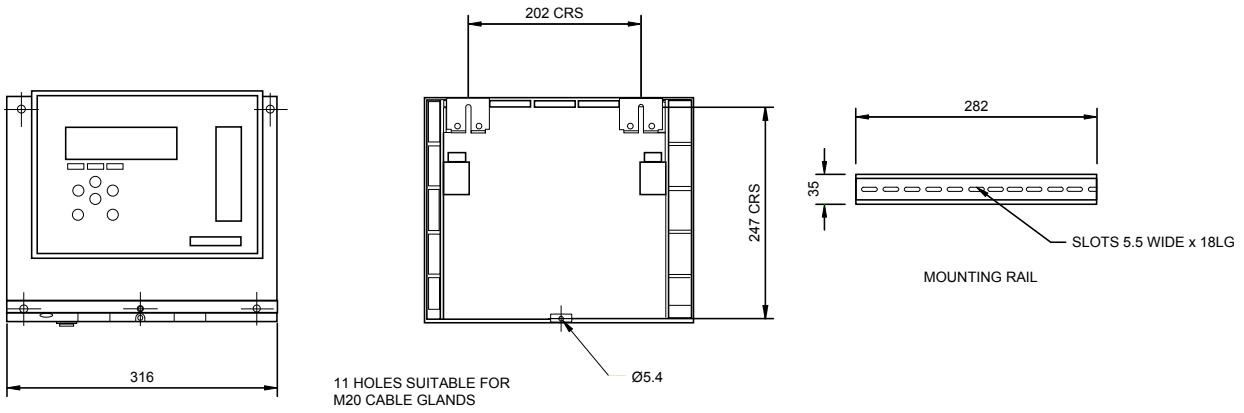
The ambient temperature in which the unit can operate satisfactorily is 0°C to 50°C

2.4 Mounting

The Chemtrim should be positioned at an easily read and accessed height. Wallace & Tiernan recommend that the centre of the display is at a height of 1650 mm.

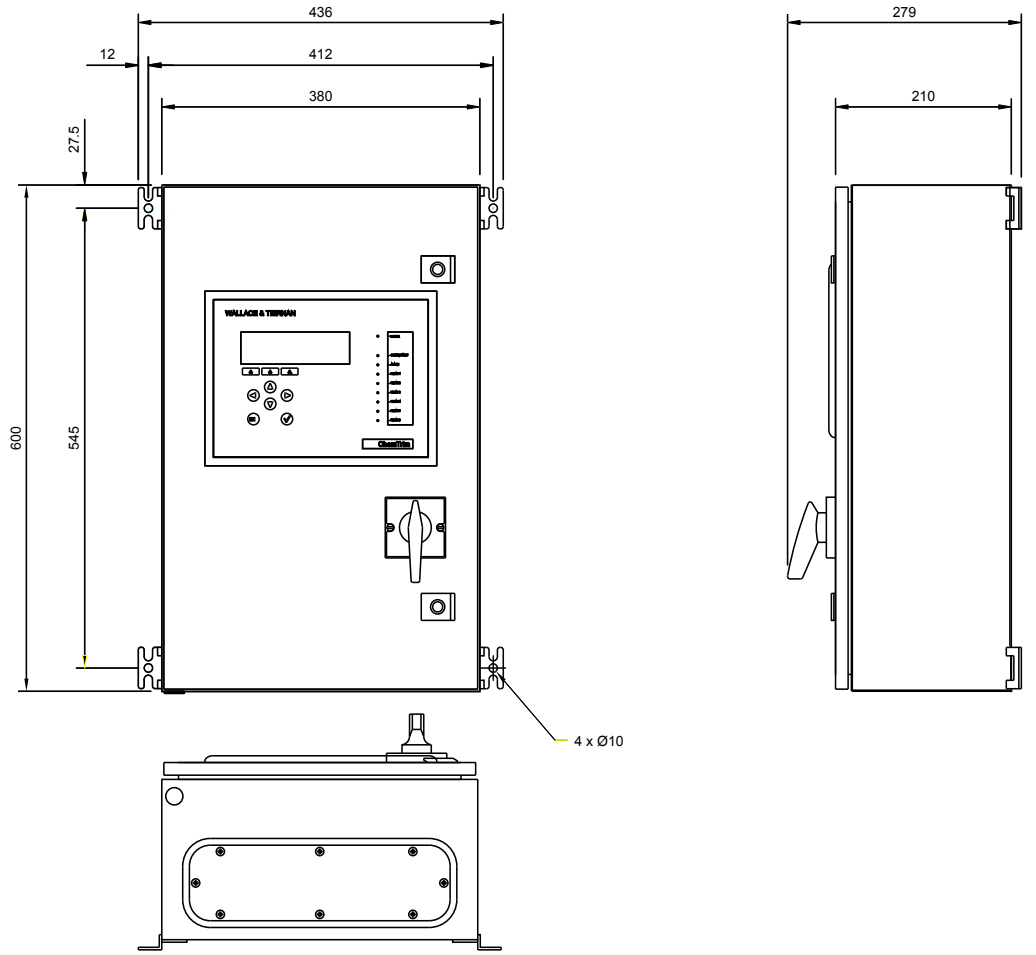
2.4.1 Plastic enclosure

A metal mounting rail 282 mm long x 35 mm wide with 5.5 mm x 18 mm slots is first fixed to the wall. Each module then hangs from this rail. A 5.4 mm diameter hole, indicated on the drawing on the next page, is used to securely fix the unit to the wall.



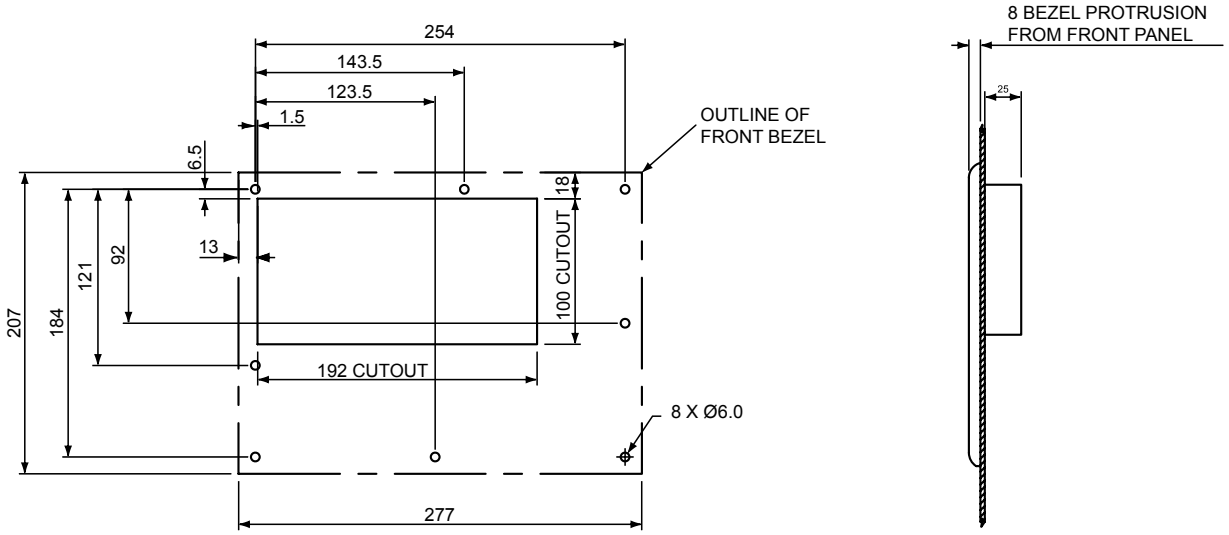
2.4.2 Steel enclosure

When the Chemtrim controller is supplied in a steel enclosure it should be secured to the wall by four screws in the brackets fitted to the rear of the case at the corners the hole centres of which are shown below.



2.4.3 Panel mounted

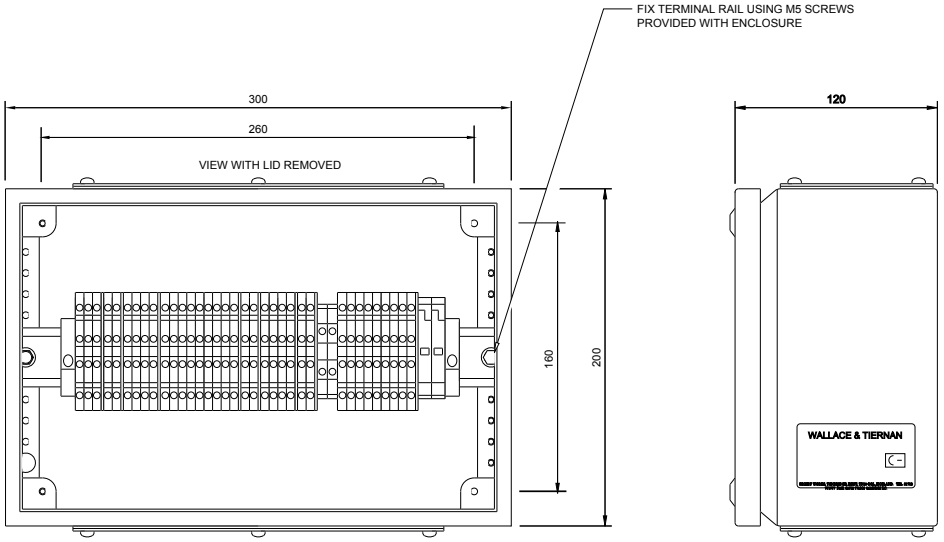
When panel mounting the Chemtrim the cutout and fixing holes should be to the following drawing.



FRONT PANEL DETAILS

2.4.4 Terminal box

The terminal box has four 8.7 mm diameter fixing holes the centres of which are shown over.

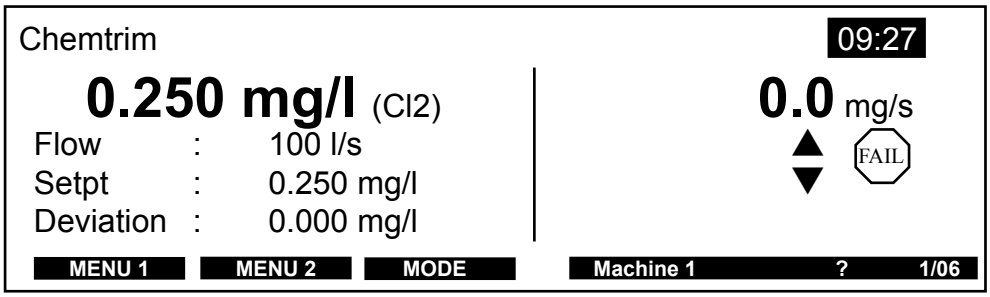


2.5 Electrical Connections

The external electrical connections should be made as shown on the external connection diagrams at the back of this manual. The mains supply to the Chemtrim controller should be taken from a switched fuse unit (5A) mounted within 2 metres.

Keep a minimum of 75 mm of clear space beneath each enclosure. This will be of great assistance when making electrical connections especially the RS232 interface lead.

3 COMMISSIONING



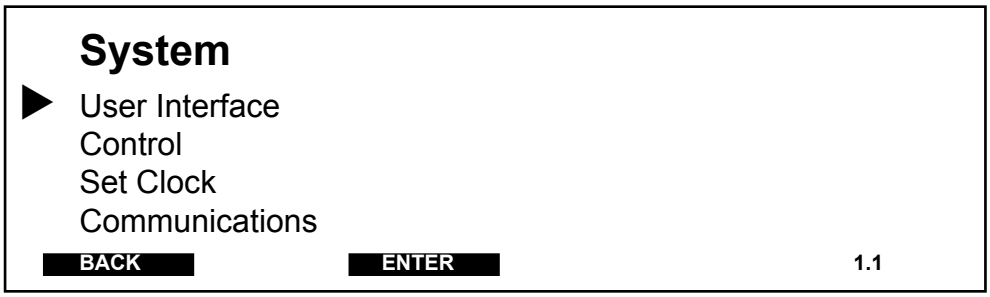
Pressing the MENU 1 key results in the following menu being displayed.

3.1 System

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'System', then press the ▲ key beneath **ENTER.** The following menu is displayed. The system menu is used as part of the commissioning procedure to set the following parameters:-

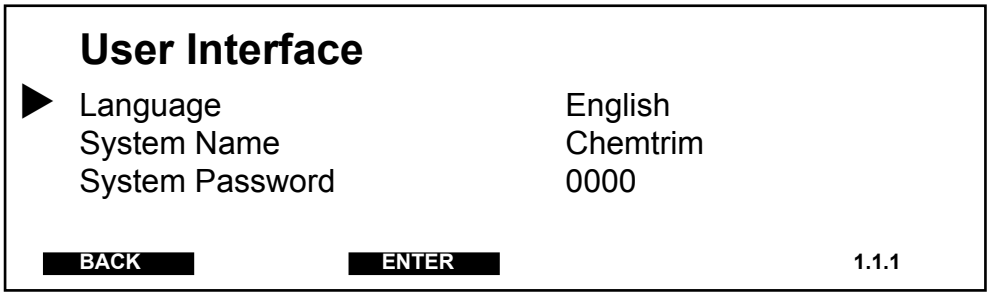
PARAMETER	**OPTIONS**
User Interface (see Section 3.1.1)	
Language	English
System Name	Chemtrim
System Password	0000
Control (see Section 3.1.2)	
Control Mode	Residual/Ratio/Feed Forward/ Setpoint Trim/Flow & Residual
Control Method	Chlorinate/Pre-chlorinate/De-chlorinate
Ext. Setpoint	Not Used/4-20mA/0-20mA
Control Action	Normal/Setpoint - Residual
Set Clock (see Section 3.1.3)	
Time	hh:mm
Date	dd.mm.yy
Communications (see Section 3.1.4)	
RS485 Protocol	W&T
RS485 Address	00
RS232 Function	Off/IAP-Download/Data Download

3.1.1 System - User Interface



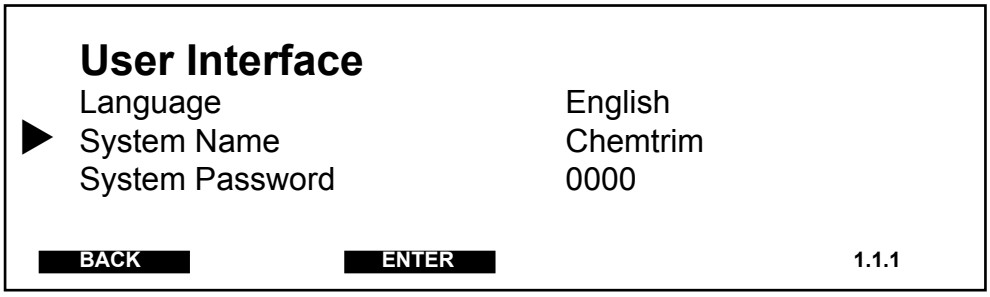
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'User Interface', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the language of the displays (English, French or German), give the system a name and also enter a system password.

Language



The language is fixed to English and as such cannot be altered.

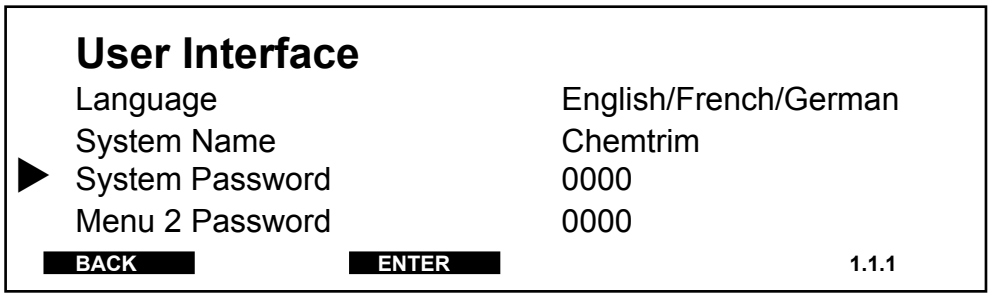
System Name



Having set the language press the ▼ key until the ▶ cursor lines up with '**System Name**', press **ENTER.** A second ▶ cursor appears adjacent to where the system name is entered. The first character is entered by scrolling using the ▲ and ▼ keys. When the desired first character is displayed press the ▶ key and the enter the next character. The system name can be up to eleven characters long and when entered is shown in the top left hand corner of the normal display. With the desired system name displayed press the ▲ key beneath **ENTER .**

System Password

The Chemtrim has two levels of password protection that can be enabled. The first is the '**System Password**' that prevents unauthorised access to **'Menu 1'** and **'Menu 2'** the commissioning and configuration options. The second is the 'Menu 2 Password' that has to be entered to gain access to the Menu 2 configuration options but doesn't allow entry into the Menu 1 options. The '**Menu 2 Password**' can only be defined once the system password has been set. Initially the System and Menu 2 passwords are set to 0000, leaving the unit with no prohibited access.



Having set the system name press the ▼ key until the ▶ cursor lines up with '**System Password**', press **ENTER.** A second ▶ cursor appears adjacent to where the system password is entered. The first character is entered by scrolling using the ▲ and ▼ keys. When the desired character is displayed press the ▶ key and the enter the next character. The system password is four characters long. With the desired system password displayed press the ▲ key beneath **ENTER .**

As soon as the system password is defined the '**Menu 2 Password**' entry point is displayed. If Menu 2 is required to be password protected by a different password to the System Password enter the password as described in the previous paragraph. When the system password is set to 0000 the '**Menu 2 Password'** option is not displayed.

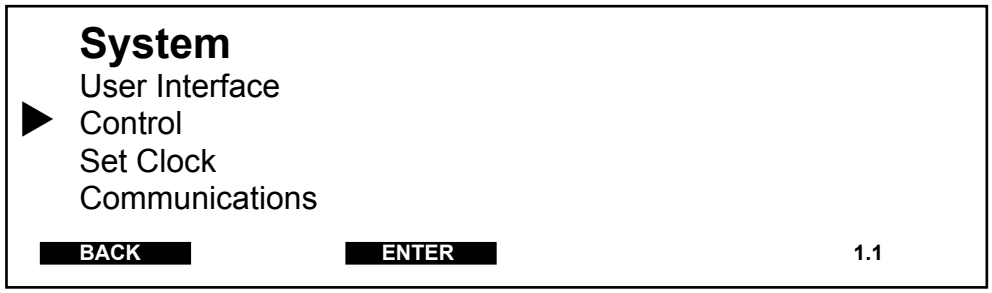
NOTE: If a system password and menu 2 password (if required) have been defined but no key has been pressed for a period of 60 minutes the passwords are automatically set, locking the system against unauthorised entry.

When the Chemtrim has been password protected the main view screens have a key icon displayed on the top line to indicate that the system is fully locked.

3.1.2 System - Control

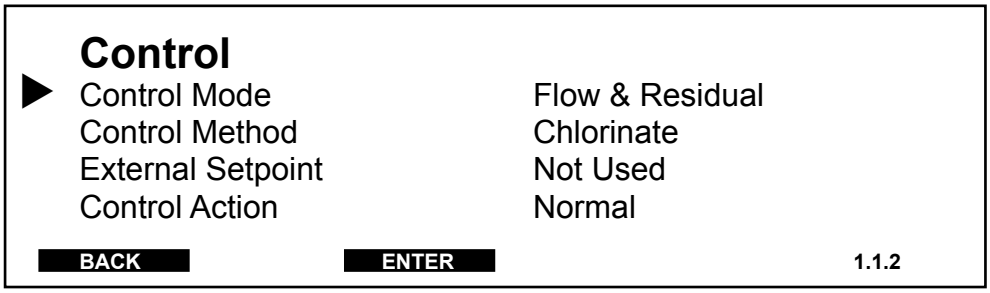
Pressing the MENU 1 key results in the following menu being displayed.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'System', then press the ▲ key beneath **ENTER.** The following menu is displayed.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the control mode (Residual/Ratio/Feed Forward/Setpoint Trim/Flow & Residual), the control method (Chlorinate/Pre-chlorinate/De-chlorinate) and, if required, the external setpoint (Not Used/4-20mA/0-20mA).

Control Mode



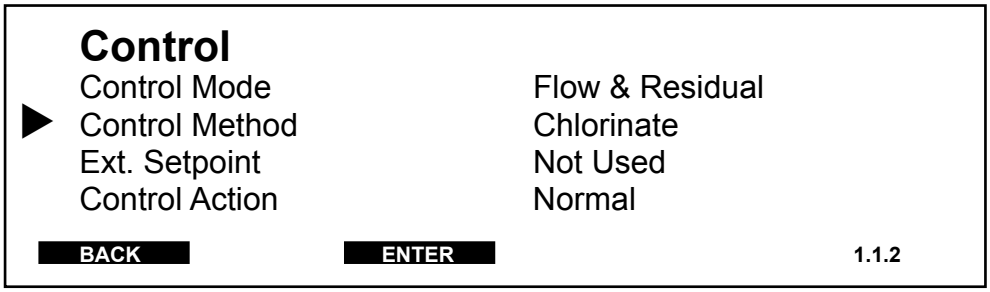
To set the control mode, using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control Mode**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between single feedback / ratio / feed forward / setpoint trim and flow & residual, refer to Section 1.2 for a full explanation of the different control modes. With the desired control mode displayed press the ▲ key beneath **ENTER.**

NOTE: Changing the control mode will result in many of the commissioning and configuration parameters to be set to the default values.

Control Method

The control method entered into the Chemtrim determines how the unit calculates the required chemical dosage rate. There are three variations of control method chlorinate, pre-chlorinate and de-chlorinate; chlorinate should be selected when the water being treated already contains a chlorine residual; pre-chlorinate should be selected when the water being treated contains contains no chlorine; de-chlorination should be selected when sulphur dioxide or sodium bisulphite is being added to the water to decrease the chlorine residual to maintain the control setpoint.

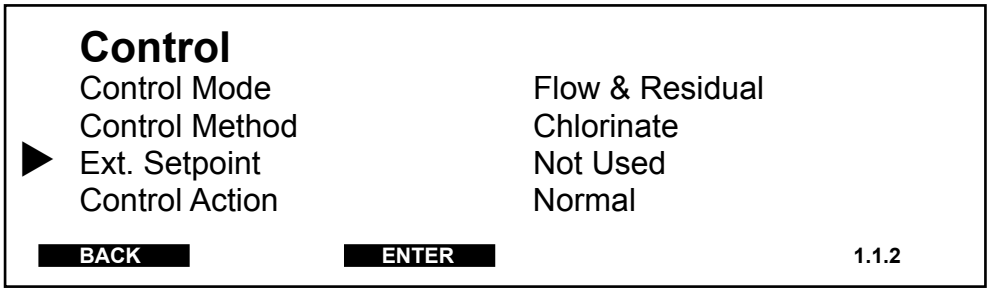
To set the control method, use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control Method**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between chlorination/pre-chlorination/ dechlorination. With the desired control method displayed press the ▲ key beneath **ENTER.**



External Setpoint

The external setpoint option should be selected if a remotely operated setpoint facility is included in the system control. If it is included then the type of input signal has to be selected (0 to 20mA or 4 to 20mA). If it is not included in the system '**Not Used**' should be selected.

Having set the control method press the ▼ key until the ▶ cursor lines up with '**External Setpoint**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between not used / 0....20mA / 4....20mA. With the desired external setpoint displayed press the ▲ key beneath **ENTER.**



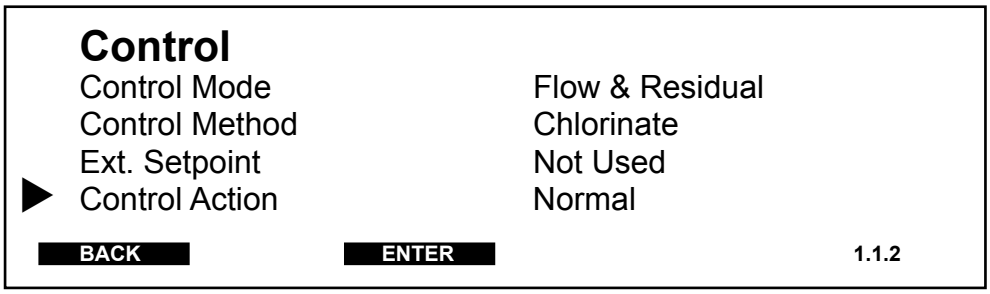
Control Action

The Control Action option is only displayed if 'Ratio' is has been selected as the Control Method. The operator may select between 'Normal' and 'Setpoint - Resid'.

When 'Normal' is selected as the control action the output of the controller is calculated as the product of the flow and residual signals together with the dosage factor.

When 'Setpoint - Resid' is selected as the control action the output of the controller is calculated as the product of the flow signal and the dosage factor and a factor calculated as (setpoint - measured residual)/setpoint. When the measured residual equals the setpoint the output will therefore be zero. When the measured residual is zero the output will be the product of the flow and the dosage factor.

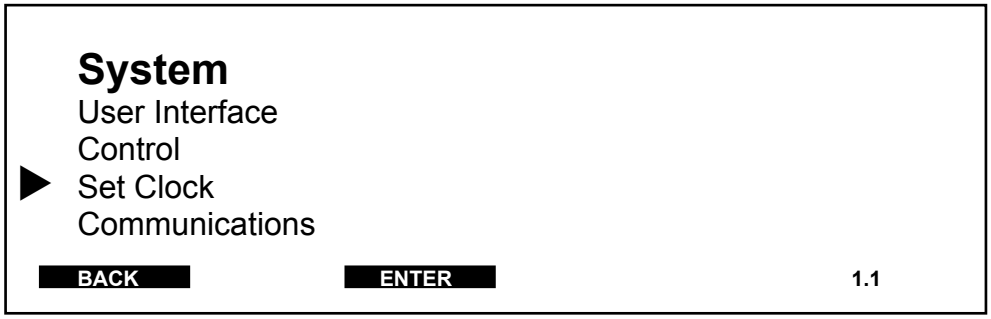
Having set the external setpoint press the ▼ key until the ▶ cursor lines up with '**Control Action**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Normal and Setpoint - Resid. With the desired control action displayed press the ▲ key beneath **ENTER.**



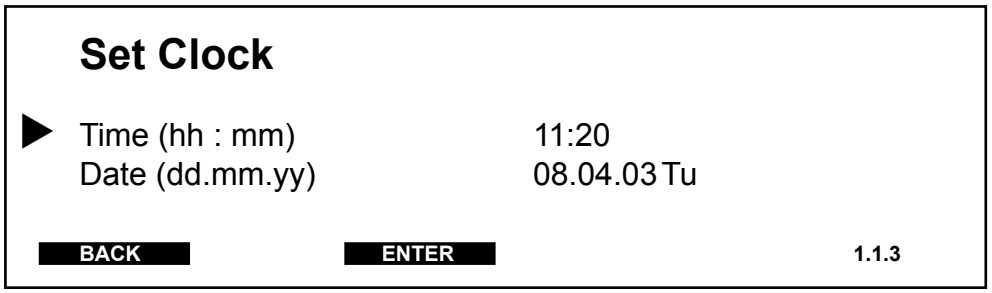
3.1.3 System - Set Clock

Pressing the MENU 1 key results in the following menu being displayed.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'System', then press the ▲ key beneath **ENTER.** The following menu is displayed.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Set Clock**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the time and date.



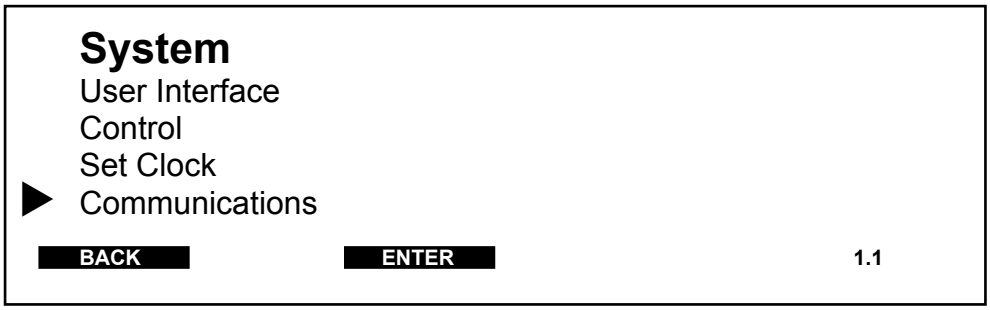
Press the ▼ key until the ▶ cursor lines up with '**Time**', press **ENTER.** A second ▶ cursor appears adjacent to where the time is entered. The first number, the hour, is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct time is displayed. Press the ▲ key beneath **ENTER .**

Having entered the time press the ▼ key until the ▶ cursor lines up with '**Date**', press **ENTER.** A second ▶ cursor appears adjacent to where the time is entered. The first number, the date, is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the day, month and year are entered. Press the ▲ key beneath **ENTER .**

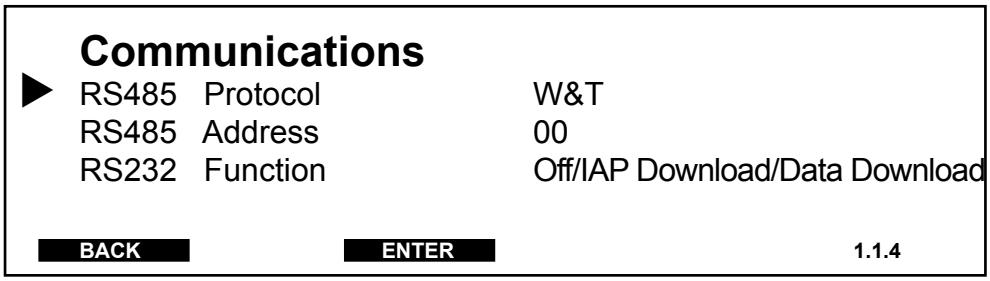
3.1.4 Communications

Pressing the MENU 1 key results in the following menu being displayed.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'System', then press the ▲ key beneath **ENTER.** The following menu is displayed.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Communications**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the communications.



RS485 Communications

The RS485 interface supports Wallace & Tiernan protocol (fixed data format. The OPC server will allow the controller to interface with:-

- OPC compliant SCADA systems
- W&T Web-server

All operating and commissioning parameters are accessible using the RS485 interface, and some additional variables giving status/alarm information.

RS232 Communications

The RS232 interface enables a standard laptop computer to be connected to the controller. This interface may be used to load the main program into flash memory, or download data from the controller.

3.2 Input Signals

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'Input Signals', then press the ▲ key beneath **ENTER.** The following menu is displayed. The input signals menu is used as part of the commissioning procedure to set the following parameters:-

PARAMETER	OPTIONS
Flow (see Section 3.2.1)	
Signal Type	4-20mA / 0-20mA / 0-10V
Resolution	0.1l/s / 0.01l/s / 1l/s
Range	000.0l/s to 30000l/s
Range Used	10% to 100%
Display Flow as	l/s / m^3/h / MLD
Flow 2 (see Section 3.2.2)	
Signal Type	*Not Used / 4-20mA / 0-20mA / 0-10V
Resolution	0.1l/s / 0.01l/s / 1l/s
Range	000.0 l/s to 30000 l/s
Range Used	10% to 100%

*When Not Used is selected as the signal type for **Flow 2** the Resolution, Range and Range Used displays do not appear.

Analyser 1 (see Section 3.2.3)

Signal Type	4-20mA / 0-20mA
Measurement	Cl_2 / O3 / ClO2 / NH3 / DEOX
Units	µg/l / mg/l
Range	999µg/l / 100mg/l

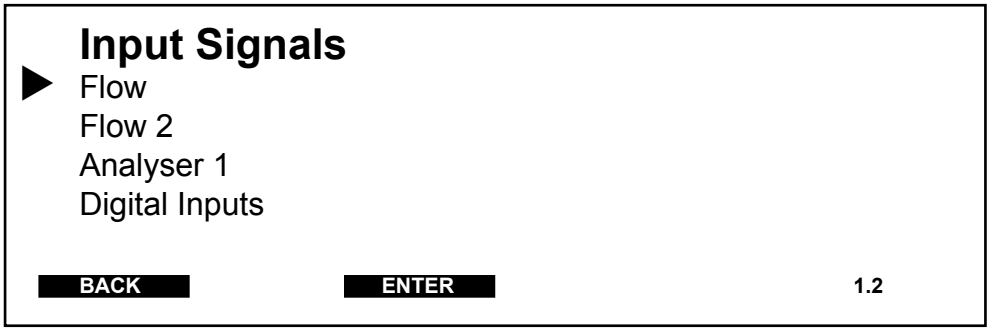
Analyser 2 (see Section 3.2.3)(only displayed when setpoint trim is selected as the control mode - see Section 3.1.2)

Signal Type	4-20mA / 0-20mA
Units	µg/l / mg/l
Range	999µg/l / 100mg/l

Digital Inputs (see Section 3.2.4)

Digital Input 1	Not Used / Control to 100% / Control to 50% / Control to 0% / Alarm Inhibit / Control Inhibit
Digital Input 2	Not Used / Alarm Inhibit / Shutdown

3.2.1 Input Signals - Flow



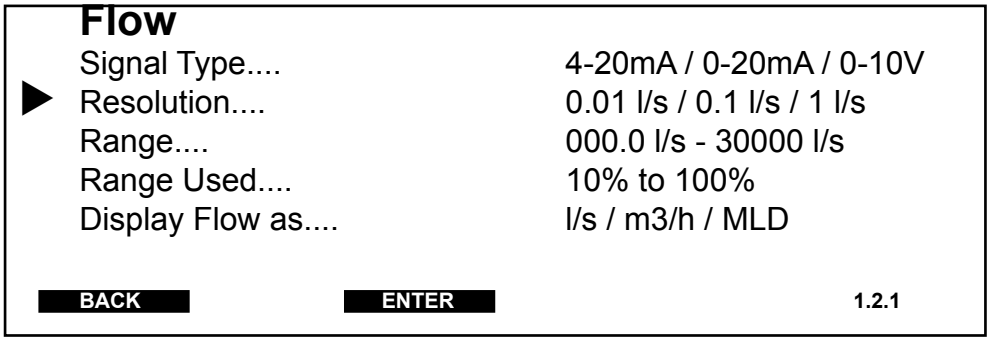
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Flow**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the flow signal type, resolution, range, range used and the unit the flow is displayed in.

Signal Type

To set the signal type using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Type**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or

▼ key cycles the display between 4-20mA, 0-20mA and 0-10V. The commisioning engineer should now select the type of signal that the system flow meter is outputting. With the desired signal type displayed press the ▲ key beneath **ENTER.**

Resolution



The resolution of the displayed flow should be set in accordance with the following table.

Range of Flow Meter	Resolution Setting
0 to 49.99 l/s	0.01 l/s
50.0 to 499.9 l/s	0.1 l/s
500 to 30000 l/s	1 l/s

Having set the signal type press the ▼ key until the ▶ cursor lines up with the '**Resolution**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between 0.01 l/s, 0.1 l/s and 1 l/s. The commisioning engineer should now select the resolution in accordance with the range of the system (see note below). With the desired resolution displayed press the ▲ key beneath **ENTER.**

Range

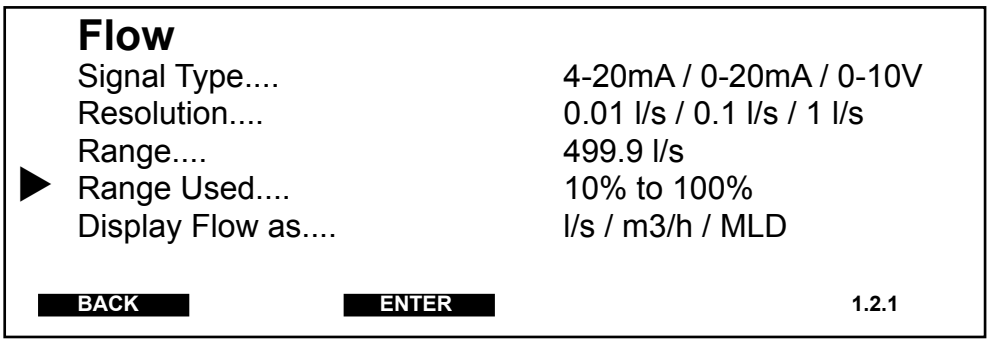
The data entered as the range must coincide with the actual maximum water flow to be treated.

NOTE: If the range entered does not coincide with the resolution setting, as shown in the table above, it will default to the maximum range for the resolution set.

Having set the resolution press the ▼ key until the ▶ cursor lines up with the '**Range**', press **ENTER.** A second ▶ cursor appears adjacent to where the range value is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct range is displayed. Press the ▲ key beneath **ENTER .**

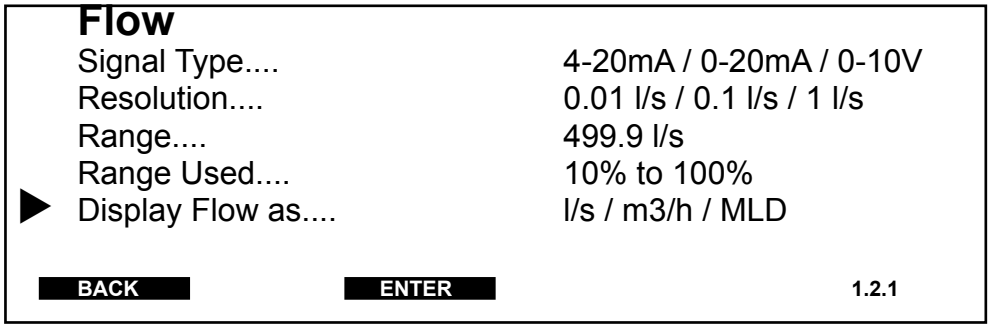
Range Used

The range used display allows the commissioning engineer to set a percentage of the range which is anticipated to be the effective range e.g. range set 100 l/s, range used 90%, effective range = 90 l/s.



Having set the range press the ▼ key until the ▶ cursor lines up with the '**Range Used**', press **ENTER.** A second ▶ cursor appears adjacent to where the range used percentage is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the desired percentage range used is displayed. Press the ▲ key beneath **ENTER .**

Display Flow as



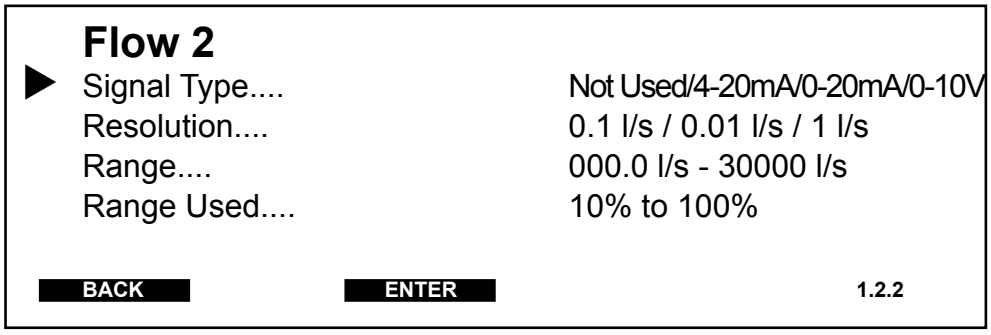
Having set the range used press the ▼ key until the ▶ cursor lines up with '**Display Flow as**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between l/s, m^3/h and MLD. The commisioning engineer should now select the units that flow is displayed in on the standard display. With the desired flow units displayed press the ▲ key beneath **ENTER.**

3.2.2 Input Signals - Flow 2

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Flow2**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the flow signal type, resolution, range and range used.

The following menu options should only be selected if a second water flow meter is included in the system. If ther is no second flow meter '**Not Used**' must be selected as the '**Signal Type**', the resolution, range and range used options are then not displayed.

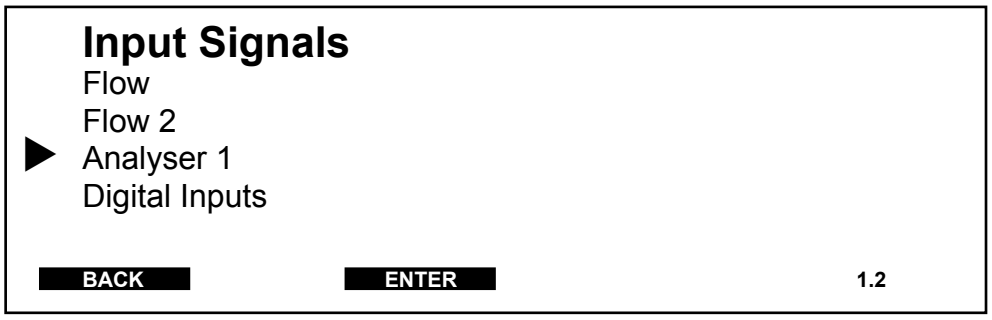
Flow 2



To set the signal type using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Type**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Not Used, 4-20mA, 0-20mA and 0-10V. The commisioning engineer should now select the type of signal that the system flow meter is outputting. With the desired signal type displayed press the ▲ key beneath **ENTER.**

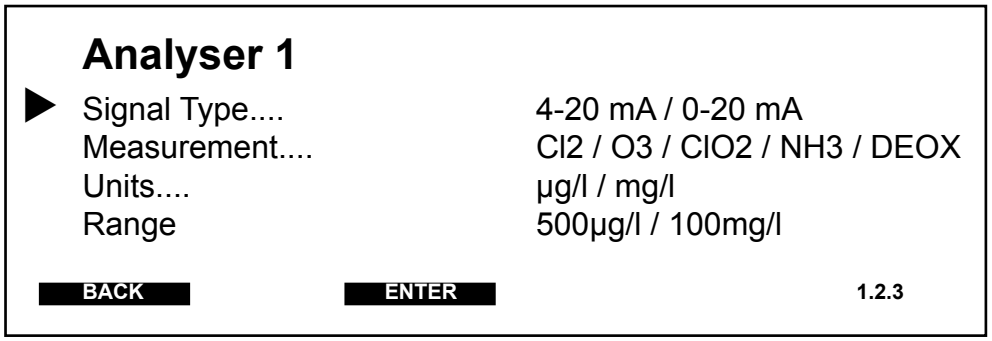
The resolution, range and range used should be set in the same manner as described in Section 3.2.1.

3.2.3 Input Signals - Analyser 1



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Analyser 1**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the signal type, measurement, units and range .

Signal Type

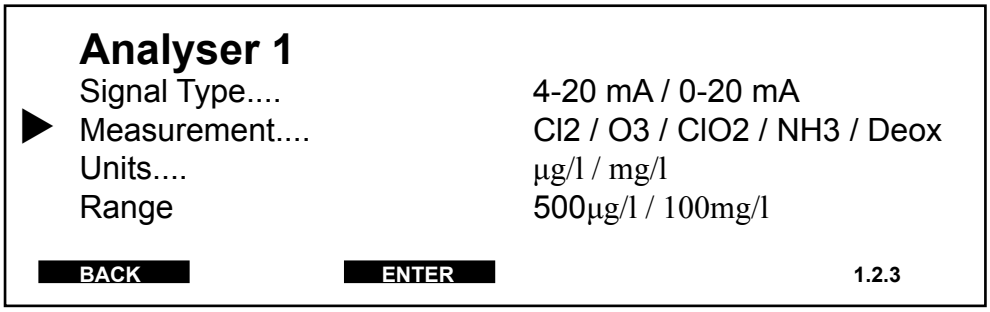


To set the signal type using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Type**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between 4-20mA and 0-20mA. The commissioning engineer should now select the type of signal that the analyser 1 is outputting. With the desired signal type displayed press the ▲ key beneath **ENTER.**

Measurement

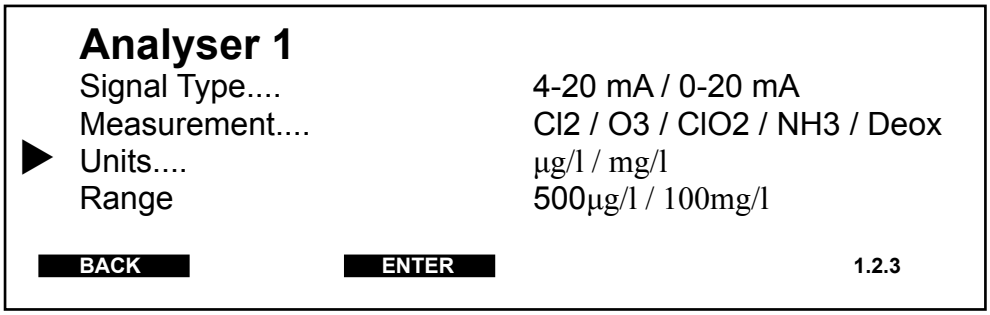
Having set the signal type press the ▼ key until the ▶ cursor lines up with the '**Measurement**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ and ▼ keys cycles the display between Cl2, O3, ClO2, NH3 and Deox. The commissing engineer should now select whether the signal coming into the Chemtrim from the analyser is proportional to the

measured chlorine residual (Cl2), ozone (O3), chlorine dioxide (ClO2), ammonia (NH3) or is from a centre zero analyser (Deox). When the desired measurement is displayed press the ▲ key beneath **ENTER .**



Units

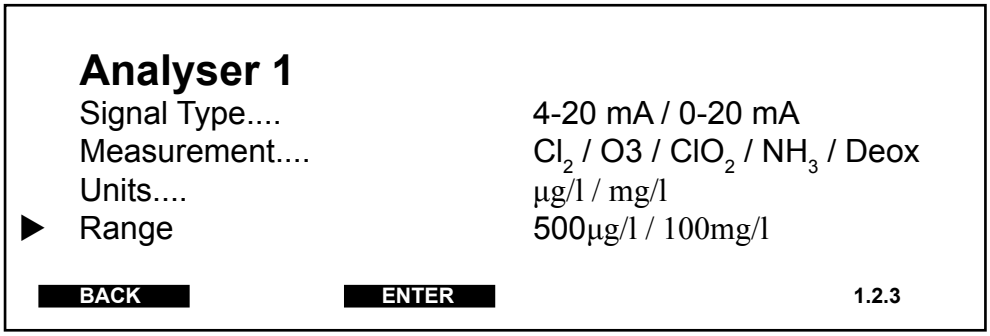
Having set the measurement press the ▼ key until the ▶ cursor lines up with the '**Units**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ and ▼ keys cycles the display between µg/l and mg/l. The commissing engineer should now select whether the residual measurement shown on the main display is in µg/l or mg/l. When the desired unit is displayed press the ▲ key beneath **ENTER .**



Range

Having set the units press the ▼ key until the ▶ cursor lines up with the '**Range**', press **ENTER.** A second ▶ cursor appears adjacent to where the range value is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct range is displayed. Press the ▲ key beneath **ENTER .**

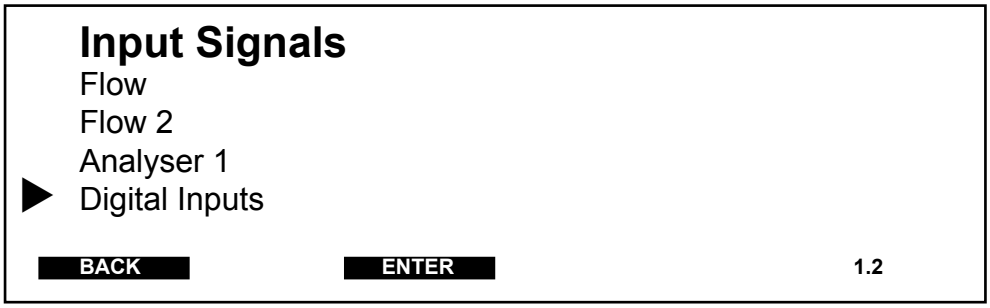
NOTE: If µg/l has been selected as the unit in the previous section the range has a maximum entry of 999µg/l. If mg/l has been selected then the range can be set to 100 mg/l maximum.



Analyser 2

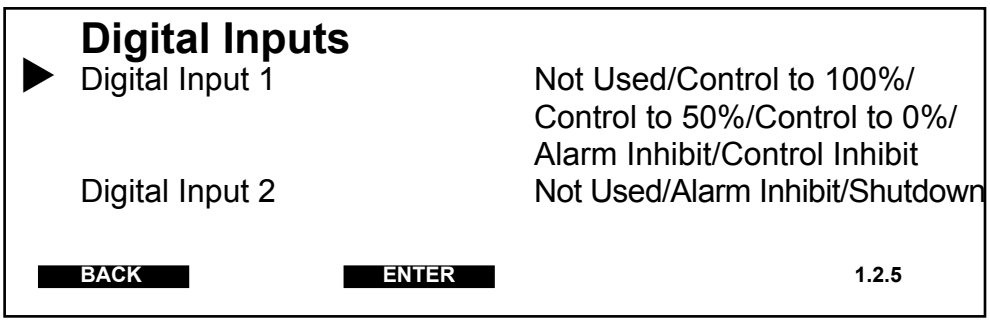
If setpoint trim has been set as the system mode of control (see Section 1.2) then the commissioning engineer has to enter the signal type, units and range for analyser 2. The procedure for carring this out is the same as detailed for analyser 1.

3.2.4 Input Signals - Digital Inputs



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Digital Inputs**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the action of digital input 1 and digital input 2.

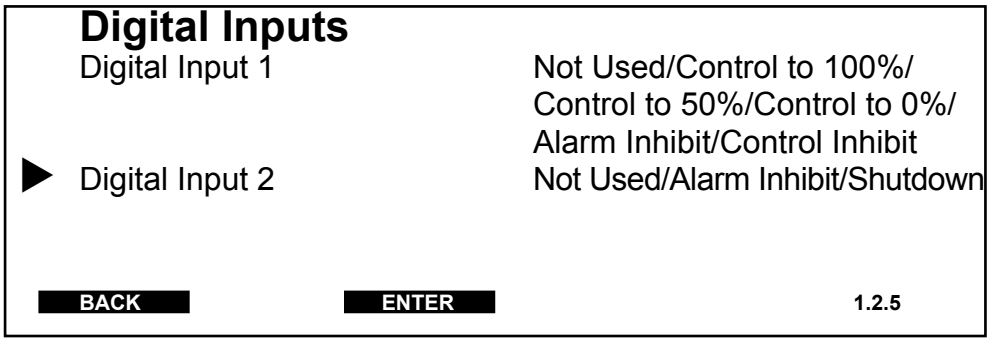
Digital Input 1



To set the action of digital input 1 use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Digital Input 1**', then press the ▲ key beneath

the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between not used, control to 100%, control to 50%, control to 0%, alarm inhibit and control inhibit. The commissioning engineer should now select the action for digital input 1. With the desired digital input displayed press the ▲ key beneath **ENTER.**

Digital Input 2



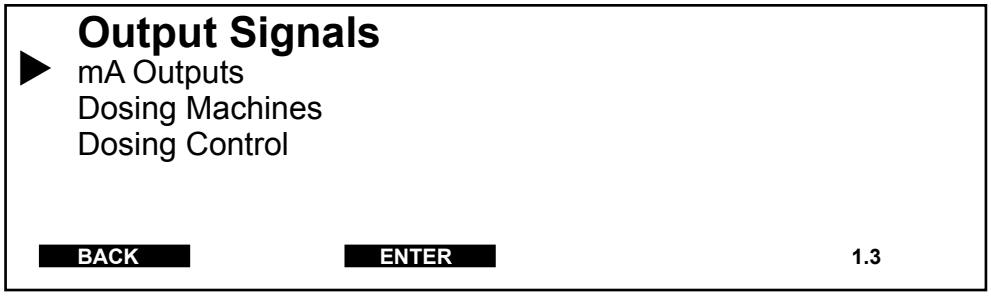
To set the action of digital input 2 use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Digital Input 2**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between not used, alarm inhibit and shutdown. The commissioning engineer should now select the action for digital input 2. With the desired digital input displayed press the ▲ key beneath **ENTER.**

3.3 Output Signals

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'Output Signals', then press the ▲ key beneath **ENTER.** The following menu is displayed. The output signals menu is used as part of the commissioning procedure to set the following parameters:-

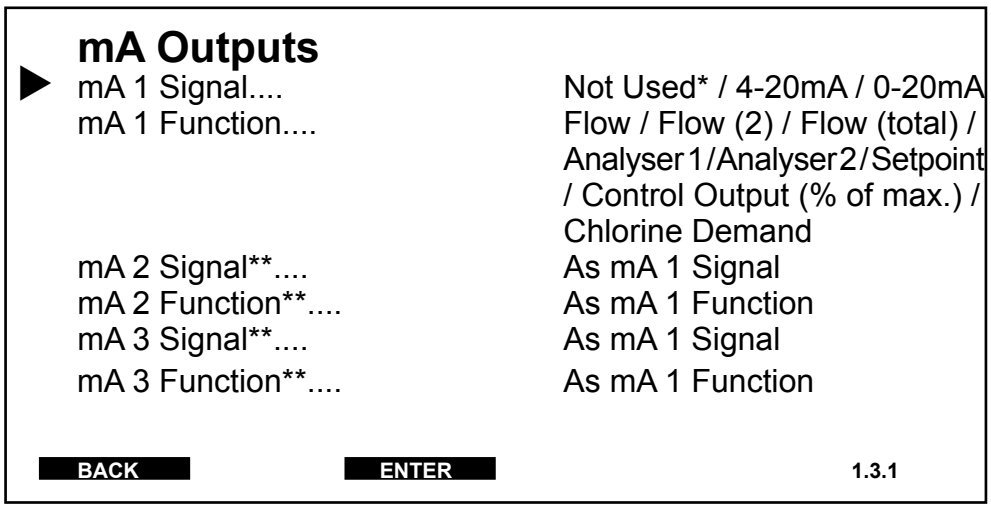
PARAMETER	OPTIONS
mA Outputs (see Section 3.3.1)	
mA 1 signal	Not Used / 4-20mA / 0-20mA
mA 2 signal	Not Used / 4-20mA / 0-20mA
mA 3 signal	Not Used / 4-20mA / 0-20mA
Dosing Machine (see Section 3.3.2)	
Machine Type	Gas Feed / Pump
Resolution	0.001g/s / 0.01g/s (gas feed) 0.01 l/h / 1 l/h (pump)
Gas Capacity	0.001 to 9.999g/s or 0.01 to 99.99g/s
Pump Capacity	0.01 to 99.99l/h or 1 to 9999l/h
Product Strength	0.01 to 35%
Dosing Control (see Section 3.3.3)	
Dosing Control	Positioner / Positioner + mA / mA Output / Pulse
mA Signal	0-20mA / 4-20mA
Pulse Range	30 to 122

3.3.1 Output signals - mA outputs



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**mA Outputs**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the output signal type and function.

Signal Type



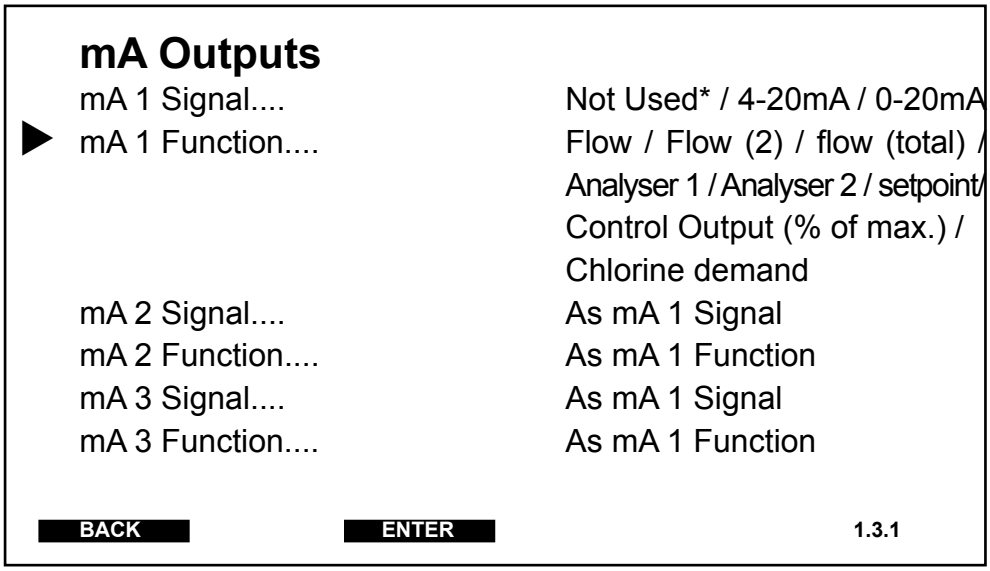
* If 'Not Used' is selected as the mA output signal the 'mA Function' option will not be displayed.

** The signal type and function for mA 2 and mA 3 are set in the same manner as for mA 1, therefore the procedure is not repeated.

To set the output signal type use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**mA 1 Signal** ', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Not Used, 4-20mA and 0-20mA. The commisioning engineer should now select the type of output signal required. With the desired signal type displayed press the ▲ key beneath **ENTER.**

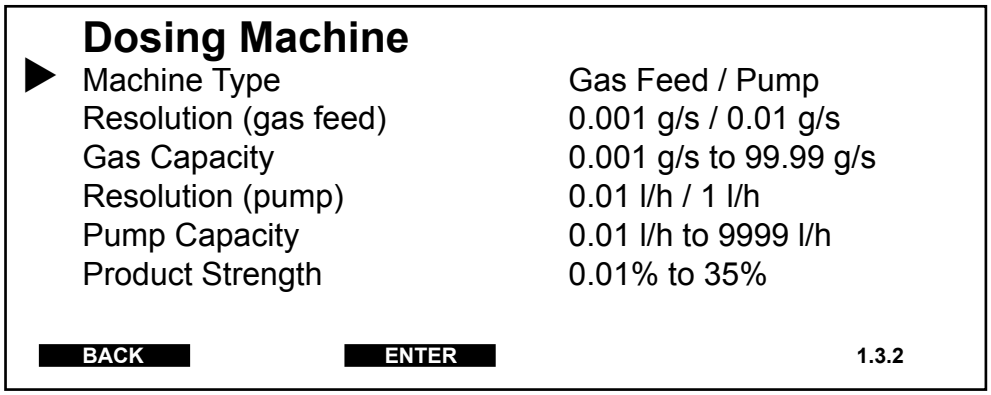
Signal function

Having set the mA signal type its function now has to be selected. To set the output signal function use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**mA 1 Function** ', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Flow, Flow (2), Flow (total), Analyser 1, Analyser 2, Setpoint, Control Output and Chlorine Demand. The commisioning engineer should now select the type of output signal function required. With the desired function displayed press the ▲ key beneath **ENTER.**



3.3.2 Output signals - dosing machine

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing Machine**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the machine type, resolution, capacity and product strength (pumps only).



To set the machine type use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Machine Type**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between gas feed and pump. The commisioning engineer should now select the type of machine included in the system. With the desired machine type displayed press the ▲ key beneath **ENTER.**

Resolution

Having set the machine type press the ▼ key until the ▶ cursor lines up with the '**Resolution**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between the settings shown below. The commisioning engineer should now select the resolution in accordance with the capacity of the system (see table below) and the type of machine selected. With the desired resolution displayed press the ▲ key beneath **ENTER.**

Gas Capacity	Resolution Setting
0.001 to 9.999 g/s	0.001 g/s
0.01 to 99.99 g/s	0.01 g/s
Pump Capacity	**Resolution Setting**
0.01 to 99.99 l/h	0.01 l/h
1 to 9999 l/h	1 l/h

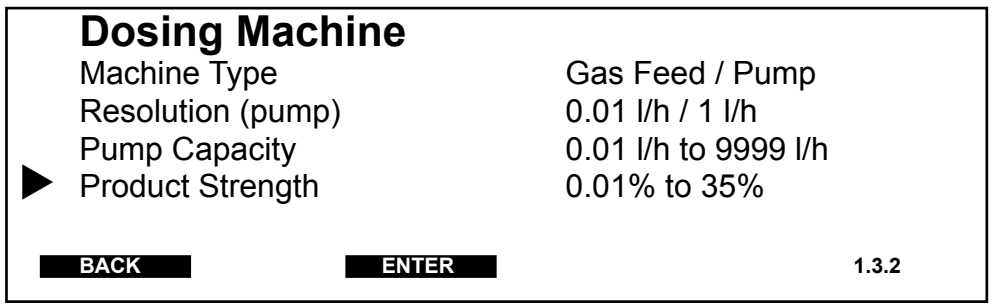
Gas capacity / Pump capacity

Having set the resolution press the ▼ key until the ▶ cursor lines up with '**Gas Capacity**' or '**Pump Capacity**', press **ENTER.** A second ▶ cursor appears adjacent to where the capacity value is entered. The first number is entered by scrolling using the ▲ or ▼ key. When the desired number is displayed press the ▶ key and enter the next one. Repeat the foregoing until the correct capacity is displayed. With the desired capacity displayed press the ▲ key beneath **ENTER.**

The data entered as the capacity must coincide with the actual maximum gas or pump capacity.

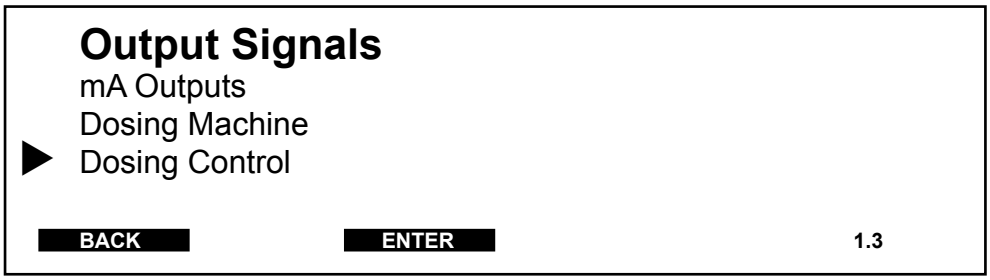
NOTE: If the capacity entered does not coincide with the resolution setting, as shown in the table above, it will default to the maximum range for the resolution set.

Product strength (only applies when the machine type is 'Pump')



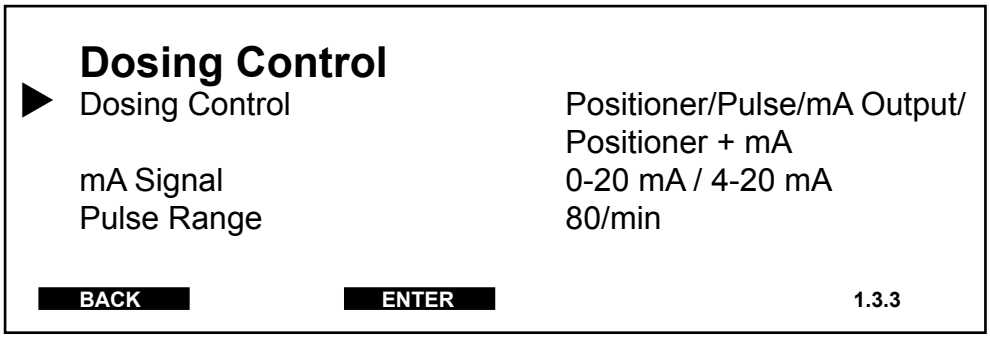
Having set the capacity press the ▼ key until the ▶ cursor lines up with the '**Product Strength**', press **ENTER.** A second ▶ cursor appears adjacent to where the product strength is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. NOTE: the maximum entry is 35%. Repeat the foregoing until the correct range is displayed. Press the ▲ key beneath **ENTER .**

3.3.3 Output signals - dosing control



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing Control**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the dosing control, output signal, pulse range, booster pumps and vent pumps.

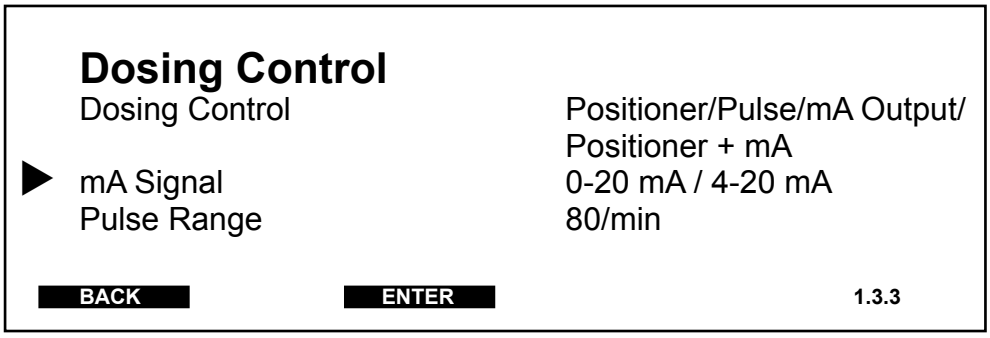
Dosing control



To set the dosing control use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing Control**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Positioner, Pulse, mA Output and Positioner + mA. The commisioning engineer should now select the type of dosing control included in the system. With the desired machine type displayed press the ▲ key beneath **ENTER.**

NOTE: For a full explaination of the different dosing control options refer to Section 1.1.

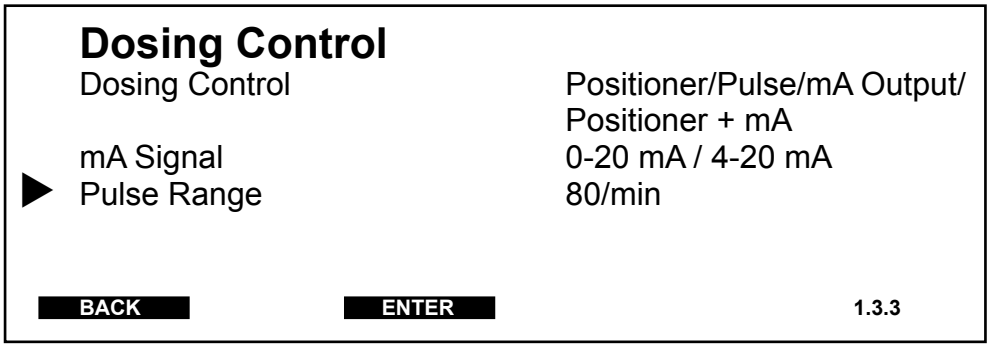
mA signal



NOTE: The mA Signal option is only displayed when the dosing control type is mA Output or Positioner + mA.

Having set the type of dosing control press the ▼ key until the ▶ cursor lines up with the '**mA Signal**', press **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between 0-20mA and 4-20mA. The commisioning engineer should now select the type of output signal required. With the desired signal type displayed press the ▲ key beneath **ENTER.**

Pulse range



NOTE: The Pulse Range option is only displayed when the dosing control type selected is Pulse.

Having set the dosing control type to pulse press the ▼ key until the ▶ cursor lines up with the '**Pulse Range**', press **ENTER.** A second ▶ cursor appears adjacent to where the pulse range is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. A minimum of 30 and a maximum 122 pulses per minute can be entered. Repeat the foregoing until the pulses per minute is displayed. Press the ▲ key beneath **ENTER .**

3.4 Alarms

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with 'Alarms', then press the ▲ key beneath **ENTER.** The

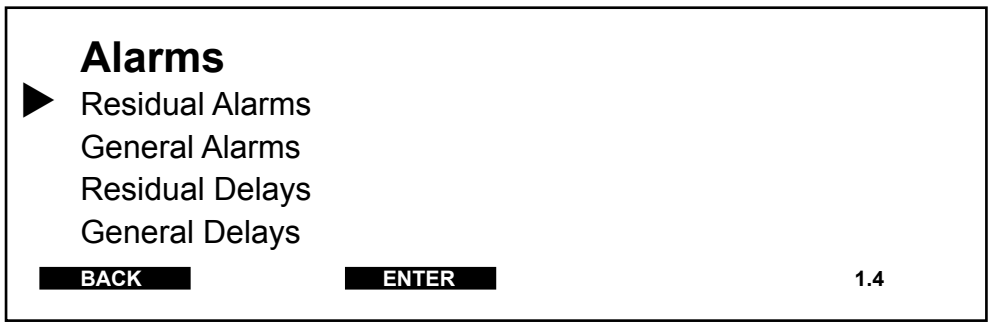
following menu is displayed. The alarms menu is used as part of the commissioning procedure to set the following parameters:-

PARAMETER	OPTIONS
Residual Alarms (see Section 3.4.1)	
Low Residual 1	Disable / Enable
High Residual 1	Disable / Enable
Low Residual 2	Disable / Enable
High Residual 2	Disable / Enable
General Alarms (see Section 3.4.2)	
Low Flow	Disable / Enable
Machine Fail	Disable / Enable
High demand	Disable / Enable
Booster Pump	Disable / Enable
Low Control	Disable / Enable
High Control	Disable / Enable
Residual Delays (see Section 3.4.3)*	
Low Residual 1	00:00:30
High Residual 1	00:00:30
Low Residual 2	00:01:30
High Residual 2	00:45:00
General Delays (see Section 3.4.4)**	
Low Flow	00:02:30
Machine Fail	00:04:20
High demand	00:01:30
Booster Pump	00:45:00
Low Control	00:01:30
High Control	00:01:30

* The residual delay times are only displayed if their associated residual alarm is enabled.

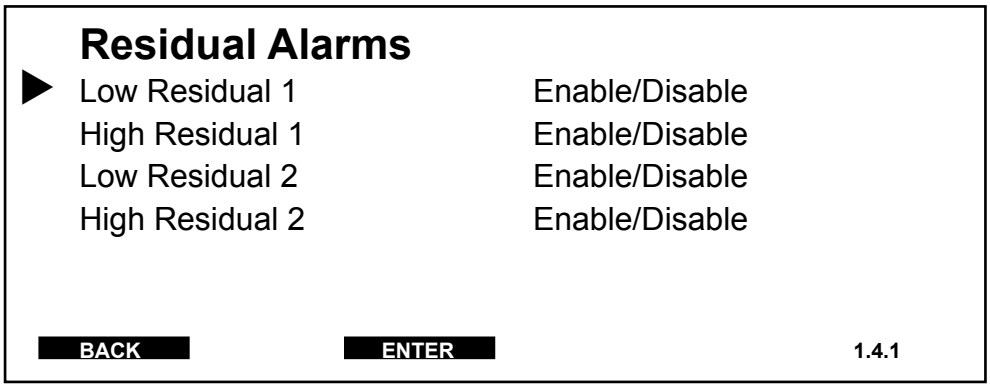
** The general delay times are only displayed if their associated general alarm is enabled.

3.4.1 Alarms - residual alarms



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Residual Alarms**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to enable/ disable low and high residual alarms.

Low Residual 1

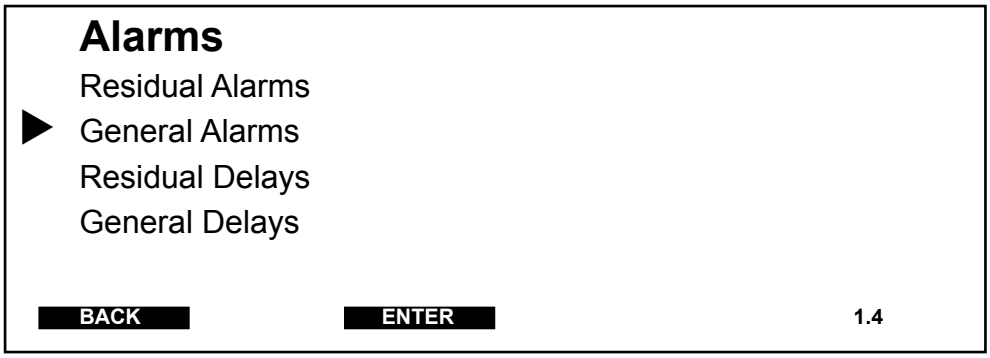


NOTE: Only those alarms that are enabled in this procedure will be available to map to a relay contact (see Section 3.5, displays 1.5.3, 1.5.4 and 1.5.5) or be displayed on the main display. This menu screen is not displayed if either ratio or feed forward are selected as the control mode (see Section 3.1.2, display 1.1.2).

To enable/disable low residual alarm 1 use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Residual 1**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between enable and disable. With the desired alarm state displayed press the ▲ key beneath **ENTER.**

The commissioning engineer should now repeat the foregoing for 'High residual 1', 'Low Residual 2' and 'High Residual 2'.

3.4.2 Alarms - general alarms



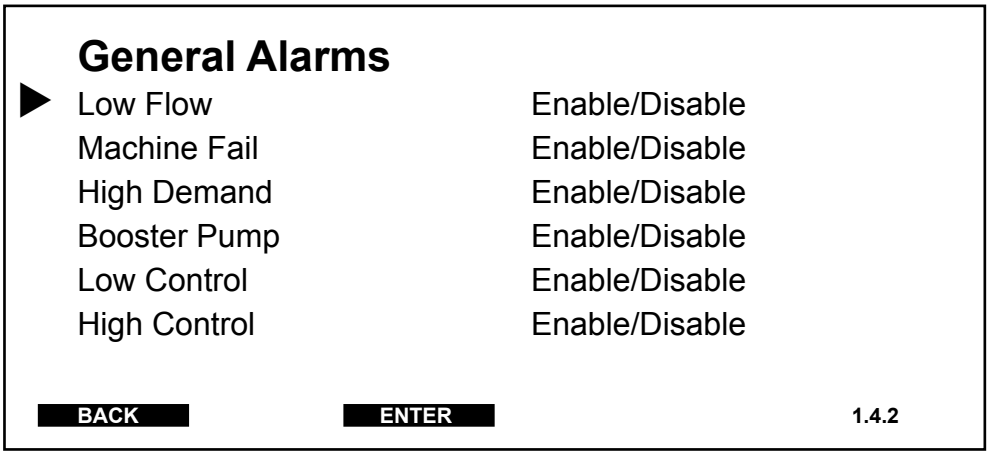
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**General Alarms**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to enable/ disable the low flow, machine fail, high demand, booster pump, low control and high control alarms.

NOTE: Only those alarms that are enabled in this procedure will be available to map to a relay contact (see Section 3.5, displays 1.5.3, 1.5.4 and 1.5.5) or be displayed on the main display.

NOTE: The low flow alarm is not displayed if residual is selected as the control mode (see Section 3.1.2, display 1.1.2).

NOTE: The high demand alarm is only displayed if either flow and residual or setpoint trim is selected as the control mode (see Section 3.1.2, display 1.1.2).

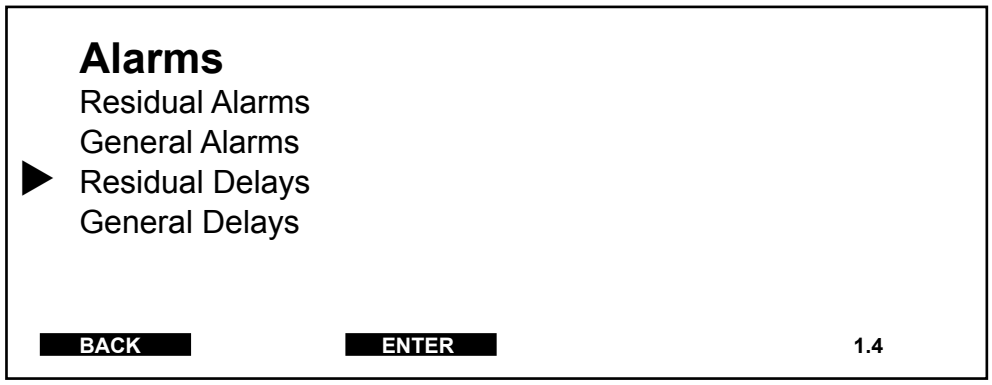
Low Flow



To enable/disable low flow alarm use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Flow**', then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between enable and disable. With the desired alarm state displayed press the ▲ key beneath **ENTER.**

The commissioning engineer should now repeat the foregoing for 'Machine Fail', 'High Demand', 'Booster Pump', 'Low Control' and 'High Control'.

3.4.3 Alarms - residual delays

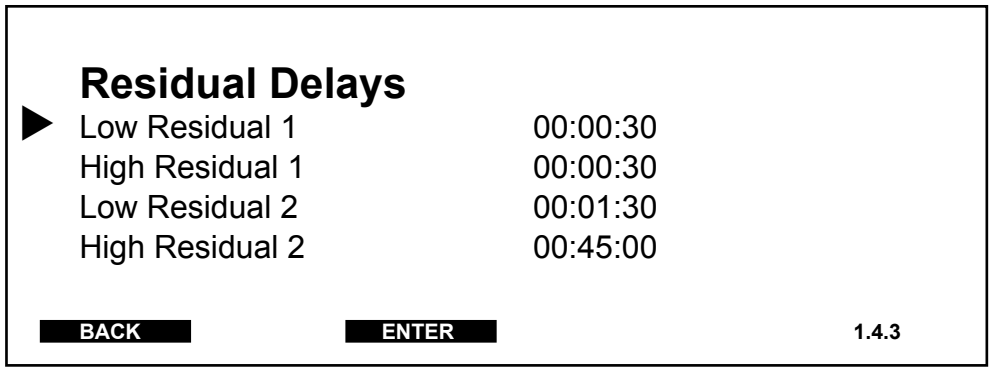


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Residual Delays**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the time delay before the low residual1, high residual 1, low residual 2 and high residual 2 alarms in order to eliminate spurious alarms taking place.

NOTE: Only those alarms that have been enabled in Section 3.4.1 will be evident in the following display.

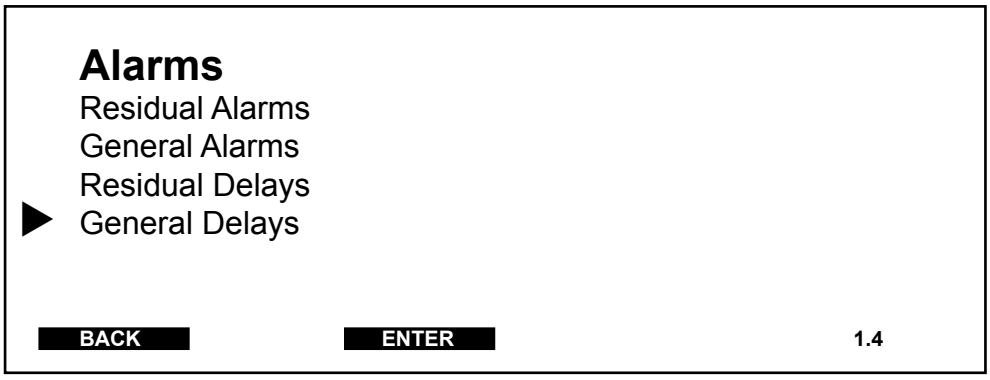
NOTE: The procedure for setting the residual delay for each of the alarms is the same so only setting low residual 1 is explained.

Low Residual 1



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Residual 1**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the time delay is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct delay time is displayed. Press the ▲ key beneath **ENTER .**

3.4.4 Alarms - general delays

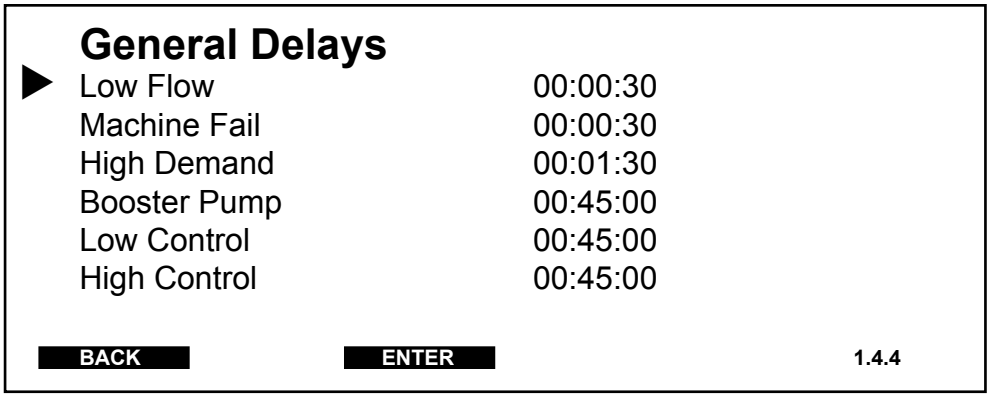


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**General Delays**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to set the time delay before the low flow, machine fail, high demand, booster pump, low control and high control alarms in order to eliminate spurious alarms taking place.

NOTE: Only those alarms that have been enabled in Section 3.4.2 will be evident in the following display.

NOTE: The procedure for setting the general delay for each of the alarms is the same so only setting low flow is explained.

Low Flow



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Flow**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the time delay is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct delay time is displayed. Press the ▲ key beneath **ENTER .**

3.5 Relays

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Relays**', then press the ▲ key beneath **ENTER.** The following menu is displayed. The relays menu is used as part of the commissioning procedure to set the following parameters:-

PARAMETER	OPTIONS
Operation 1 (see Section 3.5.1**)**	
Relay 1 Op	Not Used / Watchdog / NC / NO
Relay 2 Op	Not Used / NC / NO / Operating 1
Relay 3 Op	Not Used / NC / NO / operating 2
Operation 2 (see Section 3.5.2**)**	
Relay 4 Op	Not Used / NC / NO / External Setpoint

Map Functions 1 (see Section 3.5.3**)**

Relay 1	■ Low Flow			
Relay 2	■ High Demand	Low		Hi
Relay 3	Machine 1 Fail	■	Residual 1	■
Relay 4			Residual 2	

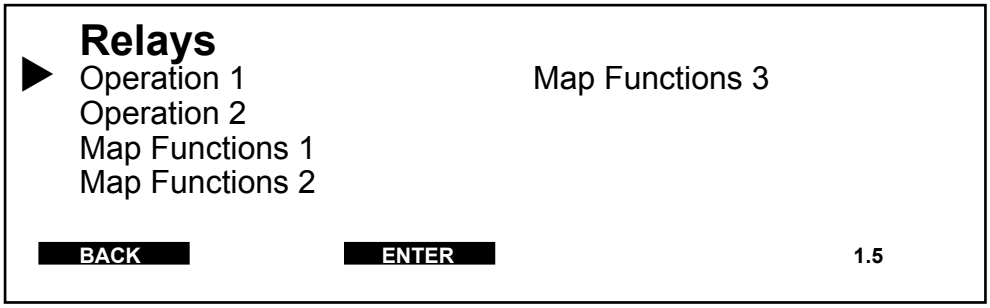
Map Functions 2 (see Section 3.5.4**)**

Relay 1	■ Flow Fail
Relay 2	■ Flow 2 Fail
Relay 3	Analyser 1 Fail
Relay 4	■ Analyser 2 Fail

Map Functions 3 (see Section 3.5.5**)**

Relay 1	■ mA Out Fail
Relay 2	■ Disengaged 1
Relay 3	Disengaged 2
Relay 4	■ Shutdown

3.5.1 Relays - operation 1



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Operation 1**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the alarm relays.

Each alarm relay can be configured for normally open or normally closed operation with the relay mode being set to latched with acknowledge, unlatched or latched with reset operation.

Relay 1 can be set for Watchdog operation instead of the normal alarm operation. In this mode the relay changes state every second providing that the main loop of the controller software is running.

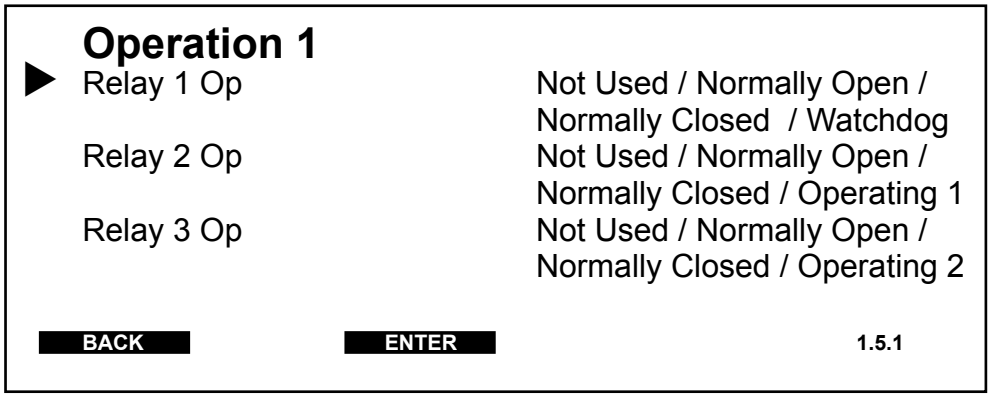
Relay 2 may be set to indicate machine 1 running instead of the normal alarm operation. In this mode the contact is closed when dosing machine 1 is on.

Relay 3 may be set to indicate machine 2 running instead of the normal alarm operation. In this mode the contact is closed when dosing machine 2 is on.

Relay 4 may also be set to indicate that the external setpoint is active. In this mode the contact is closed when the external setpoint is switched on.

The Chemtrim has 4 alarm relays, each with one single pole changeover contact. Associated with each relay contact is a front panel mounted status LED.

Relay Op 1, 2 and 3



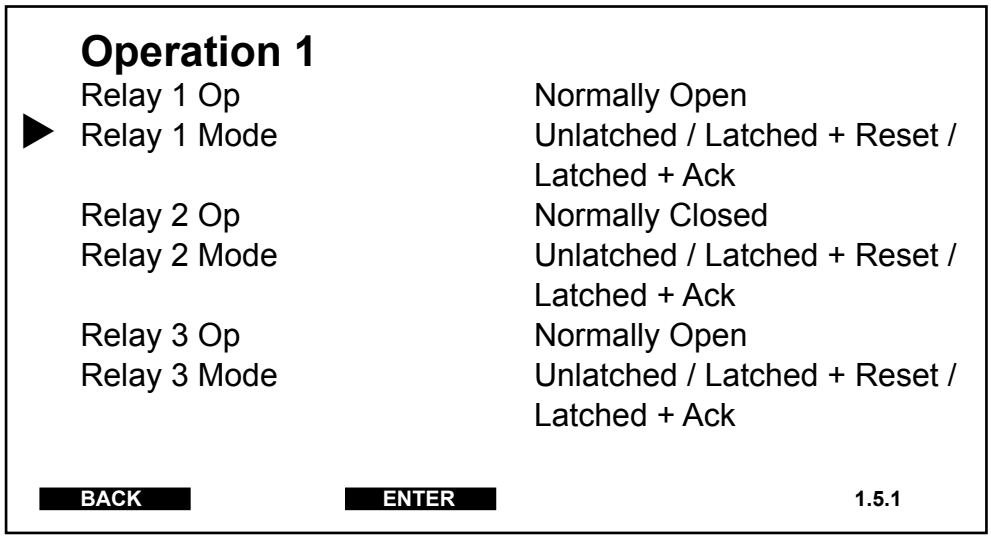
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Relay Op 1**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Not Used / Normally Open / Normally Closed / Watchdog . With the desired alarm relay state displayed press the ▲ key beneath **ENTER.**

NOTE: When configuring '**Relay Op 2**' and '**Relay Op 3**' the watchdog option is replaced by '**Operating 1**' and '**Operating 2**'.

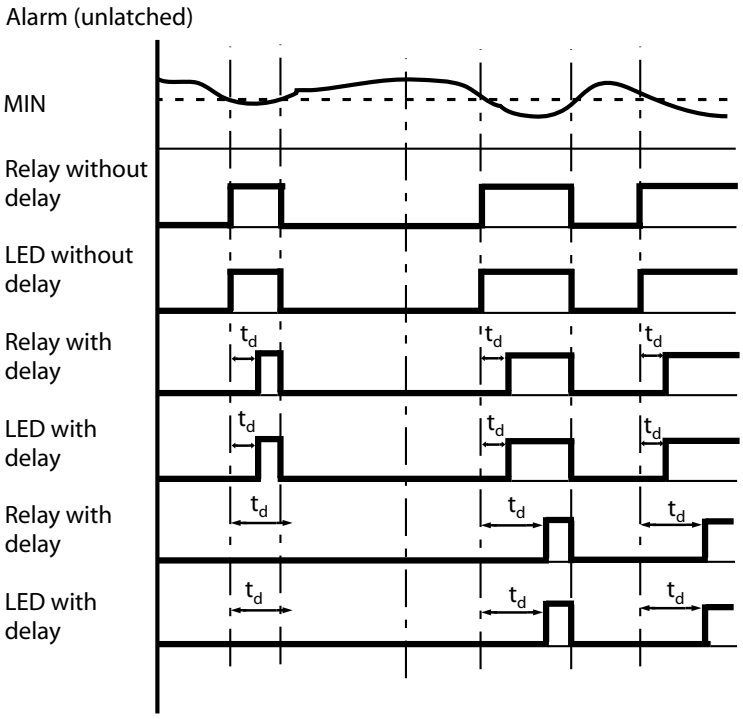
Relay 1, 2 and 3 Mode

The following menu allows the commissioning engineer, if any or all the relays are configured for normally open or normally closed operation in the foregoing procedure, to configure the relay mode to either unlatched, latched + reset or latched + ack.

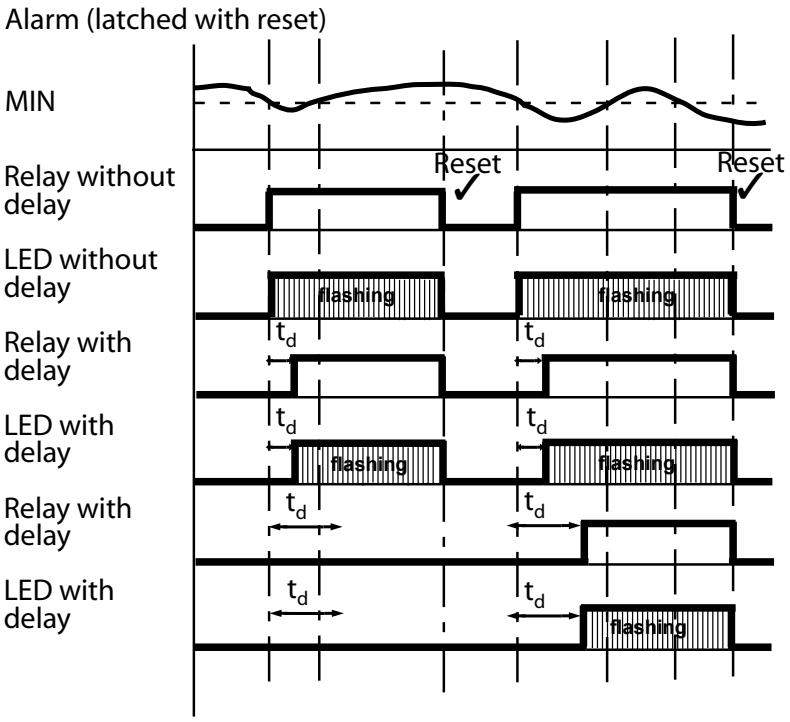
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Relay 1 Mode**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between unlatched, latched + reset or latched + ack. With the desired relay mode displayed press the ▲ key beneath **ENTER.**



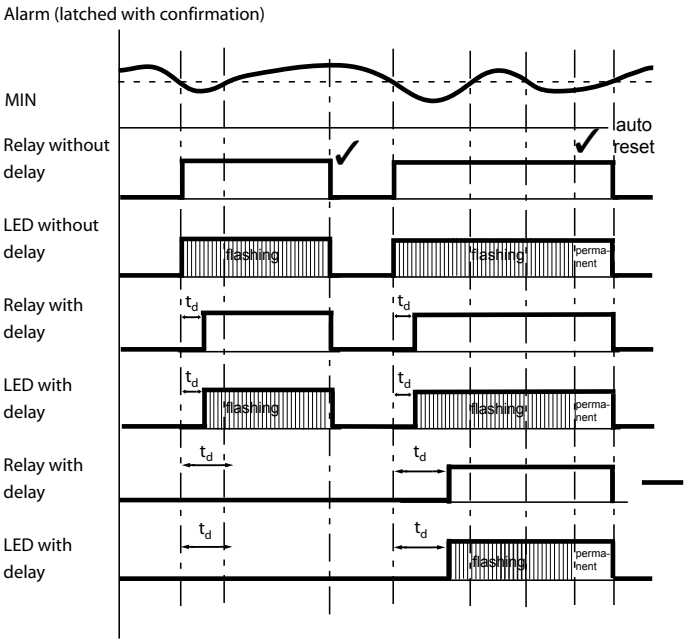
When '**Unlatched**' is selected the relay changes to the active state and the associated LED is lit when an alarm is triggered. When the alarm condition is removed the relay becomes inactive and the LED is turned off. The reset key has no function in this mode.



When '**Latched + Reset**' is selected the relay changes to the active state and the associated LED is lit when an alarm is triggered. When the reset key is pressed the relay will change to the inactive state even if the alarm source is still present. In order for the relay to trigger again the alarm source must be removed then trigger again.



When '**Latched + Ack**' is selected the relay changes to the active state and the associated LED flashes. If the reset key is pressed and the alarm source is no longer active the relay will change to its inactive state. If the reset key is pressed and the alarm source is still active the relay will not change state but the LED will change to steady burn. This indicates that the relay will change automatically when the source is removed. If multiple alarms have been mapped and a new alarm occurs while the LED is steady, the LED will flash again requireing a further press of the reset key.



In both the latched and unlatched modes, a relay will change to its alarm state when any of the alarms mapped to it become active.

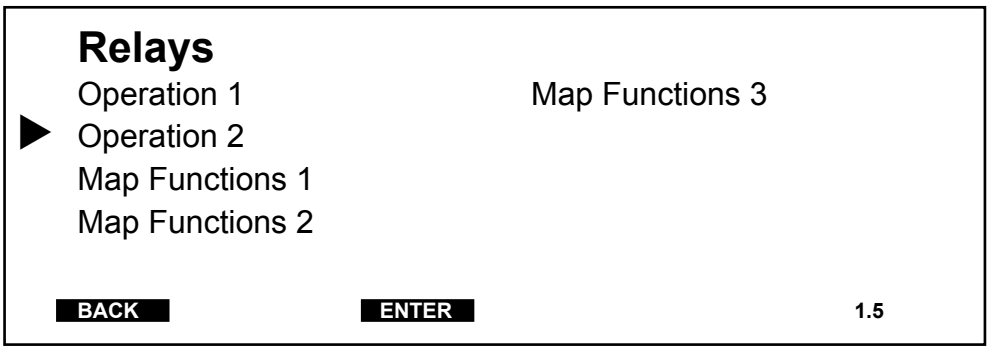
In the unlatched mode a relay will return to the 'no alarm' state when all of the alarm conditions mapped to it become inactive. Inhibit times for any previously active alarms are reset automatically.

In latched + acknowledge mode a relay will remain in the alarm state until all the alarm conditions mapped to it become inactive and the alarm reset key has been pressed.

A separate LED is used to indicate the status of each relay. If the LED is illuminated then the corresponding alarm relay is in the alarm state. For a latched + acknowledge relay, the corresponding LED will flash if the relay is in the alarm state but there are no active alarm conditions mapped to the relay. The flashing LED indicates that user action is required. Pressing the alarm reset key will enable the relay to change state when the alarm condition is removed.

Having set relay 1 mode, relay 2 mode and relay 3 mode should be set in the same way if they are displayed.

3.5.2 Relays - operation 2



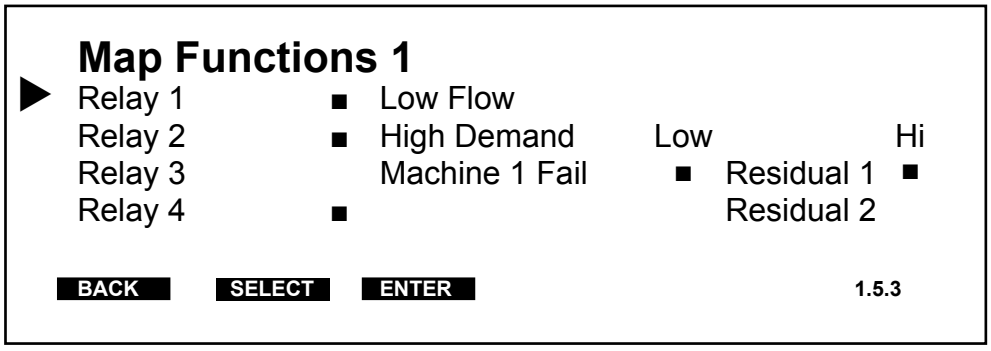
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Operation 2**', then press the ▲ key beneath **ENTER.** The commissioning engineer should now configure the operation and mode for relay 4 as described in Section 3.5.1

3.5.3 Relays - map functions 1, 2 and 3

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Map Functions 1**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to map the alarm functions to specific relays.

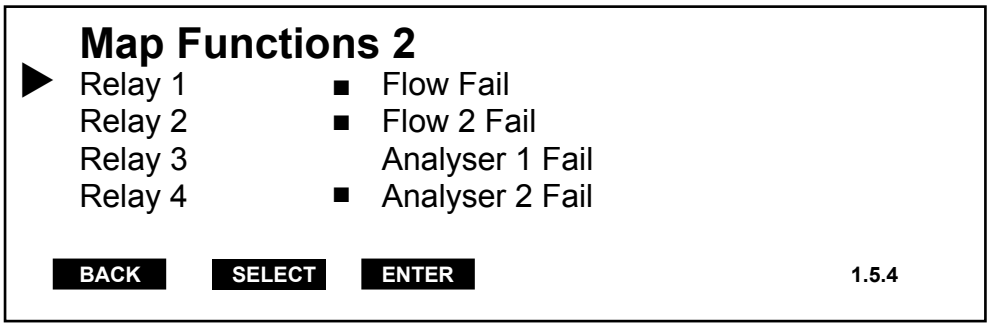
The procedure for setting **'Map Functions 2'** and **'Map Functions 3'** is identical to the following procedure for setting **'Map Functions 1'** so only map functions 1 is explained.

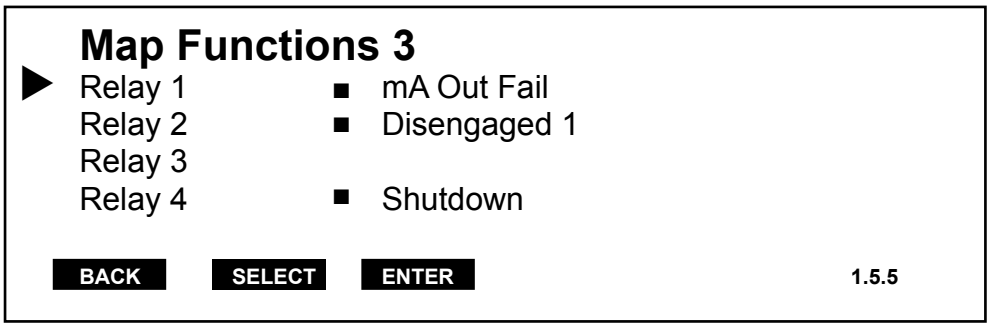
NOTE: The following displays illustrate all the alarms that are available for mapping to relays. In reality though, only those alarms that are enabled in Sections 3.4.1 and 3.4.2 will be available to map to a relay contact.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with **'Relay 1'** then press the ▲ key beneath the word **ENTER.** A second ▶ cursor appears. Pressing the ▲ , ▼, ▶ and ◀ keys moves the cursor around the map functions. When the cursor is adjacent to a function you require press the ▲ key beneath **SELECT** to check the function. Repeat the foregoing until all the required alarm functions being mapped to relay 1 are checked. Press the ▲ key beneath **ENTER.** Repeat the forgoing on the remaining relays that are displayed.

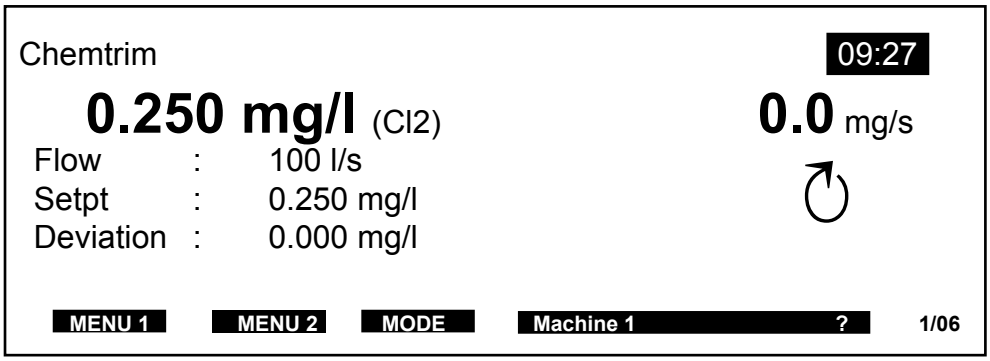
When map functions 1 has been set repeat the foregoing on map functions 2 and 3.





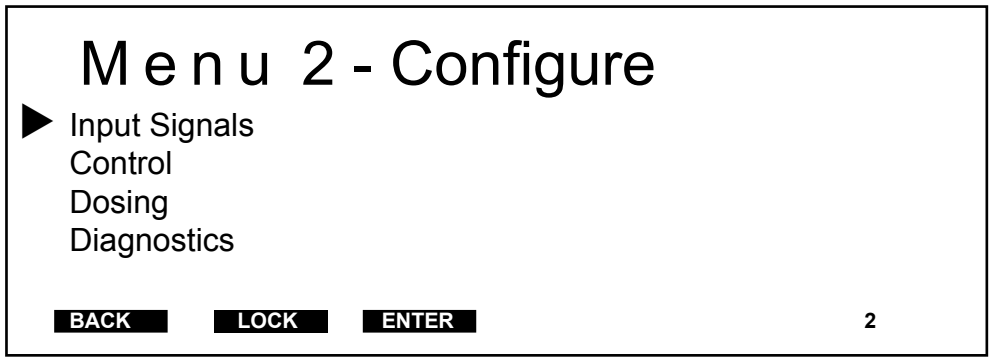
NOTE: 'System Fault' is always displayed. 'Setpoint Fail' is only displayed if external setpoint has been enabled in Section 3.1.2. 'Calibration Fail' is only displayed if the positioner option is selected in Section 3.3.3. mA Out Fail is only displayed if the corresponding output has been enabled for 4-20mA operation in Section 3.3.1

4 CONFIGURE



Pressing the MENU 2 key results in the following menu being displayed.

4.1 Input Signals



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Input Signals**', then press the ▲ key beneath **ENTER.** The following menu is displayed. The system menu is used as part of the commissioning procedure to set the following parameters:-

PARAMETER	OPTIONS
Flow* (see Section 4.1.1)	
Flow Shutdown	On / Off
Low Flow Alarm	5.0 l/s
Manual	Off / On
Manual Value	98.0 l/s
Signal Failure	Shutdown
Flow 2* (see Section 4.1.2)	
Manual	Off / On
Manual Value	98.0 l/s
Signal Failure ‡	Shutdown

Analyser 1** (see Section 4.1.3)

Manual	Off / On
Manual Value	300 µg/l
Signal Failure ‡	Shutdown

Analyser 2* (Cl2 only)** (see Section 4.1.4)

Manual	Off / On
Manual Value	230 µg/l
Signal Failure ‡	Shutdown

Residual Alarms** (see Section 4.1.5)

Low Residual 1	2 mg/l
High Residual 1	4 mg/l
Low Residual 2	6 mg/l
High Residual 2	10 mg/l
Move Alarms	On / Off
High Demand	1 mg/l

* If residual has been selected as the control mode in Section 3.1.2 the 'Flow' and 'Flow 2' options will not be displayed. The 'Flow 2' menu screen is only displayed when a second input card is detected.

** The 'Analyser 1' menu screen is not displayed if feed forward is selected as the control mode in Section 3.1.2.

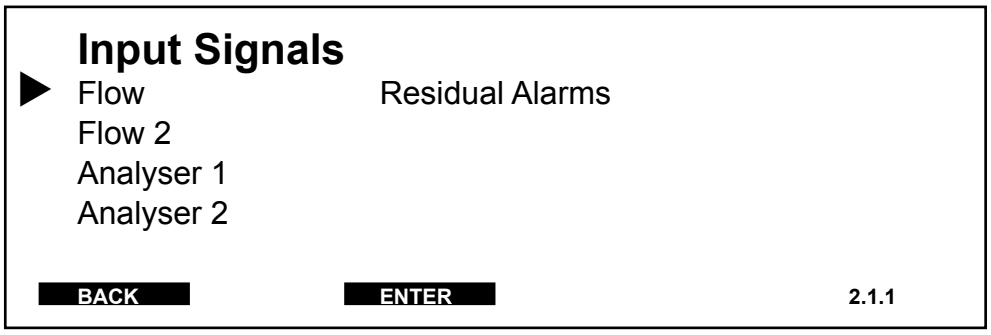
*** The 'Analyser 2' menu screen is only displayed if setpoint trim is selected as the control mode in Section 3.1.2.

**** The high and low residual alarm setting screens are not displayed unless they have been mapped in Section 3.5.1 (screen 1.5.3).

‡ The signal failure option is only displayed if the signal type is selected as 4-20mA in Sections 3.2.1, 3.2.2, 3.2.3 and 3.2.4 (screens 1.2.1, 1.2.2, 1.2.3 and 1.2.4).

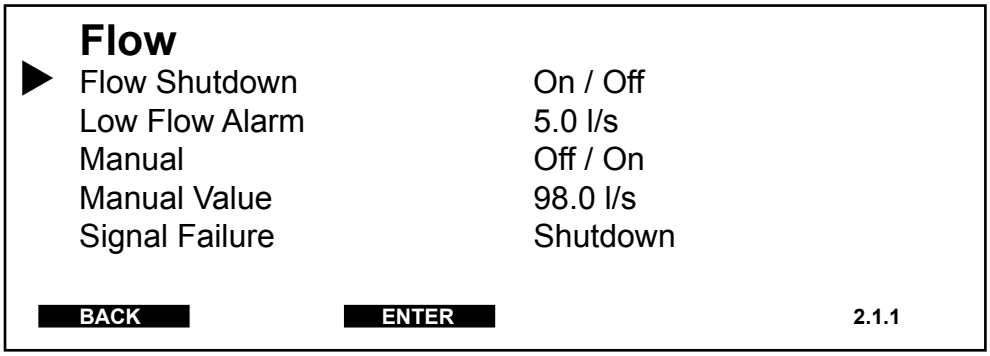
4.1.1 Input Signals - flow

NOTE: If residual has been selected as the control mode in Section 3.1.2 the 'Flow' and 'Flow 2' options will not be displayed. The 'Flow 2' menu screen is only displayed when a second input card is detected.



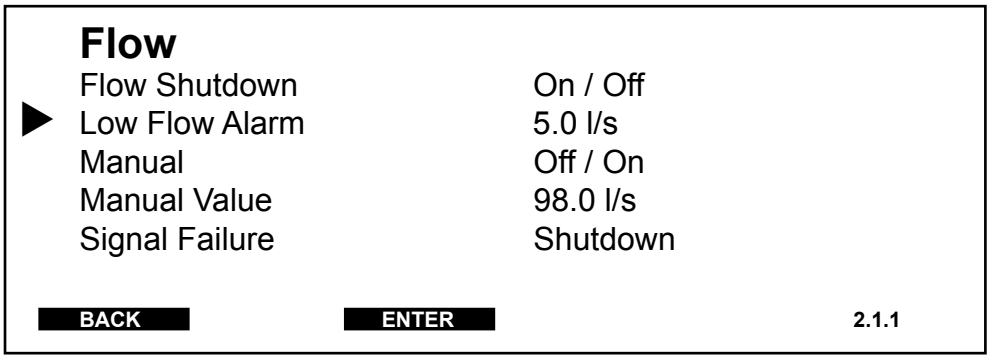
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Flow**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the water flow parameters in accordance with the desired system operation.

Flow Shutdown



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Flow Shutdown**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. In the On position if the water flow falls below the level at which the low flow alarm has been set the system will shut down. In the Off position when the water flow falls below the low flow alarm setting an alarm is generated but the system is not shutdown. With the desired flow shut down mode displayed press the ▲ key beneath **ENTER.**

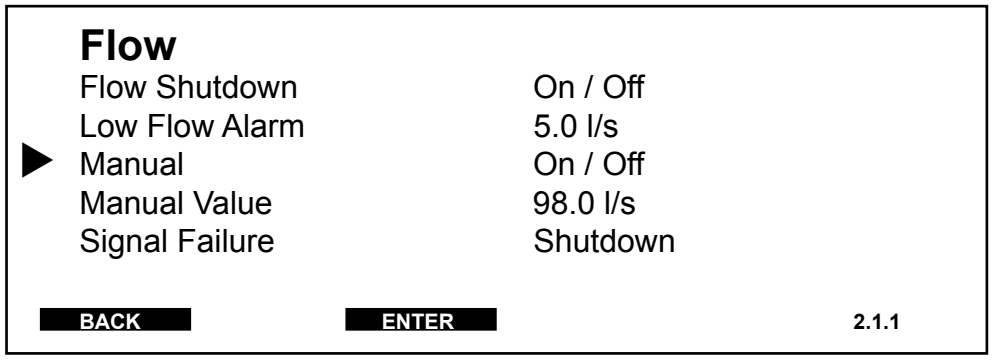
Low Flow Alarm



Having set the flow shutdown, entry of the level at which the low flow alarm is generated is next. Press the ▼ key until the ▶ cursor lines up with the '**Low Flow Alarm**', press **ENTER.** A second ▶ cursor appears adjacent to where the low flow alarm setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct low flow alarm setting is displayed. Press the ▲ key beneath **ENTER .**

NOTE: If the system being controlled includes two flow meters the total flow through both flow meters has to fall below the low flow alarm setting before an alarm is generated.

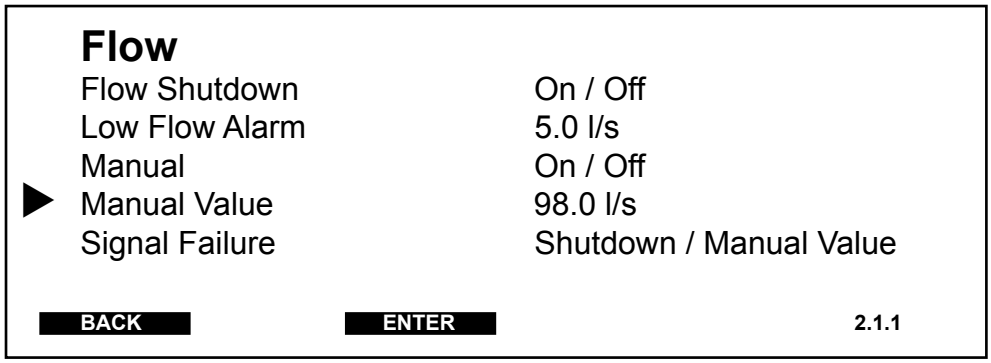
Manual



This manual facility is included for the occasions when the flow meter requires servicing/maintenance. In the OFF position the controller is free to react to a variable mA signal, from a flow meter, that is proportional to flow. When in the ON position the controller assumes there is a constant flow of water to be treated, the level of which will have to be set in the following 'Manual Value' section.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired manual setting displayed press the ▲ key beneath **ENTER.**

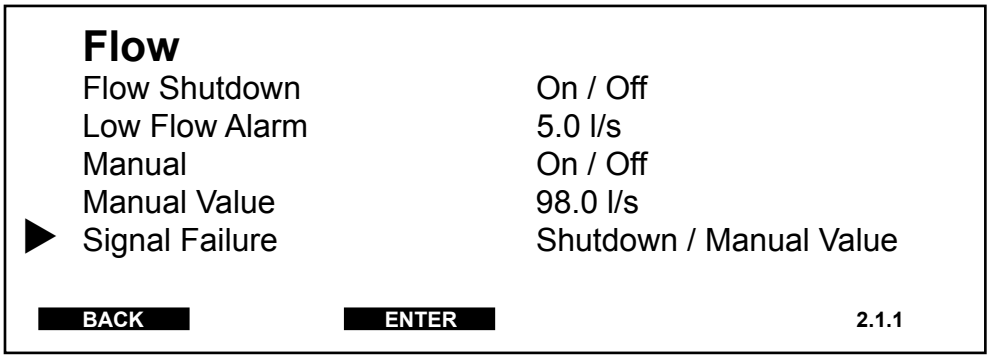
Manual Value



When a water flow meter is taken out of operation for servicing/maintenance the controller can be made to assume that there is a constant flow of water, the level of which is set in the 'Manual Value' option.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the manual value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct manual value for flow is displayed. Press the ▲ key beneath **ENTER .**

Signal Failure



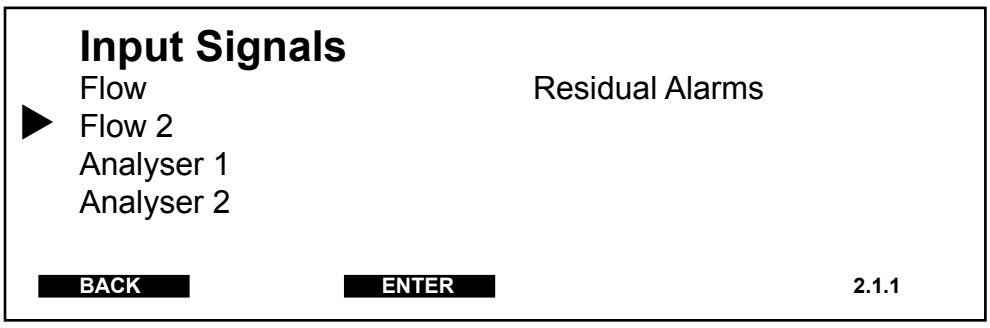
NOTE: The signal failure option is only displayed if the signal type is selected as 4-20mA in Section 3.2.1 (screen 1.2.1).

In this procedure the commissioning engineer can determine what happens in the event of a flow signal failure. A choice between shutting the system down and the system using the manual value for flow has to be made.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Shutdown and Manual Value. With the desired signal failure setting displayed press the ▲ key beneath **ENTER.**

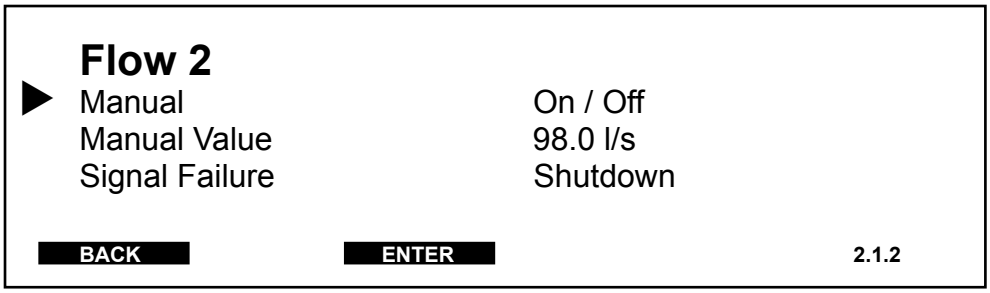
4.1.2 Input Signals - Flow 2

NOTE: The 'Flow 2' menu screen is only displayed when a second input card is detected.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Flow 2**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the water flow parameters in accordance with the desired system operation.

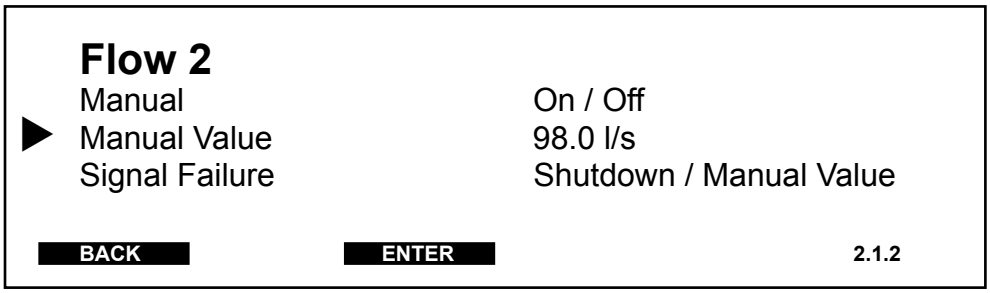
Manual



This manual facility is included for the occasions when the flow meter requires servicing/maintenance. In the OFF position the controller is free to react to a variable mA signal, from a flow meter, that is proportional to flow. When in the ON position the controller assumes there is a constant flow of water to be treated, the level of which will have to be set in the following 'Manual Value' section

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired manual setting displayed press the ▲ key beneath **ENTER.**

Manual Value

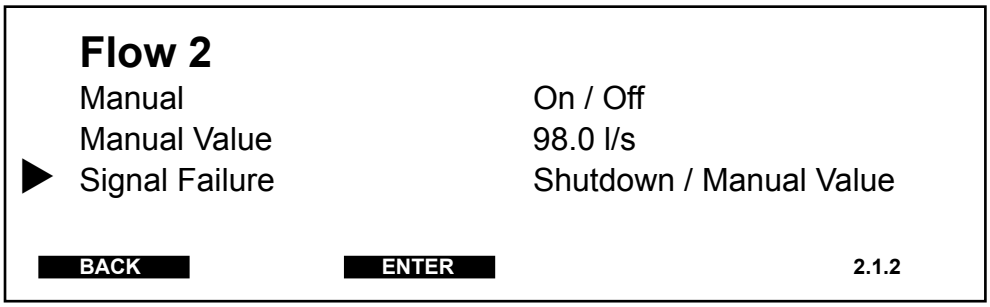


If a constant flow of water is being treated and the system does not include a water flow meter, the actual flow rate of the water has to be entered at this point.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the manual value setting is entered. The

first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct manual value for flow is displayed. Press the ▲ key beneath **ENTER .**

Signal Failure



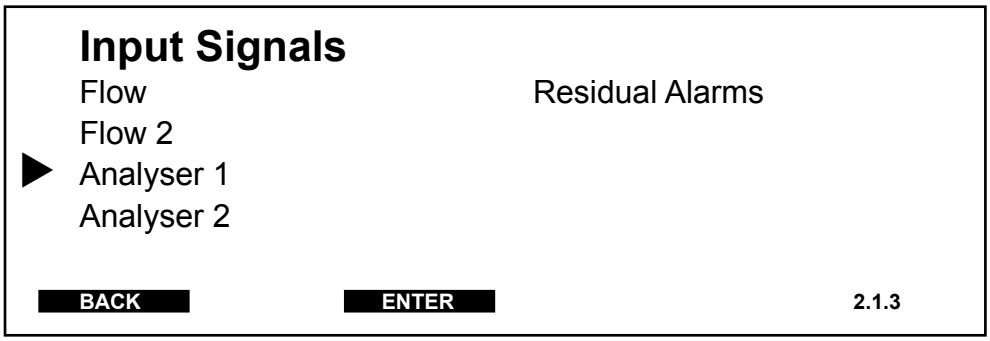
NOTE: The signal failure option is only displayed if the signal type is selected as 4-20mA in Section 3.2.2 (screen 1.2.2).

In this procedure the commissioning engineer can determine what happens in the event of a flow signal failure. A choice between shutting the system down and the system using the manual value for flow has to be made.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Shutdown and Manual Value. With the desired signal failure setting displayed press the ▲ key beneath **ENTER.**

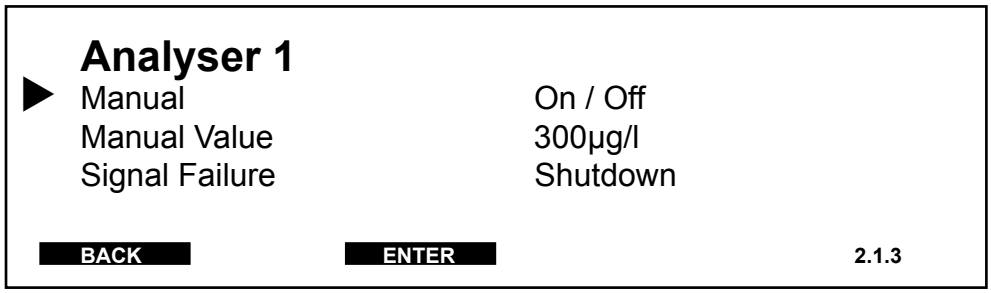
4.1.3 Input Signals - Analyser 1

NOTE: The 'Analyser 1' menu screen is not displayed if feed forward is selected as the control mode in Section 3.1.2.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Analyser 1**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the analyser 1 parameters in accordance with the desired system operation.

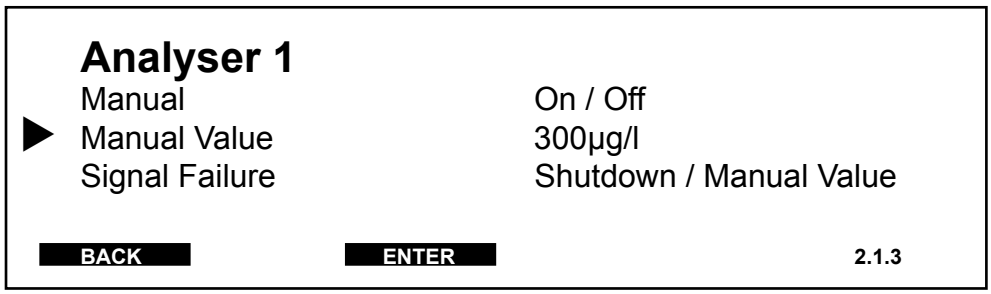
Manual



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired manual setting displayed press the ▲ key beneath **ENTER.**

In the OFF position the controller is free to react to a variable mA signal, from analyser 1, that is proportional to residual. In the ON position analyser 1 is taken out of service, its output no longer forming part of the control calculation. This would typically be used if the output of the analyser had become unreliable or the analyser needed servicing. In this instance the controller assumes there is a constant residual in the water, the level of which has to be set in the following 'Manual Value' section.

Manual Value

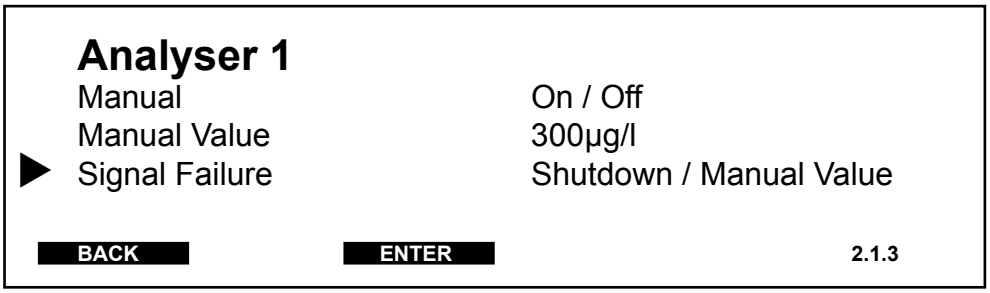


If analyser 1 has been taken out of operation a manual value for the residual has to be entered at this point.

NOTE: Only a value between 0 and the range set in Section 3.2.3 can be entered as the manual value.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the manual value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct manual value for residual is displayed. Press the ▲ key beneath **ENTER .**

Signal Failure



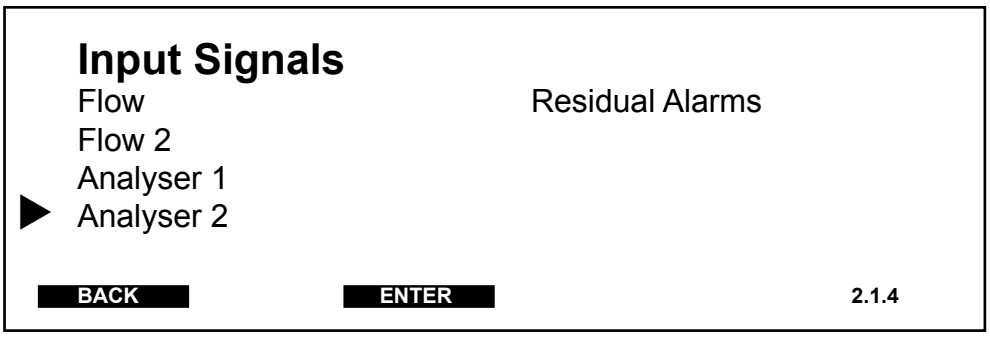
NOTE: The signal failure option is only displayed if the signal type is selected as 4-20mA in Section 3.2.3 (screen 1.2.3).

In this procedure the commissioning engineer can determine what happens in the event of a residual signal failure. A choice between shutting the system down and the system using the manual value for residual has to be made.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Shutdown and Manual Value. With the desired signal failure setting displayed press the ▲ key beneath **ENTER.**

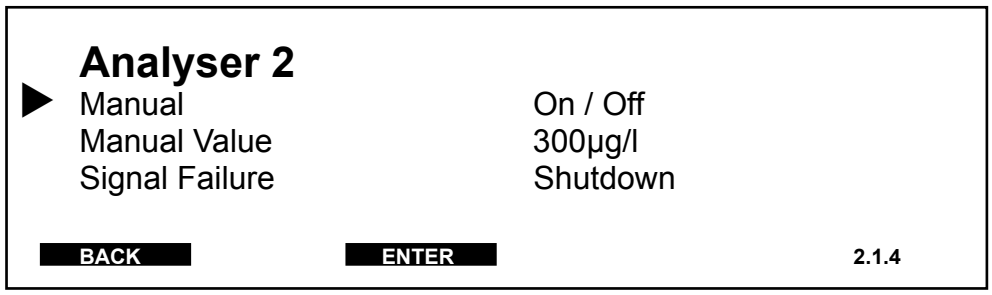
4.1.4 Input Signals - Analyser 2

NOTE: The 'Analyser 2' menu screen is only displayed if setpoint trim is selected as the control mode in Section 3.1.2.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Analyser 2**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the analyser 2 parameters in accordance with the desired system operation.

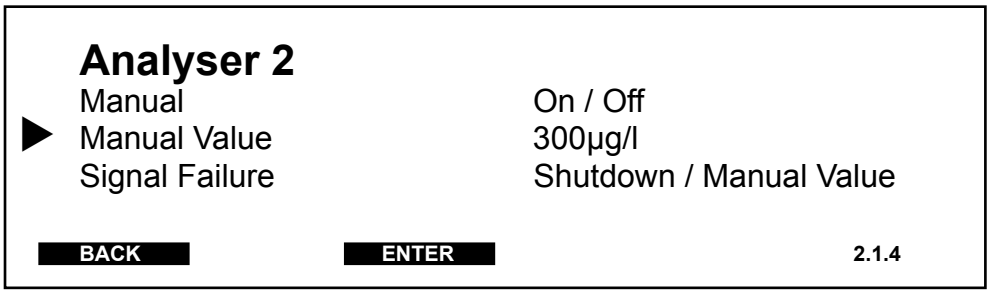
Manual



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired manual setting displayed press the ▲ key beneath **ENTER.**

In the OFF position the controller is free to react to a variable mA signal, from analyser 2, that is proportional to residual. In the ON position analyser 2 is taken out of service, its output no longer forming part of the control calculation. This would typically be used if the output of the analyser had become unreliable or the analyser needed servicing. In this instance the controller assumes there is a constant residual in the water, the level of which has to be set in the following 'Manual Value' section.

Manual Value

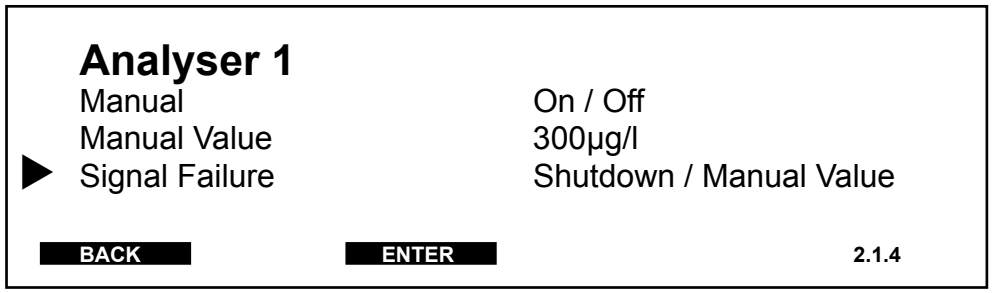


If analyser 2 has been taken out of operation a manual value for the residual has to be entered at this point.

NOTE: Only a value between 0 and the range set in Section 3.2.3 can be entered as the manual value.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Manual Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the manual value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct manual value for residual is displayed. Press the ▲ key beneath **ENTER .**

Signal Failure



NOTE: The signal failure option is only displayed if the signal type is selected as 4-20mA in Section 3.2.3 (screen 1.2.3).

In this procedure the commissioning engineer can determine what happens in the event of a residual signal failure. A choice between shutting the system down and the system using the manual value for residual has to be made.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Signal Value**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Shutdown and Manual Value. With the desired signal failure setting displayed press the ▲ key beneath **ENTER.**

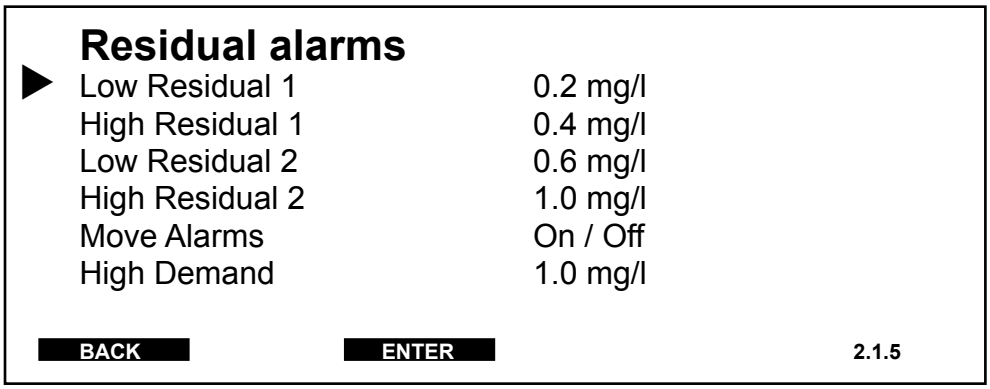
4.1.5 Input Signals - Residual Alarms

NOTE: The 'Analyser 2' menu screen is only displayed if setpoint trim is selected as the control mode in Section 3.1.2.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Residual Alarms**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the operator to set the values at which the residual alarms are triggered.

NOTE: For the following residual alarm setting screens to be displayed they must have been enabled in Section 3.4.1 (screen 1.4.1).

Low Residual 1



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Residual 1**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the manual value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct manual value for residual is displayed. Press the ▲ key beneath **ENTER .**

NOTE: Only a value between 0 and the range set in Section 3.2.3 can be entered as the alarm value.

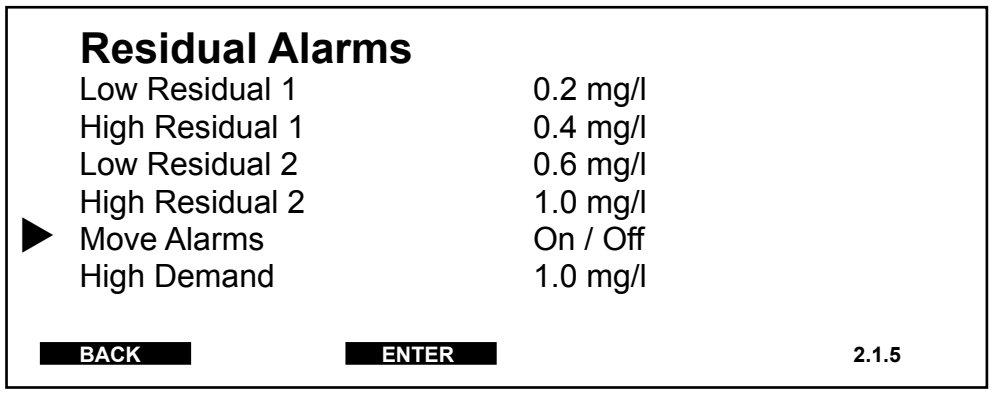
High Residual 1 - Low Residual 2 - High Residual 2

The setting of the High Residual 1, Low Residual 2 and High Residual 2 alarm values is identical to that described for Low Residual 1 above, therefore, the procedure is not repeated.

Move Alarms

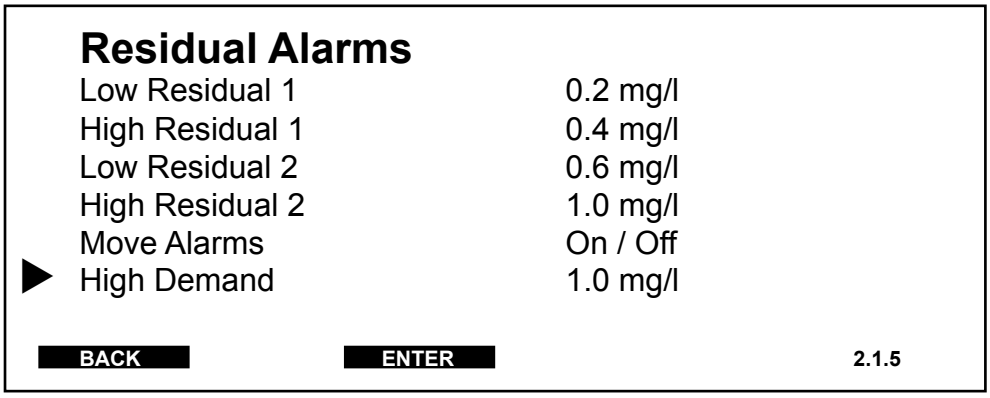
The move alarms facility is used in conjunction with the setpoint . When the move alarms facility is switched on, the low residual1 and high residual 1 alarms will be automatically adjusted to maintain a percentage alarm deadband about the setpoint when the value entered for setpoint

is changed. If the move alarms facility is to be included in the system control this option must be turned on.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Move Alarms**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired move alarms setting displayed press the ▲ key beneath **ENTER.**

High Demand



The 'High Demand' alarm is only relevant when either flow and residual or setpoint trim control modes have been selected. It is used to notify the operator that there has been a significant increase in the chemical demand of the water being treated, usually because of rain washing ammonia off the land and into the water supply.

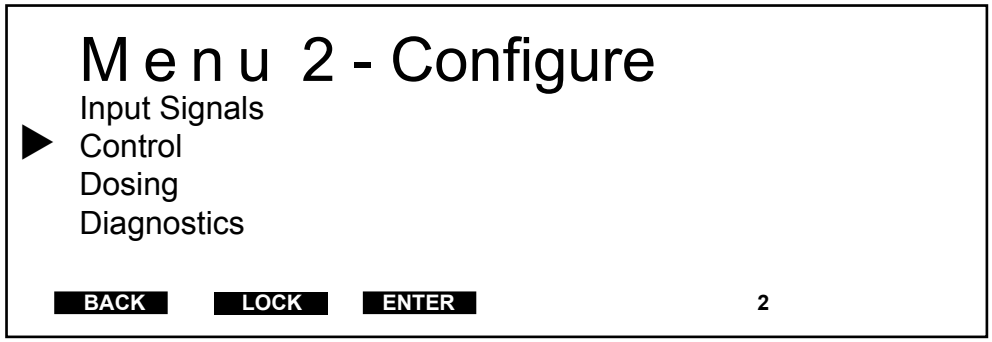
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**High Demand**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the high demand value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one.

Repeat the foregoing until the desired High Demand alarm setting is displayed. Press the ▲ key beneath **ENTER .**

NOTE: Only a value between 0 and the range set in Section 3.2.3 can be entered as the alarm value.

4.2 Control

NOTE: This option is not available if feed forward or ratio is selected as the control mode in Section 3.2.1



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control**', then press the ▲ key beneath **ENTER.** The following menu is displayed. The control menu is used as part of the configuration procedure to set the following parameters:-

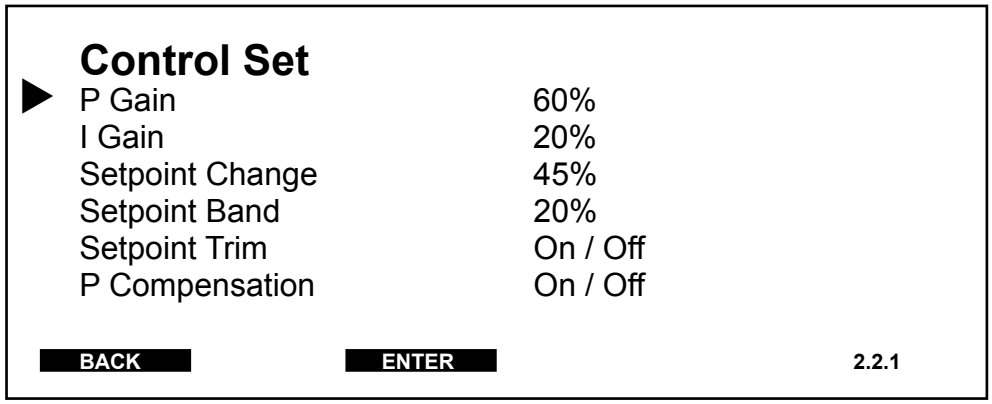
PARAMETER	**OPTIONS**
Control Set (see Section 4.2.1)	
P Gain	60%
I Gain	20%
Setpoint Change*	45%
Setpoint Band*	20%
Setpoint Trim*	On / Off
P Compensation**	On / Off
Process Time (see Section 4.2.2)	
Process Time	Flow Prop
Deadtime T1	01min 00s
Deadtime T2	00h 15min 00s
Deadtime T3	01min 00s
Deadtime T4	02h 00min 00s
Deadtime T5	01min 00s

* Setpoint Change, Setpoint Band and Setpoint trim screen options are only displayed if setpoint trim is selected as the control mode in Section 3.1.2.

** P Compensation is only displayed when either residual, flow and residual or setpoint trim is selected as the control mode in Section 3.1.2.

4.2.1 Control - Control Set

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control Set**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the control parameters in accordance with the desired system operation.



P Gain

P Gain is short for proportional gain. In operation the controller continuously calculates the dosage rate so that the measured residual corresponds to the setpoint. If a chemical change occurs in the water being treated the measured residual will no longer correspond to the setpoint. The controller calculates the error which is then multiplied by the P Gain. The degree of correction made to the dosage rate is a percentage of the error, e.g.:-

Setpoint	=	0.50 mg/l	} all calculated
Measured residual	=	0.30 mg/l	} as a
P Gain	=	50%	} percentage

The dosage rate would be increased by 0.1 mg/l (50% of the error).

Residual

To calculate the proportional gain and integral gain values when residual has been selected as the system control:

Run the dosing machine in manual at 30 to 70% capacity. The flow must be constant. Use the bar graph display screen to calculate the P gain as follows:

$$\text{System gain, K} = \frac{\text{Output (\%)}}{\text{Input (\%)}} = \frac{\text{Resid 1 (\%)}}{\text{Dosing (\%)}}$$

$$\text{P Gain (\%)} = \frac{50}{K}$$

$$\text{I Gain (\%)} = \frac{60}{K}$$

Flow and Residual / Setpoint Trim

To calculate the proportional gain value when either flow and residual or setpoint trim has been selected as the system control:

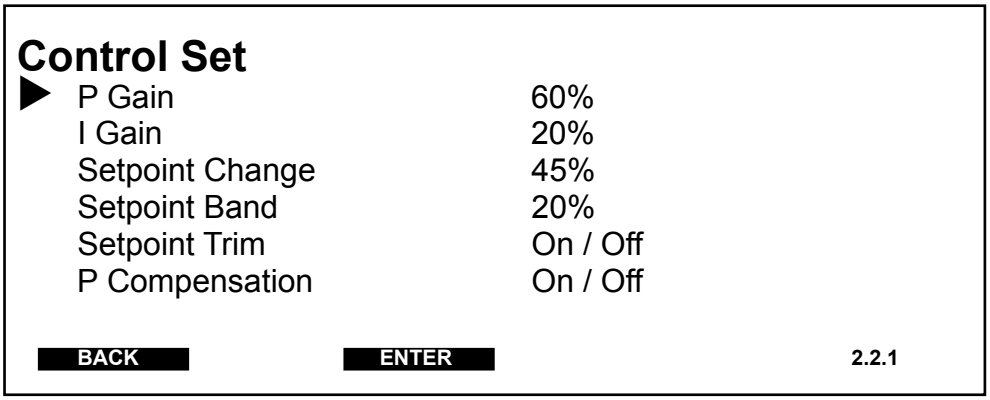
Run the dosing machine in manual at 30 to 70% capacity. The flow must be constant. Use the bar graph display screen to calculate the P gain as follows:

$$\text{System gain, K} = \frac{\text{Output (\%)}}{\text{Input (\%)}} \times \frac{\text{Flow (\%)}}{\text{Dosing (\%)}}$$

$$= \frac{\text{Resid 1 (\%)}}{\text{Dosing (\%)}} \times \frac{\text{Flow (\%)}}{100}$$

$$\text{P Gain (\%)} = \frac{50}{K}$$

$$\text{I Gain (\%)} = \frac{60}{K}$$

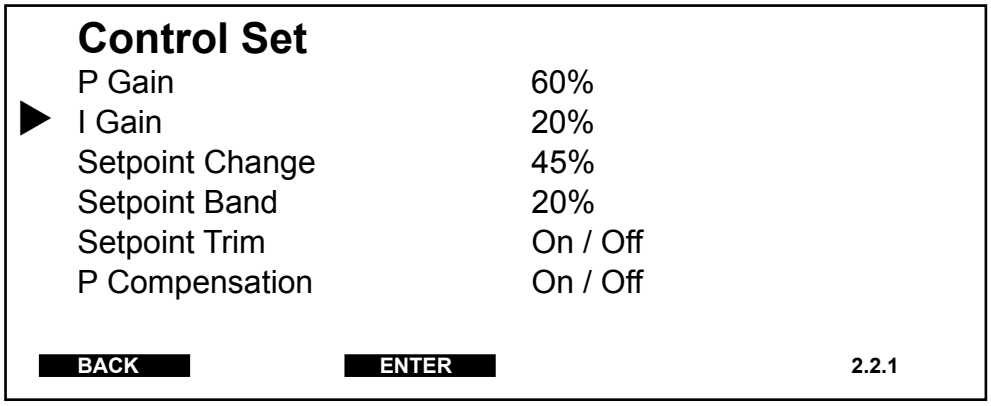


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**P Gain**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the P Gain setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER .**

I Gain

The integral component of the PI algorithm is designed to eliminate the steady state error, that is the error that still remains after the proportional component has had an effect. Integral changes are only made at the end of each process time.

The integral gain is entered as a percentage of the error. For example, if the error at the end of the process time is 2% and the integral gain is set to 50%, the controller will make a 1% change to the control output to reduce the error by 50% (for a system gain of 1). Over several process time periods the error then tends to zero. Refer to the preceeding P Gain section for details on how to calculate the I gain.

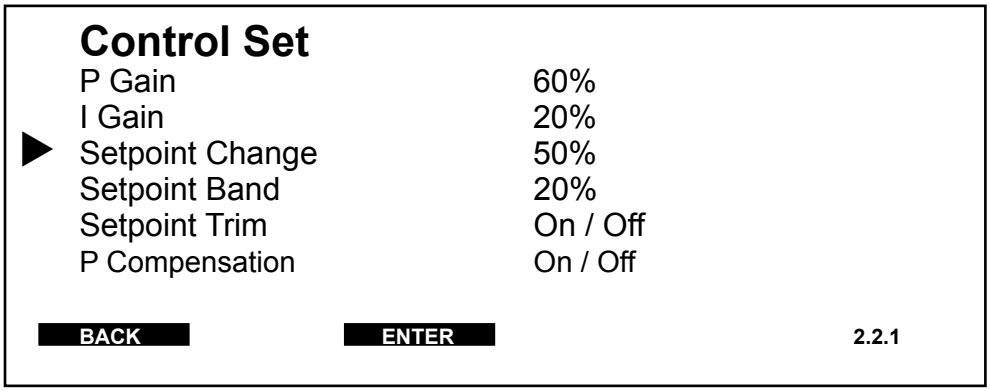


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**I Gain**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the I Gain setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is

displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER .**

Setpoint Change

The Setpoint Change screen option is only displayed when setpoint trim is selected as the control mode in Section 3.1.2.



Setpoint trim is used when two residual cells are measuring the residual at different sampling points in the main. The first cell is employed in a fast acting primary control loop where it is compared with a primary setpoint; the second cell signal is used in a much slower secondary control loop where it is also compared with the primary setpoint. If the latter signal varies from its setpoint, the controller will trim the primary setpoint to increase/decrease the measured residual of the secondary control loop. The amount that the setpoint is adjusted is entered as a percentage of the error. For example:

Measured Residual	=	0.6 mg/l	{ all
Setpoint	=	1.0 mg/l	{ calculated
Setpoint Change	=	50%	{ as a
Error	=	0.4 mg/l	{ percentage

Therefore, the setpoint will be adjusted by 0.2 mg/l which equals 50% of the error.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Setpoint Change**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the setpoint change value setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER .**

Setpoint Band

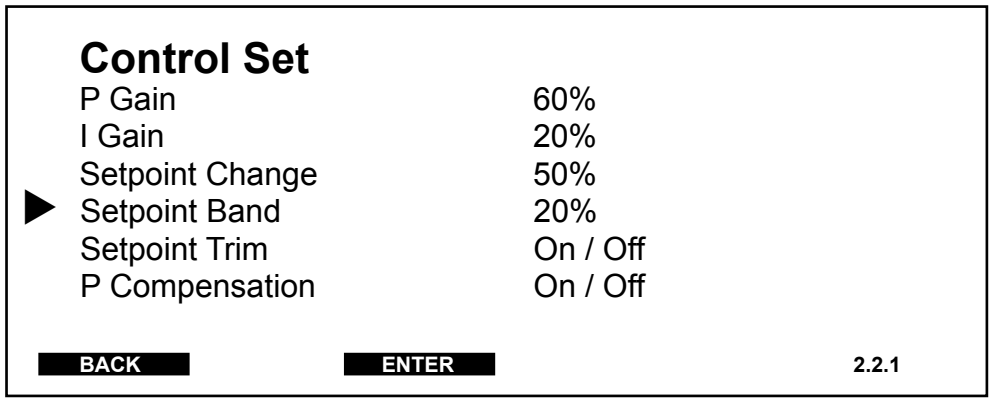
The Setpoint Band screen option is only displayed when setpoint trim is selected as the control mode in Section 3.1.2.

Having entered the setpoint change percentage the setpoint band must now be entered. Setpoint band is entered as a percentage which actually equates to a percentage of the range of the analyser. For example:

Analyser Range	=	2.0 mg/l
Setpoint	=	1.0 mg/l
Setpoint band	=	20%

Therefore, the setpoint band is 20% of 2.0 mg/l (analyser range), which equals 0.4 mg/l. This means that the setpoint band is 0.4 mg/l either side of the setpoint. In operation, setpoint trim modifies the primary setpoint to maintain the desired measured residual of the treated water going into supply. The setpoint band, however, always remains about the original primary setpoint value, not the modified setpoint. If the modified setpoint is altered to the setpoint band limit the controller will inhibit any further changes to the modified setpoint. The setpoint band can be set between 5 and 50%.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Setpoint Band**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the setpoint band setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER.**



Setpoint Trim

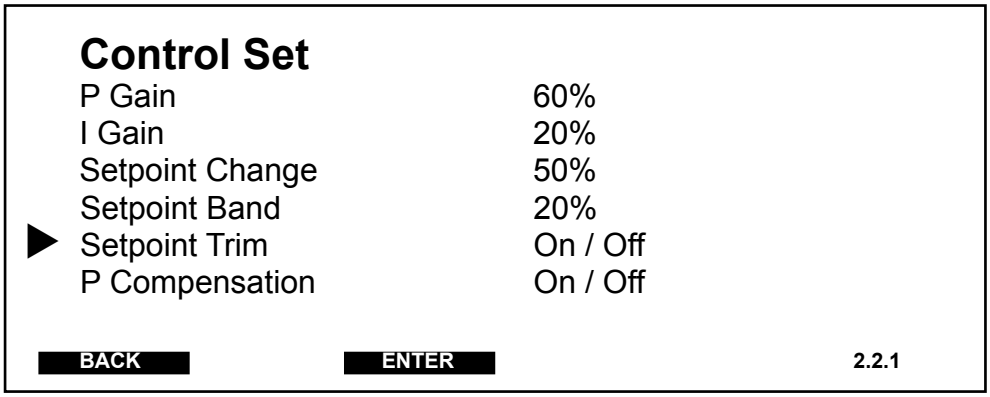
The Setpoint Trim screen option is only displayed when setpoint trim is selected as the control mode in Section 3.1.2.

This option allows the operator to switch the setpoint trim control mode on and off. In the off position the only the primary control loop is utilised, the secondary loop has no effect.

When configuring setpoint trim its is important to first establish a stable primary control loop. Once the primary control loop is stable turning setpoint trim on results in the following:

1 The controller compares the primary measured residual with the secondary measured residual.

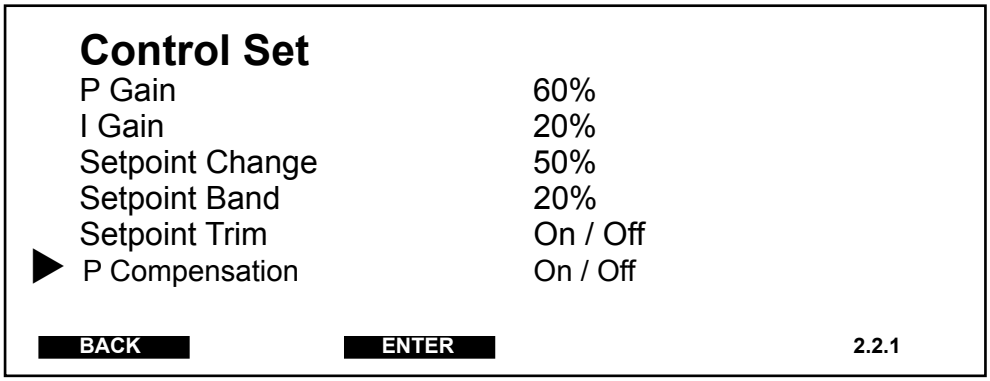
2 The difference between the measured residuals is added to the primary setpoint to create a modified setpoint which the system then controls to. On this occasion setpoint change is overridden.



To turn setpoint trim On / Off press the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Setpoint Trim**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired setpoint trim setting displayed press the ▲ key beneath **ENTER.**

P Compensation

The P Compensation option is only displayed when either residual, flow and residual or setpoint trim has been selected as the system control in Section 3.1.2. P Compensation, when turned on, provides a smooth control transition at times when the system experiences a sudden demand change, or when a change to the control setpoint has been made, or when the system is started/restarted.



To turn P Compensation On / Off press the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**P Compensation**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Off and On. With the desired P Compensation setting displayed press the ▲ key beneath **ENTER.**

4.2.2 Control - Process Time

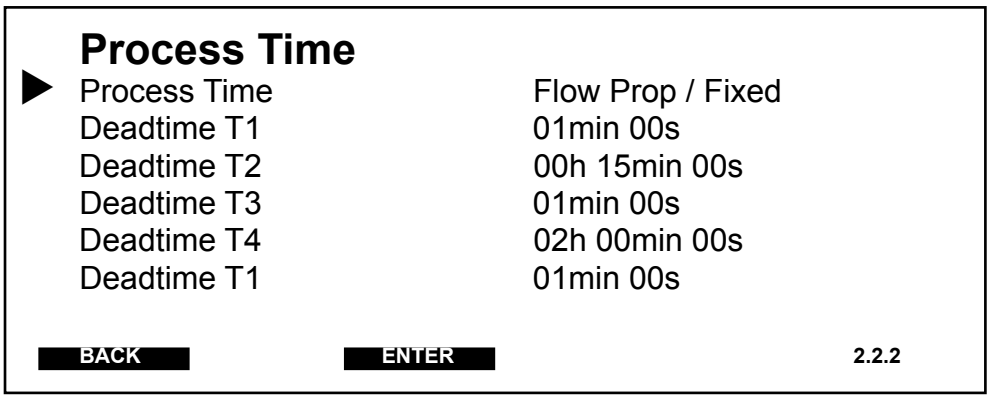
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Process Time**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the control parameters in accordance with the desired system operation.

NOTE: The 'Process Time' option is only displayed in screen 2.2 when either residual, flow and residual or setpoint trim has been selected as the control mode in Section 3.1.2.

NOTE: If residual is selected as control mode only 'Deadtime T2' will be shown in the following display and the process time will be fixed. If flow and residual is selected as the control mode only 'Deadtime T1', 'T2' and 'T3' will be shown in the following display. When setpoint trim is selected as the control mode 'Deadtime T1' to 'Deadtime T5' are displayed.

NOTE: The process time can only be set to flow proportional if either flow and residual or setpoint trim has been selected as the control mode in Section 3.1.2.

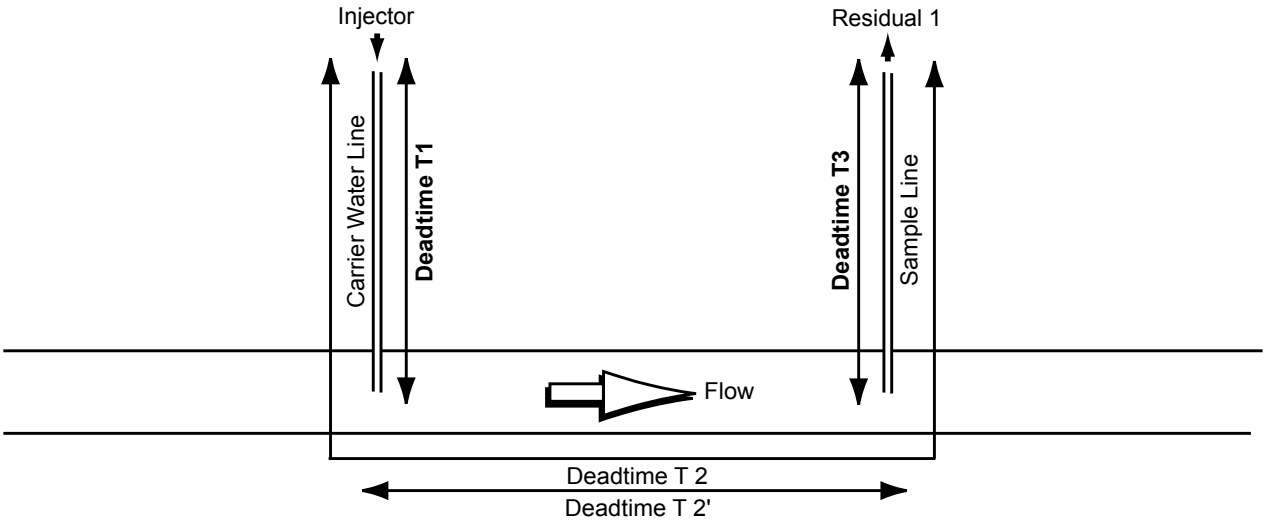
Process Time



This facility is included to enable either a flow proportional or fixed process time to be selected. In the 'Fixed' position the process time will remain constant as set by the plant operator. In the 'Flow Prop' position the set process time is relative to 100% water flow, which means if the current water flow is less than 100%, the process time will be increased inversely.

To select either flow prop or fixed process time press the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Process Time**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Prop Flow and Fixed. With the desired setting displayed press the ▲ key beneath **ENTER.**

Process Time Calculation - Residual



Conditions

The flow must always be constant for this mode.
The demand must be constant during the setup procedure.

Procedure

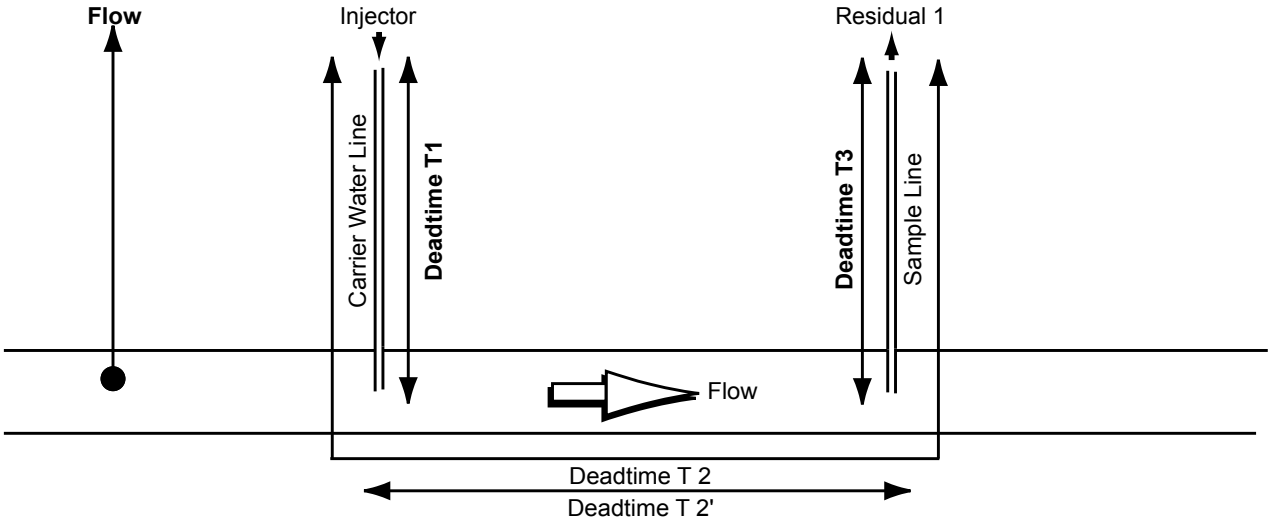
1 Run the controller in manual mode at a constant dose rate between 30% and 70% of capacity.
2 Make a step change to the dose rate.
3 Measure the time from the step change to response at Residual Analyser 1.
4 Enter this as Deadtime T2.

Notes:

Deadtime T1 not used.
Deadtime T3 not used.

Process Time Calculation - process time = T2.

Process Time Calculation - Flow and Residual



Conditions

The flow must be constant during the setup procedure.
The demand must be constant during the setup procedure.
The operator must select either fixed or flow proportional process time.

Procedure - Fixed Process Time

1 Run controller in manual mode at a constant dose rate bteween 30% and 70% of capacity.
2 Make a step change to the dose rate.
3 Measure the time from the step change to the response at Residual Analyser 1.
4 Enter this time as Deadtime T2.

Process Time Calculation - Fixed Process Time = T2

Notes:

Deadtime T1 not used for fixed process time.
Deadtime T3 not used for fixed process time.

Procedure - Flow Proportional Process Time

1 Calculate Deadtime T1 and enter it into the controller.
2 Calculate Deadtime T3 and enter it into the controller.
3 Run the controller in manual mode at a constant doser rate of between 30% and 70% of capacity.
4 Make a step change to the dose rate.
5 Measure the time from the step change to the response ar Residual Analyser 1.
6 Enter this as Deadtime T2.

Process Time Calculation - Flow Proportional Process Time

As T2 is entered, T2' at 100% flow is calculated as follows:

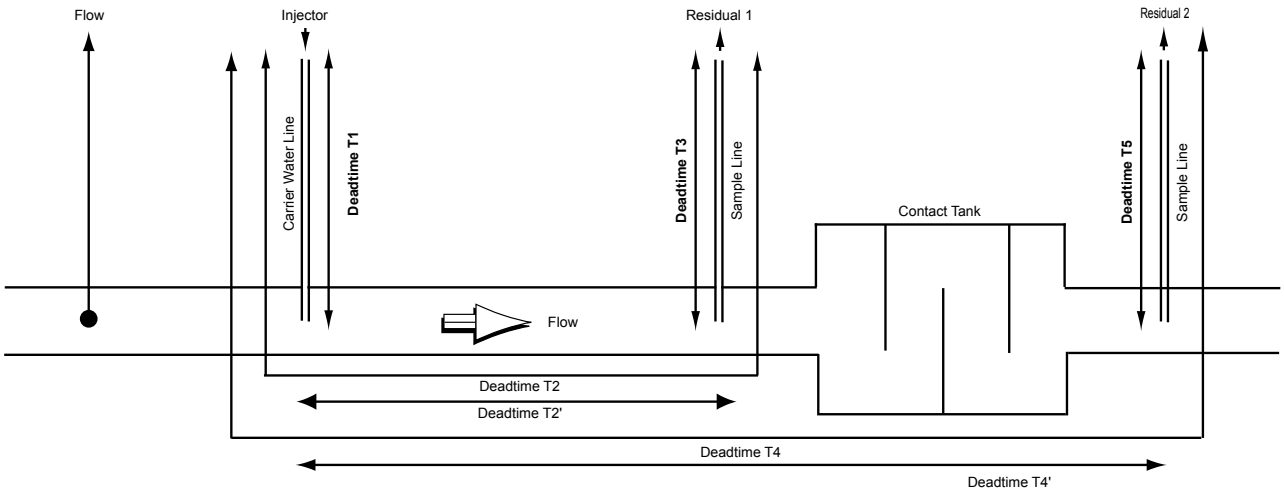
$T2'_{100} = ((T2 - (T1+T3)) . F1) / 100$

T2' for any given flow is calculated by:

$T2' = (100 / Flow) . T2'_{100}$

Process time calculation = T1 + T2' + T3

Process Time Calculation - Setpoint Trim



Conditions

The flow into the contact must equal flow out of the contact tank for this mode.
The flow must be constant during the setup procedure.

The demand must be constant during the setup procedure.
The operator must select either fixed or flow proportional process time.

1 Run controller in manual mode at a constant dose rate bteween 30% and 70% of capacity.
2 Make a step change to the dose rate.
3 Measure the time from the step change to the response at Residual Analyser 1.
4 Enter this time as Deadtime T2.
5 Measure the time from the step change to the response at Residual Analyser 2.
6 Enter this time as Deadtime T4.

Process Time Calculation - Fixed Process Time

Process time - primary loop = T2
Process time - sccondary loop = T4

Notes:

Deadtime T1 not used for fixed process time.
Deadtime T3 not used for fixed process time.

Procedure - Flow Proportional Process Time

1 Calculate Deadtime T1 and enter it into the controller.
2 Calculate Deadtime T3 and enter it into the controller.
3 Calculate Deadtime T5 and enter it into the controller.
4 Run the controller in manual mode at a constant doser rate of between 30% and 70% of capacity.
5 Make a step change to the dose rate.
6 Measure the time from the step change to the response ar Residual Analyser 1.
7 Enter this as Deadtime T2.
8 Measure the time from the step change to the response ar Residual Analyser 2.
9 Enter this as Deadtime T4.

Process Time Calculation - Flow Proportional Process Time

As T2 is entered, T2' at 100% flow is calculated as follows:

$T2'_{100} = ((T2 - (T1+T3)) \cdot F1) / 100$

T2' for any given flow is calculated by:

$T2' = (100 / Flow) \cdot T2'_{100}$

Process time - primary loop = T1 + T2' + T3

As T4 is entered, T4' at 100% flow is calculated as follows:

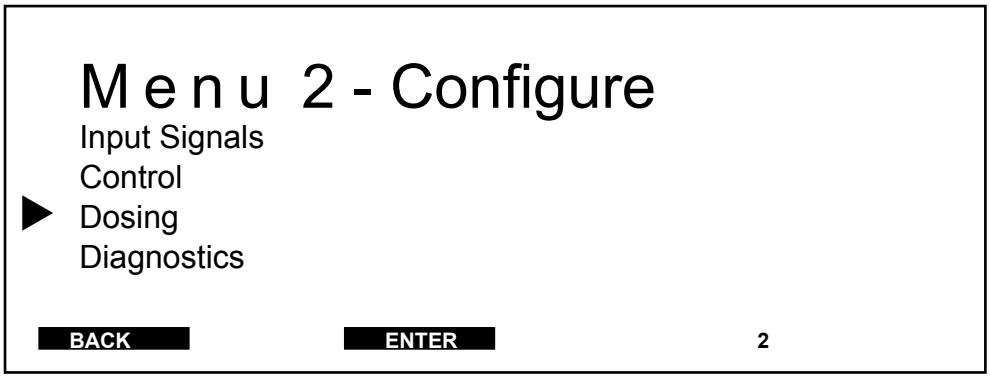
$T4'_{100} = ((T4 - (T1+T5)) . F1) / 100$

T4' for any given flow is calculated by:

$T4' = (100 / Flow) . T4'_{100}$

Process time - secondary loop = T1 + T4' + T5

4.3 Dosing

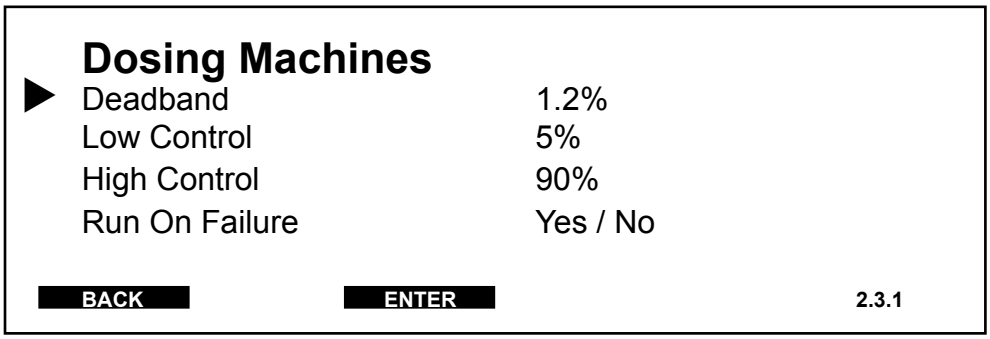


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing**', then press the ▲ key beneath **ENTER.** The following menu is displayed. The dosing menu is used as part of the configuration procedure to set the following parameters:-

PARAMETER	**OPTIONS**
Dosing Machines (see Section 4.3.1)	
Deadband	1.2%
Low Control	5%
High Control	90%
Run On Failure	Yes / No
Vent / Boost (see Section 4.3.2)	
Gas Line Venting	On / Off
Pump venting	On / Off
Pump Boost	On / Off
Frequency	12:00:30
Duration	00:00:30
Calibration (see Section 4.3.3)	
Start Cal	No / Local

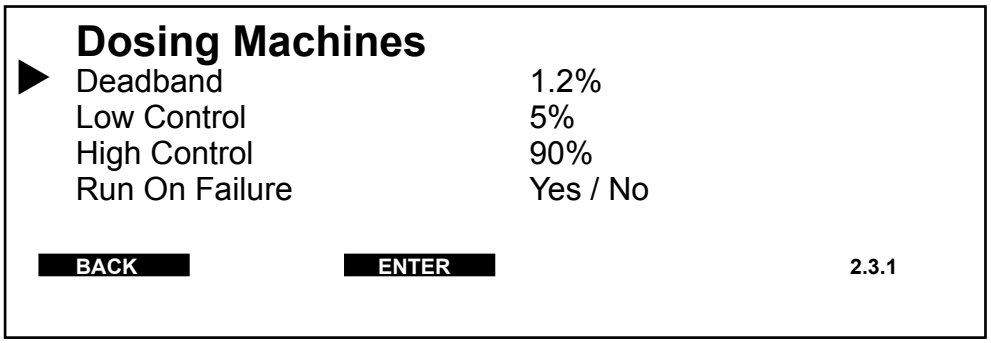
4.3.1 Dosing - dosing machines

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing Machines**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the commissioning engineer to configure the control parameters in accordance with the desired system operation.



Deadband

NOTE: The 'Deadband' menu option is only displayed if 'Positioner' is selected as the system dosing control in Section 3.3.3.

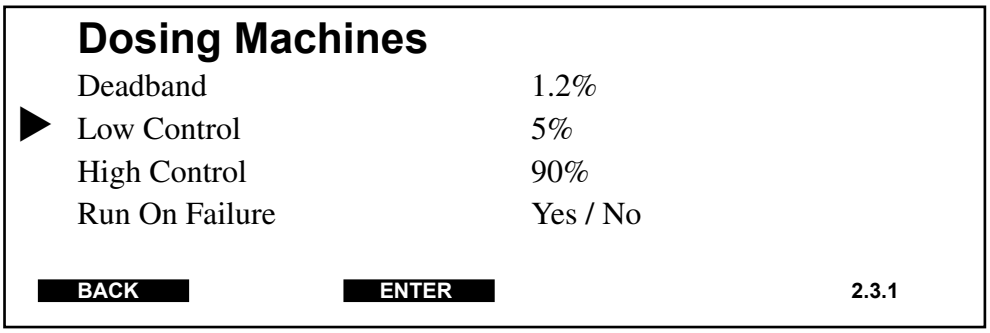


As previously mentioned 'Deadband' is only relevant if positioner is selected as the system dosing control. Positioner is used if a variable stroke dosing pump with an electric positioner, or gas control unit with an automatic dosage regulator is used. The Chemtrim uses the incoming signal to compute the position at which the dosing machine should be set to achieve the required dosage rate. It then provides Increase or Decrease signals to the dosing machine or regulator to adjust the setting as appropriate. The variable stroke mechanism of the pump or regulator unit incorporates a potentiometer which connects back to the Chemtrim to provide a positional reference feedback so that it can determine when the correct position for the required output is achieved. Deadband allows the operator to set a percentage margin about the positional reference where no action is taken.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Deadband**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the deadband setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER.**

Low Control and High Control

NOTE: The 'Low Control' and/or 'High Control' menu screen is only displayed if the alarm is enabled in Section 3.4.2.



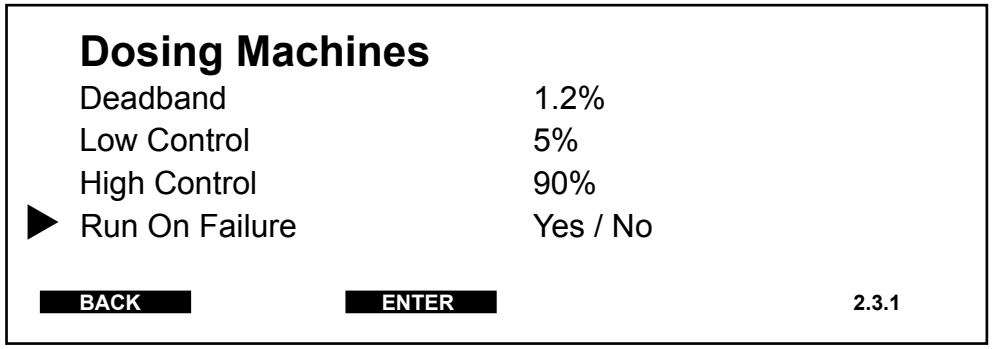
These low and high control alarms are presented for all control modes. The routines set the percentage of the full scale control output below or above which (as applicable) an alarm will be triggered. In normal operation the range of the control output to the dosing machine will be known. This facility allows thresholds outside the normal control range to be set. In this way, if the alarm is raised it points to the external factors in the installation affecting the normal dosing range which must be investigated.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Low Control**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the low control setting is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Press the ▲ key beneath **ENTER.**

Repeat the foregoing for 'High Control'.

Run On Failure

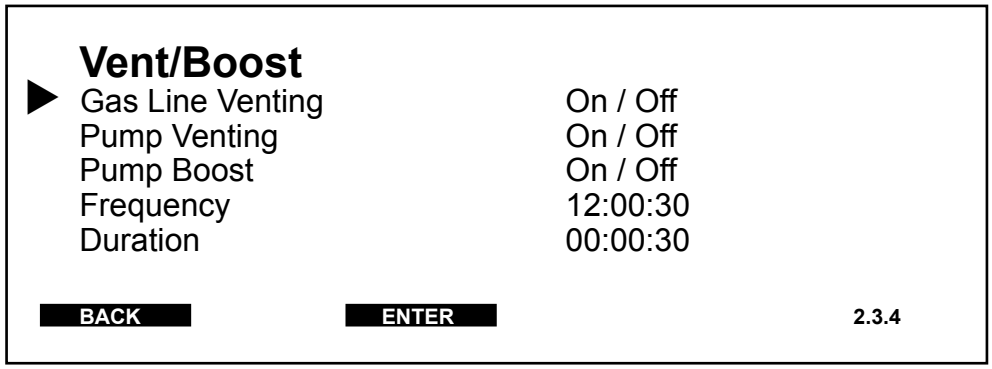
If at any time both dosing machines fail the 'Run On Fail' menu option will dictate whether the system shuts down or the controller tries to run a machine until the reason for the failure has been corrected.



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Run On Failure**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Yes and No. In the 'Yes' position the controller tries to run machine 1. With the desired run on failure setting displayed press the ▲ key beneath **ENTER.**

4.3.2 Dosing - Vent / Boost

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Vent Boost**', then press the ▲ key beneath **ENTER.** The following menu is displayed .



If 'Gas Feed' is selected as the dosing machine type in Section 3.3.2 only 'Gas Line Venting' is shown on the following Vent/Boost menu screen. This option can be switched on or off. When enabled, the corresponding vent relay will operate for 10 seconds when a gas machine switches off. The relays are used to control valves in the gas line to release the vacuum when the dosing machines shut off.

If 'Pump' is selected as the dosing machine type in Section 3.3.2, 'Pump Venting' and 'Pump Boost' are shown on the following Vent/Boost menu screen. These options may be switched on or off. If 'Pump Boost' is switxhed on, two further options are displayed - 'Frequency' and 'Duration'. If 'Pump Venting' is enabled but not 'Pump Boost' then only the 'Frequency' option is displayed.

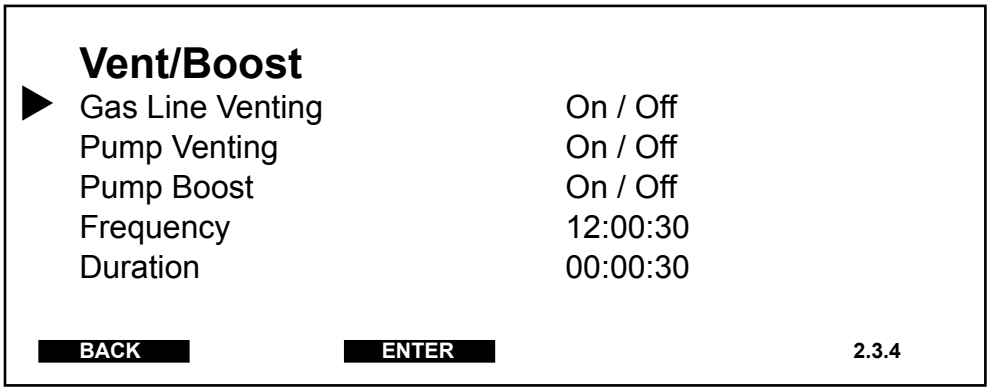
If 'Pump Venting' has been selected the corresponding vent relay will operate when a pump is started and periodically at the selected frequency. If the frequency has been set to zero, the vent relay will only operate on pump start up. The duration for venting is fixed at 10 seconds.

When 'Pump Boost' is selected the dosing pump will initially run at 100% on start up and periodically at the selected frequency. If the frequency has been set to zero the pump will only be boosted at start up. The duration setting determines how long the pump will run in the boost mode.

Gas Line Venting

NOTE: The gas line venting option is only available when 'Gas Feed' is selected as the dosing machine type in Section 3.3.2.

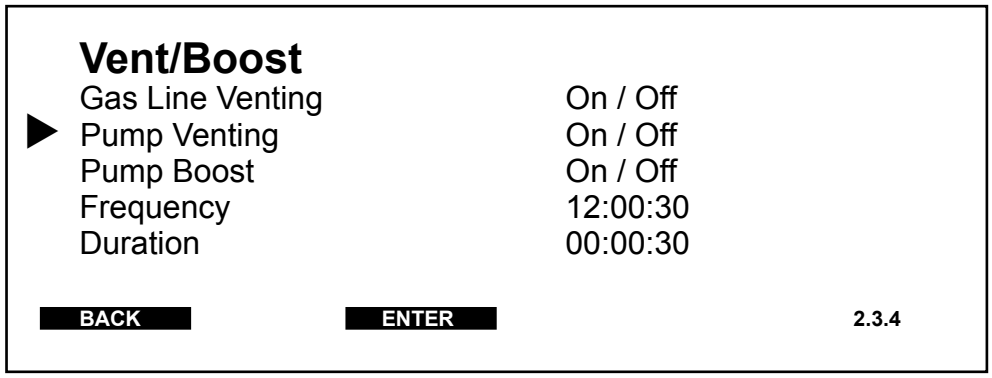
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Gas Line Venting**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between On and Off. With the desired gas line venting setting displayed press the ▲ key beneath **ENTER.**



Pump Venting

NOTE: The pump venting option is only available when 'Pump' is selected as the dosing machine type in Section 3.3.2.

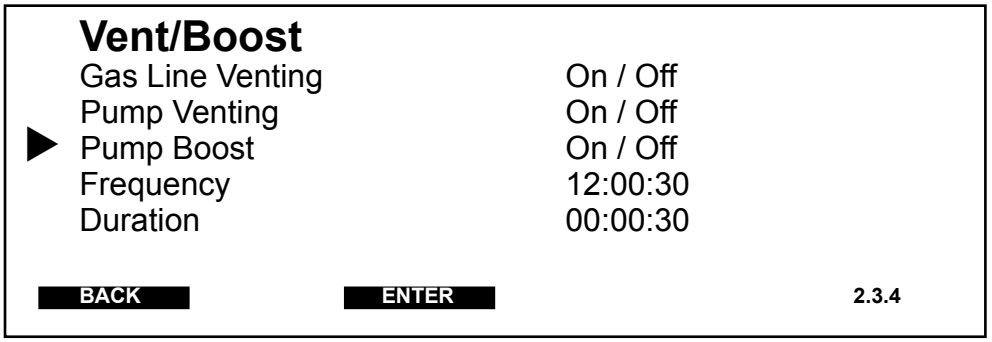
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Pump Venting**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between On and Off. With the desired pump venting setting displayed press the ▲ key beneath **ENTER.**



Pump Boost

NOTE: The pump boost option is only available when 'Pump' is selected as the dosing machine type in Section 3.3.2.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Pump Boost**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between On and Off. With the desired pump venting setting displayed press the ▲ key beneath **ENTER.**



Frequency

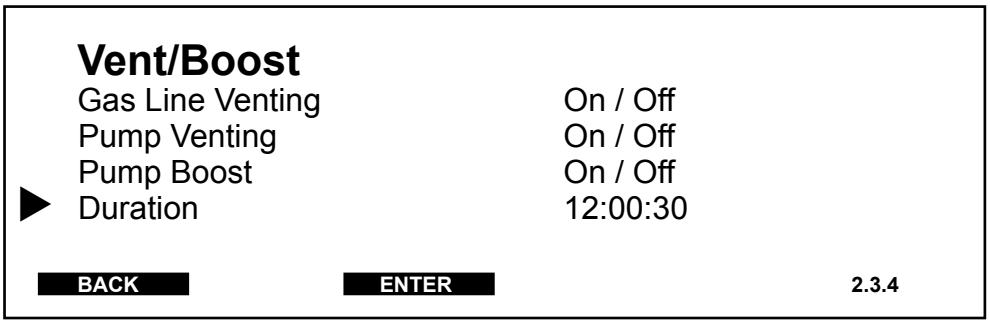
If either or both pump venting or pump boost were enabled in the previous two menus the operator should now set the frequency of operation. The maximum entry is 18:00:00. If the frequency is set to zero, the vent relay and/or pump boost will only operate on pump start up.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Frequency**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the frequency is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct frequency is displayed. Press the ▲ key beneath **ENTER .**

Duration

If pump boost is enabled the operator should now set the duration of operation. The entry must be between 10 and 180 seconds. 18:00:00. The duration setting determines how long the pumps run at 100% in the pump boost mode.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Duration**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the duration is entered. The first number is entered by scrolling using the ▲ and ▼ keys. When the desired number is displayed press the ▶ key and the enter the next one. Repeat the foregoing until the correct duration is displayed. Press the ▲ key beneath **ENTER .**



4.3.3 Dosing - Calibration

NOTE: The calibration menu option is only displayed when positioner is selected as the system dosing control in Section 3.3.3.

A 5 point calibration routine is used with the following rules:

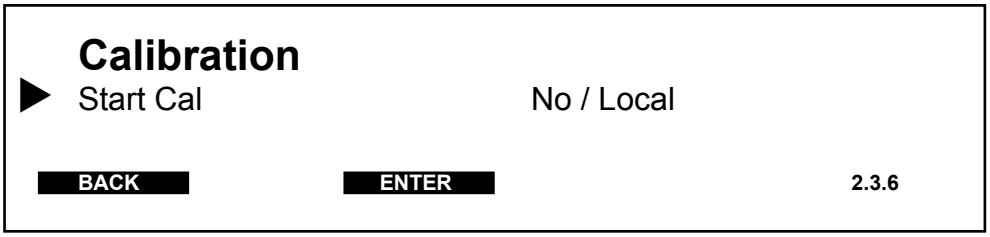
Calibration Point	Rules
0% 10%	One or both of these points must be used. If the 10% point only is used, the 0% point is extrapolated
50%	This point must always be entered.
90% 100%	One or both of these points must be used. If the 90% point only is used, the 100% point is extrapolated.

Hence the final calibration may be 3, 4 or 5 points.

NOTE: Feed back calibration is only possible in the Manual mode. The machine to be calibrated must be switched on as decribed in Section 5.1.2.

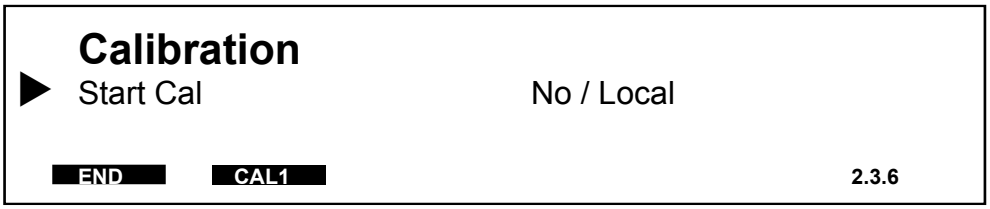
If a machine fails calibration, the 'cal failure' alarm becomes active.

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Calibration**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between No and Local. In the 'Local' position the following calibration routine takes place using the keys on the Chemtrim controller. With local displayed press the ▲ key beneath **ENTER.**



If the controller has not been set for manual control 'Only In Manual' will be displayed.

The following display appears:



Press the ▲ key beneath **CAL1**. The display changes to:

This is the first calibration point. The operator should now choose whether to calibrate at 0% and/or 10%. If 0% calibration is required press the ▲ key beneath **ENTER,** if not press the ▲ key beneath **NEXT** and proceed from the CAL 10% display**.** Pressing **ENTER** changes the display to:

Use the ▲ and ▼ keys to adjust the pump or gas control unit positioner to register 0% at its setting scale. When set press **ENTER** to store that value**.** The display will now prompt Cal 10%.

If the 10% calibration point is to be entered press **ENTER**, if not press **NEXT** and proceed from 'Set 50%'. When pressing **ENTER** the prompt changes to 'Set 10%'.

Use the ▲ and ▼ keys to adjust the pump or gas control unit positioner to register 10% at its setting scale. When set press **ENTER** to store that value**.** The display will now prompt Set 50%.

There is no option to bypass the 50% calibration point.
Use the ▲ and ▼ keys to adjust the pump or gas control unit positioner to register 50% at its setting scale. When set press **ENTER** to store that value**.** The display will now prompt Cal 90%.

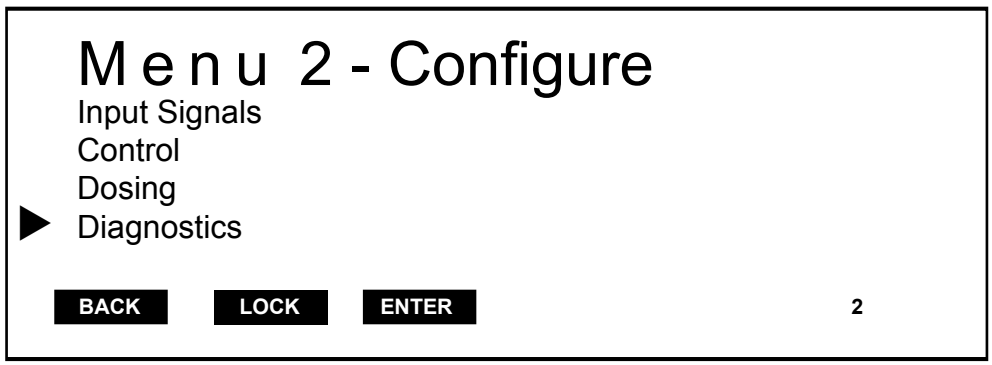
If the 90% calibration point is to be entered press **ENTER**, if not press **NEXT** and proceed from 'Cal 100%'. When pressing **ENTER** the prompt changes to 'Set 90%'.

Use the ▲ and ▼ keys to adjust the pump or gas control unit positioner to register 90% at its setting scale. When set press **ENTER** to store that value**.** The display will now prompt Cal 100%.

If the 100% calibration point is to be entered press **ENTER**, When pressing **ENTER** the prompt changes to 'Set 100%'.

Use the ▲ and ▼ keys to adjust the pump or gas control unit positioner to register 100% at its setting scale. When set press **ENTER** to store that value.

4.4 Diagnostics



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Diagnostics**', then press the ▲ key beneath **ENTER.** The following menu is displayed. The diagnostics menu is used to view the following parameters:-

PARAMETER			**OPTIONS**
Alarm History (see Section 4.4.1)			
1	23.02.00	16:47	Low Residual ?
2	23.02.00	19:03	Extra Low Residual ?
3	24.02.00	06:23	Low Flow ?
4			
5			
6			
Data Logging (see Section 4.4.2)			
Parameter			Control / Analyser 1 / Analyser 2 / Flow
Reset Trend			Yes / No
Analogue Inputs (see Section 4.4.3)			
Flow1		11.3 mA	45.8 l/s
Flow 2	- - -	- - -	
Analyser 1	4.2 mA	0.125 mg/l	
Analyser 2	- - -	- - -	
External Setpoint		- - -	- - -
Controller I/O (see Section 4.4.4)			
mA1: Control		8 mA (25)	
mA2: - - -			
mA3: - - -			
mA4: Yout		12 mA (50)	

DI 1 2 3 □■□

K 1 2 3 4 □□□□

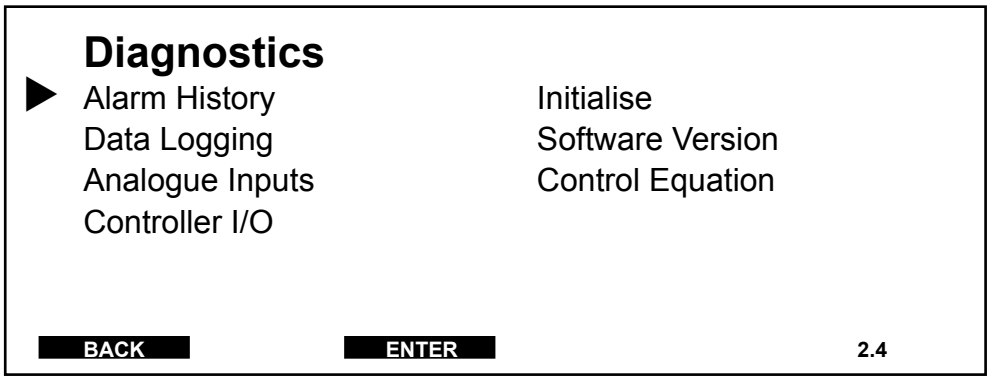
5 6 7 8 □■□□

Initialise (see Section 4.4.5)
Reset - - -
Reset + Init - - -
Software Version (see Section 4.4.6)

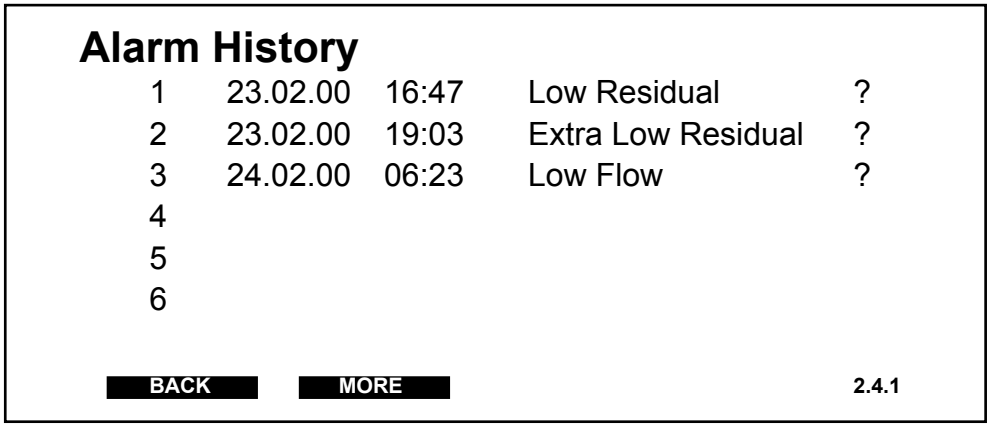
1	mA/V	02	Main CPU:
2			01.00 EAC1047
3			
4	mA/V	02	Display Version:
5			01.01_EAE1017_01
6	mA-Out 4x		02

Control Equation (see Section 4.4.7)

4.4.1 Diagnostics - Alarm History



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Alarm History**', then press the ▲ key beneath **ENTER.** The following menu is displayed.

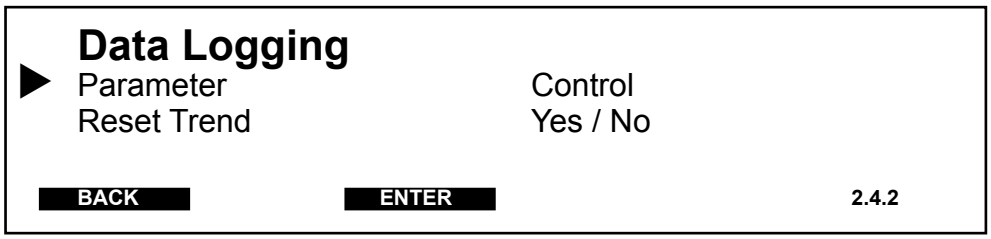


The last 24 alarms are shown on the alarm history display. The date and time of each alarm is also displayed. The alarm history is stored in a non-volatile memory and will be retained if the power is removed. This display is read only.

4.4.2 Diagnostics - Data Logging

Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Data Logging**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the operator to select a parameter for recording and also to reset the trend if required.

Parameter

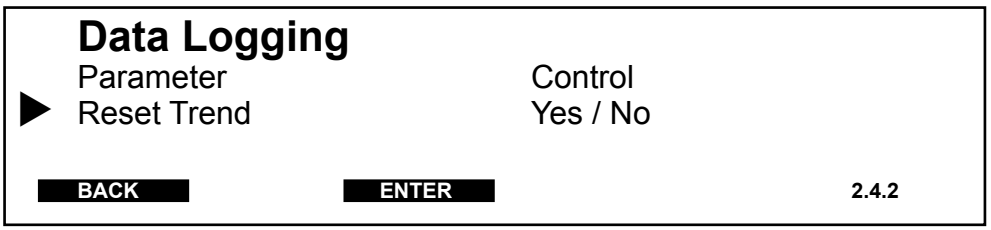


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Parameter**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Control (output total), Analyser 1, Analyser 2 and Flow (total). With the desired data logging parameter displayed press the ▲ key beneath **ENTER.**

The data logging is fixed to 1 month of data at 2 minute sampling time. The time and date are stored with the first data point to enable the date/ time of all the following data points to be calculated.

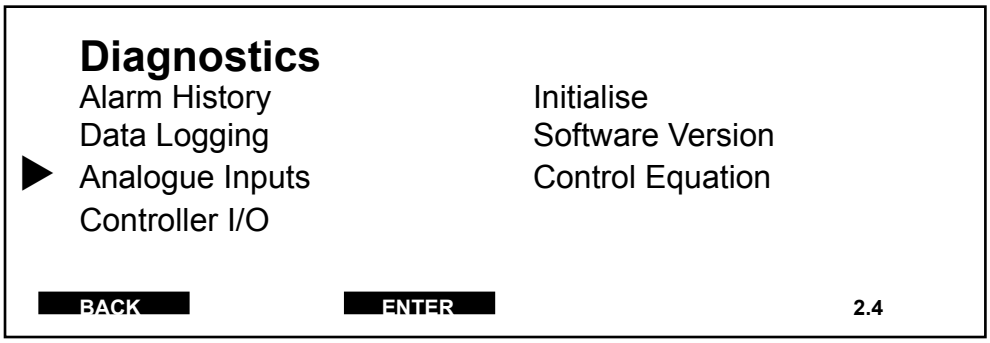
The data may be viewed as a graph on the controller display or, downloaded to a laptop via the RS232 interface.

Reset Trend

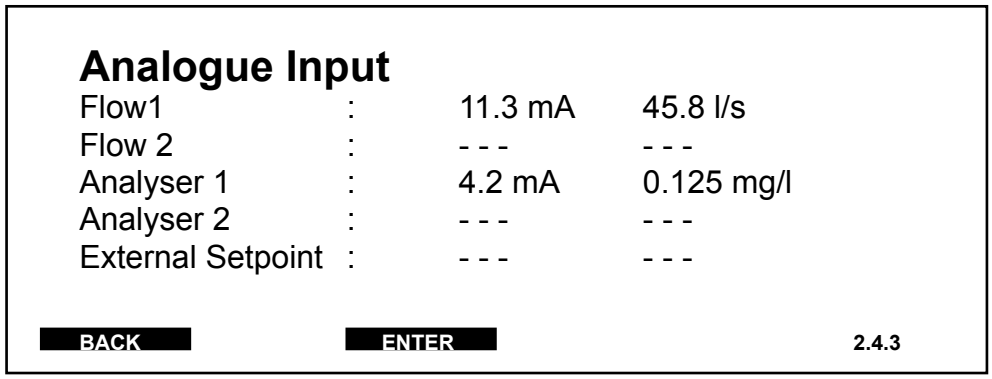


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Reset Trend**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Yes and No. When 'Yes' is selected and the ▲ key beneath **ENTER** is pressed the main screen graph is reset.

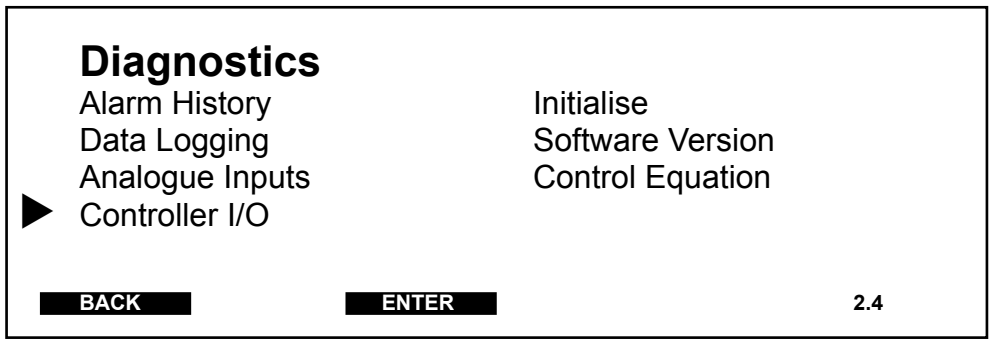
4.4.3 Diagnostics - Analogue Inputs



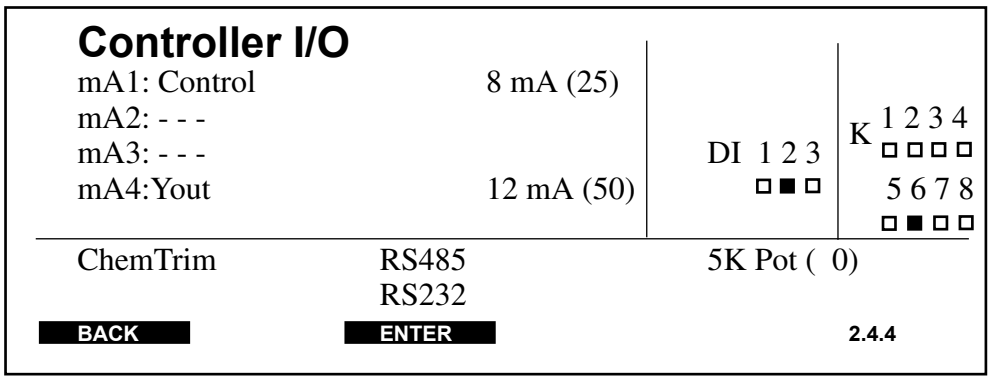
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Analogue Inputs**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the operator to view (not change) the values of the analogue inputs and what that means in relationship to water flow, residual etc.



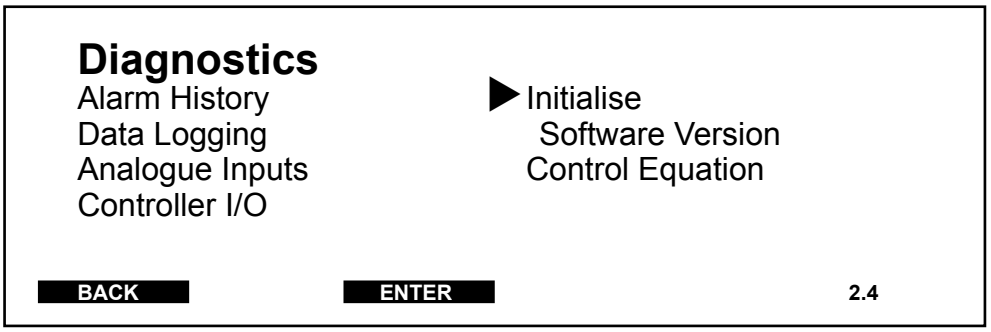
4.4.4 Diagnostics - Controller I/O



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Controller I/O**', then press the ▲ key beneath **ENTER.** The following menu displays the I/O status of the Chemtrim Controller.

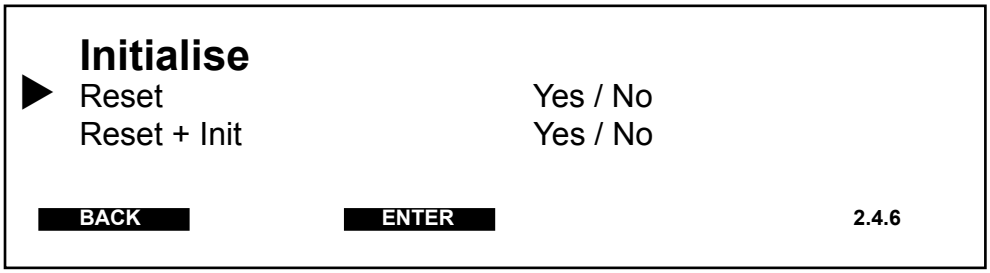


4.4.5 Diagnostics - Initialise



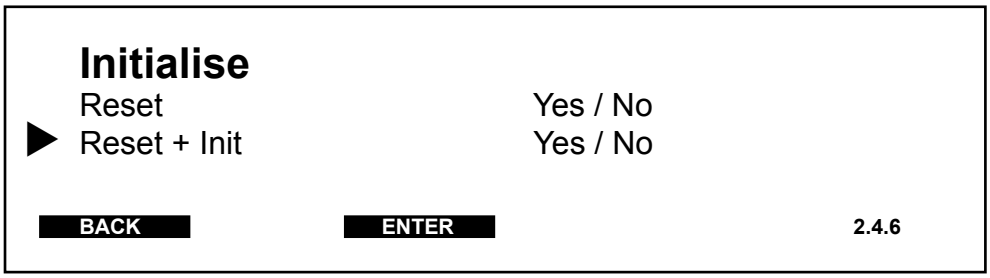
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Initialise**', then press the ▲ key beneath **ENTER.** The following menu is displayed which allows the operator to reset the controller in one of two ways.

Reset



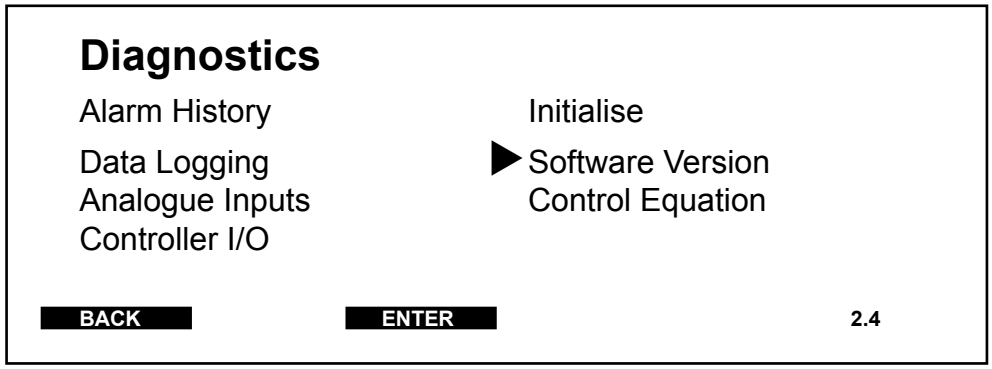
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Reset**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or t key cycles the display between Yes and No. When 'Yes' is selected and the ▲ key beneath **ENTER** is pressed the controller is reset.

Reset + Init

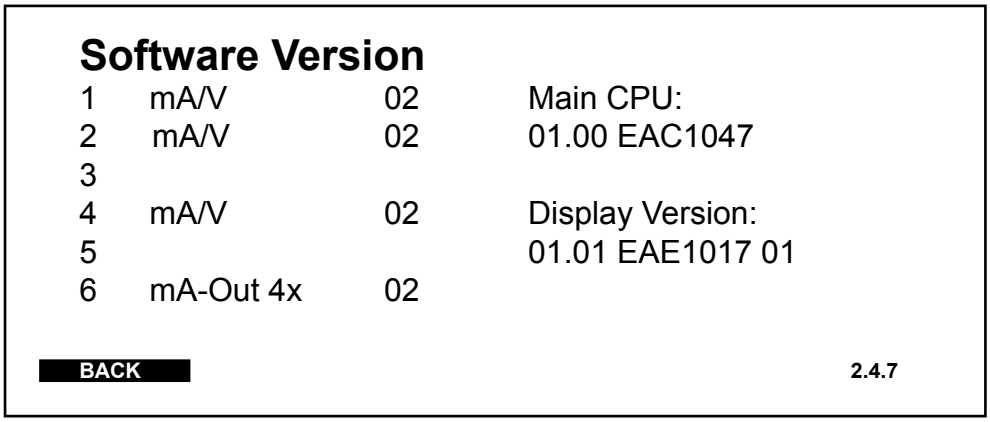


Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Reset + Init**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between Yes and No. When 'Yes' is selected and the ▲ key beneath **ENTER** is pressed the controller is reset and the software set defaults are loaded.

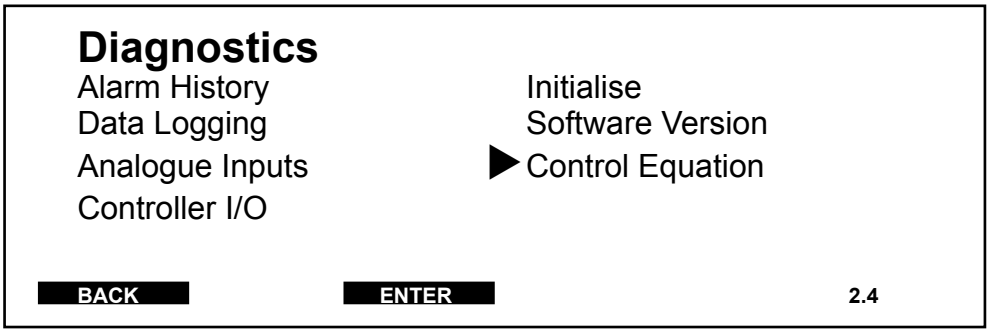
4.4.6 Diagnostics - Software Version



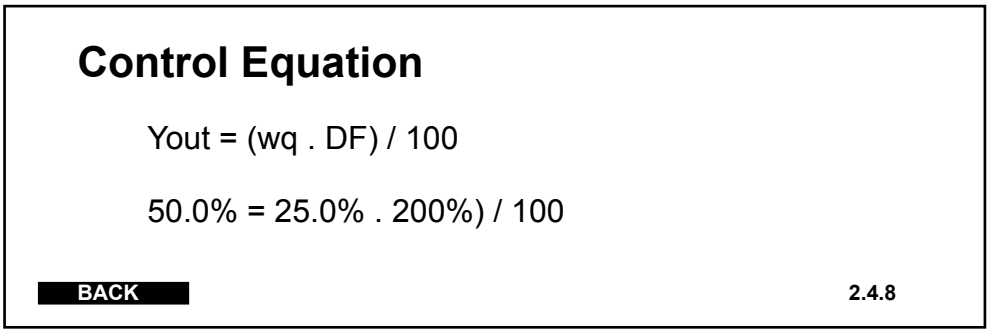
Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Software Version**', then press the ▲ key beneath **ENTER**. The following menu is displayed.



4.4.7 Diagnostics - Control Equation



Using the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Control Equation**', then press the ▲ key beneath **ENTER.** The following menu is displayed which shows the control equation for the system control set in Section 3.1.2.



5 MODE

The **MODE** menu option allows the operator to select between AUTOMATIC and MANUAL control of the system dosing units.

The dosing machine associated with the Chemtrim controller can be operated in either an Automatic or Manual mode from the Chemtrim. In Automatic mode the controller constantly examines the levels and status of the input signals and applies signals to change the dosing machine output in relation to those signals. In Manual mode the controller still monitors the input signals but any change of dosing machine setting required will require manual entry.

To determine the present control mode of the Chemtrim refer to the display panel and note which icon is evident. The Automatic mode is denoted by a ⏱ symbol, while the Manual mode is denoted by a ✋ hand symbol.

5.1 Manual Mode

Pressing the Mode key when in the manual mode (✋) results in the following menu screen being displayed:

5.1.1 Change

Pressing the **CHANGE** key when in the Manual control mode changes the control to the Automatic mode. A second press of the **CHANGE** key will return the control back to Manual.

5.1.2 Man Set

Pressing the **MAN SET** key when in the manual mode allows the operator to set the dosing position of the machine manually and also to turn Dosing Machine 1 ON/OFF. Having pressed the **MAN SET** key the display changes to:

Turning a Dosing Machine On/Off

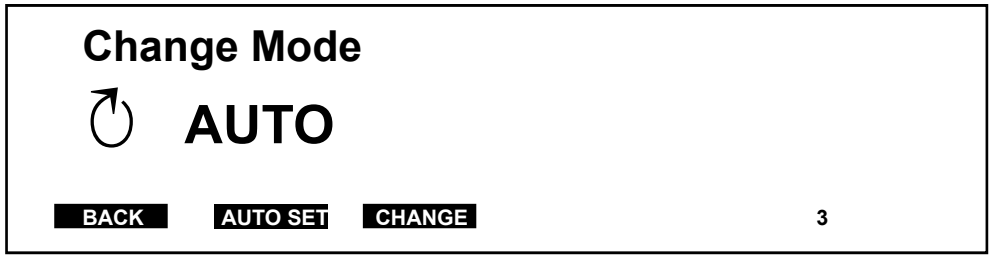
To turn a dosing machine On/Off, use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosing Machine 1**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between On and Off. Press the ▲ key beneath **ENTER** to store the change.

Manually Setting the Dosing Machine Position

To manually set the position of dosing machine 1, use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**M/C 1 Position**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the percentage position is entered. The first number is entered by scrolling using the ▲ or ▼ keys. When the desired number is displayed press the ▶ key and enter the next one. NOTE: The maximum entry is 100%. Repeat the foregoing until the correct percentage is displayed. Press the ▲ key beneath **ENTER** to store the change.

5.2 Automatic Mode

Pressing the Mode key when in the automatic mode (↻) results in the following menu screen being displayed:

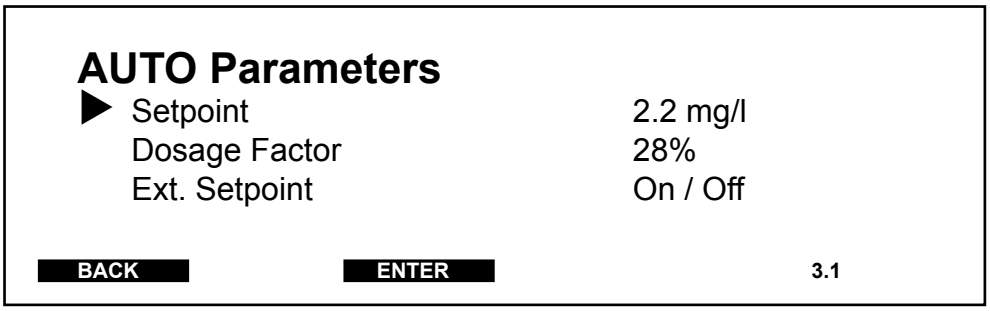


5.2.1 Change

Pressing the **CHANGE** key when in the Automatic control mode changes the control to the Manual mode. A second press of the **CHANGE** key will return the control back to Automatic.

5.2.2 Auto Set

Pressing the **AUTO SET** key when in the automatic mode allows the operator to change the setpoint and dosage factor. If external setpoint has been enabled as part of the system control it can be turned On/Off in this menu option. Having pressed the **AUTO SET** key the display changes to:



Setpoint

NOTE: The setpoint menu option is only available when the system control is set to either residual, flow and residual or setpoint trim.

The Setpoint can be set by the operator to any value within the residual range set in Section 3.2.3. For a normal residual range this can be from 0 to full scale range in µg/l or mg/l. For a centre zero residual range the setpoint can be any value +ve range.

To change the control setpoint, use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Setpoint**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears adjacent to where the setpoint value is entered. The first number is entered by scrolling using the ▲ or ▼ keys. When the desired number is displayed press the ▶ key and enter the next one. Repeat the foregoing until the desired new setpoint is displayed. Press the ▲ key beneath **ENTER** to store the change.

Dosage Factor

NOTE: The dosage factor menu option is only available when the system control is set to either ratio or feed forward.

The dosage factor enables the user to set the dosage percentage in feed forward and ratio control modes. The dosage can be set between 10% and 500%, the default setting being 100%.

To change the dosage factor, use the ▲ and ▼ keys navigate the ▶ cursor until it lines up with '**Dosage Factor**', then press the ▲ key beneath

ENTER. A second ▶ cursor appears adjacent to where the dosage factor percentage is entered. The first number is entered by scrolling using the ▲ or ▼ keys. When the desired number is displayed press the ▶ key and enter the next one. Repeat the foregoing until the desired dosage factor is displayed. Press the ▲ key beneath **ENTER** to store the change.

External Setpoint

If the external setpoint facility has been enabled as part of the system control in Section 3.1.2, it can be turned on/off in this menu option.

To turn the external setpoint facility on/off, use the ▲ and ▼ keys to navigate the ▶ cursor until it lines up with '**External Setpoint**', then press the ▲ key beneath **ENTER.** A second ▶ cursor appears. Pressing either the ▲ or ▼ key cycles the display between On and Off. Make the selection then press the ▲ key beneath **ENTER** to store the change.

Chemtrim Settings NOTE: The numbers in ( ) refer to the display number

Reference **Factory Setting** **Commissioning**

SYSTEM (1.1)

User Interface (1.1.1)		
Language	English	
System Name	Chemtrim	
System Password	0000	
Menu 2 Password	0000	

Control (1.1.2)		
Control Mode	Flow & Residual	
Control Method	Chlorinate	
Ext. Setpoint	Not Used	
Control Action	Normal	

Communications (1.1.4)		
RS485 Protocol	W&T	
RS485 Address	00	
RS232 Function	Off	

INPUT SIGNALS (1.2)

Flow (1.2.1)		
Signal Type	4…20mA	
Resolution	0.1 l/s	
Range	100.0 l/s	
Range Used	100 %	
Display Flow as	l/s	

Flow 2 (1.2.2)		
Signal Type	Not Used	
Resolution	0.1 l/s	
Range	100.0 l/s	
Range Used	100 %	

Analyser 1 (1.2.3)		
Signal Type	4…20mA	
Measurement	Cl2	
Units	ug/l	
Range	500 ug/l	

Reference	Factory Setting	Commissioning
Analyser 2 (1.2.4)		
Signal Type	4…20mA	
Units	ug/l	
Range	500 ug/l	

Digital Inputs (1.2.5)		
Digital Input 1	Not Used	
Digital Input 2	Not Used	

OUTPUT SIGNALS (1.3)

mA Outputs (1.3.1)		
mA 1 Signal	Not Used	
mA 1 Function	Control Output	
mA 2 Signal	Not Used	
mA 2 Function	Control Output	
mA 3 Signal	Not Used	
mA 3 Function	Control Output	

Dosing Machine (1.3.2)		
Machine Type	Gas Feed	
Resolution	0.001 g/s	
Gas Capacity	0.050 g/s	
Pump Capacity	2.00 l/h	
Product Strength	14%	

Dosing Control (1.3.3)		
Dosing Control	Positioner	
mA Signal	4…20mA	
Pulse Range	80 / min	
Booster Pumps	Off	
Vent Contacts	Off	

ALARMS (1.4)

Residual Alarms (1.4.1)		
Low Residual 1	Disable	
High Residual 1	Disable	
Low Residual 2	Disable	
High Residual 2	Disable	

Reference	Factory Setting	Commissioning
General Alarms (1.4.2)		
Low Flow	Disable	
Machine Fail	Disable	
High Demand	Disable	
Low Control	Disable	
High Control	Disable	

Residual Delays (1.4.3)		
Low Residual 1	05min 00s	
High Residual 1	05min 00s	
Low Residual 2	05min 00s	
High Residual 2	05min 00s	

General Delays (1.4.4)		
Low Flow	02min 00s	
Machine Fail	01min 00s	
High Demand	10min 00s	

RELAYS (1.5)

Operation 1 (1.5.1)		
Relay 1 Op	Not Used	
Relay 1 Mode	Unlatched	
Relay 2 Op	Not Used	
Relay 2 Mode	Unlatched	
Relay 3 Op	Not Used	
Relay 3 Mode	Unlatched	

Operation 2 (1.5.2)

Relay 4 Op	Not Used	
Relay 4 Mode	Unlatched	

Reference	Factory Setting	Commissioning

Map Functions 1 (1.5.3)

Relay		1	2	3	4
Low Flow		[ ]	[ ]	[ ]	[ ]
High Demand		[ ]	[ ]	[ ]	[ ]
Machine 1 Fail		[ ]	[ ]	[ ]	[ ]
Setpoint Fail		[ ]	[ ]	[ ]	[ ]
System Fault	[ ]	[ ]	[ ]	[ ]	
Low Residual 1		[ ]	[ ]	[ ]	[ ]
High Residual 1		[ ]	[ ]	[ ]	[ ]
Low Residual 2		[ ]	[ ]	[ ]	[ ]
High Residual 2		[ ]	[ ]	[ ]	[ ]
Low Control		[ ]	[ ]	[ ]	[ ]
High Control		[ ]	[ ]	[ ]	[ ]

Map Functions 2 (1.5.4)

Relay	1	2	3	4	
Flow Fail		[ ]	[ ]	[ ]	[ ]
Flow 2 Fail		[ ]	[ ]	[ ]	[ ]
Analyser 1 Fail		[ ]	[ ]	[ ]	[ ]
Analyser 2 Fail		[ ]	[ ]	[ ]	[ ]
Calibration Fail		[ ]	[ ]	[ ]	[ ]
Control Inhibit		[ ]	[ ]	[ ]	[ ]

Map Functions 3 (1.5.5)

Relay	1	2	3	4	
mA Out Fail		[ ]	[ ]	[ ]	[ ]
Disengaged 1		[ ]	[ ]	[ ]	[ ]
Shutdown		[ ]	[ ]	[ ]	[ ]

INPUT SIGNALS (2.1)

Flow (2.1.1)		
Flow Shutdown	Off	
Low Flow Alarm	1.0 l/s	
Manual	Off	
Manual Value	1.0 l/s	
Signal Failure	Shutdown	

Reference	Factory Setting	Commissioning
Flow 2 (2.1.2)		
Manual	Off	
Manual Value	1.0 l/s	
Signal Failure	Shutdown	
Analyser 1 (2.1.3)		
Manual	Off	
Manual Value	0.025 mg/l	
Signal Failure	Shutdown	
Analyser 2 (2.1.4)		
Manual	Off	
Manual Value	0.010 mg/l	
Signal Failure	Shutdown	
Residual Alarms (2.1.5)		
Low Residual 1	0.200 mg/l	
High Residual 1	0.300 mg/l	
Low Residual 2	0.200 mg/l	
High Residual 2	0.300 mg/l	
Move Alarms	Off	
High Demand	0.10 mg/l	

CONTROL (2.2)

Control Set (2.2.1)		
P Gain	50 %	
I Gain	50 %	
Setpoint Change	50 %	
Setpoint Band	20 %	
Setpoint Trim	Off	
Process Time (2.2.2)		
Process Time	Fixed	
Deadtime T1	01min 00s	
Deadtime T2	00h 05min 00s	
Deadtime T3	01min 00s	
Deadtime T4	02h 00min 00s	
Deadtime T5	01min 00s	

Reference	Factory Setting	Commissioning

DOSING (2.3)

Dosing Machines (2.3.1)		
Deadband	2.0 %	
Low Control	10 %	
High Control	90 %	
Run On Failure	Yes	

Vent / Boost (2.3.4)		
Gas Line Venting	Off	
Pump Venting	Off	
Pump Boost	Off	
Frequency	00h 30min 00s	
Duration	00min 30s	

DIAGNOSTICS (2.4)

Data Logging (2.4.2)		
Parameter	Control	

ChemTrim Spare Parts

Description	Part No.
Fuse T1A / 250V, Type TR5 (115V / 230V AC units)	AAC5527
Fuse T2.5A / 250V, Type TR5 (24V DC units)	AAC5788
Fuse T3.15A / 250V, 5 x 20mm (Steel panel units only)	AAA1138
mA / V Input Card (Slots 1, 2 & 4)	AAC2764
4 x mA Output Card (Slot 6)	AAC2638
8 x Relay Output Card (Slot 7)	AAC2554
RS232 Interface Lead	AAC5890
Connector, 8 way, LH cable entry	AAC4933
Connector, 8 way, RH cable entry	AAC4936

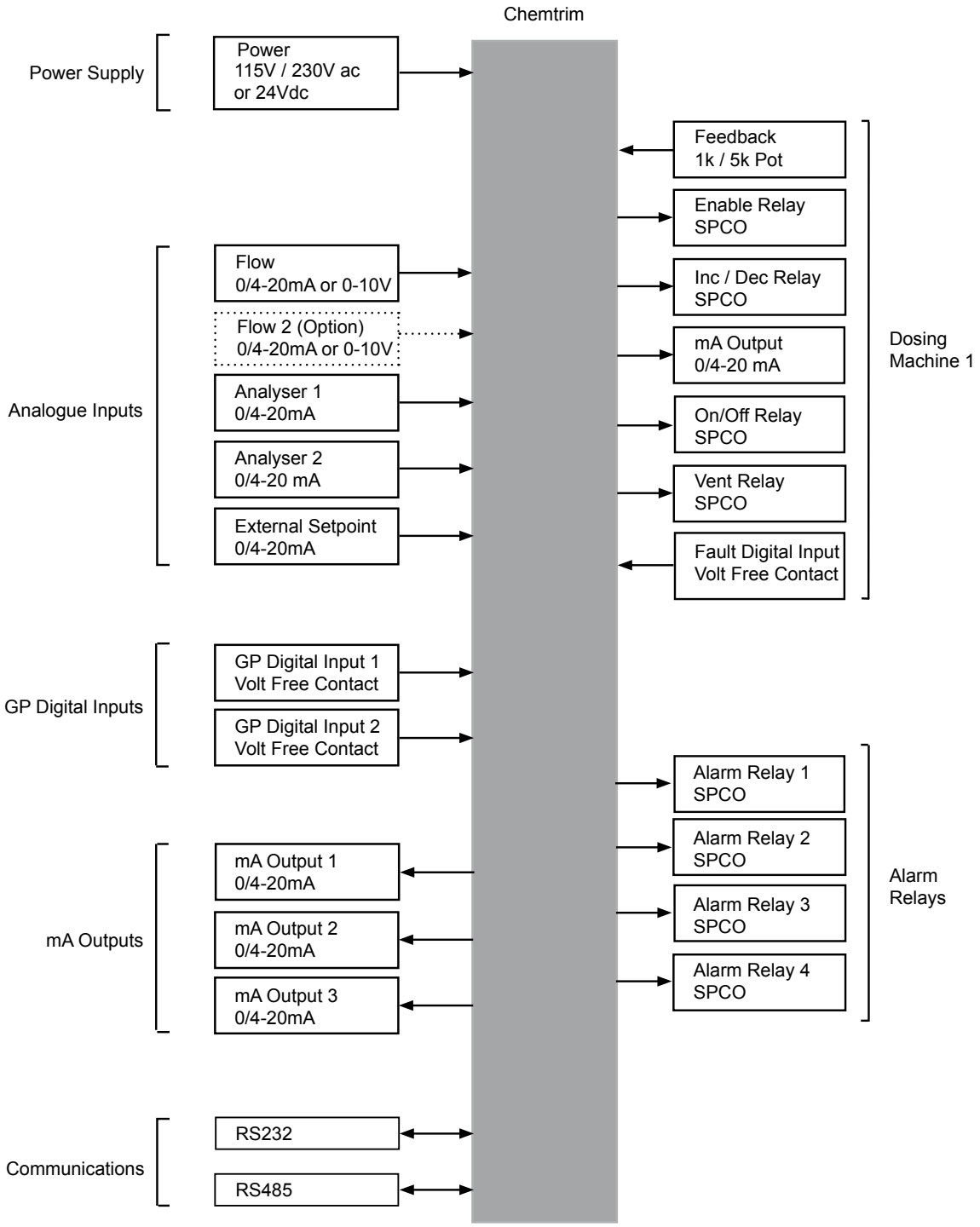


Fig. 1 Chemtrim Controller I/O

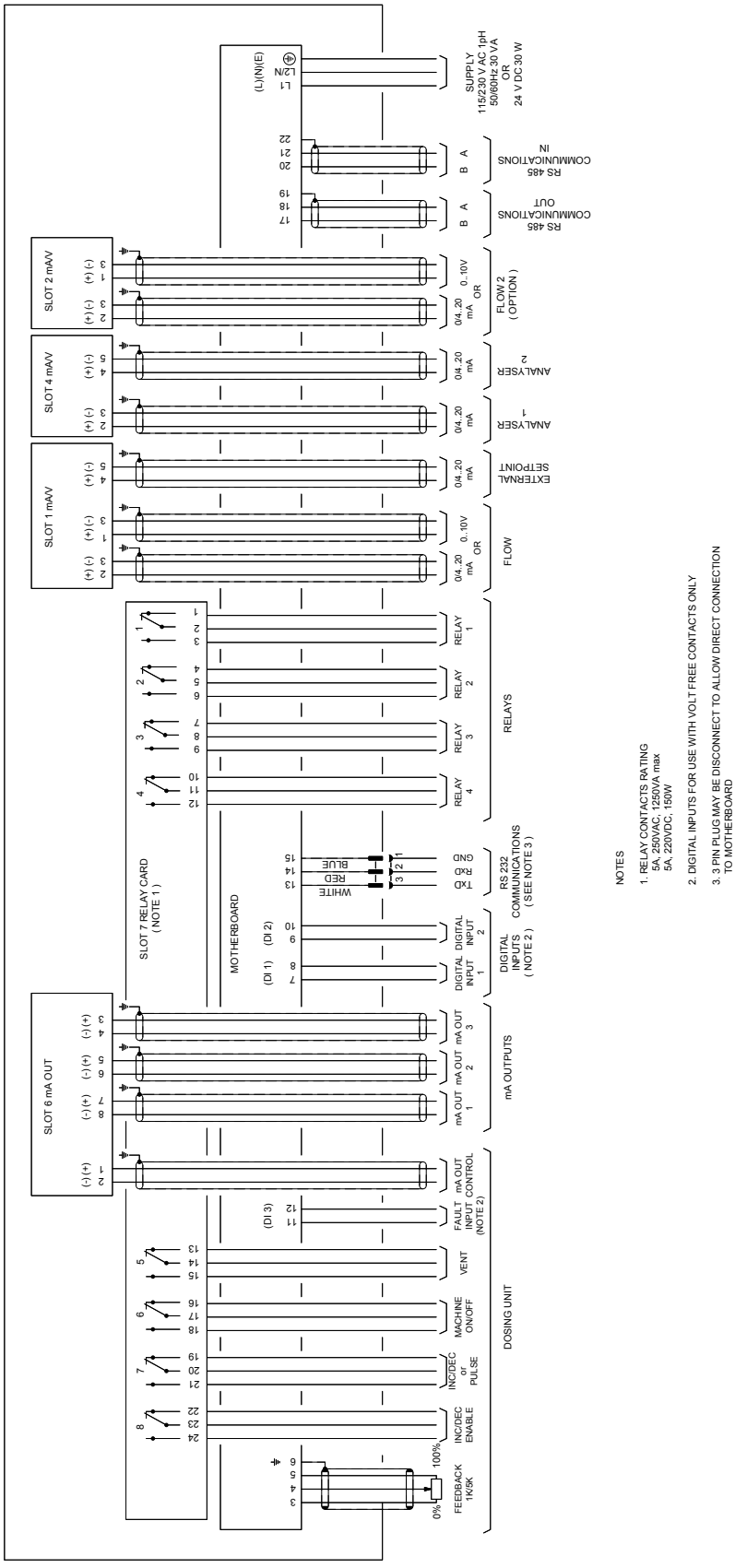


Fig. 2 External Connection Diagram - Chemtrim General I/O - Plastic Enclosure (XAC1186)

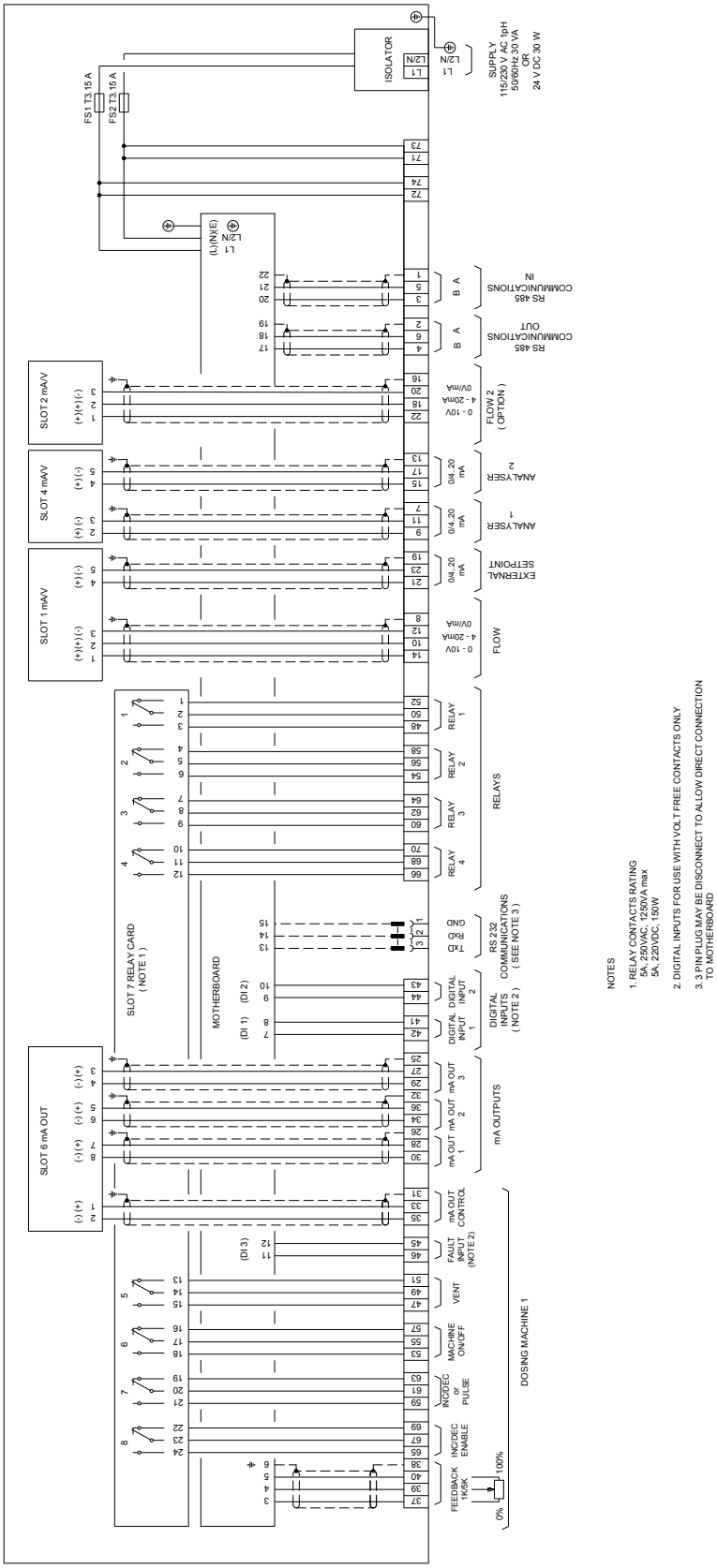


Fig. 3 External Connection Diagram - Chemtrim Controller General I/O - Steel Enclosure (XAC1183)

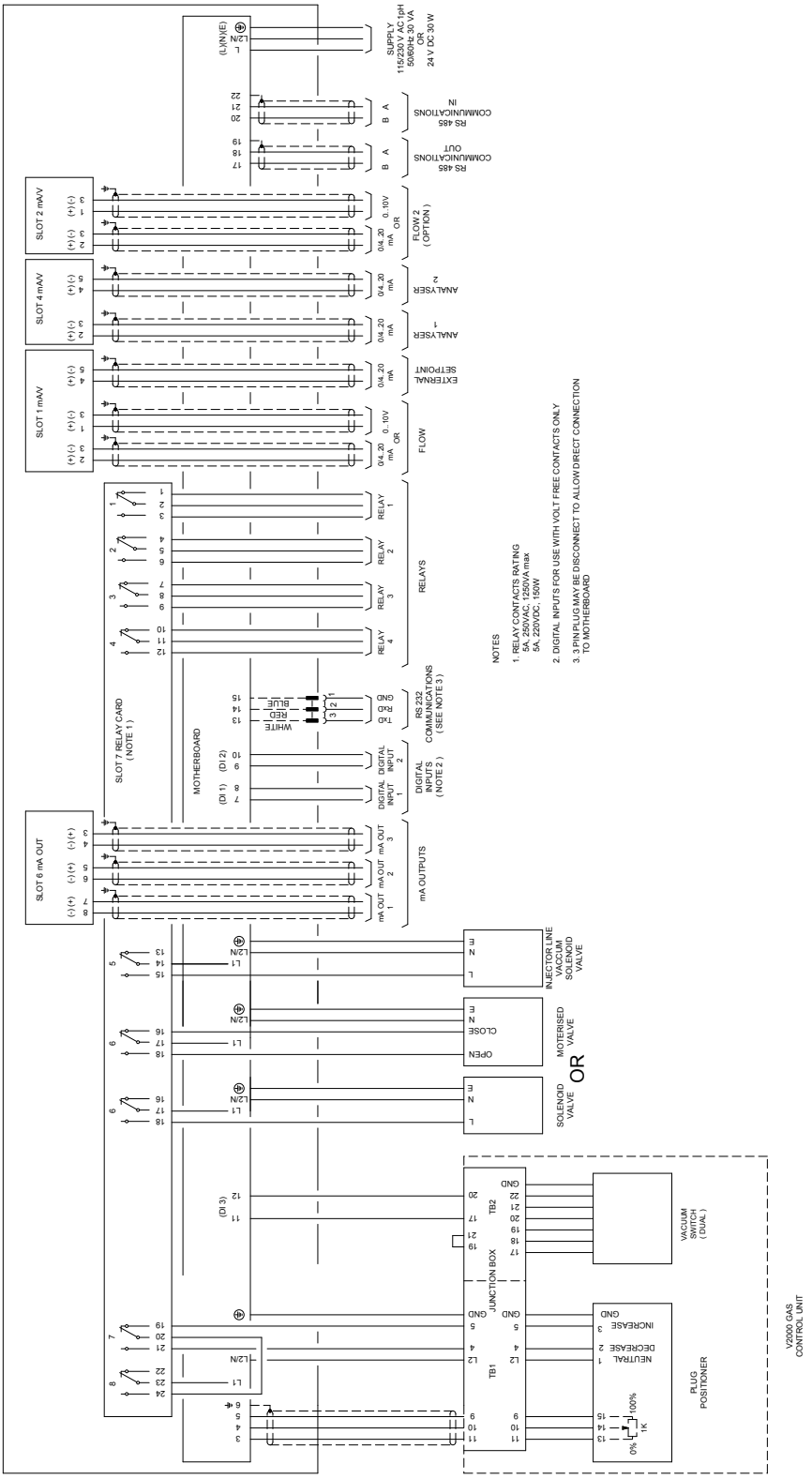


Fig. 4 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - V2000 Gas Control Units (XAC1211)

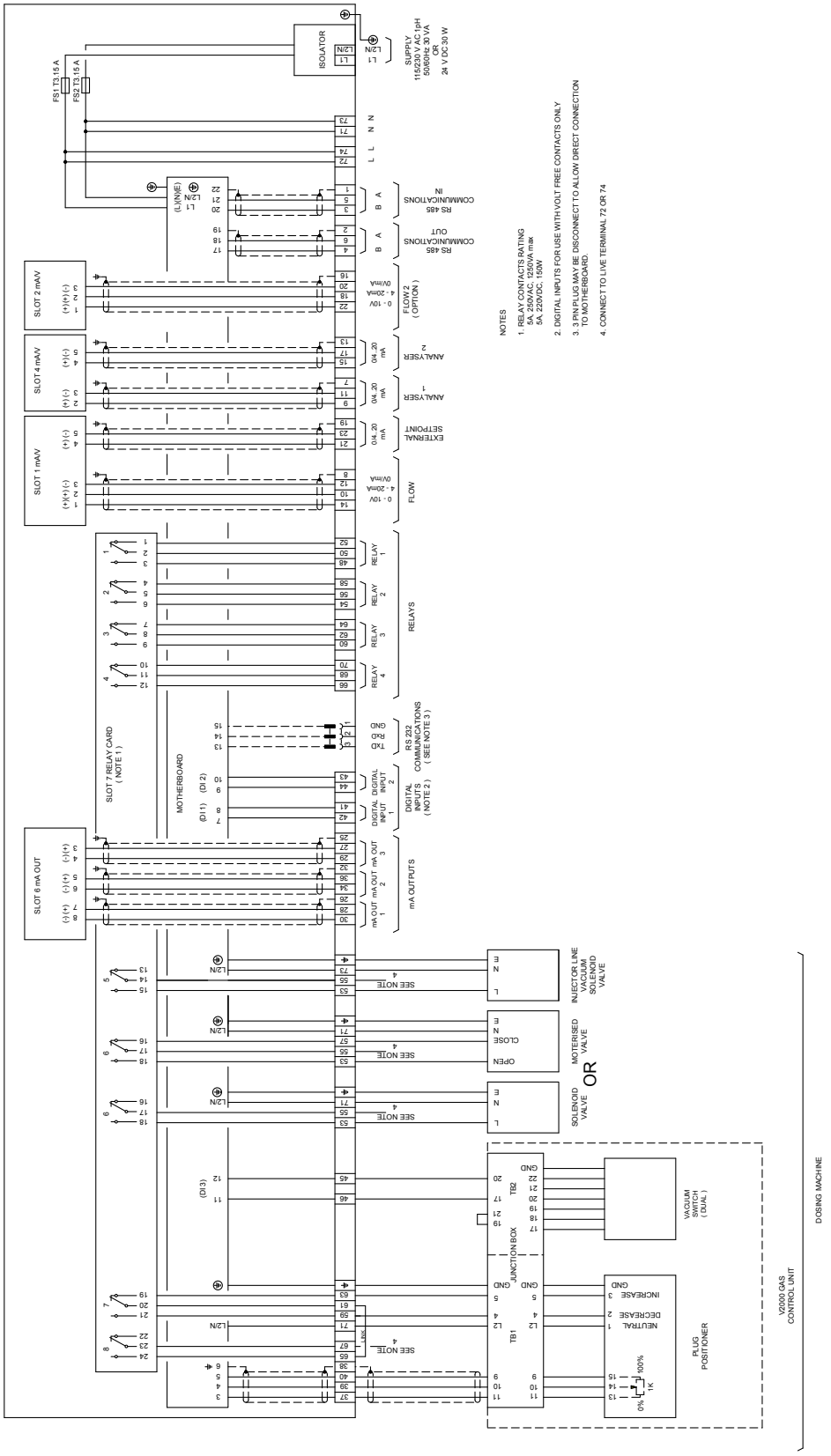


Fig. 5 External Connection Diagram - Chemtrim Controller - Steel Enclosure - V2000 Gas Control Units (XAC1210)

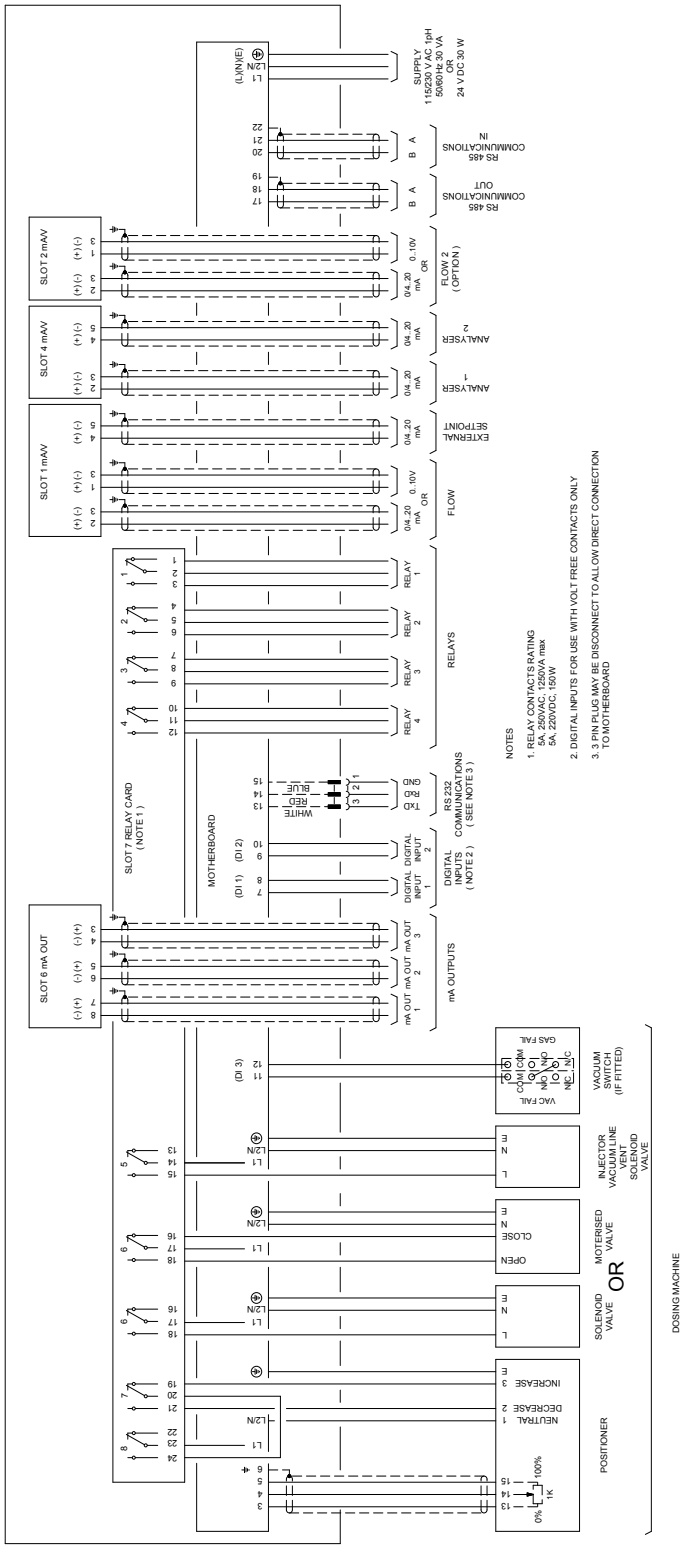


Fig. 6 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - V10k Positioners (XAC1195)

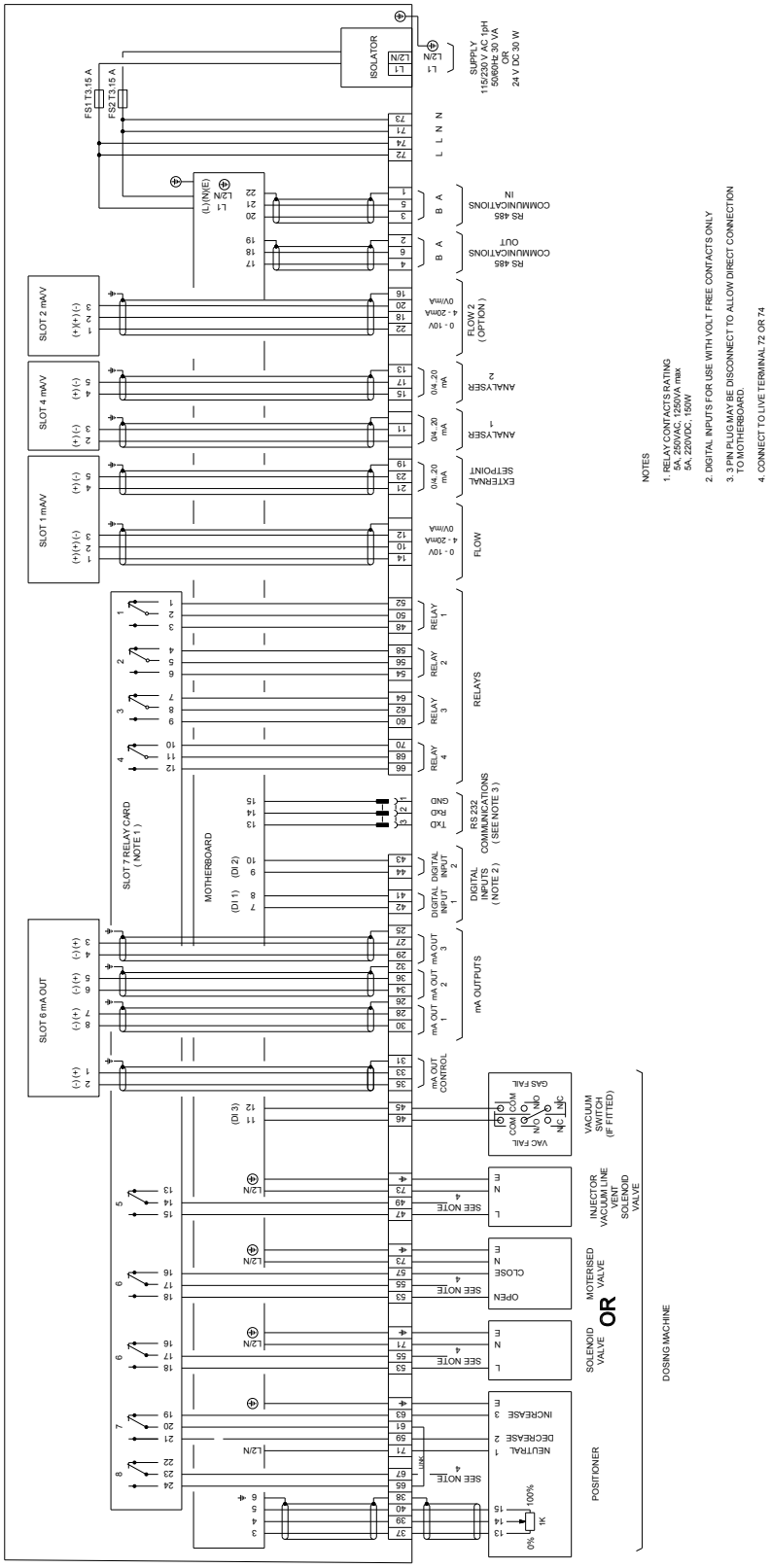


Fig. 7 External Connection Diagram - Chemtrim Controller - Steel Enclosure - V10k Positioners (XAC1184)

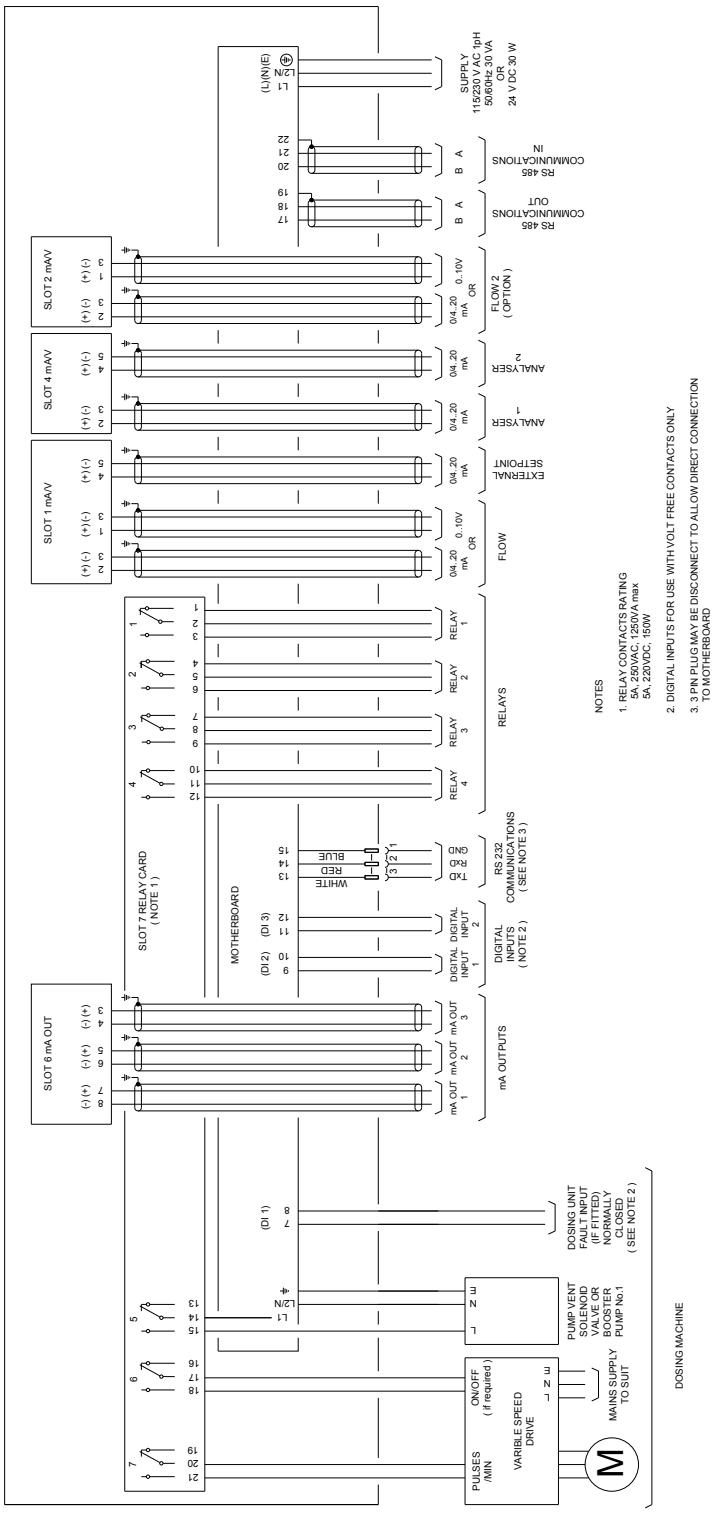


Fig. 8 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - Solenoid Pumps (XAC1196)

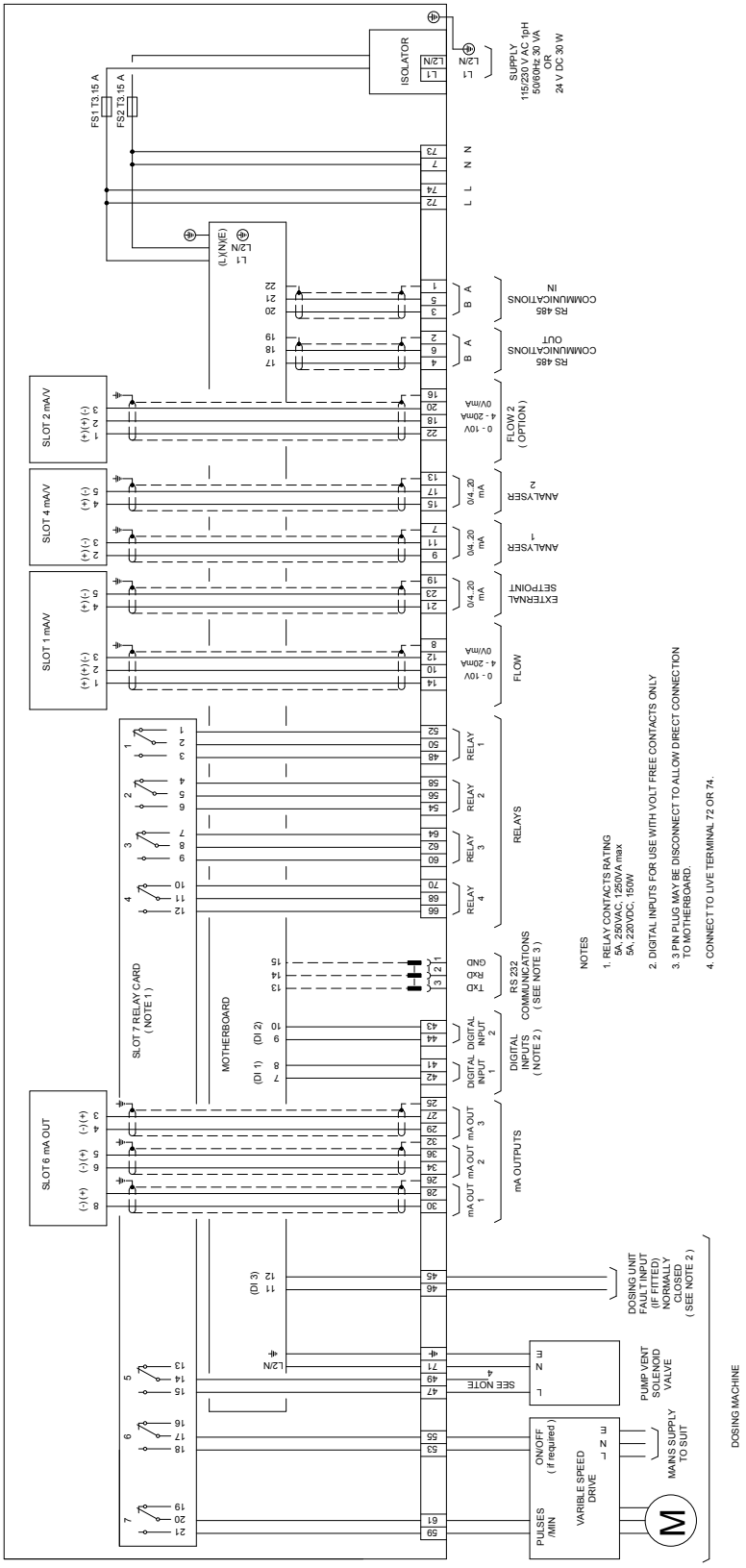


Fig. 9 External Connection Diagram - Chemtrim Controller - Steel Enclosure - Solenoid Pumps (XAC1185)

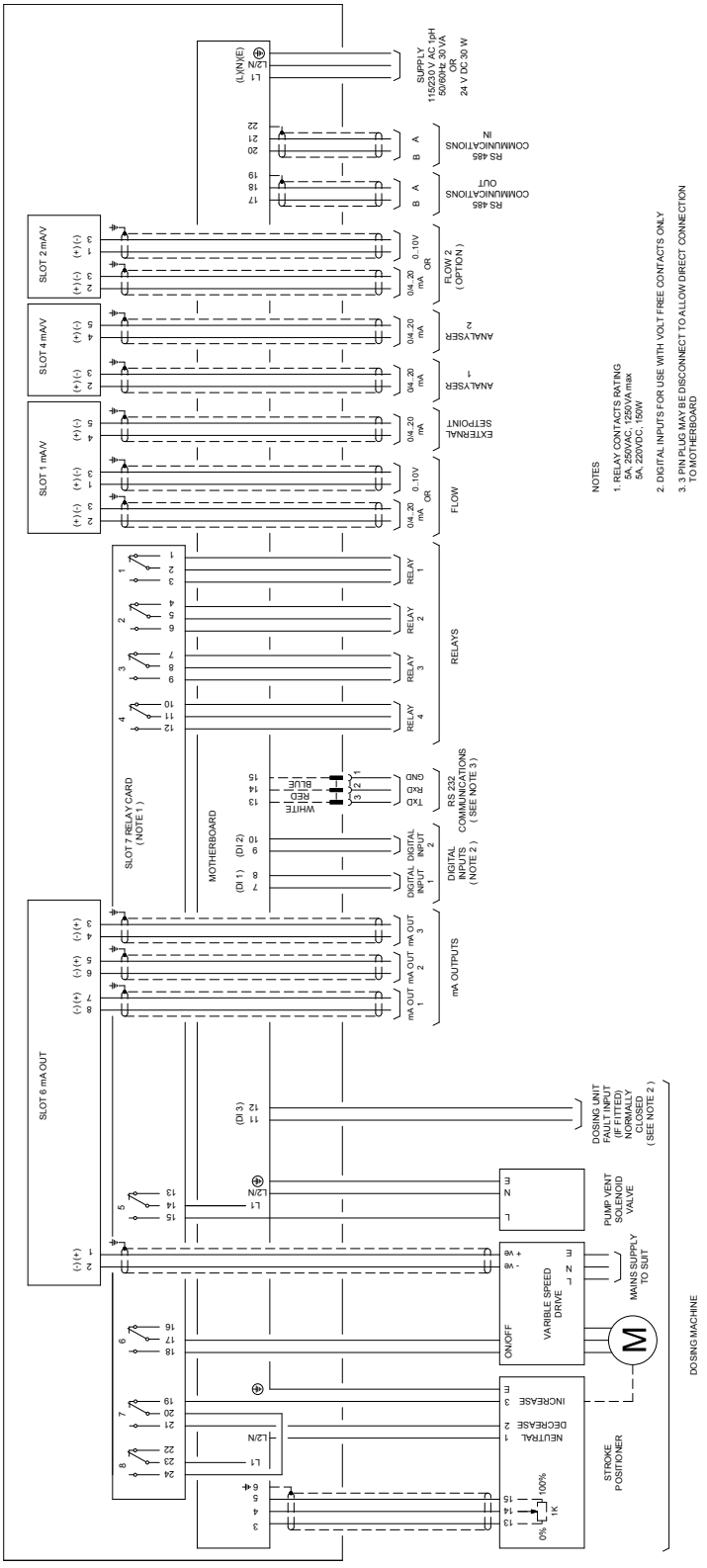


Fig. 10 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - Stroke Positioner and Variable Speed Control (mA out) (XAC1198)

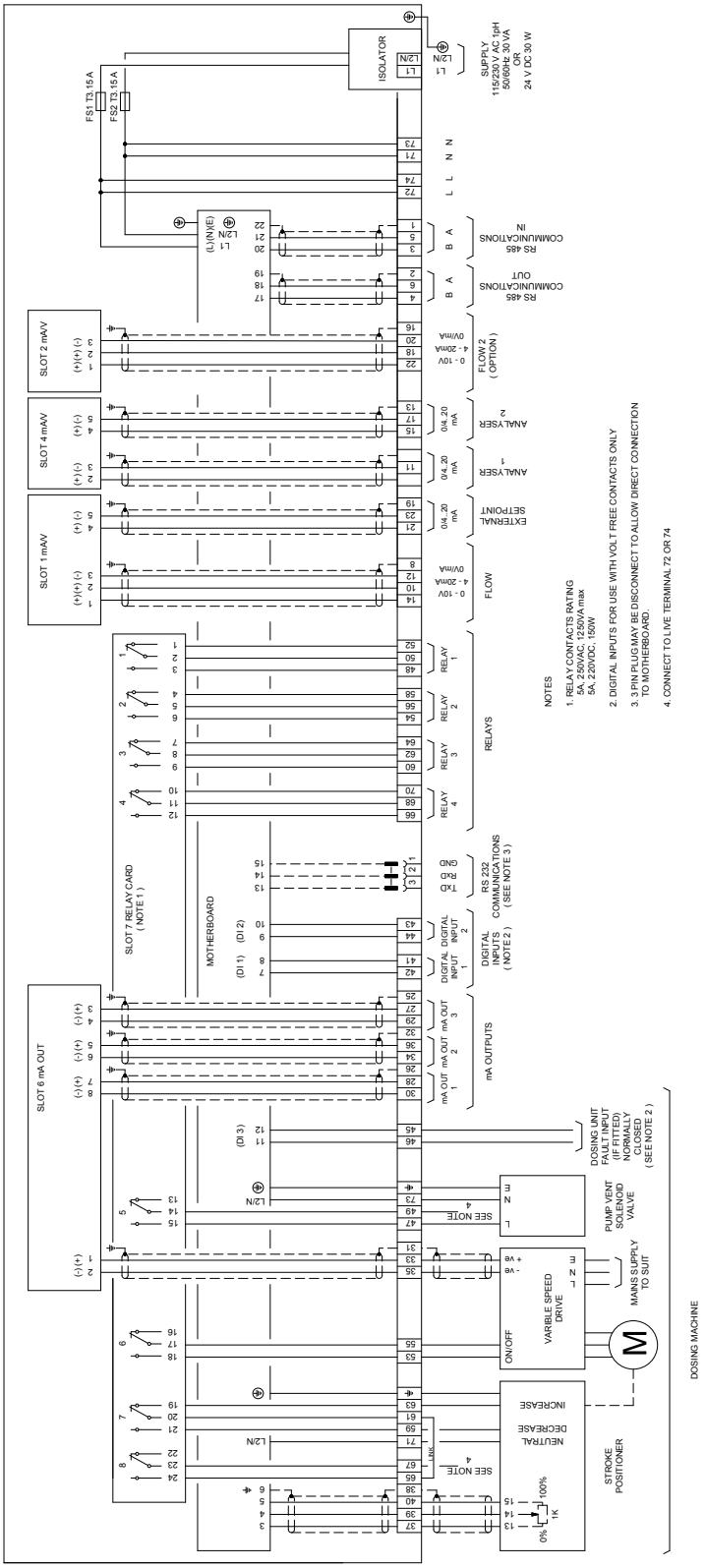


Fig. 11 External Connection Diagram - Chemtrim Controller - Steel Enclosure - Stroke Positioner and Variable Speed Control (mA out) (XAC1188)

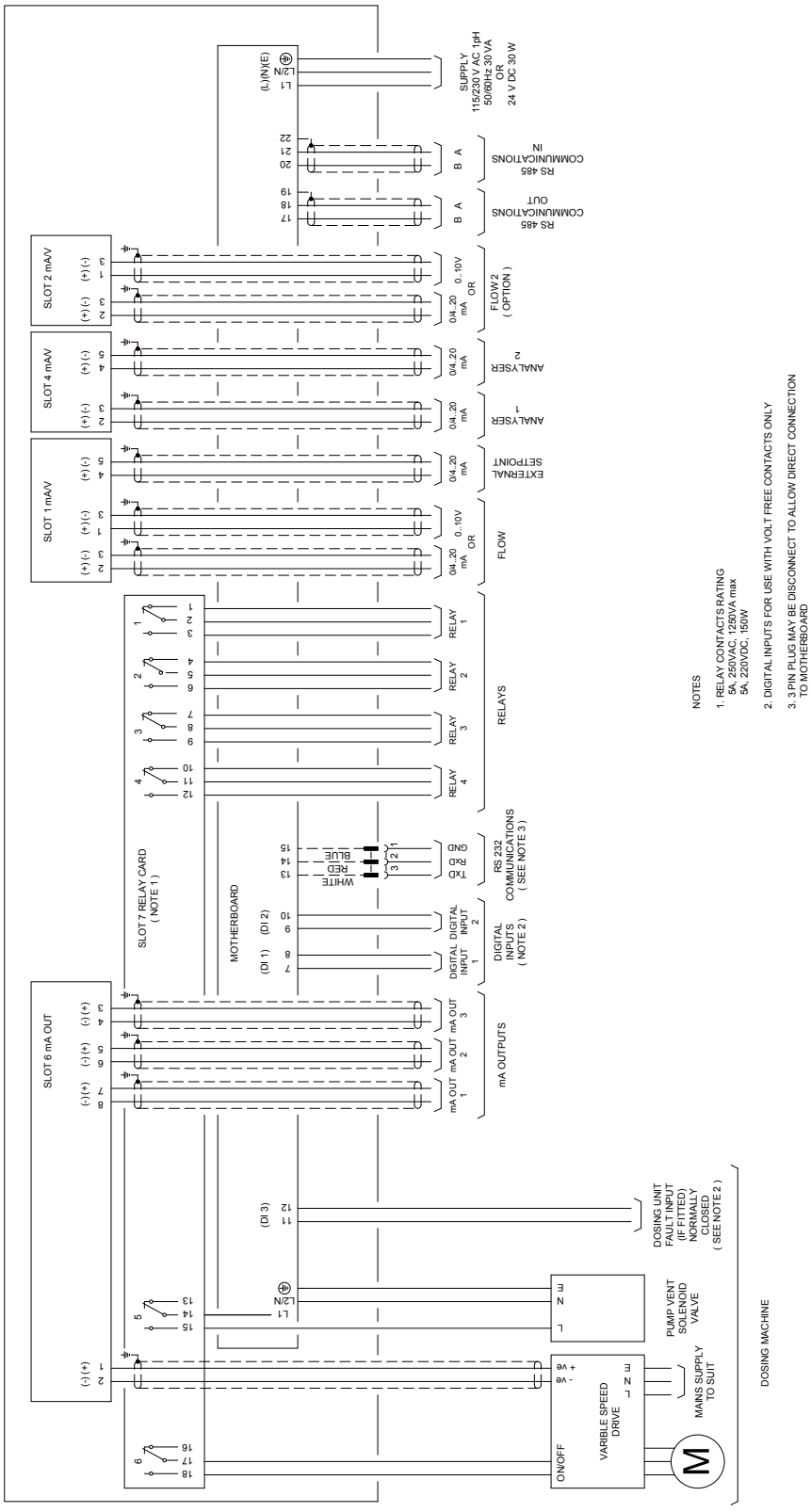


Fig. 12 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - Variable Speed Control (XAC1197)

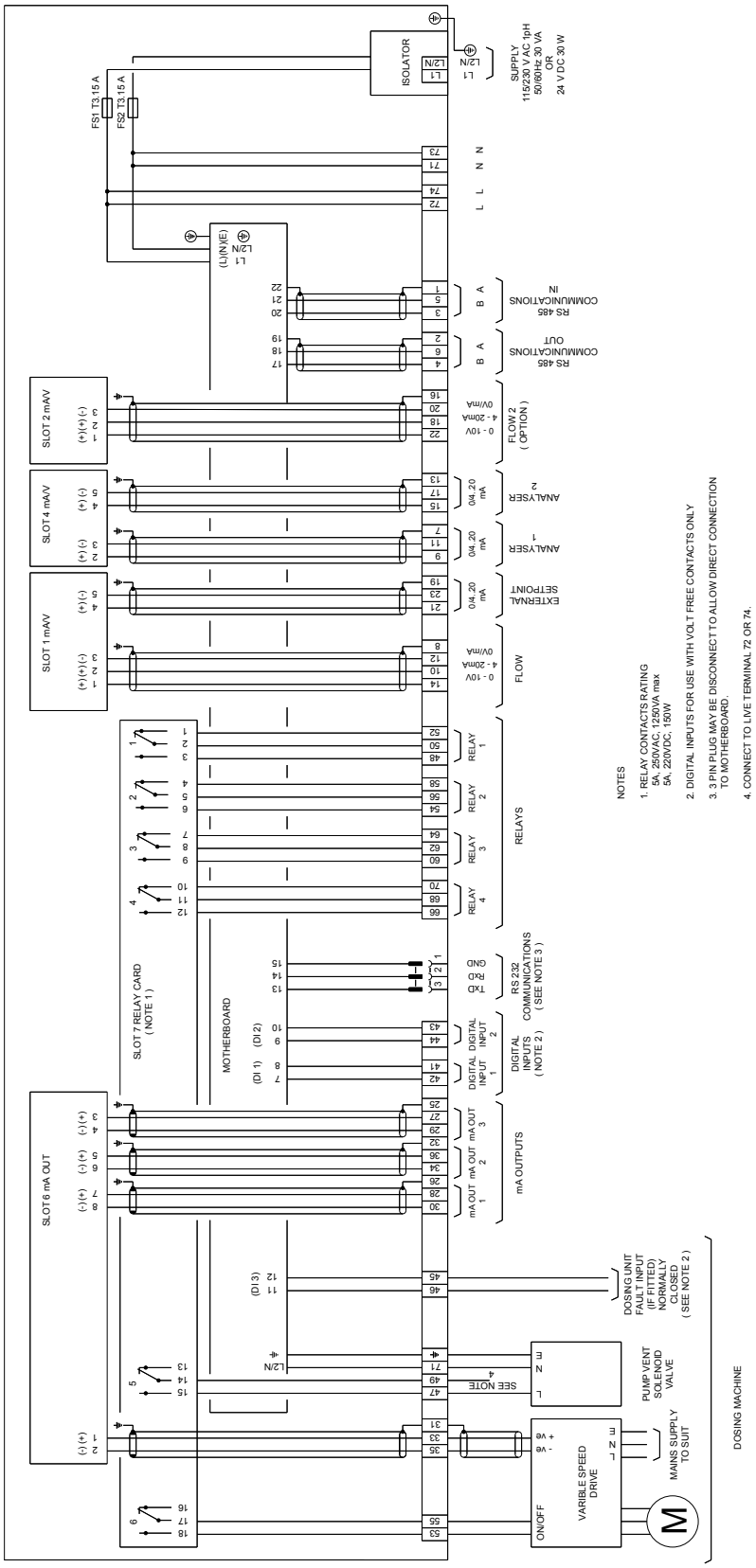


Fig. 13 External Connection Diagram - Chemtrim Controller - Steel Enclosure - Variable Speed Control (XAC1187)

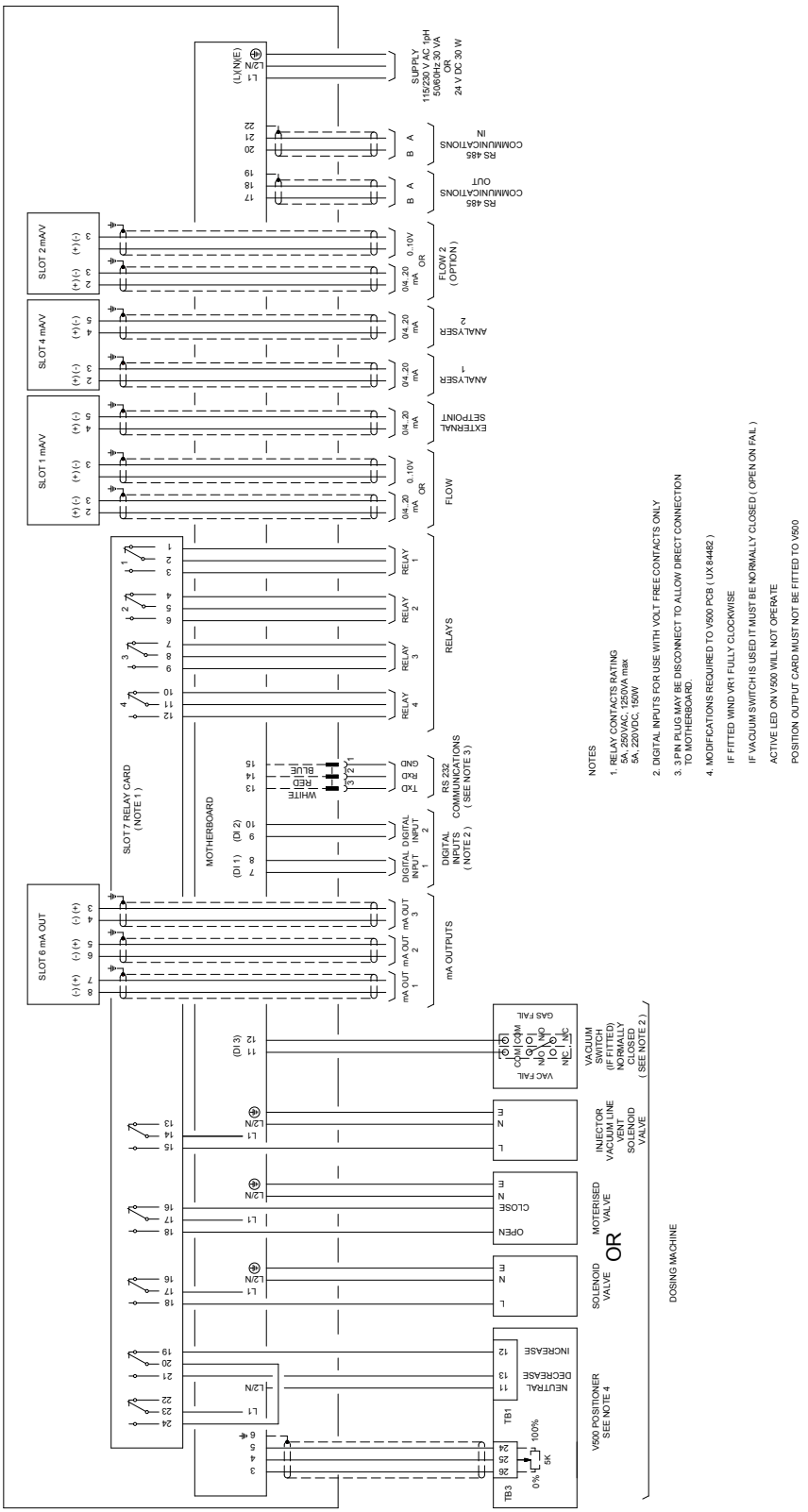


Fig. 14 External Connection Diagram - Chemtrim Controller - Plastic Enclosure - V500 Positioner (XAC1234)

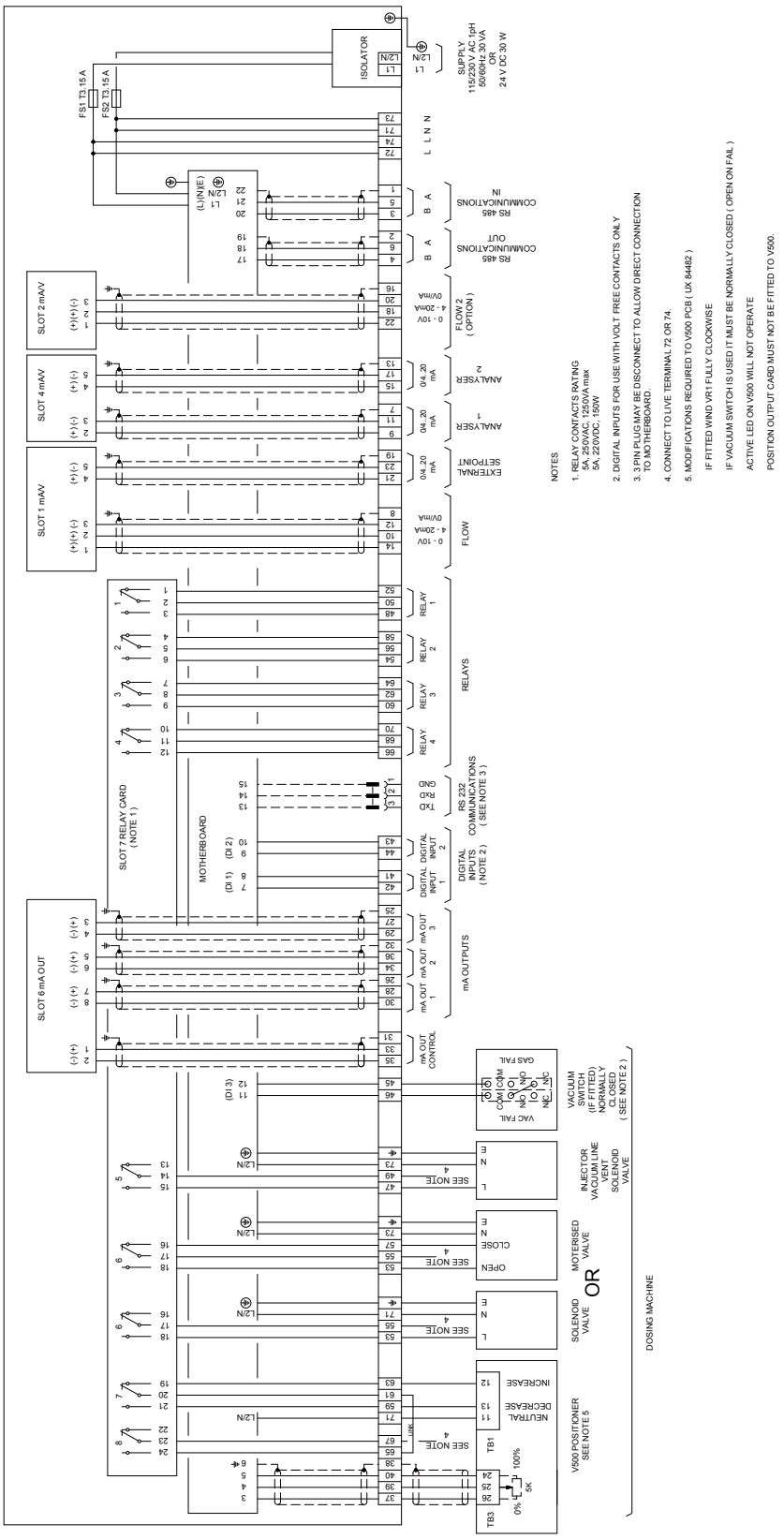


Fig. 15 External Connection Diagram - Chemtrim Controller - Steel Enclosure - V500 Positioner (XAC1233)

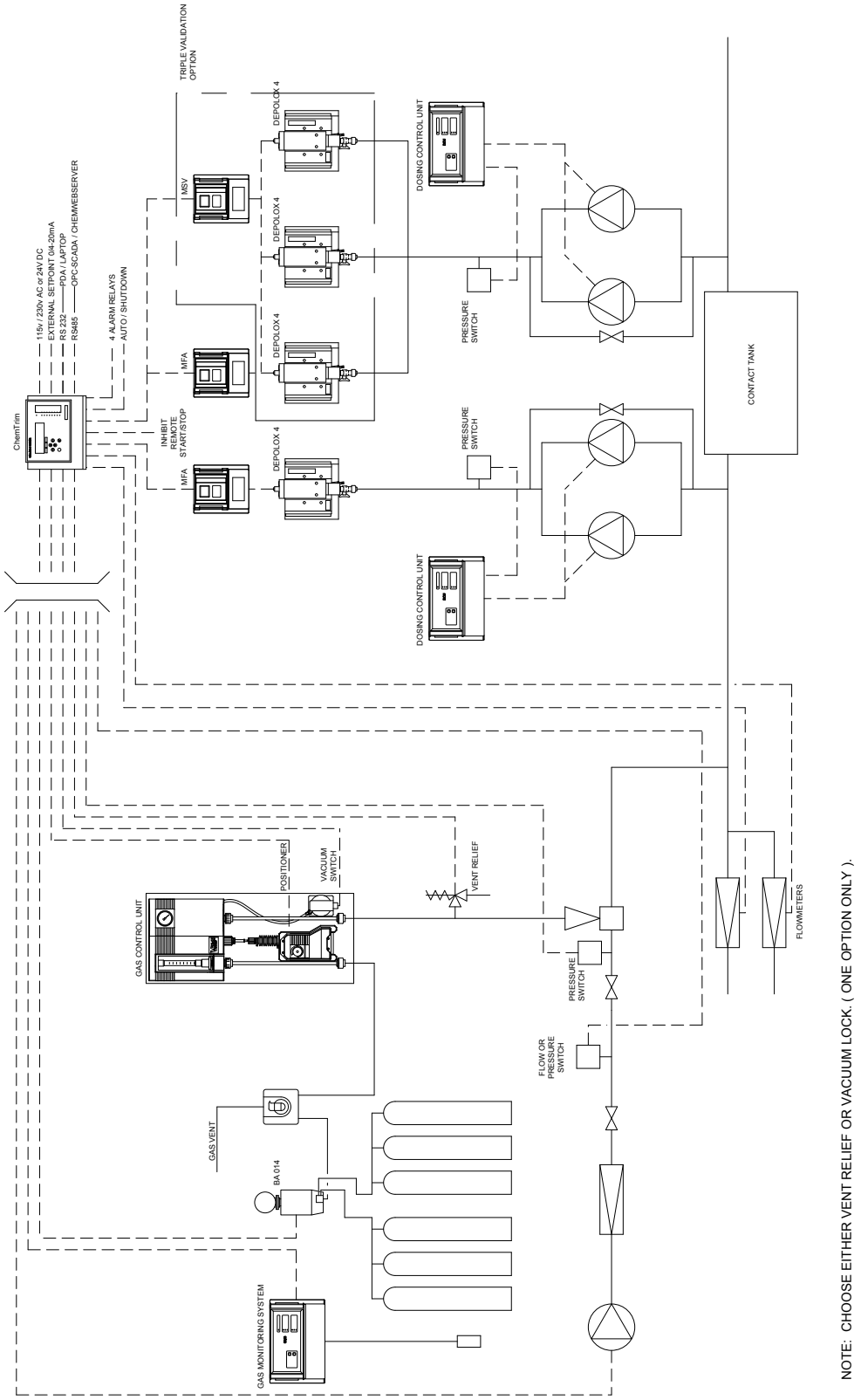


Fig. 16 Flow Diagram - Chemtrim Controller - Gas Control Units (XAC1232)

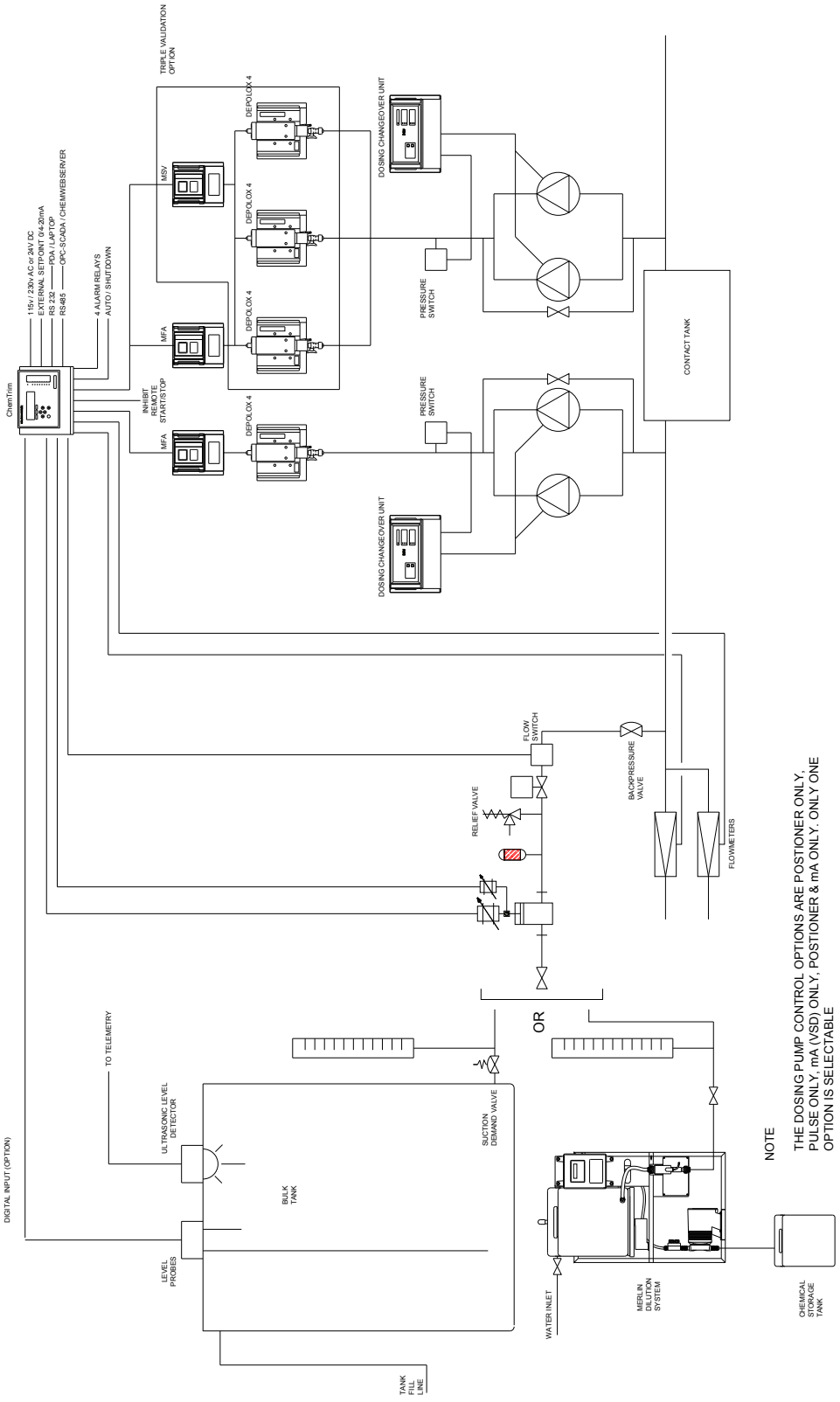
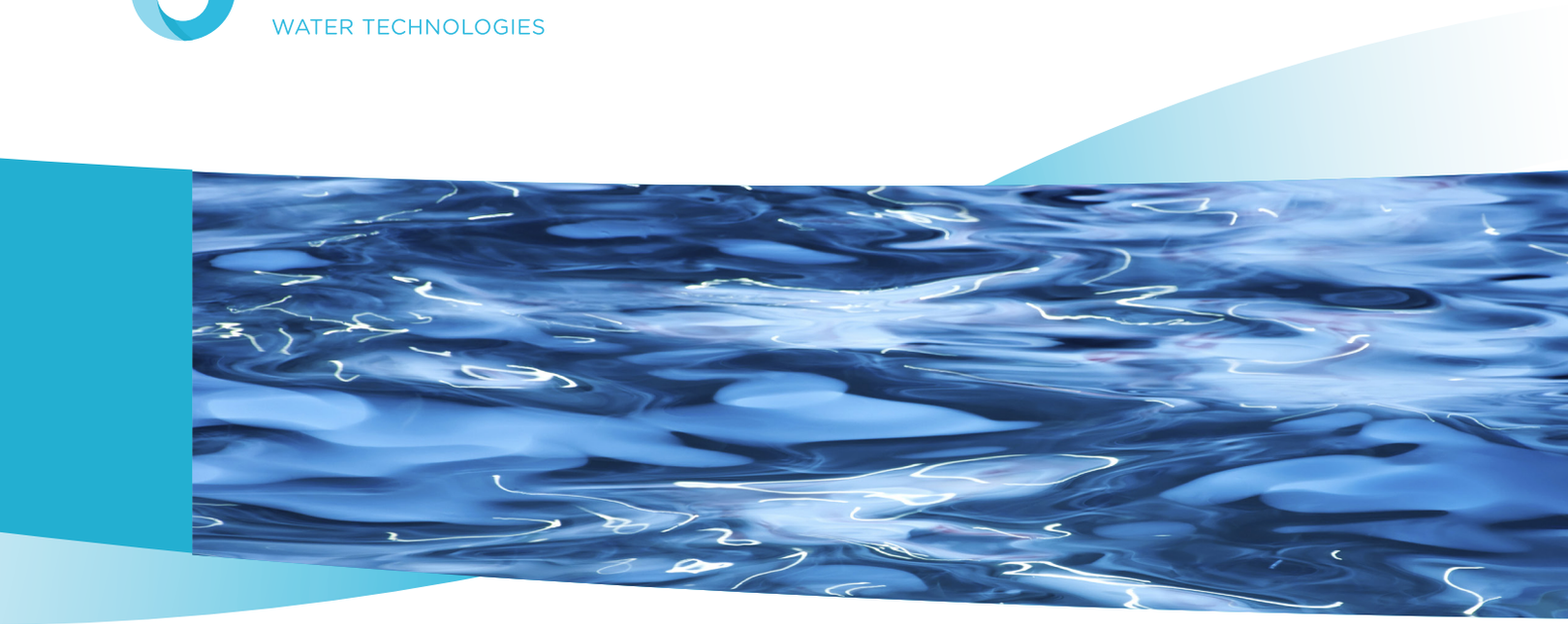


Fig. 17 Flow Diagram - Chemtrim Controller - Dosing Pumps - (XAC1238)



Evoqua Water Technologies Aftermarket Support and Service

INTRODUCTION

Every day, millions of people and thousands of companies rely on Evoqua Water Technologies to help them meet their needs for clean water.

As the leading global provider of chemical dosing, metering, disinfection, chlorination, filtration, deionisation and electrochlorination products, Evoqua Water Technologies provide systems and process technology for water treatment in the municipal, industrial and the leisure industries.

AFTERMARKET SUPPORT AND SERVICE

Meeting our customers needs is our highest priority. In addition to supplying the products you need, we also offer a full range of aftermarket support and service options. Our dedicated team of highly skilled engineers are committed to providing a first class service to our customers.

Getting the correct level of aftermarket support and service can ensure that your plant runs as efficiently as possible by preventing breakdowns and minimising plant downtime.

Our modular flexible approach ensures that our aftermarket support and service offering can be tailored to meet your exact requirements, our offering includes:-

- Technical Assistance
- 24 Hour Telephone Support
- Breakdown Cover
- Maintenance Contracts
- Planned & Preventative Maintenance Programs
- Call-Out Service
- Supply of Spare Parts and Critical Spares
- System Refurbishments & Upgrades

CO-ORDINATION

Evoqua Water Technologies dedicated Customer Service Department is co-ordinated from our Derby office.

Tel: - 0845 450 2882

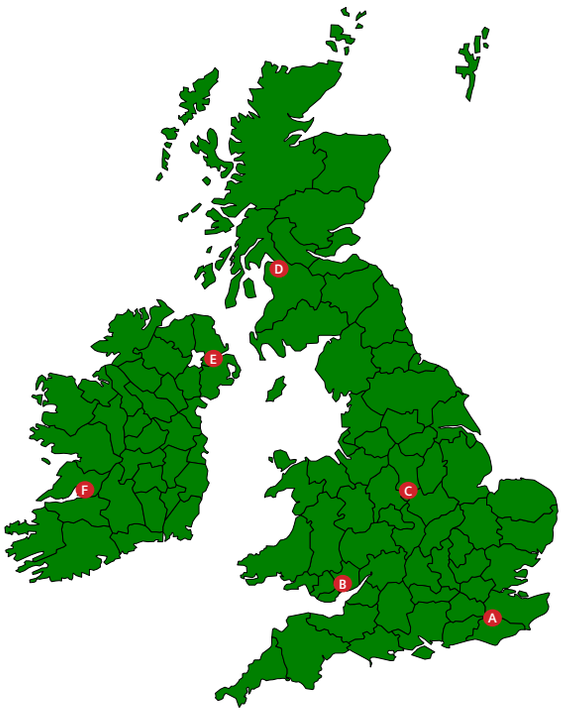
customerservice.uk@evoqua.com

COMMISSIONING

Following installation, our team of commissioning engineers are responsible for the safe handover of the equipment from ourselves to the new owner guaranteeing its operability in terms of performance, reliability and safety.

All our commissioning engineers undergo a comprehensive training programme on our products and the latest industry and health and safety standards.

In our team we have commissioning engineers who are trained to work in all industry sectors both on shore and offshore.



FULL COVERAGE UK & IRELAND

Over the years we have been able to grow our aftermarket support and service operation considerably. To ensure our customers get the very best support and shortest response times our engineers and support staff are strategically located across the country, to give us the very best coverage of the whole of the UK & Ireland.

A - Sevenoaks, Kent
B - Caldicot, Gwent
C - Little Eaton, Derbyshire
D - Kirkintilloch, East Dunbartonshire
E- Belfast, Northern Ireland
F - Limerick, Ireland

Did you know?

Evoqua Water Technologies has over 200 current service and maintenance contracts in mainland UK & Ireland and carry out over 2000 site vists per year

Did you know?

Our skilled engineers carry work in all industries including; life sciences, food & beverage and leisure

TRAINING

Evoqua Water Technologies understands the importance of training to our customers; receiving the correct training can ensure that you get the optimum performance out of our equipment and your plant.

Our team of qualified trainers can put together bespoke training solutions tailored to suit your needs. This could either be classroom based, or hands-on operator training, conducted onsite or at one of our locations around the country.

We have also found training creates stronger links with our customers and it gives us a better opportunity to understand each others requirements.

CONTACT

Evoqua Water Technologies have service centres all over the world. Please see the contacts table below to find a centre closest to you.

Country	Email	Telephone
Australia	info.au@evoqua.com	+61 (0) 3 8720 6597
Canada	canadainfo@evoqua.com	+1 905 944 2800
Germany	wtger@evoqua.com	+49 8221 9040
Singapore	infosg@evoqua.com	+65 6830 7100
USA	wtus@evoqua.com	+1 856 507 9000
UK	info.uk@evoqua.com	+44 0845 450 2882

EVOQUA WATER TECHNOLOGIES

One60 London Road, Sevenoaks, Kent, TN13 1BT, United Kingdom
Tel: +44 (0) 1732 771777 Email: info.uk@evoqua.com www.evoqua.com