Golden Coast

GC Crystal

Dosing Systems

The Crystal Chemical Dosing system is an equipment range and technical support package offering the latest in automated water treatment.

From specification, installation, commissioning and ease of use, Crystal offers you and your customers the clearest solution.

The Complete Package

Starting with a free on-site survey to specification, installation, commissioning and training, the team behind Crystal offer you a total package.

Using proportional control, Crystal systems have the flexibility to operate efficiently and effectively with bodies of water of all sizes including small pools.

We can also offer ERMES connectivity software allowing a system to be remotely controlled and monitored for both domestic and commercial installations.

Exactly tailored to suit your client's needs, Crystal automatic chemical dosing systems offer a safe and long lasting solution to automatic water treatment.

Crystal Dosing Systems

Crystal is appropriate to both pool refurbishments and new builds. A typical Crystal system is based on integrated peristaltic pumps and controllers.

Product information

Crystal Pro is an all in one solution offering pH and free chlorine monitoring. The twin channel controller offers a variety of outputs – ideal for connecting to remote or existing dosing pumps. On/off, proportional and PWM (simulated proportional using on/off pumps) operating modes. The wide LCD backlit display is good for easy viewing.

The closed amperometric chlorine probe offers accuracy and stability. An ion selective membrane cap reduces interference from other particles in the water. The pH probe assures long-time stability and accuracy. pH easy-maintenance probes provide accurate reading value and fast response, performances required for the most accurate measurements.

The off-line probe holder with integrated flow switch and regulator means the system automatically stops chemical addition in the event of no flow. The 127 mm water filter comes with a PET (60 µ) washable cartridge and 6x8 fittings.
Multiple user levels through password protection.
End users can be given their own password that allows single point calibration only whereas service engineers can use their own password to have full access.

Calibration and water sampling guidance is pre-printed on the panel for easy end user reference along with service and set point reminders.

Features

- “EASY-NAV” encoder wheel control.
- Flow control input.
- Local and remote controlled.
- ERMES web communication.
- Permanent data storage with system log.
- PT100 temperature probe.
- Stand-by input.
- Alarms: damaged probes, max dosage, threshold, levels and flow.
- Programmable delay at dosing start-up (up to 60 minutes).
- Priority dosage.
- Probe readout menu.
- Probes check up.
- Multiple probe readings can be viewed.
- Working modes: on/off, impulsive proportional, proportional PWM and fixed PWM.
- Automatic or manual dosing activity.

Crystal Pro

pH and free chlorine monitoring panel.

1. Twin channel controller with a variety of outputs - ideal for connecting to remote or existing dosing pumps. On/off, proportional and PWM (simulated proportional using on/off pumps) operating modes.
2. Water filter for 6x8 hose fitting with a PET (60 µ) washable cartridge.
3. pH probe for pressures up to 7 bar/70 °C. Complete with 0.8 m cable and epoxy body.
4. Closed amperometric chlorine probe for accuracy and stability. An ion selective membrane cap reduces interference from other particles in the water.
5. Temperature probe (0 °C ÷ 100 °C, maximum 10 bar).
6. Probe block with integrated flow switch – the system automatically stops chemical addition in the event of no flow.

Multiple user levels through password protection. End users can be given their own password that allows single point calibration only whereas service engineers can use their own password to have full access.

Calibration and water sampling guidance pre-printed on the panel for easy end user reference along with service and set point reminders.

Available with ERMES remote connectivity packages.

Panel size

600 x 650 mm

Code

21 18 679 260

Crystal PPM

pH and free chlorine.

1. Twin channel controller with integrated peristaltic pumps giving proportional pH and sanitiser addition.
2. Water filter for 6x8 hose fitting with a PET (60 µ) washable cartridge.
3. pH probe for pressures up to 7 bar/70 °C.
4. Closed amperometric chlorine probe for accuracy and stability – an ion selective membrane cap reduces interference from other particulates in the water.
5. Probe block with integrated flow switch – the system automatically stops chemical addition in the event of no flow.

Calibration and water sampling guidance pre-printed on the panel for easy end user reference along with service and set point reminders.

Available with ERMES remote connectivity packages.

Panel size

600 x 650 mm

Code

21 18 679 160

Crystal MVF

pH or Redox (ORP) monitoring and control.

1. Twin channel controller with integrated peristaltic pump for proportional pH addition plus socket for feeder output for on/off sanitiser addition.
2. Water filter for 6x8 hose fitting with a PET (60 µ) washable cartridge.
3. Redox/Oxidation Reduction Potential (ORP) electrode shows the activity of the sanitiser within the water. Pressures up to 7 bar/70 °C. Complete with 0.8 m cable and epoxy body.
4. pH probe for pressures up to 7 bar/70 °C. Complete with 0.8 m cable and epoxy body.
5. Probe block with integrated flow switch – the system automatically stops chemical addition in the event of no flow.

Calibration (pH) and water sampling guidance pre-printed on the panel for easy end user reference along with service and set point reminders.

Available with ERMES connectivity.

Panel size

600 x 650 mm

Code

21 18 679 060

Crystal Dosing Systems Comparison

		 Crystal Pro	 Crystal PPM	 Crystal MVF
pH & free chlorine monitoring		✓	✓	×
pH monitoring active oxygen		×	×	×
pH & redox (ORP) monitoring		×	×	✓
Twin channel controller		✓	✓	✓
Integrated solenoid dosing pumps		×	×	×
Integrated peristaltic pumps		×	✓	✓
Independent dosing pumps		×	×	×
Socket for feeder output		×	×	✓
Proportional pH correction		✓	✓	✓
Proportional pH & sanitiser addition		✓	✓	✓
Timer based active oxygen		×	×	×
Closed amperometric chlorine probe		✓	✓	×
Redox (ORP) probe		×	×	✓
pH probe		✓	✓	✓
Probe block with integrated flow switch		✓	✓	✓
Multiple user levels through password protection		✓	×	×
Non-layered password protection		×	✓	✓
Low maintenance dosing pumps		×	×	×
Water filter		✓	✓	✓
Temperature probe		✓	×	×
Stand by input		✓	✓	✓
Probe alarm		✓	✓	✓
Maximum dosing time alarm		✓	✓	✓
Threshold alarm		✓	×	×
Level alarm		✓	✓	✓
Flow alarm		✓	✓	✓
Programmable delay at dosing start-up		✓	✓	✓
Service menu for real time reading		✓	✓	✓
Real time internal clock		✓	✓	✓
Working mode:	On/Off	✓	✓	✓
	Impulsive proportional	✓	×	×
	Proportional PWM	✓	✓	✓
	Fixed PWM	✓	×	×
Automatic or manual dosing activity		✓	✓	✓
Wide and LCD backlit display		✓	✓	✓
LED display		×	×	×
2 metering pumps with PVDF pump heads		×	×	×
Flow control input		×	×	×
“EASY NAV” wheel		✓	✓	✓
Proportional pump driven by internal built-in pH meter		×	×	×
Proportional pump driven by internal built-in ORP meter		×	×	×
ERMES connectivity		✓	✓	✓

Crystal Pro Dosing Pumps

In addition to the Crystal Pro dosing system, we have our pro range of dosing pumps. There is a choice of 4 different models, to suit your requirements.

DFX75PVDF

Constant pump with stroke speed (frequency) adjustment and stroke length adjustment.

- Flow rate: 5 L/hr @ 7 bar.
- PVDF/PTFE/FPM wetted parts.
- Stroke frequency adjustment 0–100%.
- Stroke length adjustment 0–100%.
- 230 V AC.

Code

21 18 678 600

DFX218PVDF

Constant pump with level control, stroke speed (frequency) adjustment and stroke length adjustment.

- Flow rate: 18 L/hr @ 2 bar.
- PVDF/PTFE/FPM wetted parts.
- Stroke frequency adjustment 0–100%.
- Stroke length adjustment 0–100%.
- Features low level control.
- 230 V AC.

Code

21 18 678 610

DFX+75PVDF

Proportional pump driven by external digital signal, to each external pulse corresponds one pump stroke with level control.

- Flow rate: 5 L/hr @ 7 bar.
- PVDF/PTFE/FPM wetted parts.
- Pulse proportional stroke frequency.
- Stroke length adjustment 0–100%.
- Features low level control.
- 230 V AC.

Code

21 18 678 620

DFX+218PVDF

Constant-proportional pump driven by external digital signal, to each external pulse corresponds one pump stroke with level control.

- Flow rate: 18 L/hr @ 2 bar.
- PVDF/PTFE/FPM wetted parts.
- Pulse proportional stroke frequency.
- Stroke length adjustment 0–100%.
- Features low level control.
- 230 V AC.

Code

21 18 678 630

Crystal Dosing Pumps

We have a range of dosing pumps. There is a choice of 3 different models, to suit your requirements

DWX55PP and DW55XPVDF

These are all wall mounted dosing pumps, with manual adjustment options.These pumps all have on/off proportional control, manual stroke frequency adjustment and a 230V AC power supply.

Code

21 18 678 500

21 18 678 510

DFXFLOC

This is a wall mounted dosing pump, specially for flocculant/poly aluminium chloride (PAC), with microprocessor technology. It offers a constant pump with level control, stroke speed (frequency) adjustment, and a divider mode to reduce 10 times the pump capacity. Double measurement scale (24hr): 0–300 gr/day or 0–3000 gr/day.

Code

21 18 678 700

PRXVA

A peristaltic pump with flow rate injection, constructed from a PP body reinforced with 30% talc, with a polycarbonate front panel. Includes santroprene wetted parts and offers stroke frequency adjustment 0-100%.

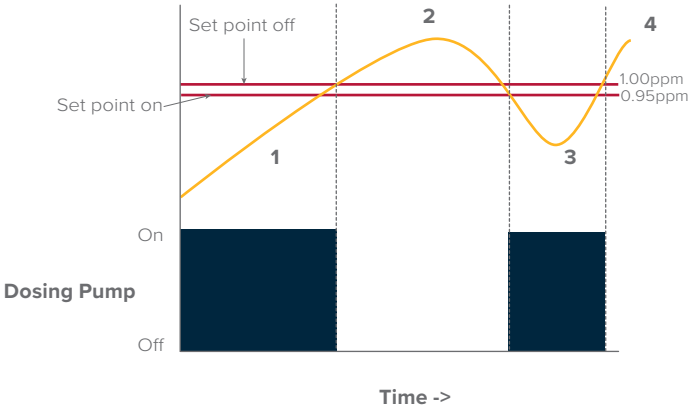
Code

21 18 678 733

Crystal Dosing Pumps Control Options

On/Off

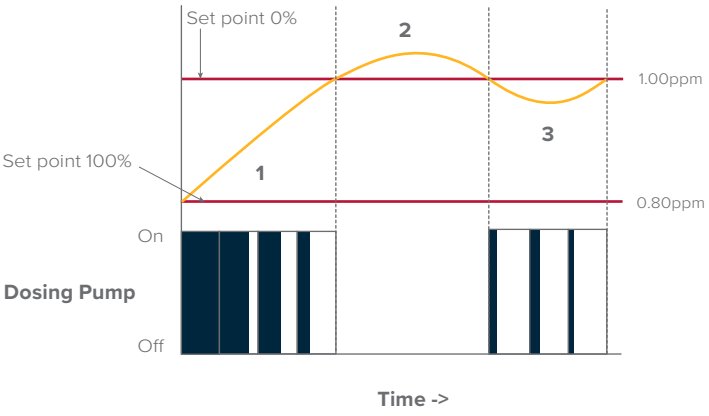
Once a parameter reading has dropped below the on set point, the controller powers the dosing pump until the off set point is reached. On/off dosing is prone to over and under dosing based on the lag time of the system e.g. if a system takes 30 minutes to register the level change, potentially the pump can be dosing at maximum speed for 30 minutes before this is realised.



1. Dosing pump is running to increase level.
2. Pump stops once set point is reached however, due to system lag time, the level continues to rise (overdose).
3. Pump again is powered but level continues to drop due to system lag until pump catches up.
4. Pump stops again once off set point is reached and the level will continue to rise as before due to system lag.

On/Off Proportional

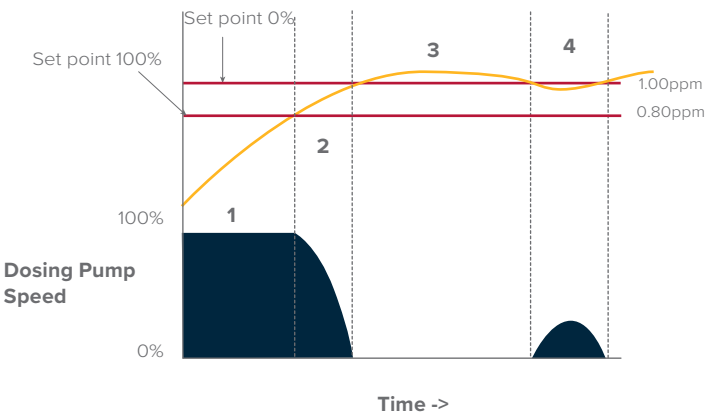
Mechanically similar to on/off dosing however elements of proportional dosing are employed. The pump still runs at 100% capacity although the amount of run time is varied proportionally. This 'run time' is expressed as a percentage over 100 seconds e.g. 80% = pump running 80 seconds out of 100. With on/off proportional dosing, the run time is reduced as the set point nears. e.g. near to set point = 10% = 10 seconds run out of 100.



1. First run of pump is 100% (i.e. 100 seconds of 100 seconds). After this period, the controller can see that the level is starting to drift towards the set point. The second pump run is, for example 80%. If, after 100 seconds, the level is still drifting towards set point, the pump run will continue to reduce proportionally.
2. Pump stops at set point 0%. The system lag effect is similar to on/off dosing but not to the same extent.
3. As the level drifts away from set point, the pump run starts low (e.g. 10%). As the level continues to drift away, the pump run is increased proportionally. As the reading drifts back to setpoint, the pump run is again reduced proportionally.

Proportional

As the parameter reading drifts away from the set point, the dosing pump speed incrementally increases i.e. the further from the set point, the higher the pump stroke frequency. Similarly, as the reading nears the set point, the dosing pump speed proportionally decreases. Where possible, we would recommend that chemical dosing is proportional.



1. Dosing pump starts running at 100% to increase the level.
2. As the level passes set point 100% and drifts towards the set point 0%, the pump gradually (proportionally) reduces its speed.
3. Pump stops when set point 0% is reached, but due to system lag time the level continues to rise as before.
4. Pump begins to run at a slow speed as the level drifts below set point 0%. The pump speed increases as the reading drifts further from set point 0%. Once reading begins to drift back to set point, the pump begins to reduce speed proportionally.

Crystal Dosing Pumps Comparison

	 DWX55PP	 DWX55PVDF	 DFXFLOC
Peristaltic pump	×	×	×
Wall mounted	✓	✓	✓
Foot mounted	×	×	×
Flow rate	5 L/hr @ 5 bar	5 L/hr @ 5 bar	
PP/PTFE/FPM	✓	×	×
PVDF/PTFE/FPM	×	✓	✓
PMMA/PTFE/FPM	×	×	×
Santoprene	×	×	×
Stroke frequency adjustment: 0–100%	✓	✓	×
Stroke length adjustment: 0–100%	×	×	×
Timed addition	×	×	✓
Low level control	×	×	✓
Manual venting	✓	✓	✓
On/off proportional control	✓	✓	×
Internal pre-set	×	×	✓
Pulse proportional stroke frequency: 0–100%	×	×	×
Power supply	230 V AC	230 V AC	230 V AC
Dimensions (H x W x D)	168 x 63 x 160 mm	168 x 63 x 160 mm	210 x 107 x 125 mm
Weight	2.2 kg	2.2 kg	2.2 kg
Code	21 18 678 500	21 18 678 510	21 18 678 700

Solenoid driven metering pumps are widely used to dose chemical fluids and it is important that the most suitable material in contact with fluid is selected for each application. This compatibility table serves as a useful help in this respect.

The resistance of any material depends on several factors so this list is supplied only as an initial guide.

Resistance rating

Resistant: 1
Fairly resistant: 2
Not resistant: 3

Crystal Dosing Pumps Comparison

	 PRXVA	 DFX75PVDF	 DFX218PVDF	 DFX+ 75PVDF	 DFX+ 218PVDF
Peristaltic pump	✓	×	×	×	×
Wall mounted	✓	×	×	×	×
Foot mounted	×	✓	✓	✓	✓
Flow rate	Various	5 L/hr @ 7 bar	18 L/hr @ 2 bar	5 L/hr @ 7 bar	18 L/hr @ 2 bar
PP/PTFE/FPM	×	×	×	×	×
PVDF/PTFE/FPM	×	✓	✓	✓	✓
PMMA/PTFE/FPM	×	×	×	×	×
Santoprene	✓	×	×	×	×
Stroke frequency adjustment: 0–100%	✓	✓	✓	×	×
Stroke length adjustment: 0–100%	×	✓	✓	✓	✓
Timed addition	×	×	✓	×	×
Low level control	×	×	✓	✓	✓
Manual venting	×	✓	✓	✓	✓
On/off proportional control	✓	✓	✓	✓	✓
Internal pre-set	×	×	×	×	×
Pulse proportional stroke frequency: 0–100%	×	×	×	✓	✓
Power supply	230 V AC	230 V AC	230 V AC	230 V AC	230 V AC
Dimensions (H x W x D)	125 x 85 x 88 mm	150 x 91 x 223 mm	157 x 91 x 225 mm	150 x 91 x 223 mm	157 x 91 x 225 mm
Weight	0.5 kg	4.1 kg	4.1 kg	4.1 kg	4.1 kg
Code	21 18 678 733	21 18 678 600	21 18 678 610	21 18 678 620	21 18 678 630

		PVDF	PP	PVC	PMMA	PTFE	FPM	PE	
Hydrochloric Acid, concentrate	1	1	1	1	1	1	1	1	1
Sulphuric Acid, 85%	1	1	1	1	3	1	1	1	2
Sodium Bisulphite	1	1	1	1	1	1	1	1	1
Sodium Hydroxide (Caustic Soda)	2	3	1	1	1	1	2	1	1
Calcium Hypochlor (Chlor ted Lime)	1	1	1	1	1	1	1	1	1
Sodium Hypochlorite, 12.5%	1	1	2	1	1	1	1	3	1
Hydrogen Peroxide, 30% (Perydrol)	1	1	1	1	3	1	1	1	1

Crystal Floc Dosing Set

A complete FLOC or PAC dosing solution. Ideally suited for chemicals supplied in 25 L carboys reducing chemical handling by the end user.

Product information

FLOC (flocculant) is a liquid that is metered into a pool improving the filter efficiency and, in turn, the water quality. FLOC works by bonding together small particles in the water making them much larger and easier to trap in the filtration system.

When using floc we would recommend that it is:

- As far away as possible from other dosing equipment.
- Away from all sources of chlorine to reduce the risk of chlorine gas generation.
- Injected as far upstream of the filter as possible.

Also:

- Acid/chlorine injection points should be located POST filter.
- FLOC cannot be used with Diatomaceous Earth or high rate sand filters.

Calculating the addition rate

We offer a specific dosing pump for dosing FLOC – the DFXFLOC.

The correct amount of FLOC to be dosed will vary based on the size of the pool.

Generally speaking, the following formulae can be used to calculate the addition rate of FLOC:

Minimum dose rate (gr/24 hr) = Filter flow rate (m^3/hr) x 5.8*
E.g. 100 m^3/hr flow = 100 x 5.8 = 580 gr/24hr.

* Value of 5.8 assumes the following: Minimum FLOC addition rate of 0.3 ml/m^3/hr - FLOC S.G. of 1.2.

How Floc works

Without FLOC

The smaller particles are too small for the filter media to trap and so they freely circulate through the system. Larger particles are trapped as normal.

With FLOC

The smaller particles are bound together. This forms much larger particles which can easily trapped by the sand filter for later removal as part of the backwashing process.

Code

FLOC Dosing System	21 18 679 020
pH Only Dosing System	21 18 679 025

Dosing Accessories

We have a large range of accessories to suit your requirements.

Chlorine Probe

Closed amperometric probe.

Code

21 18 680 050

pH Probe

pH electrode.

Code

21 18 680 060

Redox Probe

ORP electrode.

Code

21 18 680 065

Probe Cleaner Fluid

Enables the correct routine maintenance of the probes.

100 ml:

71 29 639 010

230 ml

71 29 639 023

Buffer Solutions

Buffer solutions for probe calibration.

pH 4 – 55 ml

21 18 680 104

pH 7 – 55 ml

21 18 680 107

pH 9 – 55 ml

21 18 680 109

650 mV – 55 ml

21 18 680 111

Tubing

PVC – 4 mm ID x 6 mm OD – 30 m coil
21 18 680 203

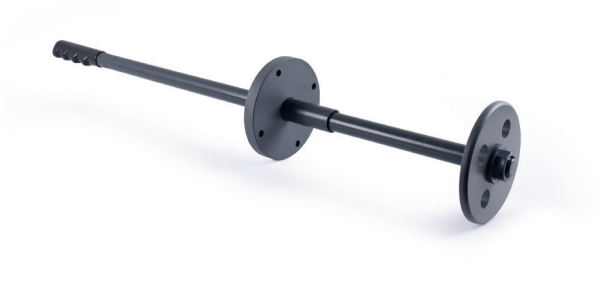
PE – 4 mm ID x 6 mm OD – 30 m coil
21 18 680 213

PE – 6 mm ID x 8 mm OD – 30m coil
21 18 680 243

PVDF – 4 mm ID x 6 mm OD – 10 m coil
21 18 680 221

PVDF – 4 mm ID x 6 mm OD – 30 m coil
21 18 680 223

HDPE – 10 mm ID x 14 mm OD – 50 m coil
21 18 680 275



Manual Mixer

600 mm shaft, 130 mm impeller. Plunger type manual mixer constructed from PVC.

Code
21 18 687 000

Electric Mixer – High Speed

Electric mixer with PVC coated steel shafts and PVC impellers. 1400 rpm rotation speed along with a 230 V AC single phase 50 Hz motor.

630 mm shaft, 70 mm impeller
21 18 687 070

830 mm shaft, 70 mm impeller
21 18 687 075

Electric Mixer – Slow Speed

Electric mixer with PVC coated steel shafts and PVC impellers. 65 rpm or 200 rpm rotation speed (select at order) along with a 230 V AC single phase 50 Hz motor.

630 mm shaft, 150 mm impeller
21 18 687 150

830 mm shaft, 150 mm impeller
21 18 687 155

Economy Injector

- ⅜" BSPM & 4x6 hose connections.
- PP/FPM wetted parts.
- Band type injection valve.

Code

71 18 680 140

Standard Injector

- ½" BSPM & 4x6 hose connections.
- PVDF/FPM/Ceramic wetted parts.
- Ball and spring type injection valve.
- Supplied as standard with most dosing pumps.

Code

71 18 680 150

Double Junction Injector

- ½" BSPM & 4x6 hose connections.
- PVDF/FPM/Ceramic wetted parts.
- Ball and spring plus band type injection valve (double junction).

Code

71 18 680 160

Withdrawable Injector with Ball Valve

- ½" BSPM & 4x6 hose connections.
- PVDF/FPM/Ceramic wetted parts.
- Ball and spring type withdrawable injection valve.
- Injection supplied with PVC isolation valve.

Code

71 18 680 170

BSP Solenoid Valves

- Must be installed upstream of dosing feeder.
- Maximum solution strength 10 mg/L.

¼"

71 00 666 002

½"

71 00 666 005

Suction Lance with Level Control

Available in different shaft lengths to suit holding tanks.

460 mm, 4x6 Connections

21 18 680 340

Carboy – 630 mm, 4x6 Connections

21 18 680 348

720 mm, 4x6 Connections

21 18 680 350

900 mm, 4x6 Connections

21 18 680 354

1150 mm, 4x6 Connections

21 18 680 357

Crystal Sheathing

- Blue Sheathing 15m
- Red Sheathing 15m

Code

71 18 680 205

71 18 680 215

Chemical Solution Day Tanks

Day tank – 50 L
- Dimensions: ..... 425 mm x 500 mm
- Code: 21 22 683 050

Day tank – 100 L
- Dimensions: ..... 495 mm x 700 mm
- Code: 21 22 683 100

Day tank – 200 L
- Dimensions: ..... 635 mm x 785 mm
- Code: 21 22 683 200

Day tank – 300 L
- Dimensions: ..... 660 mm x 1075 mm
- Code: 21 22 683 300

Day tank – 500 L
- Dimensions: ..... 815 mm x 1100 mm
- Code: 21 22 683 500

Day tank – 1000 L
- Dimensions: ... 1065 mm x 1355 mm
- Code: 21 22 683 900

Chemical Solution Bund Tanks

Bund tank – 110 L
- Dimensions: ..... 805 mm x 325 mm
- Code: 21 22 685 100

Bund tank – 220 L
- Dimensions: ..... 970 mm x 395 mm
- Code: 21 22 685 200

Bund tank – 330 L
- Dimensions: ..... 940 mm x 680 mm
- Code: 21 22 685 300

Bund tank – 550 L
- Dimensions: ..... 1130 mm x 680 mm
- Code: 21 22 685 500

Bund tank – 1100 L
- Dimensions: ..... 1825 mm x 560 mm
- Code: 21 22 685 900

Carboy Bund Tank

27 L with support plinth

880 x 440 x 300mm.

Code

21 18 685 027

Crystal Erosion Feeder Assembly

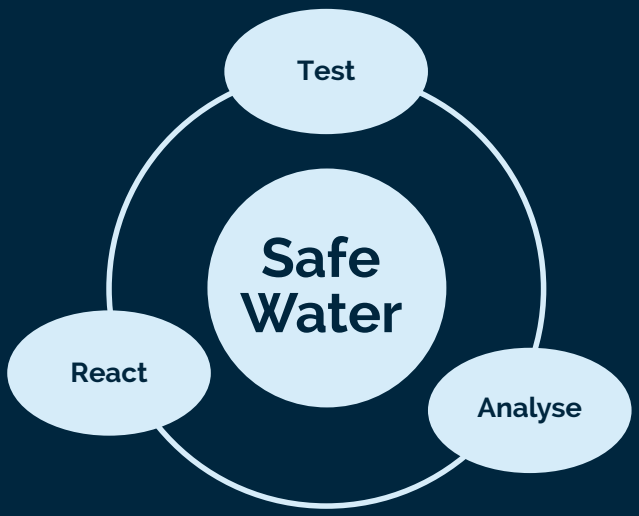
To control erosion feeder from dosing controller.

Set includes:

- Rainbow HC-3315 high capacity off-line trichlor/ bromine tablet feeder.
- Solenoid valve.
- Pipework to suit.

Principles of Treating Swimming Pool Water

The chemical treatment process can arguably be broken down into three stages: Test, Analyse and React. Each stage forms part of an ongoing cycle which is repeated at regular intervals to ensure that the pool water chemistry remains balanced and safe. This cycle is repeated until all variables are within range, and then at regular intervals.



Carrying out this process manually has a number of drawbacks and potential pitfalls, which include:

- Time
- Accuracy
- Human error
- Effort
- Regularity
- Health and safety

Use of a chemical dosing system refines this cycle and overcomes many of the imperfections that cause problems whilst reducing the time and labour spent on routine operational tasks.

Test

This first stage, is in many ways, the most important because without manual water testing, an informed decision cannot be made about the condition of the pool water.

For a commercial operator manual water testing and record keeping is of significant importance. Not only does guidance state that water testing should be undertaken every 2-3 hours during and after use, the results many prove useful in diagnosing an issue with the pool or to spot other useful patterns and trends.

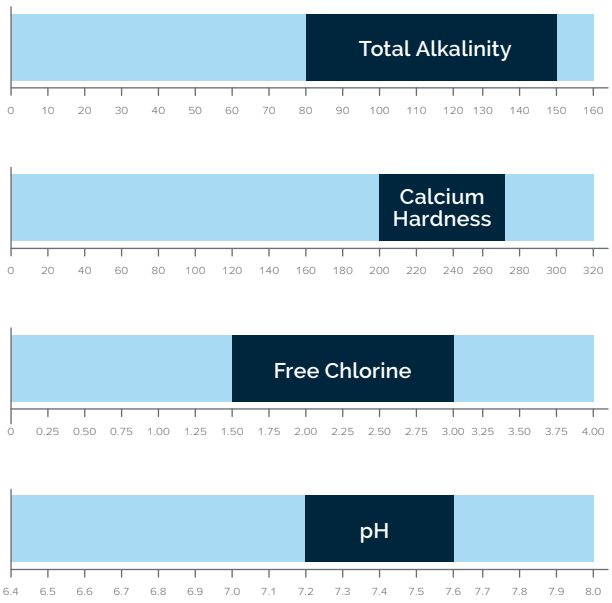
Even with monitoring and control equipment installed, guidance should still be followed. Manual water tests should be undertaken, recorded and compared to the chemical controller readings at regular intervals. It is important that testing is undertaken in a controlled and routine manner. Staff should be trained to use testing equipment correctly and consistently. Ideally, the same method of testing should be used to record values each time. A comparator type test kit is acceptable for record keeping and indicative values but for calibrating the probes on a dosing system, a reliable and accurate photometer should be used.

Having a dosing system is not a substitute for manual water testing and record keeping; however, it can help ensure that further action in terms of analysing and reacting is kept to a minimum.

For the domestic pool owner, manual testing remains important. Guidance states that (domestic) pools should at least be tested daily before use and more frequently during peak usage and hot weather. There can be issues with domestic pool water testing and often it is neglected completely. What is the user testing with? Is it accurate? Is it being used correctly? Is testing being carried out regularly enough to ensure the pool water is consistently safe?

Analyse

Once test results have been determined, they can be analysed to decide whether any further action is necessary. Values can be compared to known recommended ranges to see if the parameters are too high, too low, or within range.



The human factor can play a big role in the consistency of water quality – is the operator aiming for a set figure, or to be somewhere within a wide range? Is the operator carrying out the analysis knowledgeable enough to make an informed decision? Do they know enough about the operation of the pool to know what other factors may be affecting the readings? Do they understand enough about the chemicals they are using?

It is necessary to undertake a test multiple times before reaching a conclusion. Any results that look particularly erroneous should be investigated before taking action. Sometimes it can be better to do nothing and gather further information and data before reacting.

React

The final stage before repeating the whole process is to add any required chemicals to the pool water. Careful consideration should always be given to manually adding chemicals to pool water, particularly when chemical dosing equipment is already installed. In this case, it should be a last resort and well thought out.

The rule ‘if in doubt, don’t!’ should be followed. A good understanding is required of the chemical being used, how much is needed, how it should be dosed and the expected result. Is the operator knowledgeable and competent enough to hand dose chemicals? Do they have appropriate training? Will the chemicals be handled correctly and safely?

Benefits of a Dosing System

Having examined the three stage process to keeping pool water safe, how can a dosing system benefit a customer?

Time

If completed manually, diligently and correctly, each stage can be time consuming. This represents hassle to a domestic pool owner who should simply be able to enjoy their pool and distracts the staff of commercial operators, making them less productive.

Regularity

A dosing system does not sleep, does not go away for a week, and does not forget to test on Tuesday. A dosing system is constantly cycling through each of the above stages. A chemical dosing system is the ultimate method of ensuring consistency in safe water.

Human error

A chemical dosing system will constantly monitor and control sanitiser and pH levels. Chemical addition is performed in a controlled and minimised manner which is ultimately the best way to achieve good water quality and bather comfort.

The margin for human error in monitoring and added chemicals is largely removed. It should be understood that a chemical dosing system will only perform as well as it has been set up to i.e. the equipment must be fit for purpose and selected to meet expectations. It must be commissioned correctly then operated and maintained in line with guidance and the manufacturer’s recommendations.

Testing and Analysing

On a daily basis, the main interaction with the chemical dosing system involves comparing the manual test results with the display on the controller. More often than not you can then rest easy knowing that you don't have to do anything else. If it's slightly out, further manual testing and monitoring is recommended before performing a simple, single-point calibration.

Pooltest 3 Palintest Test Kit

- Provides digital results for the three key parameters for pool disinfection control: chlorine, pH and cyanuric acid.
- Colorimetric analysis giving accurate and fast digital results.
- Waterproof with a large backlit LCD screen.
- Easy to use four button operation.
- Measures up to 5 ppm Cl2 as standard, choose the extended range version to measure up to 10 ppm Cl2.

Code

- Soft case: 20 66 621 332
- Hard case: 20 66 621 334

Pooltest 6 Palintest Test Kit

- Provides simple and effective pool testing, offering the parameters required for a water balance calculation.
- Colorimetric analysis giving accurate and fast digital results.
- Large backlit LCD screen ideal for use in any location.
- On-board memory to store the last 10 results.
- Measures chlorine, pH, cyanuric acid, bromine, alkalinity and calcium hardness.
- Measures up to 5 ppm Cl2 as standard, choose the extended range version to measure up to 10 ppm Cl2.

Code

- Soft case: 20 66 621 694
- Hard case 20 66 621 696

Pooltest 3 & 6 Palintest Compact Service and Test

- Visual evaluation.
- External and internal clean.
- Upgrade of software.
- Calibration.
- Test.
- Re-certification.
- Identify necessary repairs.

Code

20 66 980 006

Pooltest 9 Bluetooth Palintest Test Kit

- Including the nine most important pool and spa parameters, water quality testing has never been so simple or connected.
- Single-key direct access to all parameters.
- Battery or mains powered and completely waterproof.
- On-board data log, downloadable via Bluetooth® SMART or USB and share with colleagues and customers via the Aqua Pal app.
- Measures chlorine, pH, cyanuric acid, alkalinity, calcium hardness, copper and ozone.
- Supplied in a choice of portable or benchtop kits, it is ready to go to work from the moment it arrives.

Code

- With bluetooth: 20 66 621 999

Pooltest 9 Palintest Service and Test

- Visual evaluation.
- External and internal clean.
- Upgrade of software.
- Calibration.
- Test.
- Re-certification.
- Identify necessary repairs.

Code

20 66 980 009

Pooltest 25 Bluetooth Palintest Test Kit

- The complete photometer; offering a comprehensive range of test parameters.
- Supplied in a variety of kit formats and with Bluetooth® SMART connectivity for data download and sharing data via smartphones and tablets.
- A complete range of pool parameters to enable disinfection control and water balance testing.
- Completely waterproof and supplied in a variety of kit formats for using poolside, in the vehicle or installed in the pump room.
- Delivered with all accessories and components required to start work immediately.
- Supplied with a 2 year warranty.
- Continues to set the standard for professional pool testing equipment.

Code

- With bluetooth: 20 66 621 025

Pooltest 25 Palintest Service and Test

- Visual evaluation.
- External and internal clean.
- Upgrade of software.
- Calibration.
- Test.
- Re-certification.
- Identify necessary repairs.

Code

20 66 980 025

Redox or amperometric?

When it comes to chemical dosing controllers, there are two common methods of tracking the chlorine levels within a pool or spa: using either a redox or amperometric (free chlorine) probe. Selecting one over the other shouldn't be based solely on the initial cost, because there are more factors to consider which could influence that choice.

To make an informed decision, it is important to have an understanding of how probes function and what factors affecting them could and should drive that decision.

pH probe

At a basic level, all dosing probes – including pH probes – are designed to react with specific constituents within the water; this creates a mV output from the probe which is then interpreted and converted by the software within the controller to a reading which users can understand and themselves interpret. Because of this, it is important to be confident in the quality of the equipment in use, because an inferior or defective probe, a low-quality controller, or even a faulty or low-grade cable or connection could have an effect on the accuracy – and therefore efficacy and safety – of the entire system.

All Crystal dosing equipment is manufactured from high quality components under a strict quality control regime and tested thoroughly.

Closed-cell amperometric probe

A closed-cell amperometric probe is the most accurate and consistent way to monitor and control the level of free chlorine within a body of water. They aren't affected by pH, which is especially important in spas and heavily-loaded pools. For this reason, they are considered the standard for commercial applications and are heavily recommended for use in spas. Another great benefit is that the output reading on the controller is easily relateable to the known target level and to any readings taken during manual testing – there are no calculations or comparisons required to know exactly how much available sanitiser is contained in the water.

To summarise, amperometric probes are consistently reliable, and easy to understand and use. As well as commercial applications, these benefits make amperometric dosing systems attractive for use in medium to high-end domestic situations and with end users looking to minimise their interaction with the system.

Redox probe

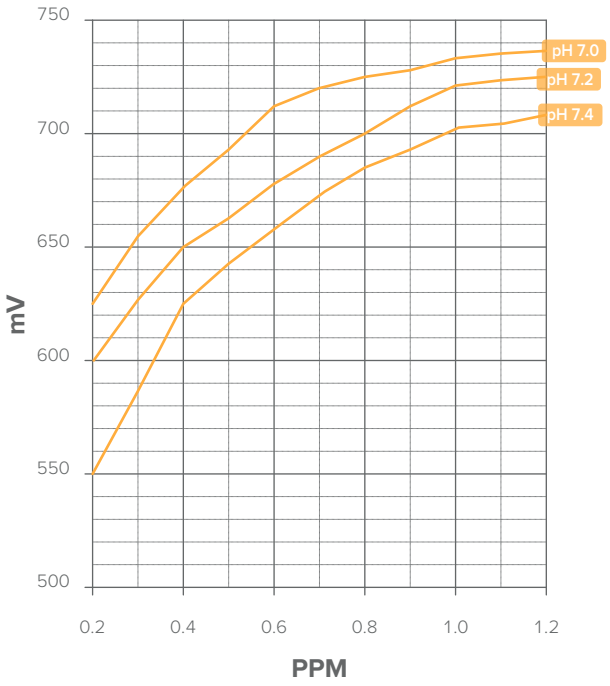
A redox probe doesn't directly measure the level of sanitiser within a pool. These probes are designed to monitor the oxidation reduction potential within the water; or, in other words, they measure how active the sanitiser is.

The activity of a sanitiser is dependant on pH and therefore a redox based system is heavily reliant on a consistent pH for accuracy. Heavy bather loads and air injection have an effect on both pH and general activity within a body of water, which can skew the readings, or have an adverse effect on a redox-based dosing system. As such, redox is not considered appropriate for use in spas and heavy commercial applications (as a sole indicator*). Another drawback of a redox system is that in order to relate its output in mV (millivolt) to an actual free chlorine level you have to convert the reading by comparing it to a table, taking into account the water's pH. This takes time and isn't an exact science, because the tables themselves cannot be 100% accurate and there are so many factors which can affect the sanitiser's activity.

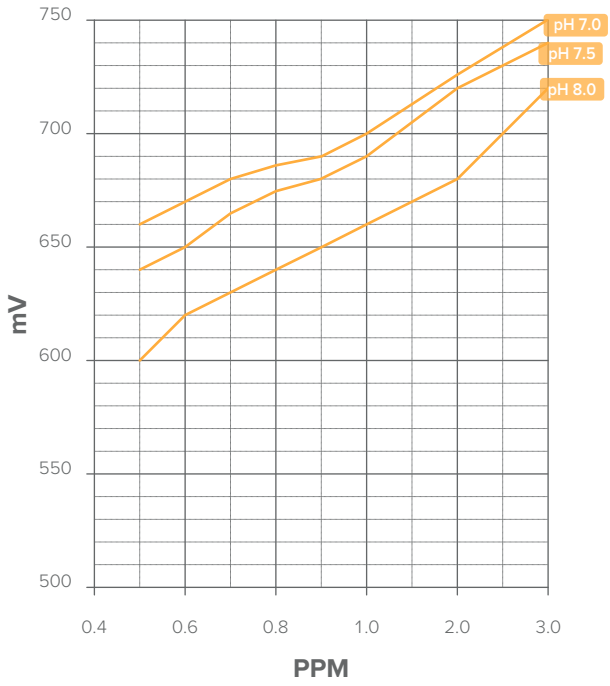
To summarise, measuring the sanitiser activity is an important and useful method – it is valuable to know that your sanitiser is working – but there are trade-offs and drawbacks to such systems which must be considered when specifying the equipment and care must be given to ensure the conditions are suitable for the reliable application of a redox system.

* In commercial applications, because of the usefulness of gaining an understanding of sanitiser activity as well as availability, some commercial operators are using systems which utilise both amperometric AND redox probes in unison to get the best of both worlds, better manage their water chemistry, and reduce their chlorine residual/consumption.

Free chlorine/mV relationships



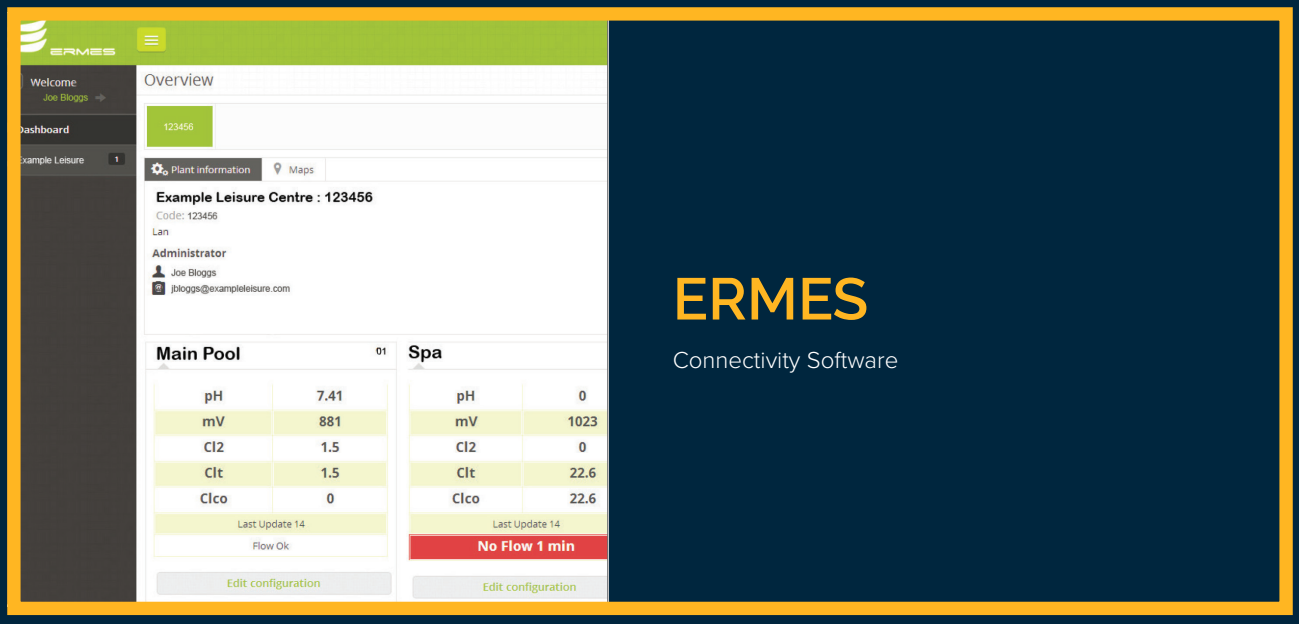
Free bromine/mV relationships



The graphs above show how the "redox value" representing a certain amount of free chlorine and free bromine varies according to the pH – this is often represented in a table such as the one shown below. Using these tables to relate a redox value based on the activity within the water to ascertain the level of available sanitiser is a flawed and inaccurate method – sanitiser levels aren't the only factor which affects activity and certainly in an environment such as a spa the pH and general activity can fluctuate rapidly. Tables such as those below are approximate representations of graphs such as those above, different sources may quote different figures, and the figures are different for chlorine and bromine, yet people operate using the wrong guide.

Please note; the figures represented here are given as indicative examples, not as a guide to be relied upon, and any charts relating mV (millivolt) values to pH to sanitiser levels are not going to be 100% accurate.

	pH 7.2	pH 7.3	pH 7.4	pH 7.5	pH 7.6	pH 7.7	pH 7.8	ppm Cl
mV (millivolt)	677	672	668	663	659	654	650	0.80
	684	680	675	670	666	661	657	0.85
	692	687	682	677	673	668	663	0.90
	698	694	689	684	679	674	669	0.95
	705	700	695	690	685	680	675	1.00
	717	712	707	701	696	691	686	1.10
	728	722	717	712	706	701	695	1.20
	738	732	727	721	716	710	705	1.30
	747	742	736	730	724	719	713	1.40
	756	750	744	738	732	727	721	1.50
	771	765	759	753	747	741	735	1.70
	779	773	766	760	754	748	741	1.80
	792	785	779	773	766	760	753	2.00



Crystal dosing system controllers can be remotely accessed from any compatible web browser via ERMES software (apart from the Eco system).

What is ERMES?

ERMES allows users to remotely access their chemical dosing controller through any internet enabled device. When users first log in they are presented with a summary screen which shows all the controllers and sites assigned to the account.

Each controller can be investigated further giving status information on dosing pumps, flow, set points etc. Logged information from the controller can be presented in traditional text log format or can be presented in graph form which, for example, can be used to identify trends in the water chemistry.

Text updates and text alerts

Controllers fitted with a GPRS modem are capable of sending text (SMS) updates and alerts to any mobile device.

Text updates can be prompted by sending a text to the controller which will 'reply' with the update (shown on page 25). Information sent includes: ID name, pH level, sanitiser level, temperature, flow status, pH tank level, sanitiser tank level, dosing pump status, dosing pump speed and other ouput status.

Text alerts are automatically sent by the controller once an alarm state is triggered. Preprogrammed telephone numbers are sent the following information in the event of an alarm: ID name, alarm status, pH level alarm status, sanitiser alarm status, tank level status and flow alarm status.

ERMES Connectivity Software

24/7 History and logs

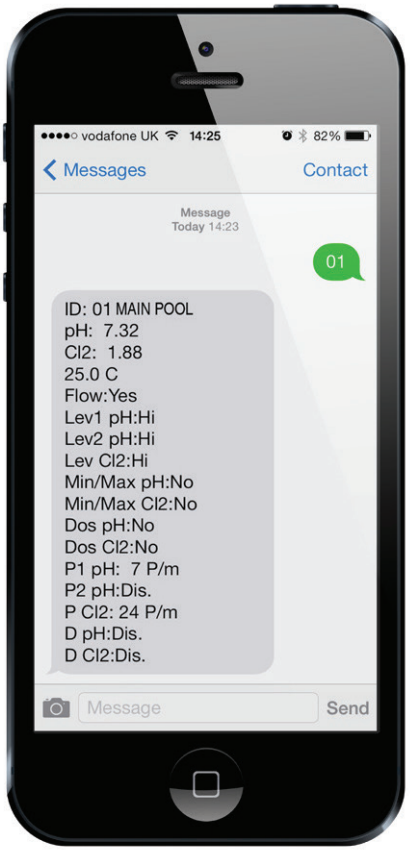
All parameters on the controller such as pH, sanitiser and flow etc are automatically logged. The data can be used for identifying trends or in problem solving.

The logs can be viewed and exported using the online web interface. The data can be displayed via an interactive graph or in plain text.

Multiple pools/spas? Multiple sites?

Multiple controllers can be linked through the same connectivity device. Multiple sites can be registered to the same ERMES account.

ERMES can display all controllers linked to an account in an easy to read overview screen. Each controller can also be individually integrated for further information. A maximum of 30 controllers can be linked to one account.



Getting connected

USB

For local connection only. Controller is fitted with a USB port. Once a USB drive is connected, the event log is automatically transferred for further analysis. A special version of the ERMES software is provided for reading the logs on a compatible computer.

Ethernet

Controller is connected to a local area network with internet access. Once configured, the user can access the controller ‘live’ via the ERMES web server using any internet enabled device. Ethernet users can send alerts by email.

GPRS modem

Using a data SIM card, the controller is connected to the mobile data network. The controller automatically connects to ERMES and can be accessed ‘live’ via the ERMES web server using any internet enabled device. GPRS users can send alerts by email and SMS ERMES uses approx 250mb data per calendar month.

On-site Services

Installation, commissioning and training

The first weeks following the installation of a dosing system are crucial in terms of satisfaction of the end client. If the installation is performed correctly and goes smoothly, there is less chance of teething problems which may lower confidence. Crystal engineers install and commission many systems all year round.

Before attempting an installation, there are a number of site preparations that are completed prior to arrival. The most important of these preparations being water balance and sanitiser levels. Full pre-installation check lists are sent once the visit is booked and the team can be contacted for guidance.

Have your own engineers? We are more than happy for our trade customers to install our systems and we can arrange to attend to commission and provide training to the end user/ operator once it is completed on request. That said, we take industry guidance notes very seriously and will only sign off installations once they are deemed ‘safe’.

End user and operator training is a crucial part of ensuring that the equipment is correctly operated and maintained. Our standard handover training after commissioning the system is usually sufficient, however, we understand that staff training needs will vary depending on skill and experience. In some cases, we offer enhanced in depth training. Training requirements can be assessed during the pre-site survey and advice will be given as to whether a more intensive session is recommended. We can also return to site further down the line to deliver ‘refresher’ training or to train new members of staff as required.

Safety Containment Training

As with any chemical, there are risks when using a chemical dosing system. Some guidelines to achieve the safest possible installation are shown below.

Enclosures and Covers

The most encompassing way of doing this is to place the items that represent the greatest risk within a contained area, ie, a plastic windowed GRP cabinet. All of our dosing panels can be supplied within a GRP enclosure for the ultimate in end user protection. Pro based systems can be housed within our specially designed Crystal cover which provides access to the control interface whilst protecting the end user from harm. In this configuration, the probe block is fitted with a LED pack which changes colour to indicate that an alarm condition has been activated. Speak to a member of Crystal team for more information.

The basic theory is to arrange the chemical handling aspect 'totally contained.' Pipework to these cabinets is doubled walled and gland and injection fittings can also be arranged within the cabinet with a powerful isolator, controlling the operation of the internal parts, mounted externally to allow safe isolation.

Gas Alarms

Gas alarms enhance the safety of any plant room. Each alarm is supplied with a main control unit which features the end user interface as well as a remote 'detector' unit (additional detectors can be supplied). In the event of excessive gas detection a high volume and pitched sounder is triggered at the main control unit as well as the detector.

Gas alarms are available for Chlorine Gas or Carbon Dioxide (CO_2). Test and calibration equipment that generates a small amount of chlorine gas is also available on request.

Colour Differentiation

Colour differentiations across chemicals and associated handling equipment will also help to ensure optimum safety. Tanks, bunds, sheathing etc. are all available in different colours.

Labelling can also be used ie, different coloured floor tape linking the day tank storage arrangement to the appropriate position within the chemical store to support safe replenishment.

Health and Safety

Personal Protective Equipment (PPE)

It's good practice to select appropriate protective gloves, clothing and other equipment. Remember to be aware that no material offers protection against all chemicals.

A management system for the correct selection, use and maintenance of PPE should be in place. Make sure all PPE you require can be worn and used together.
Caution: PPE can reduce mobility, limit communication and increase heat stress.

Basic PPE includes the following:

- Protective gloves – a range of sizes should be available, as gloves must fit!
- Coveralls and aprons – clothing should be worn under coveralls to reduce skin contamination. Select the right type of coverall for your work.
- Eye and face protection – select the right equipment depending on the hazard. If you wear contact lenses it is advisable to wear spectacles when working with chemicals because volatile solvents could be trapped between the lens and the eye. Safety glasses must be worn by contact lens wearers at all times where a risk of this nature may arise.
- Footwear – in addition to chemical resistance, necessary properties may include antistatic soles, resistance to crushing, heat or sharp spikes.
- Hearing protection – provide the right hearing protection, compatible with other PPE.
- Respiratory Protective Equipment (RPE) should be used in the following situations: clearing up a spillage, maintenance and emergencies.
  You should ensure that your RPE fits properly and is kept clean and stored in a clean place.

Check for deterioration of protective equipment.

Storage of chemicals

All containers should be clearly labelled to indicate the nature of the substance. No chemicals should be stored unlabelled at any time to avoid risk of error and ensure correct storage and disposal. Safety Data Sheets should be made accessible to the user of the substance. Highly toxic substances and carcinogens should not be stored on open shelves. Store chemicals below shoulder level.

Chemical safety data sheets

Safety data sheets provide information on chemical products that help users of those chemicals to make a risk assessment. They describe the hazards the chemical presents, and give information on handling, storage and emergency measures in case of an accident. Safety data sheet information may lead to guidance appropriate for your task.

By law (see REACH, Chemical classification) suppliers of chemicals must provide an up to date safety data sheet if a substance is dangerous for supply.
Caution: A safety data sheet is not a risk assessment.
You should use the information it contains to help make your own assessment.

Health and Safety Equipment

Equipment Available

Protective Clothing

Health and Safety Kit 1.

Code

20 22 690 060

Eyewash Station

Small.

Code

20 22 690 070

Crystal Chemical Spill Kit

Kits include:

- 25 chemical absorbent pads with small kit.
- 50 chemical absorbent pads with large kit.
- 4 chemical absorbent socks.
- 1 chemical absorbent cushion with small kit.
- 2 chemical absorbent ushions with large kit.
- Disposable bag and tie.
- Gloves.
- Goggles.
- Dammit® Slab.

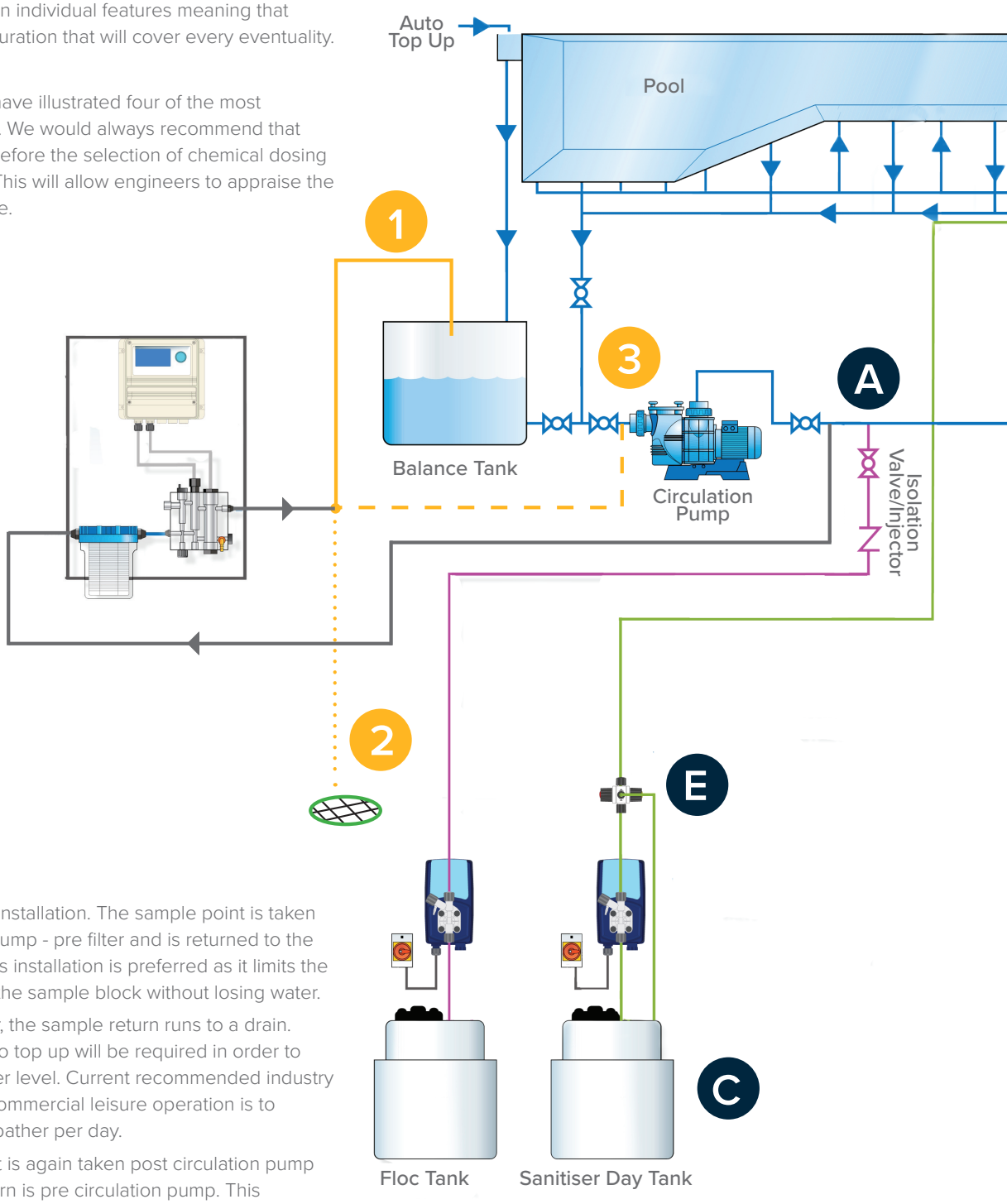
Code

20 22 690 060

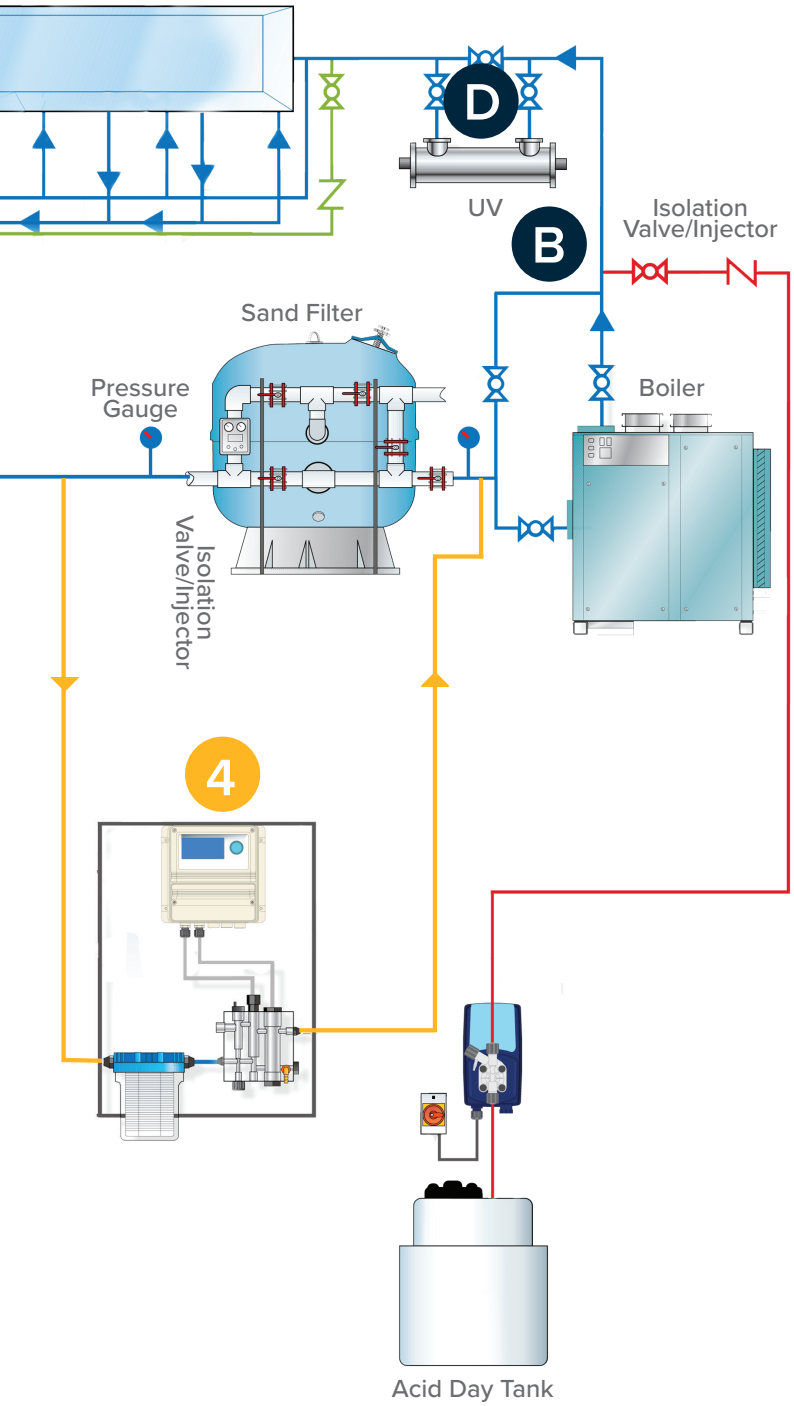
Typical Installation in an Efficient and User-friendly Pool

A typical installation is difficult to define as each and every plant room has its own individual features meaning that there isn't one configuration that will cover every eventuality.

On these pages we have illustrated four of the most common installations. We would always recommend that the site is surveyed before the selection of chemical dosing equipment is made. This will allow engineers to appraise the plant room and advise.



1. A fairly common installation. The sample point is taken post circulation pump - pre filter and is returned to the balance tank. This installation is preferred as it limits the pressure across the sample block without losing water.
2. As No. 1 however, the sample return runs to a drain. A functioning auto top up will be required in order to maintain the water level. Current recommended industry standards for a commercial leisure operation is to refresh 40 L per bather per day.
3. The sample point is again taken post circulation pump however the return is pre circulation pump. This installation should be avoided wherever possible as any sealing breach in the sample line pipework could lead to air ingress which could air lock the circulation pump resulting in possible pump failure. This option is not suitable for closed probes.
4. A different approach from the other three. The sample is taken pre-filter and returned post filter. The pressure differential across the filter is relied on to generate sample line flow.



Dosing Pointers

A The FLOC injection point should be as far upstream of the filter as possible and located away from other injection points.
This allows the FLOC sufficient time to react, bonding the smaller particles together before reaching the filter. Injection points should never be placed on the suction side of the circulation pump as this could syphon the chemical from the storage tanks.

B Acid injection points should, where possible, be post boiler/heat exchange.
Introduction of a strong acid to these devices may cause significant damage.
Close proximity to the sanitiser injection point should be avoided where possible.
Current guidance is to have the injection points at least 10 pipe diameters apart.

C Chemicals, wherever they are stored should always be in separate containers.
Sanitisers and acids should never be allowed to mix and should be bunded individually.

D UV plants are an effective way of disinfecting pool water.
If a UV plant is installed, sanitiser injection points should be installed post UV plant.

E Multifunction valves can be used to redirect chemical flow in the event that an injection valve or the line becomes blocked. Multifunction valves should also be used where day tanks are located above the plant room to prevent syphoning.

Injection valve type will vary depending on the plantroom level in relation to the pool/spa. If the plant room is located below the pool level, isolatable removable injection valves should be considered for ease of use.

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Golden Coast