

# *Kamco*

OPERATING AND SERVICING GUIDELINES

## SCALEBREAKER DESCALING PUMPS

| C20 | C40 | C90 | C210 |



FOR DETAILS OF OUR FULL RANGE OF  
DESCALING CHEMICALS PLEASE VISIT  
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# **Kamco Descaling Pump Manual** **C20 | C40 | C90 | C210**

The Kamco 'SCALEBREAKER' range of pumps and chemicals have been specifically designed for the removal of scale and rust deposits which naturally form in heating and cooling circuits.

This manual contains detailed guidelines for the safe use of the Scalebreaker range of equipment. How to connect the pump onto the equipment to be descaled, creating a circuit, and which chemical is best suited for each application.

**Please take time to carefully read through these guidelines before using your Kamco pump.**

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# **Kamco Descaling Pump Manual**

## **C20 | C40 | C90 | C210**

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**SECTION A – INTRODUCTION**

The Kamco 'SCALEBREAKER' range of pumps and chemicals have been specifically designed for the removal of scale and rust deposits which naturally form in heating and cooling circuits.

Heating and cooling systems using steel pipework and components frequently suffer fouling, and a build-up of debris as a result of the natural corrosion process by which iron tries to revert to its oxides. In hard water areas, when water is heated, the natural minerals within the water break down into insoluble crystals, which deposit out as scale.

These deposits not only restrict water flow, but also act as a very effective insulant, severely reducing heat transfer and hence efficiency of the equipment, necessitating regular cleaning and descaling.

Applications include:

- Heat exchangers and calorifiers.
- Boilers and steam generators.
- Condensers and chillers.
- Injection moulding and extrusion machines.
- Catering equipment.
- Cooling towers and evaporators.

Precautions should be taken to ensure a safe working environment:

- Take care when lifting large or heavy items.
- Regularly check power leads for wear or damage, use with a residual circuit breaker.
- When handling chemicals wear suitable protective clothing, gloves and goggles.
- Use in a well-ventilated area.
- PAT test (Portable Appliance Test) the electrics annually.
  
- Read and observe manufacturers' instructions.

**SECTION B – SCALEBREAKER PUMP SPECIFICATION**

**INTRODUCTION**

All Kamco pumps are of the self-priming, vertical axis centrifugal type. Units are built for ease of handling, with hand holds and grips for manoeuvrability and emptying. Low weight and a wide base aid stability. Models from the C40 upwards are fitted with wheels.

**'Standard' model or 'Fresh Water Flush Facility' (FWF) model**

The larger Scalebreaker pumps are available in two different formats:

**'Standard'** format with a two-part hose set: flow and return.

**'Fresh Water Flush Facility'** format with four-part hose set: flow, return, water inlet and dump.

The 'Fresh Water Flush Facility' format gives the operator the option of introducing fresh water directly into the tank, and the ability to dump the waste into a nearby drain or disposal vessel without the need to disconnect the flow and return hoses from the equipment being descaled.

**Motors.**

Electric motors are totally enclosed fan-cooled type, to IP54 and IP55 protection rating, continuously rated. Pumps are available with 230v, 50Hz, 110v, 50Hz, or 120v, 60Hz motors, with illuminated, membrane covered switches. 240v, 60Hz motors are available on larger models.

**Flow reversal device.**

All units have an instantaneous flow reverser valve to change the direction of flow between clockwise and anticlockwise directions. The valve can be operated without the need to switch the motor off. Alternating the flow of the descaling chemical enables deposits to be attacked from different directions and can drastically reduce the time taken. It is also very effective in flushing out loosened debris.

**Operational and temperature capabilities.**

All units can operate up to 60°C.

Descaling can be undertaken cold, above 0°C, but chemical performance is enhanced with temperature.

**Chemical handling capabilities**

Scalebreaker pumps are acid-proof, and may be used with all acids in common descaling use, i.e. hydrochloric, phosphoric, sulphamic, citric, formic, acetic, etc. as well as alkalis.

Pumps may be used with chlorine solutions for sterilising purposes.

For compatibility with other chemicals, please check with Kamco.

**Hoses and connections.**

Reinforced PVC hoses with polypropylene chemical resistant BSP threaded female couplings.

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**SCALEBREAKER C20 - TECHNICAL DATA**



**Scalebreaker C20**

Pump Type:	Positive drive centrifugal
Motor:	0.45 kW, 230v
Degree of protection:	IP54
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 260mm, D 460mm, H 540mm.
Weight empty (without hoses):	8kg.
Tank capacity (to filler cap):	20l.
Product code for 230v model:	CDP020

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

**Contents of the Scalebreaker C20 kit**

- C20 descaling pump.
- Set of 2 x 3m x 16mm dia. flow and return hoses.
- 3/4" BSP connections to pump unit
- 1/2" BSP connections on free ends of flow and return hoses.
- Hoses supplied loose.
  
- 10 part BSP adapter set.

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**SCALEBREAKER C40 (STANDARD MODEL) - TECHNICAL DATA**



**Scalebreaker C40 Standard**

Pump Type:	Positive drive centrifugal
Motor:	0.80 kW, 230v
Degree of protection:	IP55
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 390mm, D 440mm, H 690mm.
Weight empty (without hoses):	17kg.
Tank capacity (to filler cap):	39l.
Wheels:	75mm diameter wheels inset in rear face.
Product code for 230v model:	CDP040S

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

**Contents of the Scalebreaker C40 kit**

C40 descaling pump.  
Set of 2 x 3m x 16mm dia. flow and return hoses.  
3/4" BSP connections.

Hoses supplied loose.

10 part BSP adapter set.

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**SCALEBREAKER C40 (WITH FLUSH FACILITY) - TECHNICAL DATA**



**Scalebreaker C40 FWF**

Pump Type:	Positive drive centrifugal
Motor:	0.80 kW, 230v
Degree of protection:	IP55
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 390mm, D 440mm, H 690mm.
Weight empty (without hoses):	17kg.
Tank capacity (to filler cap):	39l.
Features:	Fresh water inlet, and dirty water dumping facility.
Wheels:	75mm diameter wheels inset in rear face.
Product code for 230v model:	CDP040

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

**Contents of the Scalebreaker C40 kit**

- C40 descaling pump.
- Set of 2 x 3m x 16mm dia. flow and return hoses.
- Water inlet tap with 3m x 13mm dia. hose.
- 1 x 3m x 16mm dia. dump hose.
- 3/4" BSP connections.
- Hoses supplied loose.
- 10 part BSP adapter set.



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**SCALEBREAKER C90 (STANDARD MODEL) - TECHNICAL DATA**



**Scalebreaker C90 Standard**

Pump Type:	Positive drive centrifugal
Motor:	1.1 kW, 230v
Degree of protection:	IP55
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 390mm, D 590mm, H 890mm.
Weight empty (without hoses):	23kg.
Tank capacity (to filler cap):	57l.
Wheels:	200mm diameter wheels.
Product code for 230v model:	CDP090S

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

**Contents of the Scalebreaker C90 kit**

- C90 descaling pump.
- Set of 2 x 3m x 19mm dia. flow and return hoses.  
3/4" BSP connections.
- Hoses supplied loose.
- 10 part BSP adapter set.

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**SCALEBREAKER C90 (WITH FLUSH FACILITY) - TECHNICAL DATA**



**Scalebreaker C90 FWF**

Pump Type:	Positive drive centrifugal
Motor:	1.1 kW, 230v
Degree of protection:	IP55
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 390mm, D 590mm, H 890mm.
Weight empty (without hoses):	23kg.
Tank capacity (to filler cap):	57l.
Features:	Fresh water inlet, and dirty water dumping facility.
Wheels:	200mm diameter wheels.
Product code for 230v model:	CDP090

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

**Contents of the Scalebreaker C90 kit**

C90 descaling pump.  
Set of 2 x 3m x 19mm dia. flow and return hoses.  
Water inlet tap with 3m x 13mm dia. hose.  
1 x 3m x 19mm dia. dump hose.  
3/4" BSP connections onto pump.

Hoses supplied loose.

10 part BSP adapter set.

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**SCALEBREAKER C210 (WITH FLUSH FACILITY) - TECHNICAL DATA**



**Scalebreaker C210 FWF**

Pump Type:	Positive drive centrifugal
Motor:	1.1 kW, 230v
Degree of protection:	IP55
Motor rating:	Continuous
Temperature range:	0°C to 50°C
Dimensions:	W 530mm, D 670mm, H 890mm.
Weight empty (without hoses):	28kg.
Tank capacity (to filler cap):	125l.
Features:	Fresh water inlet, and dirty water dumping facility.
Wheels:	200mm diameter wheels.

A 5amp fuse should be fitted in the plug top. A residual current circuit breaker adapter should be used.

Product code for 230v model: CDP210

**Contents of the Scalebreaker C210 kit**

C210 descaling pump.  
Set of 2 x 3m x 22mm dia. flow and return hoses.  
Water inlet tap with 3m x 19mm dia. hose.  
1 x 3m x 22mm dia. dump hose.  
1" BSP connections onto pump (flow / return / dump hoses).  
3/4" BSP connections onto pump (water inlet hose).

Hoses supplied loose.

**SECTION C – SCALEBREAKER CHEMICALS**

**INTRODUCTION**

The prepared chemical solutions may be used to soak the equipment to be descaled, although the process is significantly faster when the solution is circulated vigorously by means of a suitable pump such as a Scalebreaker descaling pump.

During descaling limescale dissolves with the evolution of gas. The resulting effervescence and foaming can create a barrier which impedes, and in some case prevents, further reaction with the deposits. Agitation of the solution or the use of a Scalebreaker pump will break down this barrier allowing further reaction to take place.

**General usage and application notes**

As a general guide, the rate at which deposits are dissolved increases with solution strength and higher temperatures. Lower chemical concentrations will require a higher water temperature for best effect.

Pumps and chemicals should not be operated at temperatures exceeding 50°C.

As chemicals increase in strength so does the limitation in their use. Stronger chemicals should not be used on certain materials and so it is essential to know what the item to be descaled is made of, to enable the appropriate chemical selection. Kamco descaling chemicals are either in crystalline or liquid form.

Crystals should be dissolved in water prior to adding to the Scalebreaker tank.

Relative strengths of chemicals, in ascending order:

Scalebreaker CG crystals.

Scalebreaker SR crystals.

Scalebreaker FX liquid.

Scalebreaker HD liquid.

**Strength indicator**

Stronger chemicals incorporate a red to yellow pH colour change indicator to give a visual check on solution strength. As the solution strength is exhausted the colour changes from pink, through amber to yellow. Further descaling chemical can be added to return the solution back to full strength.

**Inhibited**

Stronger chemicals are comprehensively inhibited to help protect metal surfaces during the descaling process.

**Safety.**

Suitable precautions should be taken when handling any chemicals especially acids.

Avoid contact with eyes and skin. Wear protective clothing, gloves and goggles.

When descaling with any acid, there is a possibility of flammable hydrogen gas being given evolved, and the working area should be well ventilated. Avoid smoking nearby, or any other means of ignition.

Always add the descaling chemical to the water to avoid a reaction.

**Transport regulations**

Due to the hazardous nature of these chemicals some transport restrictions may apply, especially to Scalebreaker HD. Please call for advice. All goods are available for collection.

**Material Safety Data Sheets (MSDS).**

The latest Material Safety Data Sheets are available to download from the Kamco website.

These sheets include: chemical composition, hazard classification, first aid measures, handling, storage and disposal information.

[www.kamco.co.uk](http://www.kamco.co.uk)

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**SECTION C – SCALEBREAKER CHEMICALS**

**DESCALING CRYSTALS**

**SCALEBREAKER CG**



**Applications:**

Food grade descaling chemical.

**Usage rate:**

50-150 gm. per litre of water.  
Dissolves faster in hot water.

**Appearance:**

White crystals.

**Odour:**

None

**Features:**

Food grade.

**Safe to use on:**

Steel, stainless steel, cast iron  
copper, brass, aluminium  
and most plastics.

**Comments:**

Very safe to handle and store.  
Biodegradable.  
Non-fuming, non-toxic.

**Pack sizes:**

Carton 6 x 2.5kg pails.  
15kg pail.

**SCALEBREAKER SR**



**Applications:**

Descaling limescale.

**Usage rate:**

25-150 gm. per litre in water.  
Dissolves faster in hot water.

**Appearance:**

Orange / pink crystals.

**Odour:**

Very slightly sulphurous.

**Features:**

Colour strength indicator and inhibited.

**Safe to use on:**

Steel, stainless steel, cast iron  
copper, brass, aluminium  
PVC, polythene and most plastics / rubbers.

**Comments:**

Safe to handle and store, but strong when  
dissolved in water.  
Non-fuming.  
Non-flammable and non-volatile.  
Dissolves up to 50% of its own weight of scale.

**Pack sizes:**

Carton 6 x 2.5kg pails.  
15kg pail. #  
-----

**ZNI BOOSTER INHIBITOR**

For use with Scalebreaker SR crystals to enable descaling  
of galvanised equipment.  
Add at a ratio of 30gm per 1kg of Scalebreaker SR.  
(i.e. 450gms per 15kg pail).  
Effective for up to 5 hours.

# - Please note carriage restrictions may apply.

**SCALEBREAKER FX**



**Applications:**

Descaling liquid for rust and limescale deposits in pipe work, radiators, heating & cooling systems. Dissolves iron oxides at ambient temperatures.

**Usage rate:**

10 - 20% in water.  
Equates to approximately 1 part FX to 6 parts water.

**Appearance:**

Pink / red liquid.

**Odour:**

Slightly sweet.

**Features:**

Colour strength indicator and inhibited.  
Wetting agents to penetrate heavy deposits.

**Safe to use on:**

Steel, stainless steel, cast iron  
copper, brass.  
and most plastics / rubbers.

**Comments:**

Not suitable for aluminium or galvanised steel.  
Non-fuming.  
Non-flammable and non-volatile.

**Pack sizes:**

Carton 4 x 5ltr bottles.  
10ltr drum. #

**SCALEBREAKER HD**



**Applications:**

High strength descaling liquid for rust and limescale deposits. Powerful and economical liquid for use in cleaning heavily scaled equipment, where speed and high solvency power are critical.

**Usage rate:**

10 - 15% in water.  
Equates to approximately 1 part HD to 7 parts water.

**Appearance:**

Pink / red liquid.

**Odour:**

Pungent.

**Features:**

Colour strength indicator and inhibited.  
Wetting agents to penetrate heavy deposits.

**Safe to use on:**

Steel, cast iron copper, brass.  
and most plastics.

**Comments:**

Note: an extremely powerful chemical, use with caution.  
Not suitable for aluminium ,  
galvanised or stainless steel.  
Do not use in central heating systems.  
High fuming.  
Non-flammable.  
Transport restrictions apply.

**Pack sizes:**

Carton 4 x 5ltr bottles. #

# - Please note carriage restrictions may apply.

**SECTION C – SCALEBREAKER CHEMICALS**

**ASSOCIATED CHEMICALS**

**NEUTRALISING CRYSTALS**



**Applications:**

1. Neutralising residual acidity from water left circulating in system,
2. Neutralising descaling chemicals before disposal.

**Usage rate:**

1-5% in water.

**Appearance:**

White crystals.

**Odour:**

None.

**Features:**

**Safe to use on:**

All materials.

**Comments:**

Safe to handle and store.  
Keep dry.

**Pack sizes:**

Carton 6 x 2.5kg pails.  
15kg pail.

**FOAMBREAKER ANTI FOAM LIQUID**



**Applications:**

A concentrated liquid additive to prevent excessive foaming when descaling, can also be used to suppress existing foam.

**Usage rate:**

ca. 10ml per 50l of descaling solution.

**Appearance:**

Creamy white liquid.

**Odour:**

None.

**Features:**

**Safe to use on:**

All materials.

**Comments:**

Disperses in water and acid solutions.  
For best effect apply and circulate prior to addition of descaling chemical.

**Pack sizes:**

1ltr dispenser bottle.

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**SUMMARY OF CHEMICALS USED WHEN DESCALING**

Product	Application	How much do you need?	How is it packed?
<b>Scalebreaker CG</b>	Food grade descaling chemical.	50-150 gm. per litre.	<b>Carton of 6 x 2.5kg pails. 15kg pail.</b>
<b>Scalebreaker SR</b>	Descaling heat exchangers, boilers or water heaters.  Suitable for materials including aluminium.  Pour slowly into <b>Scalebreaker</b> pump tank whilst re-circulating	25-150 gm. per litre.  Dissolves half of its own weight of scale.  Colour change indicator.	<b>Carton of 6 x 2.5kg pails. 15kg pail. #</b>
<b>Scalebreaker FX</b>	Descaling heat exchangers, boilers or water heaters.  NOT suitable for use with aluminium or galvanised steel.	In liquid form, ready to use. Make a solution of 1 part Scalebreaker FX to 6 parts of water.	<b>Cartons of 4 x 5 litre. 10 litre drums. #</b>
<b>Scalebreaker HD</b> <small>Note this is an extremely powerful chemical, use with caution.</small>	Descaling heat exchangers, boilers or water heaters. <b>Not for use in heating systems.</b> NOT suitable for use with aluminium, galvanised or stainless steel.	In liquid form, ready to use. Make a solution of 1 part Scalebreaker HD to 7 parts of water.	<b>Cartons of 4 x 5 litre. #</b>
<b>Neutralising Crystals</b>	To neutralise acidic water to enable safe disposal down a <b>FOUL SEWER</b>  Pour slowly into the <b>Scalebreaker</b> tank whilst recirculating.	Between 1 and 5% in water.	<b>Cartons of 6 x 2.5 kg pails. 15 kg pails.</b>
<b>pH paper</b>	To check that the solution is neutral, pH reading should be 7 (i.e. the same as tap water) Dip 3cm in dump water and compare colour with chart.	Approx. 10 cm.	<b>5 metre dispenser pack.</b>
<b>Znl Booster Inhibitor</b>	To protect galvanised pipes when being descaled with SR Crystals. Pour slowly into the <b>CLEARFLOW</b> tank whilst re-circulating <b>BEFORE</b> addition of Scalebreaker SR Crystals.	3% by weight of Scalebreaker SR Crystals.	<b>450g pack. to treat 15kg SR Crystals.</b>
<b>Foambreaker</b>	To control excessive foaming whilst descaling.	<b>10ml per 50 litre</b> of descaling solution.	<b>1 litre dispenser pack.</b>

# = Please note carriage restrictions apply to some chemicals / pack sizes, please call for advice.



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### pH TEST EQUIPMENT

When descaling it is important to monitor the pH value of the descaling solution. The pH is a measure of strength and is a good indication of progress when descaling.

The pH scale commences at 0 and progresses through to 14, where:

0	=	strong acid i.e. strong descaling chemical.
7	=	neutral i.e. mains water supply.
14	=	strong alkali i.e. caustic soda.

After adding the descaling chemical to the water a typical reading may be around 1 - 2, i.e. acidic. As the descaling progresses the chemical will be exhausted and the reading will begin to rise towards 7. The lower the reading the stronger the solution and its ability to descale.

Monitor progress taking regular readings, which will indicate if the process is complete or if additional chemicals are required. This is explained further within 'Use of the Descaling Equipment ' section.

Any water left in the system after the descaling process should be left neutral i.e. the same as the mains water supply with a pH of 7.

If a reading is below 7, either continue dumping the contaminated water, or add and circulate neutralising crystals to obtain a neutral level.

If the reading is above 7, continue dumping the water until a neutral level is obtained.

pH can be tested either with test paper or an electronic meter.

### pH TEST PAPER



The roll contains a 5mt strip of test paper. Tear off a small section, and dip it into the water to be tested. The moistened paper will change colour according to the pH of the solution. Match the colour with the colour wheel on the roll.

Red	=	1	i.e. strong acidic solution.
Yellow	=	7	i.e. neutral.
Blue	=	14	i.e. strong alkaline solution.

**ELECTRONIC pH METER**

- A fast and accurate check that heating system water is neutral after a power flush.
- Large 3 digit display with annunciator characters.
- Waterproof, dustproof, and rugged for use in damp conditions.
- Battery life, ready and calibration indicators.
- Automatic temperature compensation.
- Auto 'power off' prolongs battery life.
- Push button calibration.



**Conditioning**

The pH meter should be conditioned before first use. Remove the cap and immerse electrode in tap water for one hour. This activates the electrode and dissolves any crystal formation.

**Taking a reading with the Electronic pH meter**

1. Take a sample of at least 100ml of the water to be tested in a suitable clean beaker / vessel, to a depth of approx. 5cm.
2. Remove protective cap from the pH meter.
3. Turn the pH1 meter on by depressing the ON/OFF button located on the front of the meter.
4. Immerse the pH meter into the sample of water, without touching the bottom of the sample container.
5. Stir gently and wait for the display reading to stabilise. The pH meter automatically compensates for temperature, and variations on the meter display can be due to the sensor adjusting to the sample temperature.
6. Read the figure from the display.

To hold the display for easier reading, press 'HOLD' key. Press 'HOLD' key again to release.

7. Press the ON/OFF button to shut the pH tester off.  
Note: The Eco pH meter automatically shuts off after 8.5 minutes of non-use to conserve batteries.

8. After taking the reading, remove the meter from the sample, and flush with clean water before storing.

Specification	
pH range:	0.0 to 14.
Resolution:	0.1 pH
Accuracy:	0.1 pH
Auto temp compensation:	Yes.
Auto power off:	Yes.
Auto-buffer	pH 4, 7, & 10.
Batteries:	4 x LR44.
Battery life:	>60 hours.

**SECTION D – USE OF THE DESCALING EQUIPMENT**

**Safety Precautions**

When working with acidic descaling chemicals always wear suitable protective clothing and goggles.  
Check and observe instructions supplied with descaling chemicals.  
Always add the acid to the water, NEVER add water to the acid.

**Scalebreaker controls**

Scalebreaker pumps are supplied with the following controls:

**Flow reverser (all models) :**

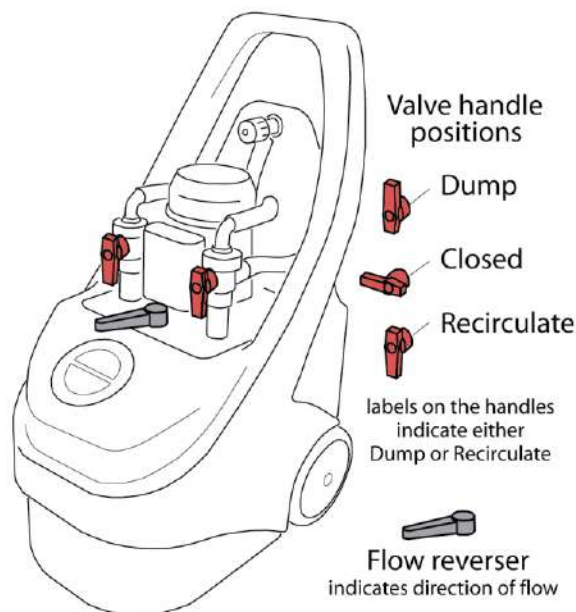
This lever directs the flow either clockwise or anti-clockwise around the system. The direction the lever is pointing is the direction of flow.

**Water Inlet tap (models with fresh water flush facility):**

Allows the introduction of fresh water directly into the Scalebreaker tank.

**Circulation / dump valves (models with flush facility):**

The handle on these valves directs the water either to recirculate or to dump.  
When the valve handle is in the horizontal position the valve is closed.



**Hose connections to the Scalebreaker pump**



**Flow and Return Hoses:** need to be connected to the equipment being descaled so that a circuit is created allowing water to travel back to the Scalebreaker pump.

**Water Inlet Hose:** needs to be connected to a suitable water supply.

**Dump Hose:** needs to be directed into a suitable foul sewer (if waste is neutral) or waste disposal container.

**Descaling procedure**

1. Connect hoses to the back plate of the Scalebreaker pump as previously illustrated.
2. Connect the outer ends of the flow and return hoses securely to the plant or equipment to be descaled, using BSP threaded adapters & PTFE tape if necessary.
3. Connect the power cable to a suitable earthed power supply, according to model. As the pump will be used in a damp location, we recommend that a residual current circuit breaker be used.
4. Fill the tank using the water inlet tap, adding sufficient descaling solution to ensure that the pump rotor housing is submerged during use. The minimum liquid level is shown on the tank.
5. Switch on the pump, and check to ensure that the liquid level does not fall below the minimum level marked on tank, as some of the contents of the tank enter the equipment being descaled, particularly when the overall capacity of the system being descaled is greater than the tank capacity of the pump.  
If necessary, add more descaling solution, or water.
6. Check all connections for leaks.
7. During use, the tank cap should remain loose and **not be screwed on by more than a quarter turn**, to allow for the passage and elimination of the gas evolved during descaling.
8. Check that the foam level does not exceed the maximum filling level. If necessary, carefully add FOAMBREAKER to the solution.
9. The built-in flow reverser makes it possible to attack scale from both directions. During descaling periodically move the flow reverser handle from one side to the other. This reduces descaling time considerably, and is more effective in flushing out any solid matter, which may accumulate on the circumference of the base of the tank. By attacking scale from each direction it is possible to clean piping which is almost totally obstructed.

**Safety:** Caps should be kept securely on all chemical containers whilst not in use. As a matter of prudence, and to avoid splashes, operators should avoid standing directly over the open neck of either chemical containers or the filling neck of the descaling pump whilst pouring or adding chemicals.

**Checking progress of the descale.**

The descale may be considered complete when there is sufficient strength left in the solution and no further reaction is taking place. This can be monitored in various ways.

- a). When removing hard water deposits, check for bubbles within the return hose. Bubbles cease to be created when all reaction has finished.
- b). Scalebreaker chemicals have a built-in colour change indicator which allows the strength to be monitored visually.
- c). If the equipment being descaled has flow meters, check the flow rate. The rate should increase as the water ways are cleared.

d). Use pH test equipment to check the strength of the solution.

Check the pH value at the beginning of the process, and continue to monitor at regular intervals.

If the pH value gradually increases towards 7 descaling / chemical cleaning is still taking place.

When the reading remains the same, either the descaling is complete, or the solution strength has been exhausted.

Check strength and if necessary top up the solution.

## Kamco Descaling Pump Manual C20 | C40 | C90 | C210

### Completing the descale, disposal of the solution and testing.

Once complete the descaling solution can be dumped out of the system, either into a suitable container for potential further use, or down a suitable foul sewer.

Before dumping down a sewer the solution acidity should be neutralised using neutralising crystals.

The amount of crystals necessary will depend on the volume and strength of the solution. Use pH test equipment for this purpose.

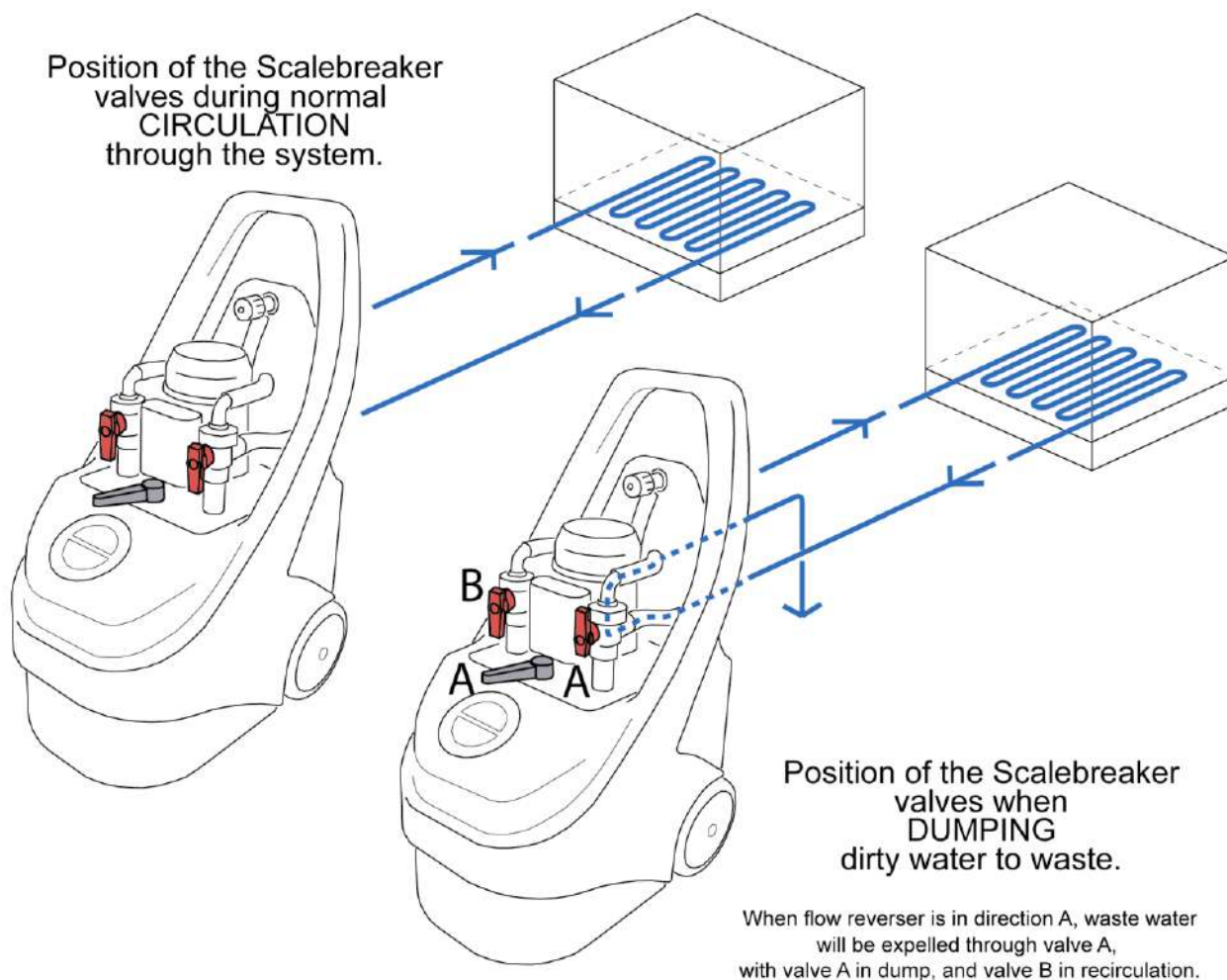
#### **For units with flushing facility:**

To dump the solution the valve on the return side of the unit should be rotated 180° so that the handle is pointing upwards.

The waste solution is now directed down the dump hose. Whilst dumping, the water level in the tank will start to drop. Open the water inlet tap to replenish the water within the tank, ensuring the level is kept above the minimum marker.

The pump is now circulating fresh water into the system purging it of contaminated water.

First circulate in one direction and then the other until the water is running clear. Check the pH to ensure all acidity has been removed.



If the pump is not to be used for a period of time, wash out the pump after use by circulating clean water through it, to prevent any residues from drying and causing the rotor to jam.

***SECTION E – FREQUENTLY ASKED QUESTIONS ABOUT DESCALING***

***Q. Which descaling chemical should I use?***

- A. This is determined by the type of deposit and the materials of which the equipment to be decaled is constructed. First determine the materials, as this may eliminate the use of some of the stronger chemicals.

***Q. Which is the strongest chemical?***

- A. These increase in strength from Scalebreaker CG, through SR, FX up to HD.

***Q. Which is the best all round chemical to use?***

- A. Assuming there's no aluminium or galvanised steel within the system we'd recommend Scalebreaker FX. It is in liquid form for ease of use, is quite strong, and can break down both scale and rust deposits. It doesn't fume, and may be despatched on most parcels carriers.

***Q. How do I know when I have finished descaling?***

- A. There are various indicators that can be used, and these are described within the earlier section of the manual. Monitoring the pH value is the best indicator to progress. If the pH reading is static and there is sufficient strength left in the solution, then descaling has finished.

***Q. What effect will Scalebreaker chemicals have on seals and 'O' rings in waterways?***

- A. O rings and seals are made of many different plastic materials, but generally Scalebreaker FX can be safely used with O ring and seal materials such as butyl and nitrile rubbers, EPDM, and Viton. These are used in cooling circuits of mould tools and water-cooled rollers. Scalebreaker HD may be used if the O rings are EPDM or Viton, but not otherwise.

***Q. Can you clear a complete blockage in pipe work?***

- A. Not always. The built-in flow reverser makes it possible to attack scale from both directions. By attacking scale or a restriction from both sides it is possible to clean piping which is almost totally obstructed, but if there is a complete obstruction of compacted debris, then it is difficult to get descaling chemical to the blockage face to dissolve it. It is always better to carry out descaling before a complete blockage occurs.

***Q. What precautions should I take when descaling?***

- A. 1. When working with acidic descaling chemicals always wear suitable protective clothing and goggles, and check and observe instructions supplied with descaling chemicals.
2. During descaling, the tank cap should not be screwed on by more than a quarter turn, to allow for the passage and elimination of the gas evolved during descaling.
3. Caps should be kept securely on all chemical containers whilst not in use. To avoid splashes, operators should avoid standing directly over the open neck of either chemical containers or the filling cap of the descaling pump whilst pouring or adding chemicals.
4. When descaling with any acid, some hydrogen gas may be evolved. Hydrogen is a flammable gas, and the working area should be well ventilated. Avoid smoking nearby, or any other means of ignition.

**SECTION F - TROUBLE SHOOTING, SERVICE AND REPAIR**

Kamco have a “Service and Repair” facility at our premises in St Albans, and can undertake repairs or supply replacement parts as required.

Your Scalebreaker pump was flow and pressure tested after assembly to ensure that it would perform to a high standard. However, over time and use parts may have been physically damaged, worn out, or partially blocked by non-soluble matter. If you are concerned that your pump may not be producing the same performance as when it left our factory there are a number of steps that you can take to test, and repair, your unit. These are listed below. They are not time consuming, do not require a high level of expertise and will not invalidate the warranty.

**Trouble shooting / problem solving.**

A flow chart is included on the following page to assist in diagnosing common problems that can be experienced on site. The chart and illustrated test are a useful guide in determining if a problem is related to the Scalebreaker pump or if it is a problem related to the equipment being descaled.

**How to check your Scalebreaker performance.**

**Test 1 - Pressure test**

**What you need:** Pressure gauge 0-30 psi adapted to the appropriate BSP size.

1. Fill the tank at least half full of full of water.
2. Point the flow reverser lever to the left.

**Standard models:**

3. Cap off the end of the right-hand hose.
4. Hold the left-hand hose and proceed as for point 8. below

**FWF models:**

5. Position the left-hand valve to “Circulate” and the right hand valve to “Dump”.
6. Attach one supply/return hose to the BSP nipples (short circuiting the flow).
7. Attach the dump hose as normal.
8. Holding the end of the dump hose away from you to a suitable discharge point, switch on the motor for five seconds. You should see a strong jet of water.
9. Attach the pressure gauge to the end of the hose end and turn the motor on for 30 seconds. While the motor is running you should get a reading of 13psi for the C20, 23-25psi for the C40, and 26-28psi for the C90 and C210.

**Test 2 - Flow rate test**

**What you need:** Empty clean 5 litre container (e.g. a used Scalebreaker FX container)

1. Repeat steps 1-7 of test above.
2. Hold the dump hose so that it will discharge water into the empty container.
3. When ready, ask an assistant to time how long it takes to fill the container. You should get a reading of between:  
7-8 seconds for the C90, 9-11 seconds for the C40, and 16-18 seconds for the C20.
4. For the CF210 fill a 25lt container which should take approximately 25 seconds.

**Inspection**

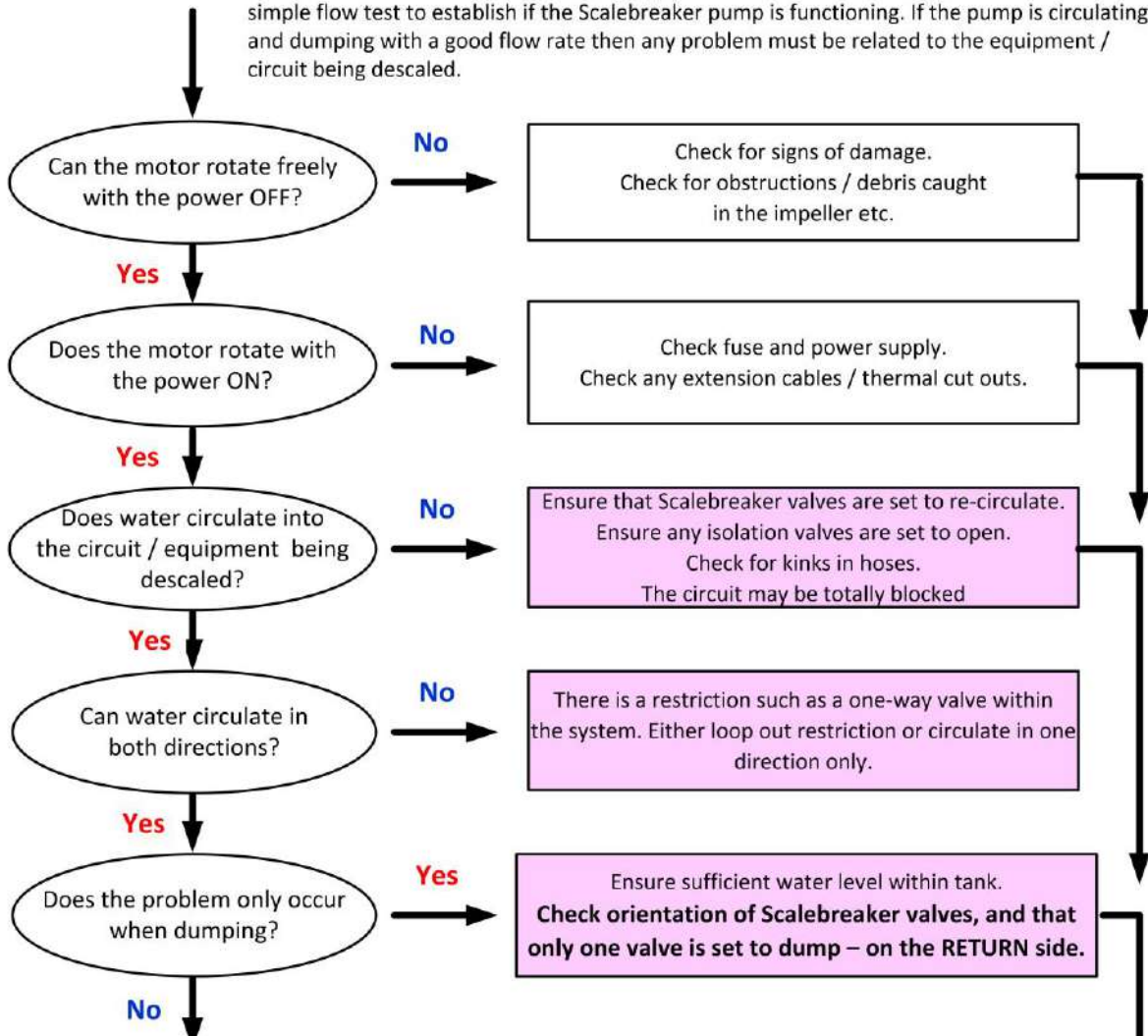
1. Remove the 4 bolts that hold the flange onto the tank.
2. Lift and withdraw the pump assembly from the tank.
3. Inspect the rotor cover at the bottom of the unit to ensure:
  1. It is flat.
  2. There are no securing bolts damaged or missing
  3. The O-ring is still in place and has not been pushed out or damaged.
4. Inspect the inside of the impeller to make sure that there is no debris inside.
5. Check all hose connection to ensure they are secure.

***If none of the above faults are apparent please call the Kamco Technical Help line on 00 44 (0)1727 875020***

**TROUBLE SHOOTING / PROBLEM SOLVING**

**TROUBLE SHOOTING / PROBLEM SOLVING**

Use the flow chart to determine any likely problem and then if necessary undertake the simple flow test to establish if the Scalebreaker pump is functioning. If the pump is circulating and dumping with a good flow rate then any problem must be related to the equipment / circuit being descaled.



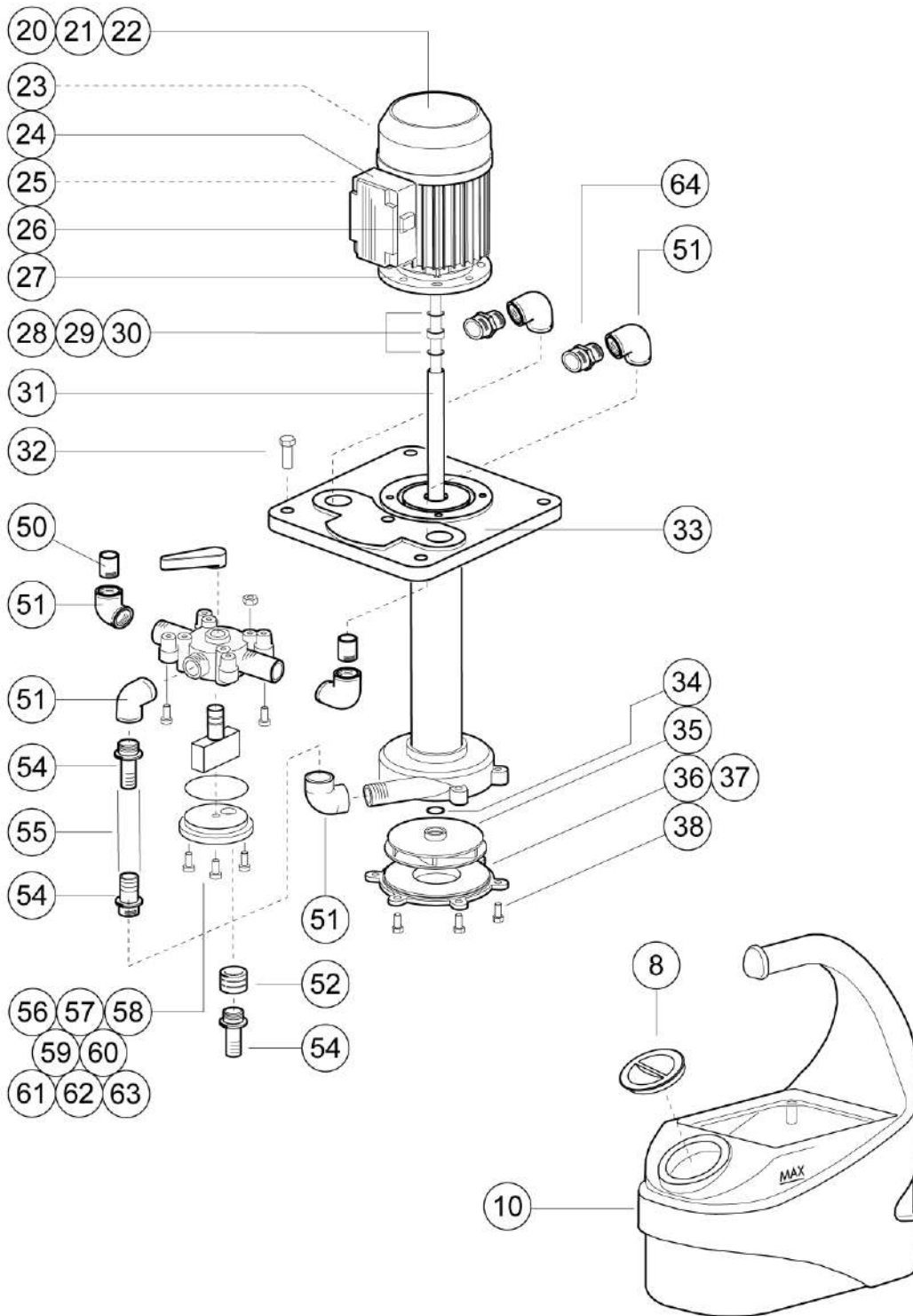
**Carry out the following test to establish if it is a Scalebreaker problem or a heating system problem.**

1. Fill the tank to half height
2. Loop the flow and return connections together with one of the flow / return hoses.
3. Place the dump hose back through the filler cap.
4. Set both valves to re-circulate. Switch on and check flow, then operate flow reverser to check flow in reverse direction.
5. Now set valve on return side to dump and check flow.
6. Return this valve to re-circulate mode, change flow direction and set other valve to dump.
7. If the pump is working, the problem is within the circuit being descaled.

If this test fails:  
**Contact Kamco for further assistance.**



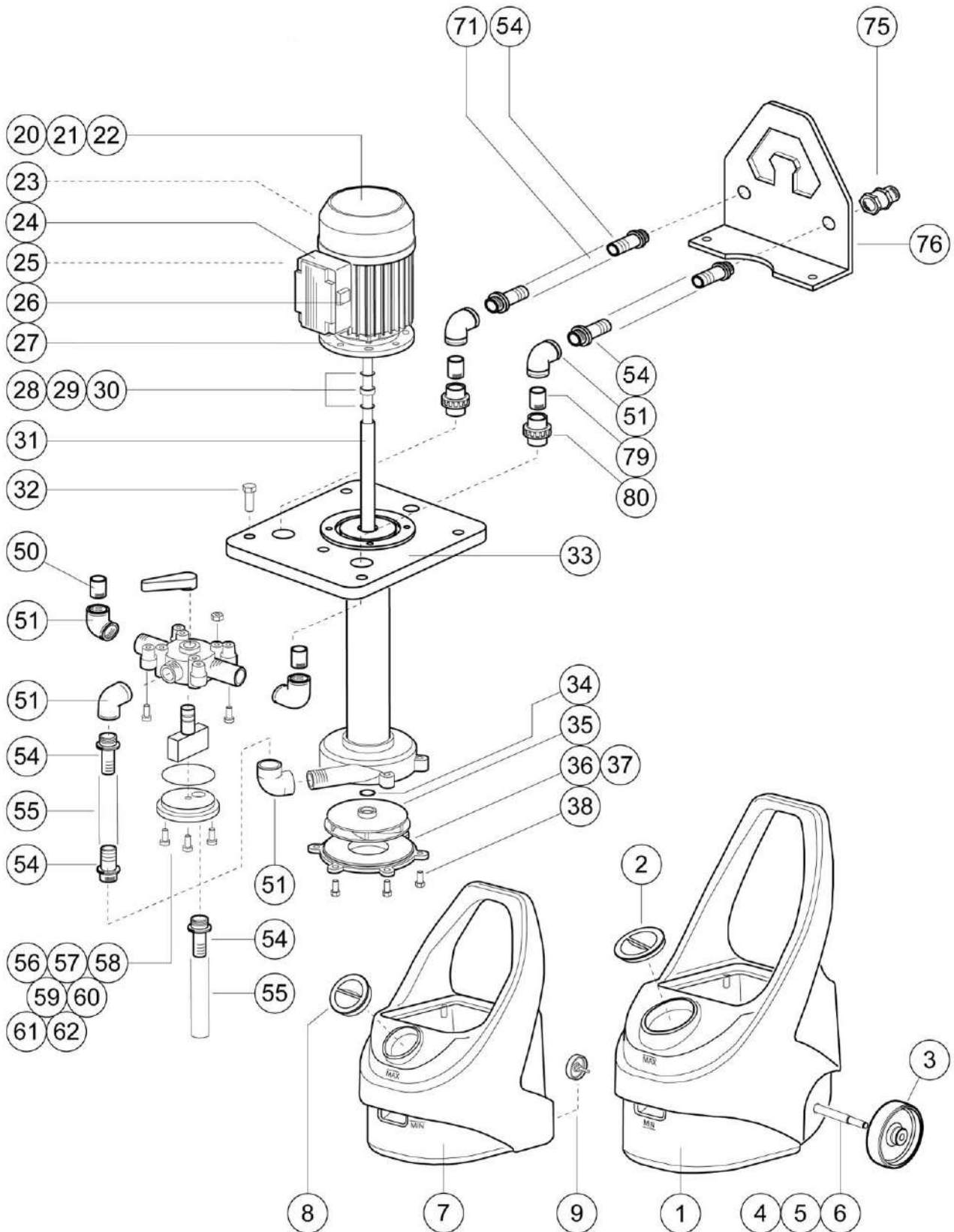
**SCALEBREAKER C20 - EXPLODED VIEW AND SPARES DIAGRAM**



Refer to the following pages for component descriptions and part codes.

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

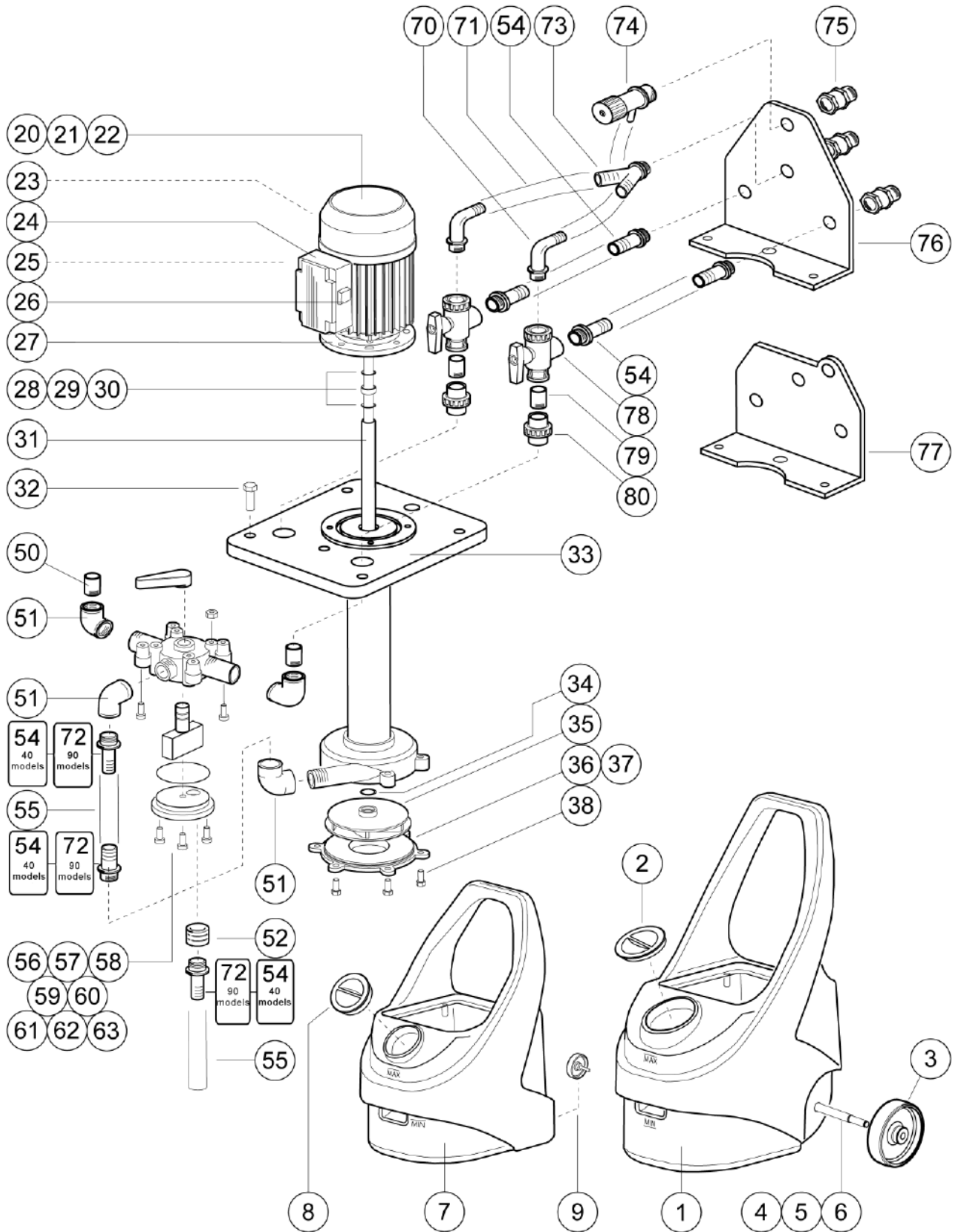
**SCALEBREAKER C40 / C90 (STANDARD MODEL) EXPLODED VIEW AND SPARES DIAGRAM**



Refer to the following pages for component descriptions and part codes.

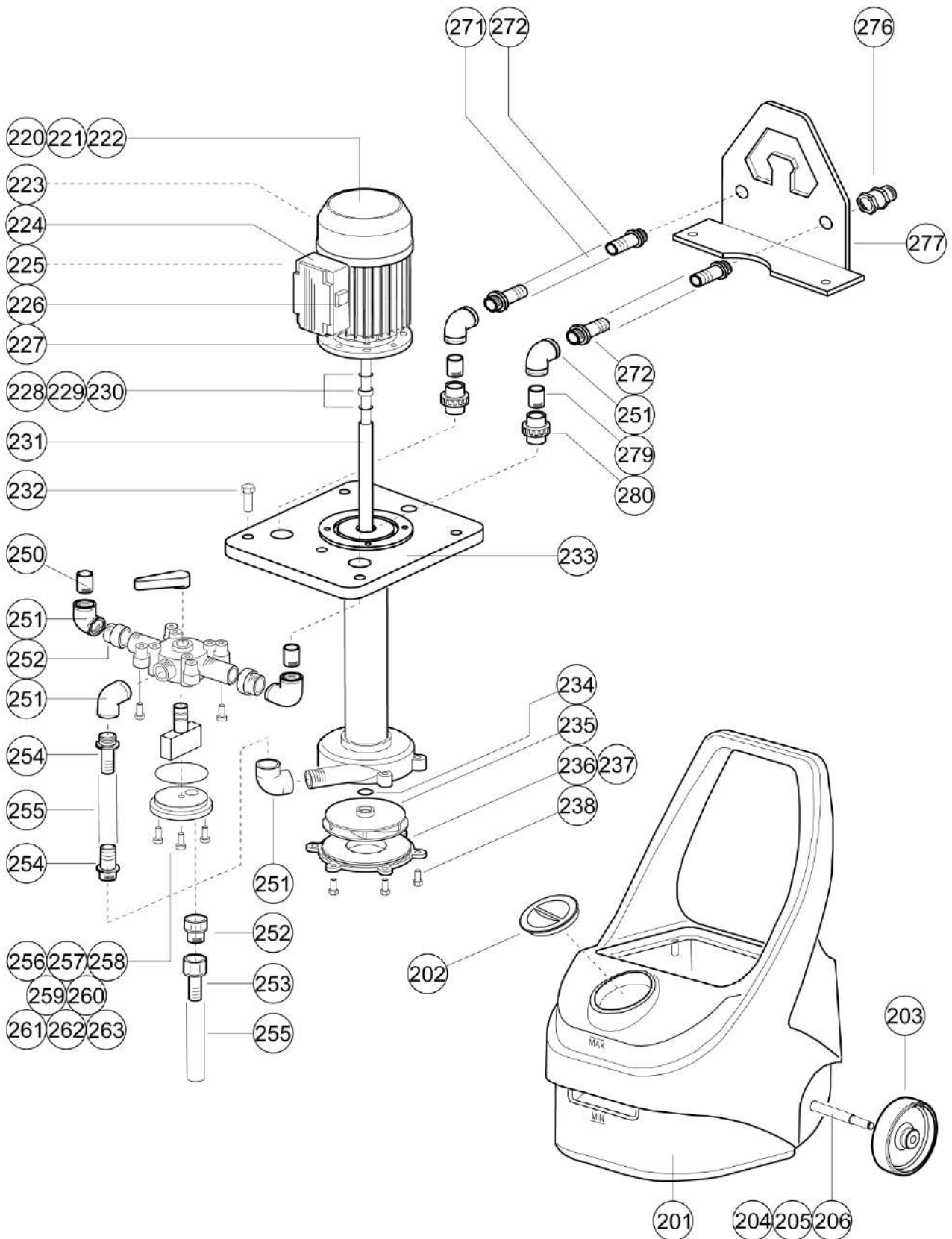
**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

**SCALEBREAKER C40 / C90 (WITH FLUSH FACILITY) EXPLODED VIEW AND SPARES DIAGRAM**



Refer to the following pages for component descriptions and part codes.

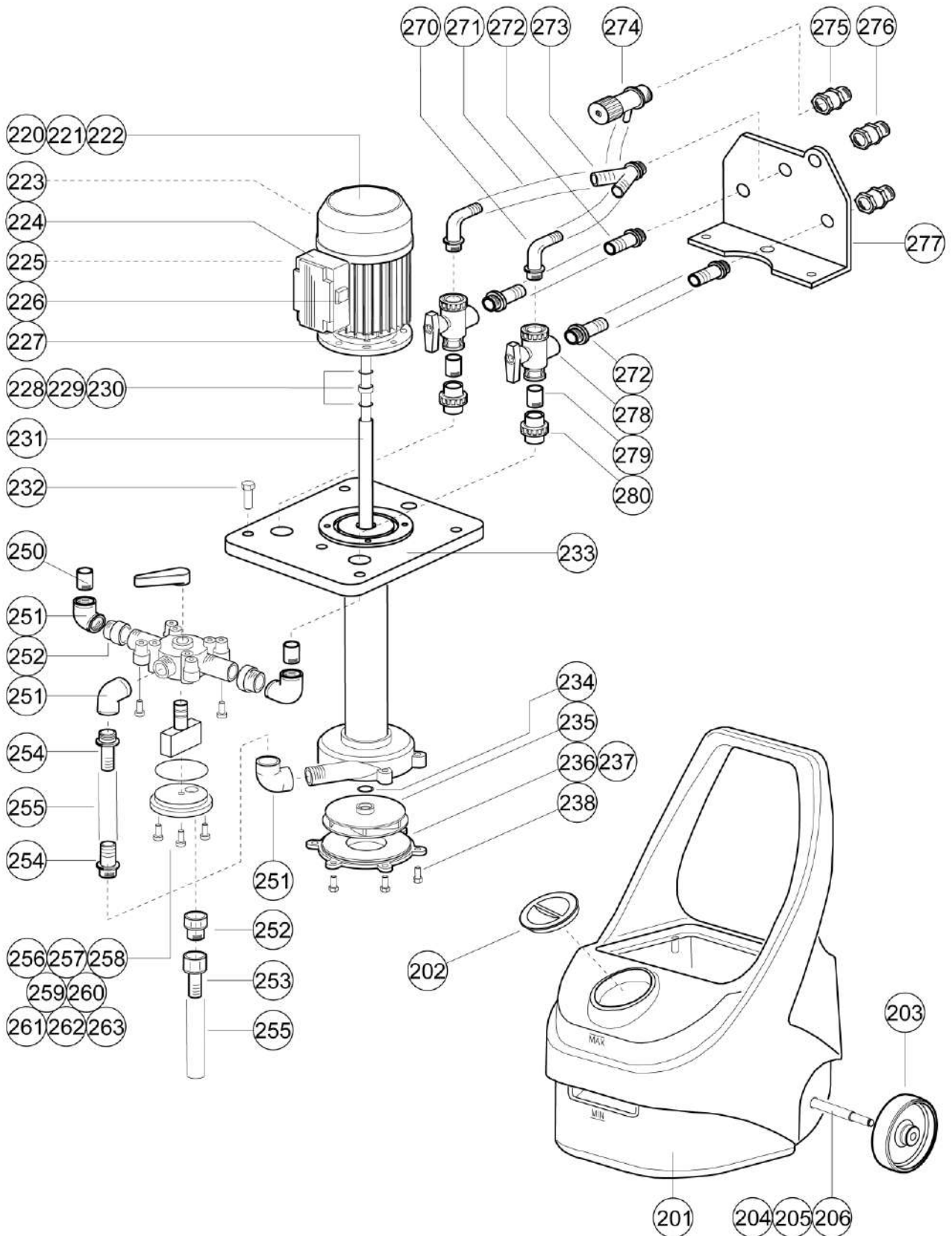
**SCALEBREAKER C210 (STANDARD MODEL) EXPLODED VIEW AND SPARES DIAGRAM**



Refer to the following pages for component descriptions and part codes.

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

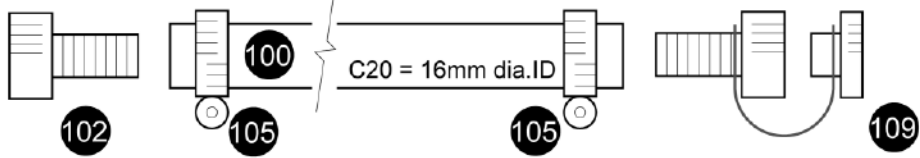
**SCALEBREAKER C210 (WITH FLUSH FACILITY) EXPLODED VIEW AND SPARES DIAGRAM**



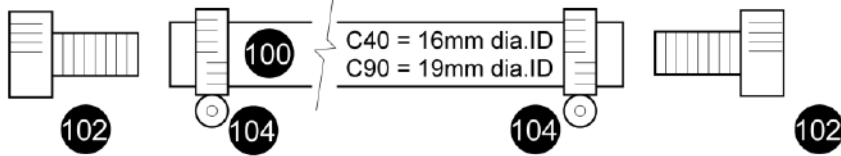
Refer to the following pages for component descriptions and part codes.

**EXPLODED VIEW OF HOSE ASSEMBLIES**

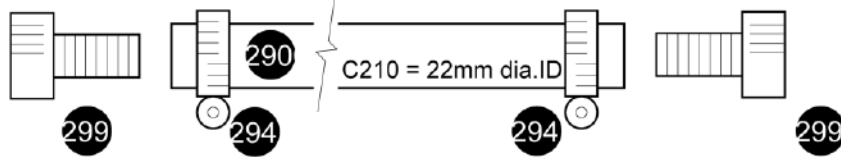
2 x Flow and Return Hoses, each 3 mtrs long (C20 model).



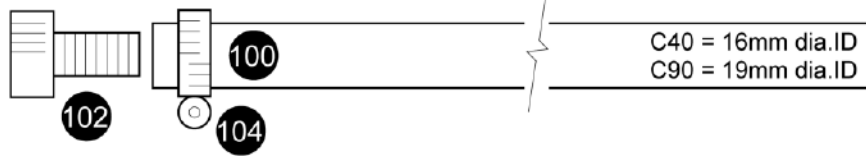
2 x Flow and Return Hoses, each 3 mtrs long (All C40 & C90 models).



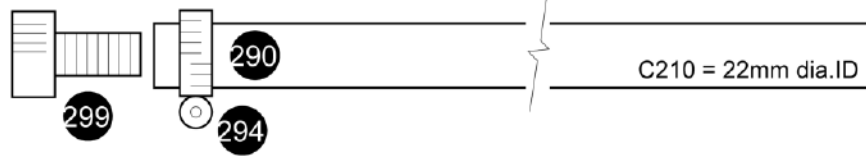
2 x Flow and Return Hoses, each 3 mtrs long (Both C210 models).



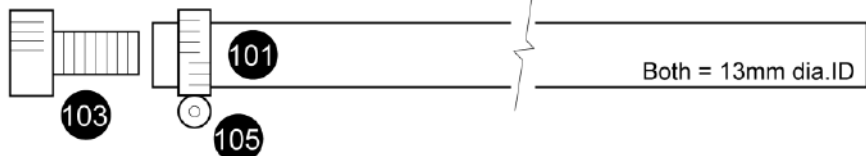
1 x Dump Hose, 3 mtrs long (C40 & C90 models with flush facility).



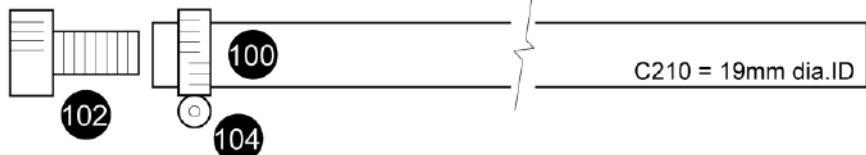
1 x Dump Hose, 3 mtrs long (C210 model with flush facility).



1 x Water Inlet Hose, 3 mtrs long (C40 & C90 models with flush facility).



1 x Water Inlet Hose, 3 mtrs long (C210 model with flush facility).



Refer to the following pages for component descriptions and part codes

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

**SPARES LIST**

No. on Diagram	Pump Type	Product Code	Description	Unit Price
1	C90	H09006K	C90 moulded tank	
2	C90	H04005	C90 tank cap	
3	C90	H09008K	C90 wheel (each)	
4	C90	H09007K	C90 axle	
5	C90	H09009K	C90 axle circlip inner 22.2mm	
6	C90	H09010K	C90 axle circlip outer 20.0mm	
7	C40	H04020K	C40 moulded tank	
8	C20 & C40	H04021K	C20 & C40 tank cap	
9	C40	H04022K	Pair of CF40 wheels with axles	
10	C20	H02001	C20 moulded tank	
20	C20	H02002L22	C20 motor 230v (exc. fan cover)	
20	C20	H04002L11	C20 motor 110v (exc. fan cover)	
20	C40	H04002L22K	C40 motor 230v (exc. fan cover)	
20	C40	H04002L11K	C40 motor 110v (exc. fan cover)	
20	C90	H09002L22K	C90 motor 230v (exc. fan cover)	
20	C90	H09002L11K	C90 motor 110v (exc. fan cover)	
21	C20	H01502G	C20 fan cover	
21	C40 & C90	H04012KA	C40 & C90 fan cover	
22	C20	H01502E	C20 motor fan	
22	C40 & C90	H04012KB	C40 & C90 motor fan	
23	C20	H01502B	C20 motor bearings	
23	C40 & C90	H03002B	C40 & C90 motor bearings	
24	C20	H03002F	C20 motor switch box	
24	C40 & C90	H03002F	C40 & C90 motor switch box	
25	C20	H02002D22	C20 capacitor 230v	
25	C20	H02002D11	C20 capacitor 110v	
25	C40	H03002D22	C40 capacitor 230v	
25	C40	H03002D11	C40 capacitor 110v	
25	C90	H19002D22	C90 capacitor 230v	
25	C90	H19002D11	C90 capacitor 110v	
26	All	H01502C	On/off switch for motor	
27	C20	H01503A	M6 x 40mm brass bolt	
27	C40 & C90	H030HJ08	M8 x 40mm brass bolt	
27	C20	H01503	M6 brass nut	
27	C40 & C90	H030HJ07	M8 brass nut	
27	C20	H01503B	M6 brass washer	
27	C40 & C90	H030HJ09	M8 brass washer	
28	All	H03002A	Motor shaft circlip	
29	All	H03006	White Arnite bush	
30	All	H03007	Drive shaft 'O' ring	
31	C20	H01509	C20 drive shaft sleeve	
31	C40	H04014K	C40 drive shaft sleeve	
31	C90	H09005K	C90 drive shaft sleeve	
32	All	H01507K	M12 PP bolt	
33	C20	H02000C	C20 flange and body	
33	C40	H04013K	C40 flange and body	
33	C90	H09001K	C90 flange and body	

continued on next page.

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

***SPARES LIST (continued)***

No. on Diagram	Pump Type	Product Code	Description	Unit Price
34	All	H0150211A	Impeller 'O' ring	
35	C20 & C40	H04015K	C20 & C40 impeller	
35	C90	H09004K	C90 impeller	
36	All	H04017K	Rotor cover	
37	All	H04016K	Rotor cover 'O' ring	
38	All	H03012K	M10 PP bolt	
50	C20	M1028	3/4" BSP threaded nipple - 50mm long	
50	C40 & C90	H04018KF	3/4" BSP threaded nipple - 45mm long	
51	All	H03023	3/4" BSP female/female elbow	
52	C40 & C90	H030F46	3/4" x 3/4" BSP socket	
54	C20 & C40	H090F04	3/4" BSP male x 19mm PP hose adapter	
54	C90	H190F15	3/4" BSP male x 25mm PP hose adapter	
55	C20 & C40	HH019X30	Clear hose 19mm ID (per m)	
55	C90	HH2229	Clear hose 22mm ID (per m)	
56	All	H04018KAA	Flow reverser handle	
57	All	H04018KBB	Flow reverser paddle	
58	All	H04018KCC	Flow reverser body	
59	All	H04018KDD	Flow reverser top plate	
60	All	H04018KE	'O' ring for reverser top plate	
61	All	H03007	'O' ring for flow reverser paddle	
62	All	H04018KH	M6 x 50mm socket cap head screw	
63	All	H030F54	M6 nut	
64	C20	H030F07	3/4" x 3/4" BSP brass nipple	
70	C40 & C90	H090F03	3/4" BSP male x 20mm 90° hose adapter	
71	C40 & C90	HH019X30	Clear hose 19mm ID (per m)	
72	C40 & C90	H090F04	3/4" BSP male x 19mm PP hose adapter	
73	C40 & C90	H030HJ06	3/4" BSP male x 20mm 'Y' piece hose adapter	
74	C40 & C90	H190F16	3/4" BSP x 19mm water inlet tap	
75	C40 & C90	H090F06	3/4" BSP female x 3/4" BSP male brass adapter	
76	C40 & C90	H04024GW	C40 / C90 hose support bracket (standard model)	
76	C90	H09011K	CF90 hose support bracket (with flush facility)	
77	C40	H04024K	CF40 hose support bracket (with flush facility)	
78	C40 & C90	H090F01	3/4" single union L port valve	
79	C40 & C90	H04023K	3/4" BSP threaded nipple - 35mm long	
80	C40 & C90	H04019K	3/4" BSP union	
-	All	H01514A	10 part BSP adapter set	



**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

***SPARES LIST (continued)***

No. on Diagram	Pump Type	Product Code	Description	Unit Price
201	C210	H21004K	CF210 moulded tank	
202	C210	H04005	CF210 tank cap	
203	C210	H09008K	CF210 wheel (each)	
204	C210	H21005K	CF210 axle	
205	C210	H09009K	CF210 axle circlip inner 22.2mm	
206	C210	H09010K	CF210 axle circlip outer 20.0mm	
220	C210	H21001S22	CF210 motor 230v (exc. fan cover)	
220	C210	H21001S11	CF210 motor 110v (exc. fan cover)	
221	C210	H04012KA	Fan cover	
222	C210	H04012KB	Motor fan	
223	C210	H03002B	Motor bearings	
224	C210	H03002F	Motor switch box	
225	C210	H03002D22	CF210 capacitor 230v	
225	C210	H03002D11	CF210 capacitor 110v	
226	C210	H01502C	On/off switch for motor	
227	C210	H030HJ08	M8 x 40mm brass bolt	
227	C210	H030HJ07	M8 brass nut	
227	C210	H030HJ09	M8 brass washer	
228	C210	H03002A	Motor shaft circlip	
229	C210	H03006	White 'Arnite' bush	
230	C210	H03007	Drive shaft 'O' ring	
231	C210	H21003K	CF210 drive shaft sleeve	
232	C210	H01507K	M12 PP bolt	
233	C210	H21001KCOMP	CF210 flange and body	
234	C210	H0150211A	Impeller 'O' ring	
235	C210	H09004K	CF210 impeller	
236	C210	H04017K	Rotor cover	
237	C210	H04016K	Rotor cover 'O' ring	
238	C210	H03012K	M10 PP bolt	

continued on next page.

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

**SPARES LIST (continued)**

<b>No. on Diagram</b>	<b>Pump Type</b>	<b>Product Code</b>	<b>Description</b>	<b>Unit Price</b>
250	C210	H21010K	1" BSP threaded nipple - 45mm long	
251	C210	H030F26	1" BSP female/female elbow	
252	C210	MI036	1" BSP male x 3/4" female reducing bush	
253	C210	H190F20	1" BSP female x 25mm hose adapter	
254	C210	H190F15	3/4" BSP male x 25mm PP Hose adapter	
255	C210	HH2229	Clear hose 22mm ID (per m)	
256	C210	H04018KAA	Flow reverser handle	
257	C210	H04018KBB	Flow reverser paddle	
258	C210	H04018KC	Flow reverser body	
259	C210	H04018KD	Flow reverser top plate	
260	C210	H04018KE	'O' ring for reverser top plate	
261	C210	H03007	'O' ring for flow reverser paddle	
262	C210	H04018KH	M6 x 50mm socket cap head screw	
263	C210	H030F54	M6 nut	
270	C210	H190F10	1" BSP male x 25mm 90° hose adapter	
271	C210	HH2229	Clear hose 22mm ID (per m)	
272	C210	H190F05	1" BSP male x 25mm PP hose adapter	
273	C210	H190F07	1" BSP male x 25mm 'Y' piece hose adapter	
274	C210	H190F16	3/4" BSP male x 19mm Water Inlet Tap	
275	C210	H090F06	3/4" female x 3/4" BSP male brass adapter (water inlet)	
276	C210	H21007K	1" BSP female x 1" male brass adapter (flow, return, dump)	
277	C210	H21006K	CF210 hose support bracket (standard model)	
277	C210	H21006GW	CF210 hose support bracket (with flush facility)	
278	C210	H21008K	1" BSP single union L port valve	
279	C210	H21009K	1" BSP threaded nipple - 40mm long	
280	C210	H21011K	1" BSP threaded union	

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

**HOSE COMPONENTS**

No. on Diagram	Pump Type	Product Code	Description	Unit Price
100	C20 & C40	HH016X30	Clear hose 16mm ID per metre (state length)	
100	C90 C210	HH019X30	Clear hose 19mm ID per metre (state length)	
101	C40 & C90	HH013X30	Yellow hose 13mm ID per metre (state length)	
102	C20 & C40	H030F47	3/4" BSP female x 16mm PP hose adapter	
102	C90	H030F69	3/4" BSP female x 19mm PP hose adapter	
103	C40 & C90	H04027K	3/4" BSP female x 13mm PP hose adapter	
104	C90	H030F13A#	Worm drive clip, 16-25mm	
105	C20 & C40	H030F13	Worm drive clip, 12-22mm	
106	C40	H030F04	3/4" BSP male x 16mm PP hose adapter	
106	C90	H090F04	3/4" BSP male x 20mm PP hose adapter	
109	C20	H01515	1/2" BSP x 16mm PP hose adapter with plug	
290	C210	HH022X30	Clear hose 22mm ID per metre (state length)	
294	C210	H030F13B	Worm drive clip, 20-32mm	
299	C210	H190F20	1" BSP female x 25mm PP hose adapter	
	C20	H030F05	Pack 10 x 1/2" seals	
	C20 40 90	H030F06	Pack 10 x 3/4" seals	
	C210	H190F06	Pack 10 x 1" seals	

**HOSE ASSEMBLIES**

No. on Diagram	Pump Type	Product Code	Description	Unit Price
	C20	HHC20FR	Pair of 3m x 16mm ID flow and return hoses	
	C40	HHC40FR	Pair of 3m x 16mm ID flow and return hoses	
	C40	HHC40WI	3m x 13mm ID water inlet hose	
	C40	HHC40DH	3m x 16mm ID dump hose	
	C90	HHC90FR	Pair of 3m x 19mm ID flow and return hoses	
	C90	HHC90WI	3m x 13mm ID water inlet hose	
	C90	HHC90DH	3m x 16mm ID dump hose	
	C210	HHC210FR	Pair of 3m x 22mm ID flow and return hoses	
	C210	HHC210	3m x 19mm ID water inlet hose	
	C210	HHC210	3m x 22mm ID dump hose	

**Kamco Descaling Pump Manual**  
**C20 | C40 | C90 | C210**

**Kamco Ltd**

Unit 9 Curo Park, Frogmore,  
St. Albans, Hertfordshire, AL2 2DD

Tel: 01727 875020

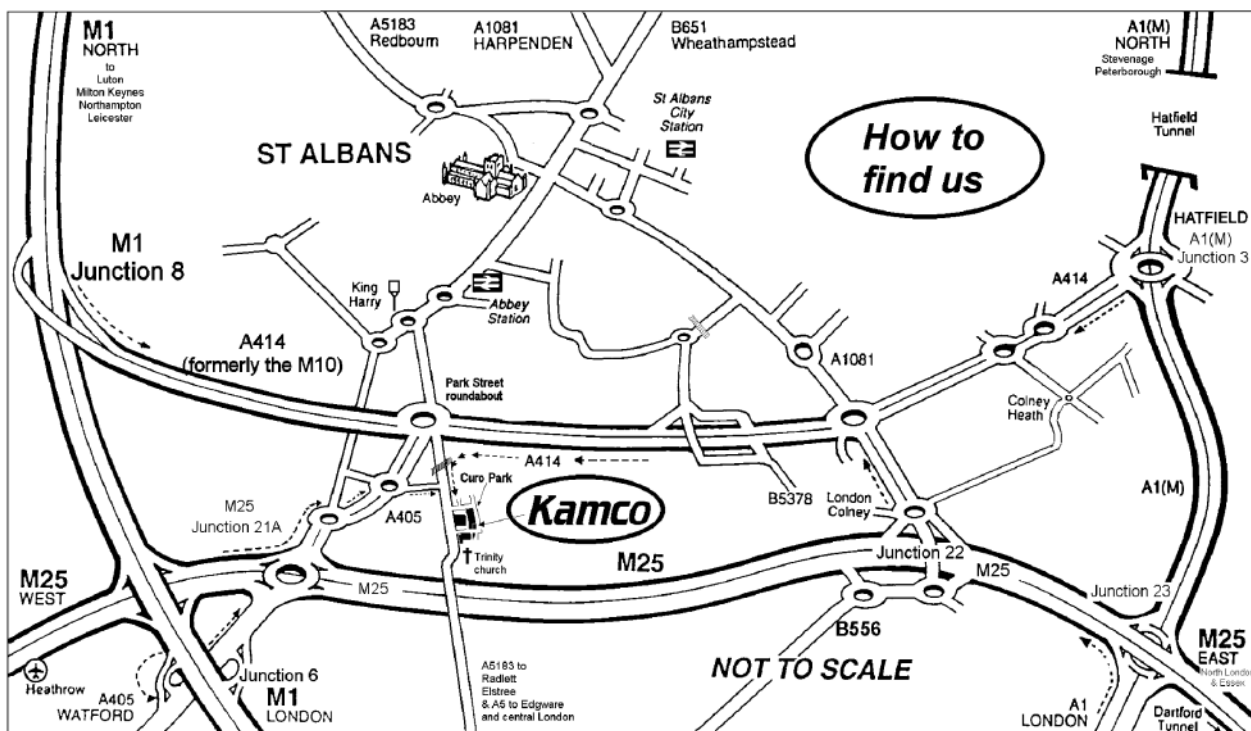
email: [info@kamco.co.uk](mailto:info@kamco.co.uk)

Additional information may be obtained from our website:  
**[www.kamco.co.uk](http://www.kamco.co.uk)**

Log on to our web site for complete details of our full product range, latest product developments, operational instructions, chemical information etc.

**HELP LINE**

Contact our help line on 01727 875020. Monday to Friday 8.30am to 4.30pm.



Location: Curo Park, Frogmore is located 1 mile south of the “Park Street” roundabout on the A5183 from St Albans to Radlett.

From the North: Curo Park is located on the left-hand side of the A5183. The main access road is shared with the entrance to Park Industrial Estate. Drive along the approach road for 250 metres, bear right, and look for our building on the right at the end.

From the South: Curo Park is located on the right-hand side of the A5183. There is a secondary access road 50 metres after Trinity church, between the new houses. Drive along the approach road for 200 metres. We are the last building on the left.