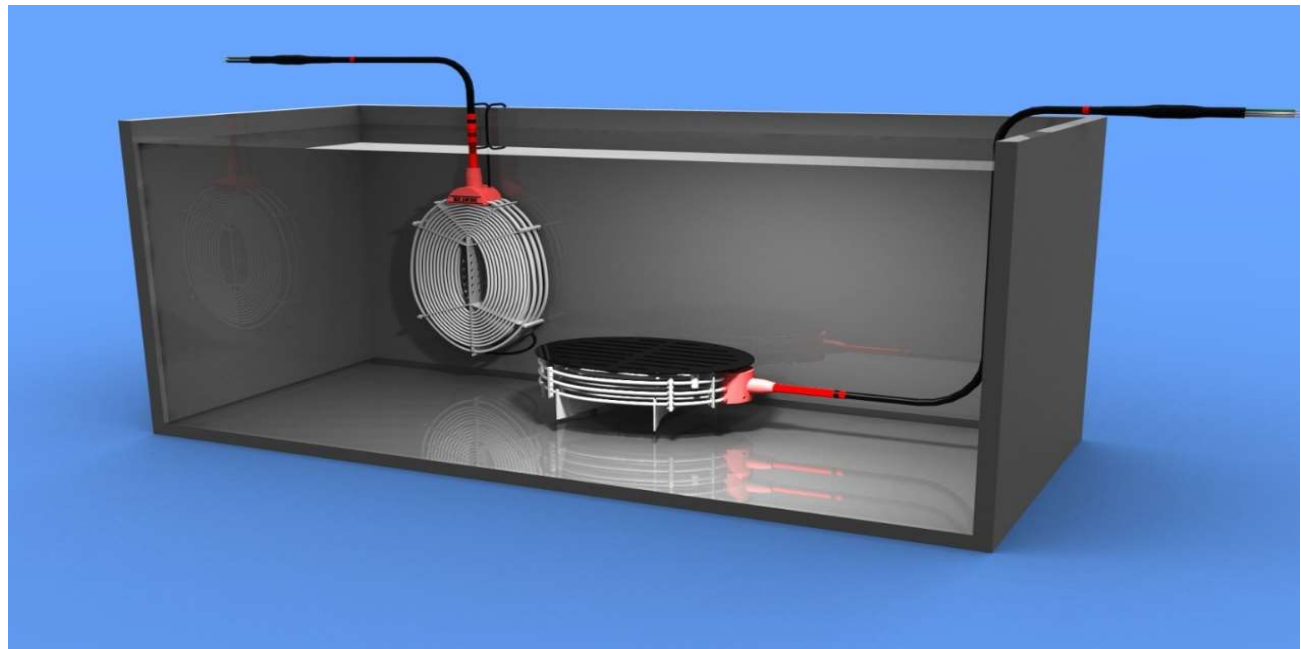


# **POLARIS POPULAR**

**NON - CORRODABLE ELECTRIC IMMERSION HEATER**

## **INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS**

These instructions should be carefully read and understood by all operators before use.  
**Please verify you have the correct instructions**



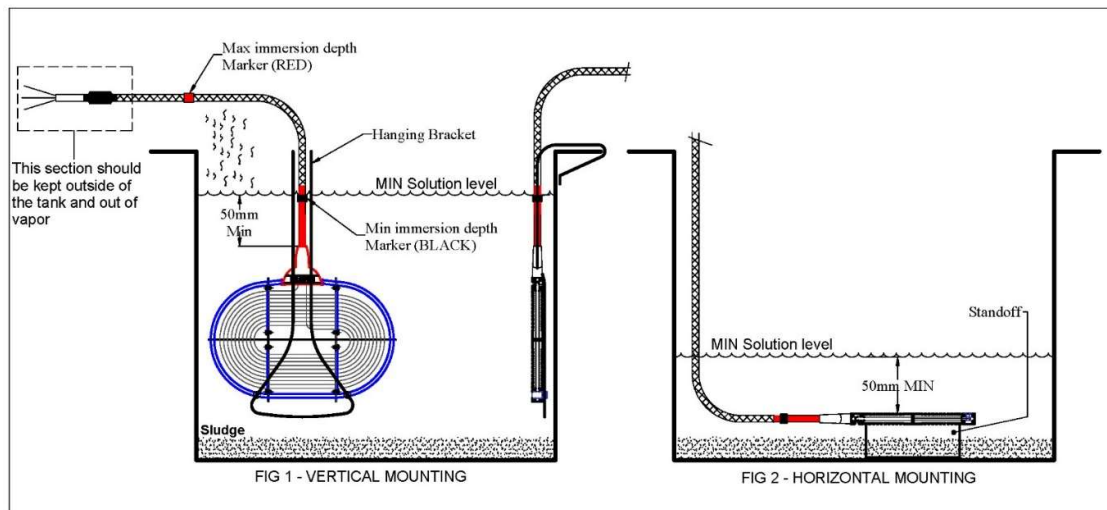
This Polaris Popular Immersion heater is manufactured from the finest quality non corrodable materials and should give trouble free service provided it is installed, operated and maintained in accordance with these instructions.

## INSTALLATION

### IMPORTANT – INSTALLATION MUST BE CARRIED OUT BY A QUALIFIED ELECTRICIAN

The unit is best located near the bottom of the tank, clear of any scale or sludge. Minimum liquid depth above the heater is 50mm and is indicated by a black marker. The Maximum immersion depth of the heater is indicated by a red marker near the end of the supply lead. See Figures 1 and 2. Insufficient depth will impair heat transfer, and will overheat and burn-out the element, RENDERING WARRANTY INVALID.

The immersion heater can be used in tanks made from plastic, metal and glass so long as no sharp edges can damage the exiting cable from the heater.

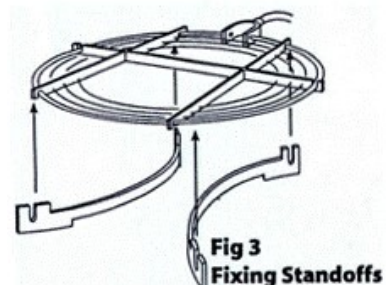


### Vertical mounting of heater

For mounting vertically, POPULAR heaters are fitted with non-corrodable hanging brackets as standard, see Fig.1. To prepare the hanging bracket, carefully remove the ties and hand-straighten the uprights. Set the heater to a suitable depth in the tank observing the Black safe level indicator to ensure minimum depth. Bend the brackets over the tank lip with excess length against the outside of tank. In cases where the solution is agitated and/or has a high specific gravity it is recommended that the hanger be clamped to the tank or the heater be fitted with weights to prevent flotation. Corrosion resistant weights for this purpose are available from BRAUDE. The heater may be placed directly against the tank wall but it is recommended that a 25mm clearance should be allowed to the front and sides of the heater. A protective baffle is also available for the POPULAR which is fitted to the heater frame using the clips provided.

### Horizontal mounting of heater

For mounting horizontally, stand offs are provided which should be fixed to the heater frame as shown in Fig 3. Once fitted the heater may be placed directly onto the tank floor as shown in Fig 2 ensuring a minimum 25mm clearance above and to the sides of the heater. Care should be taken to ensure that the heater stands out of any sludge which may be present on the tank bottom. In cases where the solution is agitated and/or has a high specific gravity it is recommended that weights be fitted to the heater to prevent flotation. Corrosion resistant weights for this purpose are available from BRAUDE. A protective baffle is also available for the POPULAR heater which is fitted to the heater frame using the clips provided



## **ELECTRICAL CONNECTIONS (See Fig 4, 5 & 6)**

The following points should be observed when connecting the heater to electrical supply.

- Ensure that the heater is rated at the correct voltage for supply. Details will be found on the end of the heater lead
- An earth is provided as an integral part of the POPULAR heater, It is essential that this is satisfactorily connected.
- It is essential that a Residual Current Device (RCD) is incorporated in the circuit which will provide protection in the event of damage to the heater causing earth leakage.
- The heater supply lead is provided with bare conductor ends which can be directly wired into your supply control panel OR have a suitable industrial plug fitted in accordance with the ratings shown in table 1 below.
- Where the heater is to be directly wired into a control panel there shall be a disconnection incorporated in the fixed wiring.

## **CURRENT RATINGS**

Electrical circuits should be protected by suitable circuit breakers. The table below gives nominal line currents, to assist in selecting a suitable fuse or circuit breaker and plugs for attachment to the heater. N.B. The heater will operate with a higher current during start up and when cold.

<b>RECOMMENDED PLUG, MCB &amp; RCD RATINGS FOR SINGLE &amp; THREE PHASE HEATERS</b>								
<b>Nominal Rating (kW)</b>	<b>Heater 230V Single Phase</b>	<b>Single phase plug rating 230V, 50-60Hz</b>	<b>RCD Current rating 230V</b>	<b>MCB Current rating 230V</b>	<b>Heater 400V Three Phase (per phase)</b>	<b>Three phase Plug rating 400V 50-60Hz</b>	<b>RCD Current rating 400V</b>	<b>MCB Current rating 400V</b>
½	2.3A	16A	25A	6				
1	4.7A	16A	25A	6				
1½	7.3A	16A	25A	10	2.2A	16A	25A	6
2	11.7A	16A	25A	16				
3	14.5A	16A	25A	16	4.7A	16A	25A	6
4	20.0A	32A	40A	25				
4½	22.0A	32A	40A	25	7.3A	16A	25A	10
6	29.1A	63A	40A	40	11.7A	16A	25A	16
9	43.4A	63A	63A	50	14.5A	32A	25A	20
12					20.0A	32A	40A	25
15					26.4A	32A	40A	32
18					29.1A	32A	40A	40

**Table 1- Nominal running current in each line when cold**

For other supply voltages i.e. 440V see the heater lead label for phase current or contact Braude at [technical@braude.co.uk](mailto:technical@braude.co.uk)

Always consult a qualified electrician when installing RCD & MCB.

RCD should have a trip sensitivity of 30mA and be TYPE AC

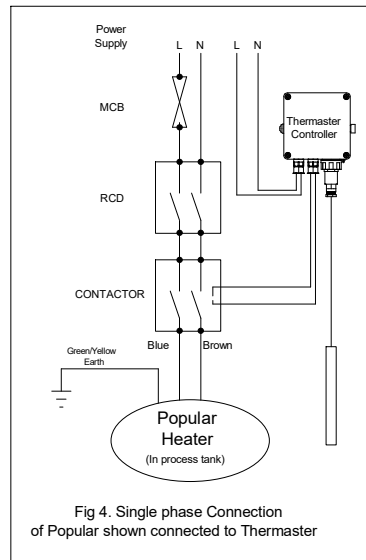
Single phase heaters should be attached to 2 pole RCD and three phase to 4 pole RCD

MCB used should be TYPE B (resistive loads)

Single phase heaters should be attached to 1 pole MCB and three phase to 3 pole MCB

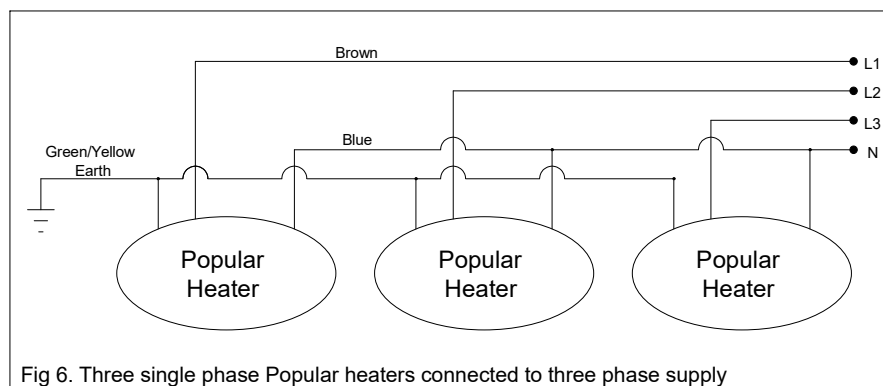
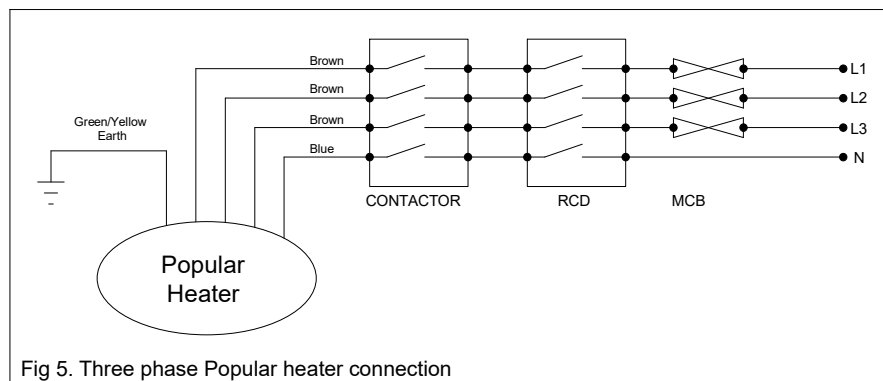
## SINGLE PHASE CONNECTION

See Figure 4 and connecting instructions on the supply lead



## THREE PHASE CONNECTIONS

Three phase units are connected as shown on Figure 5. If a 3 live and earth mains electrical supply is being used with no neutral, the blue (star-point) lead of the 'POPULAR' should be insulated and left unconnected. Three single phase heaters of equal rating can be connected to three phase supply. See Fig.6. Users and operators must ensure that the individual heater's voltage ratings are not exceeded.



## OPERATION

The POPULAR is suited for use in most corrosive solutions at temperatures up to 100°C. To confirm compatibility refer to the chemical chart on page 7 or ask the supplier of the heater.

**ALWAYS ENSURE THAT THE SOLUTION LEVEL COMPLETELY COVERS THE HEATER TO LEVELS INDICATED IN FIGS. 1 AND 2.**

Although the heater is of robust construction, care should be taken to prevent impact damage on the element.

## HIGH SPECIFIC GRAVITY (S.G) SOLUTIONS

All standard Braude Polaris Popular heaters have a watt density of approx. 1w/cm<sup>2</sup>. Where the heater is to be used in a solution which has an S.G of between 1.4 and 1.8 a **LOW WATT DENSITY (LWD) heater should be used**, which has a watt density of 0.5w/cm<sup>2</sup>

## HIGH PH SOLUTIONS

All standard Braude Polaris heaters are predominately manufactured from Fluoropolymer and PVDF materials. Where they are to be used in a solution with a PH of above 12 it recommended that either Polypropylene or PTFE fames are used.

## HEXAVALENT CHROMIC ACID

Hexavalent chromic acid has a severe effect on Polypropylene which is present on all standard heater leads (braid) and therefore a 'CA' type heater should be specified when ordering.

## MAINTENANCE

The POLARIS POPULAR heater is manufactured from non-corrodable materials and therefore requires minimum maintenance. In order to obtain maximum performance from the heater the following procedures must be observed.

Examine the heater periodically. Certain solutions may tend to build a deposit or film on the heater element over a period of time. This must not be allowed to build up unchecked as heat transfer efficiency will suffer and premature failure of the element will occur. The level and time it takes for deposits to build up on the heater element is dependant on individual operating conditions and therefore the user will have to establish a maintenance period based on observation.

The supply lead is an integral part of the heater and therefore the heater should be returned to Braude if it becomes damaged in anyway.

The hanging brackets are manufactured from galvanized rod sheathed in PTFE.

Regular Inspection is necessary. Care must be taken to avoid perforating the bracket sheath as this may lead to contamination of certain solutions. Braude will not accept responsibility for such contamination.

## **REMOVAL, CLEANING AND STORAGE OF HEATER.**

- Before removal or draining the tank, ensure that the heater has been unplugged or disconnected from the supply and allowed to cool down for at least 15 minutes. Remove the heater and rinse thoroughly in clean water. **DO NOT TOUCH** the heated section of the heater, or place it on combustible surfaces until it is fully cooled.
- To remove deposits immerse the heater in a suitable cleaner until it is free from deposits. Rinse thoroughly in clean water. **We would recommend that you consult with your chemical supplier for establishing the best solution to clean off deposit.**
- Heavy deposits may require the units to be left in the solution overnight.

- If the heater is to be stored after cleaning, guard against possible seepage of corrosive liquid due to inadequate draining.

## **CAUTION**

The operator must exercise care when removing the heaters from tanks where corrosive solutions are in use. Make sure the heaters are fully drained and avoid 'carry over' of solution. Operators should be protected against acid spillage and splash by wearing suitable protective clothing.

## **SAFETY - IMPORTANT**

**DO NOT** Switch on power unless you have checked for correct supply voltage.

**DO NOT** Use the heater unless the 'SAFE LEVEL INDICATOR' is fully immersed.

**DO NOT** Examine, move, tamper or remove the heater from the tank unless the power is unplugged / disconnected from the supply and allowed to cool off for at least 15 minutes.

**DO NOT** Attempt to dismantle and tamper with the heater since irreparable damage may occur and invalidate the guarantee.

**DO NOT** Allow sharp objects or other items likely to cause damage to come into contact with polymer electrical elements. This is essential whether the heater power is switched on or not.

## **WARRANTY**

The Polaris heater is covered by a 12 month warranty for defects in material supplied or faults in manufacture, providing the heater installed and is used in accordance with the installation operation and manufacturing instructions.

The Warranty does not cover faults or damage occurring as a result of misuse or the effect of outside faults causing damage to the heater.

Any problem should be notified to the manufacturer as soon as it has occurred with details of the date purchased, the invoice number and the serial number of the heater.

Braude will then advise you of the procedure for return or otherwise.

All Braude products are supplied accordance with our terms and conditions of sale available on our website or by request.

Braude do not accept liability for consequential damages that may arise as a result of use of this equipment

## POLARIS POPULAR NON CORRODABLE ELECTRIC IMMERSION HEATER

### CHEMICAL RESISTANCE

#### IMPORTANT

The following information is intended as a guide for the use of the Polaris Popular Electric Heater in various chemical solutions. It is based on information gathered from various sources which are believed to be reliable and is intended for use by persons having technical skill and at their own discretion and risk.

We make no warranties expressed or implied and can assume no liability in connection with the use of this information since various factors outside our control may affect suitability of materials in particular situations.

Although the table may indicate satisfactory service for individual chemicals, certain combinations may have adverse effects upon the heater.

For chemical solutions not indicated in the table or any questionable use, always consult the manufacturer or your own chemical supplier.

Please also refer to the installation and operating instructions issued with the heater

#### Specific Notes:

1. **Electroless Plating Solutions** Certain solutions eg electroless Ni and Cu will necessitate regular acid Stripping to remove metal deposition from the heater.
2. **High Specific Gravity (S.G) And High Viscosity Solutions** All standard Braude Polaris heaters have a watt density of approx. 1w/cm<sup>2</sup>. Where the heater is to be used in a solution which has an S.G of between 1.4 and 1.8 a **Low Watt Density (LWD) heater should be used.**
3. **High pH Solutions** All standard Braude Polaris heaters are predominately manufactured from Fluoropolymer and PVDF materials. Where they are to be used in a solution with a pH of above 11, at elevated temperatures, it is recommended that a **Popular PS unit** with either Polypropylene or PTFE frames are used.
4. **Hexavalent Chromic Acid** Hexavalent chromic acid has a severe effect on Polypropylene which is present on all standard heater leads (braid) and therefore a 'CA' type heater should be specified when ordering.
5. **Phosphating and other deposit generating solutions** the heater will need cleaning at regular intervals to remove deposits.

**Please confirm with your chemical supplier the suitability of the materials of construction.**

The Popular heater uses high integrity polymers throughout.

Heating cable:	External: Teflon (PTFE/PFA)
	Internal: Cu, Sn, Ni
Frame ribs and yoke:	PVDF on standard, PP on PS unit.
Rod:	PVDF on standard, PP on PS unit.
Cable sleeving	PP on standard, Teflon on CA unit.
Hanger:	PTFE sleeved over Galvanised mild steel



THE FOLLOWING CHEMICAL SOLUTIONS ARE SATISFACTORY WITHIN THE LIMITS SHOWN AND UNLESS OTHERWISE INDICATED A MAXIMUM OPERATING TEMPERATURE OF 100°C CAN BE TOLERATED.

Chemical	Concentration where stated, w/w.	Notes
Acetic Acid – CH <sub>3</sub> COOH	97% TO 80°C	
Acetic Acid – CH <sub>3</sub> COOH	80% TO 100°C	
Aluminium Chloride – AlCl <sub>3</sub>	Saturated	
Aluminium Fluoride – AlF <sub>3</sub>	Saturated	
Aluminium Nitrate – Al(NO <sub>3</sub> ) <sub>3</sub>	Saturated	
Aluminium Sulphate – Al <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	Saturated	
Ammonium Fluoride – NH <sub>4</sub> F	25% to 60°C	
Ammonium Chloride – NH <sub>4</sub> Cl	Saturated	
Ammonium Hydroxide – NH <sub>4</sub> OH	50% to 50°C	
Ammonium	10% to 100°C	
Ammonium nitrate – NH <sub>4</sub> NO <sub>3</sub>	Saturated	
Ammonium sulphate – (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	Saturated	
Barium Chloride – BaCl <sub>2</sub>	Saturated	
Boric Acid – H <sub>3</sub> BO <sub>3</sub>	Saturated	See note 5 above
Cadmium Fluoroborate – Cd(BF <sub>4</sub> ) <sub>2</sub> Saturated		
Calcium Chloride – CaCl <sub>2</sub>	Saturated	
Calcium Nitrate – Ca(NO <sub>3</sub> ) <sub>2</sub>	50%	
Chemical Blacking		See note 5 above
Chromic Acid – CrO <sub>3</sub> +H <sub>2</sub> O	* See Note	
Copper Chloride – CuCl <sub>2</sub>	Saturated	
Copper Cyanide – CuCN <sub>2</sub>	Saturated	
Copper Fluoride – CuF <sub>2</sub>	Saturated	
Copper Nitrate (Cu(NO <sub>3</sub> ) <sub>2</sub> )	Saturated	
Copper Sulphate – CuSO <sub>4</sub>	Saturated	
Deionised Water		
Electroless Copper Plating		See note 1 above
Electroless Nickel Plating		See note 1 above
Ferric Chloride – FeCl <sub>3</sub>	Saturated	
Ferric Nitrate – Fe(NO <sub>3</sub> ) <sub>3</sub>	Saturated	
Ferric Phosphate – FePO <sub>4</sub>	Saturated	
Ferric Sulphate – Fe <sub>2</sub> (SO <sub>4</sub> ) <sub>3</sub>	Saturated	
Ferrous Chloride – FeCl <sub>2</sub>	Saturated	
Ferrous Phosphate – Fe <sub>3</sub> (PO <sub>4</sub> ) <sub>2</sub>	Saturated	
Ferrous Sulphate – FeSO <sub>4</sub>	Saturated	



Fluoroboric Acid – $\text{HBF}_4$	100%	See note 5 above
Fluorosilicic Acid – $\text{H}_2\text{SiF}_6$	50%	
Gold/Silver Plating Solutions		
Hydrochloric Acid – $\text{HCl}$	30% at 60°C	
	10% at 100°C	
Hydrofluoric Acid – $\text{HF}$	20% at 60°C	
	60% at 40°C	
Hydrogen Peroxide – $\text{H}_2\text{O}_2$	30% at 75°C	
Lead Fluoroborate – $\text{Pb}(\text{BF}_4)_2$ Saturated		
Magnesium Chloride – $\text{MgCl}_2$	Saturated	
Magnesium Nitrate – $\text{Mg}(\text{NO}_3)_2$	Saturated	
Magnesium Sulphate – $\text{MgSO}_4$	Saturated	
Mercury Chloride – $\text{HgCl}_2$		
Mercury Nitrate – $\text{Hg}(\text{NO}_3)_2$	Saturated	
Nickel Chloride – $\text{NiCl}_2$	Saturated	
Nickel Nitrate – $\text{Ni}(\text{NO}_3)_2$	Saturated	
Nickel Sulphate – $\text{NiSO}_4$	Saturated	
Nitric Acid – $\text{HNO}_3$	60% at 25°C	Specify CA unit
Nitric Acid – $\text{HNO}_3$	20% at 60°C	Specify CA unit
Nitric Acid – $\text{HNO}_3$	10% at 100°C	Specify CA unit
Organic compounds and solvents		Refer to chemical supplier
Phosphating solutions eg Fe, Zn, Mn		See note 5 above
Phosphoric Ortho-Acid – $\text{H}_3\text{PO}_4$	85%	For high SG or viscous solutions always specify Popular LWD
Plating Solutions – Commercial		Refer to your chemical supplier
Potassium Bromide – $\text{KBr}$		
Potassium Carbonate – $\text{K}_2\text{CO}_3$	50%	
Potassium Chlorate – $\text{KClO}_3$	Saturated	
Potassium Chloride – $\text{KCl}$	Saturated	
Potassium Cyanide – $\text{KCN}$	Saturated	
Potassium Dichromate – $\text{K}_2\text{Cr}_2\text{O}_7$	40%	
Potassium Ferrocyanide – $\text{K}_4\text{Fe}(\text{CN})_6$	Saturated	
Potassium Hydroxide – $\text{KOH}$	50% to 50°C	pH>11 see note3 above
Potassium Nitrate – $\text{KNO}_3$	Saturated	

Potassium Permanganate – $\text{KMnO}_4$	20% **	pH>11 see note3 above
Potassium Sulphate – $\text{K}_2 \text{SO}_4$	Saturated	
Silver Cyanide – $\text{AgCN}$	Saturated	
Silver Nitrate – $\text{AgNO}_3$	Saturated	
Sodium Carbonate – $\text{Na}_2 \text{CO}_3$	Saturated	
Sodium Chlorate – $\text{NaClO}_3$	50%	
Sodium Chloride – $\text{NaCl}$	Saturated	
Sodium Cyanide – $\text{NaCN}$	Saturated	
Sodium Fluoride – $\text{NaF}$	Saturated to 60°C	
Sodium Hydroxide – $\text{NaOH}$	50%	pH>11 see note3 above. Use PS Unit
Sodium Hydroxide – $\text{NaOH}$	10% to 100°C	pH>11 see note3 above
Sodium Nitrate – $\text{NaNO}_3$	50%	
Sodium Nitrite – $\text{NaNO}_2$	50%	
Sodium Sulphate – $\text{Na}_2 \text{SO}_4$	Saturated	
Sodium Sulphate – $\text{NaSO}_3$	Saturated	
Sulphuric Acid – $\text{H}_2\text{SO}_4$	75%	
Surfactants		Some surfactants may be highly viscous, please refer to your chemical supplier
TinStannic Chloride – $\text{SnCl}_4$	Saturated	
Tin Saturated		
Tin Stannous Chloride – $\text{SnCl}_2$		
Tin Stannous Fluoroborate – $\text{Sn}(\text{BF}_4)_2$		
Tin Sulphate – $\text{SnSO}_4$	Saturated	
Zinc Chloride – $\text{ZnCl}_2$	Saturated	
Zinc Nitrate – $\text{Zn}(\text{NO}_3)_2$	50%	
Zinc Phosphate – $\text{Zn}_3(\text{PO}_4)_2$	Saturated	See note 5 above
Zinc Sulphate – $\text{ZnSO}_4$	Saturated	

For further advice, please contact our technical department: [technical@braude.co.uk](mailto:technical@braude.co.uk)

## **RETURNS POLICY**

Any BRAUDE product that needs to be returned must comply with the following:

- A new/unused item should be returned in the original packaging with a note describing the reason for return.

BRAUDE also offer an inspection and repair or replacement service for products that have failed in use. Used products must comply with the following when returned:

- Units returned to BRAUDE must be properly cleaned, sealed and packaged and are not contaminated with or contain any dangerous chemicals.
- A note advising the chemicals in which the units have been used is to be included inside the package, with as much information as possible about the process and the failure.
- A charge will be made for units received by BRAUDE, which require cleaning.

BRAUDE reserve the right to return any product that does not comply with the above without inspection.

## **DISPOSAL OF USED EQUIPMENT**

Disposal of any product supplied by BRAUDE must comply with any relevant regulations.

The majority of materials in BRAUDE equipment are recyclable (see page 7) and should be delivered to an appropriate recycling centre.

## **IMPORTANT**

1. Ensure that the Warranty card is completed and forwarded to the Manufacturer\*. On receipt the Warranty will be registered and will become operative. No acknowledgement will be sent by the Company. Failure to register within 21 days of purchase will render the Warranty null and void.
2. The Warranty covers repair or replacement within the Warranty period.
3. Please refer to the operating, maintenance instructions and chemical resistance chart supplied before use.

\*E. BRAUDE (LONDON) LTD, Liberta House, Sandhurst, Berkshire, GU47 8JR, U.K.

## **WARRANTY**

This product has been manufactured to the highest standards using fine quality materials. Installation, operation and maintenance in accordance with the instructions and chemical resistance chart provided will ensure trouble free service.

Care should be taken that the equipment is correctly connected to current and voltage conforming with the information indicated on the label.

In the event of any defect in materials or workmanship and subject to the Company's general conditions of sale and warranty, the Company undertakes to correct at its discretion by repair or replacement, any such defect occurring within 12 (TWELVE) MONTHS from delivery of this equipment to the original purchaser (fair wear and tear excluded) provided the equipment is delivered carriage paid to our Works, suitably packed and insured. The Company's decision on all questions relating to alleged defects shall be conclusive.

This Warranty becomes void if repair is attempted or the equipment is interfered with by personnel other than authorised by the manufacturer, or is damaged due to accident or user's negligence, or if the Company's payment terms and any other conditions are not fully complied.

Under no circumstances will the period of the original 12 MONTHS warranty be extended. The Manufacturer or Supplier cannot be held responsible for claims covering consequential loss or damage.

All other claims or warranties are hereby expressly excluded.