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K SERIES CHILLERS

KT1

STANDARD MODELS

INSTRUCTION MANUAL

Issue 3.5

Contents

1.0 Introduction

By selecting a K series chiller, you have invested in many years' experience in the design and manufacture of precision temperature control instrumentation.

ATC has built your K series chiller without compromise to meet the objectives of performance and reliability. Please read this manual carefully to ensure you understand the operation of the machine and how to use the unit safely and efficiently.

If you have any questions regarding installation or repair of this unit, please contact ATC direct.

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Safety

For your safety we draw your attention to the following **Warning** and **Caution** statements throughout the manual, identified by the symbols…

 and 

respectively. The safe operation of a KT series chiller remains the responsibility of the operator at all times.

Caution: *Failure to comply with a Caution will invalidate product warranty and absolve ATC from any liability, howsoever caused, and could result in permanent damage to equipment.*

Warning: *Use of this equipment in any manner not specified by the manufacturer may result in the protection provided by the equipment being impaired.*

Warning: *Failure to comply with a 'Warning' may result in personal injury or death. ATC does not accept any liability for injury caused through use of this equipment.*

Warning: No user serviceable parts.

Warning: Very hot surfaces, in excess of 100°C

Warning: Very cold surfaces and gases, lower than -40°C. Severe frostbite hazard.

Warning: Opening the refrigeration system may expose the operative to toxic and corrosive compounds (HFC's). Take protective measures including suitable eye protection.

Warning: Gases may exceed 300 psi (20 bar) during operation.

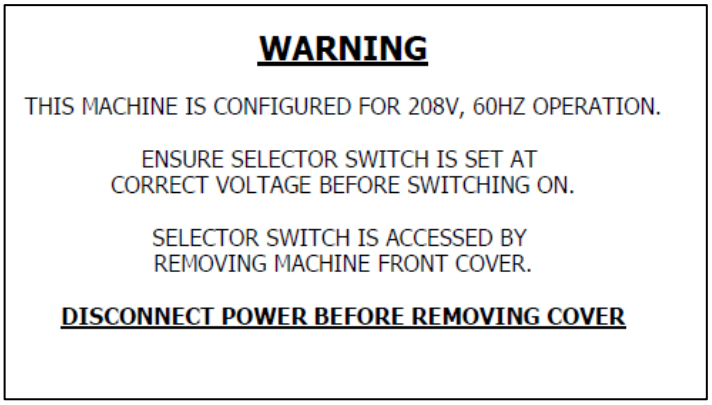
Warning: All refrigerants do not support combustion and are asphyxiating gases.

Warning: After switching off, the fan blades continue to rotate. Do not attempt service whilst the blades are rotating.

Warning: All chillers contain water and electricity in close proximity. Always ensure the unit is isolated before service. **The Kt1 has an on-off switch and four protective fuses. Never bypass these components.**

Caution: Filling/topping up of the tank should only be undertaken with the unit switched off, to prevent back-flooding of the fluid.

Caution: The high integrity refrigeration system contains no user-serviceable parts. Repair and service requires specialised knowledge and tools. Any unauthorised tampering with the refrigeration system automatically invalidates warranty.



1.1 Unpacking

Please check that both the packaging and the unit are undamaged. If there is any doubt, it is vital that you inform both ATC and the carrier before making a claim on the carrier. There are no hidden shipping bolts or other fixings. You should inspect the packaging for signs of transit damage before signing for the unit, and if possible unpack the unit before signing. Once you have signed for the goods, ATC cannot be held responsible for any transit damage subsequently found.

Remove the unit from its original packaging and ensure that there is no packaging left around the cooling ducts.

Please retain all packaging in the unlikely event that the chiller needs to be returned to our local representatives.

1.2 Site requirements

- **Hard, level surface**. Ideally smooth to allow freewheeling of castors, which are designed for indoor use.
- **Clean, dust free environment**. Air-cooled chillers move large volumes of air, and large amounts of air-borne contamination will result in fouling of the condenser, reducing the capacity of the unit and in extreme cases causing a system shut-down.
- **Non-condensing ambient**, from +4°C to +40°C. Cooling capacity is lost above 35°C.
- **Electrical supply** single phase 208VAC +5% (60Hz) 7A, 230VAC +5% (50Hz) 7A, 220VAC +5% (60Hz) 7A.
- Electrical terminations.
    - Live: Brown
    - Neutral: Blue
    - Earth: Green/yellow
- **Clearance** front and rear of the unit at least 250mm.
- **Plumbing** to be clean and compatible with the fluid to be used. It is advisable that the minimum of right-angle bends and compression fittings are used. See also section 2.0

1.3 Warranty registration

Please visit the website warranty registration page to ensure ATC can offer you the best possible support;

https://www.app-therm.com/warranty-registration/

a) **For how long is my ATC product under warranty?**
ATC provides a comprehensive return to base 2-year parts, 1-year labour warranty from delivery as standard on all new equipment, provided it has been installed and operated in accordance with the manual.

b) **Where will ATC fulfill the product warranty?**
ATC's standard warranty terms are Return to Base (RTB) – issues with chillers are often easily solvable over the phone or email, or by reviewing ATC's technical guidance on the web and in the product manual. On occasion, at the discretion of ATC, goods may be serviced on site FOC or a service loan unit may be supplied. Warranty cover excludes the cost of travel by engineers and loan unit rental charges. Obtaining onsite service for a product, even in full warranty, is a chargeable service.

c) **Who is liable for shipping charges in the event of warranty failure?**
During the **first year** of the warranty period, freight costs to and from ATC are covered by ATC. During the **second year** of the warranty, freight costs to and from ATC are payable by the customer.

d) **I'm experiencing problems with my chiller. It's within warranty – what do I do next?**
Contact ATC to discuss the issue you are having on +44(0)1530 839998 or support@app-therm.com. Be sure to have your model number and serial number on-hand to aid those attempting to solve remotely.

e) **Telephone support couldn't fix my chiller – what do I do next?**
An RMA form must be completed. This allows both the end-user and ATC to clarify your details, to set the party responsible for shipping costs, and to set a different return address if desired. Shipping advice is provided, and the end-user must sign a declaration that states the unit is safe to handle. Return the form by email for fastest response.

f) **What happens if my chiller failed outside warranty or requires non-warranty repair work?**
A purchase order will be requested to cover an initial inspection – this will only be invoiced if the inspection shows there is no fault. If packaging is required, i.e. a crate, a separate charge will be levied. If the end user prefers ATC to arrange a collection, a shipping charge may be levied.

g) **Our process must continue running – can we have a loan unit whilst our chiller is in repair?**
ATC hold several standard air-cooled chillers at the factory for the sole purpose of offering for loan. These are available on a first-come, first-serve basis. Models up-to 3kW capacity are available.

h) **To avoid any delays in remedial actions in the event of a repair it is essential to retain the original packaging. Please note that if the unit is returned for repair without original packaging, a fee may be charged for the provision of replacement packaging.**

2.0 Installation

Having ensured that your installation meets all the site requirements identified in section 1.2, it is best practice that the fluid lines between your application and the chiller have the following characteristics:

- *Short*
- *Large diameter* (ideally at least 12mm internal diameter)
- *Free from right angle bends*, to suppress water hammer and reduce pressure losses
- *Opaque*, ideally black, to inhibit growth of algae. Alternatively, use solid copper or welded ABS. **Caution**: Never use transparent tubing.
- *Clean*. If your installation is to existing pipe work, it is good practice to flush the system with either a commercially available central heating cleaner or 5% acetic acid solution. The system should be flushed clean with tap water to remove all traces of cleaner prior to filling the system.

All connections should be made using either the ATC 'easy clamp' or a jubilee type clip. Where threaded or compression type fluid joints are to be made, always use a suitable jointing compound such as PTFE tape.

Voltage selection

Caution: If your KT1 series chiller is rated for multi voltage and dual frequency operation it may have a transformer and internal voltage supply switch, it is essential that the voltage selector switch on the chiller is set to match the voltage and frequency available at your site.

The voltage selector switch can be found on the front of the chiller. Access is gained by removing the two knobs on the front ventilation panel to expose the selector switch.

Confirm the required voltage setting, then always replace the cover for normal operation.

Coolant Filling

Having ensured that the system is correctly connected, with the inlets and outlets having the correct orientation relative to your application, all joints tight and leak free, and with the unit isolated from the electrical supply, prepare to fill the unit with Hexid fluid.

Hexid fluids are the preferred coolant choice as they provide excellent corrosion protection, freeze protection, algae inhibition, pump protection and good heat transfer properties.

Caution: Always use ATC recommended fluids in your K series chiller. Never use other anti-freeze mixtures, as they may corrode your application and will damage the K series pump seals.

Filling procedure

1. Check all valves are open, including solenoid valves located in your application.
2. Remove the screw cap from the tank
3. Fill with Hexid to the rim of the tank neck.
4. Switch the unit on.
5. Wait while the fluid level drops in the tank.
6. Switch the unit off.
7. Repeat steps 3 to 5 until all the air has been purged from the system.
8. Top up to the rim of the tank neck to ensure the level switch is made.
9. Check the system carefully for leaks, including the inside of your application. The system is now ready to be run.

Warning: Always isolate the chiller from the electrical supply when filling the tank.

3.0 Operation

KT1 chiller has been configured to provide temperature stability to +0.1°C.

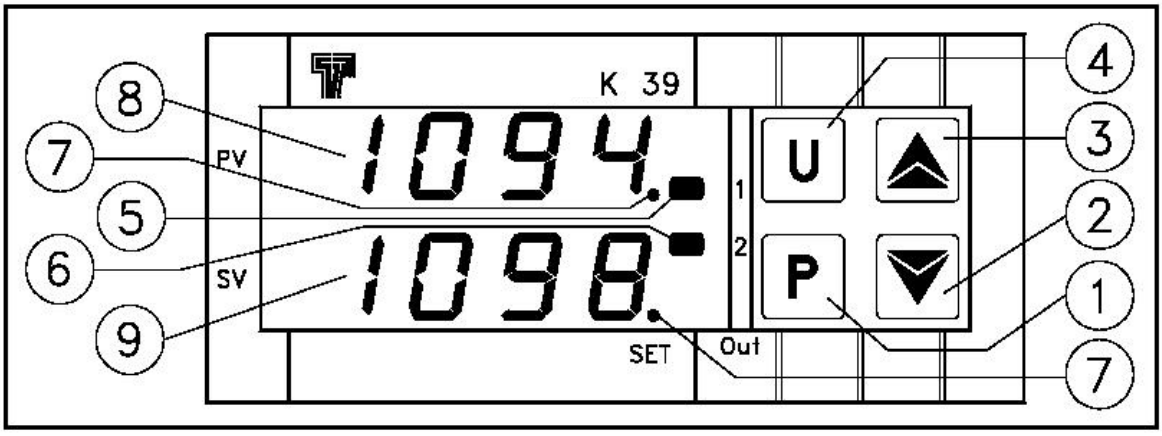
The chiller includes a dual digital display, high/low temperature and low fluid level alarms.

High temperature alarm: 10°C above set point

Low temperature alarm: 10°C below set point

Low fluid alarm / No flow alarm: Neon indication (off)

K series chillers are fitted with a high performance 3 term PID controller, which is capable of controlling the set temperature to within 0.1°C of the set point.



3.1 – Changing the Set Point

This procedure permits rapid programming of the active Set Point and possibly the alarm thresholds.

Push the ’P’ button, then release it. The display will flash ‘SP 1’.

To modify the set point, press the ‘UP’ button to increase it or the ’DOWN’ button to decrease it.

Once the new set temperature is displayed the value is stored automatically after approximately 10 seconds, ‘SP 1’ will continue to flash during this time.

K 39 Controller error messages

Error	Reason	Action
- - - -	Probe interrupted	Verify the correct connection between probe and instrument and then verify the correct functioning of the probe
uuuu	The measured variable is under the probe's limits (under-range)	
oooo	The measured variable is over the probe's limits (over-range)	
ErAt	Auto-tuning not possible because the process value is higher (with "Func" =HEAt) than [SP- |SP/2|] or lower (with "Func" =CooL) than [SP+ |SP/2|].	Swap the instrument to OFF control (OFF) and then to automatic control (rEG) in order to make the error message disappear. Once the error has been found, try to repeat the auto-tuning.
noAt	Auto-tuning not finished within 12 hours	Check the functioning of probe and actuator and try to repeat the auto-tuning.
LbA	Loop control interrupted (Loop break alarm)	Check the working of probe and actuator and swap the instrument to (rEG) control
ErEP	Possible anomaly of the EEPROM memory	Push key "P"

Fluid flow and pressure

KT1 series chillers contain a high-pressure volumetric pump capable of 150 psi. All units are normally supplied with a pre-set maximum of 50 psi unless a different pressure is required. Pressures above this will cause the internal safety bypass valve to open, protecting your application from potentially dangerous pressures.

It is possible for users to change the operating pressure of the chiller, as follows:

1. Switch off the chiller.
2. Remove the cover from the chiller by removing the 4 screws on each side. Release the earth connection tab mounted on the underside of the cover, left hand side as viewed from the front.
3. Switch on the chiller and while running, release the locking nut on the pressure relief valve; a grey valve mounted on the pump head and located at the right side of the chiller, as viewed from the front.
4. Turn the valve knob anticlockwise to reduce the flow/pressure, clockwise to increase the flow/pressure. Secure the locking nut once you have achieved your desired pressure.
5. The pressure can be observed on the gauge on the front panel.

6. Switch off the chiller, replace cover, securing the earth tab and secure with the screws provided.

Caution:

Changing the flow/pressure with the pressure relief valve will also change the pre-set pressure safety set-point. This will move to a lower pressure than the factory setting when decreasing the flow/pressure, and to a higher pressure when increasing the flow/pressure.

Caution:

When the flow/pressure is manually increased with the pressure relief valve, the safety provided by the valve will be affected at higher pressures than standard. For this reason, please ensure that it is safe for your application to operate at pressures in excess of 50 psi, even if the pressure setting on the chiller reads lower than this. A blockage in your application could result in the pressure exceeding the raised safety pressure, and while the Kt1 series chiller is tested to 120 psi, your application may not be safe at this pressure.

We recommend that *pressures exceeding 100psi must never be used*.

4.0 Maintenance and service requirements

Caution: Failure to carry out service at the specified intervals may permanently damage your equipment.

Interval	Actions
Weekly	Check fluid level
Monthly	Check the condenser (air intake) is free from obstructions or accumulations of debris. Cleaning may be achieved with a domestic vacuum cleaner with brush attachment.*
Annually	Change the fluid. Check for fluid leaks throughout the whole system. Check the condenser for fouling.

* **Caution:** Never blow the condenser out with compressed air.

4.1 Troubleshooting

Symptom	Causes
Compressor not running, but fan running	Is the controller displaying an alarm? If there is no obvious cause, check… • The condenser is clean • Ambient not too high • No temporary power failure The likely cause is the compressor's internal protection has been activated (normally caused by high ambient temperature) and should restart in five minutes.
Noisy operation / High fluid pressure And/or low flow	Check: • Pump filter, if fitted • No restrictions in the pipe work • Operating coolant pressure set too low Clean fluid path with weak detergent solution, flush and replace fluid with correct Hexid fluid.
Fluid lines becoming fouled brown or green	Algae contamination. Clean system with weak detergent solution, replace fluid lines with opaque (ideally black) lines to inhibit algae growth. Use Hexid fluid.
Fluid seen leaking from system	Under high humidity conditions, fluid may appear to be leaking from the system. This is usually just condensation, but it is always prudent to check for fluid leaks.
Poor fluid flow	Flush with clean water, replace fluid with Hexid.
Poor cooling	Almost always caused by blocked condenser. Clean with soft brush or vacuum cleaner with brush attachment Continued failure may indicate high ambient or excessive load applied to the unit. Check these first
	Fan Failure

5.0 Return of goods procedure

If the unit is damaged during transit, or subsequently develop a fault requiring its return to ATC, the following procedure must be followed.

1. Call the ATC service point on +44(0)1530 839998 or email sales@app-therm.com.
    - You will be issued with a Return Materials Authorisation number ('Q number').
2. Return the completed RMA form to ATC, together with your purchase order number.
3. Pack the returning item securely, enclosing a copy of the completed RMA form, and ensure that the packaging is clearly labelled with the Q number. Neither ATC nor your shipper will be liable for any damage incurred in transit.
4. Upon receipt of the completed RMA form, an engineer will be allocated or a service loan unit* will be despatched if available.

* Please note that ATC will raise an invoice as part of the service loan procedure, and you will receive a credit against this upon the safe return of the loan unit.

Address for return units:

Applied Thermal Control Limited
Goods Inward
39 Hayhill Industrial Estate
Barrow upon Soar
Leicestershire
LE12 8LD
United Kingdom

6.0 Dimensions and performance

	Kt1
Cooling Capacity At 20°C set point and 20°C ambient	1000 Watts 50Hz 1200 Watts 60Hz
Dimensions H x W x D	490 x 370 x 560 mm
Weight	60 Kg
Temperature range	4°C - 35°C
Pumps available	P5, P10, P17
LED temperature display	0.1°C resolution standard.
Temperature control	Microprocessor P.I.D.
Pressure gauge	Standard
Fluid connections	3/8" and ½" barb supplied Custom connections available
Temperature stability, under stable conditions	0.1°C
Power requirements	7 Amps, 230V 50Hz 7 Amps, 208V 60Hz 7 Amps, 220V 60Hz 10 amps, 115V 60Hz
Warranty	2 years parts, 1 year labour

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Operating Manual; Declaration of Conformity

Annex J-2

DOCUMENT DETAILS

Date	6/JAN/2020	Compiled by	MJH	Revision	2

EU DECLARATION OF CONFORMITY

Document layout;	Governed by Machinery Directive 2006/42/EC, Annex II.

REGISTERED BUSINESS ADDRESS

Applied Thermal Control Ltd, 39 Hayhill Industrial Estate, Barrow-upon-Soar, Loughborough, LE12 8LD, UK.

AUTHORISATION TO COMPILE THE TECHNICAL FILE

Mitchell Howard, Applied Thermal Control Ltd, 39 Hayhill Industrial Estate, Barrow-upon-Soar, Loughborough, LE12 8LD, UK.

DESCRIPTION & IDENTIFICATION OF MACHINERY

Generic denomination;	K-Series
Function;	Recirculating chiller
Model;	All with 'K' prefix.
Type;	Air-cooled or water-cooled vapour compression-based.
Serial number;	
Commercial name;	As above.

NOTIFIED BODY

Not applicable

QUALITY ASSURANCE SYSTEM

QMS International Ltd, Muspole Court, Muspole Street, Norwich, NR3 1DJ, United Kingdom.
ASCB Registered; 201409-2

DECLARATION

The manufacturer declares that the machinery described above fulfils all the relevant provisions of the;

- Machinery Directive 2006/42/EC.
- EMC Directive 2014/30/EU, via harmonised standards;
  - IEC 61000-6-2:2005 (Immunity for industrial environments).
  - IEC 61000-6-4:2006 +A1:2011 (Emission for industrial environments).
- Low Voltage Directive 2014/35/EU.
- RoHS Directive 2011/65/EU (*RoHS 2*);
  - The machinery above contains no Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr6+), Polybrominated Biphenyls (PBB) or Polybrominated Diphenyl Ether (PBDE).
- RoHS Directive (EU) 2015/863 (*RoHS 3*);
  - Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
  - Benzyl butyl phthalate (BBP): < 1000 ppm
  - Dibutyl phthalate (DBP): < 1000 ppm
  - Diisobutyl phthalate (DIBP): < 1000 ppm

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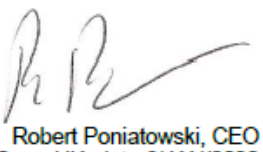

Robert Poniatowski, CEO
Signed in Barrow-upon-Soar, UK, date 6/JAN/2020