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K SERIES CHILLERS

K12

STANDARD MODELS

INSTRUCTION MANUAL

Issue v 1.1



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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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For your information, all chillers comprise four functional elements:

1	Refrigeration	Provides cooling and heating to the fluid , also known as the secondary refrigerant . Repairs require specialist skills and tools.
2	Fluid handling	Includes the pump but excludes the pump motor . Repairs require basic skills and a limited number of commonly available specialised parts
3	Electrical	Covers all electrical components, including pump motor , compressor and alarms or interlocks . Sound electromechanical skills are required.
4	Control	Comprises controller , sensor and actuator . Sound electromechanical skills are required.

Safety

For your safety we draw your attention to the following **Warning** and **Caution** statements throughout the manual. The safe operation of a K series chiller always remains the responsibility of the operator.

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: *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, more than 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: Always ensure the unit is isolated before service. Three phase represents increased danger from electric shock.

Warning: All chillers contain water and electricity in close proximity. Always ensure the unit is isolated before service. All K series chillers are protected from over current by the master circuit breaker. Never bypass this component.

Caution: Your K series chiller is fitted with a high-pressure volumetric pump, capable of supplying fluids at 150psi. Ensure that your plumbing is compatible.

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

Caution: All connections must be made with those supplied.

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.

Caution: THREE PHASE UNITS ARE NOT PHASE LOCKED, and whilst running the pump backwards will not damage the unit, the pump and compressor will not operate correctly if this is done.

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 the castors, which are designed for indoor use.
- **Non-condensing ambient,** from +4°C to +40°C, ideally indoors. Cooling capacity is lost above 30°C.
- **Clean, dust free environment.** Air-cooled chillers move very large volumes of air. Large amounts of air-borne contamination will result in fouling of the condenser, reducing the capacity of the unit, and extreme cases may cause a system shut down.
- **Water supply (applies only to water cooled chillers).** Water cooled versions of these K series chillers all require clean process water at a flow rate of at least 10 litres per minute at a pressure of not less than 1 bar (15psi). The systems are designed for water to the chiller at 15°C. If the water available does not meet these requirements, please consult ATC for specific advice regarding your installation. Please have the following information available: **(i) cooling water flow, (ii) cooling water pressure, (iii) cooling water temperature and (iv) chiller serial number.**
- **Suitable power.** The supply requirements can be determined from the details printed on the rating plate. All ATC units are designed for a –15% to +10% fluctuation in supply voltage. Ensure that the house supply circuit breaker is suitably rated and is of the slow-blow type, since the chiller is capable of momentarily drawing ten times the current shown on the rating plate at start-up.
- **Clearance** front and rear of the unit at least 500mm.
- **Outside installation.** The unit is compatible with outdoor installation, provided that shelter from direct rainfall and sunlight is provided. It is strongly recommended that Hexid A4 is used to provide baseline frost protection.
- **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.

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
- *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 with Hexid.

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 K series chiller is rated for multi-tap and dual frequency operation, it is essential that the voltage selector switch on the K series chiller is set to match the voltage and frequency available at your site.

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 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 outer cover from the chiller, then remove cover from the tank
3. Fill with Hexid to 10mm below 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 30mm below 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.

There are two on-board circuit breakers protecting the chiller. The main three phase MCB is located on the front panel. This also acts as the emergency off (EMO) and requires continuity via the terminal strip located at the rear of the unit. Should a remote EMO be required, a separate EMO may be fitted in series. The other MCB, protecting the single-phase components (fans, controller and solenoid), is located to the rear of the electrical box inside the unit. See Figure 1, page 12.

Setting the maximum permissible fluid pressure

If your chiller is fitted with a rotary vane pump, it will be fitted with a pressure control valve as standard. This type of pump is ideal for small capacity chillers as it is very efficient and capable of very high pressures with little or no loss of fluid flow at higher pressures. ATC fit a pressure control valve as standard, to protect your application from damaging over pressure. **Pump types affected by the pressure control system are P5, P10 and P17.** The valve simultaneously limits the maximum permissible system pressure and the operation flow and pressure characteristics. It is important to understand that the pressure displayed during normal operation is lower than the peak pressure in a deadhead situation. In the event of blockage of a return line from the application, the pressure may exceed 10 bar (150 psi). The pressure control valve is factory set to 50 psi. If your application is incapable of sustaining this pressure, the following adjustment must be made:

1. Connect a short length of flexible hose between the inlet and outlet of the chiller.
2. Following the 'filling procedure' (see earlier this section) carefully fill the tank with fluid and switch on.
3. *With the chiller running*, fold the flexible tubing back on itself, and secure with a cable tie to block the fluid outlet.
4. Read the pressure displayed on the front panel.
5. Adjust the pressure using the pressure control valve ('A' in Figure 2, page 12) until your known maximum system pressure shows on the front panel. NOTE - in optional low temperature chillers, this is metallic and covered in insulating material

The maximum system pressure attainable has now been adjusted. Please be aware that the actual running pressure will be lower than this value. If the maximum system pressure is close to the actual pressure achieved during normal operation, only a proportion of the pump's output will be supplied to your application.

Adjusting fluid flow and pressure

It is possible to change the operating pressure of the chiller, also using the pressure control valve, as follows:

1. With the chiller running, release the locking nut on the pressure control valve.
2. Turn the valve knob ('A' in Figure 2, page 12) anticlockwise to reduce the flow/pressure, clockwise to increase the flow/pressure. NOTE - in optional low temperature chillers this is metallic and covered in insulating material
3. The pressure can be observed on the gauge on the front panel.

Caution:

Changing the flow/pressure with the pressure control valve will also change the preset pressure safety setpoint. 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 control 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 K 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.*

Figure 1: MCB locations, looking from rear of chiller

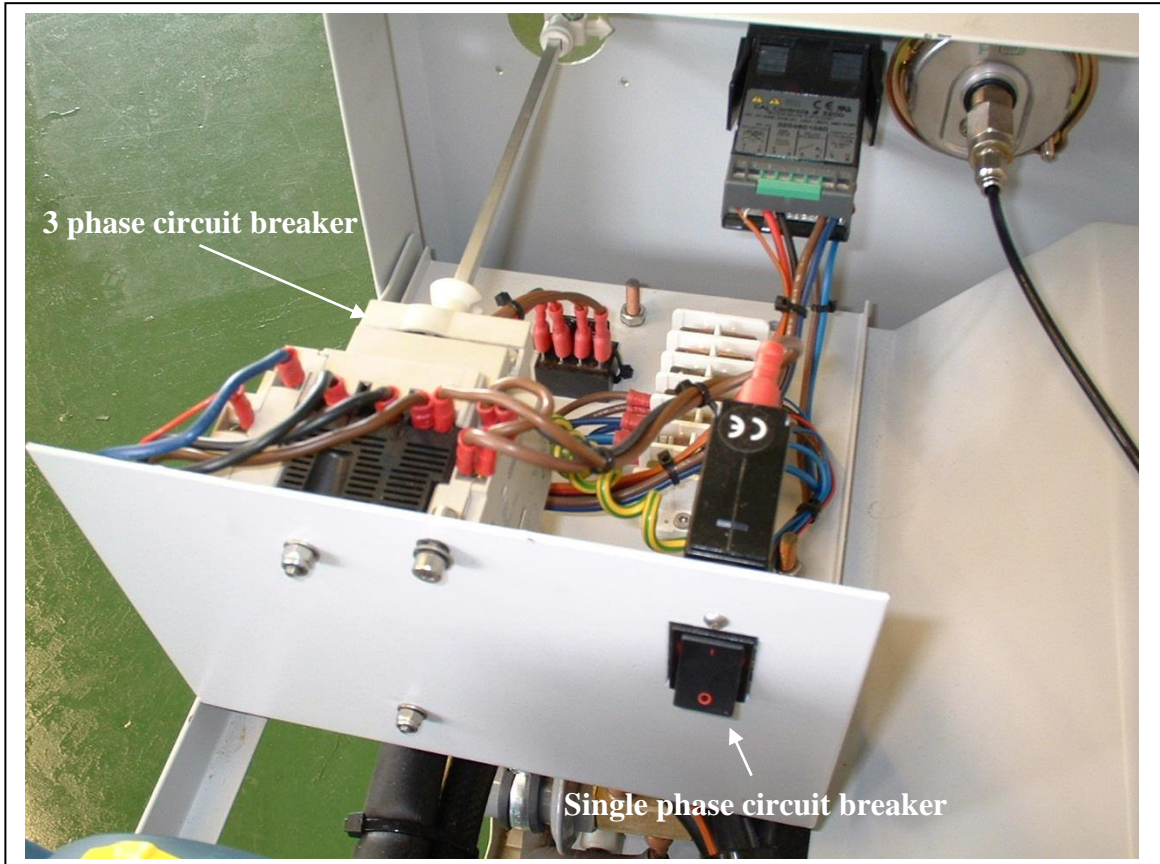
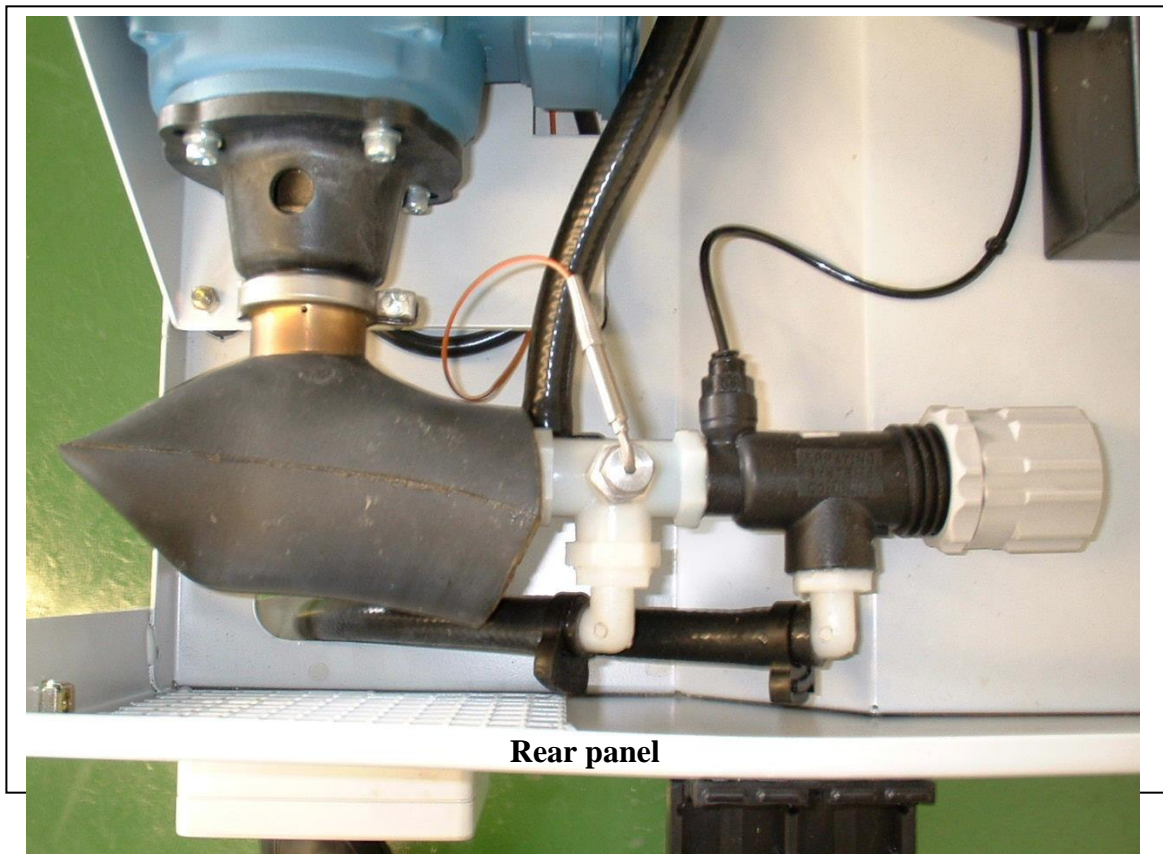


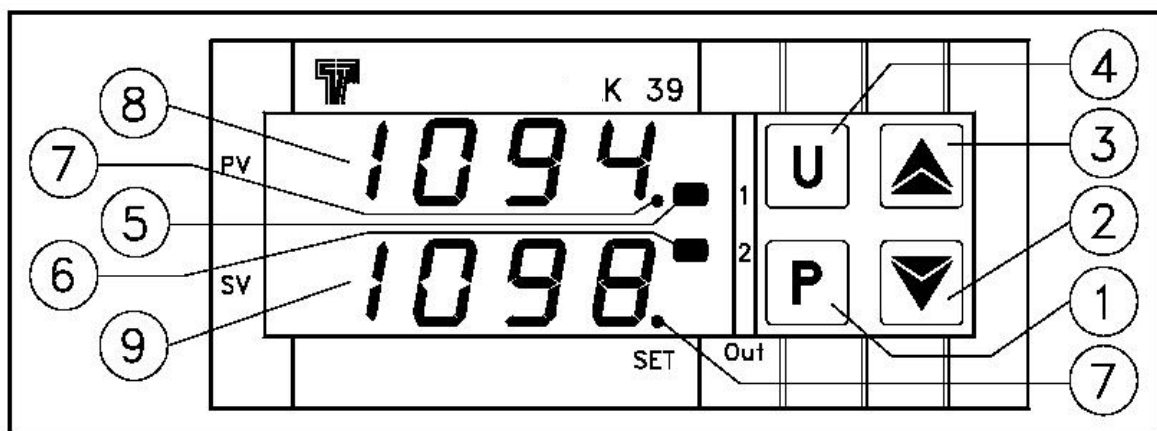
Figure 2: Pressure control valve location - viewed from above



3.0 Operation

K12 chillers have been configured to provide temperature stability to 0.1°C.

K series chillers are fitted with a high performance 3 term PID controller, which is capable of controlling temperature to within 0.1°C of set point. In addition, there is a high and low temperature warning via the LED on the display of the controller, which is triggered if the temperature deviates more than 10°C from 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 Push the 'P' button, then release it. The value is stored automatically after approximately 10 seconds, 'SP 1' will continue to flash during this time.

K39 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 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"

If the set point is moved more than 10°C the alarm may be triggered. The alarm will silence as soon as the set and measured temperatures are within 10°C. It is only possible to set the temperature outside the preset values of +4°C and +35°C for chillers with optional high and low temperature range extensions.

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

This section outlines common refrigeration system faults. In most cases a refrigeration service technician will have to carry out the necessary repairs as these involve specialist skills and tools. It is very important that the prime cause of the problem is identified and rectified.

Whenever service or repair work is carried out on the refrigeration system, the refrigerant should be pumped into a recovery vessel if it cannot be held in the system receiver. If the refrigerant is uncontaminated, it can be re-used. Otherwise, it should be returned to the refrigerant manufacturer for recycling. Legally, companies other than refrigerant manufacturers may recycle refrigerant, but checks should be made to ensure the quality of the recycled product is acceptable. Refrigerants should not be vented to the atmosphere because of their unacceptably high ozone depletion potentials and greenhouse strengths.

The tables below address each of the symptoms listed. The left-hand column gives the possible *causes*, the next column identifies *checks* that should be carried out and the right-hand column identifies *actions*, which should be taken. The shaded checks and actions are those, which should only be carried out by a refrigeration service technician and give an indication to the end user of the type of rectification necessary. Unshaded checks and actions are those, which the end user can undertake. The list is not exhaustive but covers the most common problems encountered in commercial refrigeration.

Symptom: Chiller too warm

Cause...	Check...	Action...
Compressor not running	Power on?	Switch on
	Compressor failed?	Compare measured motor winding resistances against manufacturer's values
	Compressor start/run relay or capacitor failed?	Find reason and rectify fault
	Compressor tripped on controls or pressure switches?	Check high/low pressure trips and fluid level before repairing wiring

Symptom: Chiller too warm

Cause...	Check...	Action...
Compressor not running	Loose wiring?	Locate and correct cause of fault.
	Fuses and/or earth leakage trip OK?	Check crimped terminals
	Phase failure of 3 phase supplies	Check orientation of phases by looking at fluid flow direction.

Symptom: Chiller too warm

Cause...	Check...	Action...
Compressor is running, but under the following conditions:		
Low evaporating pressure	Refrigerant volume OK? Evaporator fouled? Evaporator iced?	Find leaks, repair, add refrigerant Clean evaporator Adjust defrost settings or repair defrost system
High condensing pressure	Refrigerant volume OK? Condenser fouled? Fan motor/blade OK?	Reduce refrigerant charge Clean condenser Repair/replace
Incorrect superheat	TEV setting correct?	Adjust TEV
Evaporator or condenser fans working incorrectly	Direction of rotation OK? Fan motor/blade OK?	Reverse rotation Repair/replace
Evaporator or condenser air flow restricted	Condenser fouled? Fin block fouled? Evaporator fin block frozen?	Clear fouling from air-side face of condenser Blow through fin block with compressed air, or with specialist fin block cleaner Adjust defrost settings or repair defrost system
Prolonged bubbles in liquid line sight glass	Refrigerant volume OK? Pressure drop through filters? Condenser blockage?	Find leaks, repair, add refrigerant Clean filters Clean condenser

Symptom: Chiller too cold

Cause...	Check...	Action...
Thermostat	Temperature and differential OK?	Adjust setting to maximum level for product quality
	Thermostat / bulb damaged?	Repair/replace
Equipment runs continuously	Control circuit OK?	Correct faulty wiring/control

Symptom: Unit cycles rapidly or shuts down after short period of operation

Cause...	Check...	Action...
Thermostat	Temperature and differential OK?	Adjust setting to maximum level for product quality
LP switch	Refrigerant volume OK?	Find leaks, repair, add refrigerant
	Evaporator fouled/iced?	Clean evaporator, repair/adjust defrost system
HP switch	Water-cooled condenser control valve failed open?	Check for running water when chiller is shut down
	Condenser fouled?	Clean condenser
	Fan assembly damaged?	Repair/replace
Discharge temperature protection	Poor water supply to water-cooled condenser? Failed valve?	Check cooling water supply/temperature/pressure. Check water flow out of chiller when running
	Ambient too high / inadequate air flow?	Reduce ambient / increase cool air supply to condenser
Discharge temperature protection	As for HP switch, above	As for HP switch, above

Symptom: Other malfunction

Cause...	Check...	Action...
Compressor noisy	3 phase direction OK?	Correct orientation
	Compressor mounting vibration?	Improve vibration isolation
	Compressor oil level OK?	Repair leaks, add oil
	Drive and alignment of open compressors OK?	Repair drive and/or realign motor and compressor
	Electrical supply unbalanced?	Correct supply
Condensing unit noisy	Condensing unit pipe work OK?	Improve isolation and fixing

Symptom: Other malfunction

Cause...	Check...	Action...
Condenser or evaporator fan noisy	Fixing of fan to motor shaft OK?	Tighten
	Motor bearings OK?	Lubricate or replace motor
	Fan blade OK?	Repair/replace
	Motor mounting bolts OK?	Tighten

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
Unit 1 Garden Court
Gee Road
Whitwick Business Park
Coalville
Leicestershire
LE67 4NB
United Kingdom

6.0 Dimensions and performance, K12

APPLIED THERMAL CONTROL K12 High precision recirculating chiller

Feature	K12
<i>Dimensions L x W x H (Air cooled)</i>	775 x 510 x 1130 mm
<i>Dimensions L x W x H (Water cooled)</i>	775 x 510 x 853 mm
<i>Cooling capacity (fluid @ 18°C)</i>	14000 watts
<i>Microprocessor-based temperature controller</i>	3 term P.I.D digital
<i>Temperature adjustable</i>	1°C increments
<i>Temperature stability</i>	+/- 0.1 °C
<i>Temperature range</i>	+4°C to +35°C
<i>Extended temperature range - Optional</i>	-20°C to +70°C
<i>Digital temperature display</i>	Standard
<i>Temperature alarm - Standard off-set +/- 10°C</i>	Adjustable High / Low
<i>Low fluid level alarm Option</i>	Visual
<i>Low flow alarm option</i>	Visual
<i>Auto diagnostic functions</i>	Controller and sensor
<i>System volume</i>	7 litres
<i>Pressure control system</i>	Standard fitment internal - user adjustable
<i>Compatible fluids</i>	Hexid fluids / water / propylene glycol
<i>Fluid connections</i>	12mm i.d. hose tails & 3/4" BSP male
<i>Pump P10</i>	10 Litres per minute, up to 150 psi (10 bar)
<i>Pump P17</i>	17 Litres per minute, up to 150 psi (10 bar)
<i>Weight</i>	125kg
<i>Wheels for mobility</i>	Standard (2 locking)
<i>Power requirements</i>	12 amps 415 VAC, 3ph, 50/60Hz 18 amps 208VAC, 3ph, 60Hz
<i>Warranty</i>	2 years parts one-year labour.
<i>Computer interface optional</i>	RS 485 serial to modbus standard
<i>Water cooled condenser</i>	Optional

		Applied Thermal Control Ltd Garden Court, Gee Road Whitwick, LE67 4NB, United Kingdom Tel: +44 (0) 1530 83 99 98 Email: sales@app-therm.com		EC Declaration of Conformity (DoC) K-Series	
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Document layout;		Governed by Machinery Directive 2006/42/EC, Annex II.			
REGISTERED BUSINESS ADDRESS					
Applied Thermal Control Ltd, Garden Court, Gee Road, Whitwick, LE67 4NB, UK					
AUTHORISATION TO COMPILE THE TECHNICAL FILE					
Mitchell Howard, Applied Thermal Control Ltd, Garden Court, Gee Road, Whitwick, LE67 4NB, 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; <ul style="list-style-type: none"> • Machinery Directive 2006/42/EC. • EMC Directive 2014/30/EU, via harmonised standards; <ul style="list-style-type: none"> ○ BS EN 61000-6-3:2007+A1:2011 (Emissions). ○ BS EN 61000-6-1:2007 (Immunity). • Low Voltage Directive 2014/35/EU. • RoHS Directive 2011/65/EU; <ul style="list-style-type: none"> ○ The machinery above contains no Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr6+), Polybrominated Biphenyls (PBB) or Polybrominated Diphenyl Ether (PBDE). 					
PERSON EMPOWERED TO DRAW UP DECLARATION					
 Robert Poniatowski, CEO Signed in Coalville, UK, date 22/JUN/2018					

Appendix 1: Water cooled condenser option

The water-cooled condenser option is available as an alternative to the air-cooled standard version.

Chillers with a water-cooled condenser require an in-house cooling water supply, which meets the following recommended specifications:

- 10 litres/minute
- 1 bar minimum differential pressure across chiller
- 25°C maximum temperature, but lower is better

The modulation valve, which can be found behind the left-hand grille towards the rear of the chiller, does not require adjustment. It is factory set to control the refrigeration system at an optimum pressure and temperature.

Coolant and house water connections

There are two pairs of water connections on the rear of water-cooled chillers. The left-hand pair are the recirculating coolant connections; these are the connections for the coolant supply to your application. The right-hand pair are the connections for the house water supply.

Standard configuration for both coolant and house water is

Inlet	Right
Outlet	Left

with respect to the chiller unit.

All other operation features are the same as those described in the main body of this manual.

Appendix 2: Integral deionising cartridge option

If your K series chiller is supplied with the integral deionising cartridge, it is **very important that this cartridge is replaced every three months, or when the cartridge media in the appropriate window turns from blue to brown, whichever is the sooner.**

The only approved replacement cartridge is order code WA012, available from ATC or from our authorised distributors.
