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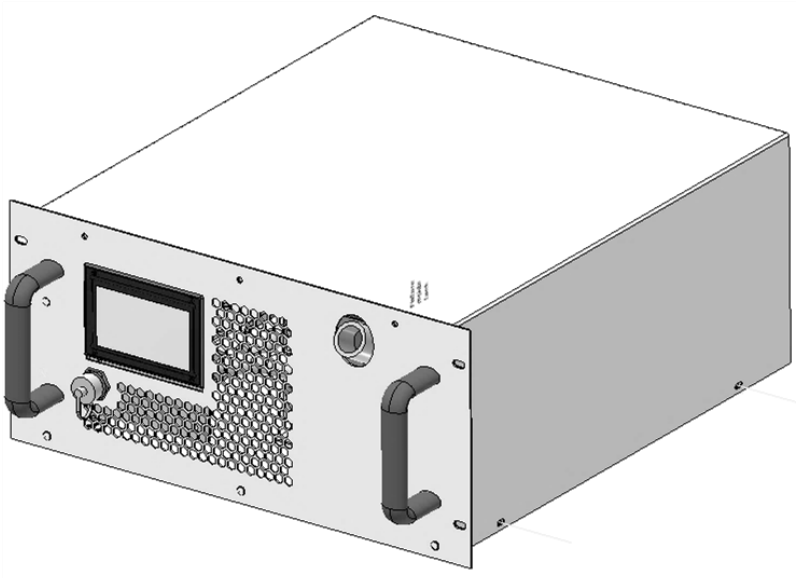
Installation, Operation & Service Manual

R05

DOCUMENT DETAILS

Date	23/JUN/2022	Compiled by	MJH	Page	1 / 5	Revision	1



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CHANGE LOG

Date	Revision	Page ref	Change
23/JUN/2022	1	All	First release

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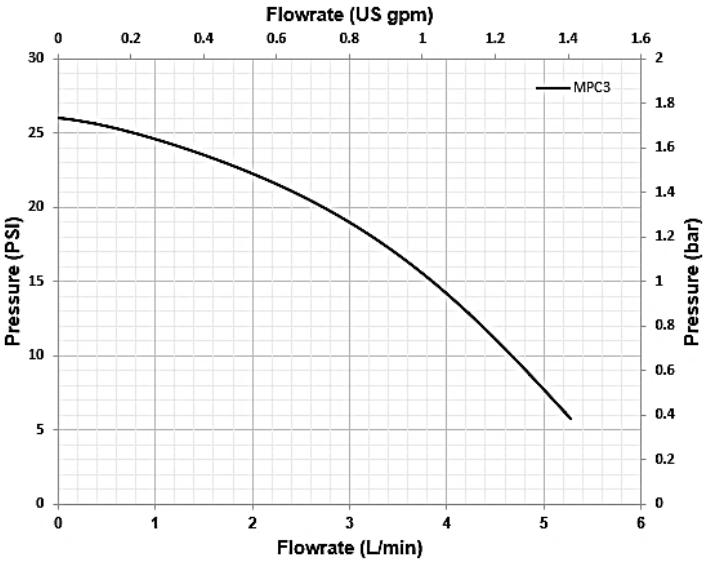
PRODUCT SPECIFICATIONS

Attribute	R05
Weight	25kg 55.1lbs
Heat transfer fluid volume	2300mL 0.608USGal
Cooling capacity ($T_{setpoint}$ +20°C / +68°F) ($T_{ambient}$ +20°C / +68°F) *($T_{ambient}$ +30°C / +86°F)	500W 1706BTU/h 0.142TR
Temperature stability	0.1±°C
Temperature resolution	0.1±°C
Settable temp. range	+4 to +35°C
Optional temp. range	-10 to +65°C
Power supply requirement	100-240Vac 50/60Hz 1~ / 2~ 1A@240Vac, 2A@115Vac
Sound pressure level	35-64dBa
Controller screen size	4.3” diagonal
Dimensions (W*D*H)	5U 19” rack 500mm / 19.7” deep
Diagnostic functions	PID, compressor and fan percentage utilization. Fridge system HP value. Compressor error states. Export system log via USB.
Fluid fittings (standard)	1/2" BSPPF
Fluid fittings (option)	Pushfit 12mm
Low fluid level alarm	Visual, 3 level
Controller	Resistive touchscreen, glove-friendly, pen-friendly.
Tool-less access	No
Overtemperature protection	Hardware limited Software settable
Compressor overload protection	Via PCB function
Overcurrent protection	Fused, 2* T6.3A H250V
Rated duty cycle	Continuous
Compatible heat transfer fluids	DI water, propylene glycol mixes, Hexid A4 & A6



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SAFETY NOTICES

For your safety, we draw your attention to the following warning and caution marks throughout the manual; the safe operation of an ATC chiller always remains the responsibility of the operator. This equipment is intended to be used as a liquid temperature conditioning device – it requires no external pump, nor any further manipulation of temperature. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

	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.
	Caution; Filling/topping up of the tank should only be undertaken with the unit switched off, to prevent back-filling of the fluid.
	Caution; The high integrity refrigeration system contains no user-serviceable parts. Repair and service requires specialized knowledge and tools to be provided by ATC or its local agent. Any unauthorized tampering with the refrigeration system automatically invalidates warranty.
	Warning; Very cold surfaces and gases, lower than -20°C (-40°F). Severe frostbite hazard.
	Warning; Opening the refrigeration system may expose the operator to toxic and corrosive compounds (HFCs). Take protective measures including suitable eye protection.
	Warning; Gases may exceed 15 barg (220psig) during operation.
	Warning; Refrigerant is class A1. It does not support combustion but is oxygen depleting. Review equipment rating label for specific refrigerants and CO_2e.
	Warning; Water and electricity are in close proximity. Always ensure the unit is isolated before service. The R-series is protected from overcurrent by mains fusing. Never bypass these components.
	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; After switching off, the fan blades slow to a stop. Do not open until the fan has stopped rotating.
	Affixed to the chiller’s fan, this symbol printed on yellow background advises of the possible damage to fingers or other extremities from rotating fan blades. Allow blades to stop before service begins.

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INCLUDED ANNEXES

Specific technical product information is provided in the following series of annexes.

Annex A-1 220310 Shipping & Unpacking - Crane or forklift not typically necessary
Annex B-12 220622 Site & Environmental Requirements for R05
Annex C-6 220309 Installation - Generic air-cooled with 0.5inch fittings
Annex D-1 220623 Fluid Handling & Startup Procedures - Mini & R05
Annex E-1 200707 XTD controller XTD043RB-K620G&F (Mini at SW v39.4)
Annex F-5 220610 Centrif or turbine pump without relief
Annex G-1 220623 Troubleshooting - Initial help for Mini & R05
Annex H-1 191121 End-user maintenance - air-cooled units with water as fluid
Annex I-1 210830 Maintenance for technicians - Generic refrigerated units
Annex J-5 200706 EU Compliance Statement Conflict Minerals
Annex J-7 200715 EU Compliance Statement REACH
Annex J-8 200827 EU Compliance Statement POPs
Annex J-10 201111 EU Compliance Statement RoHS
Annex J-12 210830 UKCA DoC R-series
Annex J-13 220406 EU DoC R-series
Annex K-1 200623 Standard warranty terms of ATC
Annex M-1 220623 Recommended spares, M-, EM-, R05-Series
Annex R-1 170621 SDS Refrigerant HFC-R134a
Annex R-3 200203 SDS Hexid A4 v6.4

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Annex A-1

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CRANE OR FORKLIFT NOT TYPICALLY NECCESARY

This guide applies to products that can conceivably be lifted/positioned by one or more persons without the aid of machinery. Upon reviewing recommendations below, you may opt to use machinery. This is at your discretion. ATC are not responsible for injury or death sustained through improper handling procedures.

UNPACKING

1	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. 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.
2	Remove the unit from its original packaging and ensure that there is no packaging left around the cooling ducts. There is no internal product packaging that requires the chiller to be opened.
3	Please retain all packaging in the unlikely event that the chiller needs to be returned to our local representatives.

MANUAL HANDLING RECOMMENDATIONS

4 For UL compliance, ATC must make the statement; “as the unit is >18kg, ATC must recommend that 2 persons are used to lift by hand, or a crane”.

5

Your region’s workplace safety regulations may differ. The below information is provided as a guideline only in the absence of any other regulations. It is based on the United Kingdom’s ‘Manual Handling Operations Regulations (1992)’.
Lifting items of any weight can cause injury if handled incorrectly, depending on what the load is and the physicality of the person handling it. Manual handling guidelines suggest that the maximum safe lifting weight for a woman is 16kg and the maximum safe lifting weight for men is 25kg. These recommendations change depending on the height the object is lifted to and how the object is carried, outlined in the tables below.

Recommendations for Men

Height Object is Lifted	Max Weight Held Close to Body	Max Weight at Arm's Length
Head Height	10kg	5kg
Shoulder Height	20kg	10kg
Elbow Height	25kg	15kg
Knuckle Height	20kg	10kg
Mid-Lower Leg Height	10kg	5kg

Recommendations for Women

Height Object is Lifted	Max Weight Held Close to Body	Max Weight at Arm's Length
Head Height	7kg	3kg
Shoulder Height	13kg	7kg
Elbow Height	16kg	10kg
Knuckle Height	13kg	7kg
Mid-Lower Leg Height	7kg	3kg

When two people are lifting an item, the approximate rule is that you should not exceed 2/3rds of the sum of both individual’s lifting limits. If two men who can carry a maximum of 25kg each are lifting an object together, then the object should not weigh more than around 33kg. If three people are lifting an object, the maximum weight of this object should not exceed half the sum of all individual’s lifting limits.

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Operating Manual; Site & Environmental Requirements

Annex B-12

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R05 SITE & ENVIRONMENTAL REQUIREMENTS

1	**Rack mount** – this product is only intended to be used with a ventilated standard 19" rack cabinet. R05 is a 5U high unit, 500mm deep. It must be secured with 4-off end user-supplied M6 bolts for rack cabinet upright rails. ATC strongly recommends the use of support guides that run from the front upright rail to the back upright rail of the rack cabinet to support the weight of the chiller.		
2	**Clean, dust-free environment** – R05 units use an internal axial frame fan to provide airflow for cooling the pump motor, compressor and condenser. Do not block the front or rear vents. The system will shut down if refrigeration high pressure is triggered.		
3	**Non-condensing ambient temperature** – +5°C to +40°C (+39°F to +104°F). This prevents build-up of moisture on internal components.		
4	**Humidity** - 80% for ambient temperatures up to +31°C (+88°F), decreasing linearly to 50% relative humidity at +40°C (+104°F) ambient temperature.		
5	**Electrical supply**	**R05**	
	ATC power supply specification	-U	-L
	Nominal supply voltage	100-230Vac	24Vdc
	Voltage fluctuations	±10%	±5%
	Frequency	47Hz to 63Hz	n/a
	Mode of supply	1P+N+E / 2P + E	+V, 0V
	Current draw at 100Vac	5.8A	12A
	Power inlet module	IEC C14	Proprietary
	Power inlet rating	10A 250V	25A 600V
	Power supply fuse specification	T6.3A	T16A
	Power supply fuse location	Inlet module, external access	Internal, DIN-rail mount.
	The user must provide protective earth at power inlet. Secondary fuses protecting individual components are internally-mounted.		
6	**Clearance** – the rack form factor limits clearance considerations to the rear face of the unit. Ensure there is sufficient room at the rear of the product to remove the power cable without obstruction. Ensure bend radius of your chosen hose/tube/pipework is not compromised. The front face of the R10 has no vents, but the R20 does – it is a suction vent. Left and right-hand side clearance is dictated by the rack cabinet, but both R10 & R20 have suction vents on those faces.		
7	**Plumbing** – tubing, piping or hose must be clean and compatible with the fluid to be used. The chiller is compatible with deionized water and water-glycol mixtures such as Hexid fluid.		
8	**Indoor use only** – altitude up to 2000m.		
9	**Installation category** – transient overvoltage category II; Pollution degree 2. Temporary overvoltages occurring on mains supply are acceptable within limits defined in the aforementioned categories.		

Caution; Always use ATC recommended fluids in your chiller – many other anti-freeze mixtures have the potential to corrode your application and to damage seals in the chiller.

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Annex C-6

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INSTALLATION FOR AIR-COOLED UNITS WITH 1/2" BSPPF FITTINGS

This guide applies to the following product groups;

- K-Series, R-Series and G-Series refrigerated units, where heatload is rejected to air.
- A-Series airblast units, where heatload is rejected to air.

HOSE RECOMMENDATIONS

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

1	**Short in length** – this reduces friction-based pressure drop and addition ambient heat load.
2	**Large diameter bore** – at least 12mm (1/2”).
3	**Free from 90° bends** – to limit the effects of water hammer. If this cannot be avoided, sharp changes of direction should be minimized so far as possible. Doing this correctly can yield higher pump performance and extend time between maintenance intervals. It will also reduce electrical energy consumption.
4	**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. Failing this, it is recommended to use a domestic bleach in solution with tap water, diluted to the point where the bleach can longer be smelled by human nose.
5	**Opaque, ideally black** – to inhibit light passing through the tube and algae building up. Alternatively, solid ABS or copper pipe can be used where application chemistry allows.
6	**Insulation, where low temperature process is planned** – the process line from chiller to application contains the feed of low temperature fluid. Insulation prevents heat from entering this line and can promote better stability. Uninsulated return lines are helpful where free cooling can be obtained by allowing heat to transfer to air – likewise, insulating the return line is helpful if the fluid temperature is below ambient.

	Caution; Never use transparent tubing. UV light will pass through, prompting growth of organic contamination.

CONNECTING ADPATERS TO PRODUCT BULKHEAD FITTINGS

1	Standard units are supplied with 1/2” British Standard Pipe Parallel Female (BSPPF) threads (also known as G threads (ISO228)) by default. These fittings are not valved and will ‘drop’ the volume of the system if left open to atmosphere.
2	Ensure the appropriate thread sealants are used in the fitting of adapters to hose. For metallic mating parts, we recommend Loctite 577. For plastic adaptors such as those supplied with the product, we recommend using ~8-12mm wide PTFE tape, wrapped around the male thread before tightening.
3	Ensure that the system is correctly connected. The ‘donut’ labels around the ports are clearly marked with inlet and outlet symbols and function in both English and French language. Ports marked as outlet means fluid leaves the product and must be connected to the process inlet.
4	Check all joints are tight and leak free.
5	Where this product is incorporated into other equipment, it is the responsibility of the assembler to ensure safety.

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BACKFILLING

1	In situations where the chiller is situated physically lower than the application being cooled, fluid will apply pressure to the water circuit of the product.
2	The weakest seal is normally the tank lid, and this is typically where fluid will escape the unit.
3	Ideally, the product will be located higher or level with the product water-line. If this is not possible, a non-return solenoid valve kit can be installed as an optional standard assembly.
4	Please raise any questions with the sales team on sales@app-therm.com.

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Annex D-1

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FILLING, STARTING & DRAINING OF MINI & R05 PRODUCTS

This annex describes the filling, starting, and draining processes associated with standard Mini and R05 products. It differs from other ATC chillers/coolers primarily through the user's interaction with the touchscreen interface. Read this guide in its entirety before starting the process. You should have hoses connected and made best efforts to ensure joints are watertight before starting.

FILLING & STARTING

1	**Connect the chiller to the electrical supply and switch on at the rear rocker switch.** The controller should begin to load and leave you on the splash screen with ATC logo in the middle.
2	**Check all application valves are open, including solenoid valves and variable position valves.** The chiller will require an open water circuit to pump into. Any obstructions can increase the time, or entirely prevent the bleeding of air from the system.
3	**Remove the cap from the tank lid.** On the Mini, this is at the rear on top. On the R05 this is on the front panel. Fill the tank to leave 10-20mm (0.4-0.8") of air between water line and where the lid seals.
4	**Turn your attention to the screen on the front of the chiller.** Above the settings 'gear' icon, you will see a pump icon. Holding this icon will manually run the pump, and it will ignore any interlock provided by the level switches. Hold the button until the water line drops to just above the outlet port, then release.

Caution; Do not run the pump dry. Do not deadhead the pump.

5	**Repeat the process of filling and manually running the pump.** When the level no longer drops when the pump is run, the unit is filled but we still need to ensure trapped air has been allowed out.
6	**Start the chiller by holding the green process start button in the top right.** Leave the cap off the tank for >30mins to allow air to escape. Whilst running, the tank illustration on the user interface ought to stay green and full.
7	**Be aware of the prospect of trapped air becoming compressed in the system.** When the chiller is turned off, the compressed air expands and can push fluid through the tank lid. To avoid this, allow any drop in level to occur without topping-up early in the 30min air-bleeding cycle. Whilst not foolproof, this is the best way to avoid backfilling.
8	**Check the application and tubing for signs of leaks whilst the chiller is running.** Replace the tank lid when satisfied the system is full and bled of air.

DRAINING

1	**On both R05 and Mini, open the ports to gravity-drain the plate heat exchanger and return line.** Use the manual priming button on the touchscreen to empty the tank via the discharge line. Do not run the pump dry. You may also use a manual siphon tube to empty the tank, although the R05 neck is narrow and should be measured first. Never turn a chiller upside-down.

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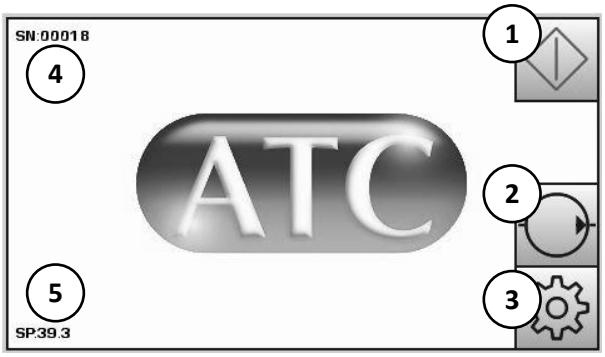
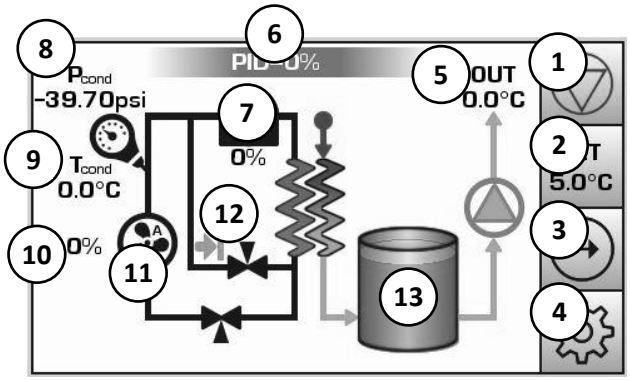
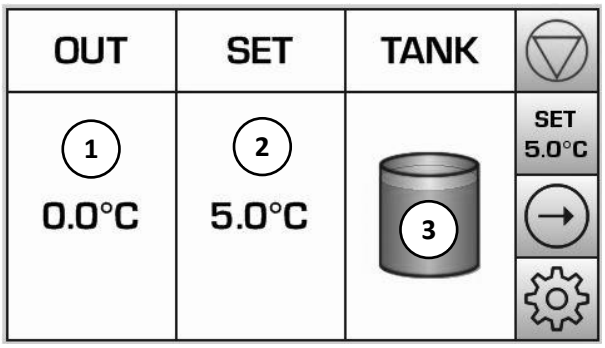
XTD043RB-K620G / XTD043RB-K620F (SOFTWARE VERSION 39.4, MINI PROJECT)



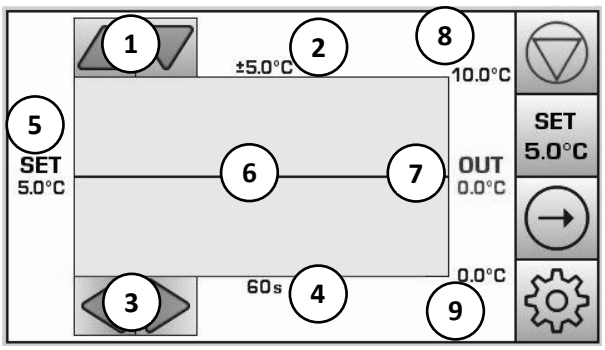
Splash Screen
Upon first powering on, the chiller will arrive at this page after a software loading sequence is complete.
1. Process-start will start fridge and water circuit.
2. Pump priming button runs pump without process starting.
3. Access to settings menu.
4. Service pack refers to software version installed.
5. Serial number is added by ATC during production.



Process View
1. Process stop.
2. Set outlet temperature.
3. Carousel scroll.
4. Settings menu.
5. Actual outlet temperature.
6. System overall utilization.
7. Compressor utilization.
8. High side fridge pressure.
9. Condensing temperature.
10. Fan speed utilization.
11. Fan speed mode.
12. Bypass valve status.
13. Tank level status.



Simple View
1. Actual outlet temperature.
2. Setpoint temperature.
3. Tank level status.



Tolerance Plot
1. Adjusts the plotting resolution to aid visibility.
2. Relative to point 1, the current set resolution.
3. Adjusts the length of time over which data is plotted.
4. Relative to point 3, the current timeframe.
5. Current setpoint, a fixed horizontal line, i.e. a target.
6. A red line will be plot continuously about the black set line.
7. The actual temperature being plotted.
8. Based on the tolerance set at point 2, the upper tolerance.
9. Based on the tolerance set at point 2, the lower tolerance.

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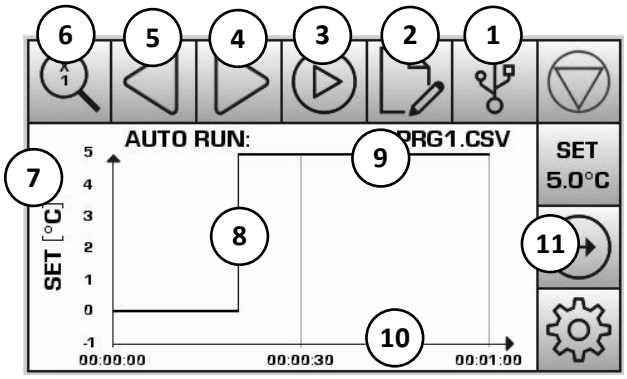
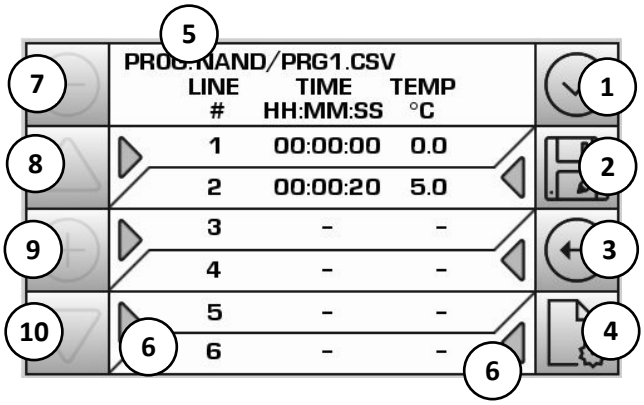
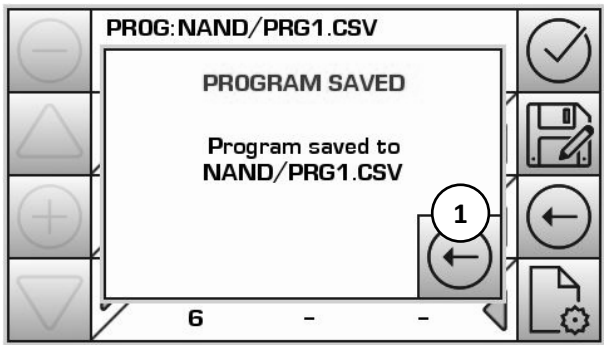


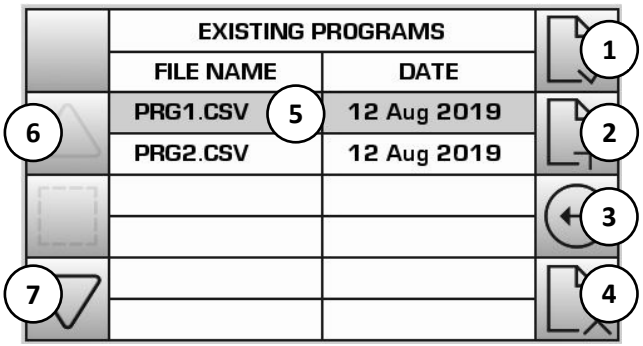
Program Mode
1. USB program loading and software management menu.
2. Create new or load existing program.
3. Start loaded program.
4. Scroll right through scheduled setpoints.
5. Scroll left through scheduled setpoints.
6. Adjusts the scale of the X axis to aid visibility of program.
7. Y axis shows the range of setpoint values in program.
8. Vertical line shows programmed change to setpoint temp.
9. Name of loaded program.
10. X axis shows time scale of entire program.
11. Move through carousel onto *'Engineering View'*.



Manage Programs (generate, load from NAND and modify)
Menu accessible via button '2' under 'Program Mode'.
1. Accept changes and revert to Program Mode above.
2. Save changes to local NAND memory.
3. Back button reverts to Program Mode above.
4. Takes you to 'Existing Programs' menu.
5. Name of loaded program in the course of being edited.
6. When line added, tapping the arrows first selects the line, then allows editing of line time and setpoint temperature.
7. Delete the selected line.
8. Move up to earlier lines where program lines exceed 6.
9. Add a new line. Lines automatically move up if deleted.
10. Move down to later lines where program lines exceed 6.



Save screen
Appears when button '2' from 'Manage Programs' is used.
1. Back out to 'Manage Program' menu.



Existing Programs in NAND Memory
Menu accessible via button '4' under 'Manage Programs'.
1. Load highlighted program (reverts to 'Manage Programs').
2. Copy highlighted program to new line.
3. Return to 'Manage Programs'.
4. Delete highlighted program (warning; no confirmation!)
5. Selected program is highlighted grey.
6. When ≥2 programs are in the list, use up arrow to select.
7. When ≥2 programs are in the list, use down arrow to select.

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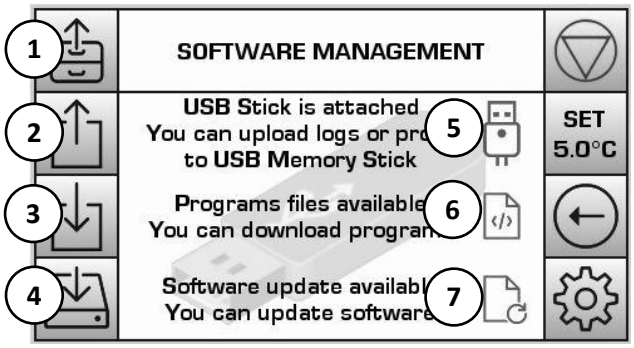
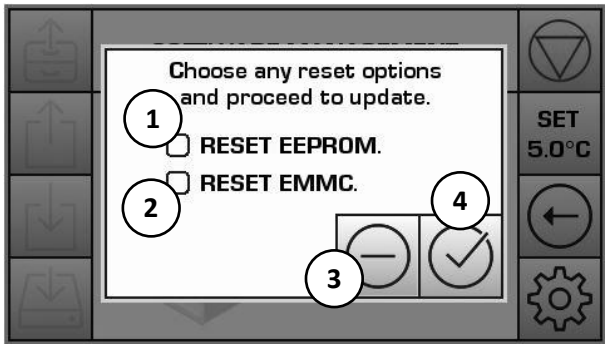
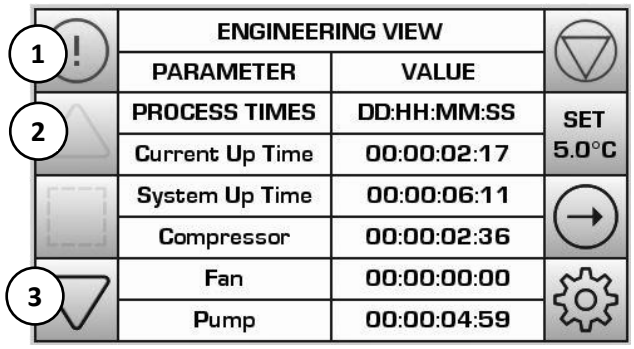


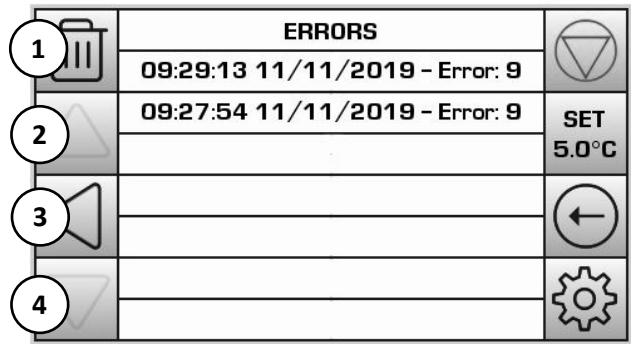
Software Management (incl. logs and programs)
1. Error log upload to USB device. Sends a CSV file.
2. Upload programs created on MS Excel.
To generate a CSV template, upload a 'dummy' program.
3. Download programs created on-screen into CSV file.
4. Install software update (*see Reset Options below*).
5. A USB stick is available both uploading and downloading.
6. CSV programs available to download into NAND memory.
7. Software update recognized on USB device.



Reset Options
Menu accessible via button '4' under 'Software Management'.
1. EEPROM resets all machine settings back to default.
Some software updates will require this to be ticked.
2. EMMC reset deletes all internal memory and log files.
3. Cancel software update.
4. Start update process.

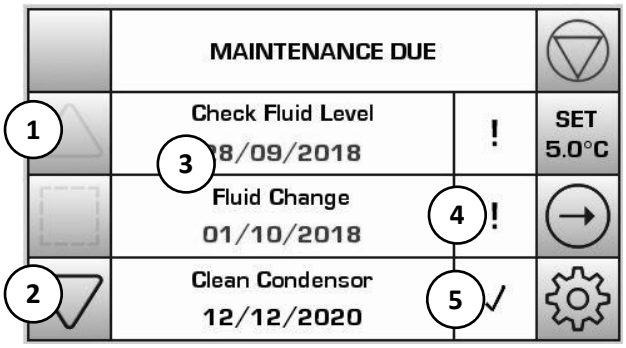


Engineering View
1. When illuminated red, tap to move to error view (below).
2. Scroll up through available parameters.
3. Scroll down through available parameters.

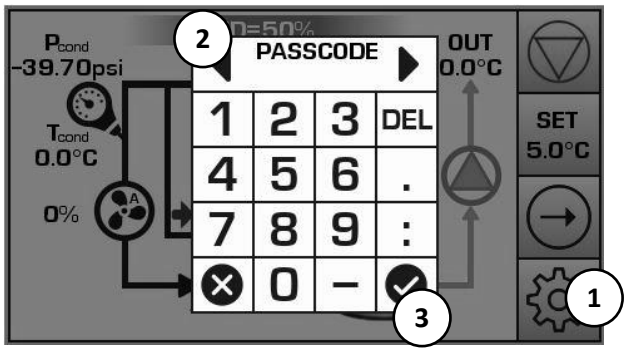


Error View
1. Clear error lists.
2. Scroll up through error list.
3. Return to *'Engineering View'*.
4. Scroll down through error list.

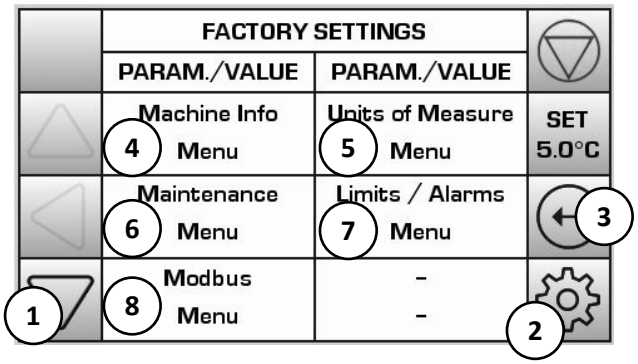
Error Codes
1. Comp. overload/locking.
2. Comp. disconnected.
3. Comp. overcurrent.
4. Comp. abnormal VDC.
5. Comp. overheat.
6. PV PT100 disconnected.
7. Modbus data error.
8. Temp. high level limit.
9. Fluid tank empty.



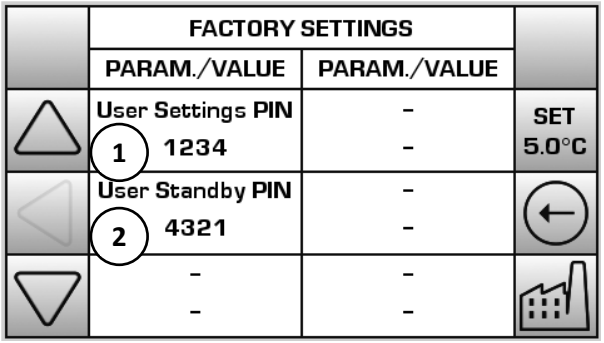
Maintenance Prompt View
1. Move up the parameter list.
2. Move down the parameter list.
3. Date is editable, tap to adjust next check date. When date is reached, text becomes red.
4. Exclamation mark is shown for overdue. Tap to confirm check made.
5. Tick mark is shown by black text for maintenance not due.



Passcode Entry
1. Pressing the settings gear icon shows the passcode screen.
Enter 4159 to enter factory settings.
Enter 1234 to enter user settings.
2. Passcode appears in box above keyboard.
3. Select to enter passcode.



Factory Settings (1)
Screen available after successfully entering the passcode.
1. Down arrow scrolls through factory settings pages.
2. Pressing the settings icon again takes you to user settings.
User settings are a cut-back version of factory settings.
3. Return to main carousel.
4. Serial number, commissioning date, default power on, etc.
5. Temperature and pressure display units, etc.
6. Edit the text parameters of various maintenance prompts.
7. Edit temperature and pressure limits before error log.
8. Where capable, modify MODBUS settings.



Factory Settings (2)
Scroll down from 'Factory Settings' (1)
Further to 'Passcode Entry' above;
1. To access higher level settings, the user settings PIN can be edited while access has been gained to *'Factory Settings'*.
2. Where standby mode is enabled, this PIN appears to prevent the user from starting process without PIN entry first.

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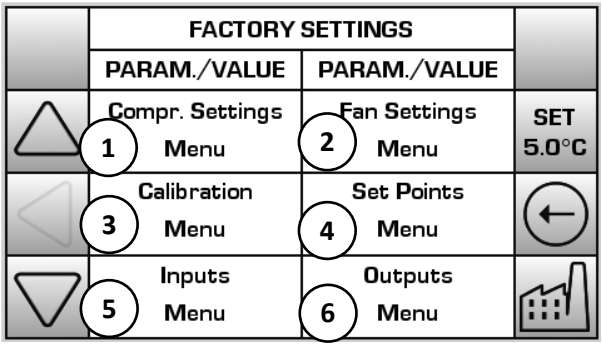
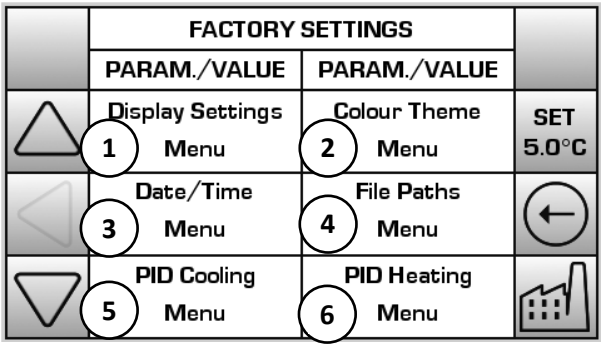
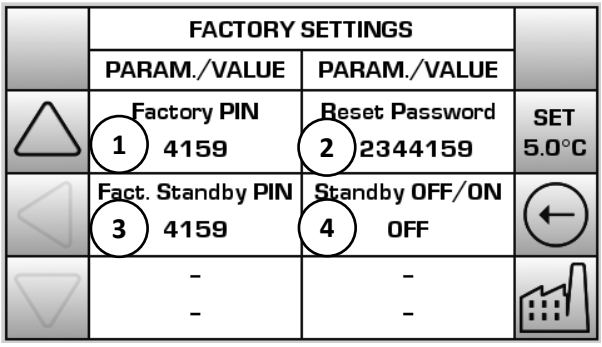


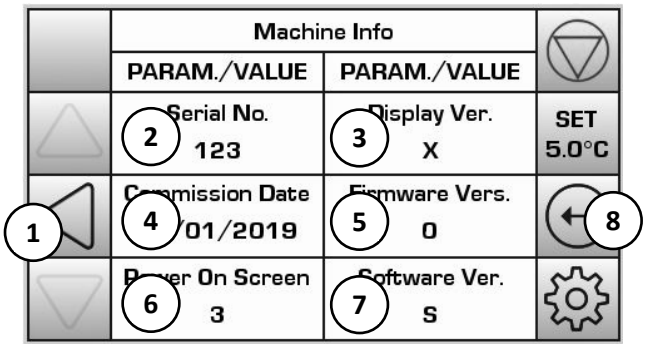
Factory Settings (3)
Scroll down from 'Factory Settings' (2)
1. Modify stop, minimum and maximum compressor speed.
2. Modify fan behavior, speed offset, min and max speed.
3. Modify temperature probe offset.
4. Modify default, minimum and maximum setpoint.
5. Modify input hardware termination positions.
6. Modify output hardware termination positions.



Factory Settings (4)
Scroll down from 'Factory Settings' (3)
1. Adjust brightness and screen orientation.
2. View and apply color themes.
3. Adjust real time clock settings.
4. Adjust naming conventions for log and scheduled programs.
5. Adjust controller (and system) behavior.
6. Adjust controller (and system) heating behavior.



Factory Settings (5)
Scroll down from 'Factory Settings' (4)
1. Set a new factory PIN for lower level settings access.
2. Reset password if EEPROM reset requests it.
3. Allows adjustment of factory standby PIN.
4. Enable standby mode, (password protected process start).



Machine Information
1. Return to *'Factory Settings'* main menu.
2. Serial number is added here by factory electronically.
3. Display version, not editable.
4. Commissioning date (factory final test run date).
5. Firmware version, not editable.
6. Select a carousel screen to display upon process start.
7. Software version, not editable.
8. Exit back to main carousel.

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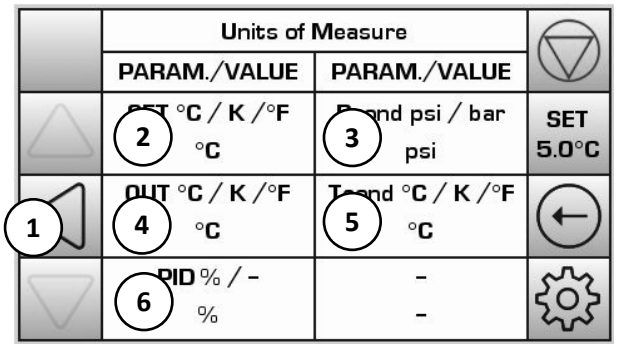
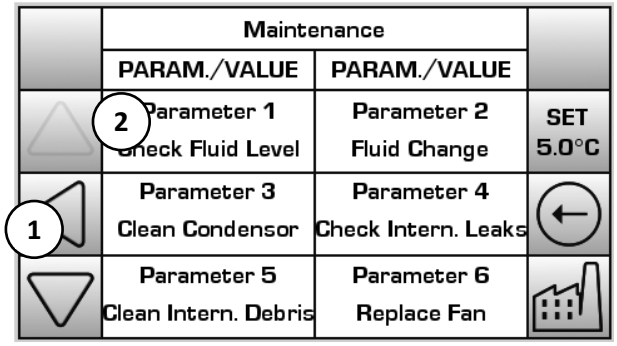
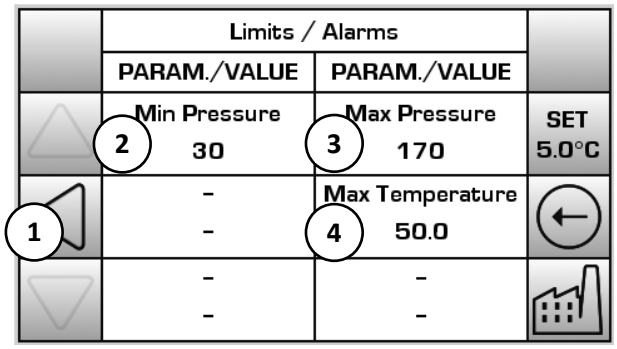


Units of Measure
1. Return to *'Factory Settings'* main menu.
2. Select Celsius, Kelvin or Fahrenheit for setpoint unit.
3. Select psi or bar for refrigeration condensing pressure.
4. Select Celsius, Kelvin or Fahrenheit for liquid outlet temp.
5. Select Celsius, Kelvin or Fahrenheit for condensing temp.
6. Select whether to display PID with or with a % symbol.

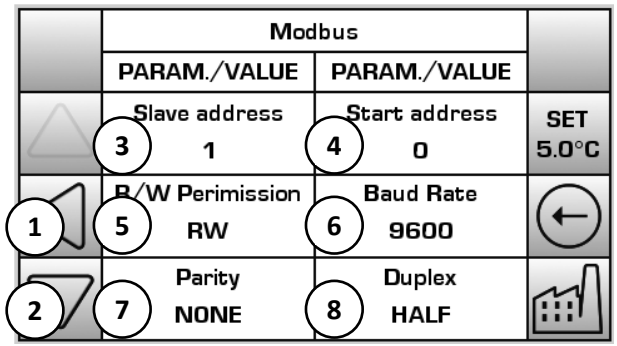


Maintenance Parameters
1. Return to *'Factory Settings'* main menu.
2. Rename, delete or add new text for reminders.



Limits & Alarms
1. Return to *'Factory Settings'* main menu.
2. Error log entered when pressure drops lower than setting.
3. Error log entered when pressure runs higher than setting.
4. Error log entered when temperature runs over setting.

Where values are exceeded, a pop-up note appears.



RS485 MODBUS
Only XTD043RB-K620F model can run MODBUS.
1. Return to *'Factory Settings'* main menu.
2. *(Not pictured)*; single option to enable or disable MODBUS.
3. Set unique address in a multi-system RS485 network.
4. Select start address.
5. Direction of data, select read-write, or read-only.
6. Data transmission rate.
7. Select odd or even.
8. Select half or full; standard ATC wiring is 3-wire half duplex.

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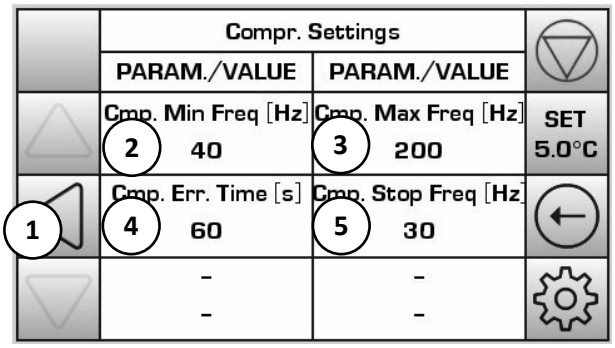
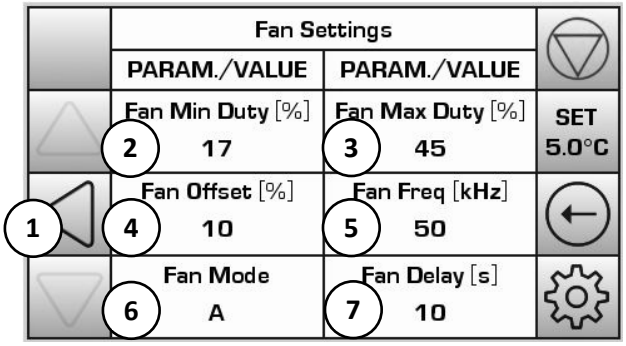


Compressor Settings

This variable speed compressor has been carefully set up by ATC to work within manufacturer's limits.

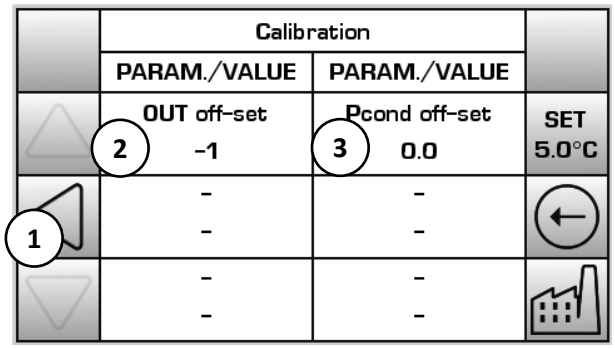
1. Return to *'Factory Settings'* main menu.
2. Compressor minimum frequency (40Hz is 20% duty).
3. Compressor maximum frequency (200Hz is 100% duty).
4. When a compressor error occurs, the compressor times out for 60s. This is enforced by compressor control PCB.
5. Frequency issued to instruct the compressor to stop.



Fan Settings

Fan performance is closely linked to overall refrigeration system health. ATC caution users against making changes.

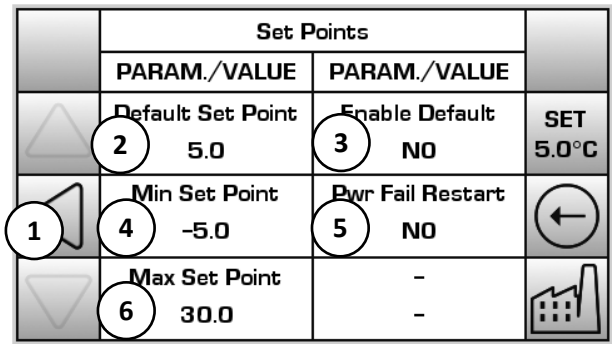
1. Return to *'Factory Settings'* main menu.
2. To avoid stalling, the minimum duty default is 17%.
3. To ensure proportional control, the max duty is 45%.
4. Speed offset by fixed value above algorithm requirement.
5. Pulsed control frequency. Set to suit specific fan.
6. Switch between manual and automatic control.
7. Inrush current prevention, if compressor starts at same time.



Calibration (Temperature & Pressure)

In the unlikely event your chiller requires a replacement PT100 or pressure sensor, the previous calibration value(s) may no longer be valid.

1. Return to *'Factory Settings'* main menu.
2. Used by the factory to set difference between actual outlet temperature and that seen by the PT100 probe, in order to display real temperature.
3. Allows the factory to set pressure offset between measurement taken from calibrated gauge and that seen by pressure transducer.



Setpoint Defaults

1. Return to *'Factory Settings'* main menu.
2. If unit is switched off and on again, with 'Enable Default' (2) active, the default setpoint overrides the last manual setpoint.
3. After power cycling, a default setpoint can be enforced to prevent chiller moving back to a previous unwanted setpoint.
4. Minimum settable temperature by user.
5. If power is cut when chiller is running (past 'process start'), the restoration of power reverts the operating state to that before the cut.
6. Maximum settable temperature by user.

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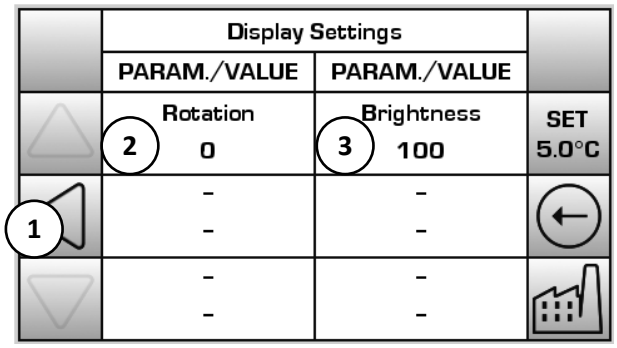
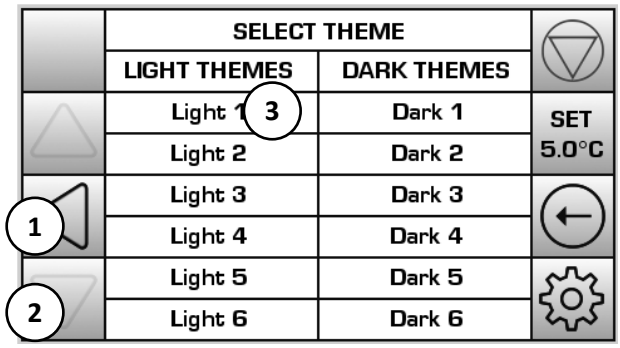
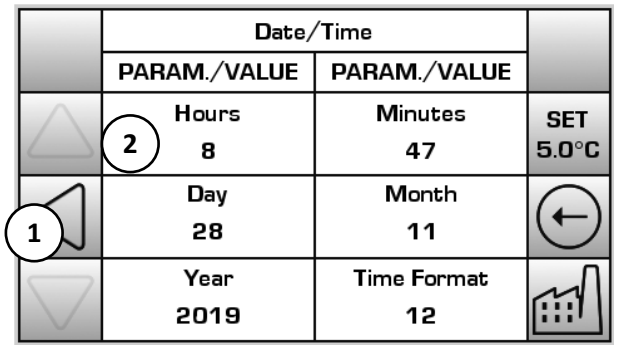


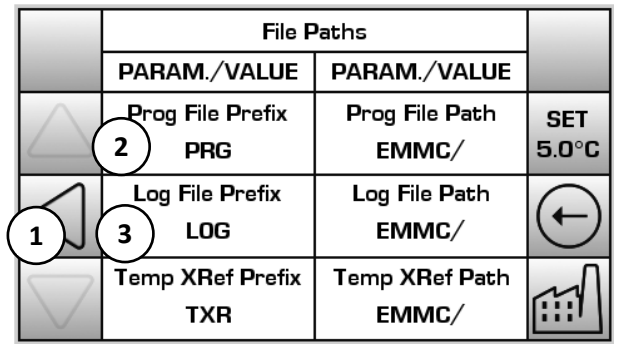
Display Settings
1. Return to *'Factory Settings'* main menu.
2. Rotation of screen through 180 degrees to improve viewing angle if unit is to be situated above or below eyeline.
3. Set display backlight strength.



Color Theme
1. Return to *'Factory Settings'* main menu.
2. Scroll through color options.
3. Tap to select color choice.

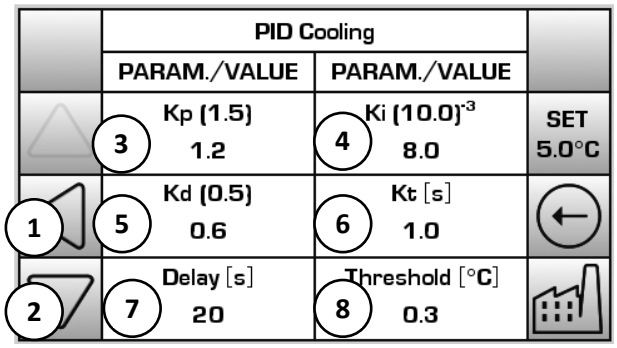


Date & Time, Real Time Clock
Incorrect setting of this clock will result in log entries and maintenance prompts referencing date and time incorrectly.
1. Return to *'Factory Settings'* main menu.
2. Tap each individual setting to make text appear red.
   Tap the red arrows either side to adjust value.
   Tap the red value to confirm entry.

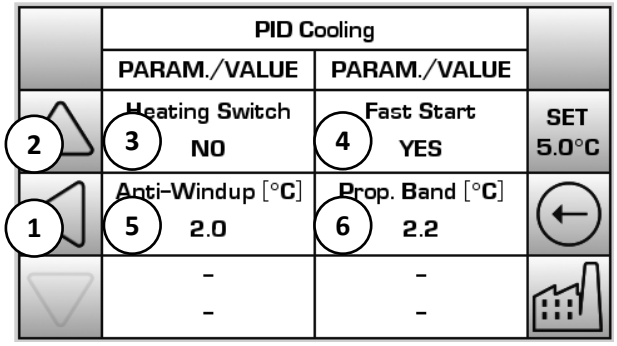


File Paths
1. Return to *'Factory Settings'* main menu.
2. For programs created on the controller, a prefix can be edited to personalize the files.
3. Log files generated can have customized prefix.

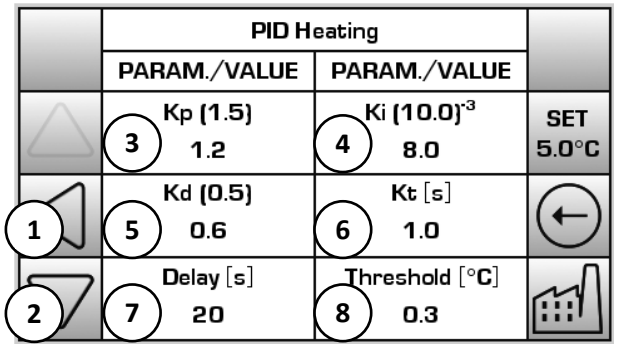
It is not recommended to adjust any other values.



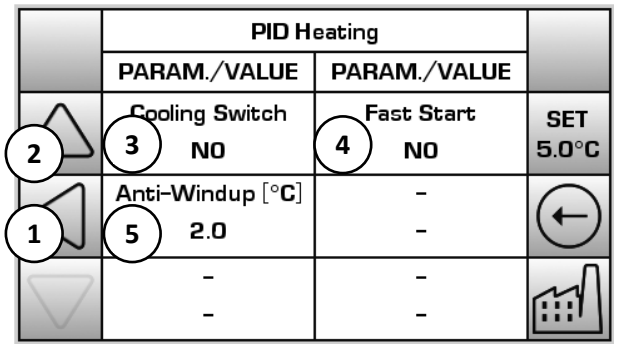
PID Cooling Settings (1)
1. Return to *'Factory Settings'* main menu.
2. Scroll down for more settings.
3. Proportional term adjustment for cooling behavior.
4. Integral term adjustment for cooling behavior.
5. Derivative term adjustment for cooling behavior.
6. Cannot adjust – this is time for a single PID loop.
7. Time elapsed until cooling PID changes to heating mode.
8. Delay counter *(7)* starts after overshoot exceeds this value.



PID Cooling Settings (2)
1. Return to *'Factory Settings'* main menu.
2. Scroll up for more settings.
3. Allow heating mode to function via the solenoid valve.
4. 'Yes' enables compressor to start running immediately.
5. Integral term removed from PID calculation inside set range.
6. Outside this limit, P-band control is 'on-off', i.e. 0 or 100%.



PID Heating Settings (1)
1. Return to *'Factory Settings'* main menu.
2. Scroll down for more settings.
3. Proportional term adjustment for heating behavior.
4. Integral term adjustment for heating behavior.
5. Derivative term adjustment for heating behavior.
6. Cannot adjust – this is time for a single PID loop.
7. Time elapsed until heating PID changes to cooling mode.
8. Delay counter *(7)* starts after overshoot exceeds this value.



PID Heating Settings (2)
1. Return to *'Factory Settings'* main menu.
2. Scroll up for more settings.
3. Allow cooling mode to function via solenoid valve.
4. 'Yes' enables compressor to start running immediately.
5. Integral term removed from PID calculation inside set range.

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XTD043RB-K620G / XTD043RB-K620F SOFTWARE UPDATE PROCEDURE

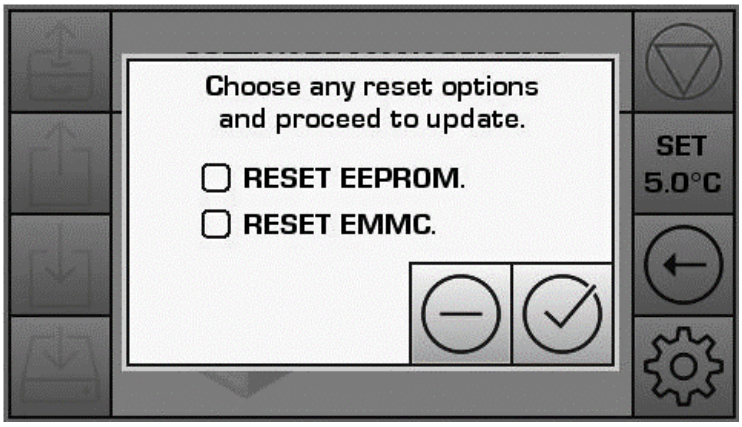
1/ Find an empty USB flash drive and ensure that its formatted to FAT32 (they usually are unless they are changed to something else).
2/ Put the latest version of the file update.ppf and nothing else in the root directory of the flash drive.
NOTE: the file must not be renamed to anything other than “update” with the extension .ppf
3/ Insert the flash drive into the front of the chiller with the power off.
4/ Turn on the chiller and wait for it to bot to its splash screen.
5/ Start the process running using the Process-start button on the splash screen.

6/ Navigate to the program mode screen by pressing the arrow in the circle button 3 times.

7/ Press the USB button.

8/ Press the update button at the bottom left.

9/ Select RESET EEPROM. And RESET EMMC. And then the tick button, this should begin the update.
NOTE: DO NOT remove the flash drive during the update procedure as this could damage the controller.



10/ Once complete the chiller will ask to restart and then continue to work as normal once rebooted, the date and time may need to be changed in the settings menu as well as the serial number if this has been populated but these are optional, you can then remove the flash drive.

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Operating Manual; Pressure & Flow Adjustment

Annex F-5

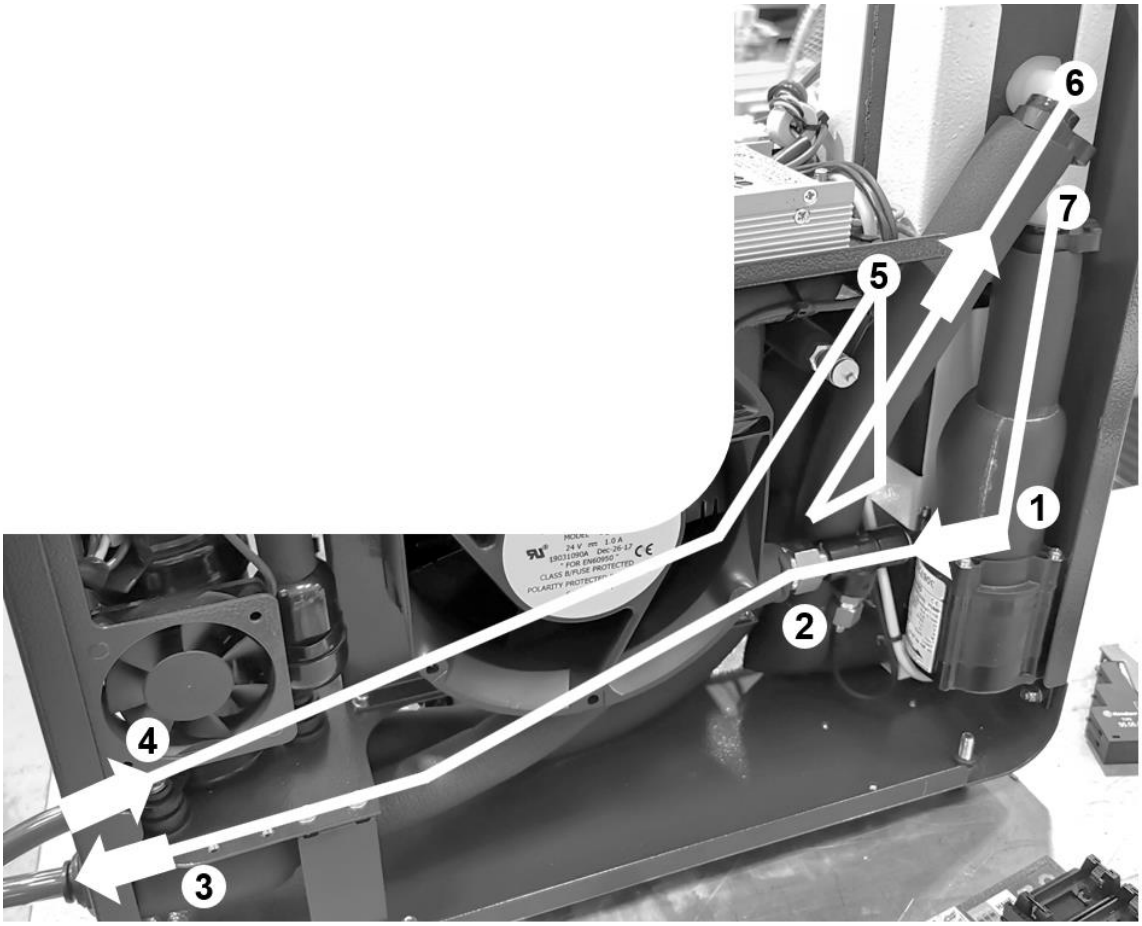
DOCUMENT DETAILS

Date	10/JUN/2022	Author(s)	MJH	Page	1 / 2	Revision	2

CENTRIFUGAL OR TURBINE PUMP WITHOUT RELIEF

This arrangement comprises a centrifugal or turbine type pump without any form of flowrate control or pressure relief downstream of the pump discharge. Without any relief, it is critical to ensure the pump is not deadheaded. In systems with low-pressure pumps and no control valves in the connected application, this approach provides a simple and cost-effective water circuit, albeit one more prone to failure through lack of safety devices. This annex describes ATC's default settings and how to adjust the system.

REPRESENTATIVE COMPONENT LAYOUT & FUNCTIONS *(IMAGE BELOW FROM EM05)*



A	It is important to understand the basic principle that all else being equal, higher flow results in a higher demand for pressure to overcome forces of friction and viscosity. The pump motor generates the motive force required to turn the pump head and create that pressure.
B	The more restrictive a water circuit is, the higher the pressure required to maintain flowrate. Centrifugal and turbine-type pumps are designed to generate lower pressure and higher flowrates. They are mechanically loose which usually leads to a longer lifetime in service.
1	**Pump discharge** – centrifugal is gravity fed and discharges at 90deg to the inlet.
2	**Temperature sensor** – may or may not be present on your unit, but temperature is governed at the outlet.
3	**Front outlet bulkhead fitting** – see Annex C for specific information about connecting to the unit.
4	**Front inlet bulkhead fitting (hidden)** – as above.
5	**Return to Plate Heat Exchanger (hidden)** – layouts vary, but in this unit, we return to the PHE. Other layouts may see a return to tank or return to airblast coil.
6	**Tank return** – the 'no relief' system pictured has returned to tank. Some systems will go straight to pump.
7	**Tank suction** – the feed to the pump to begin the path again.

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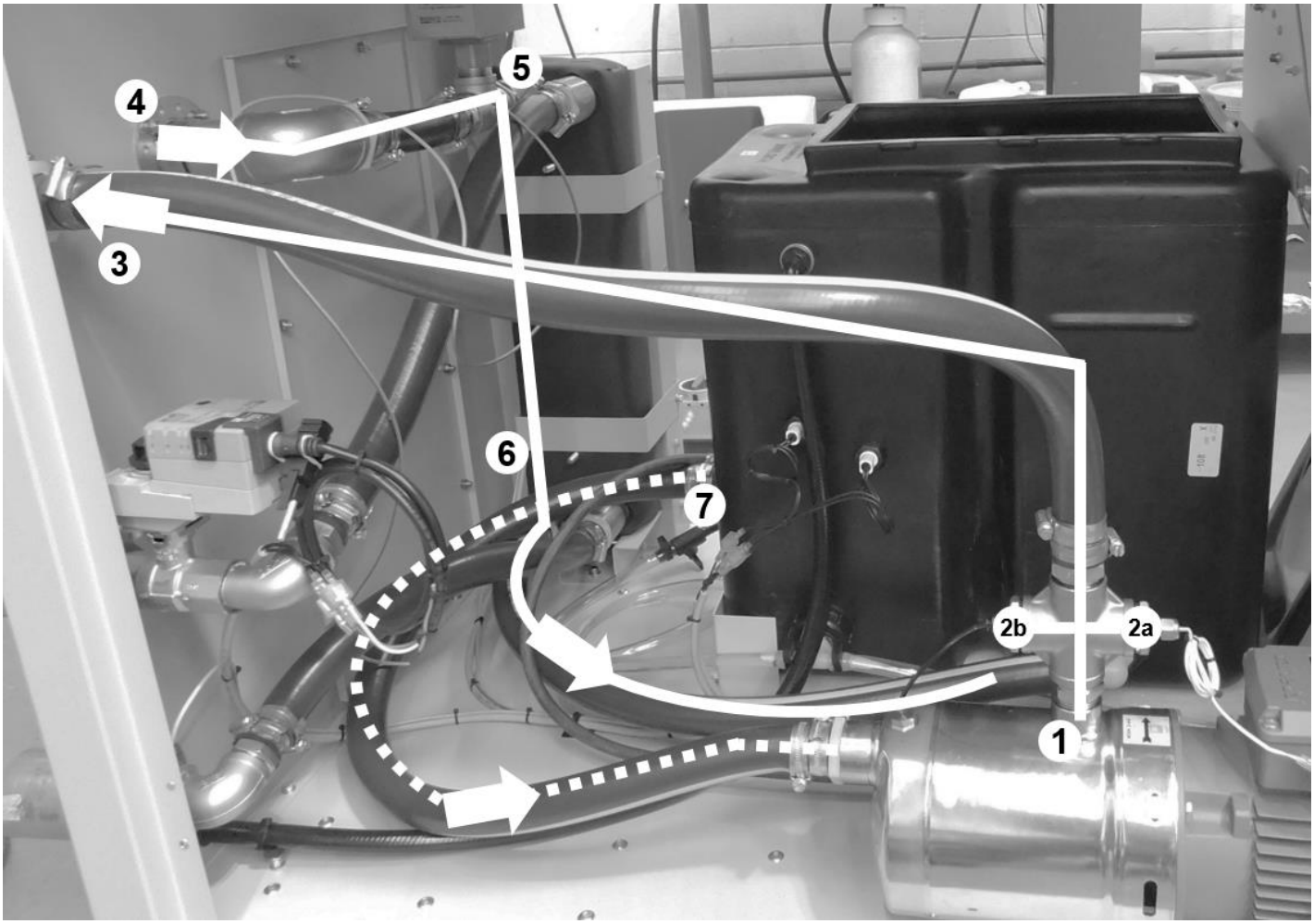
ADDITIONAL REPRESENTATIVE LAYOUT *(IMAGE BELOW FROM XF050)*



With the following exceptions, the numbered descriptions apply as per page 1;

2a	**Temperature sensor** – as per page 1.
2b	**Pressure gauge connection** – normally routed to front panel.

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DOCUMENT DETAILS

Date	23/JUN/2022	Author(s)	MJH	Page	1 / 1	Revision	2

MINI & R05 GENERIC INITIAL TROUBLESHOOTING

Symptom	Potential Cause(s)
Compressor not running	Check the connection of the compressor power plug situated on top of the compressor itself.
	Check the connection of the signal line from the controller to the compressor PCB control board.
	The compressor has built-in logic issued via its PCB control board – board error states are communicated to the main touchscreen controller.
Noisy operation	Usually bearing failure in rotating machinery causes noise – this might be the cooling fan, the compressor or the pump. Pay attention to specific components to identify the source of noise.
Fluid lines becoming fouled / containing biological matter	Not using opaque tubing can lead to UV light passing through the tubing, prompting growth of organisms.
	Not following maintenance schedule for cleaning/flushing.
Fluid seen leaking from system	Your fluid may be incompatible with the materials used in chiller construction. Contact ATC to ensure the fluid is compatible.
	Rapid changes in system temperature can cause some materials to change shape at a faster rate than others. Contact ATC to discuss alternative materials and parts in water circuit construction.
Poor cooling capacity (undercooling)	Check for any error states on the compressor – the controller will indicate if an error has occurred – tapping to clear will allow refrigeration to continue.
	This can be caused by 1) excess application thermal heat load, 2) excess ambient temperature, 3) fan failure, or 4) controller issues with fan speed or compressor control.
Excess cooling capacity (overcooling)	Check behavior of heating solenoid valve – if no power reaches the coil, or if it jammed closed, cooling may continue to occur.
	Check value that system seeing for ‘OUT’ liquid temperature. A value reported that is higher than actual will force the system to cool without need.
Following period of being powered-down, chiller no longer retains correct time and date settings.	When no mains power is provided to the chiller, a PCB-mounted button cell is used to power the real time clock (RTC). This is a lithium cell with Panasonic part number BR-1225/BN. The item is UL-approved under file number MH12210. ATC provide approved replacements.

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Annex H-1

DOCUMENT DETAILS

Date	November 2019	Compiled by	MJH	Revision	1

PERIODIC MAINTENANCE REQUIREMENTS BY END USER

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

Print this sheet out and display close to the chiller to maximize the visibility of maintenance requirements.

Weekly	**Week 1**	**Week 2**	**Week 3**	**Week 4**
Check fluid level – top up as required.				

Monthly	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Check the condenser is free from dust or accumulation of debris.												

Annually	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**
Drain process fluid and replace with fresh fluid.								
Check for fluid leaks throughout chiller and application.								
Clear any debris from inside the chiller.								

A vacuum cleaner is recommended for cleaning out the condenser, while soft cloths and IPA are recommended for cleaning metallic surfaces. If any spillages have occurred, best practice is to allow the water to evaporate off and wipe up remaining glycol residue with a cloth. Always clean with power supply isolated.

Caution; Never blow out the condenser with compressed air.

Caution; If the mains lead is lost or damaged, contact ATC who will be able to supply a replacement of the correct specification.

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Annex I-1

DOCUMENT DETAILS

Date	30/AUG/2021	Author(s)	MJH	Page	1 / 1	Revision	3

GENERIC MAINTENANCE FOR TECHNICIANS

	Warning; Opening the refrigeration system may expose the operative to toxic and corrosive compounds (HF). Take protective measures including suitable eye protection.
	Warning; Gases may exceed 300 psi (20 bar) during operation.
	Warning; Refrigerants do not support combustion (A1-class), but do displace air (oxygen), presenting asphyxiation risk.
	Warning; After switching off, the condenser cooling fan blades continue to rotate. Do not attempt servicing whilst the blades are rotating.
	Warning; All chillers contain water and electricity in close proximity. Ensure the unit is isolated before service. This product is protected from overcurrent by fuses (or MCB) on the mains inlet. Never bypass the overcurrent protection.

Following service or repair by a trained technician;

a) Ensure any electrical connections that may have been disturbed are given the ‘tug-test’

b) Ensure earth bonding conductors are re-attached.

c) Ensure the correct fuses are in place.

d) Ensure the mains cord being used is to specification, and is free from damage

e) Subject the unit to a PAT test to ensure the unit is safe before running.

f) Ensure there are no leaks inside or outside the unit.

g) Using the wiring schematic for guidance, simulate faults to check each interlock’s function.

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Annex J-5

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	MJH	Page	1 / 1	Revision	01

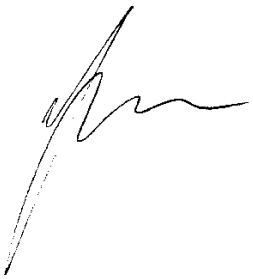
CONFLICT MINERALS COMPLIANCE STATEMENT

Applied Thermal Control (ATC) adheres to and embraces the ethical values that support our everyday activities. As an expression of these principles and ethical values, ATC adheres to the principle of responsible sourcing of components containing precious and non-precious metals and metal salts in compliance with applicable laws and regulations.

The metals considered are Tantalum (Ta), Tungsten (W), Tin (Sn) and Gold (Au). ATC actively sources components from suppliers known to be reputable and could demonstrate compliance upon request with the Conflict Minerals acts and guidelines.

ATC uses Gold and Tin in electrical components, on PCBs and in rotating machinery, as governed by technical requirements of products. These metals could potentially originate from conflict mineral sites. As many of our suppliers do not purchase these metals direct from smelters, both they and ATC must rely heavily on information that will be provided by their suppliers to determine the source and chain of the metals in those products.

ATC is committed to working with its customers and supply chain to meet the customer's specification and requirements with regards to traceability, sourcing requirements and restrictions. ATC commits that, to the best of our knowledge, our suppliers are complying with the conflict minerals act as stated in their documentation. These statements are reviewed, and updates obtained as required.



Mitchell Howard, Technical Manager
Signed in Coalville, UK, date 6/JUL/2020

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Annex J-7

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	MJH	Page	1 / 1	Revision	01

WHAT IS THE REACH REGULATION 1907/2006?

REACH is a regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry. REACH places the burden of proof on companies. To comply with the regulation, companies must identify and manage the risks linked to the substances they manufacture and market in the EU. They have to demonstrate to ECHA how the substance can be safely used, and they must communicate the risk management measures to the users. If the risks cannot be managed, authorities can restrict the use of substances in different ways. In the long run, the most hazardous substances should be substituted with less dangerous ones. REACH stands for Registration, Evaluation, Authorization and Restriction of Chemicals. It entered into force on 1/JUN/2007.

REACH 'ARTICLE' COMPLIANCE CONSIDERATIONS

REACH ANNEX XVII COMPLIANCE

Substances under Annex XVII are restricted either in full (not to be used at all) or for specific uses (can be used in some uses but cannot be used in identified uses).

Applied Thermal Control has contacted all our suppliers and to the best of our knowledge, none of the articles that we sell intentionally contain any of the Annex XVII substances currently on the candidate list in concentrations of >0.1% by weight.

REACH ANNEX XIV COMPLIANCE

Substances under Annex XIV require authorization to use in the EU after sunset date, require communication to downstream recipients when over threshold (0.1% w/w at article level) and require notification to ECHA when SVHC over threshold and imported over 1000kg annually and use not already registered.

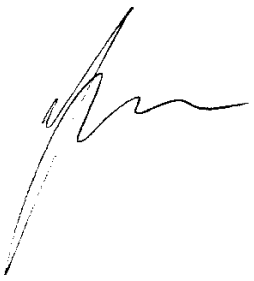
Applied Thermal Control has contacted all our suppliers and to the best of our knowledge, none of the articles that we sell intentionally contain any of the Annex XVII substances currently on the candidate list in concentrations of >0.1% by weight.

SVHC LIST COMPLIANCE

Substances of Very High Concern (SVHC) require communication to downstream recipients when over threshold (0.1% w/w at the article level), notification to the European Chemicals Agency (ECHA) when SVHC over threshold and when imported over 1000kg annually and use not already registered.

Applied Thermal Control has contacted all our suppliers and to the best of our knowledge, none of the articles that we sell intentionally contain any of the Annex XVII substances currently on the candidate list in concentrations of >0.1% by weight.

DECLARATION



Mitchell Howard, Technical Manager
Signed in Barrow-upon-Soar, UK, date 15/JUL/2020

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Annex J-8

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	MJH	Page	1 / 1	Revision	01

WHAT IS THE POPs REGULATION 2019/1021?

POPs stands for persistent organic pollutants. In Europe, the global Stockholm Convention is implemented through POPs legislation. POPs are organic substances that persist in the environment, accumulate in living organisms and pose a risk to our health and the environment. They can be transported by air, water or migratory species across international borders, reaching regions where they have never been produced or used. International risk management is necessary as no region can manage the risks posed by these substances alone.

The European Parliament (and Council) issued regulation 2019/1021 on 20/JUN/2019, and further amended (regulation 2020/784) on 8/APR/2020.

POPs LISTED UNDER INITIAL REGULATION 2019/1021

Pesticides;
Aldrin, Chlordane, DDT, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene.

Industrial Chemicals;
Hexachlorobenzene, Polychlorinated Biphenyls (PCBs).

Industrial Chemical Byproducts;
Hexachlorobenzene byproducts;
Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF), and PCBs.

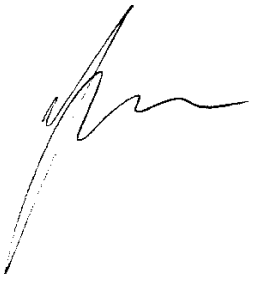
POPs LISTED UNDER AMENDMENT 2020/784

Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds.

POPs COMPLIANCE STATEMENT

We certify that to the best of our knowledge, based upon up-to-date information from our suppliers, all products supplied by Applied Thermal Control are fully POPs compliant in accordance with regulations and amendments above mentioned.

DECLARATION



Mitchell Howard, Technical Manager
Signed in Barrow-upon-Soar, UK, date 27/AUG/2020

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Annex J-10

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	MJH	Page	1 / 1	Revision	02

WHAT IS THE RoHS DIRECTIVE?

The RoHS Directive places restrictions on the use of certain hazardous substances in electrical and electronic equipment (EEE). RoHS compliance has been required for many years, however in 2014 it became a mandatory requirement under CE Marking. ATC products do not clearly fall within any of the existing categories of equipment, but as of 23/JUL/2019, all EEE not covered falls within scope of the directive. In contrast to RoHS 1, RoHS 2 is a CE marking Directive, and requires, for finished EEE, the use of the CE mark on the product to show compliance. The responsibility for affixing the CE mark resides with the manufacturer.

RoHS 1 2002/95/EC

Adopted in February 2003 by the EU and taking effect on 1/JUL/2006, RoHS 1 restricted the use of 6 hazardous materials;

1) Lead (Pb)
2) Mercury (Hg)
3) Cadmium (Cd)
4) Hexavalent Chromium (Cr6+)
5) Polybrominated Biphenyls (PBB)
6) Polybrominated Diphenyl Ether (PBDE)

We certify that to the best of our knowledge, based upon up-to-date information from our suppliers, all products supplied by Applied Thermal Control are fully RoHS 1 compliant.

RoHS 2 2011/65/EU

Adopted in July 2011 by the EU and taking effect on 2/JAN/2013, RoHS 2 expands the scope of RoHS 1 by adding new categories. RoHS 2 compliance is required to CE mark the product. Compliance with RoHS 2 is mandatory from 22/JUL/2019.

We certify that to the best of our knowledge, based upon up-to-date information from our suppliers, all products supplied by Applied Thermal Control are fully RoHS 2 compliant.

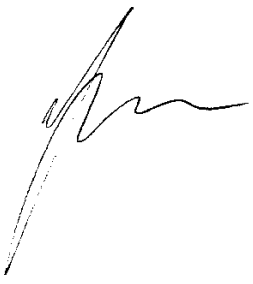
RoHS 3 2015/863/EU

Adopted in 2015 by the EU and taking effect from 22/JUL/2019, RoHS 3 adds four additional substances to RoHS 1's list.

1) Bis(2-Ethylhexyl) phthalate (DEHP): < 1000 ppm
2) Benzyl butyl phthalate (BBP): < 1000 ppm
3) Dibutyl phthalate (DBP): < 1000 ppm
4) Di-isobutyl phthalate (DIBP): < 1000 ppm

We certify that to the best of our knowledge, based upon up-to-date information from our suppliers, all products supplied by Applied Thermal Control are fully RoHS 3 compliant.

DECLARATION



Mitchell Howard, Technical Manager
Signed in Barrow-upon-Soar, UK, date 11/NOV/2020

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Annex J-12

DOCUMENT DETAILS							
Date	30/AUG/2021	Author(s)	MJH	Page	1 / 1	Revision	1

UKCA DECLARATION OF CONFORMITY (DoC)

Demand created by;	The Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019

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;	R-Series
Function;	Recirculating chiller
Model;	All with ‘R’ 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 is in conformity with the relevant statutory requirements applicable to the specific product. The manufacturer takes full responsibility for the product’s compliance.

- Supply of Machinery (Safety) Regulations 2008
- Electromagnetic Compatibility Regulations 2016
- Electrical Equipment (Safety) Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

PERSON EMPOWERED TO DRAW UP DECLARATION

Robert Poniatowski, CEO
Signed in Barrow-upon-Soar, UK, date 30/AUG/2021

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Annex J-13

DOCUMENT DETAILS

Date	6/APR/2022	Author(s)	MJH	Page	1 / 1	Revision	1

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, address as above.

DESCRIPTION & IDENTIFICATION OF MACHINERY

Generic denomination;	R-Series
Function;	Recirculating chiller
Model;	All with ‘R’ 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, UK. ASCB Registered; 201409-2

DECLARATION

Applied Thermal Control declares that the machinery described above fulfils all the relevant provisions of the directives and standards below.

Directive	**Harmonised Standards applied**
Machinery Directive 2006/42/EC (inclusive Low Voltage Directive 2014/35/EU)	EN ISO 12100:2010 (MD) BS EN 61010-1:2010+A1:2019 (LVD)
EMC Directive 2014/30/EU	IEC 61000-6-2:2005 IEC 61000-6-4:2006 +A1:2011
RoHS Directive 2011/65/EU (*RoHS 2*) RoHS Directive (EU) 2015/863 (*RoHS 3*)	EN IEC 63000:2018
Pressure Equipment Directive (2014/68/EC)	Out of Scope. Sound Engineering Practice (SEP) applied.

PERSON EMPOWERED TO DRAW UP DECLARATION

Robert Poniatowski, CEO
Signed in Barrow-upon-Soar, UK, date 6/APR/2022

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Annex K-1

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	RW, MJH	Page	1 / 1	Revision	02

WARRANTY TERMS

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 warrantied?
ATC provides a comprehensive return to base 2-year parts, 1-year labor 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 for shipping to ATC are for the customer's account. Freight costs for shipping from ATC are for ATC's account.
During the **second year** of the warranty, freight costs to and from ATC are for the customer's account.

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. The contact details in the header of this document are an ideal place to start. 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.

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Operating Manual; Recommended Spares

Annex M-1

DOCUMENT DETAILS

Date	23/JUN/2022	Author(s)	MJH	Page	1 / 2	Revision	2

RECOMMENDED SPARES FOR M, EM- & R05-SERIES CHILLERS

Recommended spares include all rotating machinery (i.e. motors, fans), all sacrificial elements (i.e. fuses) and parts that users interact with (dials, fittings). Pricing is available from sales@app-therm.com.

COMMON TO MINI AND ECOMINI

PN	Description	QTY
WA697	Water Pump	1
RA282	Fridge Compressor	1
RA282	Compressor Controller	1
EA787	Compressor Cooling Fan	2
RA287	Fridge Condenser Fan	1
EA512	Power Inlet Fuse	2
EA769	Pump Fuse	1
EA764	DIN Rail Fuse Holder	1
WA643	Self-Sealing Water Bulkhead (SA00016)	2
WA644	Self-Sealing Water Connectors (SA00016)	2
WA642	12mm Push Fit Water Bulkhead	2
WA652	12mm Push Fit Plug	2
EA044	IEC Cordset	1
EA770	Power Inlet Connector Module	1
MA310	Rubber Mounting Feet	4
WA641	Fluid Tank Assembly	1

MINI-SPECIFIC

PN	Description	QTY
EA754	Power Supply	1
EA760	USB Port	1
EA755	Touch Screen Controller NON-RS485	1
EA778	Touch Screen Controller WITH-RS485	1
EA513	Controller Fuse	1
EA762	Pump Relay	1
EA759	Optical Level Switch	2
EA757	Pressure Transducer	1
EA586	RTD Temperature Probe PT100	1
RA285	Solenoid Coil	1

ECOMINI-SPECIFIC

PN	Description	QTY
EA815	Power Supply	1
EA019	NTC Temperature Probe assembly	1
EA812	Speed Control Potentiometer	1
EA813	Speed Control Dial	1
EA816	Low Temperature Cutoff Controller	1

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Annex M-1

DOCUMENT DETAILS

Date	23/JUN/2022	Author(s)	MJH	Page	2 / 2	Revision	2

R05-SPECIFIC

PN	Description	QTY
WA690	BULKHEAD FITTING – 1/2" BSPPF	2
WA716	TANK – 2.3L	1
WA717	TANK CAP – 3/4" BSPPM with seal	1

SAFETY DATA SHEET

according to Regulation (EU) 2015/830

Harp® 134a

Revision 0

Revision date 2017-06-21

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product name	Harp® 134a
REACH Registration Number	01-2119459374-33
CAS No.	811-97-2
EC No.	212-377-0

1.2. Relevant identified uses of the substance or mixture and uses advised against

Product Use	[SU3] Industrial uses: Uses of substances as such or in preparations at industrial sites; ----- [SU22] Professional uses: Public domain (administration, education, entertainment, services, craftsmen);
Restricted use	[SU21] Consumer uses: Private households (= general public = consumers);
Description	Gas.

1.3. Details of the supplier of the safety data sheet

Company	Harp International Limited
Address	Gellihirion Industrial Estate Pontypridd Rhondda Cynon Taff CF37 5SX UK
Web	www.harpintl.com
Telephone	+44 (0)1443 842 255
Fax	+44 (0)1443 841 805
Email	harp@harpintl.com
Email address of the competent person	safety@harpintl.com

1.4. Emergency telephone number

Emergency telephone number	+44 (0) 1270 502891 24 Hours

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

2.1.2. Classification - EC 1272/2008	Compressed gas: H280;

2.2. Label elements

Hazard pictograms	

Harp® 134a

2.2. Label elements

Signal Word	Warning
Hazard Statement	Compressed gas: H280 - Contains gas under pressure; may explode if heated.
Precautionary Statement: Storage	P410+P403 - Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

Other hazards	Asphyxiant in high concentrations. May cause cold burns/frostbite.

SECTION 3: Composition/information on ingredients

3.1. Substances

67/548/EEC / 1999/45/EC

Chemical Name	Index No.	CAS No.	EC No.	REACH Registration Number	Conc. (%w/w)	Classification	M-factor.
Harp® 134a (1,1,1,2-Tetrafluoroethane (HFC 134a))		811-97-2	212-377-0	01-2119459374-33	90 - 100%		

EC 1272/2008

Chemical Name	Index No.	CAS No.	EC No.	REACH Registration Number	Conc. (%w/w)	Classification	M-factor.
Harp® 134a (1,1,1,2-Tetrafluoroethane (HFC 134a))		811-97-2	212-377-0	01-2119459374-33	90 - 100%	Compressed gas: H280;	

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation	Move the exposed person to fresh air.
Eye contact	Rinse immediately with plenty of water.
Skin contact	Frostbite: treat as thermal burns.
Ingestion	Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

Inhalation	Seek medical attention if irritation or symptoms persist.
Eye contact	Seek medical attention if irritation or symptoms persist.
Skin contact	Frostbite: treat as thermal burns.
Ingestion	Ingestion is not considered a potential route of exposure.

4.3. Indication of any immediate medical attention and special treatment needed

Inhalation	If you feel unwell, seek medical advice (show the label where possible).
Eye contact	Seek medical attention if irritation or symptoms persist.
Skin contact	Seek medical attention if irritation or symptoms persist.
Ingestion	Ingestion is not considered a potential route of exposure.

SECTION 5: Firefighting measures

5.1. Extinguishing media

	Use extinguishing media appropriate to the surrounding fire conditions.

5.2. Special hazards arising from the substance or mixture

	This product is not flammable in air under ambient conditions of temperature and pressure. Certain mixtures of the product and air under pressure may be flammable. At high temperature :, Thermal decomposition giving toxic and corrosive products :, Gaseous hydrogen fluoride (HF)., Carbon oxides.

5.3. Advice for firefighters

	Wear self contained breathing apparatus and protective clothing. Cool containers / tanks with water spray. Ensure a system for the rapid emptying of containers. In case of fire nearby, remove

Harp® 134a

5.3. Advice for firefighters

	exposed containers.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

	Ensure adequate ventilation of the working area. Avoid contact with skin and eyes. Evacuate personnel to a safe area. Wear self contained breathing apparatus and protective clothing. Vapours are heavier than air.

6.2. Environmental precautions

	Do not release into the environment.

6.3. Methods and material for containment and cleaning up

	Recovery: Allow to evaporate. Elimination: See chapter 13.

6.4. Reference to other sections

	See section 8. EXPOSURE CONTROLS / PERSONAL PROTECTION for further information. See section 13. DISPOSAL CONSIDERATIONS for further information.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

	Ensure adequate ventilation of the working area. Avoid contact with eyes and skin. Adopt best Manual Handling considerations when handling, carrying and dispensing. Keep away from sources of ignition - No smoking. Do not eat, drink or smoke in areas where this product is used or stored. When using do not eat or drink. Wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

	Keep containers tightly closed. Keep in a cool, dry, well ventilated area. Store in correctly labelled containers. Keep away from sources of ignition - No smoking. Store out of direct sunlight. Storage temperature: <45°C.
Suitable packaging	Stainless steel. Steel.

7.3. Specific end use(s)

	See section 1.2. Relevant identified uses of the substance or mixture and uses advised against for further information.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

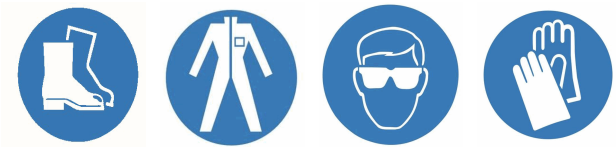
	Occupational exposure controls.

8.1.1. Exposure Limit Values

Harp® 134a (1,1,1,2-Tetrafluoroethane (HFC 134a))	**WEL 8-hr limit ppm:** 1000	**WEL 8-hr limit mg/m3:** 4240
	WEL 15 min limit ppm: -	**WEL 15 min limit mg/m3:** -
	WEL 8-hr limit mg/m3 total inhalable dust: -	**WEL 15 min limit mg/m3 total inhalable dust:** -
	WEL 8-hr limit mg/m3 total respirable dust: -	**WEL 15 min limit mg/m3 total respirable dust:** -

8.2. Exposure controls

8.2. Exposure controls



8.2.1. Appropriate engineering controls	Ensure adequate ventilation of the working area.
8.2.2. Individual protection measures	Wear protective clothing.
Eye / face protection	Approved safety goggles.
Skin protection - Handprotection	Wear suitable gloves.
Skin protection - Other	Wear suitable protective clothing.
Respiratory protection	Wear suitable respiratory equipment when necessary.
Occupational exposure controls	Keep away from food, drink and animal feedingstuffs.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance	Gas
Colour	Colourless
Odour	Slight
Odour threshold	No data available
Freezing Point	No data available
Evaporation rate	No data available
Water solubility	No data available
Fat Solubility	No data available
Soluble in	No data available
Partition coefficient (n-octanol/water)	No data available
Partition coefficient	No data available
Autoignition temperature	> 743 °C
Decomposition temperature	> 370 °C
Vapour pressure	= 0.574 MPa
Vapour density	= 4.24 kg/m3
Relative density	= 1.21 (H2O = 1 @ 20 °C)
Initial boiling point	- 26 °C
Melting point	- 108 °C
Flash point	Not applicable.
pH	Not applicable.
Flammability (solid, gas)	Not applicable.
Viscosity	Not applicable.
Explosive properties	Not applicable.
Oxidising properties	Not applicable.
Solubility	No data available

9.2. Other information

9.2. Other information

VOC (Volatile organic compounds)	Not relevant
Conductivity	No data available
Surface tension	No data available
Gas group	No data available
Benzene Content	No data available
Lead content	No data available

SECTION 10: Stability and reactivity

10.1. Reactivity

Stable under normal conditions. The gaseous product in presence of air can form, under certain conditions of temperature and pressure, a flammable mixture.

10.2. Chemical stability

Stable under normal conditions. The gaseous product in presence of air can form, under certain conditions of temperature and pressure, a flammable mixture.

10.3. Possibility of hazardous reactions

No data is available on this product.

10.4. Conditions to avoid

Keep away from heat and sources of ignition. Avoid contact with flames and red hot metallic surfaces.

10.5. Incompatible materials

Alkaline hydroxides. Alkaline earth metals. Strong oxidising agents. Finely divided metals.

10.6. Hazardous decomposition products

At high temperature :, Thermal decomposition giving toxic and corrosive products :, Gaseous hydrogen fluoride (HF)., Carbon oxides. Decomposition temperature: >370°C.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	Slightly harmful by inhalation. As with other volatile aliphatic halogenated compounds, through vapour accumulation and/or inhalation of large quantities, the product can cause :, Loss of consciousness and cardiac disorders aggravated by stress and lack of oxygen, risk of mortality.
Skin corrosion/irritation	Ejection of liquefied gas : frostbite possible.
Serious eye damage/irritation	Ejection of liquefied gas : frostbite possible.
Respiratory or skin sensitisation	No data available.
Germ cell mutagenicity	No data available.
Carcinogenicity	No data available.
Reproductive toxicity	No data available.
STOT-single exposure	No data available.
STOT-repeated exposure	No data available.
Aspiration hazard	No data available.
Repeated or prolonged exposure	No data available.

11.1.4. Toxicological Information

No data available

SECTION 12: Ecological information

Harp® 134a

12.1. Toxicity

	No data available

12.2. Persistence and degradability

	Not readily biodegradable.

12.3. Bioaccumulative potential

	Does not bioaccumulate.

Partition coefficient

	Harp® 134a No data available

12.4. Mobility in soil

	No data is available on this product.

12.5. Results of PBT and vPvB assessment

	This substance is not considered to be persistent, bioaacumulating, toxic (PBT), nor very persistent, very bioaccumulating (vPvB).

12.6. Other adverse effects

	Global warming potential (GWP): Global warming potential with respect to CO2 = 1430 (IPCC Assessment Report 4). Ozone depletion potential: Ozone depletion potential; ODP; (R-11 = 1), Value:.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

	Dispose of in compliance with all local and national regulations.

Disposal methods

	Contact a licensed waste disposal company.

SECTION 14: Transport information

Hazard pictograms

14.1. UN number

	UN3159

14.2. UN proper shipping name

	1,1,1,2-TETRAFLUOROETHANE

14.3. Transport hazard class(es)

ADR/RID	2
Subsidiary risk	-
IMDG	2.2
Subsidiary risk	-
IATA	2.2
Subsidiary risk	-

14.4. Packing group

Packing group	-

Harp® 134a

14.5. Environmental hazards

Environmental hazards	No
Marine pollutant	No

14.6. Special precautions for user

	No data is available on this product.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

	No data is available on this product.

ADR/RID

Hazard ID	20
Tunnel Category	(C/E)

IMDG

EmS Code	F-C S-V

IATA

Packing Instruction (Cargo)	200
Maximum quantity	150 kg
Packing Instruction (Passenger)	200
Maximum quantity	75 kg

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulations	REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

15.2. Chemical safety assessment

	No data is available on this product.

SECTION 16: Other information

Other information

Text of Hazard Statements in Section 3	Compressed gas: H280 - Contains gas under pressure; may explode if heated.

Further information

	The information supplied in this Safety Data Sheet is designed only as guidance for the safe use, storage and handling of the product. This information is correct to the best of our knowledge and belief at the date of publication however no guarantee is made to its accuracy. This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any other process.

SAFETY DATA SHEET
HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1.	**Product Name**	Hexid A4
1.2.	**Supplier**	Applied Thermal Control Limited 39 Hayhill Industrial Estate, Barrow upon Soar, Leicestershire, LE12 8LD. United Kingdom. www.app-therm.com
1.3.	**Telephone Number**	+44(0)1530 839998
1.4.	**Email**	sales@app-therm.com
1.5.	**Emergency Telephone Number**	+44(0)1530 839998
1.6.	**Intended/Recommended Use**	Heat Transfer Fluid

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

The product is not classified as dangerous according to Regulation (EC) No. 1272/2008.
This mixture is not classified as dangerous according to Directive 1999/45/EC.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1.	**Chemical Nature**	Water (CAS 7732-18-5), not classified. Propylene glycol (CAS 57-55-6) (REACH 01-2119456809-23) (EINECS 200-338-0) not classified. Fluorescein (trace) and biocide (trace) not classified.
3.2.	**Food Grade**	

SECTION 4: FIRST AID MEASURES

	General advise	No special precautions required. Treat symptomatically.
4.1.	**Eye Contact**	Rinse thoroughly with plenty of water, also under the eyelids. Remove contact lenses after a few minutes and continue rinsing. If symptoms persist, call a physician.
4.2.	**Skin Contact**	Wash off immediately with plenty of water. If skin irritation persists, call a physician.
4.3.	**Inhalation**	Remove to fresh air. If symptoms persist, call a physician.
4.4.	**Ingestion**	Rinse mouth with water. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Water spray, foam, dry powder or CO2. Alcohol-resistant foam

5.2 Unsuitable extinguishing Media

High volume water jet. Do not use a solid water stream as it may scatter and spread fire.

5.3 Specific hazards during firefighting

In fire conditions, toxic decomposition products may be formed (see also section 10). In combustion, emits fumes, smoke, carbon dioxide (CO2) and carbon monoxide (CO). Heating will cause a pressure rise - with severe risk of bursting and explosion, Violent steam generation or eruption may occur upon application of direct water to hot liquids.

5.4. Advice for firefighters

In the event of fire, wear self-contained breathing apparatus. Wear personal protective equipment. Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. Keep containers cool by spraying with water if exposed to fire. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Burning fluids may be extinguished by dilution with water

SAFETY DATA SHEET
HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions

Use personal protective equipment. Avoid contact with skin and eyes. Keep unnecessary and unprotected personnel from entering the area.

6.2. Precaution to protect the environment

Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration.

6.3 Clean-up procedures

Contain the spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal. Dike the area of spill to prevent spreading and pump liquid to salvage tank. Treat recovered material as described in section 13 Disposal considerations.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Keep container tightly closed. Handle in accordance with good industrial hygiene and safety practice. Spills of these organic materials on hot fibrous insulations may lead to lowering of the auto-ignition temperatures possibly resulting in spontaneous combustion.

7.2. Conditions for safe storage

Keep only in the original container.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Component: Propane-1,2-diol CAS-No. 57-55-6
Other Occupational Exposure Limit Values EH40 WEL, Time Weighted Average (TWA):, Total vapour and particulates.150 ppm, 474 mg/m3
EH40 WEL, Time Weighted Average (TWA):, Particulate.10 mg/m3
ELV (IE), Time Weighted Average (TWA):, Total vapour and particulates.150 ppm, 470 mg/m3
ELV (IE), Time Weighted Average (TWA):, Particulate.10 mg/m3

8.2. Exposure controls/Appropriate engineering controls

Local exhaust.	If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

Personal protective equipment

Respiratory protection	Suitable respiratory protective device Combination filter: A-P2
Filter Type	Combined particulates and organic vapour type
Hand protection	Category short time exposure Break through time> 10 min
Protective index	Class 1 When prolonged exposure is expected: Break through time> 120 min
Protective index	Class 4 Observe the information of the glove manufacturers on permeability. Protective gloves should be chosen according to Workplace Safety Assessment. Gloves recommended according to EN 374 (protection against chemicals).
Material	Chemical resistant gloves made of butyl rubber or nitrile rubber category III according to EN 374.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1	Appearance at 20°C	Fluorescent green clear liquid
9.2	Odour	Almost odourless
9.3	Flash point	Boils without flashing
9.4	Ignition temperature	Not Available
9.5	Flammability Limit	Not Available
9.6	Oxidizing Properties	Not Available
9.7	Auto flammability	450°C
9.8	Density at 25°C	~1.036g/cm^3
9.9	pH (as is)	7
9.10	Boiling point	102°C
9.7	Auto flammability	450°C
9.8	Solubility in water	Miscible
9.9	Freezing point	-21°C

SAFETY DATA SHEET
HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

9.10	Specific Heat Capacity	3.78kJ/kg °K
9.11	Viscosity, Kinetic, at 25°C	3.51mPa.s

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
Stable under recommended storage conditions. No dangerous reaction known under conditions of normal use.

10.2. Chemical stability
No decomposition if stored and applied as directed. Stable under recommended storage conditions. Hygroscopic.

10.3. Hazardous reactions
Hazardous polymerisation does not occur.

10.4. Conditions to avoid
Generation of gas from decomposition causes pressure in closed systems. Keep away from direct sunlight. Avoid high temperatures. Avoid temperatures exceeding the decomposition temperature. Avoid UV light.

10.5. Materials to avoid
Strong acids, Strong bases, Strong oxidizing agents.

10.6. Hazardous decomposition products
Aldehydes, Alcohols, Ether, Organic acids.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Toxicity Oral
LD50 : > 20000 mg/kg (rat) This product can present a small hazard if large quantities are swallowed.

11.2. Inhalation
LC50 : 6.15 mg/l (rat; 4 h; vapour) At ambient temperature the exposure to vapours is minimal due to a low volatility rate. Inhalation may cause irritation to the nose, throat, upper respiratory tract and lungs. No deaths occurred

11.3. Dermal
LD50 : > 20000 mg/kg (rabbit) Prolonged skin contact is unlikely to result in absorption of harmful amounts. Skin irritation by prolonged exposure is unlikely. Repeated contact may cause flaking and softening of skin.

11.4. Eyes
Slight irritation is possible. Direct contact with eyes may cause temporary irritation. Corneal injury is unlikely.

11.5. Sensitisation
Patch test on human volunteers did not demonstrate sensitisation properties.

11.6. CMR Carcinogenicity
Animal testing did not show any carcinogenic effects. Information given is based on data obtained from similar substances.

11.7. Mutagenicity
No data available.

11.8. Reproductive toxicity
No data available.

11.9. Specific Target Organ Toxicity
Single exposure no data available. Repeated exposure no data available.

11.10. Other toxic properties
Repeated dose toxicity. In rare cases, repeated excessive exposure to propylene glycol may cause central nervous system effects. Aspiration hazard Due to its physical properties, the substance does probably not pose any aspiration hazard.

11.11. Other relevant toxicity information
Handle in accordance with good industrial hygiene and safety practice.

11.12. Experience with human exposure
Health injuries are not known or expected under normal use.

SAFETY DATA SHEET
HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

SECTION 12: ECOLOGICAL INFORMATION

12.1. Acute toxicity

Fish - LC50 : 40613 mg/l (Oncorhynchus mykiss; 96 h) (static test)
Daphnia and other aquatic invertebrates - LC50 : 18340 mg/l (Ceriodaphnia Dubia (water flea); 48 h) (static test)
Algae - ErC50 : 19000 mg/l (Pseudokirchneriella subcapitata (green algae); 96 h) (Growth inhibition)
Bacteria - NOEC : > 20000 mg/l (Pseudomonas putida; 18 h)Chronic toxicity
Aquatic invertebrates - NOEC : 13020 mg/l (Ceriodaphnia Dubia (water flea); 7 d) (semi-static test)

12.2. Persistence and degradability

Biodegradability 81 % (anaerobic; Exposure Time: 28 d)(OECD 301 F)
Readily biodegradable 96 % (anaerobic; Exposure Time: 64 d)(OECD 306.)

12.3. Bioaccumulative potential

BCF - 0.09 estimated Low bioaccumulative potential

12.4. Mobility

Estimated Koc < 1, indicating very high soil mobility.

12.5. PBT and vPvB assessment

Not a PBT or vPvB substance or mixture

12.6. Other adverse effects

Do not flush into surface water or sanitary sewer system. Avoid subsoil penetration. This substance is not in Annex I of Regulation (EC) 2037/2000 on substances that deplete the ozone layer.

SECTION 13: DISPOSAL CONSIDERATION

13.1. Waste treatment methods

Disposal together with normal waste is not allowed. Special disposal required according to local regulations. Do not let product enter drains. Contact waste disposal services.

13.2. Contaminated packaging

Empty contaminated packaging thoroughly. They can be recycled after thorough and proper cleaning. Packaging that cannot be cleaned are to be disposed of in the same manner as the product.

13.3. European Waste Catalogue Number

No waste code according to the European Waste Catalogue can be assigned for this product, as the intended use dictates the assignment. The waste code is established in consultation with the regional waste disposer.

SECTION 14: TRANSPORT INFORMATION

Not dangerous goods for ADR, RID, IMDG and IATA.

14.1. EEC Regulations

UNNO None **Class** None **Packing Group** None
Road & Rail Transport (ADR & RID) None **IMDG** Not Applicable **ICOA** None

SECTION 15: REGULATORY INFORMATION

15.1	Classification	Not classified as hazardous to users.
15.2.	CAS No.	57556
15.3.	Risk or Safety phrases	None
15.4.	Labelling	None

SECTION 16: OTHER INFORMATION

Key literature references and sources for data taken from supplier information and data from the "Database of registered substances" of the European Chemicals Agency (ECHA) were used to create this safety data sheet. Other information - The information provided in this Safety Data Sheet is correct to our knowledge at the date of its revision. The information given only describes the products with regard to safety arrangements and is not to be considered as a warranty or quality specification and does not constitute a legal relationship.
The information contained in this Safety Data Sheet relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.