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Installation, Operation & Service Manual

XF025

DOCUMENT DETAILS

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CHANGE LOG

Date	Revision	Page ref	Change
8/SEP/2022	1	ALL	First release



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PRODUCT SPECIFICATIONS – OVERVIEW

ADMINISTRATIVE DATA

CAD assembly dwg no.	MA097
Standard model numbers	XF025

PHYSICAL ATTRIBUTES

Physical dimensions	W750 x D1100 x H1060mm
Construction	Sheet steel gauge 1.5mm Epoxy polyester powder coat
Mounting type	Castors, 2 swivel, 2 braked
Acceptable environment	Indoors or outdoors sheltered
Dry weight	80kg
Wet weight	95kg
Noise level	≤50dB(A)@1m
Toolless access	Partial

TEMPERATURE CONTROL ATTRIBUTES

Technology	Water-to-water heat exchanger
Control method	Modulating valve
Temperature stability	±0.5°C
Cooling capacity condition 1	12kW (5°K rise over supply)
Cooling capacity condition 2	25kW (10°K rise over supply)
Cooling capacity condition 3	50kW (20°K rise over supply)
Maximum ambient	+40°C
Design flowrate	25L/min
Temperature range (standard)	+4°C to 70°C
Temperature resolution	0.1°C
Maximum Total Heat Rejection	Applied load, plus power in

WATER CIRCUIT ATTRIBUTES

System volume	11-15L
Pump options	P25, P40
Pressure relief control	Optional gate valve
Standard fittings	1" (P25, P40) or 1-1/2" (P80) BSPPF (ISO G)
Standard chemical compatibility	Hexid, Water, Glycol mix

ELECTRICAL ATTRIBUTES

Standard power supply	Various, see specific annex for options.
Current at 400V 3~	Various, see specific annex for options.
Standard supply configuration	Various, see specific annex for options.
Standard overcurrent restart mode	Manual

SAFETY INTERLOCKS, STANDARDS & INDICATORS

1st party approvals	CE, UKCA
3rd party approvals	UL/CSA-ready
Empty fluid reservoir alarm	Process stop interlock
Low fluid flow alarm	Available option
House water pressure alarm	Available option
Process water pressure alarm	Available option
Temperature out of range alarm	Standard
Fluid tank level alarm	Standard
Emergency off	Via overload handle
Interlock restored restart mode	Manual (Automatic is an available option)



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SAFETY NOTICES

For your safety, we draw your attention to the following warning and caution marks throughout the manual. Warning symbols can be found on the unit. Ensure you have read through all warnings before starting the unit. The safe operation of ATC products 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. 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.

- | | |
|--|---|
|  | 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; This product 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 heat exchanger system automatically invalidates warranty. |
|  | Warning; Hot and cold surfaces are present during operation. Take caution and care when touching pump during operation. |
|  | Warning; Water pressures of up to 10 bar during operation. |
|  | Warning; Water and electricity near one another. Always ensure the unit is isolated before service. The product is protected from overcurrent by MCB (miniature circuit breaker). Never bypass this component. |
|  | During fault diagnostics and maintenance, it may be necessary to remove panels, which expose the operator to the dangers of pressurized systems, hot or cold pipes and electrical circuits. Only qualified personnel who are aware and equipped to deal with these systems should only carry out such work. |
|  | Any temporary electrical supply to the chiller should be correctly earthed and connected through an earth leakage trip. |
|  | In case of unexpected coolant leakage, safety glasses should always be worn when the chiller is operated with the covers removed. |
|  | Under no circumstances leave the cooler unattended with the side panels removed. |
|  | Never alter settings of pressure switches, overloads, circuit breakers or any safety device without first consulting Applied Thermal Control. |



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INCLUDED ANNEXES

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

- Annex A-5 210226 Shipping _ Unpacking - Crane or forklift recommended
- Annex B-16 220908 Site _ Environmental Requirements for XF025
- Annex C-7 220309 Installation - Generic water-cooled with 1.0inch fittings
- Annex C-9 220609 Installation - Generic water-cooled with 1.5inch fittings
- Annex D-3 201007 Fluid Handling _ Startup Procedures - Generic
- Annex E-5 210301 KR3 - how to use
- Annex E-5K 210729 KR3 Program XF025 with SA3 heater
- Annex F-5 220610 Centrif or turbine pump without relief
- Annex G-12 210326 Troubleshooting - X-Series modulating control valve functional explanation
- Annex G-16 220909 Troubleshooting - Initial help for XF025
- Annex H-2 210326 End-user maintenance - water-cooled units with water as fluid
- Annex I-5 210302 Maintenance for technicians - Generic non-refrigerated units
- Annex J-3 220406 EU DoC X-series
- 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-19 220610 UKCA DoC X-Series
- Annex K-1 200623 Standard warranty terms of ATC
- Annex L-3 211130 Heater pack general application
- Annex L-11 210528 KR1 KR3 RS485 Modbus RTU Protocol
- Annex L-12 220610 Volt Free Contacts
- Annex L-51 220614 Remote Stop-Start
- Annex M-12 220909 Recommended spares, XF025
- Annex R-3 200203 SDS Hexid A4 v6.4



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UNPACKING UNITS WEIGHING OVER 60kg (133lbs) ON CASTORS

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.

As the unit weighs >60kg, ATC recommends it should be lifted with slings through the underside, using a forklift or overhead crane. ATC highly recommends that it is not manually lifted, and that safe slinging and lifting practices are adhered to.

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.

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



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SITE & ENVIRONMENTAL REQUIREMENTS FOR XF025

This guide applies to XF025 water-to-water heat exchangers and describes the requirements for all services and conditions necessary for years of trouble-free running. If you require more detail, please contact ATC for support on sales@app-therm.com or using the phone numbers in the head of this document.

GUIDANCE

- 1 **Storage temperature range.** Without process fluids, -20°C to +70°C.
- 2 **Storage humidity range.** Non-condensing, relative humidity 5% to 95%. Before starting product, allow product to acclimate for 24h in location of use when storing outside *operating* humidity range.
- 3 **Operating temperature range.** With appropriate process fluids, -20°C to +40°C.
- 4 **Operating humidity range.** 80% for ambient temperatures up to +31°C (+88°F), decreasing linearly to 50% relative humidity at +40°C (+104°F) ambient temperature.
- 5 **Hard, level surface.** A level surface is important for ensuring proper filling and allowing air to escape.
- 6 **Electrical supply.** XF025-based products (including non-standard numbers) can accept

	-0spec	-2spec	-3spec	-8spec
Voltage range	230V	220V	400V	208V
Voltage fluctuations about nominal	±10%	±10%	±5%	±10%
Maximum current draw	4.5A		6.5A	
Mode of supply	1P+N+E	1P+N+E or 2P+E	3P+E	3P+E
Frequency	50Hz	60Hz	50Hz	60Hz
Overload protection	GV2 4-6.3A	GV2 4-6.3A	GV2 4-6.3A	GV2 4-6.3A
Internal fuse for controller	T0.5A H250V	T0.5A H250V	T0.5A H250V	T0.5A H250V
Appliance inlet	Terminal block	Terminal block	Terminal block	Terminal block

Mains supply via an earth leakage detecting residual current device (RCD) is recommended.
- 7 **Clearance.** Clearance is required as follows;
 - a) Ensure the on/off switch on the front face is unobstructed to allow access in case of emergency.
 - b) Fitting of hoses and electrical supply to the rear of the unit to allow recommended bending radii.
 - c) Maintenance access points require top and side panels to be removed.
 - d) It is possible to site multiple machines of the same type side-by-side.

The exact amount of clearance can be determined by the OEM or end user as process is not affected as it would be in an air-cooled product. Access for maintenance is the primary consideration.
- 8 **Plumbing.** Tubing, piping or hose must be clean and compatible with the fluid to be used. The product is compatible with deionized water, tap water and water-glycol mixtures such as Hexid A4 and A6. Ensure the connected pipework is suitable for handling the flowrate of the fitted pump at a system pressure ≥6bar.
- 9 **Indoor use only.** Altitude up to 2000m above sea level. Ensure the unit has adequate ventilation.
- 10 **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 sealing compounds and materials are present and unapproved fluids have the potential to corrode your application and damage seals.
- Caution; Do not use inadequately rated wiring. Consult an electrician if you are unsure.
- Caution; The safety of any system incorporating the equipment is the responsibility of the assembler of the system.
- Caution; Do not replace detachable mains cords with inadequately rated cords. Contact ATC for appropriately rated products.



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INSTALLATION FOR WATER-COOLED UNITS WITH 1" BSPPF FITTINGS

This guide applies to the following product groups;

- K-Series, R-Series and G-Series refrigerated units, where heat load is carried away by water supply.
- XR- and XF-Series water-to-water heat exchangers, where heat load is carried away by water supply.

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** – we recommend hose internal diameter (ID) on 1" BSPPF fittings is no smaller than 3/4" (19mm), and preferably larger than 1" (25.4mm).
- 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 ADAPTERS TO PRODUCT BULKHEAD FITTINGS

- 1** Standard units are supplied with 1" British Standard Pipe Parallel Female (BSPPF) threads (also known as G threads (ISO228)) by default, for both application/process and house/primary water supply. 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 outlets mean fluid leaves the product and must be connected to the process inlet or house water return line.
- 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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INSTALLATION FOR WATER-COOLED UNITS WITH 1-1/2" BSPPF FITTINGS

This guide applies to the following product groups;

- K-Series, R-Series and G-Series refrigerated units, where heat load is carried away by water supply.
- XR- and XF-Series water-to-water heat exchangers, where heat load is carried away by water supply.

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/cooler have the following characteristics.

- 1 Short in length** – this reduces friction-based pressure drop and additional ambient heat load.
- 2 Large diameter bore** – we recommend hose internal diameter (ID) on 1-1/2" BSPPF fittings is no smaller than 1-1/4" (32mm), and preferably larger than 1-1/2" (38mm).
- 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 no 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/cooler to application contains 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 ADAPTERS TO PRODUCT BULKHEAD FITTINGS

- 1** Standard units are supplied with 1-1/2" British Standard Pipe Parallel Female (BSPPF) threads (also known as G threads (ISO228)) by default, for both application/process and house/primary water supply. 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 outlets mean fluid leaves the product and must be connected to the process inlet or house water return line.
- 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/cooler 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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FILLING A SYSTEM

- a) **Check all application valves are open, including solenoid valves and variable position valves.**
 - i) The product will require an open water circuit to pump into.
 - ii) Any obstructions can increase the time, or entirely prevent the bleeding of air from the system.
- b) **Remove the cap from the tank lid on the top of the product.**
 - i) Fill the tank to just underneath the bottom of the filling port.
- c) **Turn your attention to the main power switch.**
 - i) Immediately after toggling this switch assuming that the power cord is connected and turned on at the wall the product will begin to pump water.
 - ii) Leave the product to run until it cuts out on the level switch interlock.
 - iii) Turn the unit off at the mains switch.
 - iv) Fill the tank again to lift the level switches.
 - v) Start the product again until the unit cuts out again.



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

- d) **Repeat steps at c) until the chiller tank water level (if visible) doesn't drop, and the chiller doesn't cut-out on its level switches.**
- e) **With the unit now running;**
 - i) Leave the cap off the tank for >30mins to allow air to escape, or very loosely screwed on to prevent water splashing out of the tank if the unit has a 'flow through' design.
- f) **Check the application and tubing for signs of leaks whilst the chiller is running.**
 - i) Replace the tank lid fully when satisfied the system is full and bled of air.

DRAINING A SYSTEM

- a) **Isolate the unit. Have a suitable bucket or drain on-hand.**
 - i) Remove the tank lid to allow air into the system.
 - ii) Disconnect hoses individually. Be aware hoses as well as the unit are filled with fluid.
 - iii) Consider using the red transport plugs to block product ports to give yourself time to empty hoses before continuing to empty the product.
- b) **Local rules affect where fluid can be disposed of.**
 - i) Ensure hazardous products do not enter the water course and are reclaimed from the unit for professional disposal.



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BASIC PROGRAMMING GUIDE KR3 (ALL MODELS)

This guide may apply to your product if you require general navigation advice and help accessing settings. If you are planning to change the settings in any way, you may need a copy of the existing settings which are model dependent, signified by a letter on the end of Annex E-5, i.e. Annex E-5A.

DISPLAY CONTENTS DURING NORMAL OPERATION

- 1 Physical navigation buttons, up, down, return and enter.
- 2 8888.8 is the actual read value on input sensor.
- 3 888.8 is the setpoint value.
- 4 Rectangles bottom left 1-4 display when output is active.
- 5 MAN LED shows in manual mode (fixed output value).
- 6 °C or °F shows units as settable in the 'inP' group.
- 7 AL LED appears when output is beyond a set alarm point.



ACCESS TO SETTINGS

- 8 Push the return button for more than 5 seconds. The upper display will show PASS while the lower display will show 0.
- 9 Using up and down buttons set the programmed password – full access is granted by entering '40'. ATC are not responsible for damage either to the chiller or the connected equipment as a result of changing parameters without ATC's oversight.
- 10 During parameter modification the instrument continues to perform process control. In certain conditions, when a configuration change can produce a significant change to the process, it is advisable to temporarily stop the controller from controlling during the programming procedure (control outputs will be OFF). A password equal to 2000 + the programmed value (i.e. 2000 + 40 = 2040). The control will restart automatically when the configuration procedure will be manually closed.
- 11 Push the return button. If the password is correct the display will show the acronym of the first parameter group 'inP'. Push button for more than 5 seconds, the instrument will come back to the "standard display".
- 12 The configuration parameters are collected in various groups. Every group defines all parameters related with a specific function (control, alarms, output functions).
- 13 Push return button for more than 5 seconds, the instrument will come back to the "standard display". For specific settings and guidance, review the controller datasheets provided by ATC. If you are not in receipt of these, please contact ATC using the information in the header of this document.

GENERAL NAVIGATION

- 14 Return button; A short press allows to exit from the current parameter group and select a new parameter group. A long press allows you to close the configuration parameter procedure (the instrument will come back to the "standard display").
- 15 Enter button; When the upper display is showing a group and the lower display is blank, this key allows to enter in the selected group. When the upper display is showing a parameter and the lower display is showing its value, this key allows to store the selected value for the current parameter and access the next parameter within the same group.
- 16 Up button; Allows to increase the value of the selected parameter.
- 17 Down button; Allows to decrease the value of the selected parameter.
- 18 Pushing both Return and Enter buttons moves back to the previous group. Press return first to start. The selection of the group is cyclic (on a carousel), so it is possible to move back around to the group you require.



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XF025 W/ SA00003 PROGRAM PURPOSE

Internal part number	61-591
Manufacturer part number	Ascon Tecnologic KR3
Program purpose	1) Set o/p1 to drive Belimo 0-10Vdc analogue water valve for cooling duty. 2) Set o/p4 to drive SSR pulsed with mains for heating duty. 3) Set remainder of parameters to safe working limits.

XF025 W/ SA00003 PROGRAM FOR KR3

Group inP		Group 'out'		Group 'AL1'		Group 'AL2'	
Setting	Value	Setting	Value	Setting	Value	Setting	Value
SEnS	PT1	o1.t	0.10	AL1t	nonE	AL2t	nonE
dP	1	o1.F	c.rEG	Ab1	n/a	Ab2	n/a
SSc	n/a	A.o1L	n/a	AL1L	n/a	AL2L	n/a
FSc	n/a	A.o1H	n/a	AL1H	n/a	AL2H	n/a
Unit	°C	o1.AL	n/a	AL1	n/a	AL2	n/a
FiL	oFF	o1.Ac	dir	HAL1	n/a	HAL2	n/a
inE	our	o2F	nonE	AL1d	n/a	AL2d	n/a
oPE	100	o2.AL	n/a	AL1o	n/a	AL2o	n/a
io4.F	out4	o2Ac	n/a				
diF1	oFF	o3F	nonE				
diF2	n/a	o3.AL	n/a				
di.A	0	o3Ac	n/a				
		o4F	H.rEG				
		o4.AL	n/a				
		o4Ac	dir				
Group 'AL3'		Group 'LbA'		Group 'rEG'		Group 'SP'	
Setting	Value	Setting	Value	Setting	Value	Setting	Value
AL3t	nonE	LbAt	oFF	cont	PID	nSP	1
Ab3	n/a	LbSt	n/a	Auto	0	SPLL	10
AL3L	n/a	LbAS	n/a	Aut.r	oFF	SPHL	65
AL3H	n/a	LbcA	n/a	SELF	No	SP	20
AL3	n/a			HSEt	n/a	SP2	n/a
HAL3	n/a			cPdt	n/a	SP3	n/a
AL3d	n/a			Pb	25	SP4	n/a
AL3o	n/a			ti	100	A.SP	n/a
				td	25	SP.rt	trin
				Fuoc	0.50	SPLr	loc
				tcH	2	SP.u	inF
				rcG	1	SP.d	inF
				tcc	2		
				rS	n/a		
				Str.t	KM3 only		
				db.S	KM3 only		
				od	oFF		
				St.P	0		
				SSt	oFF		
				SS.tH	999.9		



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Operating Manual; Pressure & Flow Adjustment

Annex F-5

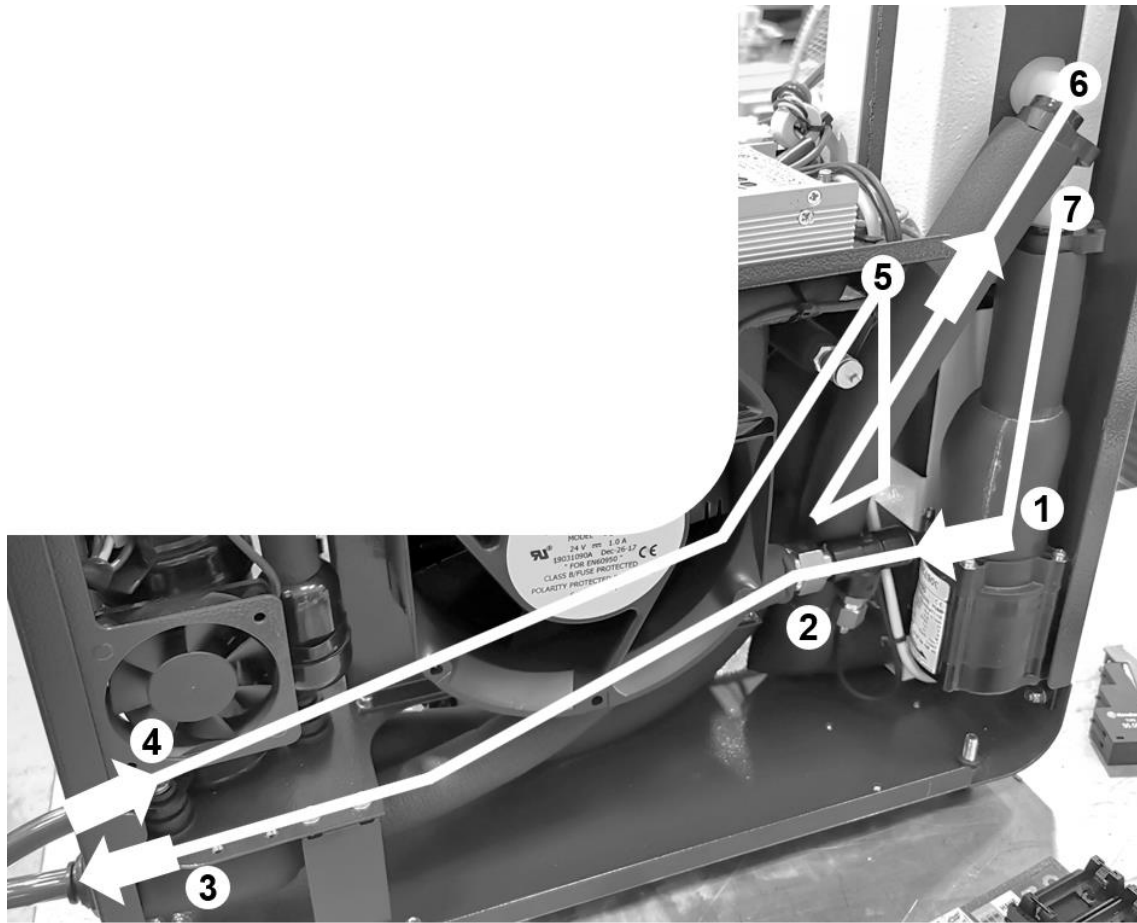
DOCUMENT DETAILS

Date	10/JUN/2022	Author(s)	MJH	Page	16 / 68	Revision	2
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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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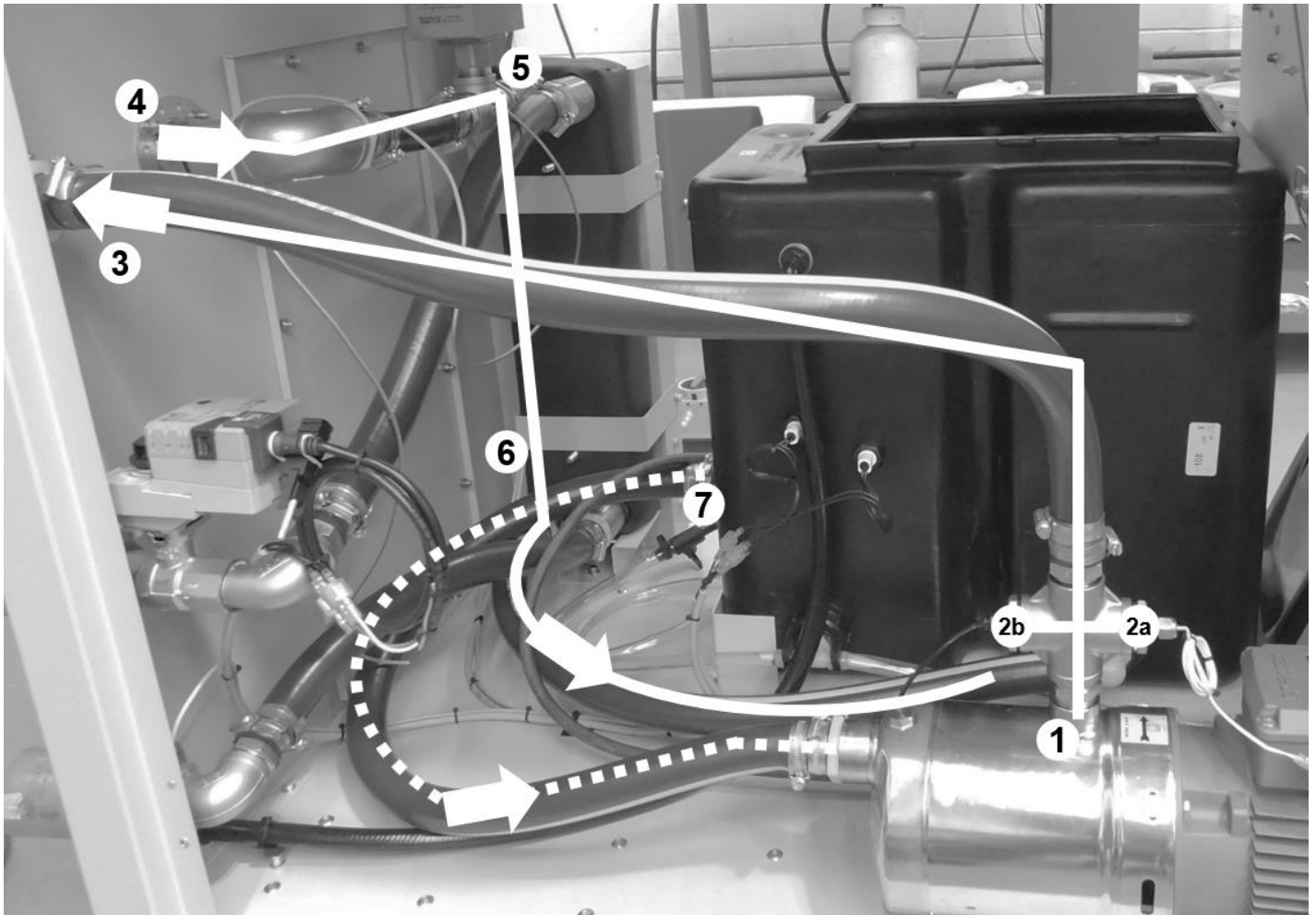
Operating Manual; Pressure & Flow Adjustment

Annex F-5

DOCUMENT DETAILS

Date	10/JUN/2022	Author(s)	MJH	Page	17 / 68	Revision	2
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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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Operating Manual; Troubleshooting & Functional Explanations

Annex G-12

DOCUMENT DETAILS

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UNITS WITH MODULATING BALL VALVE FOR FLOW CONTROL

This guide may apply to your product if you have a house-water fed chiller that regulates process temperature by throttling the house water flowrate. This document explains how this works to aid troubleshooting and sales processes.

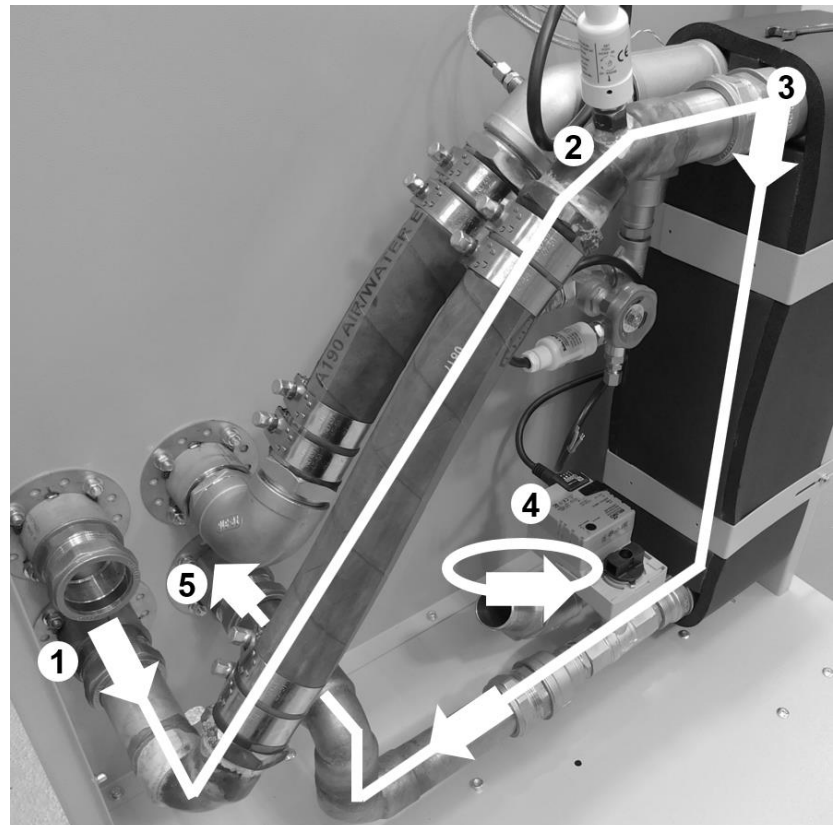
CONTROL HARDWARE

1 The modulating control valve assembly comprises a conventional ball valve with actuator to drive it. The actuator is driven by a standard modulating signal of 0-10Vdc and moves to the position defined by the signal from ATC's process control. Measuring voltage across terminal 'U' and ground provides a feedback signal for the actuator position. Mounting or removing the actuator is achieved by a single screw through the black plastic rotating assembly. The actuator can be fitted in 90° steps, where 0° must be the centerline of the valve body. To move from fully closed to fully open (90° rotation) or vice versa, should take 15s where signal is immediately applied to 0V or 10V. The actuator is overload protected, requires no limit switches and automatically stops when the end stop is reached.



CONTROL STRATEGY

- 1 House water enters the product via a bulkhead fitting. This may be a different physical size or in a different location on your product, but it will always enter the enclosure first.
- 2 This unit shows an optional house water minimum pressure switch. Too low a pressure indicates fault. This switch is settable. It is upstream of the control valve (4) to ensure it does not show an error when the control valve is closed.
- 3 House water enters the plate heat exchanger. Through the other side, the process fluid is running at a constant flowrate and higher temperature. Design nominals are +10°K higher than house water provided for rated capacity.
- 4 The control valve downstream of the plate heat exchanger keeps the heat exchange full and pressurized to ensure that a partially open control valve doesn't spray/atomize incoming house water and render the system inefficient.
- 5 Heated house water now leaves at a similar temperature to the flow heading to the process. Outlet temperature depends on the inlet/supply temperature and thermal load on the unit.





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Annex G-16

DOCUMENT DETAILS

Date	9/SEP/2022	Author(s)	MJH	Page	19 / 68	Revision	1
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GENERIC INITIAL TROUBLESHOOTING FOR XF025

SYMPTOM	POSSIBLE CAUSE
Unit not running	Check all three phases are delivering at least the rated minimum voltage. Check across L1-to-L2, L2-to-L3 and L3-to-L1. Where your product has a neutral, these checks can be made L1-to-N, L2-to-N, L3-to-N.
	Check the main incoming overload has not been tripped.
	Ensure with the overload handle in the off position, that the white pilot light is on, indicating mains is reaching the cooler.
	Check the tank is filled past the level switch to ensure it can run.
Noisy operation	Check the inverter screen (if fitted to your model) for any fault codes.
	Air in the system has not purged.
Fluid lines becoming fouled / containing biological matter	Bearing failure in rotating machinery causes noise – try to isolate specific components to identify the source of noise.
	Not using opaque tubing can lead to UV light passing through the tubing, prompting growth of organisms.
Fluid seen leaking from system	Not following maintenance schedule for cleaning/flushing.
	Fluid may be incompatible with the materials used in chiller/cooler construction. Contact ATC to ensure the fluid is compatible.
Poor cooling capacity (undercooling)	Rapid changes in system temperature can cause some materials to change shape at a different rate to others and open leak paths. Contact ATC to discuss alternative materials and parts in water circuit construction if your temperature range goes beyond the standard for this product range.
	Excess application thermal heat load. See Annex G-2 for a description on how to calculate this.
	House/primary water temperature has increased from nominal requirement, or flow has reduced.
Excess cooling capacity (overcooling)	Water regulating valve is not opening correctly or blocked by debris restricting water flow.
	A reduction in flow of application water can lead to overcooling. Check for constrictions in the application lines. Review pressure gauge position for values typically seen in normal satisfactory operation.
	Check value that controller presents for outlet liquid temperature. A value reported that is higher than actual will force the controller to cool without need.
	Water regulating valve could be stuck open, allowing excess heat to be removed from the process water circuit.



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Annex H-2





DOCUMENT DETAILS

Date	26/MAR/2021	Author(s)	MJH	Page	20 / 68	Revision	3
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PERIODIC MAINTANENCE FOR WATER-COOLED PRODUCTS

This guide may apply to your unit if you have a water-condensed refrigerated unit, or a water-cooled water-to-water heat exchanger. These units do not rely on large/multiple cooling fans to reject heat to air, but instead reject heat into a house/primary/building/city water supply.

SCHEDULE & RECOMMENDED ACTIONS

-  Caution: Failure to carry out service at the specified intervals may permanently damage your equipment.
-  Caution: If the mains wiring becomes damaged, contact ATC or a qualified electrician who will be able to supply a replacement of the correct specification.
-  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.
-  Print this sheet out and display close to the product to maximize the visibility of maintenance requirements.

Weekly	Check fluid level – top up as required.												
	1		2		3		4		5		6		7
	8		9		10		11		12		13		14
	15		16		17		18		19		20		21
	22		23		24		25		26		27		28
	29		30		31		32		33		34		35
	36		37		38		39		40		41		42
	43		44		45		46		47		48		49
	50		51		52								

Annually	Drain process fluid and replace with fresh fluid.											
	Check for fluid leaks throughout product and application.											
	Check filters for accumulation of particulate matter.											
	Clear any dust and debris from inside the product.											
	Vacuum out electrical box											



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Annex I-5

DOCUMENT DETAILS

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MAINTENANCE FOR TECHNICIANS; GENERIC NON-REFRIGERATED UNITS

This guide may apply to your product if you have an X-Series (X, XF, XR) or A-Series product. The guidance below is designed to be non-specific and to raise awareness of potential dangers for a trained engineer carrying out service work.

GUIDANCE



Warning; during operation component temperatures can exceed +70°C, take care when opening unit.



Warning; After switching off, the cooling fan blades continue to rotate (A-Series only). Do not attempt servicing whilst the blades are rotating.



Warning; All products contain water and electricity in close proximity. Ensure the unit is isolated before service. Never bypass overcurrent protection on the mains supply. Never bypass fuses or circuit breakers.

1

Following service or repair by a trained technician, ensure any electrical connections that may have been disturbed are given the 'tug-test'.

2

Ensure earth bonding conductors are re-attached.

3

Ensure the correct fuses are in place.

4

Ensure the mains cord being used is to specification and is free from damage.

5

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

6

Ensure there are no leaks inside or outside the unit.

7

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



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Operating Manual; Declarations & Approvals

Annex J-3

DOCUMENT DETAILS

Date	6/APR/2022	Author(s)	MJH	Page	22 / 68	Revision	1
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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;	X-Series
Function;	Water Heat Exchanger
Model;	All with 'X', 'XR' and 'XF' prefix.
Type;	Water cooled heat exchanger.
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 J-5

DOCUMENT DETAILS

Date	03/FEB/2021	Author(s)	MJH	Page	23 / 68	Revision	01
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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	24 / 68	Revision	01
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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

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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.

POP_s 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.

POP_s LISTED UNDER AMENDMENT 2020/784

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

POP_s 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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Operating Manual; Declarations & Approvals

Annex J-9

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EU DECLARATION OF CONFORMITY

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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;	W-Series
Function;	Recirculating chiller
Model;	All with 'W' 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 J-10

DOCUMENT DETAILS

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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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Operating Manual; Declarations & Approvals

Annex J-19

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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;	X-Series
Function;	Water Heat Exchanger
Model;	All with 'X', 'XR' and 'XF' prefix.
Type;	Water cooled heat exchanger.
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 10/JUN/2022



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Date	03/FEB/2021	Author(s)	RW, MJH	Page	29 / 68	Revision	02
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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.



DOCUMENT DETAILS

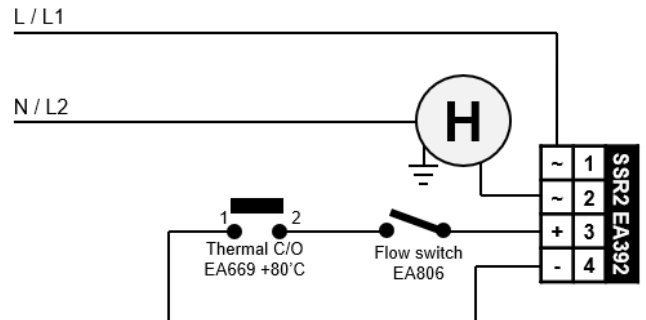
Date	30/NOV/2021	Author(s)	MJH	Page	30 / 68	Revision	1
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HEATER PACK COMMON FEATURES

This guide may apply to your product if you purchased standard option SA00003. Cartridge heaters are used to accelerate the heating of process fluid beyond that which can be achieved with heat of compression alone.

GENERAL SINGLE HEATER WIRING

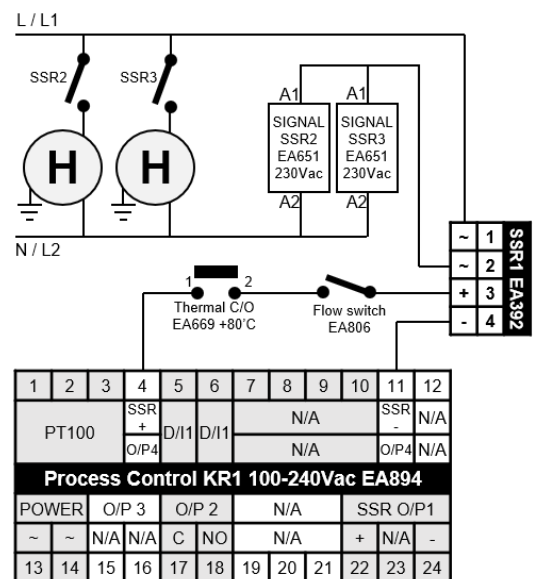
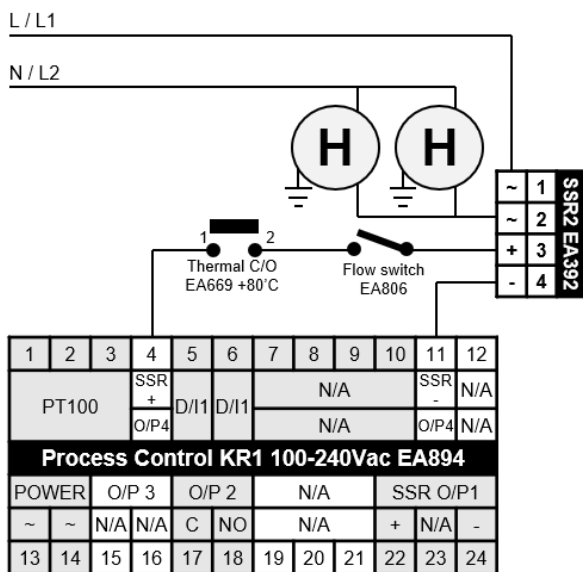
- 1 Heater packs are generally applied to standard units in the same way, regardless of product specification, heater pack capacity or temperature.
- 2 The controller (EA849 in this case) carries two solid state relay (SSR) outputs. The first is used for cooling and the second is used for heating.
- 3 Low voltage 12Vdc comes from both cooling and heating outputs to their own SSRs. Pictured right, is terminals 4+11 connected to terminals 3 and 4 of the SSR EA392.
- 4 In series with the positive side of the circuit are a thermal cutout, normally mounted on the tank within which the heaters are installed, and a flow switch.
- 5 Either of the devices opening in fault state result in the SSR failing to close. Heater(s) are installed with the SSR contacts in series with the live(s) that feed the heater(s), preventing it running.



1	2	3	4	5	6	7	8	9	10	11	12
PT100		SSR +	D/I1	D/I1	N/A		N/A		SSR -	N/A	
		O/P4							O/P4		
Process Control KR1 100-240Vac EA894											
POWER		O/P 3	O/P 2	N/A		N/A		SSR O/P1			
~	~	N/A	N/A	C	NO	N/A		+	N/A	-	
13	14	15	16	17	18	19	20	21	22	23	24

MULTIPLE HEATERS

- 6



- 7

In the above, the low voltage control SSR has a contact side capable of supporting the current pulled by two heaters in parallel.

In the above, the low voltage control SSR drives two more SSRs whose contacts drive the heaters. This allows the controllers to drive more, higher-powered heaters.



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KR1 KR3 RS485 Modbus RTU Protocol

Annex L-11

DOCUMENT DETAILS

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Serial communication
protocol ModBUS® for
KM/KR/KX

(KM1-KM3-KR1-
KR3-KX1-KX3)

this document is related to the firmware
version 4.2

KUBE Family Communication Protocol

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1 preface

TecnoLogic uses ModBUS® RTU communication protocol.

It is a royalty free protocol and it is easy to implement.

For ModBus RTU a vast literature is available also in internet.

The ModBus protocol represent all data in hexadecimal format.

All communication string finish with a check sum type CRC (cyclic redundancy check).

Every device in a line must have different address.

The protocol allows one master only and up to 255 slaves

Only Master unit can start the transmission by sending the address of the unit and the command to execute.

Only the unit having the same address will answer to the master.

The transmission characteristics are usually programmable:

Device address: From 1 to 255.

Baud rate: bit per second.

byte format:

- 1 start bit;
- 8 data bits;
- 2 final bits composed as follows: 1 parity bit (even or odd); 1 stop bit;
or
no parity bit; 2 stop bits.

The K30 allows to configure:

- address (1 – 254);
- Baud rate (1200 – 2400 – 9600 – 19200 – 38400).

The byte format is fixed: 8 bits without parity and 1 stop bit.

This document is intended to describe the K30 controllers using the MODBUS protocol in their communication capability and is mainly directed to technicians, system integrators and software developers.

2 Physical Connection

2.1 interface

Kube series controllers are provided with a RS485 serial communication interface, insulated so that any problem arising from ground potential is removed.

While at rest, the instruments are in a receive condition and are revert to transmission after a correct message has been decoded that matches the configured address.

2.2 Line

The instruments are equipped with 2 terminals named A and B.

The connection between Kube s has to be carried on in parallel, i.e. all A terminals have to be connected between them so as B terminals. A termination resistor of 120Ω is required to maintain the quiescent condition on the line.

Adopted baud rates range 1200... 38400 baud, that is very satisfactory for application performances, yet very slow for RS485 interface. This fact allows the wiring of the line with a medium quality twisted pair cable: total capacity of the line should not exceed 200 nF.

The line can be up to 1000 meters in length.

3 Communication Protocol

The protocol adopted by K30 is a subset of the widely used MODBUS RTU (JBUS, AEG Schneider Automation, Inc. registered trademark) protocol, so that connections are easy for many commercial PLCs and supervisory programs.

For users needing to develop their own communication software, all information is available as well as implementation hints.

The MODBUS RTU (JBUS) communication functions implemented in Kube series are:

Function 3	Read n register;
Function 6	Preset one register;
Function 16	Preset multiple registers.

These functions allow the supervisory program to read and modify any data of the controller. The communication is based on messages sent by the master station (host) to the slave stations (K 30) and vice versa. The slave station that recognizes the message as sent to it, analyses the content and, if it is formally and semantically correct, generates a reply message directed back to the master.

The communication process involves five types of messages:

From master to slave	From slave to master
Function 3: read n registers request	Function 3: read n registers reply
Function 6: preset one register request	Function 6: preset one register reply
Function 16: preset multiple registers request	Function 16: preset multiple registers reply
	Exception reply (as reply to all functions in abnormal conditions)

Every a message contains four fields:

- ◇ Slave address (from 1 to 255): MODBUS RTU (JBUS) reserves address 0 for broadcasting messages and it is implemented in the Kube series;
- ◇ Function code: contains 3, 6 or 16 for specified functions;
- ◇ Information field: contains data like word addresses and word values as required by function in use;
- ◇ Control word: a cyclic redundancy check (CRC) performed with particular rules for CRC16. The characteristics of the asynchronous transmission are 8 bits, no parity, one stop bit.

3.1 Function code 3: read multiple registers (maximum 16 registers)

This function code is used by the master to read a group of sequential registers present in the slave.

Master request	
Data	Byte
Slave address (1... 255)	1
Function code (3)	1
First register address (MSB = Most Significant Byte)	1
First register address (LSB = less Significant Byte)	1
Number of requested registers (MSB)	1
Number of requested registers (LSB)	1
CRC-16 (LSB)	1
CRC-16 (MSB)	1

Slave reply	
Data	Byte
Slave address (1... 255)	1
Function code (3)	1
Byte number (n)	1
Data(s)	n
CRC-16 (LSB)	1
CRC-16 (MSB)	1

In the "Data(s)" field the values of the requested registers are presented in word format [2 byte] : the first byte represent the MSB (Most Significant Byte) while the second byte represent the LSB (Less Significant Byte). This mode will be the same for all requested locations.

Example:

The master requires to the address 1 the value of the locations 25 and 26 (0x19 and 0x1A).

Master request	
Data	Byte (Hex)
Slave address	01
Function code (3 = read)	03
First register address (MSB)	00
First register address (LSB)	19
Number of requested registers (MSB)	00
Number of requested registers (LSB)	02
CRC-16 (LSB)	15
CRC-16 (MSB)	CC

Slave reply	
Data	Byte (Hex)
Slave address	01
Function code (3 = read)	03
Byte number	04
Value of the first register (MSB)	00
Value of the first register (LSB)	0A
Value of the second register (MSB)	00
Value of the second register (LSB)	14
CRC-16 (LSB)	DA
CRC-16 (MSB)	3E

The slave replay means:

The value of the location 25 = 10 (0x000A hexadecimal)

The value of the location 26 = 20 (0x0014 hexadecimal)

3.2 Function code 6: write a single word (one location)

Master request	
Data	Byte (Hex)
Slave address	01
Function code (6)	06
Register address (MSB)	03
Register address (LSB)	02
Value to write (MSB)	00
Value to write (LSB)	0A
CRC-16 (MSB)	A8
CRC-16 (LSB)	49

Slave reply	
Data	Byte (Hex)
Slave address (1-255)	1
Function code (6)	1
Register address (MSB)	1
Register address (LSB)	1
Written value (MSB)	1
Written value (LSB)	1
CRC-16 (MSB)	1
CRC-16 (LSB)	1

Example:

The master unit asks to the slave 1 to write in the memory location 770 (0x302) the value 10 (0x0A).

Master request	
Data	Byte (Hex)
Slave address	01
Function code (6)	06
Register address (MSB)	03
Register address (LSB)	02
Value to write (MSB)	00
Value to write (LSB)	0A
CRC-16 (MSB)	A8
CRC-16 (LSB)	49

Slave reply	
Data	Byte (Hex)
Slave address	01
Function code (6)	06
Register address (MSB)	03
Register address (LSB)	02
Written value (MSB)	00
Written value (LSB)	0A
CRC-16 (MSB)	A8
CRC-16 (LSB)	49

3.3 Function code 16: preset multiple registers (maximum 16 registers)

This function code allows to preset 16 registers at a time.

Master request	
Data	Byte (Hex)
Slave address (1-254)	1
Function code (16)	1
First register address (MSB)	1
First register address (LSB)	1
Number of requested registers (MSB)	1
Number of requested registers (LSB)	1
Byte count	1
Values	n
CRC-16 (LSB)	1
CRC-16 (MSB)	1

Slave reply	
Data	Byte (Hex)
Slave address (1-254)	1
Function code (16)	1
First register address (MSB)	1
First register address (LSB)	1
Number of written registers (MSB)	1
Number of written registers (LSB)	1
CRC-16 (LSB)	1
CRC-16 (MSB)	1

Example:

The master unit requires to the slave 1 to write in the registers 10314 (0x284A) and 10315 (0x284B) the values 100 (0x64) and 200 (0xC8)

Master request	
Data	Byte (Hex)
Slave address	01
Function code (16)	10
First register address (MSB)	28
First register address (LSB)	4A
Number of requested registers (MSB)	00
Number of requested registers (LSB)	02
Byte count	4
Value 1 (MSB)	00
Value 1 (LSB)	64
Value 2 (MSB)	00
Value 2 ((LSB)	C8
CRC-16 (LSB)	C9
CRC-16 (MSB)	A8

Slave reply	
Data	Byte (Hex)
Slave address	01
Function code (16)	10
First register address (MSB)	28
First register address (LSB)	4A
Number of written registers (MSB)	00
Number of written registers (LSB)	02
CRC-16 (LSB)	69
CRC-16 (MSB)	BE

3.4 the exception reply

Kube instruments reply with an exception when the request is formally correct, but cannot be satisfied standing particular situations; the reply contains a code indicating the cause of the missing regular reply, the frame is:

Exception replay	
Data	Byte (Hex)
Slave address	1
Function code	1
Error code	1
CRC-16 (LSB)	1
CRC-16 (MSB)	1

Kube series adopts a subset of MODBUS RTU (JBUS) exception code:

- Unknown function code 1
- Invalid memory address 2
- Invalid data field 3
- Controller not ready 6

3.5 Cyclic redundancy check (CRC)

CRC is a check word that permits to verify the integrity of a message.

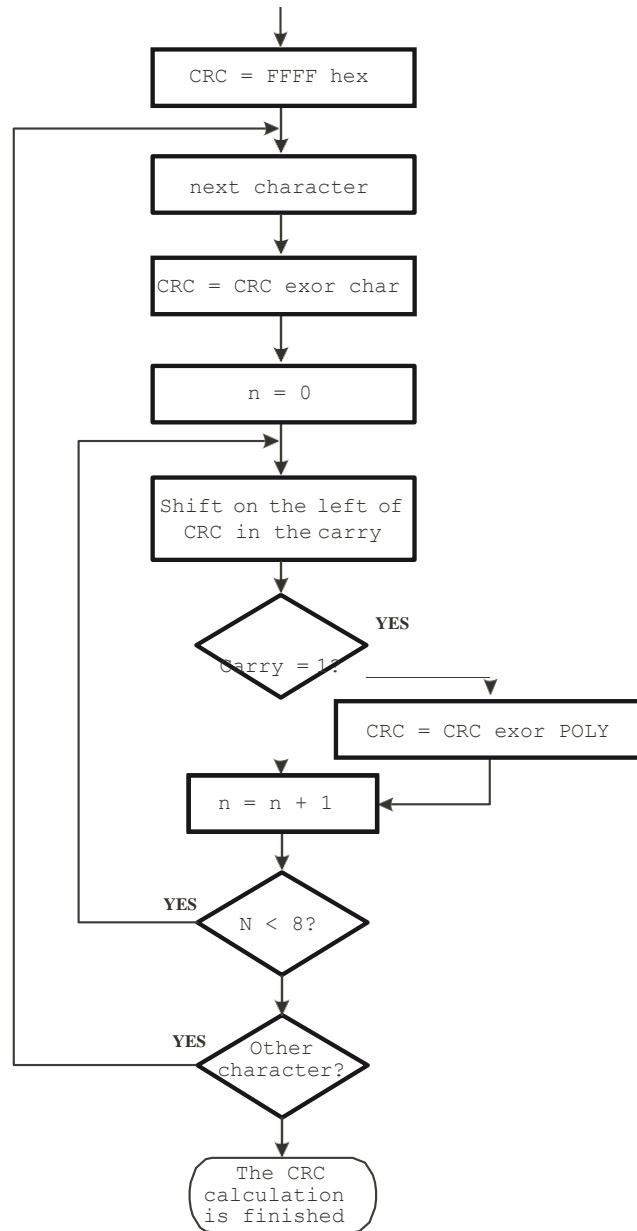
Every message, sent or received, has in the two last characters the CRC check word.

After receiving a request, the controller checks the validity of the received message comparing the received CRC with the calculated one.

When a reply is ready the controller calculates the CRC word and adds two characters to the prepared message.

CRC calculation is performed on every character of the message, excluding the last two.

Being MODBUS RTU (JBUS) compatible, Kube series controllers adopt an identical algorithm for CRC calculation, sketched in following diagram:



The polinomial adopted by MODBUS RTU (JBUS) is 1010 0000 0000 0001.

note: The first transmited character of the CRC word is the least significant between calculated bytes.

Follows a subroutine made with "C" able to calculate the CTC-16.

```
/*-----*/
crc_16      calcolo del crc_16
```

Parametri di ingresso:

buffer: stringa di caratteri di cui calcolare il CRC-16
length: numero di bytes della stringa

Questa funzione ritorna il valore di CRC-16

```
----- */
unsigned int crc_16 (unsigned char *buffer, unsigned int length)
{
    unsigned int i, j, temp_bit, temp_int, crc;
    crc = 0xFFFF;

    for (i = 0; i < length; i++){
        temp_int = (unsigned char) *buffer++;
        crc ^= temp_int;

        for ( j = 0; j < 8; j++ ) {
            temp_bit = crc & 0x0001;
            crc >>= 1;

            if ( temp_bit != 0 )
                crc ^= 0xA001;
        }
    }

    return (crc);
}

```

note: All numerical values in the format 0x. ...are expressed in hexadecimal format.

4 Data Exchange

This section contains information about data exchanged with Kube series controllers concerning numerical and not numerical data, with their formats and limits.

4.1 Some definitions

All exchanged data are in the form of 16-bit words.

Two types of data are distinguished: numerical and symbolic (or not numerical).

Numerical data represents the value of a quantity (e.g. the measured variable, the set point).

Symbolic data represents a particular value in a set of values (e.g. the thermocouple type in the set of available ones: J, K, S ...).

Both types are coded as integers number : signed numbers for numerical and unsigned numbers for symbolic.

A numerical data, coded as an integer, is coupled with appropriate number of decimal digits to represent a quantity with the same engineering units adopted aboard the instrument.

Numerical data are in fixed point representation; however we make a distinction between two kinds of data:

- ◇ The first kind has determined and unmodifiable decimal point position;
- ◇ The second has programmable decimal point position (dP parameter).

4.2 Memory zones

All readable and writable data appear to be allocated as 16-bit words in the memory of the instrument.

The memory map has three zones:

- ◇ Variables,
- ◇ Parameters,
- ◇ Instrument identification code.

Following parameters explore the characteristics of each zone.

4.3 Variables zones

In this zone there is a collection of main Kube controller variables, it is a group of frequently computed or updated data residing in volatile memory.

4.4 Most important changes

- a) During parameter modification by push-button, the serial interface continue to operate without any "limit" (you can see by serial link the value of all parameters and you can set it also).
- B) When you write a value in a location the instrument will operate as follows:
 - B.1) If you write a value within parameter range, the instrument will accept it; the new value will be memorized and the instrument will send back the standard answer.
 - B.2) If you try to write a value OUT of parameter range, the instrument will refuse the new value; the new value will NOT be memorized and the instrument will send an exception message to the master.

These are available data:

5 Address Map

All Kube instruments use only words:

initial address		Final address		Meaning
hex	dec	hex	dec	
1	1	1D	29	Group of variables common to all new Ascon Tecnolog's instruments: numeric values calculated and dynamically updated. Available in read and write operations
200	512	250	592	Group of variables compatible with the old Ascon Tecnolog's instruments (before Kube series): numeric values calculated and dynamically updated. Available in read and write operations
280	640	31B	795	Configuration parameters: Numeric and symbolic values. Available in read and write operations
800	2048	82C	2092	Instrument identification parameters
2800	10240	289B	10395	Repetition of the configuration parameters: Numeric and symbolic values. Available in read and write operations

5.1 Common Variables

no.	address		description	dec. point	r/w
	hex	dec			
1A	1	1	pV: Measured value note: When a measuring error is detected the instrument send: <ul style="list-style-type: none"> • 10000 = Under range • 10000 = Overrange • 10001 = Overflow of the A/D converter • 10003 = Variable not available 		r
2A	2	2	number of decimal figures of the measured value	0	r
3A	3	3	operative set point (value)	dP	r
4A	4	4	power output Range: -100.00 ÷ 100.00 (%) note: This parameter is ever writeable but it will be active only when the instrument operate in Manual mode.	2	r/w
5A	5	5	active set point selection 0 = SP 1 = SP 2 2 = SP 3 3 = SP 4	0	r/w
6A	6	6	Sp Range: SPLL ÷ SPLH	dP	r/w
7A	7	7	Sp 2 Range: SPLL ÷ SPLH	dP	r/w
8A	8	8	Sp 3 Range: SPLL ÷ SPLH	dP	r/w
9A	9	9	Sp 4 Range: SPLL ÷ SPLH	dP	r/w
10A	A	10	alarms status bit 0 = Alarm 1 status bit 1 = Alarm 2 status bit 2 = Alarm 3 status bit 3 ÷ 8 = Reserved bit 9 = LBA status bit 10 = Power failure indicator bit 11 = Generic error bit 12 = Overload alarm bit 13 ÷ 15 = Reserved	0	r
11A	B	11	outputs status (physical outputs) bit 0 = Output 1 status bit 1 = Output 2 status bit 3 = Output 3 status bit 4 = Output 4 status bit 5 = Output 5 status bit 6 ÷ 15 = Reserved When an output is driven by serial link, the relative bit will remain equal to 0.	0	r

no.	address		description	dec. point	r/w
	hex	dec			
12A	C	12	instrument status bit 0 = Automatic bit 1 = manual bit 2 = Standby bit 3 = Remote Set point (temporary) used bit 4 = Auto-tuning active bit 5 = Self tuning active bit 6 = Reserved bit 7 = Timer running bit 8 = Soft start running bit 9 = Ramp for set point change (up or down) running bit 10 = Delay at start up (od) running bit 11 = Program running bit 12 = Measure status (0 = OK while 1 = error). bit 13÷15 = Reserved	0	r
13A	D	13	alarms reset 0 = Not re-setted 1 = Resetted	0	r/w
14A	E	14	alarms acknowledge 0 = Not acknowledge 1 = acknowledge	0	r/w
15A	F	15	Control status 0 = Automatic 1 = Manual 2 = Stand-by	0	r/w
16A	10	16	Remote set point (temporary) (from serial link) Range: SPLL ÷ SPLH note: the remote set point is stored in RAM	dP	r/w
17A	11	17	auto tuning activation 0 = not active 1 = active	0	r/w
18A	12	18	power output used when a measuring error is detected. Range: -100 ÷ 100 note: This value is stored in RAM	0	r/w
19A	13	19	default parameters loading. -481 = Default parameter loading	0	r/w
20A	14	20	parameters table identification code Range: 0 ÷ 65535 note: The word is composed by two parts: - Low byte – Version of the parameter table - High byte – Version of the family protocol	0	r
21A	15	21	instrument identification code 20 = KM1/KM3 25 = KX1/KX3 26 = KR1/KR3	0	r
22A	16	22	First temporary code for speed configuration The code is composed by two distinct 4 digits subcodes: aaBB where: aa = Input type: 0 ÷ 25 BB = Control type and service functions 0 ÷ 21 note: 10000 = Temporary value not inserted The programmed codes will be activated only after both have been correctly be programmed.. The order has no importance.	0	r/w
23A	17	23	Second temporary code for speed configuration The code is composed by two distinct 4 digits subcodes: CdEF where: C = Alarm type 1 0 ÷ 9 d = Alarm type 2 0 ÷ 9 E = Alarm type 3 0 ÷ 9 F = Enabling service functions 0 ÷ 4 note: 10000 = Temporary value not inserted The programmed codes will be activated only after that both have been correctly programmed. The order has no importance.	0	r/w

no.	address		description	dec. point	r/w
	hex	dec			
24A	18	24	First final code for speed configuration When programmed, the code is composed by two distinct 4 digits subcodes: aaBB where: aa = Input type: 0 ÷ 25 BB = Control type and output functions 0 ÷ 21 If not programmed, the return value is -1 = Code not programmed.	0	r
25A	19	25	Second temporary code for speed configuration When programmed, the code is composed by two distinct 4 digits subcodes: CdEF where: C = Alarm 1 type 0 ÷ 9 d = Alarm 2 type 0 ÷ 9 E = Alarm 3 type 0 ÷ 9 F = Enabling service functions 0 ÷ 4 If not programmed, the return value is -1 = Code not programmed.	0	r
26A	1A	26	time to end of running program segment Range: 0 ÷ 9959 (hh.mm or mm.ss) note: When the program is not active, the return value is 0.	0	r
27A	1B	27	Manual autotuning start request pending for od or Soft start Range: 0 = No pending request waiting for the execution; 1 = Pending request waiting for the execution	0	r
28A	1C	28	autotuning start request pending for setpoint change for od or Soft start Range: 0 = No pending request waiting for the execution; 1 = Pending request waiting for the execution	0	r
29A	1D	29	Value to be retransmitted on the analogue output Range: Ao1L ÷ Ao1H	0	r/w

5.2 group of variables compatible with the old ascon Tecnolog's instruments (before Kube series)

no.	address		description	dec. point	r/w
	hex	dec			
1B	0200	512	pV : Measured value As Modbus address 1	dP	r
2B	0201	513	number of decimal figure of the measured value As Modbus address 2	0	r
3B	0202	514	power output As Modbus address 4	2	r
4B	0203	515	power output of the heating output Range: 0 ÷ 100.00 (%)	2	r
5B	0204	516	power output of the cooling output Range: 0 ÷ 100.00 (%)	2	r
6B	0205	517	alarm 1 status 0 = OFF 1 = ON	0	r
7B	0206	518	alarm 2 status 0 = OFF 1 = ON	0	r
8B	0207	519	alarm 3 status 0 = OFF 1 = ON	0	r
9B	0208	520	operative set point As Modbus address 3	DP	r
10B	020A	522	LBa status 0 = OFF 1 = ON	0	r
11B	020E	526	overload alarm status 0 = OFF 1 = ON		
12B	020F	527	Controller status 0 = Stand-by 1 = Auto 2 = Tuning 3 = Manual	0	r

no.	address		description	dec. point	r/w
	hex	dec			
13B	0224	548	Status/remote control of the output 1 0 = OFF 1 = ON note: This parameter is writeable when out 1 is "not used" by the controller (o1F output 1 function = nonE). This parameter is stored in RAM	0	r/w
14B	0225	549	Status/remote control of the output 2 0 = OFF 1 = ON note: This parameter is writeable when out 2 is "not used" by the controller (o2F output 1 function = nonE). This parameter is stored in RAM	0	r/w
15B	0226	550	Status/remote control of the output 3 0 = OFF 1 = ON note: This parameter is writeable when out 3 is "not used" by the controller (o3F output 1 function = nonE). This parameter is stored in RAM	0	r/w
16B	0227	551	Status/remote control of the output 4 0 = OFF 1 = ON note: This parameter is writeable when out 4 is "not used" by the controller (o4F output 1 function = nonE). This parameter is stored in RAM	0	r/w
17B	0240	576	digital input 1 status 0 = OFF 1 = ON note: Digital input 1 status can be read from the serial port even if the input is not used by the controller	0	r/w
18B	0241	577	digital input 2 status 0 = OFF 1 = ON note: Digital input 2 status can be read from the serial port even if the input is not used by the controller	0	r/w
19B	0244	580	program status 0 = Not configured 1 = Reset (not running) 2 = Run 3 = Hold 4 = Wait (system) 5 = End (system) 6 = Hold + Wait (system) 7 = Continue	0	r/w
20B	0245	581	timer status 0 = Not configured 1 = Reset (stop) 2 = Run 3 = Hold 4 = End (Read only)	0	r/w
21B	0246	582	program step in execution 0 = Program not active 1 = ramp step 1 2 = soak step 1 2 = ramp step 2 4 = soak step 2 5 = ramp step 3 6 = soak step 3 7 = ramp step 4 8 = soak step 4 9 = END	0	r
22B	0247	583	Remaining time to program end Range: 0 ÷ 65535 (minutes when Pru=hh.mm, seconds when Pru=mm.ss) note: When the program is not running the return code is 0	2	r
23B	248	584	program events status 0 > E1 = 0 E2 = 0 1 > E1 = 1 E2 = 0 2 > E1 = 0 E2 = 1 3 > E1 = 1 E2 = 1	0	r
24B	249	585	Remaining time to the timer end Range: 0 ÷ 65535 (Hours when Tru=hh.mm, Minutes when Tru=mm.ss) 0 ÷ 9959 (tenth of seconds when Tru=SS.S.d) note: When the timer is not active the return code is 0.	2 1	r

no.	address		description	dec. point	r/w
	hex	dec			
25B	24A	586	Wattmeter: The meaning of this parameter is defined by the CO.ty parameter setting. CO.ty = 0ff 0 CO.ty = 1 Instantaneous power (kW); CO.ty = 2 Consumed energy (kWh); CO.ty = 3 Energy used during program execution (kWh); CO.ty = 4/6 Total worked days; CO.ty = 5/7 Total worked hours; CO.ty = 8/10 Totalizer of control relay worked days; CO.ty = 9/11 Totalizer of control relay worked hours.	0	r
26B	24B	587	duration of first program ramp Range: 0 ÷ 9999 s	0	r
27B	24C	588	days counted with the controller powered on Range: 0 ÷ 9999	0	r
28B	250	592	power output when the instrument is in manual mode Range: -10000 ÷ 10000 (%)	2	r/w

5.3 instrument identification parameters





no.	address		description	dec. point	r/w
	hex	dec			
1	800	2048	Reserved	0	r
2	801	2049	Reserved	0	r
3	802	2050	Reserved	0	r
4	803	2051	Reserved	0	r
5	804	2052	Reserved	0	r
6	805	2053	Reserved	0	r
7	806	2054	Reserved	0	r
8	807	2055	Reserved	0	r
9	808	2056	Instrument Firmware Revision - First part	0	r
10	809	2057	Instrument Firmware Revision - Second part	0	r
11	80A	2058	Model Code – Instrument type 1 Range: 0x4B = 'K'	0	r
12	80B	2059	Model Code – Instrument type 2 Range: 0x4D = 'M' - KM 0x52 = 'R' - KR 0x58 = 'X' - KX	0	r
13	80C	2060	Model Code – Instrument type 3 Range: 0x31 = '1' - KM1, KR1, KX1 0x33 = '3' - KM3, KR3, KX3	0	r
14	80D	2061	Model Code – Optional functions Range: 0x2D = '-' - No functions 0x54 = 'T' - Timer 0x50 = 'P' - Timer + Programmer	0	r
15	80E	2062	Model Code – Power supply type Range: 0x48 = 'H' - 110 ÷ 240 Vac/Vdc 0x4C = 'L' - 24 Vac/Vdc	0	r
16	80F	2063	Model Code – Measure input type Range: 0x43 = 'C' - Tc, Pt100, Pt1000, mA, mV, V + Digital Input 1 0x45 = 'E' - Tc, PTC, NTC, mA, mV, V + Digital Input 1	0	r
17	810	2064	Model Code – Output 1 type Range: 0x49 = 'I' - Analogue Output 0x4F = 'O' - SSR 0x52 = 'R' - Relay	0	r
18	811	2065	Model Code – Output 2 type Range: 0x2D = '-' - Not present 0x4D = 'M' – Servomotor command relay 0x4F = 'O' - SSR 0x52 = 'R' - Relay	0	r

no.	address		description	dec. point	r/w
	hex	dec			
19	812	2066	Model Code – Output 3 type Range: 0x2D = '-' - Not present 0x4D = 'M' – Servomotor command relay 0x4F = 'O' - SSR 0x52 = 'R' - Relay	0	r
20	813	2067	Model Code – Output 4 type Range: 0x43 = 'D' - Output 4 (VDC for SSR)/Sensor Power Supply/Digital Input DI2	0	r
21	814	2068	Model Code – Serial communication type Range: 0x2D = '-' - TTL 0x53 = 'S' - Rs485 Modbus	0	r
22	815	2069	Model Code – Terminal type Range: 0x2D = '-' - Standard (screw terminals not removable) 0x45 = 'E' - Removable screw terminals 0x4D = 'M' - Removable spring terminals 0x4E = 'N' - Removable terminals (the fixed part only)	0	r
23	816	2070	Model Code – Reserved	0	r
24	817	2071	Model Code – Reserved	0	r
25	818	2072	Model Code – Reserved	0	r
26	819	2073	Model Code – Reserved	0	r
27	81A	2074	Model Code – Reserved	0	r
28	81B	2075	Model Code – Reserved	0	r
29	81C	2076	Model Code – Reserved	0	r
30	81D	2077	Model Code – Reserved	0	r
31	81E	2078	Model Code – Reserved	0	r
32	81F	2079	Model Code – Reserved	0	r
33	820	2080	Model Code – Reserved	0	r
34	821	2081	Model Code – Reserved	0	r
35	822	2082	Model Code – Reserved	0	r
36	823	2083	Model Code – Reserved	0	r
37	824	2084	Model Code – Reserved	0	r
38	825	2085	Model Code – Reserved	0	r
39	826	2086	Serial Number – First part (LL)	0	r
40	827	2087	Serial Number – Second part (L)	0	r
41	828	2088	Serial Number – Third part (H)	0	r
42	829	2089	Serial Number – Fourth part (HH)	0	r
43	82A	2090	Calibration Date – Day Range: 1 ÷ 31	0	r
44	82B	2091	Calibration Date – Month Range: 1 ÷ 12	0	r
45	82C	2092	Calibration Date – Year	0	r

5.4 parameters Setting: addresses form 280 hex (640 dec) and 2800 hex (10240 dec)

5.4.1 inp gRoUp - Main and auxiliary input configuration

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
1	SEnS	280 2800	640	Model C (Pt100, Pt1000)	0 = J = TC J, 1 = crAL = TC K, 2 = S = TC S, 3 = r = TC R, 4 = t = TC T, 5 = ir.J = IRS J, 6 = ir.cA = IRS K, 7 = Pt1 = RTD Pt100, 8 = Pt10 = RTD Pt1000, 9 = 0.60 = 0... 60 mV, 10 = 12.60 = 12... 60 mV, 11 = 0.20 = 0... 20 mA, 12 = 4.20 = 4... 20 mA, 13 = 0.5 = 0... 5 V, 14 = 1.5 = 1... 5 V, 15 = 0.10 = 0... 10 V, 16 = 2.10 = 2... 10 V	0	r/w
			10240	Model E (Ptc, Ntc)	0 = J = TC J, 1 = c rAL = TC K, 2 = S = TC S, 3 = r = TC R, 4 = t = TC T, 5 = ir.J = IRS J, 6 = ir.cA = IRS K, 7 = Ptc = TC KTY81-121, 8 = ntc = NTC 103-AT2, 9 = 0.60 = 0... 60 mV, 10 = 12.60 = 12... 60 mV, 11 = 0.20 = 0... 20 mA, 12 = 4.20 = 4... 20 mA, 13 = 0.5 = 0... 5 V, 14 = 1.5 = 1... 5 V, 15 = 0.10 = 0... 10 V, 16 = 2.10 = 2... 10 V		
2	dp	281 2801	641	Decimal Point Position (linear inputs)	0... 3	0	r/w
			10241	Decimal Point Position (different than linear inputs)	0/1		
3	SSC	282 2802	642 10242	Initial scale read-out for linear inputs	-1999... 9999	dP	r/w
4	FSc	283 2803	643 10243	Full Scale Readout for linear inputs	-1999... 9999	dP	r/w
5	unit	284 2804	644 10244	Engineer unit	0 = C = °C 1 = F = °F	0	r/w
6	Fil	285 2805	645 10245	Digital filter on the measured value note: This filter affects the control action, the PV retransmission and the alarms action.	0 (= OFF)... 200 (seconds)	1	r/w
7	inE	286 2806	646 10246	Sensor error used to enable the safety output value	or = Over range ou = Under range our = Over and under range	0	r/w
8	oPE	287 2807	647 10247	Safety output value (% of the output)	-100... 100	0	r/w
9	IO4.F	288 2808	648 10248	I/O 4 function	0 = on = Output used as PWS for TX, 1 = out4 = Output 4 (digital output 4), 2 = dG2c = Digital input 2 driven by contact, 3 = dG2U = Digital input 2 driven by voltage	0	r/w

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
10	diF1	289 2809	649 10249	Digital Input 1 function	0 = oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Standby mode, 5 = Manual mode, 6 = HEAt with SP1 and Cool with SP2, 7 = Timer RUN/Hold/Reset, 8 = Timer Run, 9 = Timer Reset, 10 = Timer Run/Hold, 11 = Timer Run/Reset, 12 = Timer Run/Reset with lock, 13 = Program Start, 14 = Program Reset, 15 = Program Hold, 16 = Program Run/Hold, 17 = Program Run/Reset, 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1... SP4 binary selection, 21 = Digital inputs in parallel to  and  keys	0	r/w
11	diF2	28A 280A	650 10250	Digital Input 2 function	0 = oFF = Not used, 1 = Alarm reset, 2 = Alarm acknowledge (ACK), 3 = Hold of the measured value, 4 = Standby mode, 5 = Manual mode, 6 = HEAt with SP1 and Cool with SP2, 7 = Timer RUN/Hold/Reset, 8 = Timer Run, 9 = Timer Reset, 10 = Timer Run/Hold, 11 = Timer Run/Reset, 12 = Timer Run/Reset with lock, 13 = Program Start, 14 = Program Reset, 15 = Program Hold, 16 = Program Run/Hold, 17 = Program Run/Reset, 18 = Sequential SP selection, 19 = SP1 - SP2 selection, 20 = SP1... SP4 binary selection, 21 = Digital inputs in parallel to  and  keys	0	r/w
12	di.A	31E 289E	798 10398	Digital Inputs Action note: The addresses related to this parameter are inserted after the last parameter set [157] tSd2	0 = DI1 direct action, DI2 direct action; 1 = DI1 reverse action, DI2 direct action; 2 = DI1 direct action, DI2 reverse action; 3 = DI1 reverse action, DI2 reverse action.		

5.4.2 out group

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
13	o1t	28B 280B	651 10251	Output 1 type (when Out 1 is an analogue output KM3 only)	0 = 0-20 = 0-20 mA 1 = 4-20 = 4-20 mA 2 = 0-10 = 0-10 V 3 = 2-10 = 2-10 V	0	r/w

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
14	o1F	28C 280C	652 10252	Out 1 function (when Out 1 is a linear output)	0 = NonE = Output not used 1 = H.rEG = Heating output 2 = c.rEG = Cooling output 3 = r.inP = Measure retransmission 4 = r.Err = Error (sp - PV) retransmission 5 = r.SP = Set point retransmission 6 = r.SEr = Serial value retransmission	0	r/w
				Out 1 function (when Out1 is a digital output)	0 = NonE = Output not used 1 = H.rEG = Heating output 2 = c.rEG = Cooling output 3 = AL = Alarm output 4 = t.out = Timer output 5 = t.HoF = Timer out -OFF in hold 6 = P.End = Program end indicator 7 = P.HLd = Program hold indicator 8 = P.uit = Program wait indicator 9 = P.run = Program run indicator 10 = P.Et1 = Program Event 1 11 = P.Et2 = Program Event 2 12 = or.bo = Out-of-range or burn out indicator 13 = P.FAL = Power failure indicator 14 = bo.PF = Out-of-range, burn out and Power failure indicator 15 = St.bY = Stand by status indicator 16 = diF.1 = The output repeats the digital input 1 status 17 = diF.2 = The output repeats the digital input 2 status 18 = on = Out 1 always ON		
15	Ao1L	28D 280D	653 10253	Initial scale value of the analog retransmission (KM3 only)	-1999 ... Ao1H	dp	r/w
16	Ao1H	28E 280E	654 10254	Full scale value of the analog retransmission (KM3 only)	Ao1L ... 9999	dp	r/w
17	o1AL	28F 280F	655 10255	Alarms linked up with the out 1	0... 63 +1 = Alarm 1 +2 = Alarm 2 +4 = Alarm 3 +8 = Loop break alarm +16 = Sensor Break +32 = Overload on output 4	0	r/w
18	o1Ac	290 2810	656 10256	Out 1 action	0 = dir = Direct action 1 = rEU = Reverse action 2 = dir.r = Direct with reversed LED 3 = ReU.r = Reverse with reversed LED	0	r/w
19	o2F	291 2811	657 10257	Out 2 function	See the values of 13 = o1F parameter	0	r/w
20	o2AL	292 2812	658 10258	Alarms linked up with the out 2	See the values of 16 = o1AL parameter	0	r/w
21	o2Ac	293 2813	659 10259	Out 2 action	See the values of 17 = o1Ac parameter	0	r/w
22	o3F	294 2814	660 10260	Out 3 function	See the values of 13 = o1F parameter	0	r/w
23	o3AL	295 2815	661 10261	Alarms linked up with the out 3	See the values of 16 = o1AL parameter	0	r/w
24	o3Ac	296 2816	662 10262	Out 3 action	See the values of 17 = o1Ac parameter	0	r/w
25	o4F	297 2817	664 10264	Out 4 function	See the values of 13 = o1F parameter	0	r/w
26	o4AL	298 2818	664 10264	Alarms linked up with the out 4	See the values of 16 = o1AL parameter	0	r/w
27	o4Ac	299 2819	665 10265	Out 4 action	See the values of 17 = o1Ac parameter	0	r/w

5.4.3 al1group

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
28	AL1t	29A 281A	666 10266	Alarm 1 type	0 = nonE = Alarm not used 1 = LoAb = Absolute low alarm 2 = HiAb = Absolute high alarm 3 = LHAo = Windows alarm in alarm outside the windows 4 = LHAi = Windows alarm in alarm inside the windows 5 = SE.br = Sensor Break 6 = LodE = Deviation low alarm (relative) 7 = HidE = Deviation high alarm (relative) 8 = LHdo = Relative band alarm in alarm out of the band 9 = LHdi = Relative band alarm in alarm inside the band	0	r/w
29	Ab1	29B 281B	667 10267	Alarm 1 function	0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	r/w
30	AL1L	29C 281C	668 10268	- For High and low alarms, it is the low limit of the AL1 threshold; - For band alarm, it is low alarm threshold	From -1999 to AL1H (E.U.)	dP	r/w
31	AL1H	29D 281D	669 10269	- For High and low alarms, it is the high limit of the AL1 threshold; - For band alarm, it is high alarm threshold	From AL1L to 9999 (E.U.)	dP	r/w
32	AL1	29E 281E	670 10270	AL1 threshold	From AL1L to AL1H (E.U.)	dP	r/w
33	HAL1	29F 281F	671 10271	AL1 hysteresis	1... 9999 (E.U.)	dP	r/w
34	AL1d	2A0 2820	672 10272	AL1 delay	From 0 (oFF) to 9999 (s)	0	r/w
35	AL1o	2A1 2821	673 10273	Alarm 1 enabling during Stand-by mode and out of range conditions	0 = Alarm 1 disabled during Stand by and out of range 1 = Alarm 1 enabled in standby mode 2 = Alarm 1 enabled in out of range condition 3 = Alarm 1 enabled in stand by mode and in over range condition	0	r/w

5.4.4 al2group

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
36	AL2t	2A2 2822	674 10274	Alarm 2 type	0 = nonE = Alarm not used 1 = LoAb = Absolute low alarm 2 = HiAb = Absolute high alarm 3 = LHAo = Windows alarm in alarm outside the windows 4 = LHAi = Windows alarm in alarm inside the windows 5 = SE.br = Sensor Break 6 = LodE = Deviation low alarm (relative) 7 = HidE = Deviation high alarm (relative) 8 = LHdo = Relative band alarm in alarm out of the band 9 = LHdi = Relative band alarm in alarm inside the band	0	r/w
37	Ab2	2A3 2823	675 10275	Alarm 2 function	0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	r/w
38	AL2L	2A4 2824	676 10276	- For High and low alarms, it is the low limit of the AL2 threshold; - For band alarm, it is low alarm threshold	From -1999 to AL2H (E.U.)	dP	r/w
39	AL2H	2A5 2825	677 10277	- For High and low alarms, it is the high limit of the AL2 threshold; - For band alarm, it is high alarm threshold	From AL2L to 9999 (E.U.)	dP	r/w
40	AL2	2A6 2826	678 10278	AL2 threshold	From AL2L to AL2H (E.U.)	dP	r/w

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
41	HAL2	2A7 2827	679 10279	AL2 hysteresis	1... 9999 (E.U.)	dP	r/w
42	AL2d	2A8 2828	680 10280	AL2 delay	From 0 (oFF) to 9999 (s)	0	r/w
43	AL2o	2A9 2829	681 10281	Alarm 2 enabling during Stand-by mode and out of range conditions	0 = Alarm 2 disabled during Stand by and out of range 1 = Alarm 2 enabled in stand by mode 2 = Alarm 2 enabled in out of range condition 3 = Alarm 2 enabled in stand by mode and in over range condition	0	r/w

5.4.5 al3 group

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
44	AL3t	2AA 282A	682 10282	Alarm 3 type	0 = nonE = Alarm not used 1 = LoAb = Absolute low alarm 2 = HiAb = Absolute high alarm 3 = LHAo = Windows alarm in alarm outside the windows 4 = LHAi = Windows alarm in alarm inside the windows 5 = SE.br = Sensor Break 6 = LodE = Deviation low alarm (relative) 7 = HidE = Deviation high alarm (relative) 8 = LHdo = Relative band alarm in alarm out of the band 9 = LHdi = Relative band alarm in alarm inside the band	0	r/w
45	Ab3	2AB 282B	683 10283	Alarm 3 function	0... 15 +1 = Not active at power up +2 = Latched alarm (manual reset) +4 = Acknowledgeable alarm +8 = Relative alarm not active at set point change	0	r/w
46	AL3L	2AC 282C	684 10284	- For High and low alarms, it is the low limit of the AL3 threshold; - For band alarm, it is low alarm threshold	From -1999 to AL3H (E.U.)	dP	r/w
47	AL3H	2AD 282D	685 10285	- For High and low alarms, it is the high limit of the AL3 threshold; - For band alarm, it is high alarm threshold	From AL3L to 9999 (E.U.)	dP	r/w
48	AL3	2AE 282E	686 10286	AL3 threshold	From AL3L to AL3H (E.U.)	dP	r/w
49	HAL3	2AF 282F	687 10287	AL3 hysteresis	1... 9999 (E.U.)	dP	r/w
50	AL3d	2B0 2830	688 10288	AL3 delay	From 0 (oFF) to 9999 (s)	0	r/w
51	AL3o	2B1 2831	689 10289	Alarm 3 enabling during Stand-by mode and out of range conditions	0 = Alarm 3 disabled during Stand by and out of range 1 = Alarm 3 enabled in stand by mode 2 = Alarm 3 enabled in out of range condition 3 = Alarm 3 enabled in stand by mode and in over range condition	0	r/w

5.4.6 lBa group - lBa Break alarm parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
52	LbAt	2B2 2832	690 10290	LBA time	From 0 (oFF) to 9999 (s)	0	
53	LbSt	2B3 2833	691 10291	Delta measure used by LBA during Soft start	From 0 (oFF) to 9999 (E.U.)	dP	
54	LbAS	2B4 2834	692 10292	Delta measure used by LBA	1...9999 (E.U.)	dP	
55	LbcA	2B5 2835	693 10293	Condition for LBA enabling	0 = uP = Active when Pout = 100% 1 = dn = Active when Pout = -100% 2 = both = Active in both cases	0	

5.4.7 rEg group - Control parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
56	cont	2B6 2836	694 10294	Control type	0 = Pid = PID (heat and/or) 1 = On.FA = ON/OFF asymmetric hysteresis 2 = On.FS = ON/OFF symmetric hysteresis 3 = nr = Heat/Cool ON/OFF control with neutral zone 4 = 3Pt = Servomotor control (available only when output 2 and output 3 have been ordered as "M")	0	r/w
57	Auto	2B7 2837	695 10295	Autotuning selection	-4 = Oscillating auto-tune with automatic restart at power up and after all point change -3 = Oscillating auto-tune with manual start -2 = Oscillating -tune with automatic start at the first power up only -1 = Oscillating auto-tune with automatic restart at every power up 0 = Not used 1 = Fast auto tuning with automatic restart at every power up 2 = Fast auto-tune with automatic start the first power up only 3 = FAST auto-tune with manual start 4 = FAST auto-tune with automatic restart at power up and after a set point change 5 = Evo-tune with automatic restart at every power up 6 = Evo-tune with automatic start the first power up only 7 = Evo-tune with manual start 8 = Evo-tune with automatic restart at power up and after a set point change	0	r/w
58	Aut.r	2B8 2838	696 10296	Manual start of the Autotuning	0 = oFF = Autotuning Not active 1 = on = Autotuning Active	0	r/w
59	SELF	2B9 2839	697 10297	Self tuning enabling	0 = no = The instrument does not perform the self-tuning 1 = YES = The instrument is performing the self-tuning	0	r/w
60	HSEt	2BA 283A	698 10298	Hysteresis of the ON/OFF control	0... 9999 (E.U.)	dP	
61	cPdt	2BB 283B	699 10299	Time for compressor protection	From 0 (oFF) to 9999 (s)	0	r/w
62	Pb	2BC 283C	700 10300	Proportional band	1... 9999 (E.U.)	dP	
63	ti	2BD 283D	701 10301	Integral time	From 0 (oFF) to 9999 (s)	0	r/w
64	td	2BE 283E	702 10302	Derivative time	From 0 (oFF) to 9999 (s)	0	r/w
65	Fuoc	2BF 283F	703 10303	Fuzzy overshoot control	0... 200	2	r/w
66	tcH	2C0 2840	704 10304	Heating output cycle time	10... 1300 (s)	1	r/w
67	rcG	2C1 2841	705 10305	Power ratio between heating and cooling action	1... 9999	2	r/w
68	tcc	2C2 2842	706 10306	Cooling output cycle time	1... 1300 (s)	1	r/w
69	rS	2C3 2843	707 10307	Manual reset (Integral pre-load)	-1000... +1000 (%)	1	r/w
70	Str.t	2C4 2844	708 10308	Servomotor stroke time	5...1000 seconds	0	r/w
71	db.S	2C5 2845	709 10309	Servomotor dead band	0...100%	1	r/w
72	od	2C6 2846	710 10310	Delay at power up	From 0.00 (oFF) to 9959 (hh.mm)	2	r/w
73	St.P	2C7 2847	711 10311	Maximum power output used during soft start	-100... 100 (%)	0	r/w
74	SSt	2C8 2848	712 10312	Soft start time	- 0 (oFF)... 800 = inF (h.mm)	2	r/w
75	SS.tH	2C9 2849	713 10313	Threshold for soft start disabling	-2000 = (oFF)... 9999 (E.U.)	dP	r/w

5.4.8 Sp group - Set point parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
76	nSP	2CA 284A	2CA 284A	Number of used set points	1... 4	0	r/w
77	SPLL	2CB 284B	715 10315	Minimum set point value	From -1999 to SPHL	dP	r/w
78	SPHL	2CC 284C	716 10316	Maximum set point value	From SPLL to 9999	dP	r/w
79	SP	2CD 284D	717 10317	Set point 1	From SPLL to SPLH	dP	r/w
80	SP 2	2CE 284E	718 10318	Set point 2	From SPLL to SPLH	dP	r/w
81	SP 3	2CF 284F	719 10319	Set point 3	From SPLL to SPLH	dP	r/w
82	SP 4	2D0 2850	720 10320	Set point 4	From SPLL to SPLH	dP	r/w
83	A.SP	2D1 2851	721 10321	Selection of the active set point	0 = SP 1 = SP 2 2 = SP 3 3 = SP 4	0	r/w
84	SP.rt	2D2 2852	722 10322	Remote set point type	0 = RSP = The value coming from serial link is used as remote set point 1 = trin = The value will be added to the local set point selected by A.SP and the sum becomes the operative set point 2 = PErc = The value will be scaled on the input range and this value will be used as remote SP	0	r/w
85	SPLr	2D3 2853	723 10323	Local/remotesetpointselection	0 = Loc = local 1 = rEn = remote	0	r/w
86	SP.u	2D4 2854	724 10324	Rate of rise for Positive set point change (ramp UP)	0.01...99.99 (inF) Eng. units per minute	2	r/w
87	SP.d	2D5 2855	725 10325	Rate of rise for Negative set point change (ramp DOWN)	0.01...99.99 (inF) Eng. units per minute	2	r/w

5.4.9 tin group - timer function parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
88	tr.F	2D6 2856	726 10326	Independent timer function	0 = NonE = Timer not used 1 = i.d.A = Delayed start timer 2 = i.uP.d = Delayed start at power up 3 = i.d.d = Feed-through timer 4 = i.P.L = Asymmetrical oscillator with start OFF 5 = i.L.P = Asymmetrical oscillator with start ON	0	r/w
89	tr.u	2D7 2857	727 10327	Timer unit	0 = hh.nn = Hours and minutes 1 = nn.SS = Minutes and seconds 2 = SSS.d = Second and tenth of seconds	0	r/w
90	tr.t1	2D8 2858	728 10328	Time 1	When tr.u = 0: 1... 9959 (hh.mm)	2	r/w
					When tr.u = 1: 1... 9959 (mm.ss)		
91	tr.t2	2D9 2859	729 10329	Time 2	When tr.u = 0: From 0 (oFF) to 9959 (inF) (hh.mm)	2	r/w
					When tr.u = 1: From 0 (oFF) to 9959 (inF) (mm.ss)		
					When tr.u = 2: From 0000 (oFF) to 9959 (inF) (tenth of seconds)		
92	tr.St	2DA 285A	730 10330	Timer status	0 = rES = Timer reset 1 = run = Timer run 2 = HoLd = Timer hold	0	r/w

5.4.10 pRg group - programmer function parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
93	Pr.F	2DB 285B	731 10331	Program action at power up	0 = nonE = Programmer not used 1 = S.uP.d = Start at power up with a first step in stand-by 2 = S.uP.S = Start at power up 3 = u.diG = Start at Run command detection only 4 = u.dG.d = Start at Run command with a first step in stand-by	0	r/w
94	Pr.u	2DC 285C	732 10332	Engineering unit of the soaks	0 = hh.nn = Hours and minutes 1 = nn.SS = Minutes and seconds	0	r/w
95	Pr.E	2DD 285D	733 10333	Instrument behavior at the end of the program execution	0 = cnt = Continue 1 = A.SP = Go to the set point selected by A.SP 2 = St.by = Go to stand-by mode	0	r/w
96	Pr.Et	2DE 285E	734 10334	Time of the end program indication	From 0 (oFF) to 9959 (inF) minutes and seconds	2	r/w
97	Pr.S1	2DF 285F	735 10335	Set point of the first soak	From SPLL to SPHL -8000 Program End	dP	r/w
98	Pr.G1	2E0 2860	736 10336	Gradient of the first ramp	1... 10000 (inF = Step transfer) Engineering Unit/minute	1	r/w
99	Pr.t1	2E1 2861	737 10337	Time of the 1 st soak	0... 9959 (hh.mm or mm.ss)	2	r/w
100	Pr.b1	2E2 2862	738 10338	Wait band of the 1 st soak	0 (oFF) to 9999 (E.U.)	0	r/w
101	Pr.E1	2E3 2863	739 10339	Events of the 1 st group	0000... 1111	2	r/w
102	Pr.S2	2E4 2864	740 10340	Set point of the 2 nd soak	From SPLL to SPHL -8000 Program End	dP	r/w
103	Pr.G2	2E5 2865	741 10342	Gradient of the 2 nd ramp	1... 10000 (inF = Step transfer) Engineering Unit/minute	1	r/w
104	Pr.t2	2E6 2866	742 10342	Time of the 2 nd soak	0... 9959 (hh.mm or mm.ss)	2	r/w
105	Pr.b2	2E7 2867	743 10343	Wait band of the 2 nd soak	0 (oFF) to 9999 (E.U.)	0	r/w
106	Pr.E2	2E8 2868	744 10344	Events of the 2 nd group	0000... 1111	2	r/w
107	Pr.S3	2E9 2869	745 10345	Set point of the 3 rd soak	From SPLL to SPHL -8000 Program End	dP	r/w
108	Pr.G3	2EA 286A	746 10346	Gradient of the 3 rd ramp	1... 10000 (inF = Step transfer) Engineering Unit/minute	1	r/w
109	Pr.t3	2EB 286B	747 10347	Time of the 3 rd soak	0... 9959 (hh.mm or mm.ss)	2	r/w
110	Pr.b3	2EC 286C	748 10348	Wait band of the 3 rd soak	0 (oFF) to 9999 (E.U.)	0	r/w
111	Pr.E3	2ED 286D	749 10349	Events of the 3 rd group	0000... 1111	2	r/w
112	Pr.S4	2EE 286E	750 10350	Set point of the 4 th soak	From SPLL to SPHL -8000 Program End	dP	r/w
113	Pr.G4	2EF 286F	751 10351	Gradient of the 4 th ramp	1... 10000 (inF= Step transfer) Engineering Unit/minute	1	r/w
114	Pr.t4	2F0 2870	752 10352	Time of the 4 th soak	0... 9959 (hh.mm or mm.ss)	2	r/w
115	Pr.b4	2F1 2871	753 10353	Wait band of the 4 th soak	0 (oFF) to 9999 (E.U.)	0	r/w
116	Pr.E4	2F2 2872	754 10354	Events of the 4 th group	0000... 1111	2	r/w
117	Pr.St	2F3 2873	755 10355	Program status	0 = rES = Program reset 1 = run = Program start 2 = HoLd = Program hold	0	r/w

5.4.11 pan group - operator hMi parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
118	PAS2	2F4 2874	756 10356	Level 2 password (limited access level)	0 = oFF (Level 2 not protected by password) - 1... 200	0	r/w
119	PAS3	2F5 2875	757 10357	Level 3 password (complete configuration level)	3... 200	0	r/w
120	PAS4	2F6 2876	758 10358	Level 4 password (CODE configuration level)	201... 400	0	r/w
121	uSrb	2F7 2877	759 10359	a button function during RUN TIME	0 = nonE = No function 1 = tunE = Auto-tune/self-tune enabling. A single press (longer than 1 second) starts the auto-tune 2 = oPLo = Manual mode. The first pressure puts the instrument in manual mode (oPLo) while a second one puts the instrument in Auto mode 3 = AAc = Alarm reset 4 = ASi = Alarm acknowledge 5 = chSP = Sequential set point selection 6 = St.by = Standby mode. The first press puts the instrument in standby mode while a second one puts the instrument in Auto mode. 7 = Str.t = Timer run/hold/reset 8 = P.run = Program run 9 = P.rES = Program reset 10 = P.r.H.r = Program run/hold/reset	0	r/w
122	diSP	2F8 2878	760 10360	Display management	0 = nonE = Standard display 1 = Pou = Power output 2 = SPF = Final set point 3 = Spo = Operative set point 4 = AL1 = Alarm 1 threshold 5 = AL2 = Alarm 2 threshold 6 = AL3 = Alarm 3 threshold 7 = Pr.tu = - During a soak, the instrument shows the soak elapsed time; - - During a ramp the display shows the operative set point. At the end of the program execution, the instrument will show "P.End" messages alternately with the measured value. - - When no program is running, the instrument shows the standard display 8 = Pr.td = - During a soak, the instrument shows the soak remaining time (count down). - - During a ramp the display shows the operative set point. At the end of the program execution, the instrument shows "P . End" messages alternately with the measured value. - - When no program is running, the instrument shows the standard display. 9 = P.t.tu = When the programmer is running, the display shows the total elapsed time. At the end of the program execution, the instrument shows "t . End" messages alternately with the measured value. 10 = P.t.td = When the programmer is running, the display shows the total remaining time (count down). At the end of the program execution, the instrument shows "P . End" messages alternately with the measured value. 11 = ti.uP = When the timer is running, the display shows the timer counting up. At the end of the counting, the instrument shows "t . End" messages alternately with the measured value. 12 = ti.du = When the timer is running, the display shows the timer counting down. At the end of the counting, the instrument shows "t . End" messages alternately with the measured value. 13 = PErc = Percent of the power output used during soft start (when the soft start time is equal to infinite, the limit is ever active and it can be used also when ON/OFF control is selected)		r/w
123	di.cL	2F9 2879	761 10361	Display colour	0 = The display colour changes to point out the actual deviation (PV - SP) 1 = Display red (fix) 2 = Display green (fix) 3 = Display orange (fix)		
124	AdE	2FA 287A	762 10362	Deviation for display colour management	1... 9999	Dp	r/w
125	di.St	2FB 287B	763 10363	Display Timeout	0 = oFF (display always ON)... 9959 (mm.ss)	2	r/w

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
126	fiLd	2FC 287C	764 10364	Filter on the displayed value	0 = oFF (filter disabled)... 100	Dp	r/w
127	Bg.F	2FD 287D	765 10365	Bar graph Function	0 = nonE = Bargraph not lit 1 = Pou = PID Output power (single action: 0... 100%, double action: -100... +100%) 2 = Po.h = Energy Used (kWh) 3 = Pr.tu = Elapsed time of the program in execution 4 = Pr.td = Time to end of the program in execution 5 = Pr.tS = Time to end of the program segment in execution 6 = ti.uP = Elapsed time of timer (T1 and T2) 7 = ti.du = Time to end of timer (T1 and T2) 8 = r.iSP = Time to preventive maintenance	0	r/w
128	dSPu	2FE 287E	766 10366	Instrument status at power ON	0 = AS.Pr = Starts in the same way it was prior to the power down 1 = Auto = Starts in Auto mode 2 = oP.0 = Starts in manual mode with a power output equal to zero 3 = St.bY = Starts in stand-by mode	0	r/w
129	oPr.E	2FF 287F	767 10367	Operative modes enabling	0 = ALL = All modes will be selectable by the next parameter 1 = Au.oP = Auto and manual (OPLO) mode only will be selectable by the next parameter 2 = Au.Sb = Auto and Stand-by modes only will be selectable by the next parameter	0	r/w
130	oPEr	300 2880	768 10368	Operative mode selection	0 = Auto = Auto mode 1 = oPLo = Manual mode 2 = St.bY = Standby mode	0	r/w

5.4.12 Ser group - Serial link parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
130	Add	301 2881	769 10369	Instrument address	oFF... 254	0	r/w
131	bAud	302 2882	770 10370	baud rate	0 = 1200 = 1200 baud 1 = 2400 = 2400 baud 2 = 9600 = 9600 baud 3 = 19.2 = 19200 baud 4 = 38.4 = 38400 baud	0	r/w
132	trSP	303 2883	771 10371	Selection of the value to be retransmitted (Master)	0 = nonE = Retransmission not used (the instrument is a slave) 1 = rSP = The instrument becomes a Master and retransmits the operative set point 2 = PErc = The instrument become a Master and it retransmits the power output	0	r/w

5.4.13 Con group - Consumption parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
133	Co.tY	304 2884	772 10372	Measurement type	0 = oFF = Not used 1 = Instantaneous power (kW) 2 = Power consumption (kW/h) 3 = Energy used during program execution. This measure starts from zero when a program runs end stops at the end of the program. A new program execution will reset the value 4 = Total worked days with threshold. It is the number of hours that the instrument is turned ON divided by 24 5 = Total worked hours with threshold. It is the number of hours that the instrument is turned ON	0	r/w
134	UoLt	305 2885	773 10373	Nominal Voltage of the load	1... 9999 (V)	0	r/w
135	cur	306 2886	774 10374	Nominal current of the load	1... 999 (A)	0	r/w
136	h.Job	307 2887	775 10375	Threshold of the working period	0 = oFF... 999	0	r/w
137	t.Job	308 2888	776 10376	Worked time (not resettable)	0... 9999	0	r

5.4.14 Cal group - User calibration parameters

no.	param.	address		description	Values	dec. point	r/w
		hex	dec				
138	AL.P	309 2889	777 10377	Adjust Low Point	From -1999 to (AH.P - 10) (E.U.)	dP	r/w
139	AL.o	30A 288A	778 10378	Adjust Low Offset	-300... +300 (E.U.)	dP	r/w
140	AH.P	30B 288B	779 10379	Adjust High Point	From (AL.P + 10)... 9999 (E.U.)	dP	r/w
141	AH.o	30C 288C	780 10380	Adjust High Offset	-300... +300 (E.U.)	dP	r/w



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DOCUMENT DETAILS

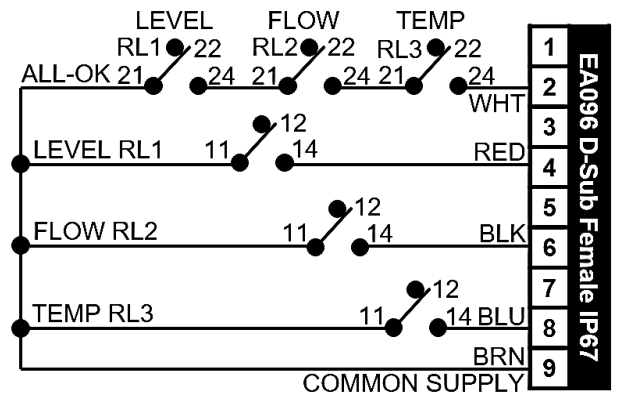
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SA00012 VOLT FREE CONTACTS STANDARD OPTION

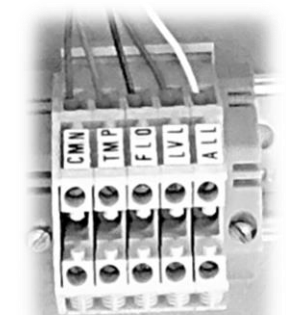
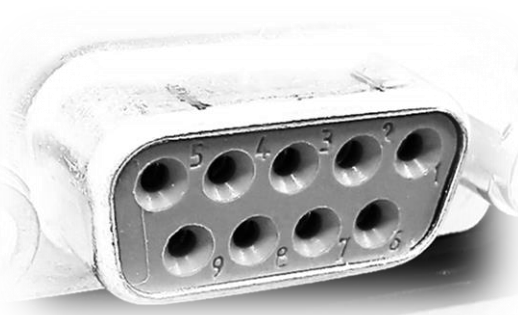
SA00012 provides access to switches to describe certain system conditions. The switches do not have voltage across them, they are 'volt-free' – the end-user or system builder can apply their own control system voltages. This approach is less complex than communications protocols such as RS485, but more limited in function.

WIRING

1 Volt-free contacts (sometimes called volt-free switches) are electrical circuits that open or close depending on the state of relays driven by hardware conditions elsewhere in the product. **Temperature** (pins 8&9) is captured from a controller output – this parameter can be easily adjusted, but factory setting is to go open-circuit within +/-10°C of setpoint. **Flow** (pins 6&9) is captured from either a flow switch or a controller reading pulses from a flow meter. Flow switches may be fixed or adjustable but will always have hysteresis built-in. Flow sensors can have a single switching point. Circuit becomes unmade on low-flow. **Level** (pins 4&9) is captured from a reed switch in the tank. By default, this signal is open-circuit once the fluid level is too low and the pump has stopped. **All-OK** (pins 2&9) combines the three signals onto a single pin pairing, sharing the same open-circuit=not OK logic.



2 Dependent on your product type, signals will either be accessible via a standard two-row 9-pin D subminiature connector (see below left) OR direct connection to terminal blocks (see below right). Where a D connector is provided, the female gender (ATC PN EA096) is supplied in all cases. If male pins are required, we recommend using a male-to-male gender-changer connector (ATC PN EA853). Pin numbers are clearly marked on the molding. The connector is rated to IP67.



3 Relays used in this standard option pack have the following ratings;

- AC-1 (AC resistive loads)**
230Vac@8A (D-connector limited)
- AC-15 (AC electromagnetic loads)**
230Vac@3A (D-connector limited)
- DC-13 (DC electromagnetic loads)**
24Vdc@2A



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DOCUMENT DETAILS

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SA00051 REMOTE STOP-START

This guide may apply to your product if you purchased standard option SA00051. Chillers/coolers with automatic restart interlock systems can be fitted with relay contacts in that allow a remote supply of 24Vdc to switch the relay coil, satisfy the interlock chain, and start process. Unless specifically requested, the end user/OEM must generate the 24Vdc supply. It may be the case that there is a 24Vdc PSU in the product already – the standard option ensures satisfactory operation by avoiding overloading the PSU.

OVERVIEW

<p>1</p>	<p>W-series and >XF050 units use terminal blocks to provide access for the end user to provide 24Vdc remote stop-start voltage.</p>		
<p>2</p>	<p>All other units use D connectors to apply voltage. The pin out to the right is only representative and your unit's pin numbers for voltage supply may differ. Consult the wiring schematic for details.</p>		



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Operating Manual; Recommended Spares

Annex M-12

DOCUMENT DETAILS

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RECOMMENDED SPARES FOR XF025 & NON-STANDARDS

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.

XF025 STANDARD MODELS

PN	Description	QTY
63-202	PUMP P25 MXHM205 230~1~50 (0-Spec)	1
63-589	PUMP P40 MXH206 400~3~50 (3-Spec)	1
WA916	PUMP P80 MXH404-60 460~3~60 (4-Spec)	1
70-151	Valve; brass; gate 3/4" BSP	1
70-152	Valve; brass; gate 1" BSP	1
74-111	Clamp; Hose; worm drive size '3'; 50-70mm	5
74-107	Hose Clamp; 30 - 40mm FA106	12
EA586	Sensor PT100B; 1/4" BSP 3 x 13mm-RES; (61-936)	1
EA101	Overload; Auxiliary Block - 1 N/O & 1 N/C (60-102)	1
EA793	PSU; 100-240Vac input - 24Vdc output 0.5A	1
EA794	Rotary Actuator; 2 Nm	1
EA834	Relay; Non Latch; 2 Pole - 8A; 24Vdc; DPCO	1
EA848	Fuse; F0.5A H250V UL-OK	1
EA880	Carel IR33 Controller	1
WA715	Belimo Control Valve - 1kvs 10L/min	1

XF025NS

PN	Description	QTY

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.

SAFETY DATA SHEET

HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

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

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

SAFETY DATA SHEET

HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

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. enclosures, local exposure below any	If this product contains ingredients with exposure limits, use process exhaust ventilation or other engineering controls to keep worker recommended or statutory limits.
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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 min	Class 1 When prolonged exposure is expected: Break through time> 120 min
Protective index permeability. Workplace Safety Assessment. 374 (protection against chemicals).	Class 4 Observe the information of the glove manufacturers on Protective gloves should be chosen according to Gloves recommended according to EN
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
9.10	Specific Heat Capacity	3.78kJ/kg °K
9.11	Viscosity, Kinetic, at 25°C	3.51mPa.s

SECTION 10: STABILITY AND REACTIVITY

SAFETY DATA SHEET

HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

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.

SAFETY DATA SHEET

HEXID A4 HEAT TRANSFER FLUID

Conforming to Directive 1907/2006/EC

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.

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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

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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.