

ColdLogik™

Perfect climate - Perfect control



New Generation Computer Room Cooling

CL20 Rear Cooler Technical Data



CL20 Rear Cooler Product Guide

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General Statement

Quality Management System

USystems Ltd is a registered company to ISO 9001:2008 Quality management standards. This standard covers all manufacturing areas and associated processes.

Product Standards

Unless otherwise stated products marketed and supplied by USystems Limited, when installed and operated in accordance with USystems instructions, conform to EMC directive and essential Health and Safety requirements of the Machinery Directive 91/368/EEC 93/44/EEC & 93/68/EEC. This includes the EMC compatibility directive 89/336/EEC. As standard, units comply with an IP21 rating. The standards are also met where compliance to TUV, UL CE and CSA are specific market requirements attained for that product.

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Overview and Principle

Data centres are the power house of today's global economy, without modern computing power applied to all facets of today's advanced economies, the quality of life would be very different.

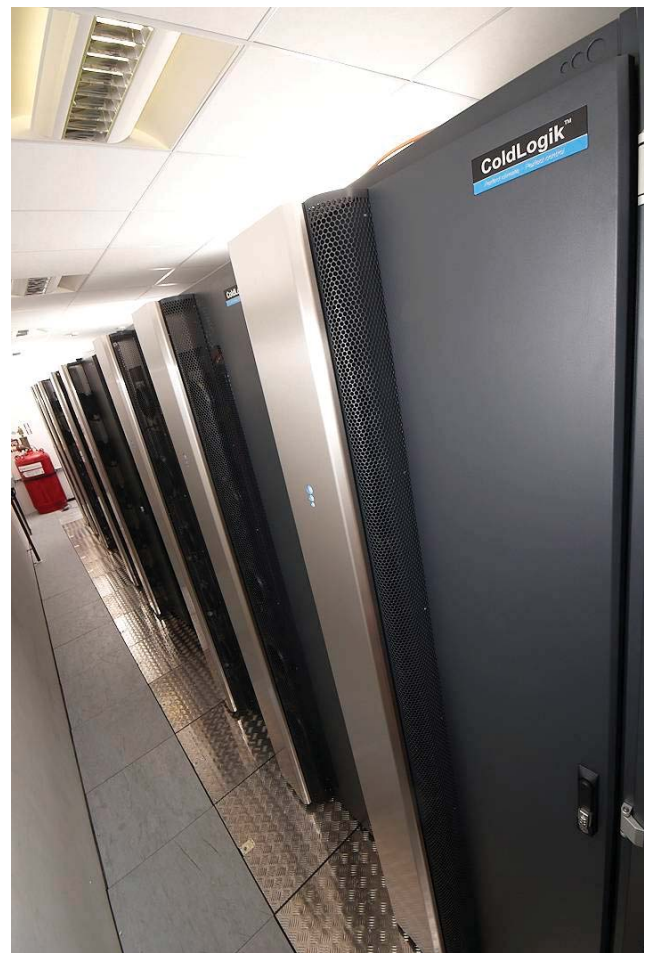
However great the benefits, there is one unfortunate fact that today's data centres are highly inefficient, in their use of energy and their subsequent effect on the global climate.

ColdLogik replaces the traditional approach to data centre cooling, allowing loads of up to 45kW per cabinet with the added benefit of removing real estate problems inherent with hot aisle cold aisle and aisle containment designs.

The waste heat generated by equipment within the cabinet is removed at source by water cooling, without the risk of leakage in the data centre by utilising the leak prevention system.

ColdLogik allows cooling water temperatures to rise from the traditional 6°C to between 14°C & 21°C; reducing chiller size and energy costs and increasing the availability of energy efficient 'free cooling'.

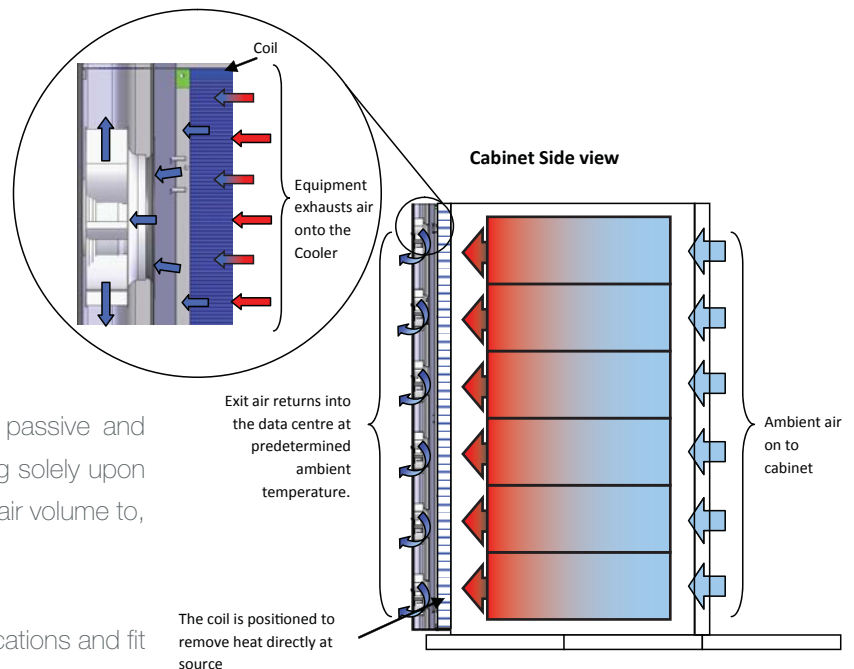
The **ColdLogik** Management System 'CMS' allows the doors to operate individually or as a system to maintain the room at the correct temperature even with external heat loads and eliminates the risk of condensation.



Overview and Principle

CL20 Rear Coolers are fitted to the back of an enclosure typically being IEC 297 3 and EIA STD 310 compliant. The Coolers have been designed to remove heat generated by the active equipment directly at source thus preventing hot exhaust air entering into the room, ensuring optimum thermal and energy performance.

Ambient air is pulled into the cabinet via the active equipment fans. The hot exhaust air produced by the active equipment then passes over a heat exchanger matrix either by its own velocity or pulled through via EC centrifugal fans mounted within the door; heat is then transferred and rejected to coolant. The resulting chilled air then passes back into the room at the predetermined room ambient temperature.



The CL20 Rear Cooler is available in both passive and active models, with the passive version relying solely upon the active equipment fans producing enough air volume to, in effect 'self cool'.

The CL20 Rear Cooler has a number of applications and fit out scenarios such as being sited within an existing data centre, working in harmony with the incumbent computer room air-conditioning, providing high density cooling, a reduction in energy consumption and the removal of hot spot problems. To achieve this the Coolers can either be retrofitted to existing 'OEM' cabinets using an interface frame or fitted directly to a ColdLogik compliant USpace 6210 cabinet.

However to gain the optimum energy performance from a **ColdLogik** solution the CL20 Rear Cooler should be deployed as a single source solution i.e. the Coolers should be used to control the entire computer room/data centre without the need of any additional air-conditioning products, including retrofit scenarios.

Overview and Principle

ColdLogik Management System 'CMS'

The key element to controlling the room environment is the CMS; each rear cooler is intelligently managed for optimum efficiency by embedded computers that continually adjust the operational parameters in response to the heat removal demands placed on the system. By making continual load adjustments the CMS Controllers maintain the room ambient temperature.

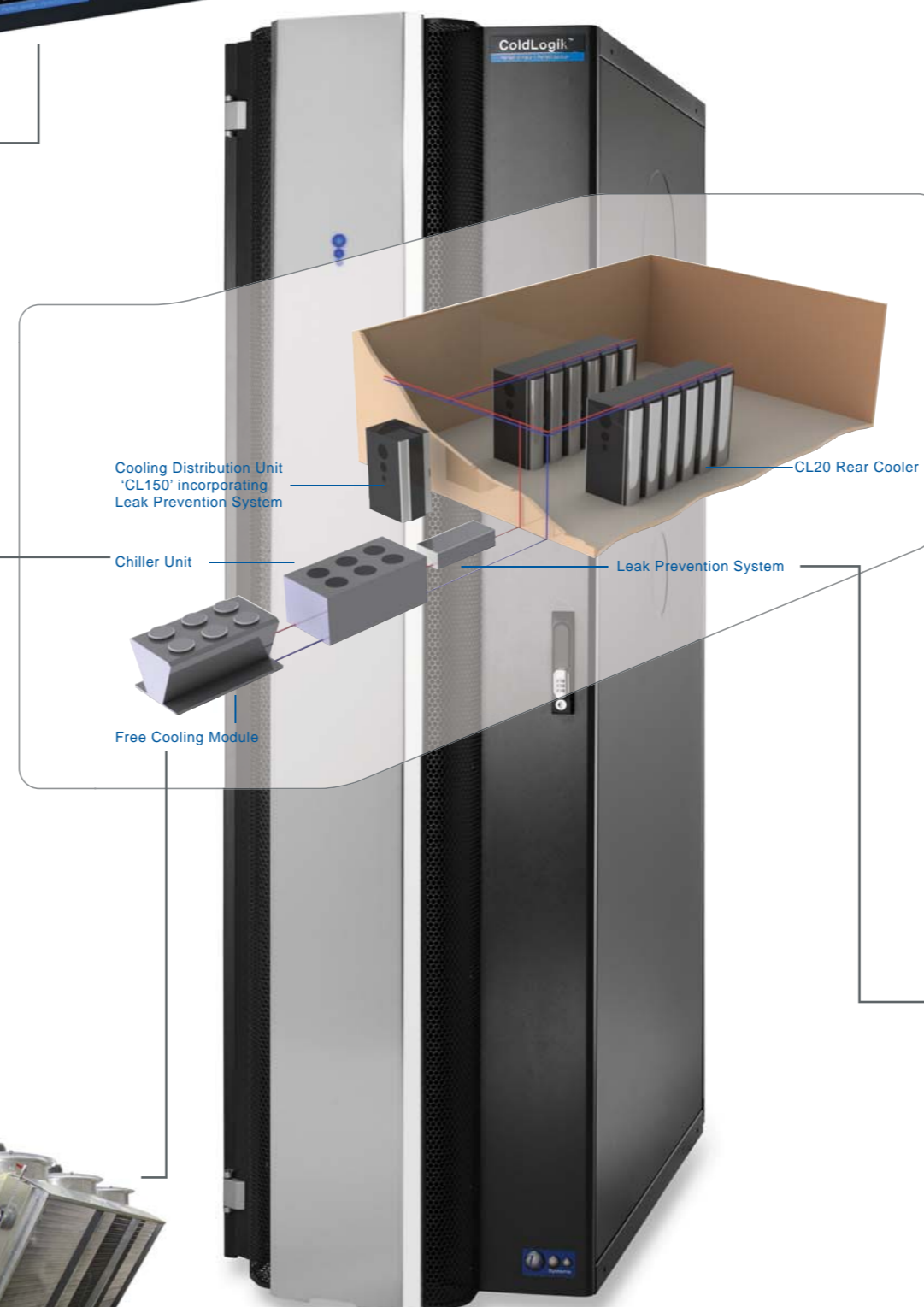
Chiller

Our chiller systems use the latest technology with either high efficiency scroll compressors or oil less magnetically driven centrifugal compressors both with high EER and ESEER energy figures. Our custom built units from 10 to 2500kW can cater for any ambient from -40°C to +55°C or adverse environmental conditions. The chillers can be supplied complete as a stand alone package with pumps and tanks or as part of a larger system. The chiller controls communicate directly with the ColdLogik system controller and can vary the water temperature as required.



Free Cooling Module

Free cooling modules can be supplied as a factory fitted extra within the chiller cubicle when space is at premium or as a separate self contained unit. All the units are designed to the closest ambient for the desired system water temperature which at worse case is only 3°C. Our free coolers are all fitted with inverter driven energy efficient fans to increase energy saving when ambient falls below the point of free cooling. A free cooling module can be fitted to an existing facility when changing from a standard CRAC to a ColdLogik system.



Overview and Principle

Leak Prevention System 'LPS'

The patent pending LPS works by putting the data centre loop including the rear coolers on a negative pressure circuit the whole data centre is safe from potential leaks in places where it can be least afforded. In the unlikely event say a coupling became loose or a hole was drilled into a pipe, air would be pulled into the gap/hole, thereby preventing water from escaping. The resulting air now in the circuit is drawn through to a tank inside or outside the chiller, where it is finally vented out of the system and prevented from continuing back around the loop. Inline sensors detect a pressure drop this in turn provides a warning alerting the user to the problem. Importantly the ColdLogik system will continue to work, with no notable effect to its cooling capabilities. As with all aspects of the ColdLogik system the LPS can be retrofitted to an existing circuit and is modular in design and therefore scalable, so as your data centre grows so can ColdLogik.

Cooling Distribution Unit 'CL150'

In many cases it is necessary to tap off an existing chiller which already supplies chilled water to other on site services at 6°C. If chilled water from the primary circuit were to remain at this temperature condensate would be induced within the coolers. The CL150 Cooling Distribution Unit 'CDU' has been designed to provide close control cooling to the rear coolers eliminating the potential of condensate. The process side, otherwise known as the secondary circuit is a sealed pressurised system with the heat extracted from the coolers being rejected to a raw chilled water circuit via a stainless steel plate heat exchanger.



CL20 Rear Cooler Range

Product Definitions:

CL20 C4 Rear Cooler

Available in three variants; each of the C4's are capable of 25kW maximum 'sensible cooling'. The performance of any coil relies upon airflow passing over the coil matrix, but in the case of the C4 variants, which are supplied passive (i.e. no active fans fitted as standard) they are however preconfigured to allow for fans to be retrofitted. For the optimum performance an airflow of 3100m³/h evenly spread over the coil is required. Most equipment manufacturers are beginning to produce increasingly energy efficient product, one area in particular is the type of fans being used. An example of this is the new highly energy efficient Dell 1U servers, which produce a negligible volume of air. To overcome this problem the CL20 C4 range is equipped to allow fans to be retrofitted post installation.

CL20 C4nc

The C4nc is the basic version of the rear cooler with no fan management system, no communication protocol and no coolant control, however the retrofitting of thermostatically controlled fans does offer some degree of room ambient air control; Fixed speed fans are also available.

CL20 C4cc

The C4cc has the additional ability to control the flow rate of coolant around the coil, when combined with optional thermostatically controlled fans the C4cc can be programmed to control the air off temperature; this in turn can help to control the overall room ambient temperature. Additionally the C4cc can be set up to switch the chiller supply water temperature to provide an even greater amount of heat adjustment. As with the C4nc version there is no option for remote communication although local monitoring is possible.

C. CL20 C4sc

The C4sc version comes with the full **ColdLogik** Management System control. Please see page 9 for full explanation

NB: One or more fans can be factory fitted to each of the above Rear Coolers at point of order.



CL20 Rear Cooler Range

Product Definitions:

CL20 C8sc Cooler

The CL20 C8sc is capable of a maximum 35kW of 'sensible' cooling and comes complete with the **ColdLogik** Management System 'CMS'.

The C8sc is designed to run at the optimum performance at all times, ensuring maximum energy savings. The CMS tracks the air off and water temperatures, by doing so it is able make minor adjustments thereby ensuring the room ambient temperature is maintained at all times.

CL20 C12sc Cooler

The CL20 C12sc is capable of a maximum 45kW of 'sensible' cooling and comes complete with the **ColdLogik** Management System 'CMS'.

As with the C8sc the C12sc is designed to run at the optimum performance; even when not requiring a high density cooling this CL20 Cooler is the most energy efficient.

ColdLogik Management System 'CMS'

The CMS lies at the heart of the **ColdLogik** solution. The room ambient temperature is controlled locally by the **ColdLogik** Management System – it achieves this by automatically adjusting the fan speed, water flow rate, and, where necessary, alters the output water temperature from the chiller, resulting in a consistent delivery of cooled air into the data centre, with no operator intervention. The whole process can also be overseen and controlled at individual cabinet level, room level and remotely via any of the industry standard communication protocols, allowing remote administration. The **ColdLogik** Management System is 2U high and can be fitted either rack mounted or on top of the cabinet.

'CMS' ensures that all variants of the **ColdLogik** system operates on a 'Sensible Cooling' principle, that is to say 'water above dew point', ensuring that the system remains a condensate free operation.



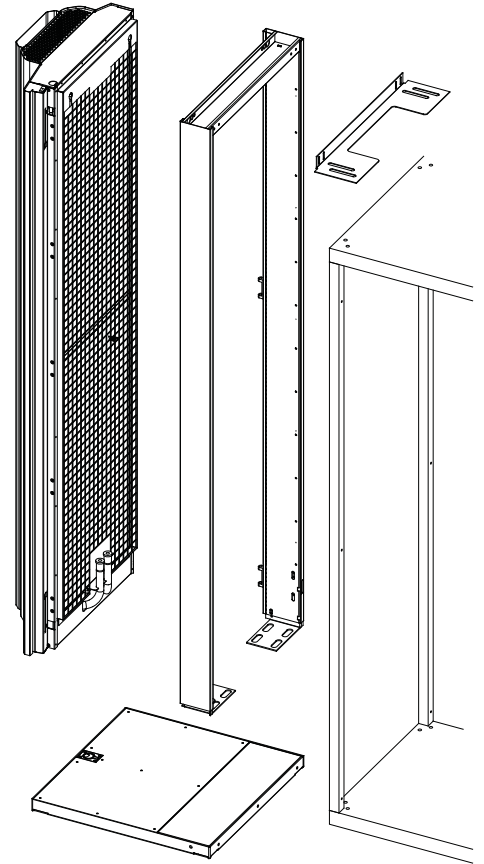
CL20 Rear Cooler Range

Product Definitions:

CL20 Interface Frame

One of the biggest advantages of the CL20 Cooler is the ability to be retrofitted onto an existing cabinet. The Interface Frame has been designed to be a universal product, so all standard and some non-standard enclosures can be accommodated. It should be noted that the Interface Frame allows a secure fixing of the rear cooler without transferring any additional weight to the existing cabinet.

The Interface Frame brings many of the benefits of the CL20 Cooler family but without the need to decommission old cabinets or even entire data centres. By working in harmony with the incumbent air conditioning system many of the benefits of the **ColdLogik** system can be realised, e.g. removal of hot spot problems, if there is a need to increase the cabinet kW density, if the need is to reduce carbon footprint, save HVAC energy and transfer the energy to housing more active equipment or simply to save money.



Zero Aisle Cooler

The CL20 Zero Aisle Cooler provides an alternative method to fitting a CL20 Rear cooler onto the USpace 6210 Cabinet or retrofitting to OEM cabinets. Safety, convenience and space saving are the key elements of this unique patent applied for design. Unlike a hinged door which typically takes up 600mm to 800mm of aisle space the Zero Aisle cooler which moves from front to rear on overhead runners and floor based wheels takes up no more than its original footprint. When fully retracted the distance between the back of the cabinet and the rear of the cooler is an impressive 900mm of clearance, allowing for near unrestricted access and working space. One other impressive feature with this system is the ability for the runners to mount to the ceiling without fixing on top of the cabinet.



Technical Information

CL20 C4 Rear Door Cooler

Range

Heights U	42U & 48U
Widths mm	600 & 800mm
Other sizes available on request	

Weight

Dry	63.4kg
Wet	76.0kg

Power

C4nc - Max fans 110v 8A & 240v 4A
 C4sc - Max 110v - 10A & 240v - 5A
 (Inclusive of ColdLogik Management System See page 18)

Fans

Backward Curved Centrifugal Fans incorporating EC technology	0 to 5 fans
Air flow 1050 m ³ /hr each max	
Speed rotation 100% v 3030rpm	
IP44 rated	
Less than 71 dBA @ 1m Sound power per fan (full load)	

Coil

Volume capacity	5.0 litres
Pressure drop	20 kPa*
Fluid Flow	2.2* m ³ /h
Nominal Performance (Sensible Cooling)	Up to 20kW
Maximum Performance (Sensible Cooling)	Up to 25kW
Coil Delta T	
14°C water at full duty = 7.9°C	
18°C water at full duty = 6.8°C	
14°C water 10.4kW = 4°C	
18°C water 9.6kW = 3.6°C	
Nominal calculations are based upon:	
(i) air off equipment @ 48°C,	
(ii) maximum air off coil @ 24°C	
(iii) chilled water supplied @ 14°C	
(iv) return water temperature @ 21.9°C	
(v) return fluid velocity 0.87m/s	

*Nominal figures

RDC Pipe Connections

22mm Copper pipe flow and return tails

Recommended fittings:

To suit negative pressure circuit – Male BSP to Quick Release Swivel Coupler

To suit positive pressure circuit – Male BSP or Tectite

NB. Site pipework connections to suit.

RDC Hoses

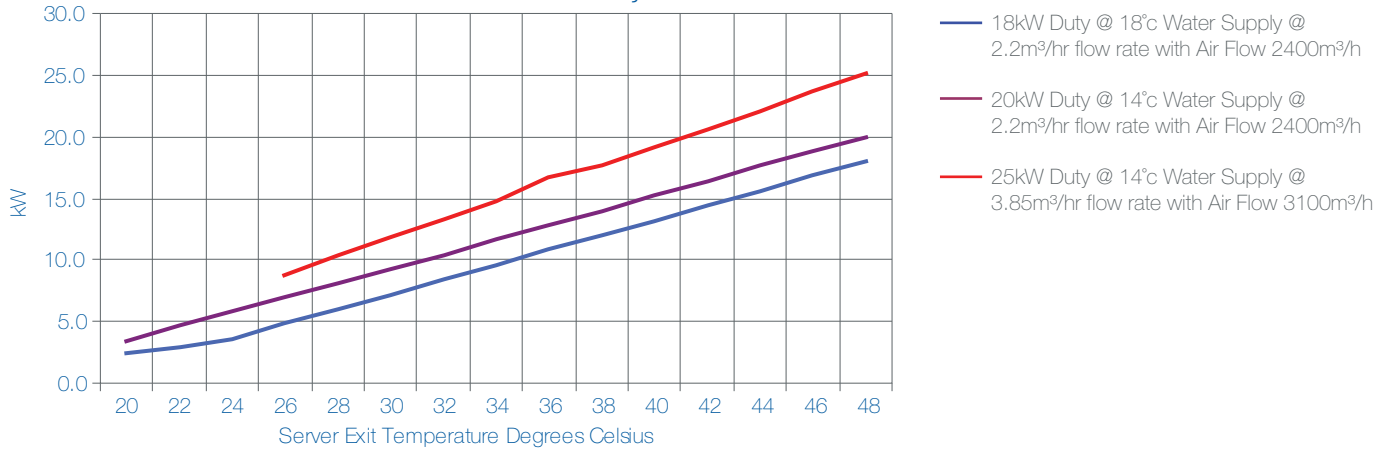
22mm O/D 19mm I/D

To suit negative pressure circuit - PTFE Hydraline FX (smooth bore) with stainless steel overbraid

To suit positive circuit - EPDM Rubber with stainless steel overbraid

Technical Information

CL20 C4 Coil Duty



Nominal Duty

2 Row Coil

Air flow 2400 m³/hr

Pressure drop over coil kPa20

14°C Chilled Water @ 2.2m³/hr Flow

Server exit °C	Duty kW	Air-off coil °C
20	3.5	15.7
22	4.6	16.3
24	5.8	16.8
26	6.9	17.4
28	8.1	18.0
30	9.3	18.5
32	10.4	19.1
34	11.6	19.6
36	12.8	20.2
38	14.0	20.8
40	15.2	21.3
42	16.4	21.9
44	17.6	22.5
46	18.8	23.0
48	20.0	23.6

Energy Efficient

2 Row Coil

Air flow 2400 m³/hr

Pressure drop over coil kPa20

18°C Chilled Water @ 2.2m³/hr Flow

Server exit °C	Duty kW	Air-off coil °C
20	2.5	18.3
22	3	19.2
24	3.6	19.7
26	4.8	20.2
28	6.0	20.8
30	7.2	21.4
32	8.4	21.9
34	9.6	22.5
36	10.8	23.0
38	12.0	23.6
40	13.2	24.1
42	14.4	24.6
44	15.6	25.2
46	16.8	25.7
48	18.0	26.3

Maximum Duty

2-Row Coil

Air Flow 3100m³/h

Pressure drop over coil kPa41

14°C Chilled Water @ 3.85m³/hr Flow

Server exit °C	Duty kW	Air-off coil °C
48°C	25.1	24°C

Technical Information

CL20 C8 Rear Door Cooler

Range

Heights U	42U & 48U
Widths mm	600 & 800mm
Other sizes available on request	

Weight

Dry	63.4kg
Wet	76.0kg

Power

C8 - Max 110v - 10A & 240v - 5A
(Inclusive of ColdLogik Management System See page 18)

Fans

Backward Curved Centrifugal Fans incorporating EC technology	5 fans
Current consumption each 0.8A max	
Air flow 1050 m ³ /hr each	
Speed rotation 100% v 3030rpm	
IP44 rated	
Less than 71 dBA @ 1m Sound power per fan (full load)	

Coil

Volume capacity	5.0 litres
Pressure drop	37 kPa*
Fluid Flow	3.6* m ³ /h
Nominal Performance (Sensible Cooling)	Up to 30kW
Maximum Performance (Sensible Cooling)	Up to 35kW
Coil Delta T	
14°C water at full duty = 7.2°C	
18°C water at full duty = 6.35°C	
14°C water 10.4kW = 3.7°C	
18°C water 9.6kW = 2.96°C	
Nominal calculations are based upon:	
(i) return water temperature @ 21.2°C	
(ii) return fluid velocity 1.42m/s	

*Nominal figures

RDC Pipe Connections

22mm Copper pipe flow and return tails

Recommended fittings:

To suit negative pressure circuit – Male BSP to Quick Release Swivel Coupler

To suit positive pressure circuit – Male BSP or Tectite

NB. Site pipework connections to suit.

RDC Hoses

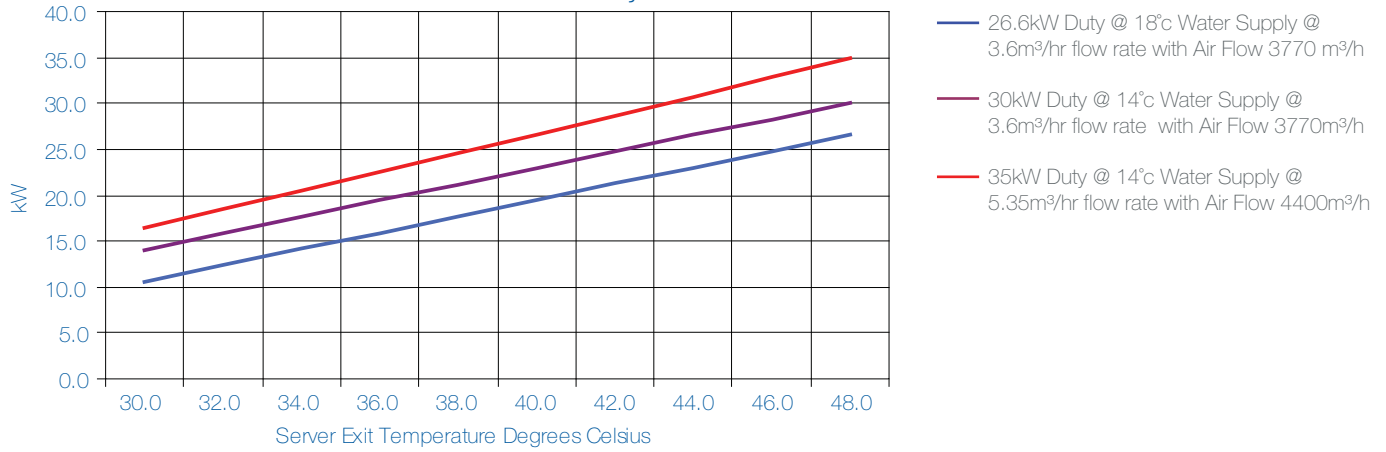
22mm O/D 19mm I/D

To suit negative pressure circuit - PTFE Hydraline FX (smooth bore) with stainless steel overbraid

To suit positive circuit - EPDM Rubber with stainless steel overbraid

Technical Information

CL20 C8 Coil Duty



Nominal Duty

2 Row Coil

Air flow 3770 m³/hr

Pressure drop over coil kPa37

14°C Chilled Water @ 3.6m³/hr Flow

Server exit	Duty	Air-off coil
°C	kW	°C
30.0	14.1	18.9
32.0	15.9	19.5
34.0	17.7	20.1
36.0	19.4	20.7
38.0	21.2	21.3
40.0	23.0	21.9
42.0	24.7	22.5
44.0	26.5	23.1
46.0	28.3	23.7
48.0	30.0	24.3

Energy Efficient

2 Row Coil

Air flow 3770 m³/hr

Pressure drop over coil kPa 37

18°C Chilled Water @ 3.6m³/hr Flow

Server exit	Duty	Air-off coil
°C	kW	°C
30.0	10.6	21.6
32.0	12.4	22.2
34.0	14.2	22.8
36.0	15.9	23.4
38.0	17.7	24.0
40.0	19.5	24.6
42.0	21.3	25.2
44.0	23.0	25.8
46.0	24.8	26.4
48.0	26.6	27.0

Maximum Duty

2-Row Coil

Air Flow 4400m³/h

Pressure drop over coil kPa 68

14°C Chilled Water @ 3.85m³/hr Flow

Server exit	Duty	Air-off coil
°C	kW	°C
48	35	24.5

Technical Information

CL20 C12 Rear Door Cooler

Range

Heights U	42U & 48U
Widths mm	600 & 800mm
Other sizes available on request	

Weight

Dry	65.8kg
Wet	78.0kg

Power

C8 - Max 110v - 10A & 240v - 5A
(Inclusive of ColdLogik Management System See page 18)

Fans

Backward Curved Centrifugal Fans incorporating EC technology	0 to 5 fans
Current consumption each 0.8A max	
Air flow 1050 m ³ /hr each	
Speed rotation 100% v 3030rpm	
IP44 rated	
Less than 71 dBA @ 1m Sound power per fan (full load)	

Coil

Volume capacity	7.4 litres
Pressure drop	17 kPa*
Fluid Flow	3.25* m ³ /h
Nominal Performance (Sensible Cooling)	Up to 40kW
Maximum Performance (Sensible Cooling)	Up to 45kW
Coil Delta T	
14°C water at full duty = 12.7°C	
18°C water at full duty = 11.2°C	
14°C water 10.4kW = 7.45°C	
18°C water 9.6kW = 5.99°C	
Nominal calculations are based upon:	
(i) return water temperature @ 26.6°C	
(ii) return fluid velocity 0.72m/s	

*Nominal figures

RDC Pipe Connections

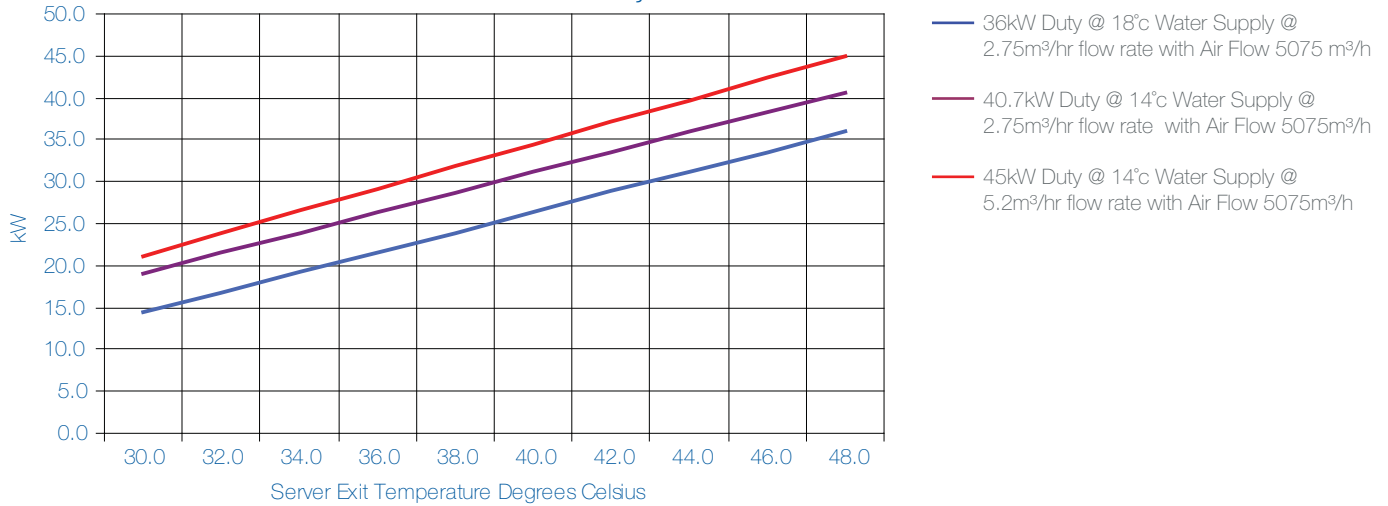
22mm Copper pipe flow and return tails
Recommended fittings:
To suit negative pressure circuit – Male BSP to Quick Release Swivel Coupler
To suit positive pressure circuit – Male BSP or Tectite
NB. Site pipework connections to suit.

RDC Hoses

22mm O/D 19mm I/D
To suit negative pressure circuit - PTFE Hydraline FX (smooth bore) with stainless steel overbraid
To suit positive circuit - EPDM Rubber with stainless steel overbraid

Technical Information

CL20 C12 Coil Duty



- 36kW Duty @ 18°C Water Supply @ 2.75m³/hr flow rate with Air Flow 5075 m³/h
- 40.7kW Duty @ 14°C Water Supply @ 2.75m³/hr flow rate with Air Flow 5075m³/h
- 45kW Duty @ 14°C Water Supply @ 5.2m³/hr flow rate with Air Flow 5075m³/h

Nominal Duty

3 Row Coil

Air flow 5075 m³/hr

Pressure drop over coil kPa 17

14°C Chilled Water @ 2.75m³/hr Flow

Energy Efficient

3 Row Coil

Air flow 5075 m³/hr

Pressure drop over coil kPa 17

18°C Chilled Water @ 2.75m³/hr Flow

Maximum Duty

3 Row Coil

Air Flow 5075m³/h

Pressure drop over coil kPa 35

14°C Chilled Water @ 5.2m³/hr Flow

Server exit	Duty	Air-off coil
°C	kW	°C
30.0	19.1	18.8
32.0	21.5	19.4
34.0	23.9	20.0
36.0	26.3	20.6
38.0	28.7	21.2
40.0	31.1	21.8
42.0	33.5	22.4
44.0	35.9	23.0
46.0	38.3	23.6
48.0	40.7	24.2

Server exit	Duty	Air-off coil
°C	kW	°C
30.0	14.4	21.6
32.0	16.8	22.2
34.0	19.2	22.8
36.0	21.6	23.4
38.0	23.9	24.0
40.0	26.4	24.5
42.0	28.8	25.1
44.0	31.2	25.7
46.0	33.6	26.3
48.0	36.0	26.9

Server exit	Duty	Air-off coil
°C	kW	°C
48	45	21.6

Technical Information

ColdLogik Management System

Features

The CMS is configurable to suit each individual installation.

- Coolant flow control (0-10v)
- Integral 24v AC motorised valve supply
- 0-10v & 5v PWM EC fan control
- Single or dual bank fan speed control
- Fan periodic functionality test
- Chiller regulation based on room values and set point
- Industry standards thresholds & differentials on all user definable parameters
- Dual and single power supply change over option
- Valve (Coolant) opening monitoring
- Return water monitoring
- Individual fan monitoring
- Single or dual bank fan speed monitoring
- Standard communication protocols Modbus, Transparent Local Area Network 'TLAN' & Fieldbus system (all other industry standards available)
- Chiller regulation monitoring
- Full status monitoring via network
- Network BMS or voltfree contact connections
- Room monitoring
- Valve open alarm
- Individual Fan fail Alarm
- Common alarm (BMS & Volt free contact)
- Local door alarm indicator, colour change on LOGO
- Power fail alarm
- Leak prevention alarm
- High & low temperature alarm
- User definable periodic preventative maintenance alarms
- Full alarm log (requires Comisioning tool or system monitoring to access)
- User definable time delays on alarm functions

System Options

- Programming key for simplistic transfer of comisioning data to another CMS
- Local Individual Cabinet display screen
- System display monitor & log up to 200 CMS
- System monitoring software (PC based)
- Comisioning tool
- Any industry standard protocol network cards

Power

110-240v 2A-1A Max input

ColdLogik Management System IEC C13 input



Contact Information

The contents of this document have been produced by USystems Ltd and are correct at time of going to press.

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ColdLogik™

Perfect climate - Perfect control



New Generation Computer Room Cooling

