



Indoor Cooling

Row

STULZ CyberRow[®]

Engineering Manual

12-33 kW

Direct Expansion DX Air, Water, Glycol

Row-Based Data Center Cooling

Utilizing EC Fan Technology

(60 Hz Data)

EM

Engineering Manual

STULZ[®]

STULZ CyberRow



Our Mission

STULZ mission is to be the premier provider of energy efficient temperature and humidity control solutions for mission critical applications.

STULZ is dedicated to providing innovative solutions for critical temperature and humidity control needs. STULZ designs and manufactures specialized, energy efficient, environmental control equipment. STULZ serves a diverse marketplace; our customers represent a variety of industries including telecommunications, information technology, medical, financial, educational, industrial process and government. Our world-class “island” manufacturing processes takes place in a

modern, 150,000 ft² facility located in Frederick, MD USA. STULZ combines a global network of sales and service companies with an extensive factory engineering staff and highly flexible manufacturing resources dedicated to providing world-class quality, innovation and customer service.

This commitment to excellence, along with a standard two year warranty, fast lead times, and outstanding customer service, make STULZ the perfect choice for all your environmental control needs.

ISO-9001 Quality Registered

STULZ is committed to satisfying customer expectations by meeting and exceeding requirements. Our Quality Policy ensures that every Employee is committed to Customer Satisfaction, Teamwork and utilizing Continuous Process Improvement methods in order to deliver an exceptional product. We will continually measure our performance to improve the effectiveness of our quality management system.

STULZ CyberRow®

Designed for scalability, reliability, and seamless integration into new or existing data centers; STULZ CyberRow rack cooling systems are suitable for use in open and contained hot-aisle and cold-aisle configurations. STULZ CyberRow is ideal for hot spot cooling in small to enterprise size data centers.

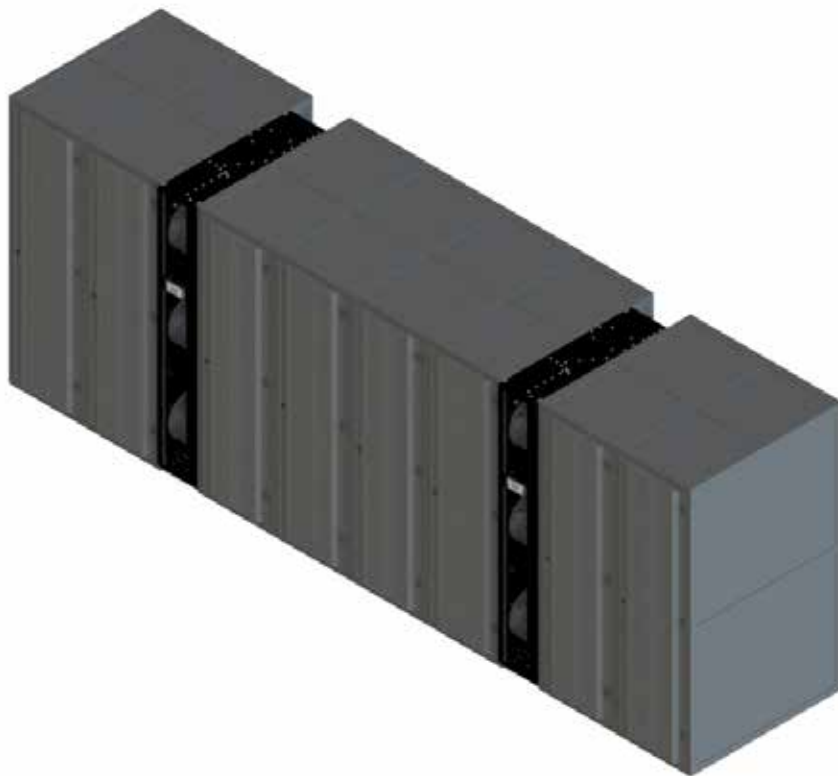
Typical applications include:

- Internet/Web Hosting
- Telecommunications
- Financial/Banking
- Insurance
- Airlines/Mass Transit
- Legal Services
- Entertainment
- Government
- Colleges/Universities
- Data Centers
- Computer/LAN Rooms
- Telecommunications Rooms
- Co-location Centers
- ISP (Internet Service Providers)
- ASP (Applications Service Providers)



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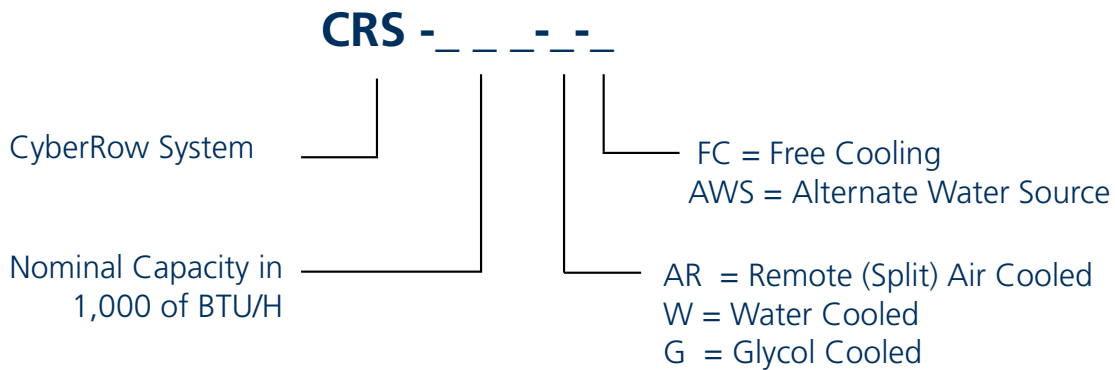
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CyberRow Row-Based System

Direct expansion CyberRow systems provide efficient cooling through one of three different methods of heat rejection. Remote air cooled (A) systems shall utilize an outdoor condenser to reject heat, while water cooled (W) and glycol cooled (G) systems shall utilize a brazed plate heat exchanger mounted inside the CyberRow cabinet. The STULZ **E²** controller allows for independent valve and fan control so the unit can adjust immediately, and precisely, to varying heat loads and optimize energy efficiency.

Model Nomenclature



Features

- Highest cooling capacities in the industry
- 12" and 24" cabinet widths
- 3 EC Fans: Independently and infinitely adjustable EC fans ensure maximum efficiency
- Used in containment, open architecture, and hot spot reduction applications
- Adapts to both high and low density IT environments
- Wide range of cooling capacities available
- 100% front and rear service access
- Adapts to all major manufacturers' racks and rack containment systems
- Seamless integration with all BMS platforms
- pLAN link to 8 units without a BMS
- High air flow with less noise
- Built in redundancy and capacity assist functions
- Top and bottom piping options
- Casters and Leveling Feet included
- Indoor use only
- Installation on raised and non-raised floors

DX System

Air Cooled Remote Evaporator

(Models CRS - ___ - AR)

The floor mounted precision air conditioner system shall be a split air cooled evaporator with remote air cooled condenser. The evaporator section shall house, at a minimum, the evaporator coil, expansion valve, compressor, evaporator blower/motor and associated electrical and refrigeration components.



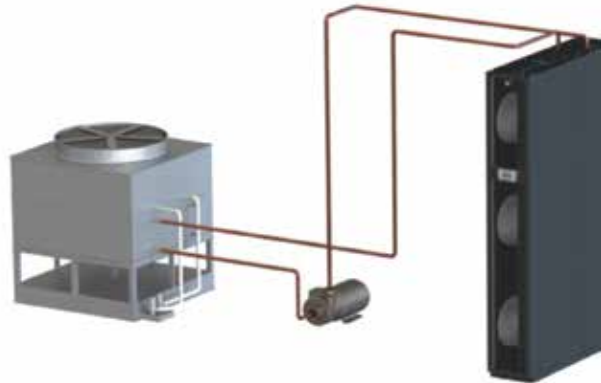
Alternate Water Source (Optional)

An alternative water source cooling cycle shall be provided to utilize building chilled water supply when available as the primary cooling cycle, with DX air cooled refrigerant cooling as a backup.

DX Water Cooled

(Models CRS - ___ -W)

The floor mounted precision air conditioner system shall be self-contained to include an integral water cooled, plate-fin condenser with factory installed head pressure water regulating control valve(s). Condenser (source) water shall be provided by a cooling tower or some other remote water source.



Head Pressure Control

Head pressure shall be automatically controlled by factory installed 2-way, or 3-way water regulating valves rated for 600 psig w.w.p.

Free Cooling (Optional)

A free-cooling cycle shall be provided to take advantage of low ambient air temperature conditions to provide compressor-less cooling.

DX Glycol Cooled

(Models CRS - ___ - G)

The floor mounted precision air conditioner system shall be self-contained to include an integral glycol cooled, plate-fin condenser with factory installed head pressure glycol regulating control valve(s). Condenser (source) glycol solution shall be provided via a STULZ model GPS - _ - _ remote glycol pump package and F _ S - _ dry cooler system.



Glycol Regulating Valves

Head pressure shall be automatically controlled by factory installed 2-way, or 3-way, water regulating valves rated for 600 psig w.w.p.

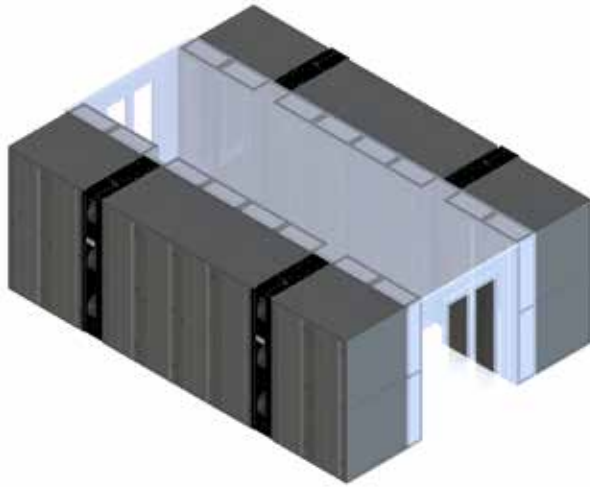
Free Cooling s (Optional)

A free-cooling cycle shall be provided to take advantage of low ambient air temperature conditions to provide compressor-less cooling.

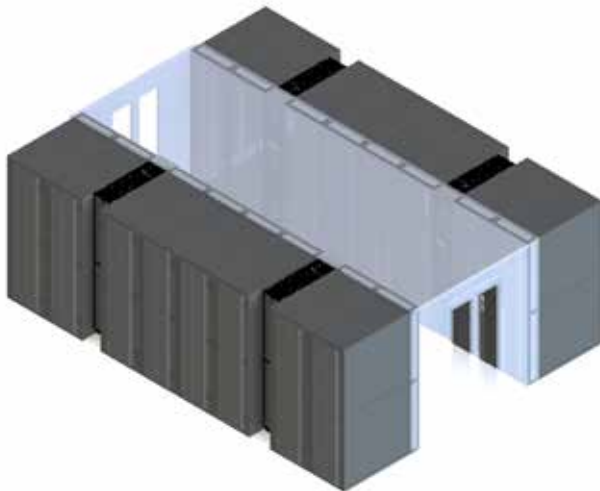
STULZ CyberRow



Open aisle configuration organizes racks in a single row or in hot and cold aisle rows, but without containment. The STULZ CyberRow draws hot air from the external environment or hot aisle, removes the heat, and supplies cooled air to the front of IT equipment in the cold aisle.



Hot aisle containment captures the hot exhaust air from IT equipment and prevents from mixing with cool air. The front of IT equipment is accessed in the external cold aisle. The STULZ CyberRow draws the contained hot air from the hot aisle, removes the heat, and supplies cooled air into the external cold aisle.



Cold aisle containment captures cooled air from the STULZ CyberRow and prevents it from mixing with hot air. The front of IT equipment is accessed in the contained cold aisle. The Stulz CyberRow draws hot air from the external environment, removes the heat, and supplies cooled air back into the contained cold aisle.

STULZ CyberRow Product Features				
MODEL	CRS-042-	CRS-084-	CRS-090-	CRS-091-
CABINET				
Galvannealed Steel, Black Powder Coated Finish	Standard	Standard	Standard	Standard
AIR PATTERN AND FILTRATION				
Front Discharge	Standard	Standard	Standard	Standard
Front Diverted Plenum Discharge	Optional	Optional	Optional	Optional
Permanent Washable Filters	Standard	Standard	Standard	Standard
MECHANICAL COMPONENTS				
Backward Inclined, Plenum Style Fan, with an EC Motor	Standard	Standard	Standard	Standard
R410A Refrigerant	Standard	Standard	Standard	Standard
Scroll Compressor	Standard	Standard	Standard	Standard
Variable Compressor Speed Control	N/A	N/A	Standard	Standard
Proportional Electronic Expansion Valve	Standard	Standard	Standard	Standard
Electronic Hot Gas Bypass Valve	Standard	Standard	N/A	N/A
Piping Configuration (Top, or Bottom)	Standard	Standard	Standard	Standard
Condensate Pump	Standard	Standard	Standard	Standard
ELECTRICAL SYSTEM				
Voltage and Power Supply	-- See Electrical Table --			
Single Point Power Connection	Standard	Standard	Standard	Standard
Dual Power Connection	N/A	N/A	N/A	Optional
Remote Stop/Start Contacts	Standard	Standard	Standard	Standard
Main Power Switch	Standard	Standard	Standard	Standard
HUMIDITY CONTROL				
5lb Electrode Canister Steam Humidifier	N/A	N/A	N/A	Optional
9kW Electric Heat/Reheat	N/A	N/A	N/A	Optional
E² MICROPROCESSOR CONTROLLER				
A/C Grouping pLAN Interface	Optional	Optional	Optional	Optional
BMS Interface	Optional	Optional	Optional	Optional
Common Alarm, Dry Contact	Standard	Standard	Standard	Standard
OPTIONAL ACCESSORIES				
Smoke Detection	Optional	Optional	Optional	Optional
Fire Detection	Optional	Optional	Optional	Optional
CODE CONFORMANCE				
UL 1995 / CAN C22.2 No. 236-11 4rd edition.	Standard	Standard	Standard	Standard
CAN/CSA C22.2 No. 236	Standard	Standard	Standard	Standard
SPECIFIC MODEL STANDARD FEATURES:				
AIR COOLED SYSTEMS				
Remote Air Cooled Condenser Rated for 95° or 105°F High Ambient	Standard	Standard	Standard	Standard
Head Pressure Control (-20°F Low Ambient Variable Fan Speed Control)	Standard	Standard	Standard	Standard
Head Pressure Control (-30°F Low Ambient Flooded and Fan Speed Control)	Optional	Optional	Optional	Optional
WATER/GLYCOL COOLED SYSTEMS				
Stainless Steel Brazed-Plate (W/G)	Standard	Standard	Standard	Standard
2-Way 600 psig Regulating Valve (W/G)	Standard	Standard	Standard	Standard
3-Way 600 psig Regulating Valve (W/G)	Optional	Optional	Optional	Optional
FREE COOLING / ALTERNATE WATER SOURCE SYSTEMS				
3-way water controlled valve with inherent 2-way operation	N/A	N/A	N/A	Standard



STULZ CyberRow

CRS-()-AR TECHNICAL DATA

DX SYSTEM	CRS-042-A	CRS-084-A	CRS-090-A	CRS-091-A
Blower/Motor - Backward Inclined, Plenum Style Fan, with an EC Motor				
Horsepower (Each)	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.
CFM	1500	2,900	2,900	2,900
Quantity of Blowers	3	3	3	3
Drive Method	Direct	Direct	Direct	Direct
Direct Expansion (DX) Coil				
Evaporator Coil - Aluminum Fin, Copper Tube				
Rows/Face Area (ft ²)	3/5.8	4/5.8	N/A	N/A
Face Velocity, fpm	260	500	N/A	N/A
Evaporator Coil - All Aluminum, Micro-Channel				
Face Area (ft ²)	N/A	N/A	5.8	8.3
Face Velocity, fpm	N/A	N/A	500	349
Alternate Water Source (AWS) Coil (Optional)				
Rows/Face Area (ft ²)	N/A	N/A	N/A	3/ 8.7
Face Velocity, fpm	N/A	N/A	N/A	333
Head Pressure Control				
AWS Control Valve (where used)	N/A	N/A	N/A	Modulating 2-way/3-Way Water Valve
Compressor - Heat pump duty rated Scroll - R410A				
Type, (Qty.)	Scroll (1)	Scroll (1)	Scroll (1)	Scroll (1)
Watts Input	3,830	7,540	8,700	8,700
Tot. Heat of Rej. (MBH)	64.6	124	131.8	131.8
Condenser Type	Remote Air Cooled			
Head Pressure Control	See Remote Condenser Selection			
Reheat / Heat - Performance Capacities DO NOT Include Evaporator Motor Heat @ Rated CFM & ESP				
Electric Reheat / Heat - Finned Tubular Heater (Standard)				
Number of Stages	N/A	N/A	1	1
Heater Rating, kW	N/A	N/A	9	9
Total Capacity, MBH	N/A	N/A	31	31
Humidification - Electrode Steam Canister with Adjustable Output (Standard)				
Steam Output, lbs/hr / (Power Input, kW)	N/A	N/A	2-5 (1.7)	2-5 (1.7)
Std Control	N/A	N/A	Modulating	Modulating
Connection Sizes - Copper				
Condensate Drain, (w/ pump)	1/2" FPT	1/2" FPT	1/2" FPT	1/2" FPT
Gas & Liquid Refrigerant Connections (Air Cooled)	5/8" O.D.	5/8" O.D.	5/8" O.D.	5/8" O.D.
Physical Data				
Approx. Weight (lbs)	450	480	480	550
Approx. Dimensions: (H"xW"xD")	78.5" x 11.6" x 42.1"			78.5" x 23.4" x 42.1"
Approx. Shipping Weight (lbs)	636	665	665	735
Approx. Shipping Dimensions (H"xW"xD")	84" x 22" x 48"			84" x 34" x 48"



DX System

CRS(-)-W/G TECHNICAL DATA

DX SYSTEM	CRS-042-		CRS-084-		CRS-090-		CRS-091-	
	W	G	W	G	W	G	W	G
Blower/Motor - Backward Inclined, Plenum Style Fan, with an EC Motor								
Horsepower (Each)	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.	1/4 H.P.
CFM	1500	1500	2,900	2,900	2,900	2,900	2,900	2,900
Quantity of Blowers	3	3	3	3	3	3	3	3
Drive Method	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Direct Expansion (DX) Coil								
Evaporator Coil - Aluminum Fin, Copper Tube								
Rows/Face Area (ft ²)	3/5.8	3/5.8	4/5.8	4/5.8	N/A	N/A	N/A	N/A
Face Velocity, fpm	260	260	500	500	N/A	N/A	N/A	N/A
Evaporator Coil - All Aluminum, Micro-Channel								
Face Area (ft ²)	N/A	N/A	N/A	N/A	5.8	5.8	8.3	8.3
Face Velocity, fpm	N/A	N/A	N/A	N/A	500	500	349	349
Free Cooling (FC) Coil (Optional)								
Rows/Face Area (ft ²)	N/A						3/8.7	3/8.7
Face Velocity, fpm	N/A						333	333
Head Pressure Control								
Standard Control	Modulating 2-Way Water Valve							
Optional Control	Modulating 3-Way Water Valve							
Free Cooling Valve (where used)	N/A						Modulating 2-way/3-Way Water Valve	
Compressor - Heat pump duty rated Scroll - R410A								
Type, (Qty.)								
Watts Input	2,970	4,090	6,140	7,920	6,900	9,700	6,900	9,700
Tot. Heat of Rej. (MBH)	66	64	128	124	135	131	135	131
GPM @ 85°F EWT/95°F LWT 0% Glycol Solution	13.2	N/A	25.6	N/A	27.1	N/A	27.1	N/A
GPM @ 110°F EGT/120°F LGT 40% Glycol Solution	N/A	13.9	N/A	26.7	N/A	28.3	N/A	28.3
Unit Press. Drop (ft.wg)	28.6	34.4	21.5	25.2	23.7	28.1	23.7	28.1
Condenser Type	Integral Brazed Plate							
Reheat / Heat - Performance Capacities DO NOT Include Evaporator Motor Heat @ Rated CFM & ESP								
Electric Reheat / Heat - Finned Tubular Heater (Standard)								
Number of Stages	N/A	N/A	N/A	N/A	1	1	1	1
Heater Rating, kW	N/A	N/A	N/A	N/A	9	9	9	9
Total Capacity, MBH	N/A	N/A	N/A	N/A	31	31	31	31
Humidification - Electrode Steam Canister with Adjustable Output (Standard)								
Steam Output, lbs/hr / (Power Input, kW)	N/A	N/A	N/A	N/A	2-5 (1.7)	2-5 (1.7)	2-5 (1.7)	2-5 (1.7)
Std Control	N/A	N/A	N/A	N/A	Modulating			
Connection Sizes - Copper								
Condensate Drain, (w/ pump)	1/2" FPT		1/2" FPT		1/2" FPT		1/2" FPT	
Condenser In/Out (NPT)	1-1/4"		1-1/4"		1-1/4"		1-1/4"	
Physical Data								
Approx. Weight (lbs)	520		550		550		620	
Approx. Dimensions: (H"xW"xD")	78.5" x 11.6" x 42.1						78.5" x 23.4" x 42.1"	
Approx. Shipping Weight (lbs)	706		736		736		806	
Approx. Shipping Dimensions (H"xW"xD")	84" x 22" x 48"						84" x 34" x 48"	



STULZ CyberRow

PERFORMANCE DATA CRS-042/084-()

MODEL		CRS-042-AR	CRS-042-W	CRS-042-G	CRS-084-AR	CRS-084-W	CRS-084-G
NET DX COOLING CAPACITY - MBH (Includes Motor Heat @ Rated CFM & ESP)							
100°FDB/69.2°FWB Entering Air Temperature							
Total	MBH	52	55	51	99	107	97
Sensible		52	55	51	99	107	97
Total	KW	15	16	15	29	31	28
Sensible		15	16	15	29	31	28
95°FDB/67.7°FWB Entering Air Temperature							
Total	MBH	49	53	48	94	101	92
Sensible		49	53	48	94	101	92
Total	KW	14	15	14	27	30	27
Sensible		14	15	14	27	30	27
90°FDB/66.1°FWB Entering Air Temperature							
Total	MBH	46	50	45	88	97	88
Sensible		46	50	45	88	87	88
Total	KW	14	15	13	26	29	26
Sensible		14	15	13	26	29	26
85°FDB/64.5°FWB Entering Air Temperature							
Total	MBH	44	49	43	85	95	82
Sensible		44	49	43	85	95	82
Total	KW	13	14	13	25	28	24
Sensible		13	14	13	25	28	24
80°FDB/62.8°FWB Entering Air Temperature							
Total	MBH	42	47	41	83	92	81
Sensible		42	47	41	83	88	81
Total	KW	12	14	12	24	27	24
Sensible		12	13	12	24	27	24



STULZ CyberRow with Server Racks



DX System

MODEL		CRS-090-AR	CRS-090-W	CRS-090-G	CRS-091-AR	CRS-091-W	CRS-091-G
NET DX COOLING CAPACITY - MBH (Includes Motor Heat @ Rated CFM & ESP)							
100°FDB/69.2°FWB Entering Air Temperature							
Total	MBH	104	112	101	104	112	101
Sensible		104	112	101	104	112	101
Total	KW	30	33	30	30	33	30
Sensible		30	33	30	30	33	30
95°FDB/67.7°FWB Entering Air Temperature							
Total	MBH	98	106	96	98	106	96
Sensible		98	106	96	29	106	96
Total	KW	28	31	28	98	31	28
Sensible		29	31	28	29	31	28
90°FDB/66.1°FWB Entering Air Temperature							
Total	MBH	93	102	91	93	102	91
Sensible		93	102	91	93	102	91
Total	KW	27	30	27	27	30	27
Sensible		27	30	27	27	30	27
85°FDB/64.5°FWB Entering Air Temperature							
Total	MBH	89	99	86	89	99	86
Sensible		89	95	86	89	95	86
Total	KW	26	29	25	26	29	25
Sensible		26	28	25	26	28	25
80°FDB/62.8°FWB Entering Air Temperature							
Total	MBH	87	97	84	87	97	84
Sensible		84	89	94	26	89	94
Total	KW	26	29	25	84	29	25
Sensible		25	26	25	25	26	25

MODEL		CRS-091-AR-AWS		CRS-091-W/G-FC	
NET FC COOLING CAPACITY WITH STANDARD COIL (Optional) MBH @ 45°F EWT, 0% Glycol Solution (Includes Motor Heat @ Rated CFM & ESP)					
100°FDB/69.2°FWB Entering Air Temperature					
Total	MBH	107		107	
Sensible		107		107	
Total	KW	32		32	
Sensible		32		32	
95°FDB/67.7°FWB Entering Air Temperature					
Total	MBH	96		96	
Sensible		96		96	
Total	KW	28		28	
Sensible		28		28	
90°FDB/66.1°FWB Entering Air Temperature					
Total	MBH	85		85	
Sensible		85		85	
Total	KW	25		25	
Sensible		25		25	
85°FDB/64.5°FWB Entering Air Temperature					
Total	MBH	74		74	
Sensible		74		74	
Total	KW	22		22	
Sensible		22		22	
80°FDB/62.8°FWB Entering Air Temperature					
Total	MBH	62		62	
Sensible		62		62	
Total	KW	18		18	
Sensible		18		18	

PERFORMANCE DATA CRS-090/091-()-()



STULZ CyberRow

Electrical Data	CRS-042-__					CRS-084-__				
	FLA (OEM Rated)			MCA	MFS	FLA (OEM Rated)			MCA	MFS
	AR	W	G			AR	W	G		
COOLING ONLY										
208/1/60	22.5	18.5	23.7	31.2	50	N/A				
208/3/60	18.5	16.2	19.2	25	40	27.8	24.6	28.7	37.5	60
460/3/60	9.3	8.2	9.6	12.2	15	13	11.6	13.5	18.8	30
575/3/60	6.7	5.9	6.9	10.1	15	10.4	8.9	10.4	13.8	20

Electrical Data	CRS-090-__					CRS-091-__				
	FLA (OEM Rated)			MCA	MFS	FLA (OEM Rated)			MCA	MFS
	AR	W	G			AR	W	G		
COOLING ONLY										
208/1/60	N/A					N/A				
208/3/60	N/A					N/A				
460/3/60	19	16.2	20.7	31.5	50	19	16.2	20.7	31.5	50
575/3/60	N/A					N/A				

(Note: Standard 1 KAIC rating, optional 65 KAIC rating available.)

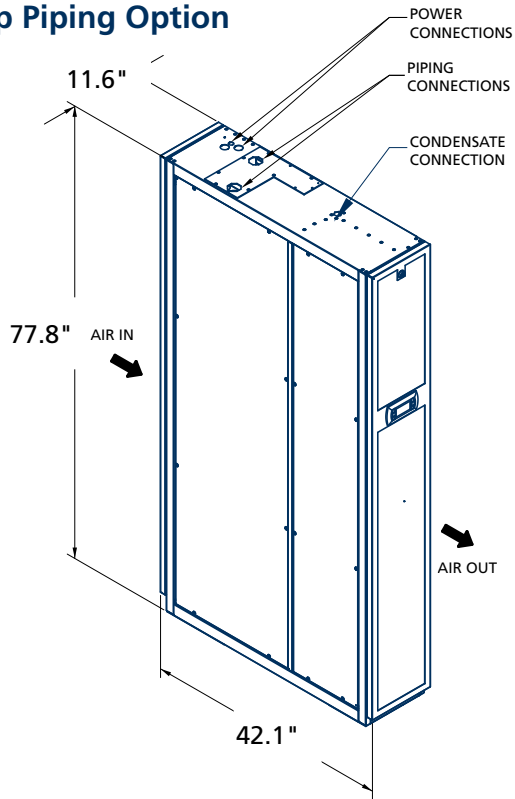
Sound Data		Sound Pressure - LpA, free field (dBA) in a 121.13 ft ² (3.43m ³) room at 3.28 (1.0m) distance									
Unit	Airflow (SCFM)	63	125	250	500	1000	2000	4000	8000	Total dBA	NR Value
CRS-042-__	1500	17.4	22.1	29.0	37.1	41.9	37.0	28.7	14.2	42.0	42
CRS-084-__	2900	21.5	49.1	52.4	55.7	54.7	53.6	49.7	31.4	65.9	55
CRS-090-__	2900	33.7	45.1	53.4	48.1	46.9	47.6	40.9	35.6	56.4	50
CRS-091-__	2900	33.7	45.1	53.4	48.1	46.9	47.6	40.9	35.6	56.4	50

(Note: All sound testing is performed in accordance to ISO 9614-2 Determination of Sound Power Levels. ISO 9614- specifies a method for measuring the component of sound intensity that is normal to a measurement surface. The measurement surface is chosen to enclose the noise source(s) so that the sound power level can be determined.)

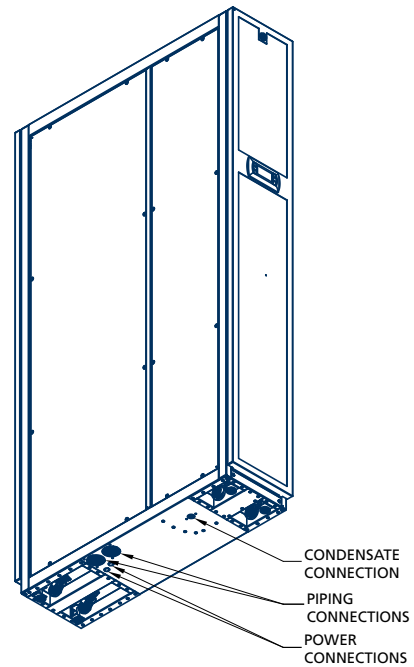


CRS-042/084/090-A,-W,-G

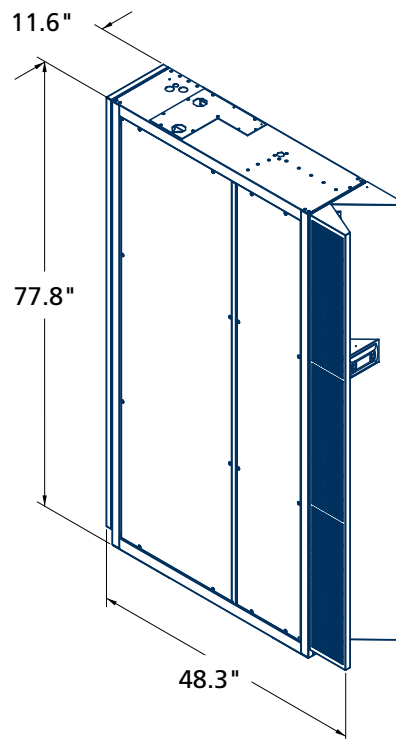
Top Piping Option



Bottom Piping Option



Side Diverted Front Panel Option

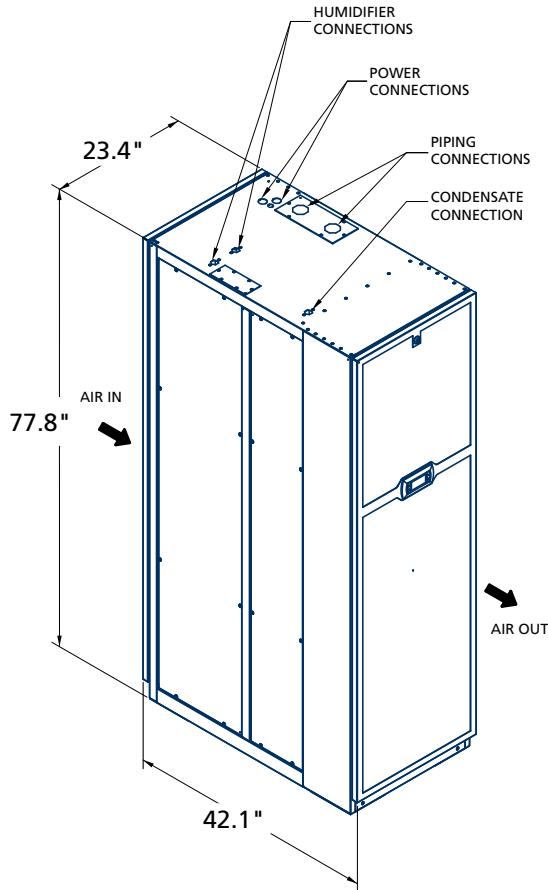


STULZ CyberRow

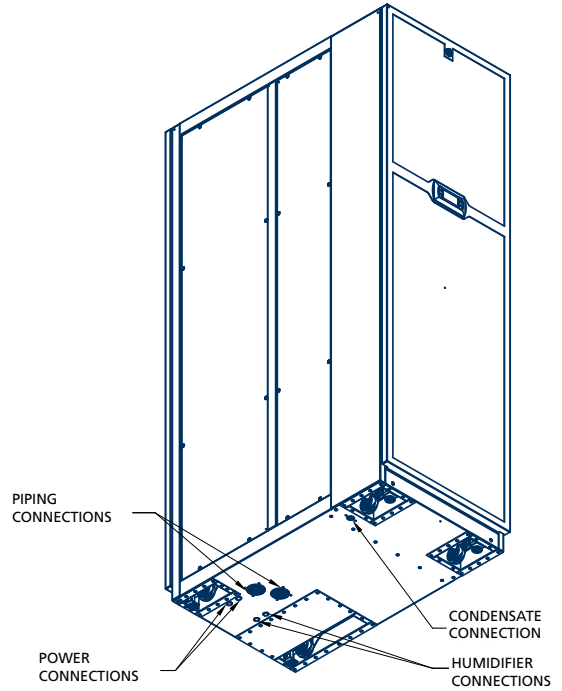
CRS-091-(A,-W,-G)-FC, -AWS

DIMENSIONAL DATA

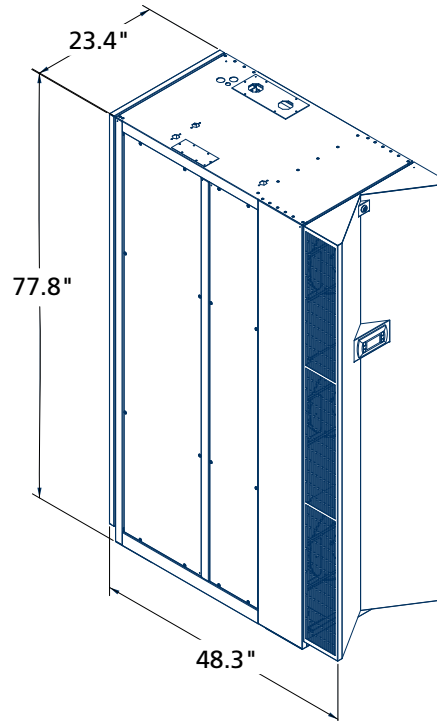
Top Piping Option



Bottom Piping Option



Side Diverted Front Panel Option



**STULZ CyberRow
12 - 33 kW Row-Based
Precision Control Air Conditioners
Direct Expansion - Air, Water, Glycol**

SUMMARY

This specification describes requirements for a precision environmental control system. The STULZ CyberRow is a row-based cooling system that shall provide precision temperature control for computer rooms, or rooms containing telecommunications or other highly sensitive heat load equipment, where continuous 24 hours a day 365 days a year air conditioning is required. Designed with both front and rear access, CyberRow systems require minimum floor space. The supplied system shall be provided with ETL Certification. The CyberRow model number shall be, CRS - _ _ _ - _ .

DESIGN REQUIREMENTS

The environmental control system shall be a STULZ CyberRow Direct Expansion (DX) factory-assembled unit. The unit shall be designed for a row-based installation with removable front and rear access panels. No allowance for side service access shall be required, however removable side access panels shall be provided for additional access.

CyberRow units are especially adapted for both raised and non-raised floors. The air handling system shall be specifically designed for high sensible heat ratio. Each system shall be capable of handling ___CFM. The unit shall have the cooling capacity of ___BTU/H, and the sensible cooling capacity of ___ BTU/H based on entering air condition of ___°F dry bulb and ___°F (°C) wet bulb. The main fan motors shall be ___HP. The unit shall have a power supply of ___volts.

QUALITY ASSURANCE

The manufacturer shall maintain a set of international standards of quality management to ensure product quality. Each system shall be subjected to a complete operational and functional test procedure at the factory prior to shipment.

CABINET

Side access panels shall be fabricated from 20 gauge galvanized steel and shall be securely bolted to a 14 gauge base and the top plate. The top plate, front and rear panels shall be fabricated from 16 gauge galvanized steel. The cabinet shall be powder coated with a satin black finish to provide durability, and to protect from corrosion. Armaflex elastomeric thermal insulation shall be used to insulate the cabinet, block noise and prevent damage from vibration. Casters and leveling feet shall be included to ease the installation and level the equipment with existing IT solutions.

AIRFLOW PATTERNS

All units shall be designed using a front discharge with a rear return airflow pattern. An optional plenum with a front diverted discharge pattern is available.

AIR FILTRATION

All units shall be equipped with removable, washable filters. These filters shall consist of an open cell structured polyurethane foam with a roll formed 3000 series aluminum frame. Filters shall meet both UL 900 and UL 94 HF-1 standards.

MECHANICAL COMPONENTS

BACKWARD INCLINED, PLENUM STYLE FAN, WITH AN EC MOTOR

The blowers shall be backward inclined plenum style fans with an Electronically Commutated (EC) motor, for maintenance free operation. The motor shall include: integrated electronic control board and direct microprocessor control signaling for fan speed control, soft-starting capabilities, and integrated current limitations. Each fan shall be low noise, low vibration manufactured with an anti-corrosive aluminum impeller. Each fan impeller shall be dynamically and statically balanced in two planes to minimize vibration during operation.

REFRIGERATION SYSTEM

All piping and components contained within the refrigeration system shall be rated for use with R410A

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refrigerant. Each refrigeration circuit shall include, as a minimum a refrigerant dryer/strainer, sight glass with moisture detector, an electronic thermal expansion valve, an evaporator coil, a compressor, a high pressure switch with manual reset, and a low pressure switch with automatic reset.

SCROLL COMPRESSOR

The compressor shall be a high efficiency, high reliability and low noise scroll compressor. The compressor shall be complete with internal vibration isolation, internal thermal overloads, an internal pressure relief valve, an internal discharge gas vibration eliminator, and external vibration mounting isolation.

EVAPORATOR COIL

The evaporator coil shall be constructed of seamless drawn copper tubes, mechanically bonded to tempered aluminum fins (that have an enhanced design for maximum heat transfer), and mounted in a stainless steel condensate drain pan. The coil shall be designed for a maximum of 500 ft./min. face velocity.

VARIABLE SPEED COMPRESSOR (CRS-090/091)

The speed of the compressor shall be controlled with a variable frequency drive (VFD) to match compressor capacity to the actual thermal load....The VFD shall be capable of providing power for the compressor to operate up to 120 rpm. The VFD shall proportionally control the compressor motor speed to maintain a constant supply air temperature.

MICRO-CHANNEL EVAPORATOR COIL (CRS-090/091)

The Micro-Channel coil shall be constructed of brazed aluminum. The coil is designed with high performance fins to provide low airside pressure drop and high heat transfer. Micro-Channel tubes offer a more predictable performance and improved air to refrigerant approach temperatures are achieved. The coil shall be mounted in a stainless steel condensate drain pan and shall be designed for a maximum of 500 ft./min. face velocity.

PROPORTIONAL ELECTRONIC EXPANSION VALVE

An electronically operated thermostatic expansion valve shall be installed to precisely control the flow of liquid refrigerant into the evaporator coil while maintaining the desired superheat across a wide range of operating conditions.

ELECTRONIC HOT GAS BYPASS (CRS-042/084)

An electronically operated hot gas bypass valve shall be installed. The hot gas bypass valve shall provide modulation of the unit's cooling capacity, and evaporator coil freeze protection under low load conditions.

PIPING CONFIGURATION

Top Piping: When top piping is specified, the CyberRow units shall be provided with connections for water/glycol or refrigerant piping and condensate discharge on the top of the cabinet.

Bottom Piping: When bottom piping is specified (e.g. raised floor applications), the CyberRow units shall be provided with connections for water/glycol or refrigerant piping and condensate pump discharge through the bottom of the cabinet.

CONDENSATE PUMP

The CyberRow shall include a factory wired, and installed, in-pan condensate pump. The condensate pump shall have the capacity of 3 gal/hr. at 3 ft. of lift with a maximum shut off (head) of 40 ft. The condensate pump shall be piped with either top or bottom discharge connections, to remain consistent with top or bottom piping connections.

Return Air Sensor

A factory mounted and wired temperature sensor (NTC) mounted in the return air stream temperatures shall be provided.

Supply Air Control (optional)

The STULZ CyberRow shall be provided with a temperature and humidity sensor factory unit mounted in the return air stream and a field installed supply air temperature (optional) and humidity sensor for supply air control capabilities. The controller shall provide the user an adjustable supply air control setpoint.

AIR COOLED HEAT REJECTION

-20°F Variable Fan Speed Control (AR)

The air cooled system shall incorporate a low ambient, variable speed fan, head pressure control. The pressure control shall be for year-round air conditioning system operation down to -20°F DB minimum ambient air temperature.

-30°F Flooded Control (AR)

The air cooled system shall incorporate a low ambient, flooded head, pressure control. The pressure control shall be for year-round system operation down to -30°F DB minimum ambient air temperature. Liquid refrigerant receivers, with receiver liquid-level sight glass and head pressure regulator valves (for flooded condenser operation) shall be included, but not factory installed.

Alternate Water Source Systems (Optional) (CRS-091-AR only)

Alternate water source cooling shall be controlled by the following standard and optional control valves:

A 2/3-way modulating AWS cooling control valve shall be factory installed. Precision cooling control shall be accomplished via an analog control signal to the proportionally actuating control valve.

WATER/GLYCOL COOLED HEAT REJECTION

Stainless Steel Brazed-Plated (W/G)

The evaporator refrigerant circuit shall be provided with a factory installed single pass, counterflow configured, brazed plate heat exchanger, with integral subcooler. It shall be constructed of type 316 stainless steel; designed and tested for a 650 psig. w.w.p.

2-Way, 600 psig Regulating Valve (W/G) (Standard)

The refrigerant circuit head pressure shall be controlled by a factory installed 2-way water/glycol regulating valve rated for 400 psig. w.w.p. The 2-way condenser water modulating valve shall automatically meter the flow of water to the condenser. It shall do so, in response to a proportional signal (0-10VDC) provided to the valve by the microprocessor controller.

3-Way, 600 psig Regulating Valve (W/G) (Optional)

The refrigerant circuit head pressure shall be controlled by a factory installed 3-way water/glycol regulating valve rated for 400 psig w.w.p. The 3-way condenser water modulating valve shall automatically meter the flow of water/glycol to the condenser. It shall do so, in response to a proportional signal (0-10VDC) provided to the valve by the microprocessor controller.

Free-Cooling Systems (Optional) (CRS-091-W/G only)

DX Water/Glycol Cooled systems with Free-Cooling are provided with the standard DX head pressure and Free-Cooling valve combination:

DX Valves – 2 or 3-way, 600 psig

FC Valve – 2/3-way, 600 psig (Valve is user configurable to be two-way or three-way.)

ELECTRICAL SYSTEM

The electrical system shall conform to National Electrical Code (NEC) requirements. In accordance with NEC Class II requirements, the control circuit shall be 24 volts AC wire, and shall not be smaller than 18 AWG. All wiring shall be neatly wrapped on run in conduit, or cable trays, and routed in bundles. Each wire shall end with a service loop and be securely fastened by an approved method. Each wire in the unit shall be numbered for ease of service tracing.

All electrically actuated components shall be easily accessible from the front of the unit without reaching over exposed high voltage components or rotating parts. Each high voltage circuit shall be individually protected by circuit breakers, or manual motor starters, on all three phases. The blower motor shall have thermal and short circuit protection. Line voltage and 24 volt control circuit wiring shall be routed in separate bundles. The electric box shall include all the contactors, starters, fuses, circuit breakers, terminal boards, and transformers required for operation of the CyberRow unit. It shall also allow for full service via front and rear access panels.

REMOTE STOP/START CONTACTS

Included in the system's electrical control circuit shall be a 2-pin terminal connection for remote stop/start of the CyberRow air conditioner by remote source.

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MAIN POWER SERVICE SWITCH

The CyberRow unit shall be provided with a unit mounted main power service switch.

E² SERIES CONTROLLER

GENERAL

The advanced microprocessor based **E²** Series controller shall be equipped with flexible software capable of meeting the specific needs of the application. The setpoints shall be default and their ranges shall be easily viewed and adjusted from the user interface display. The program and operating parameters shall be permanently stored on a non-volatile system in the event of power failure. The controller shall be designed to manage temperature and relative humidity (RH) levels to a user defined setpoint via control output signals to the CyberRow unit. Control parameters have variable outputs from 0 to 100% of the full rated capacity.

The controller shall receive inputs for measurable control conditions (temperature, relative humidity, and dew point) via return air or remote mounted supply air sensors. The internal logic will then determine if the conditions require cooling. Control setpoints shall be established to maintain design conditions of the installation. The controller will respond accordingly to changes in these conditions and control the output/demand for the appropriate mode of operation until user defined conditions are achieved.

FIELD CONFIGURABLE

The program for the **E²** Series controller shall be field configurable, allowing the operator the capability of selecting control setpoints specific to the application. Operator interface for the **E²** controller is provided via a door mounted user interface display panel. The display panel shall have a backlit LCD graphical display and function keys giving the user complete control and monitoring capability of the precision cooling system. The menu driven interface shall provide users the ability to scroll through and enter various menu screens.

PASSWORD PROTECTION

Access to the Info Menu, Alarms Log, and the ability to monitor room conditions shall be allowed without the use of a password. Modifications to the control setpoints shall require the use of a password. The controller shall be programmed to recognize predetermined security levels before allowing access to display screens containing critical

variables. Three secured menu levels (Control, Service and Factory) will support unique passwords that must be entered to access the menu screens so only authorized personnel may perform modifications to the settings.

RESTORABLE PARAMETERS/FACTORY DEFAULTS

Upon initial start-up the CyberRow system shall operate using the setpoints programmed by the factory. The customer may enter new operating parameters in the Control menu and the system will then operate accordingly. The new setpoints may be stored as, "Customer Default Setpoints". The primary setpoints entered by the factory still remain stored in the controller's memory as, "Factory Setpoints". The setpoints for the system may be readjusted in the Control menu at any time. If it becomes necessary, the customer may restore the setpoints back to the Customer Default setpoint values or to the original factory (primary) setpoint values.

A/C GROUPING pLAN OPERATION (OPTIONAL)

Multiple CyberRow system controllers shall be able to connect (grouped) to a pLAN local network, allowing the communication of data and information from each controller to a central control terminal or lead controller. The lead controller display screens can be used to monitor and adjust group control variables for the individual system controllers. Each **E²** controller connected to the pLAN network shall be identified with its own unique address.

Multiple CyberRow units consisting of up to eight STULZ precision air conditioners equipped with like controllers may be controlled and monitored via the **E²** series controller. With multiple CyberRow units each unit can selectively be configured as "Active" to operate as a primary A/C, "Capacity Assist" for staged operation, or as "Standby" to come online in case of a failed air conditioning unit to ensure continuous availability. The controller may also be configured to rotate units with timed duty cycling to promote equal run-time and ensure that each CyberRow unit within the rotating group is operationally exercised on a periodic timed basis.

BMS INTERFACE (OPTIONAL)

The **E²** series controller may incorporate a 10 Mbps communication interface port that can be field connected through a serial interface to a Building Management System via Modbus, BACnet, SNMP, or HTTP as configured by the factory. A controller interfaced to a network must be configured for BMS communication.

ALARMS, DRY CONTACT

Alarm conditions shall activate a red LED indicator that backlights the alarm function key. As an option, an alarm condition may also be enunciated by an audible alarm signal. An alarm is acknowledged by pressing the alarm key. This calls up alarm display screens that provide a text message detailing the alarm conditions. After an alarm condition is corrected, the alarm can be cleared by pressing the alarm key.

SMALL BEZEL DISPLAY PANEL

The small bezel user interface display panel features an easy to read, backlit liquid-crystal alphanumeric display equipped with contrast adjustment and LED illuminated function keys. The screens that appear on the user interface display panel present data that originates from the controller I/O module. The controller is operated via a 6-key menu-driven loop structure and offers an alarm log plus four different interface menu levels to the operator: Information, Control, Service, and Factory. These menus permit the user to easily view, control, and configure operating parameters for the CyberRow unit.

OPTIONAL ACCESSORIES

STEAM GENERATING HUMIDIFIER

The humidifier shall be a self-contained atmospheric steam generator. The humidifier assembly shall include an integral fill cup, fill and drain valves, disposable steam cylinder and associated piping. The humidifier shall be equipped with an auto adaptive control system to optimize water conductivity, control automatic drain/flush cycles, minimize energy waste and maximize cylinder life. Drain water tempered fill water shall insure drains do not exceed 140°F during operation. The humidifier shall have modulating output between 20% and 100% of rated capacity.

ELECTRIC HEAT/ REHEAT

A factory mounted and wired low-watt density, plated fin-tubular design electric resistance heater shall be included to provide automatic sensible re-heating as required during the dehumidification cycle and automatic heating mode. Electric heaters shall be provided with miniature thermal/magnetic circuit breakers, which shall protect each ungrounded conductor. Also included will be one automatic reset and one manual reset over-temperature safety device (pilot duty).

SMOKE DETECTION

A photo-electric smoke detector shall be factory installed and wired in the evaporator section of the suction side of the evaporator blower. The air conditioner will shut down upon sensing smoke in the return air stream.

FIRESTAT

The air conditioner shall be provided with a factory wired and mounted firestat. The firestat will shut down the air conditioner upon sensing a high return air temperature.

REMOTE WATER DETECTOR: SPOT TYPE

A remote single point water and leak detector shall be factory supplied and shall ship separately for field installation. Upon sensing a water leak, the normally closed water detector control circuit shall open, thereby shutting down the CyberRow unit's water producing components.

REMOTE WATER DETECTOR: STRIP TYPE

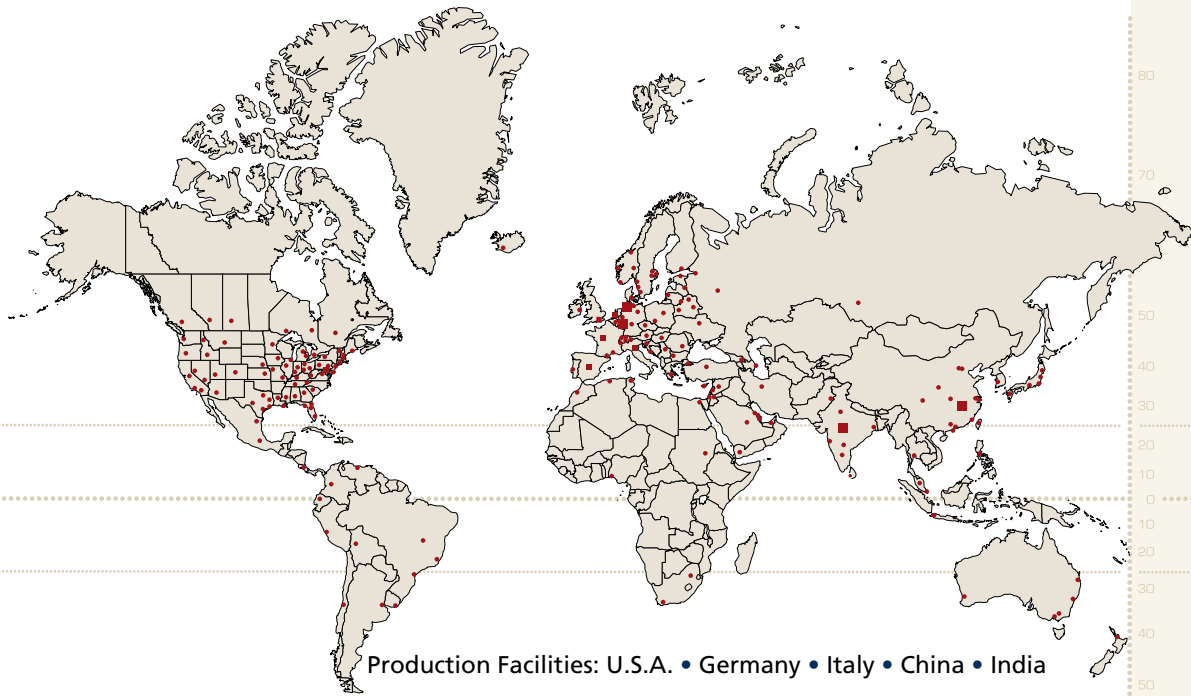
A 20 ft. long remote strip/cable type water and leak detector shall be provided for remote field installation. Upon sensing a water leak, the normally closed water detector control circuit shall open, thereby shutting down the CyberRow unit's water producing components.

CODE CONFORMANCE

The supplied system shall be provided with the following compliance approvals:



Heating and Cooling Equipment UL 1995 / CAN C22.2 No. 236-11 4rd edition.



STULZ mission is to be the premier provider of energy efficient temperature and humidity control solutions for mission critical applications.

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ISO 9001 Quality Management System - Requirements

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