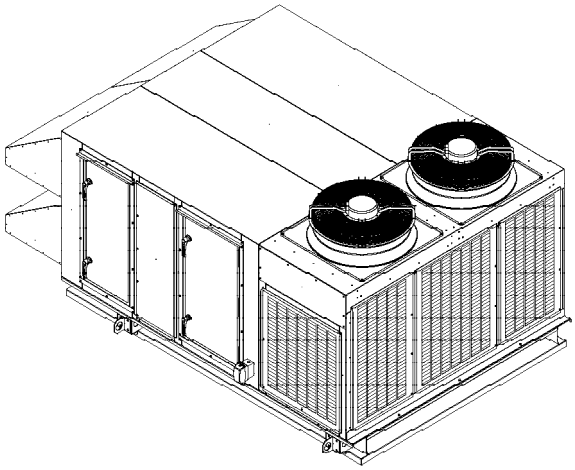

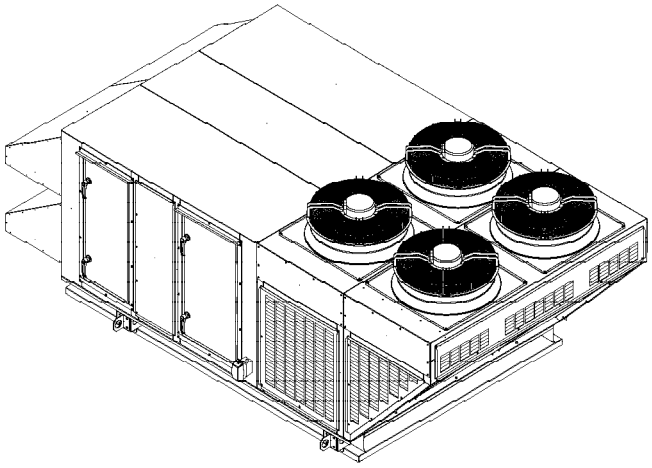

Outdoor Cooling

Air Handler

STULZ CyberPack

Packaged Rooftop Air Conditioner

IOM Installation, Operation & Maintenance

STULZ®

Model Nomenclature					
ASC-XXX-XX-X-X					
ASC	**Nominal Tonnage**	**Cabinet Size**	**Primary Cooling Method**	**Outside Air Options**	**No. of Cooling Stages**
CyberPack Air Conditioning Unit	12 = Nominal 12 tons 13 = Nominal 13 tons 15 = Nominal 15 tons 20 = Nominal 20 tons 25 = Nominal 25 tons 30 = Nominal 30 tons	A = Nominal 20 - 30 tons C = Nominal 12 - 15 tons	DX = Direct Expansion	S = Fresh Air Inlet (200 CFM Outside Air) F = Air-Side Economizer (Outside Air Hoods and Dampers)	2 = 2 Stages, 2 independent DX Circuits 3 = 3 Stages, 2 Circuits (one with Tandem Compressors)

Example: ASC-30A-DX-F-2

CyberPack System, 30 Ton Nominal Capacity, Direct Expansion Cooled, Air-Side Economizer, Two DX Circuits

Note

This manual also covers legacy Cyberpack Models:

ACS-5000-DX

ASC-5001-DX

ASC-10000-DX

Notice

STULZ Air Technology Systems, Inc.
1572 Tilco Drive
Frederick, MD 21704, USA

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1.0 INTRODUCTION

1.1 General

The STULZ CyberPack rooftop mounted precision air conditioning system covered by this manual is designed and manufactured by STULZ Air Technology Systems, Inc. (STULZ) using the latest, state-of-the-art control technology. Recognized as a world leader, STULZ provides air conditioning systems with the highest quality craftsmanship using the finest materials available in the industry. The system will provide years of trouble free service if installed and maintained in accordance with this manual. Damage to the unit from improper installation, operation or maintenance is not covered by the warranty.

Spare parts are available from STULZ to ensure continuous operation. Using substitute parts or bypassing safety interlocks in order to continue operation is not recommended and will VOID THE WARRANTY. Due to technological advancements, components are subject to change without notice.

STULZ CyberPack systems are designed to be installed outdoors on a rooftop mounting curb.

1.2 Product Description

The STULZ CyberPack unit is a self contained, air cooled DX refrigeration system. The system incorporates two independent cooling circuits with highly reliable scroll compressors. They are designed to operate with R410A refrigerant, recognized as being safer for the environment.

STULZ CyberPack systems are designed to supply conditioned air to an adjacent room or area.

NOTE

STULZ CyberPack systems are strictly for non-residential applications.

Functional modes of operation include cooling and dehumidification for environmental control of a conditioned space. During operation, the speed of the supply air fan(s) is managed by the system controller. Air to be conditioned is drawn into the return air opening, filtered, cooled and supplied to the conditioned space at a lower temperature than the inlet air.

During operation, the supply air fan(s) are managed by the system controller. Air to be conditioned is drawn into the return air opening, filtered, cooled and supplied to the conditioned space.

The supply and return air openings are in the base of the cabinet. See the Installation drawing provided with your unit for the layout and dimensions of the cabinet.

The system is provided with a main power disconnect switch located on the door of the electric box. The disconnect switch electrically isolates the unit during routine maintenance. The system incorporates individual component protection with the use of motor starter protectors and circuit breakers.

The system is equipped with highly reliable EC (Electronically Commutated) fans which offer considerable energy cost savings and long life. AC inverter whine is eliminated by using an electronically commutated permanent magnet DC motor. Fan speed is continuously adjustable via a signal from the system controller without the use of VFDs. EC fans offer energy efficient, quiet, low vibration operation.

An advanced STULZ ***E²*** series microprocessor controller is mounted inside the electric box. This controller provides superior features for more comprehensive control of the unit. These features include: full alarm system; input/output status monitoring; full integrated control of cooling and dehumidification and remote communication with building management systems.

The system controller is furnished with a user interface which is mounted on the door inside the electric box. It features an easy to read, backlit liquid-crystal alphanumeric display and LED illuminated function keys to navigate through the controller menus and adjust operating parameters. A user provided BMS may be used to directly interface to the ***E²*** controller.

Operating instructions for the ***E²*** controller are provided under separate cover. Refer to that manual for detailed instructions on operating the system controller.

1.3 Safety

1.3.1 General

STULZ Air Technology Systems, Inc. uses **NOTES** along with **CAUTION** and **WARNING** symbols throughout this manual to draw your attention to important operational and safety information.

A bold text **NOTE** marks a short message in the information to alert you to an important detail.

A bold text **CAUTION** safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A bold text **WARNING** safety alert appears with information that is important for protecting you from harm and the equipment from damage. Pay very close attention to all warnings that apply to your application.

A safety alert symbol ⚠ precedes a general **WARNING** or **CAUTION** safety statement.

A safety alert symbol ⚡ precedes an electrical shock hazard **WARNING** or **CAUTION** safety statement.

1.3.2 Safety Summary

The following statements are general guidelines followed by warnings and cautions applicable throughout the manual. Prior to performing any installation, operation, maintenance or troubleshooting procedure, read and understand all instructions, recommendations and guidelines contained within this manual.

This equipment should be serviced and repaired by journeyman, refrigeration mechanic or an air conditioning technician.

CAUTION ⚠

Never lift any component in excess of 35 pounds without help. If a lifting device is used to move the unit, ensure it is capable of supporting the weight of the unit.

CAUTION ⚠

Do not allow anyone under the equipment while it's suspended from a lifting device.

CAUTION ⚠

When moving the unit it must be kept in its normal installed position. If the unit is not kept level and vertical, damage to the compressors will result.

CAUTION ⚠

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the equipment.

CAUTION ⚠

When the air conditioner is in the cooling mode, the return air-intake and discharge (supply) must be free of obstructions.

CAUTION ⚠

All personnel working on or near the equipment should be familiar with hazards associated with electrical maintenance. Safety placards/stickers have been placed on the unit to call attention to all personal and equipment damage hazard areas.

WARNING ⚡

Never operate the unit with any cover, guard, screen panel, etc., removed unless the instructions specifically state otherwise, then do so with extreme caution to avoid personal injury.

WARNING ⚡

When working on electrical equipment, remove all jewelry, watches, rings, etc.

WARNING ⚡

This unit employs high voltage equipment with rotating components. Exercise extreme care to avoid accidents and ensure proper operation.

WARNING ⚡

A lockout/tagout procedure should be followed to ensure that power is not inadvertently reconnected.

WARNING

To prevent personal injury, stay clear of rotating components as automatic controls may start them unexpectedly. Turn off power to the unit unless you are performing tests that require power. With power and controls energized, the unit could begin operating at any time.

CAUTION

Never work on electrical equipment unless another person who is familiar with the operation and hazards of the equipment and competent in administering first aid is nearby.

WARNING

Hazardous voltage will still be present inside the electric box at the motor starter protectors and circuit breakers, even with the unit turned off at the microprocessor controller. To isolate the unit for maintenance, turn off power at the main power disconnect switch. Always disconnect main power prior to performing any service or repair.

WARNING

Refrigerant is used with this equipment. Death or serious injury may result if personnel fail to observe proper safety precautions. Great care must be exercised to prevent contact of liquid refrigerant or refrigerant gas (discharged under pressure) with any part of the body. The extremely low temperature resulting from the rapid expansion of liquid refrigerant or pressurized gas can cause sudden and irreversible tissue damage.

As a minimum, all personnel should wear thermal protective gloves and face-shield/goggles when working with refrigerant. Application of excessive heat to any component will cause extreme pressure and may result in a rupture.

Exposure of refrigerant to an open flame or a very hot surface will cause a chemical reaction that will form carbonyl chloride (hydrochloric/hydrofluoric acid); a highly poisonous and corrosive gas commonly referred to as PHOSGENE. In its natural state, refrigerant is a colorless, odorless vapor with no toxic characteristics. It is heavier than air and will disperse rapidly in a well-ventilated area. In an unventilated area, it presents a danger as a suffocant.

Always refer to the manufacturer's MSDS provided with the unit.

CAUTION

Do not use cleaning solvents near open flame or excessive heat. Wear eye protection when blowing solvent from parts. The pressure-wash should not exceed 30 psig. Solvent solutions should be disposed of in accordance with local and state regulatory statutes.

CAUTION

Certain maintenance or cleaning procedures may call for the use and handling of chemicals, solvents, or cleansers. Always refer to the manufacturer's Material Safety Data Sheet (MSDS) prior to using these materials. Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvents. Wash exposed skin thoroughly after contact with solvents.

WARNING

When performing soldering or desoldering operations, make certain the refrigeration system is fully recovered and purged and dry nitrogen is flowing through the system at the rate of not less than 1-2 CFM (.03 - .06 M^3/minute).

WARNING

Do not use chloride based water conditioning additives in condensate drain pans. This will cause corrosion to occur on the coil fins.

1.4 General Design

The STULZ CyberPack unit is housed in an aluminum cabinet mounted to a steel skid base which is designed to fit onto a raised rooftop curb. The exterior of the cabinet and base are coated with a durable, high gloss finish to protect against corrosion. The skid base is provided with removable lifting lugs to facilitate rigging, moving and positioning the unit on the rooftop curb, which is to be pre-installed.

Hinged access doors are located in the front of the cabinet and removable access panels are provided on all sides for maintenance/repair access to internal components. Operator controls are conveniently located in the electric box on the front of the cabinet. A wire chase is located in the bottom of the electric box to facilitate routing power and control wiring into the electric box during initial installation.

Standard STULZ CyberPack systems are equipped with a fresh air inlet to comply with indoor air quality requirements. The amount of fresh air entering the unit may be adjusted using a manually adjusted slide gate damper located inside the filter compartment.

STULZ CyberPack systems may be optionally configured for economizer operation using outside air to maintain temperature and humidity levels. This minimizes the use of compressors. With this option, the unit is equipped with automatically controlled outside air and return air dampers. The dampers vary the amount of outside air entering the unit, allowing cool outside air to mix with hot return air to achieve the required conditions.

STULZ ASC-12C/13C/15C-DX units have two refrigerant circuits and two scroll compressors mounted to the skid base adjacent to the cabinet. Each refrigerant circuit has its own condenser fan, which is located above the condenser coils. The system is furnished with an EC evaporator fan to deliver the supply air.

STULZ ASC-20A/25A/30A-DX units have two refrigeration circuits and two scroll compressors. Each refrigerant circuit is furnished with two condenser fans, which are located above the condenser coils. The system is furnished with two EC evaporator fans to deliver the supply air. Figures 1 and 2 depict the external layout of an ACS-30A-DX unit and identify the major components.

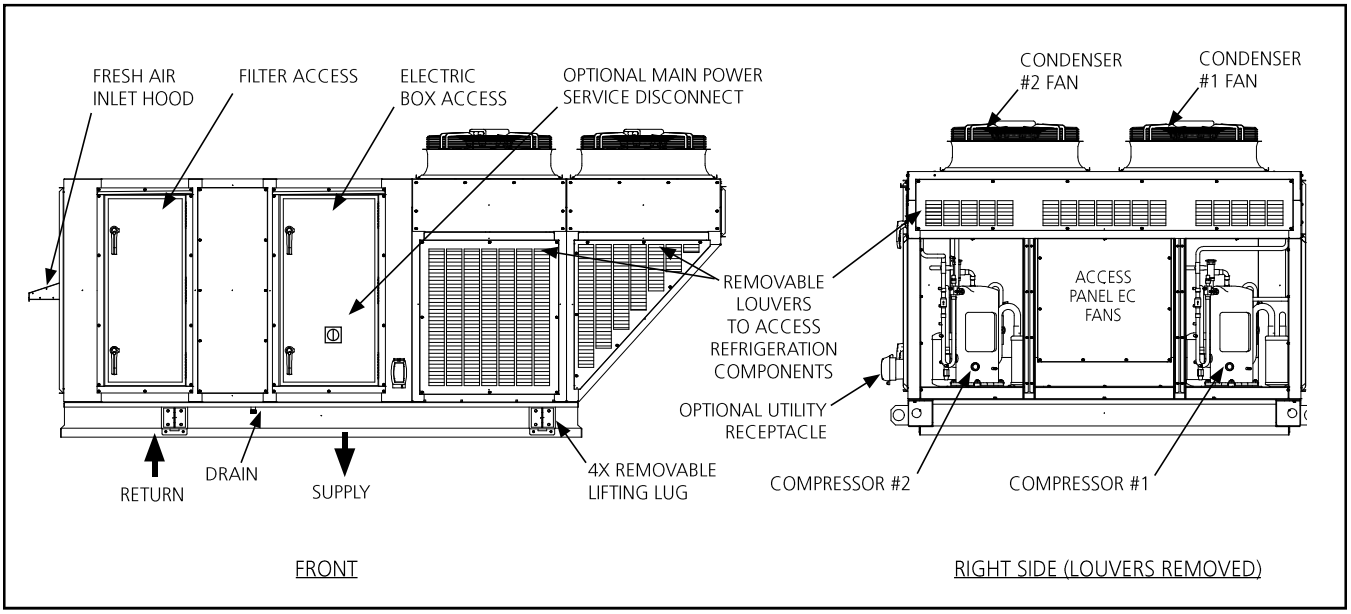


Figure 1 - General Layout - CyberPack with Standard Fresh Air Inlet (Model ASC-30A-DX Shown)

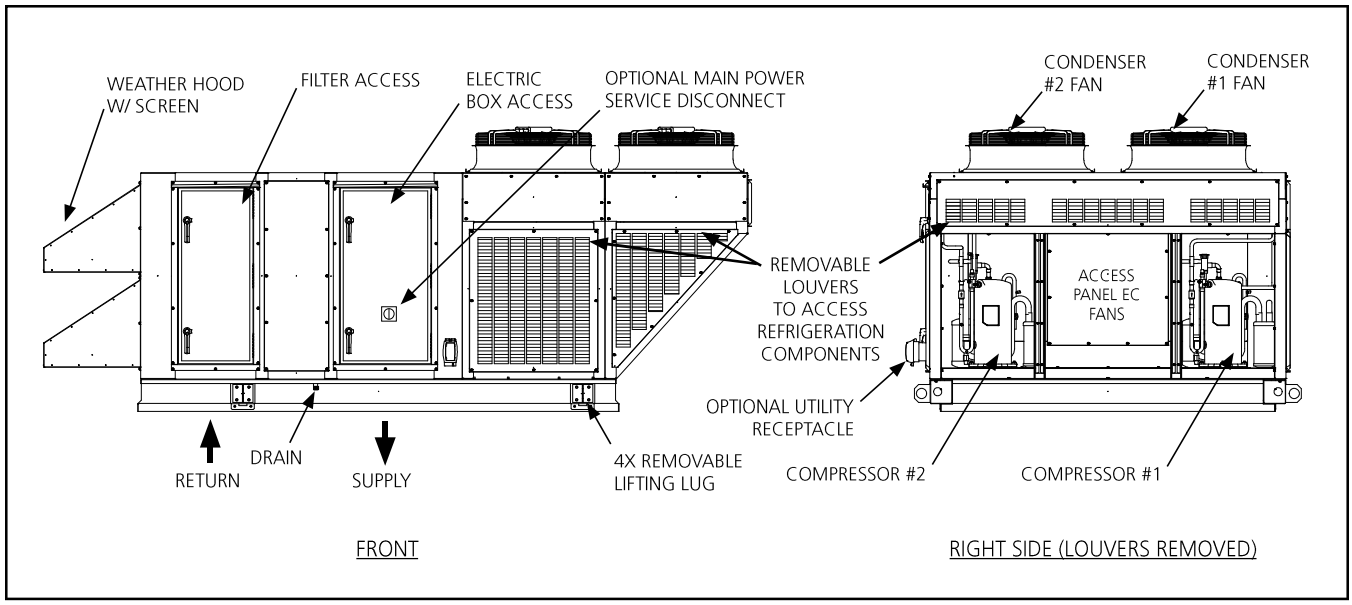


Figure 2 - General Layout - CyberPack with Optional Optional Air-Side Economizer (Model ASC-30A-DX Shown)

1.4.1 Electrical Enclosure

Electrical components are protected in an enclosure located in the front of the cabinet. The electric box access door is safety interlocked by the main power service disconnect switch, preventing the door from being opened when the switch is in the On position. The main power service disconnect switch must be turned Off to gain access to the components within the electric box. The handle of the switch can be locked in the "Off" position to prevent unintended operation.

CAUTION

Before opening the electric box door, turn the A/C unit off via the BMS or use the system controller's Remote On/Off feature.

WARNING

With power and controls energized, the unit could begin operating at any time. To prevent personal injury, stay clear of rotating components as automatic controls may start them unexpectedly.

WARNING

This unit employs high voltage equipment with rotating components. Exercise extreme care to avoid accidents. Always keep hands, clothing and tools clear of the fan blades when power is On.

1.4.2 Circuit Breakers / Motor Starter Protectors

Individual overload protection is provided by circuit breaker(s) and motor starter protectors. These devices must be manually reset once an overload condition is cleared.

1.4.3 Supply Air Fans

STULZ CyberPack units are equipped with high efficiency, Electronically Commutated (EC) fans. EC fans utilize a brushless motor equipped with permanent magnets and permanently lubricated ball bearings. The fan impellers are backward curved and attached to the rotor casing. The fans are balanced and aerodynamically optimized to minimize vibration.

The fans do not utilize drive belts. Fan speed is variable via a Modbus or 0 to 10 VDC signal from the system controller. The fan motors are equipped with integral electronics and do not require secondary electronics such as thermal protection, inverters or filters. The fans will not produce AC inverter whine.

EC fans feature an integrated monitoring function to protect the motor and electronics against damage from jamming, phase loss or overheating. If any of the following failure conditions occur, the motor automatically stops and signals an alarm:

a. Locked rotor
b. Loss of a phase

c. Low main supply voltage
d. Overheating of electronics
e. Overheating of motor

If communication with the fan(s) is lost, the controller provides a communications alarm and the fan(s) continue to run at their last received output command until a new command is received (Modbus communication is back online). If a power cycle occurs (power outage), the fan(s) will restart at their last received command once power is restored. Once the controller reboot cycle completes (and the Modbus network is online), fan speed is once again managed by the system controller.

1.4.4 Evaporator Coils

The evaporator coils are constructed with aluminum fins which are mechanically bonded to seamless drawn copper tubes. The coils are leak tested and cleaned before installation in the cabinet. The cooling coils utilize DX (Direct Expansion) refrigeration to remove heat and humidity from the air entering the unit. R410A refrigerant is used to transfer the heat from the evaporator coils to the condenser coils.

Refer to the refrigeration drawing for details of the cooling circuit.

The evaporator coils are equipped with a stainless steel condensate drain pan. Two 3/4" MPT connections are provided for condensate drainage. The condensate drain connections are located in the skid/base at the front and rear of the unit. Field installed drain lines must be provided (see section 2.6.1). A trap is required in the each drain line to ensure proper drainage. The drain lines/traps should be insulated or heat traced if they may be exposed to sub-freezing temperatures.

1.4.5 Compressors

Highly reliable scroll compressors are utilized in STULZ CyberPack systems. With fewer moving parts, scroll compressors have demonstrated superior durability. The scroll compressor is designed around two identical spirals (scrolls) that, when inserted together, form crescent shaped pockets. During a compression cycle, one scroll remains stationary while the other scroll orbits around the first. As this motion occurs, gas is drawn into the scrolls and moved in increasingly smaller pockets toward the center. At this point, the gas, now compressed to a high pressure, is discharged from a port in the center of the fixed scroll. During each orbit, several pockets of gas are compressed simultaneously, creating smooth, nearly continuous compression.

1.4.6 Condensing Unit

A condensing unit for each refrigeration circuit is located at the end of the cabinet. Microchannel coils in the condensing unit rejects the heat from the refrigerant into the ambient air. The coils are all aluminum construction with microchannel fins. The condensing unit is equipped with high efficiency axial fans. The fans utilize corrosion resistant, multi-blade impellers designed for high aerodynamic efficiency, which results in lower power consumption, lower noise levels and longer life. Each fan utilizes an electronically commutated (EC) motor with maintenance free ball bearings. The fan motors are internally protected from overload.

The condenser fans operate as needed to maintain high-side (head) pressure while the compressor operates. The refrigerant circuits include flooded head pressure control. When using this method of head pressure regulation, there must be enough refrigerant in the system to ensure an adequate charge for the lowest expected ambient temperature in which the system will operate. A receiver is used to store the extra refrigerant when the condenser is not using it. Refer to the refrigeration drawing for details on the DX cooling circuits.

1.4.7 Air Supply and Return

The openings in the bottom of the skid/base interface with the duct connections in the curb. Refer to the installation drawings (included with the unit) for supply and return locations and dimensions.

1.4.7.1 Filtration

Return air and outside air (fresh air inlet or economizer inlet) is filtered by 4" thick air filters with a minimum MERV 7 rating. The filters are located inside the cabinet before the evaporator coils. Filters may be accessed via the door on the front/left of the cabinet.

A dirty filter switch is provided for the filters. If the pressure drop across the filters approaches a predetermined value, the switch contacts open, signaling an alarm condition to the system controller. The controller displays a clogged filter alarm message indicating that the filters should be replaced. Operating the unit with dirty filters will reduce performance.

1.4.7.2 Fresh Air inlet (Standard)

The unit is equipped with a fresh air inlet on the left end of the cabinet. A weather hood on the fresh air inlet helps prevent rain or snow from entering the cabinet. A screen is provided to prevent birds or small animals from nesting in the inlet. A manually operated damper

is provided inside the cabinet to regulate the amount of fresh air that is allowed to mix with the return air.

1.4.7.3 Air-side Economizer (Optional)

The system controller manages the economizer mode to utilize outside air, when possible, to minimize the need for compressor operation. With this option, an outside air temperature/humidity sensor is provided. The controller monitors outside air temperature and humidity so as not to introduce air that is either too warm or too humid to meet the desired conditions.

A proportional control signal (1-10 VDC) modulates outside air and return air damper positions between 0-100% to maintain the supply air temperature and humidity setpoints. The controller seeks to achieve the most energy efficient mixture of outside air and return air to satisfy the temperature/humidity demand. The controller adjusts damper positions to get the mixed air conditions as close as possible to the user adjustable temperature and humidity setpoints. If outdoor air conditions are above the setpoints, the outside air damper remains closed.

1.4.8 Temperature/Humidity Sensors

1.4.8.1 Return Air Sensor

A sensor is provided (shipped loose) to monitor the temperature and relative humidity of the return air. The system controller uses these inputs to control cooling and dehumidification functions. The sensor should be installed in the return air duct. See section 2.5 for installation details.

1.4.8.2 Supply Air Sensor (Optional)

A sensor may be provided (shipped loose) to monitor the temperature and relative humidity of the supply air. The system controller uses these inputs for monitoring and status display purposes. This sensor should be installed in the supply duct. See section 2.5 for installation details.

1.4.8.3 Outside Air Sensor (Optional)

A sensor is provided for the system controller to monitor the temperature and relative humidity of the ambient (outside) air. This sensor is factory mounted outside the economizer dampers at the outside air inlet. The system controller uses this information, in conjunction with other inputs, programmed settings, setpoints and limits, to control air damper positions (mixing the return air and outside air) to achieve the target supply air temperature and humidity.

1.5 Dual Cooling Circuits

STULZ CyberPack systems are designed with two independent cooling circuits (stages). Each cooling circuit is comprised of one compressor, one evaporator coil and one condenser coil. The controller turns each stage on and off as needed based on the temperature set point plus offset value (see the ***E²*** Series Controller Operator's Manual).

1.6 System Controller

Figure 3 - *E²* Series Controller I/O Module

This unit is equipped with a STULZ ***E²*** series programmable logic microprocessor controller, which is located in the system electric box (see Figure 9). The controller has factory configured software designed to manage operation of the unit. It controls the DX cooling circuits, fans and optional dampers to maintain the return air temperature and humidity to the programmed setpoint values. Operator interface to the control parameters is provided through the controller user interface display screen and keypad.

1.6.1 Controller User Interface

The controller user interface is mounted inside the door of the electric box (see Figure 9). The display features an easy to read, backlit liquid-crystal alphanumeric display equipped with LED illuminated function keys. The screens available on the user interface display present data that originates from the controller I/O module. The controller is interfaced by the operator via a 6-key menu-driven loop structure which includes an alarm log plus several interface menus. These menus permit the user to easily view and configure operating parameters for the unit. The STULZ ***E²*** Series Controller Operator's Manual contains a display/keypad navigation overview which details how to access the control menus and adjust control parameters.

1.6.1.1 Alarms

Alarm conditions activate a red LED indicator that backlights the Alarm function key. The red LED illuminates any time an alarm condition is present, including previous alarms that haven't been reset or cleared. If alarms are active, pressing the alarm key displays a text message describing the alarm condition(s).

2.0 INSTALLATION

2.1 Receiving the Equipment

The STULZ CyberPack system has been tested and inspected prior to shipment. To ensure your equipment has been received in excellent condition, perform a visual inspection of the equipment immediately upon delivery. Carefully remove the shipping container and all protective packaging. Remove the access panels and thoroughly inspect the unit interior for any signs of transit-incurred damage. If there is shipping damage, it must be noted on the freight carrier's delivery forms **BEFORE** signing for the equipment. Any freight claims **MUST** be done through the freight carrier. STULZ ships all equipment FOB. STULZ can assist with providing information to support the claim. Should any damage be present, notify STULZ Product Support prior to attempting any repairs. Refer to section 6.0 of this manual for instructions.

A Data Package has been sent with your unit. It contains this manual, a supplemental microprocessor controller manual, system drawings, applicable MSDS's, other component manuals, warranty registration and other applicable instructions based on the configuration and options of your unit. The data package has been placed in your unit in a clear plastic bag. These documents need to be retained with the unit for future reference.

NOTE

Items that have been shipped loose, such as temperature/humidity sensors, are shipped inside the air conditioner, unless otherwise specified by the customer. Unpack and store these items in a safe place unless you are using them immediately.

2.2 Site Preparation

STULZ CyberPack systems are designed with easy service access in mind. Hinged doors are located on the front of the unit and access panels are located on the back and end. The unit has an electric box on the front of the cabinet with a hinged door for accessing the electrical components. When determining the installation location, consider how you'll route the wiring into the cabinet. The STULZ installation drawing furnished with your unit shows the recommended entry location (wire chase) if wiring is routed through the roof curb.

In order to have full service access through the front of unit, no permanent obstructions should be placed within 30 inches of the front of the cabinet. It is recommended to allow a minimum of 36 inches clearance on the sides for proper condenser airflow and for servicing components through the access panels.

NOTE

Working clearance requirements need to be established prior to mounting the unit. Refer to local and National Electrical Codes.

To minimize the effects of the environment surrounding the conditioned space, certain steps must be taken. This is especially true in data center applications, where the goal is to minimize energy use to cool/dehumidify the data center. The conditioned space should be well insulated and include a vapor barrier. The installer should ensure that the proper rated insulation is used based on the design of the space, which was the basis for the system selected.

The following table is the minimum recommended R-value (thermal resistance) to ensure optimum equipment operation.

STRUCTURE	R-VALUE
Ceiling	R-38
Wall	R-21
Floor	R-19
Door	R-5

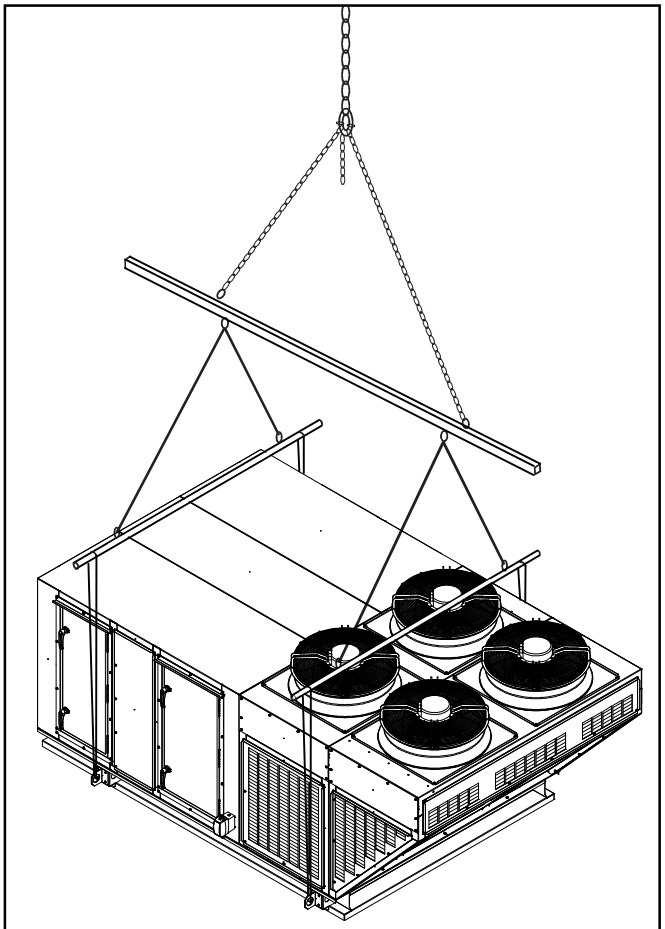
The vapor barrier is the single most important requirement for maintaining environmental control in the conditioned space. The vapor barrier in the ceiling and walls can be a polyethylene film. Concrete walls and floors should be painted with a rubber or plastic-based paint. Doors and windows should be properly sealed and a door sweep used to minimize leakage. Outside, or fresh air, should be kept to a minimum (as it adds to the cooling, heating, dehumidification and humidifying loads), while maintaining the requirement of the Indoor Air Quality (IAQ) standard. Lack of adherence to these steps can lead to erratic operation, unstable room control and excessive maintenance costs.

2.3 Rigging

The system is designed to be kept in a horizontal orientation. The unit utilizes steel mounting rails to provide rigidity and protect the unit from damage during installation. The unit may be lifted using an overhead spreader bar and slings. Lift lugs are to be installed at four points on the mounting skid for attaching lifting slings to facilitate lifting. After placing the unit, the lifting lugs may be removed. The mounting bolts for the lifting lugs are

to be re-installed in the skid and sealed (silicone RTV or equivalent) to maintain the airtight integrity of the base.

If an overhead lifting device is used, use one with an appropriate capacity to ensure it can safely handle the weight of the unit. The weight of the unit is provided on the installation drawing. If using an overhead lifting device, utilize spreader bars that exceed the cabinet width (see Figure 6) to avoid crushing the sides of the unit and/or damaging components mounted to the sides.



(STULZ ASC-30A-DX SHOWN FOR REFERENCE)

Figure 4 - Rigging

CAUTION ⚠

To prevent damage to the components, the unit must be kept level and in the horizontal position when lifting.

2.4 Mounting/Placement

STULZ CyberPack systems use welded frame construction for unit rigidity. The system is designed to be installed on a roof curb, which is provided by others. Ensure the curb is sealed to prevent air leakage. See the detail drawing provided with the unit for interface dimensions.

CAUTION ⚠

Ensure the mounting surface is level and is capable of supporting the weight of the equipment. See the installation drawing provided with the unit for the estimated weight.

CAUTION ⚠

The equipment must be level to operate properly and prevent damage to the compressors.

Locate the system where it cannot be tampered with and the main power disconnect switch cannot be inadvertently turned off. Locate the unit where the condenser fans are not likely to draw dirt and debris into the coil fins. Allow unrestricted access around the unit to perform routine inspection and maintenance. To judge the clearance requirements in front of the unit, consider that the air filters are housed inside the cabinet and need to be removed and replaced regularly through the front.

The clearance around the condenser fans should be at least 36" to ensure adequate airflow to the coils.

The conditioned supply air discharges through an opening in the bottom of the cabinet. Return air is drawn into the bottom also, through an adjacent opening. Refer to the curb mounting detail drawing for ducted return and supply interface dimensions, as well as unit skid/base dimensions and recommended curb clearances. Before placing the unit on the curb, apply a continuous bead of sealant or compliant gasket to the top surface of the curb. Secure the unit to the curb to prevent it from moving during operation.

2.5 Remote Temperature/Humidity Sensors

Various temperature/humidity (T/H) sensors may be factory supplied but shipped loose (for remote mounting). Refer to Section 1.4.8 for a description of the factory supplied sensors and how they are used in CyberPack systems.

The return air sensor is typically mounted in the return air duct (data center applications) but can also be mounted in the conditioned space (comfort cooling applications). If

mounting the return air sensor in the conditioned space, do not mount it near a doorway or an area where it would be exposed to direct sunlight.

An optional supply air T/H sensor may also be provided. It is not required for unit operation but is useful for monitoring supply air conditions. It should be mounted in the supply air duct.

An optional outside air sensor is provided when the air-side economizer option is ordered. This sensor is already mounted in the outside air inlet by the factory so no field mounting/wiring is necessary.

When locating any remote sensors, consider the length of wire to be used. As an option, a 75 foot long cable may be provided by STULZ. Follow the steps below to mount the sensor.

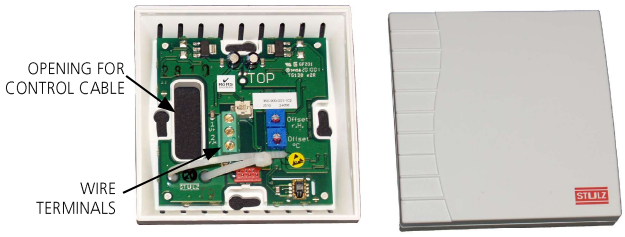


Figure 5 - Temperature /Humidity Sensor

1. Remove the cover from the base of the sensor by squeezing it at the top and bottom.

CAUTION ⚠

Take care not to damage the exposed temperature and humidity sensor elements mounted on the PC board when the cover is removed. Do not touch the sensor elements as this will affect their accuracy.

2. Place the base temporarily against the mounting surface.
3. Level the base. Mark and drill mounting holes through at least two of the available slotted holes. Also, mark through the large opening in the base and drill a hole into the mounting surface for a control cable to pass through the back of the base.
4. Run a 3-conductor shielded control cable through the opening in the base, then secure the base with screws, ensuring the word "TOP" on the PC board is oriented upward.
5. Route the sensor control cable up to the control terminal block in the electric box (see Figure 9) and terminate the control wires.
6. Replace the cover plate.

For wiring details, refer to the electrical drawing and "2.7.2 Wiring Optional Devices" on page 11

2.6 Refrigeration System Piping

The unit is a self-contained air cooled system. All piping and refrigeration control specialties are provided. No field refrigerant connections are required. The system is pre-charged with R410A refrigerant. At startup, the charge may need adjustment.

2.6.1 Condensate Drain

2.6.1.1 Gravity Drain

Two 3/4" MPT (male NPT) connections are provided for condensate drainage. The connections are located in the skid at the front and rear of the unit. Connect drain lines to direct the condensate away from the unit and away from equipment that may be damaged by water. A "P" type condensate trap must be installed. The height of the trap must be at least 2" to exceed the total static pressure of the system and ensure proper water drainage from the drain pan. The drain line must be protected from freezing temperatures with insulation or heat trace cable or tape. The diameter of the drain line should be the full size of the connection.

NOTE

Pour some water into the condensate drain pan prior to start-up. This fills the trap and prevents air from being drawn up the drain line.

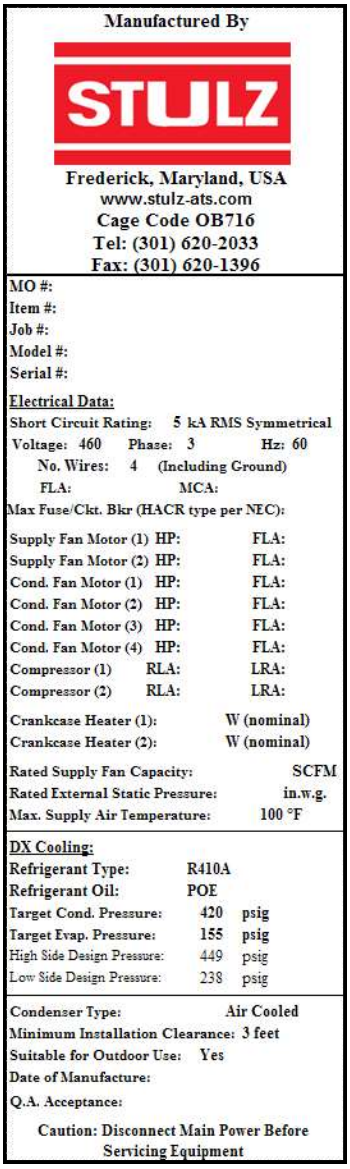
WARNING ⚠

Do not use chloride based water conditioning additives in condensate drain pans. This will cause corrosion to occur on the coil fins.

2.7 Utility Connections

2.7.1 Main Power

STULZ CyberPack systems operate on 3 phase supply power. The unit nameplate may be examined to confirm the operating voltage, frequency and phase requirements of the system (see Figure 8). It is important to verify that the main power supply coincides with the voltage, phase and frequency information specified on the system nameplate. The supply voltage measured at the unit must be ±10% of the specified voltage.


Manufactured By

STULZ

Frederick, Maryland, USA
www.stulz-ats.com
Cage Code OB716
Tel: (301) 620-2033
Fax: (301) 620-1396

MO #:
Item #:
Job #:
Model #:
Serial #:

Electrical Data:
Short Circuit Rating: 5 kA RMS Symmetrical
Voltage: 460 Phase: 3 Hz: 60
No. Wires: 4 (Including Ground)
FLA: MCA:
Max Fuse/Ckt. Bkr (HACR type per NEC):

Supply Fan Motor (1) HP: FLA:
Supply Fan Motor (2) HP: FLA:
Cond. Fan Motor (1) HP: FLA:
Cond. Fan Motor (2) HP: FLA:
Cond. Fan Motor (3) HP: FLA:
Cond. Fan Motor (4) HP: FLA:
Compressor (1) RLA: LRA:
Compressor (2) RLA: LRA:

Crankcase Heater (1): W (nominal)
Crankcase Heater (2): W (nominal)

Rated Supply Fan Capacity: SCFM
Rated External Static Pressure: in.w.g.
Max. Supply Air Temperature: 100 °F

DX Cooling:
Refrigerant Type: R410A
Refrigerant Oil: POE
Target Cond. Pressure: 420 psig
Target Evap. Pressure: 155 psig
High Side Design Pressure: 449 psig
Low Side Design Pressure: 238 psig

Condenser Type: Air Cooled
Minimum Installation Clearance: 3 feet
Suitable for Outdoor Use: Yes
Date of Manufacture:
Q.A. Acceptance:

Caution: Disconnect Main Power Before Servicing Equipment

Figure 6 - Sample Nameplate

The nameplate also provides the full load amps (FLA), the current the unit will draw under full design load, the minimum circuit ampacity (MCA) for wire sizing, and the maximum fuse or HACR (Heating, Air Conditioning, Refrigeration) breaker size (MAX FUSE/CKT BKR) for circuit protection. The unit nameplate is located inside the cabinet in the electrical box.

NOTE

If the nameplate states MAX FUSE/CKT BKR, it is required to use fuses or a HACR type circuit breaker to protect the system. Other protection devices are not allowed based upon the product listing.

WARNING

Verify power is turned off before making connections to the equipment.

NOTE

All wiring must conform to local and National Electrical Code (NEC) requirements. Only use copper conductors. Wiring terminations may become loose during transit of the equipment; therefore, it is required to verify that all wiring terminations are secure.

A manual fused disconnect switch or HACR type circuit breaker must be installed per local and National Electrical Codes for service of equipment. Do not mount a customer supplied manual fused disconnect switch or HACR type circuit breaker to the surface of the unit.

The unit is provided with terminals for all required field wiring. Refer to the electrical schematic supplied with the unit for all power and control field-wiring. It is important to identify the options that were purchased with the unit in order to confirm which field connections are required.

A wiring chase is provided for main power and control wiring (see the installation drawing for the location). The main power wires shall be terminated at the line side of the main power disconnect switch, located within the electric box (see Figure 9). A separate equipment ground lug is located next to the switch for termination of an earth ground wire. Prior to operation, an adequate unit-to-earth ground must be connected to the unit.

CAUTION

Improper wire connections will result in the reverse rotation of the scroll compressor and may eventually result in damage to the compressor. To correct this problem, exchange any two of the incoming main power wires at the main power disconnect switch. Do NOT rewire the unit's individual components.

2.7.2 Wiring Optional Devices

NOTE

All wiring must be provided in accordance with local and National Electrical Code requirements.

It is important to note that the control transformer(s) supplied with the equipment have been sized and selected based upon the expected loads for the system.

CAUTION ⚠

Do not connect any additional loads to the system control transformers. Connecting additional loads to the factory supplied control transformer may result in overloading of the transformer.

2.7.2.1 Remote Temperature/Humidity Sensors

Each remote temperature/humidity sensor requires a three conductor shielded cable with the shield being terminated in the unit electric box. Route the wires from the sensors up into the STULZ CyberPack system cabinet and into the electric box. Both the electric box and the sensor include a control terminal strip with box type lugs for wire connections (see Figures 7 and 9). Terminate the wires to the correct control terminal positions inside the electric box. Refer to the electrical drawing supplied with your unit for the proper wire terminations.

2.7.2.2 BMS Interface

A BMS may interface to the system controller via the control terminal strip inside the electric box. Refer to the electrical drawing supplied with your unit for the designated terminal positions to connect BMS interface wiring.

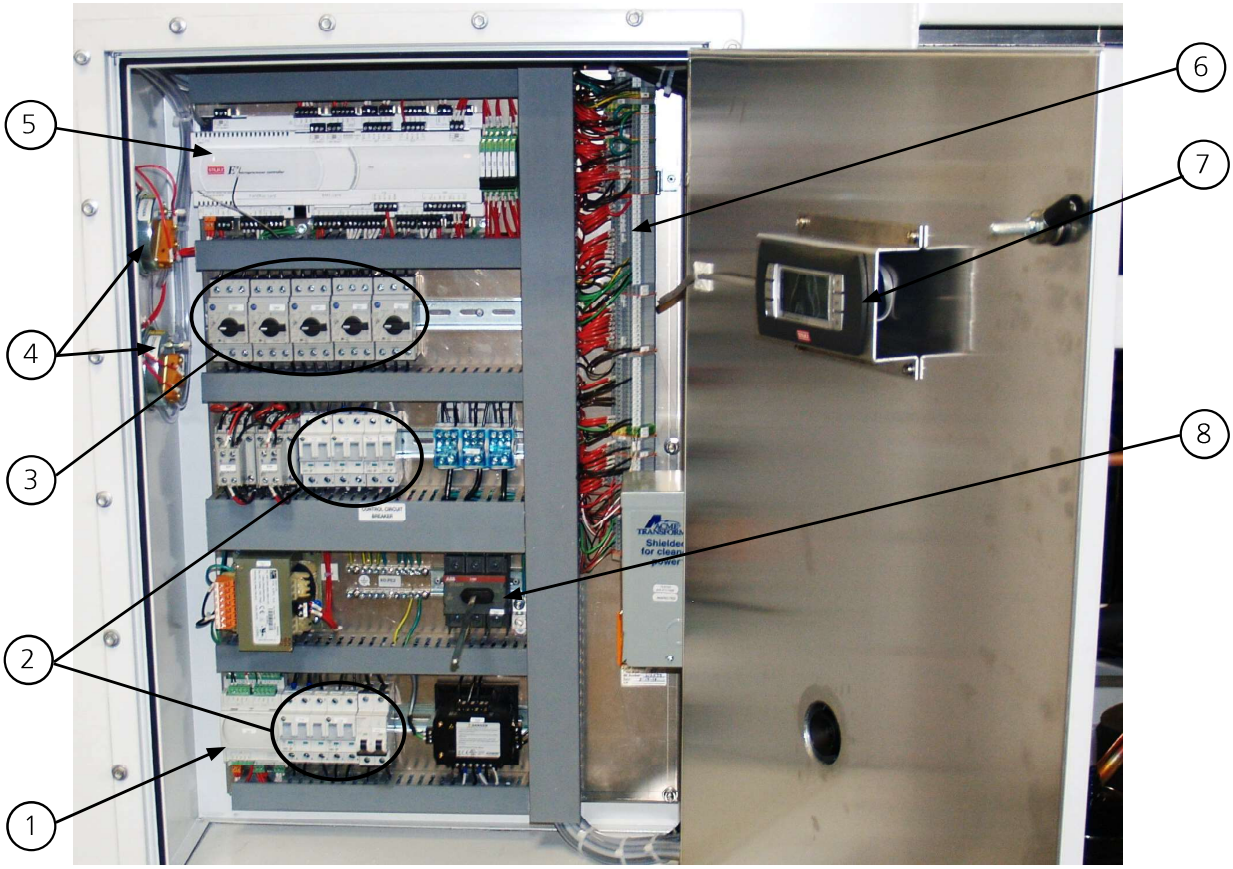


Figure 7- Electric Box

Figure 9 shows the electric box layout and identifies the major components. The numbered call outs in Figure 9 coincide with the numbered items listed below:

1. Suction Pressure Expansion Module
2. Circuit Breakers
3. Fans/Compressors Motor Starter Protectors
4. Airflow/Dirty Filter Switches
5. STULZ E^2 Series Controller I/O Module
6. Control Terminal Strip
7. STULZ E^2 Controller User Interface
8. Power Disconnect Switch

3.0 START-UP/COMMISSIONING

3.1 Operation

For new installations, ensure the unit is ready to operate by going through the Checklist for Completed Installation, located in the rear of this manual, prior to start-up.

NOTE

A Warranty Registration and Start-Up Checklist is provided with the unit data package. It should be completed during start-up and sent to STULZ. This checklist should be used as a guideline for items that need to be confirmed during start-up.

Start-up must be performed by a journeyman, refrigeration mechanic or an air conditioning technician.

3.2 Step-by-Step Start-Up Instructions

1. Close all cabinet doors and replace all access panels removed prior to performing start-up checks.

2. Apply power to start the system at the main power disconnect switch.

3. Upon applying power, the controller begins conducting internal diagnostics to confirm functionality.

4. If the actual room conditions are not within the range of the programmed operating setpoints, the system begins operating after the system controller completes its start-up sequence (approximately 2 minutes, see STULZ ***E²*** series Controller Operator's Manual).

5. Ensure that all fans are rotating correctly and freely without any unusual noise.

6. Test cooling operation by setting the temperature setpoint below the actual room temperature. The compressors should turn on and the supply air should feel cooler than the return air.

Both refrigeration circuits must be tested at start-up. There are several ways to force the second circuit into operation. Refer to section 3.3 in the STULZ ***E²*** Series Controller Operator's Manual sent in the data package with your unit.

NOTE

The compressors have a time delay on start-up.

7. Test dehumidification operation by creating a demand for dehumidification. Decrease the dehumidification setpoint 10% below actual room conditions (the setpoint may already be below actual room conditions). The compressor will energize to begin the dehumidification process. While in this mode, room temperature will decrease. As conditions in the room change, you may have to readjust the setpoint as you check operation. An adequate heat load within the space is required.

8. In all cases, several hours might be required to achieve the desired temperature and humidity level in the conditioned space. Once room conditions have been programmed or set, a repeat visit to the conditioned space may be required to ensure the system is meeting the room's requirements.

3.3 Microprocessor Controller Programming

The STULZ ***E²*** series microprocessor controller is factory programmed based on the model of the A/C system and optional features selected. Most applications require no field start-up or program adjustment, including each feature's factory "default" setting and the available adjustment range.

Separate operating instructions for the system controller have been sent with your unit. The controller is factory programmed based on the features selected with the system. Most applications require no field configuration or program adjustment beyond setting the current date and time.

A user provided BMS may be used to directly interface to the STULZ ***E²*** series controller. The operator may view all the available menu screens through a BMS, however, changes may be made only to basic parameters such as selecting operating setpoints and setting and acknowledging alarms. More advanced parameter adjustments may be made through the user interface.

4.0 SETTINGS AND ADJUSTMENTS

4.1 Refrigerant Charge

If at any time after leaving the factory the A/C system needs to be topped off, ensure R410A refrigerant is used.

4.1.1 R410A Refrigerant

R410A is a blended refrigerant recognized for being safer for the environment. R410A refrigerant contains no chlorine, the component in HCFCs that destroy the earth's ozone layer. The same care should be taken to prevent leakage however, because R410A can contribute to the greenhouse effect if released.

The component parts of R410A refrigerant have the same composition at various operating temperature/pressures in the liquid phase and gas phase reducing the temperature glide effect experienced with R407C. R410A operates at significantly higher pressures which must be considered when checking the operating temperatures/pressures while charging or troubleshooting the system.

When adding refrigerant to the system, introduce R410A into the system in liquid form rather than vapor form. Cylinders which are not provided with dip tubes should be inverted to allow only **liquid** refrigerant to charge the system. Keeping the temperature of the cylinder below 85°F will help maintain the correct refrigerant composition while the cylinder is emptied.

CAUTION ⚠

POE oil is used in systems with R410A refrigerant. POE oil quickly absorbs moisture when exposed to air. High POE oil moisture levels react with refrigerant to form acid, which results in system contamination. Keep the entire system sealed as much as possible and minimize exposure of POE oil to outside air.

NOTE

Refrigerant charging must be performed by a journeyman, refrigeration mechanic or an air conditioning technician.

1. With refrigerant gauges connected to the suction and discharge ports, connect the refrigerant cylinder to the suction side.
2. Start the system and use the system controller to lower the temperature set-point 3-5°F below room temperature. This will ensure the cooling mode stays on.
3. Allow the discharge pressure to rise to 480-520 psig and hold it constant. On cool days it may be necessary to restrict the airflow across the condenser to raise the pressure.
4. Slowly meter R410A **liquid** refrigerant through the suction side while watching the pressure gauges and monitoring superheat and sub-cooling temperatures.

CAUTION ⚠

Add liquid refrigerant slowly to prevent the refrigerant oil from "washing out" of the compressor.

5. Take a superheat temperature reading near the feeler bulb from the thermal expansion valve with the temperature measuring device being well insulated. The ideal superheat temperature is 10-15°F. Maximum allowable superheat temperature is 20°F.
6. While monitoring the sight glass, take a sub-cooling temperature reading on the output side of the condenser. The sub-cooling temperature should be 10-20°F.
7. If necessary, add **liquid** refrigerant to maintain adequate sub-cooling temperature.

4.1.2 Refrigerant Characteristics

4.1.2.1 Pressure/Temperature Settings

The following table is provided to assist with the normal settings of the system for R410A refrigerant. Where applicable, minimum and maximum settings are given along with normal operating pressures.

R410A Refrigerant Pressure/Temperature Settings			
	Normal	**Min.**	**Max.**
Sub-cooling °F	10	5	20
Superheat °F	15	10	20
Design Condensing Temp. @ 95°F Ambient	125	105	140
Suction Pressure (psig)-	130	105	155
Fan Speed Control (psig)--	440	330	480

4.1.2.2 Saturated Refrigerant Pressure

The following refrigerant temperature/pressure table is provided for reference for R410A refrigerant.

R410A Refrigerant Pressures

Temp. (°F)	Pressure (psig)
20	78.4
22	81.9
24	85.5
26	89.2
28	93.1
30	97.0
32	101
34	105
36	109
38	114
40	118
42	123
44	128
46	133
48	137
50	143
55	155
60	170
65	185
70	201

Temp. (°F)	Pressure (psig)
75	218
80	236
85	255
90	274
95	295
100	318
105	341
110	365
115	391
120	418
125	446
130	477
135	508
140	541

4.1.3 Low/High Pressure Limit Switch

Air conditioning systems utilizing R410A refrigerant are equipped with hermetically sealed high-pressure and low-pressure switches. These switches are pre-set by the manufacturer and cannot be adjusted. The high-pressure switch opens at 630 psig and has a manual reset. The low-pressure switch opens at 65 psig (± 4), closes at 105 psig (± 5) and resets automatically.

4.1.4 Head Pressure Controls

4.1.4.1 Condenser Fan Speed

Variable condenser fan speed control is used to maintain head pressure. The fan speed control is a continual modulation of the motor's speed. The system controller monitors refrigerant discharge pressure. As discharge pressure rises, the speed of the fans increase. The speed of the fans automatically varies as required to maintain the target condensing pressure.

4.1.4.2 Flooded Head Pressure Control

Used for outdoor installations where ambient condenser air inlet temperatures may fall to -30°F, flooded head pressure control is designed to maintain head pressure during low ambient conditions. A head pressure control valve and a receiver are used in the refrigeration circuit to back up liquid refrigerant into the condenser coil. The head pressure control valve is a 3-way modulating valve controlled by discharge pressure.

When the A/C unit begins to operate, discharge pressure rises. When the pressure reaches a pre-determined value, the condenser fans turn on. When ambient temperature drops, discharge pressure also drops. When discharge pressure drops to a pre-determined value, the head pressure control valve diverts discharge gas away from the condenser to the receiver. Liquid flow from the condenser is restricted, causing liquid to back up in the condenser.

Flooding the condenser reduces the area available for heat transfer. The desired result is to maintain a minimum condensing pressure during low ambient operation, thus ensuring proper system operation. The head pressure control valve requires no adjustment.

This method of controlling head pressure allows the condenser fan to run continuously. While the fan is running, the flooded head pressure control valve modulates the amount of discharge gas entering the receiver. As the pressure increases, the valve diverts more discharge gas to the condenser, allowing more liquid to flow from the condenser to the receiver.

When using this method of head pressure regulation there must be enough refrigerant in the system to ensure adequate charge at the lowest expected ambient temperature in which the system will operate. A receiver is used to store the extra refrigerant when the condenser is not using it.

4.1.5 Evaporator Fan(s)

4.1.5.1 EC Fan(s)

The speed of the EC fan(s) is controlled via Modbus or a 0 to 10 VDC signal from the system controller. The controller is set by the factory and should not require adjustment. If it is determined that the airflow needs adjustment, this may be done using the controller's programming menu selections. Refer to the operator's manual provided under separate cover for the system controller.

4.1.6 Thermal Expansion Valve

STULZ CyberPack precision A/C units utilize a Thermal Expansion Valve (TEV) on each refrigeration circuit. The TEV maintains constant superheat at the outlet of the evaporator by metering the flow of refrigerant into the evaporator. Superheat is the difference between the refrigerant vapor temperature and its saturation temperature at that pressure. By controlling superheat, the TEV keeps nearly the entire evaporator surface active while not permitting liquid refrigerant to return to the compressor. The standard superheat is factory set at 12-15°F and should not need adjustment.

5.0 MAINTENANCE AND REPAIR

5.1 Periodic General Maintenance

Systematic, periodic general maintenance of the unit is required for optimum system performance. General maintenance should include, but is not limited to the following: replacing filters, tightening loose fasteners and electrical connections, checking the condensate line to ensure it is free of debris, cleaning the interior of the unit, inspecting the units' components visually, checking level of refrigerant and ensuring no moisture is in the refrigerant.

Use copies of the Periodic General Maintenance Checklist in this manual to record periodic general maintenance inspections. For assistance, contact STULZ Product Support. Ensure adherence to all safety statements while performing any type of maintenance.

WARNING

This equipment should be serviced and repaired by a journeyman or a qualified refrigeration technician only.

WARNING

This unit employs high voltage equipment with rotating components. Exercise extreme care to avoid accidents and ensure proper operation.

Hazardous voltage is still present inside the electric box at the motor start protectors and circuit breakers, even with the unit turned off at the microprocessor controller. To isolate the unit for maintenance, turn off power at the main power disconnect switch. Always disconnect main power prior to performing any repairs.

WARNING

Turn off power to the unit, unless you are performing tests that require power. With power and controls energized, the unit could begin operating at any time. To prevent personal injury, stay clear of rotating components as automatic controls may start them unexpectedly.

5.1.1 Precision A/C Unit

Check the refrigerant sight glass on a monthly basis while the unit is running and ensure it is mostly free of bubbles. Excessive bubbles in the sight glass indicates a low refrigerant charge or a clogged filter-drier. Check for humidity in the refrigerant by viewing the color of the indicator in the center of the sight glass and comparing it to the color scale on the outer ring. If humidity is present, the system must be evacuated and recharged.

Check superheat and sub-cooling temperatures semi-annually and ensure they are within the range shown in the refrigerant pressure/temperature table in section 4.1.3.1. If necessary, adjust the refrigerant charge to achieve the correct values. If the refrigerant level is low, check the system for leaks.

5.1.1.1 Air Filters

Air filters are usually the most neglected item in an air conditioning system. To maintain efficient operation, the filters should be checked at least monthly and replaced as required.

NOTE

Conditions of spaces vary and the frequency of checking air filters should be based on those conditions.

The air filters are accessed from inside the cabinet. To change the air filters, open the filter access door on the front of the cabinet. Remove the old filters from the trays. Insert the new filter(s), ensuring the directional airflow arrows on the filters are correct, then close the filter access door.

5.1.1.2 EC Fan(s)

Periodic checks of the fan(s) should include checking the fan motor mounts, housing and impeller wheel. Check that all mounts are secure and the impeller wheel is tightly mounted. The impeller blades should be kept free of debris.

5.1.1.3 Drain Pan

To ensure proper drainage, inspect the drain pan regularly. Make sure the drain pan outlets are always free of debris and ensure the drain pan does not leak. Check that the drain lines are open and water can pass through them freely.

5.1.1.4 Coils

Coils should be inspected semi-annually and cleaned as required, following standard evaporator coil cleaning practices. Using a brush, clean the coil fins of all debris that will inhibit airflow. This can also be done with compressed air or with a commercial coil cleaner. Check for bent or damaged coil fins and repair as necessary. Check all refrigerant lines and capillaries for vibration isolation and support as necessary. Check all piping for signs of leaks.

5.1.1.5 Condenser

For air-cooled condensers, clean the condenser coil of all debris that will inhibit airflow. This can be done with compressed air or with a commercial coil cleaner. On outdoor units in winter, do not permit snow to accumulate on or around the condensing unit. Check all refrigerant lines and capillaries for vibration isolation and support as necessary. Check all refrigerant lines for signs of leaks.

5.2 Troubleshooting

Turn off all power to the unit before conducting any troubleshooting procedures, unless the procedure specifically requires the system to operate. For troubleshooting purposes, the system may be operated with the main power disconnect switch in the On position. **When the switch is turned on, high voltage is present inside the cabinet.**

WARNING

To prevent injury, keep hands, clothing and tools clear of the electrical terminals and rotating components. Ensure that your footing is stable at all times.

SYMPTOM	PROBABLE CAUSE	RECOMMENDATION
Suction Pressure Too Low	a. Dirty air filters (reduced airflow).	Clean/replace filters.
	b. Loss of refrigerant (excessive bubbles in sight glass).	Locate leak, evacuate system and repair leak. Recharge system.
	c. Clogged filter/drier (feels cold).	Replace with new filter/drier.
	d. Expansion valve stuck or obstructed (short cycle or continuous running).	Remove and clean or replace valve.
Evaporator Coil Ices	a. Low airflow.	1. Check filters. Replace as needed. 2. Check for and clear any obstructions across or in the (supply) discharge airstream. 3. Ensure evaporator fan is operating 4. Check fan speed. Increase if needed using the system controller.
	b. Temperature setting too low	Increase temperature setpoint. (68°F min.).
	c. Discharge air short circuiting back to return.	Check discharge airflow orientation in the conditioned space.
	d. Low refrigerant charge.	Find leak, repair and recharge system.
Evaporator Fan(s) Fail to Start	a. Power failure.	1. Check main power source voltage. 2. Check power input cable.

SYMPTOM	PROBABLE CAUSE	RECOMMENDATION
Evaporator Fan(s) Fail to Start (Continued)	b. Motor starter protector tripped.	Reset motor starter protector and check amperage of motor.
	c. Control transformer circuit breaker tripped.	Check for short circuit or ground fault, if none, reset circuit breaker.
	d. No control signal to fan(s).	Check for "Comm Loss" alarm message. Check modbus control wiring.
	e. EC fan's internal overheat protection interrupted fan motor operation.	Determine the cause of overheating and repair. To reset fan(s), turn off power supply for 20 seconds.
Control is Erratic	Wiring improperly connected or broken.	Check wiring against schematic diagram.
Condenser Pressure Too High	a. Non-condensable gas or air in the refrigeration system.	Recover refrigerant. Replace filter/drier. Evacuate to 50 microns and recharge.
	b. Condenser air intake is blocked.	Remove debris and clean condenser.
	c. Overcharge of refrigerant.	Reclaim excess refrigerant from system.
	d. Condenser fan not operating.	Check pressure/temperature operating switches and motor. Replace as needed.
	e. Control pressure set too high	Adjust setting to obtain correct pressure.
Condenser Pressure too Low	a. Loss of refrigerant (indicated by excessive bubbles in sight glass).	Locate leak, evacuate system and repair leak. Recharge system.
	b. Condenser fan controls not set properly.	Adjust or repair controls.
	c. Control pressure set too low.	Readjust to 440 psig.
Noisy Compressor	a. Expansion valve stuck in open position (abnormally cold suction line).	Ensure feeder bulb is tight on suction line. Check operation and superheat.
	b. Worn or scarred compressor bearings.	Replace compressor.
	c. Liquid slugging.	System overcharged. Reclaim excess refrigerant.

SYMPTOM	PROBABLE CAUSE	RECOMMENDATION
Noisy Compressor (Continued)	d. Scroll compressor not properly phased.	Phase correctly at main power source. **DO NOT REWIRE COMPRESSOR.**
Compressor Fails to Start	a. Temperature setpoint too high.	Adjust to desired temperature.
	b. Compressor internal protector is open.	Check compressor for short circuit or ground.
	c. Complete loss of refrigerant charge (low pressure safety switch).	Locate and repair leak. Recharge system.
	d. Condenser pressure too high (high pressure safety switch).	Check condenser for obstructions.
	e. Minimum off time has not expired.	Wait for time to expire.
System Short of Capacity	a. Low refrigerant (indicated by excessive bubbles in sight glass).	Check for leaks. Repair and recharge system.
	b. Expansion valve stuck or obstructed (short cycling or continuous running).	Remove valve and clear obstruction or replace valve.
	c. Clogged filter/drier (feels cold).	Replace with new filter/drier.
	d. Reduced airflow.	Check fan speed setting, air filters and evaporator coil.
Compressor Short Cycles	a. Low line voltage causing compressor to overheat.	Check power source for cause of low line voltage.
	b. Dirty or iced-over evaporator coil.	Defrost and/or clean coil.
	c. Reduced airflow.	Check air filters and supply fan speed setting (when applicable).
	d. Low refrigerant charge.	Check for leak. Repair and recharge system.
	e. Short circuiting of conditioned air.	1. Supply and/or return grilles are incorrectly oriented. Reorient grilles. 2. Supply and return grilles are too close together. Move further apart. 3. Insufficient heat load. Add temporary heat load to compensate.
	f. Return temperature sensor is improperly located.	Check for supply registers that may be too close to the return temperature sensor. Relocate sensor if necessary.

5.3 Field Service

NOTE

Do not attempt to make repairs without the proper tools.

It may be necessary to perform repairs on the refrigeration system. If field repairs are necessary, the following procedures apply:

WARNING

If refrigerant gas is released in an enclosed area it will displace oxygen and act as a suffocant. Always ensure adequate ventilation during refrigeration repairs.

WARNING

Always recover all refrigerant prior to any system repairs, failure to do so may result in system over pressurization and rupture.

5.3.1 Leak Detection

Several methods can be used to detect a leak in the refrigeration system. The most modern and easiest method is to use an electronic leak detector. Follow the manufacturer's directions and any leak can be quickly located. A second method is to use soap bubbles. Apply a solution of soapy water with a brush or sponge to the joints and connections in the refrigerant lines. A leak in the lines will cause bubbles to form.

5.3.2 Leak Repair

When a leak is located, properly reclaim the remaining refrigerant charge before beginning repairs. Adjacent piping must be thoroughly cleaned by removing all paint, dirt and oily film. Use a wire brush, sandcloth or sandpaper and wipe the area with clean, dry cloths. Protect nearby parts from heat damage by wrapping with water-soaked cloths.

5.3.3 Refrigerant Piping

When replacing components within the cabinet of the unit, the following consumable materials are recommended: Use Silfos alloy for copper-to-copper (piping discharge or suction line repairs). Silver solder (Stay-Silv #45) and flux are to be used on copper-to-brass or copper-to-steel repairs. For liquid line repairs at the drier, strainer, sight glass, or expansion valve, use a 95% tin to 5% antimony solder with flux.

When component replacement is complete, remove all traces of flux. After any repair, pressure check the system to check for leaks prior to recharging the system.

5.3.4 General Common Repairs/ Component Replacement

5.3.4.1 Compressor Failure

The compressor is the most important component of the air conditioner. Numerous safety devices are provided to protect the compressor from failing.

If a compressor failure has occurred, determine whether it is an electrical or a mechanical failure. An electrical failure will be indicated by the distinct pungent odor once the system has been opened. If a burnout has occurred, the oil will be black and acidic. A mechanical failure will have no burned odor and the motor will attempt to run, an abnormal or excessive noise may be present.

An analysis of the oil is the only way to determine the proper procedure for cleaning the refrigerant system. Acid test kits are available from several manufacturers for measuring the acid level in the oil. These are capable of making accurate acid measurements, but if they are not available, a check of the oil by sight and smell can give a quick indication if contamination remains in the system. Since refrigeration oils vary in color, a sample of the new oil in the replacement compressor should be removed prior to installation and sealed in a small glass bottle for comparison purposes. If the oil has been exposed to refrigerant, the bottle should not be tightly capped, since the residual refrigerant may create a high pressure if tightly sealed and exposed to high temperature.

CAUTION

Avoid touching or contacting the gas and oil with exposed skin. Severe burns will result. Use long rubber gloves in handling contaminated parts.

All electrical connections should be checked to ensure they are tight and properly made. Check all circuit breakers, contactors and wiring. The contactors should be examined and replaced if contacts are worn or pitted.

If there is acid in the oil, there has been an electrical failure which has caused the compressor motor to burn out. The acid diffuses throughout the refrigeration system and must be removed by using a burnout filter kit before a new compressor is placed in service. Not only must the compressor be replaced, but also the entire refrigeration circuit must be cleaned of the harmful contaminants left by the burnout. See section 5.3.4.3 (Burn-Out/Acidic Cleanup) for the proper

cleaning procedure.

If there is no acid in the oil, there has been a mechanical failure. See section 5.3.4.2 (Standard Cleanout) for the proper cleaning procedure.

CAUTION ⚠

Damage to a replacement compressor caused by improper system cleaning constitutes abuse under the terms of the warranty. This will **VOID THE COMPRESSOR WARRANTY.** Always consult the factory prior to replacing the compressor.

CAUTION ⚠

POE oil is used in systems with R410A refrigerant. If a replacement compressor is provided, ensure that it is filled with POE oil before installing.

5.3.4.2 Standard Cleanout Procedure

NOTE

Cleaning operations must be performed by a journeyman, refrigeration mechanic, or air conditioning technician.

1. Turn off power to the unit at the main power disconnect switch.
2. Remove the old compressor and install the new compressor.
3. Remove the liquid line drier and install an oversized liquid line filter-drier (one size larger than the normal selection size).
4. Evacuate the system according to standard procedures. Normally, this will include the use of a high-vacuum pump and a low-vacuum micron gauge for measuring the vacuum obtained.
5. Recharge the system.
6. Turn on the power at the main power disconnect switch and start the system at the controller.

5.3.4.3 Burn-Out/Acidic Cleanup Procedure

CAUTION ⚠

Avoid touching or allowing the gas and oil from contacting bare skin. Severe burns will result. Use long rubber gloves to handle contaminated parts.

NOTE

Cleaning operations must be performed by a journeyman, refrigeration mechanic, or air conditioning technician.

1. These systems should be cleaned using the suction line filter-drier method.
2. Turn off power to the unit at the main power disconnect switch.
3. Remove the burned out compressor and install the new compressor.
4. Install a suction line filter-drier designed for acid removal.
5. Remove the liquid line drier and install an oversized liquid line filter-drier (one size larger than the normal selection size).
6. Check the expansion valve, sight glass and other controls to see if cleaning or replacement is required.
7. Evacuate the system according to standard procedures. Normally, this will include the use of a high-vacuum pump and a low-vacuum micron gauge for measuring the vacuum obtained.
8. Recharge the system through the access valve on the suction line filter-drier.
9. Turn on power at the main power disconnect switch and start the system at the controller.
10. The permanently installed suction line filter-drier permits small-system cleanup to be completed in one service call. The pressure drop across the suction line filter-drier should be measured during the first hour of operation. If the pressure drop becomes excessive, the suction line filter-drier should be replaced (See Sporlan Bulletin 40-10, for the maximum recommended pressure drop (PSI) for the suction line filter drier).
11. In 24 hours, take an oil sample. Observe the color and test for acidity. If the oil is dirty or acidic, replace the suction line filter-drier.
12. In 2 weeks, examine oil to determine if another suction line filter-drier change is necessary.

6.0 PRODUCT SUPPORT

STULZ Product Support provides aftermarket technical and field support, warranty authorization and part sales to contractors and end users. Factory authorized services are available by request and include:

- Factory Authorized Start-up/Warranty Inspection
- Commissioning Assistance
- Break Fix Repair
- Preventive Maintenance Contracts
- Performance Evaluations
- Technician and Owner Training

6.1 Factory Authorized Start Up/Warranty Inspection

STULZ recommends purchasing Factory Authorized Start Up/Warranty Inspection for all new STULZ precision cooling equipment. Factory Authorized Start Up/Warranty Inspection ensures that your equipment is installed and operating per STULZ recommended guidelines. This essential service guarantees that STULZ equipment has the best warranty coverage available.

STULZ precision cooling equipment is covered by an industry leading 24 Month Upgraded Parts Warranty and 90 Day Labor Warranty once Factory Authorized Warranty Inspection/Start-Up is performed and Start Up Checklists are returned and validated by STULZ Product Support.

A Limited 12 Month Parts Only Warranty applies if Factory Authorized Start Up/Warranty is not purchased and Start Up Checklists are received from an unauthorized party and validated by STULZ Product Support.

The STULZ Product Support coordinates all Factory Authorized Services and ensures only STULZ certified technicians are dispatched to perform your Factory Authorized Start Up/ Warranty Inspection. Please contact the STULZ Product Support with field service requests at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST.

6.2 Technical Support

The STULZ Technical Support Department is dedicated to the prompt reply and resolution of issues experienced with supplied equipment. Please contact (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. After hours support is also available. Please provide your name and contact information and a support technician will return your call.

When calling to obtain support, it is important to have the following information readily available, (information is found on the units' nameplate):

- Unit Model Number
- STULZ Sales Order Number
- STULZ Item Number
- Unit Serial Number
- Description of Problem

6.3 Obtaining Warranty Parts

All Warranty Parts Authorizations are validated and processed through the Technical Support Department at (888) 529-1266 Monday through Friday from 8:00 a.m. to 5:00 p.m. EST. A support technician at STULZ will provide troubleshooting assistance over the telephone. If it can be determined that a part may be defective, a warranty authorization for a replacement part will be processed by STULZ Technical Support. The replacement part will then be shipped via UPS ground. If the customer requests that warranty part(s) be sent by any other method than UPS ground, the customer is responsible for the shipping charges. If you do not have established credit with STULZ you must provide a freight carrier account number.

A written (or faxed) purchase order is required on warranty parts and must be received prior to 12:00 p.m. for same day shipment. The purchase order must contain the following items:

- Purchase Order Number
- Date of Order
- STULZ Stated Part Price
- Customer Billing Address
- Shipping Address
- Customers' Telephone and Fax Numbers
- Contact Name
- Unit Model No., Serial No. & STULZ Item No.

The customer is responsible for the shipping cost incurred for returning the defective part(s) back to STULZ. Return of defective part(s) must be within 30 days at which time an evaluation of the part(s) is conducted and if the part is found to have a manufacturing defect a credit will be issued.

When returning defective part(s), complete the Return Material Authorization Tag and the address label provided with the replacement part. For prompt processing, please affix the RMA in a prominent place on the external packaging of the returned part.

6.4 Obtaining Spare/Replacement Parts

Maintaining a recommended spare parts inventory is an industry best practice for critical facilities. Onsite spares kits reduce downtime and can eliminate the cost of expedited freight charges. Recommended spares and replacement parts sales are available through Product Support at (888) 529-1266.

STULZ accepts Visa and MasterCard. STULZ may extend credit to its customers; a credit application must be prepared and approved (this process could take one week).

A 25% minimum restocking charge will be applied on returned stocked parts that were sold as spare/replacement parts. If the returned part is not a stocked item, a 50% restocking charge may be applied. Additionally a Return Material Authorization Number is required when returning parts. To receive credit for returned repair/replacement parts, the parts must be returned to STULZ within 30 days of the purchase date. Spare part sales over 30 days old will be considered final and the parts will remain the sole property of the ordering party.

STULZ CyberPack Series

FORMS

STULZ Air Technology Systems Inc.
Frederick, Maryland USA 21704
Telephone: (301) 620-2033 Facsimile: (301) 620-1396

Checklist for Completed Installation

- ❑ 1 Proper clearances for service access have been maintained around equipment.
- ❑ 2 Equipment is level and mounting fasteners are tight.
- ❑ 3 Condensate drain line connected and P-trap is filled with water.
- ❑ 4 Filter(s) installed.
- ❑ 5 Duct plenums sealed.
- ❑ 6 Incoming line voltage matches equipment nominal nameplated rating ± tolerances.
- ❑ 7 Main power wiring connections to the equipment, including earth ground, have been properly installed.
- ❑ 8 Customer supplied main power circuit breaker (HACR type) or fuses have proper ratings for equipment installed.
- ❑ 9 All wiring connections are tight.
- ❑ 10 Control wiring connections completed to wall mounted sensors.
- ❑ 11 Foreign materials have been removed from inside and around all equipment installed (shipping materials, construction materials, tools, etc.).
- ❑ 12 Inspect all piping connections for leaks during initial operation.

Frederick, Maryland USA 21704

Telephone: (301) 620-2033
Facsimile: (301) 620-1396

STULZ CyberPack Series

Periodic General Maintenance Checks and Services Checklist

Date: _____ Prepared By: _____

Model Number: _____ Serial Number:_____

Item Number: _____

Monthly

Filters

- ❑ Cleanliness
- ❑ No Obstructions

Fan Section

- ❑ Fan(s) Turn Freely
- ❑ Setscrews Tight
- ❑ Wiring Terminations Secure No Discoloration

Condensate Drain

- ❑ Drain is Open
- ❑ Condensate Pan Safety Switches Operate Freely

Miscellaneous

- ❑ Condenser Coils Clean and Clear of Obstructions
- ❑ All Hardware and Fasteners Securely Tightened
- ❑ Controls Operate Properly

Semi-Annually

- ❑ Check Refrigerant Charge. Verify Proper Superheat and Sub-cooling. Also check Suction & Discharge Pressure.
- ❑ Clean Unit as Necessary
- ❑ Clean Coils
- ❑ Tighten Electrical Connections
- ❑ Check Contacts on Contactors for Pitting
- ❑ Flush Condensate Drain

Annually

- ❑ Inspect System for Leaks and Corrosion
- ❑ Conduct a Complete Check of All Services Listed Above and Clean Units Interior

Notes: _____

_____

_____

Signature:_____

*** If factory assistance is required for any reason, provide the model number, serial number and STULZ item number found on the unit nameplate. This will speed the process and ensure accuracy of information. ***

Glossary

Definition of Terms and Acronyms

STULZ - STULZ Air Technology Systems, Inc.

BMS - Building Management System

BTU/Hr - British Thermal Units Per Hour

CFM - Cubic Feet Per Minute

CNDCT - Conductor

ESD - Electrostatic Discharge

°F - Degrees Fahrenheit

FLA - Full Load Amps

FOB - Free on Board

HACR - Heating, Air Conditioning, Refrigeration

HP - Horse Power

Hz - Hertz

IAQ - Indoor Air Quality

in. w.g. - Inches of Water Gauge

kVA - Kilo Volt Amps

kW - Kilowatt

LEWT - Low Entering Water Temperature

LRA - Locked Rotor Amps

MAX CKT BKR - Maximum Circuit Breaker

MAX FUSE - Maximum Fuse

MCA - Minimum Circuit Ampacity

MSDS - Material Safety Data Sheet

NEC - National Electric Code

NFPA - National Fire Protection Agency

PH - Phase

PSI - Pounds Per Square Inch

PSIG - Pounds Per Square Inch Gauge

RLA - Run Load Amps

R-Value - Thermal Resistance

R410A - Blended Refrigerant

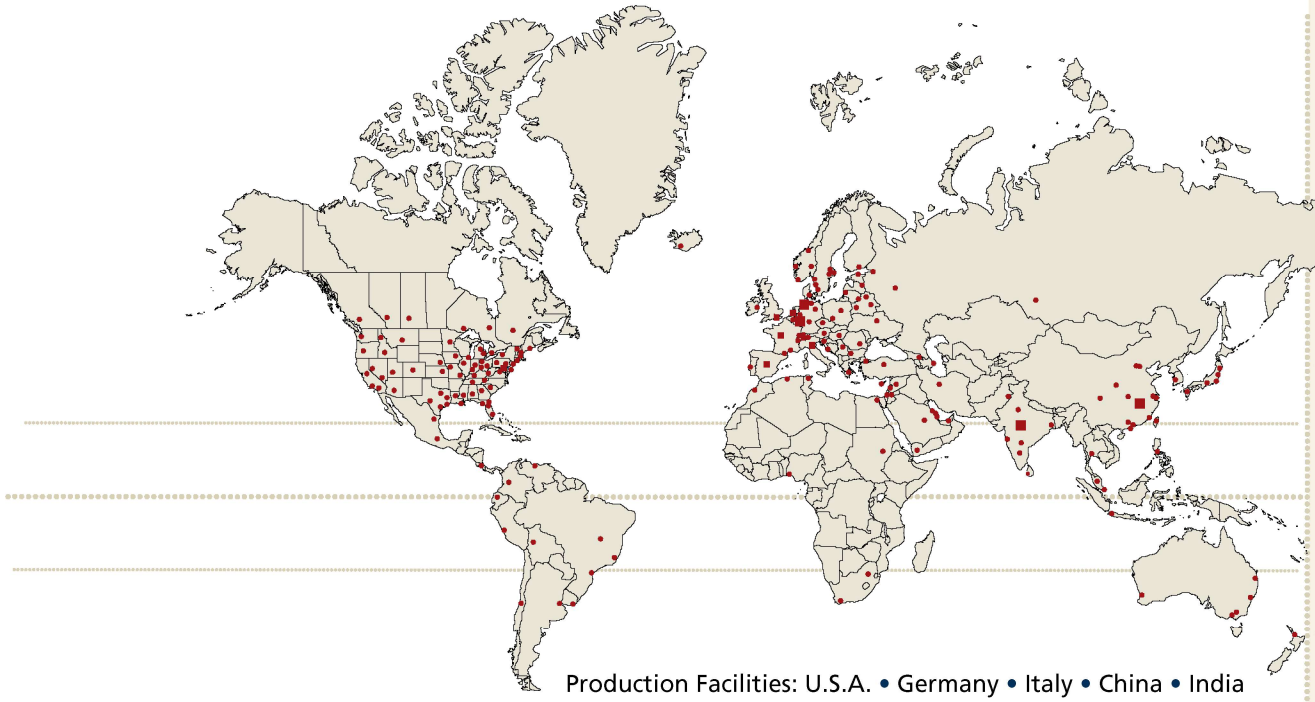
SPDT - Single Pole, Double Throw

TEV - Thermal Expansion Valve

V - Volt

VAC - Volt, Alternating Current

VDC - Volt, Direct Current



Production Facilities: U.S.A. • Germany • Italy • China • India

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

STULZ Air Technology Systems, Inc.
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ISO-9001 Quality Management System - Requirements

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