



MILLENNIUM™
AIR COOLED SCREW LIQUID CHILLERS
POWER WIRING INFORMATION

ENGINEERING SUPPLEMENT

Supersedes: 201.18-EG1 (Supl. 1) (598)

Form 201.18-ES2 (699)

GENERAL

The YORK YCAS style 'F' brings you and your customers the widest power wiring flexibility available. This Engineering Supplement summarizes the various power wiring approaches, which are available as listed in your Price Sheet. Brief comments are offered regarding National Electric Code (NEC) requirements, wiring arrangements, Part Identification Number (PIN), simple schematic illustrations, and advantages/disadvantages.

OVERVIEW

Compressor & Fan Power Supplies – Systems of 120 to 420 tons, using 2, 3, & 4 compressors are covered. These include multiple point (standard or optional), single point (optional) and numerous options using factory mounted/wired non-fused disconnect switches or circuit breakers.

Control Power Supply (120-1-50/60) – This covers the standard unit which includes the control transformer as standard and the option of providing the control terminal block instead of the standard control transformer.

LEGEND

The following are a listing of abbreviations or simplifications, which will be seen as you look over the power wiring information.

- ACL = ACROSS-THE-LINE START
- CB = CIRCUIT BREAKER
- CMP HTR = COMPRESSOR HEATER
- CT = CONTROL TRANSFORMER
- DEF = DUAL ELEMENT FUSES
- HACR = Heating, Air Conditioning & Refrigeration
- MP = MULTIPLE POINT
- PAN = LOGIC CONTROL PANEL
- STD = STANDARD
- SW = NON-FUSED DISCONNECT SWITCH
- TB = TERMINAL BLOCK
- Y-D = WYE (STAR)-DELTA START



LD04607

FACTORY INSTALLED STANDARD OR OPTIONAL WIRING WHICH IS U.L. LISTED.



FIELD WIRING **BY OTHERS** WHICH MUST COMPLY WITH THE NATIONAL ELECTRICAL CODE (NEC), LOCAL CODE REQUIREMENTS, & OF **COPPER CONDUCTORS ONLY**.



NOTE: SINGLE LINES (SOLID OR DOTTED) ARE SHOWN FOR ILLUSTRATION SIMPLICITY; MULTIPLE CONDUCTORS (WIRES) & ARE TYPICALLY REQUIRED IN THE ARRANGEMENTS WHICH FOLLOW.

NEC INTEREST ITEMS

Disconnecting Means (NEC 440-14) – This requires that a disconnecting means shall be installed within sight of the equipment. The device may be installed on the equipment. [NEC 440-14 includes an exception that waives this “within sight” requirement for industrial facilities having qualified maintenance personnel and procedures. Engineers should see 440-14 for details.]

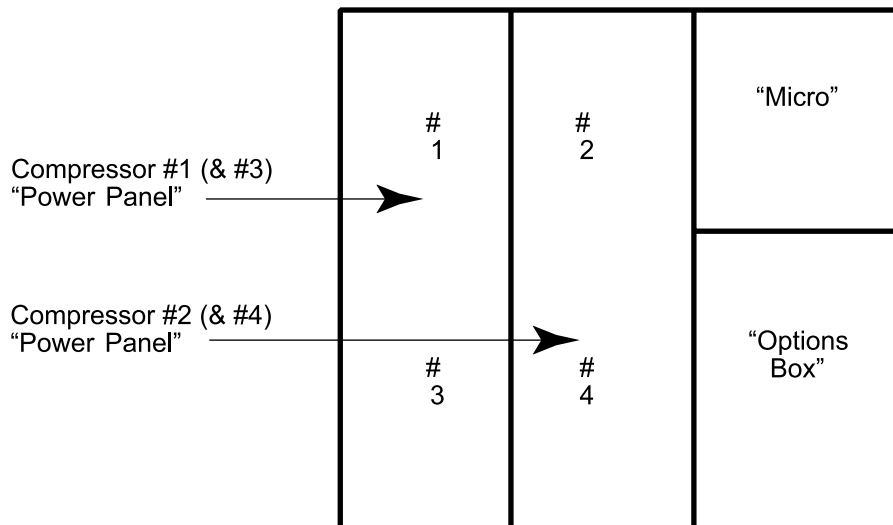
Fuses or Circuit Breakers (NEC 440-21 & 22) – If an air conditioner has been evaluated by U.L., ETL or similar testing agency for **fuses** and **HACR** type circuit breakers, these must be stamped on the nameplate. If the equipment includes properly rated internal compressor motor protection {short circuit and over load; e.g., via optional **factory mounted circuit breakers**}, conventional U.L. listed circuit breaker(s) may be used in the equipment incoming power wiring, in lieu of fuses.

Agency Listed Equipment (NEC 90-7) – NEC honors equipment which has been reviewed, tested and listed by recognized electrical testing organizations, i.e., U.L., ETL, etc. It is the intent of the NEC code that factory-installed wiring or the construction of the equipment need not be inspected at the time of installation, if the equipment has been listed by a qualified testing laboratory. Thus, local inspectors will accept U.L. or ETL labeled equipment, such as these DX chillers.

Electrical Data Basis – Please refer to the notes in the Electrical Data section of the Engineering Guide where the formulae or rules are detailed of how the calculations or selections have been made for the minimum circuit ampacity (MCA), dual element fuse sizing (minimum & maximum), and disconnect switch sizing (minimum & maximum). All of these values are in accordance with the appropriated NEC or U.L. requirements.

YCAS ELECTRICAL CENTER ORIENTATION

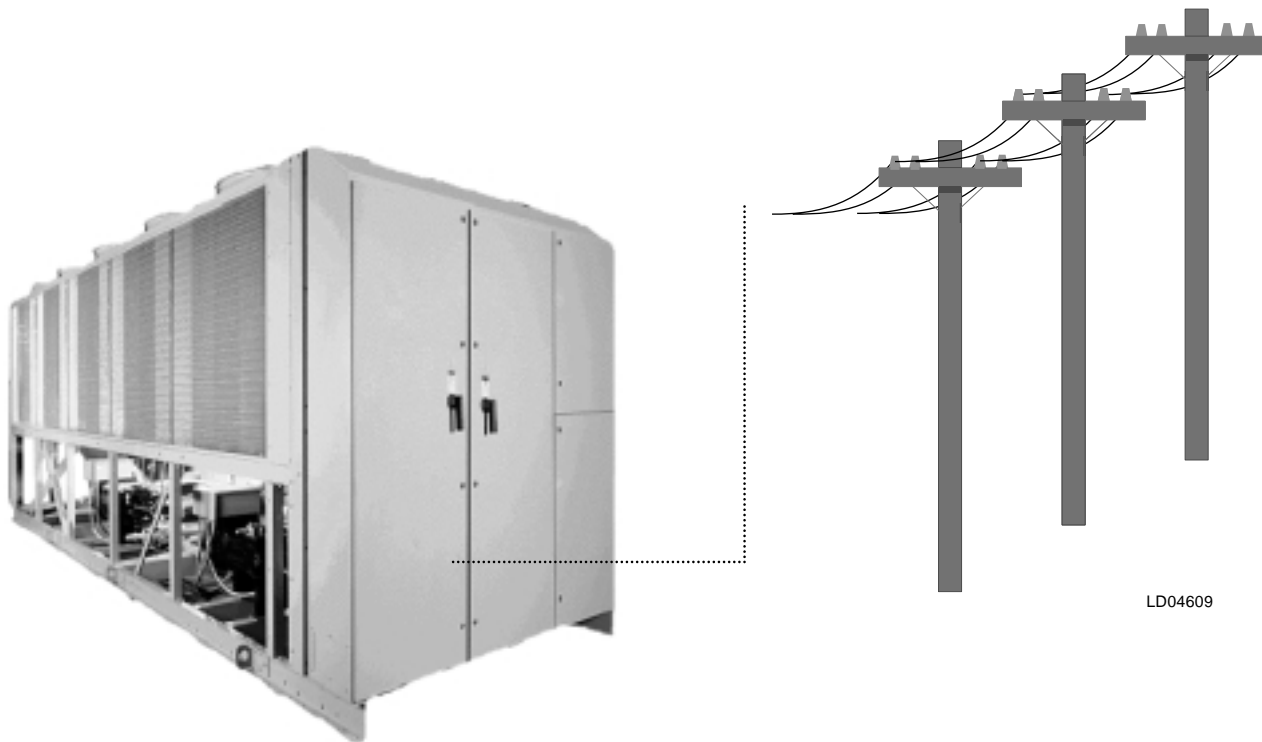
The following illustrate the YCAS electrical center orientation.



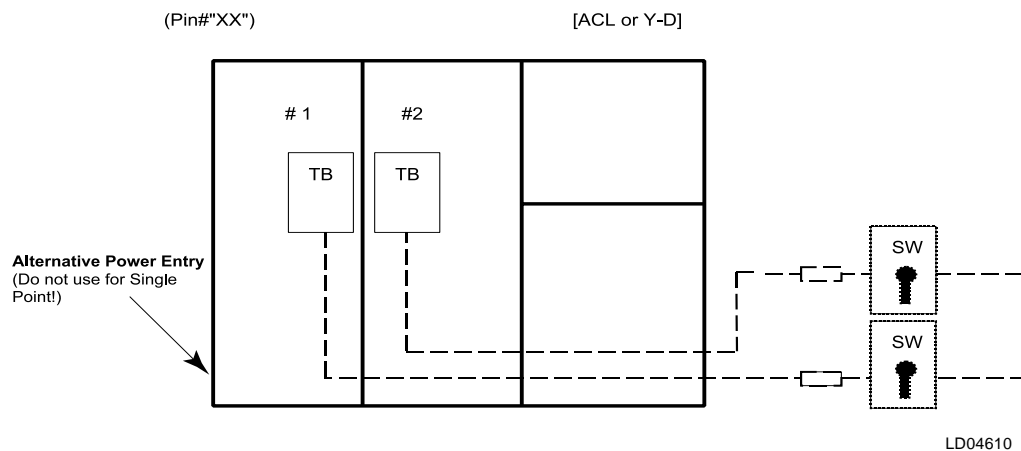
LD04608

POWER WIRING POSSIBILITIES (2 COMPRESSOR SYSTEMS)

In the next series of illustrations, the available YCAS two compressor power wiring options are shown. The key advantages and disadvantages are concisely highlighted to allow you to quickly understand what the different approaches can mean to you and your customers.



STANDARD MULTIPLE POINT TERMINAL BLOCKS



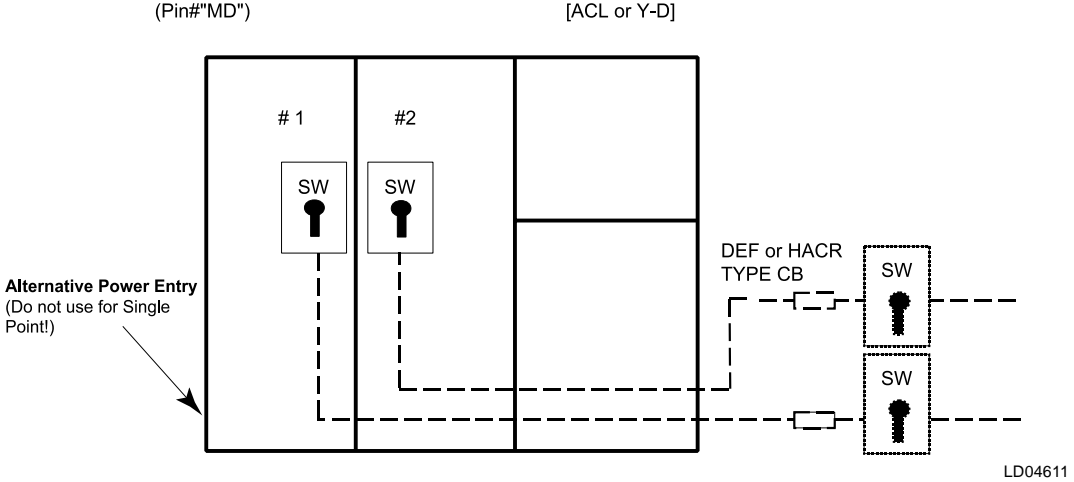
Advantages

- Widest flexibility for maintenance & service.
- Can disconnect the power to each refrigerant circuit, while maintaining power to the other system.
- Lowest “first cost” chiller configuration.

Disadvantages

- More than one disconnect switch to turn off.
- Labor & cost of field provided switchgear.

MULTIPLE POINT WITH SEPARATE SYSTEM NON-FUSED DISCONNECT SWITCHES



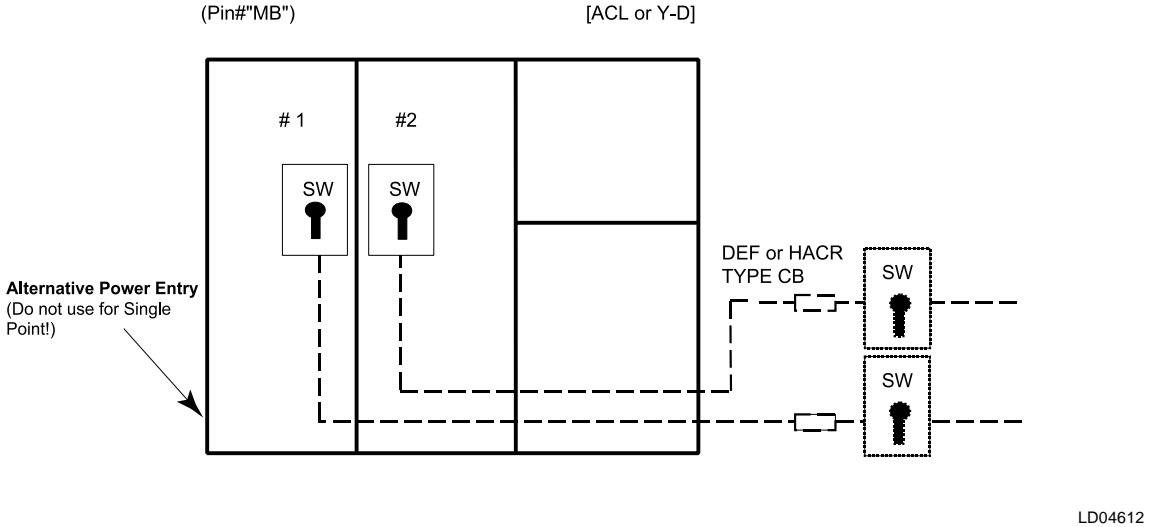
Advantages

- Widest flexibility for maintenance & service.
- Can disconnect the power to each refrigerant circuit, while maintaining power to the other system.
- Lowest "first cost" chiller configuration.

Disadvantages

- More than one disconnect switch to turn off.

MULTIPLE POINT WITH SEPARATE SYSTEM CIRCUIT BREAKERS



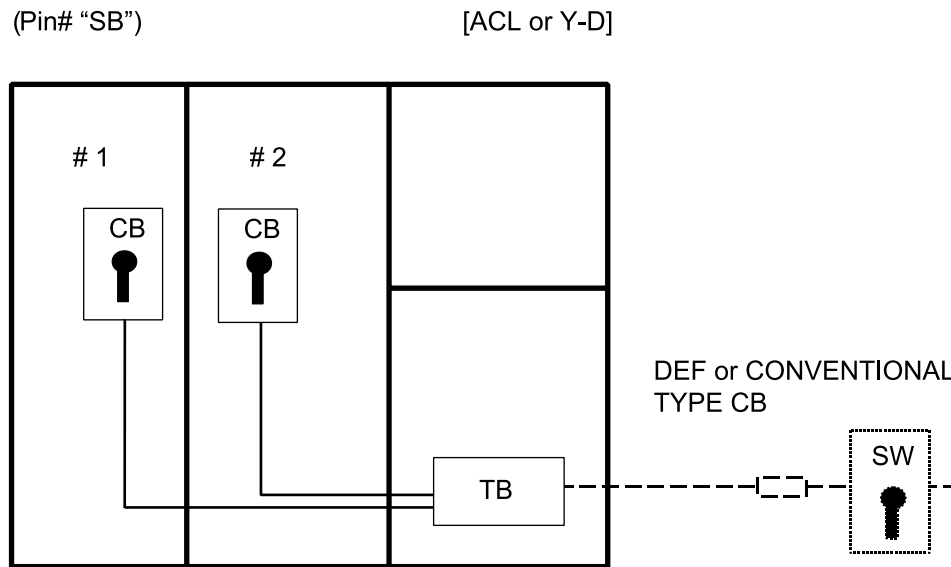
Advantages

- Widest flexibility for maintenance & service.
- Can disconnect the power to each refrigerant circuit, while maintaining power to the other system.
- Can eliminate switch adjacent to the unit.

Disadvantages

- More than one disconnect switch to turn off.

SINGLE POINT TERMINAL BLOCK WITH SEPARATE SYSTEM CIRCUIT BREAKERS



LD04613

Advantages

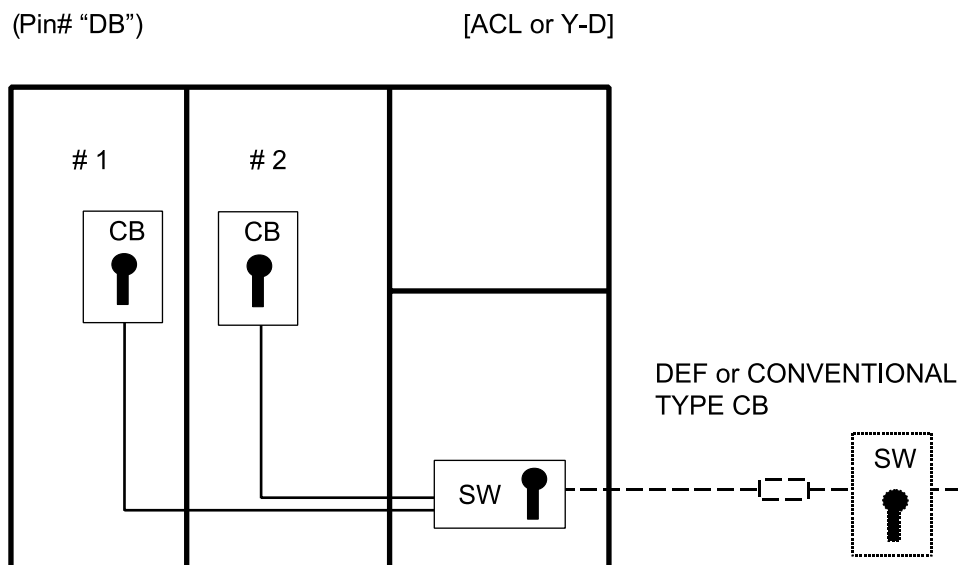
- Typically less field labor and material are required; therefore, a slightly reduced "installation cost" results with a single unit power supply.
- Can disconnect the power to each refrigerant circuit, while maintaining power to the other system.
- Allows the use of dual element fuses or field supplied conventional U.L. listed circuit breaker in the incoming power wiring (In lieu of the slightly more expensive and limited size availability of HACR type circuit breakers).
- Unlike fuses, all three legs of the power are interrupted in the event of a trip.

SINGLE POINT NON-FUSED DISCONNECT

Disadvantages

- There would be a slightly greater chiller "first cost".

SINGLE POINT NON-FUSED DISCONNECT WITH SEPARATE SYSTEM CIRCUIT BREAKERS



LD04614

Advantages

- Typically less field labor and material are required; therefore, a slightly reduced "installation cost" results with a single unit power supply.
- Can disconnect the power to each refrigerant circuit, while maintaining power to the other system.
- One switch disconnects the power to the entire unit.
- Can eliminate the switch adjacent to the unit.
- Allows the use of dual element fuses or field supplied conventional U.L. listed circuit breaker in the incoming power wiring (In lieu of the slightly more expensive and limited size availability of HACR type circuit breakers).
- Unlike fuses, all three legs of the power are interrupted in the event of a trip.

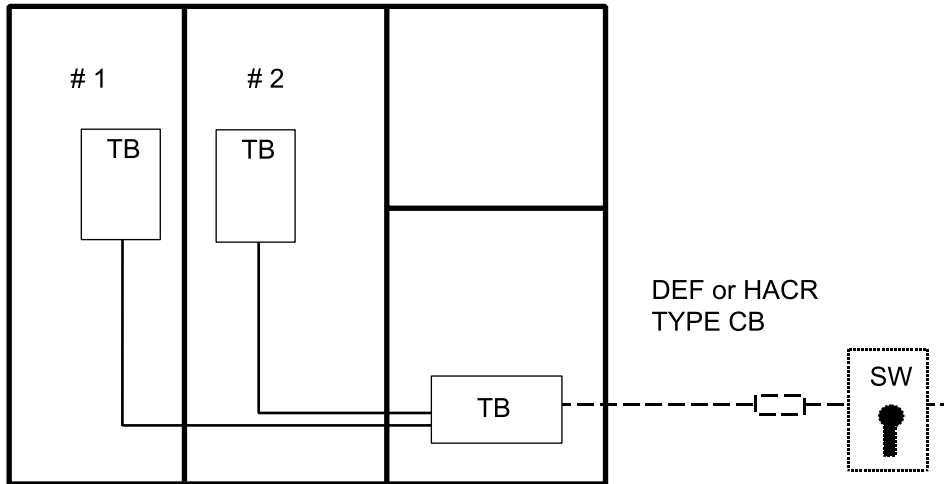
Disadvantages

- There would be a slightly greater chiller "first cost".

SINGLE POINT TERMINAL BLOCK

(Pin# "SX")

[ACL only: not available for Y-D]



LD04615

Advantages

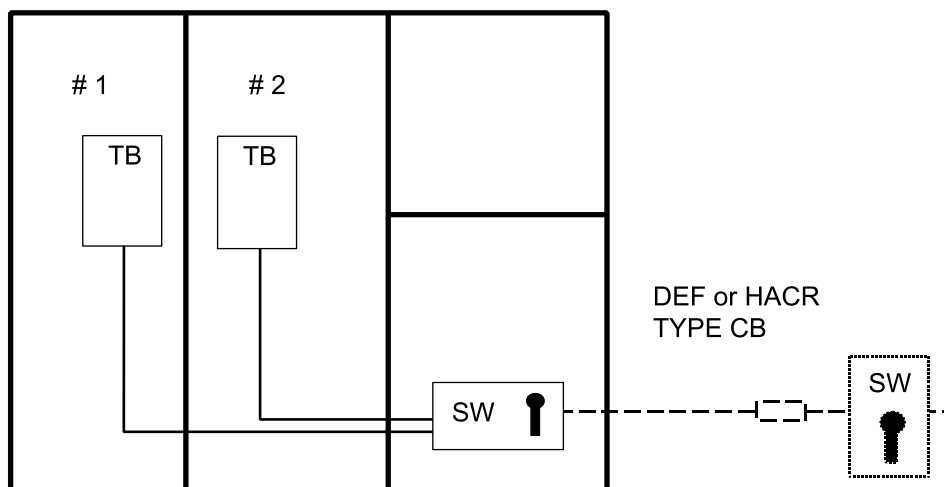
- Typically less field labor and material are required; therefore, a slightly reduced "installation cost" results with a single unit power supply.
- Allows for one power supply to the entire unit.
- One can kill the power to all compressors from one field switch adjacent to the unit.
- This is the lowest "first cost" single point configuration.

Disadvantages

- There would be a slightly greater chiller "first cost".
- There is no disconnect switch to disconnect power to one compressor, while maintaining power to the other.
- Not available with Wye (Star) – Delta.
- This requires the use of dual element fuses or more expensive and limited size availability of HACR type circuit Breakers (in lieu of conventional U.L. listed type) in the incoming power wiring supply.

SINGLE POINT NON-FUSED DISCONNECT

(Pin# "SD")

[ACL only: not available for Y-D]

LD04616

Advantages

- Typically less field labor and material are required; therefore, a slightly reduced “installation cost” results with a single unit power supply.
- Allows for one power supply to the entire unit.
- One can kill the power to all compressors from one switch.

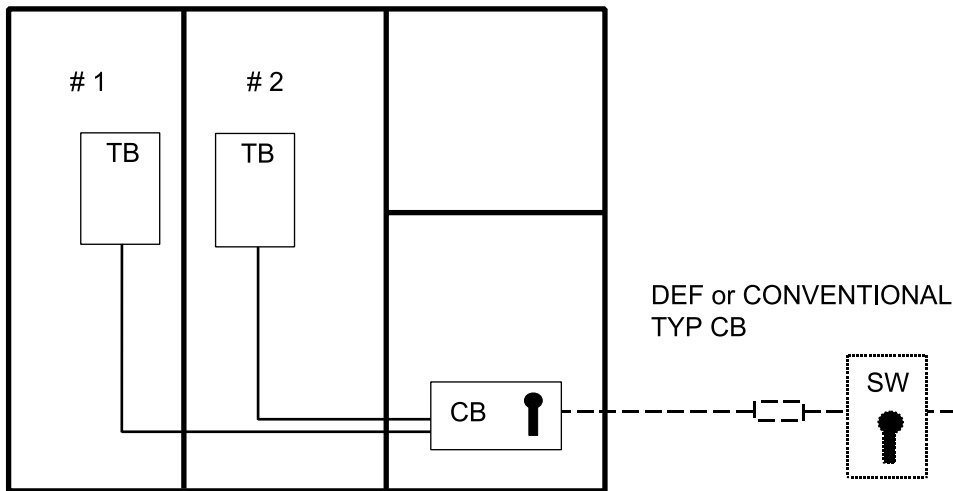
Disadvantages

- There would be a slightly greater chiller “first cost”.
- There is no disconnect switch to disconnect power to one compressor, while maintaining power to the other.
- Not available with Wye (Star) – Delta.
- This requires the use of dual element fuses or more expensive and limited size availability of HACR type circuit Breakers (in lieu of conventional U.L. listed type) in the incoming power wiring supply.

SINGLE POINT CIRCUIT BREAKER

(Pin# "BX")

[ACL only: not available for Y-D]



LD04617

Advantages

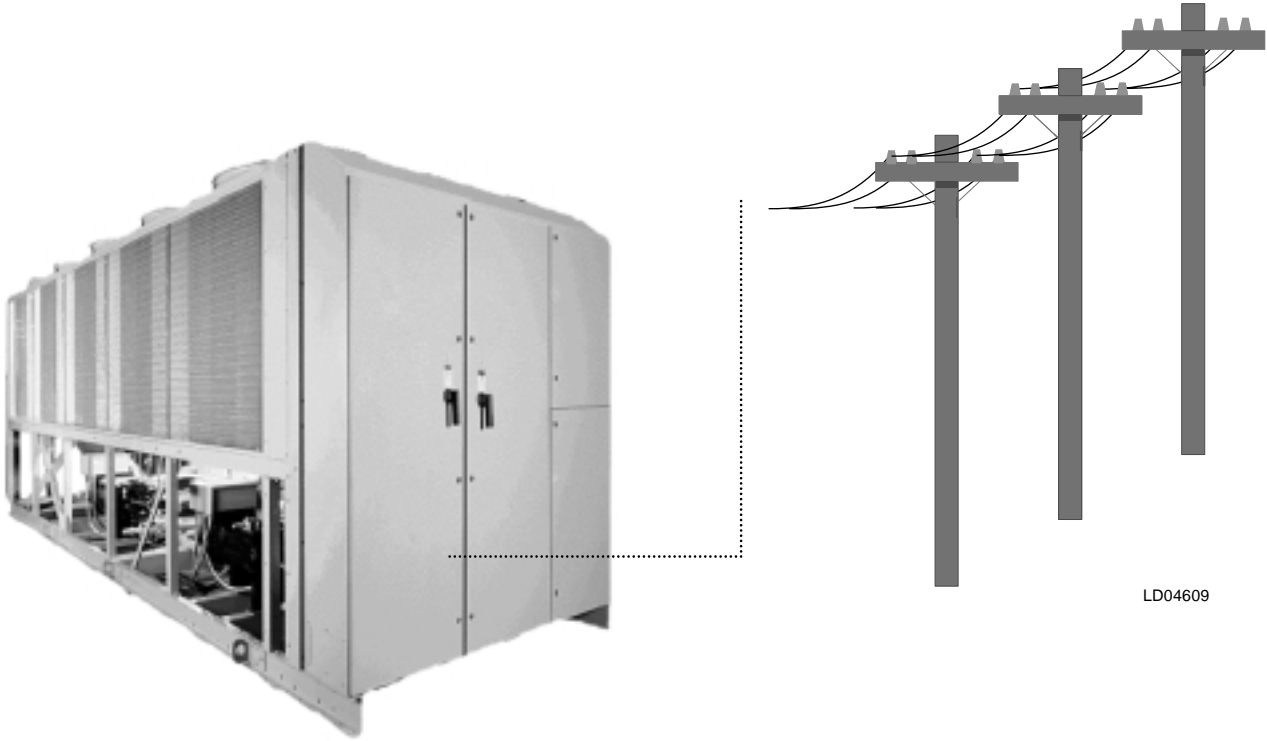
- Typically less field labor and material are required; therefore, a slightly reduced "installation cost" results with a single unit power supply.
- Allows for one power supply to the entire unit.
- One can kill the power to all compressors from one switch.
- Allows the use of dual element fuses or field supplied conventional U.L. listed circuit breaker in the incoming power wiring (In lieu of the slightly more expensive and limited size availability of HACR type circuit breakers).

Disadvantages

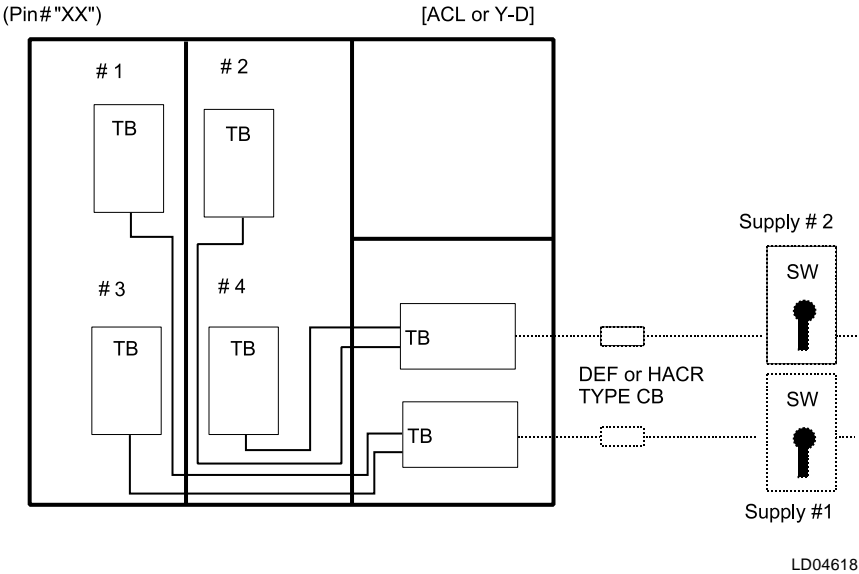
- There would be a slightly greater chiller "first cost".
- There is no disconnect switch to disconnect power to one compressor, while maintaining power to the other.
- Not available with Wye (Star) – Delta.

POWER WIRING POSSIBILITIES (3 & 4 COMPRESSOR SYSTEMS)

In the next series of illustrations, the available YCAS three and four-compressor power wiring options are shown. The key advantages and disadvantages are not shown; but would be basically the same as what has been previously covered for the two compressor systems. Therefore, please refer to them for any of the three or four compressor systems, which you may be offering.



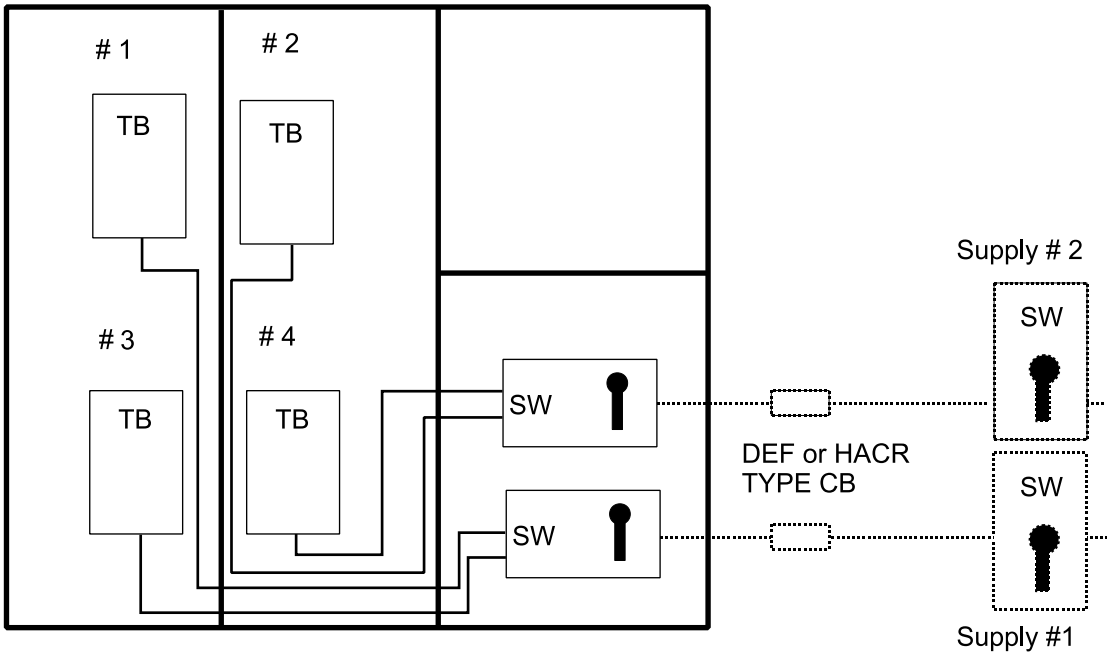
STANDARD MULTIPLE POINT WITH SEPARATE SYSTEM TERMINAL BLOCKS



MULTIPLE POINT NON-FUSED DISCONNECTS WITH SEPARATE SYSTEM TERMINAL BLOCKS

(Pin#"MD")

(ACL only: not available for Y-D)

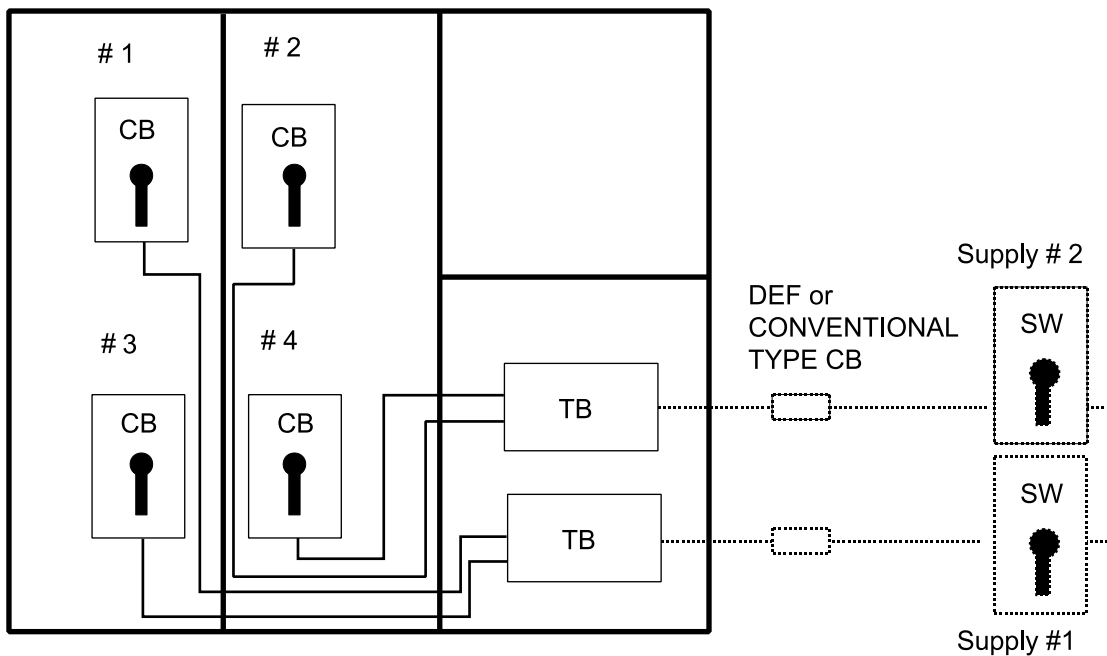


LD04619

MULTIPLE POINT WITH SEPARATE SYSTEM CIRCUIT BREAKERS

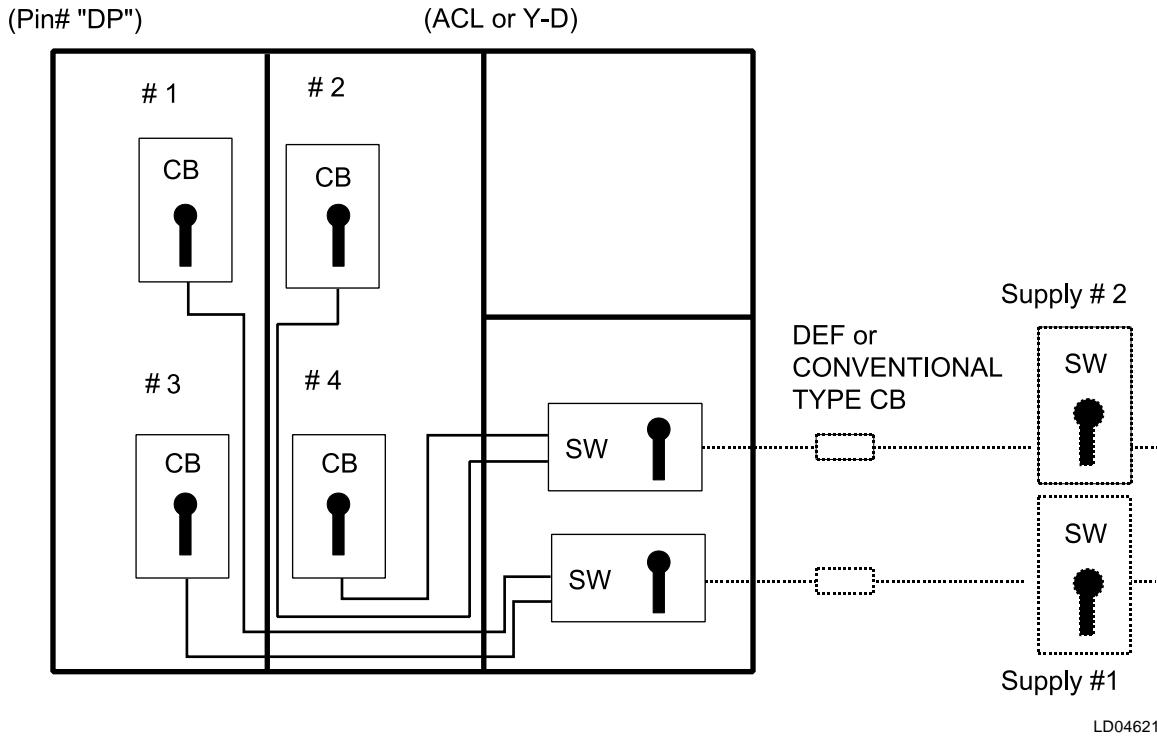
(Pin#"MB")

(ACL or Y-D)

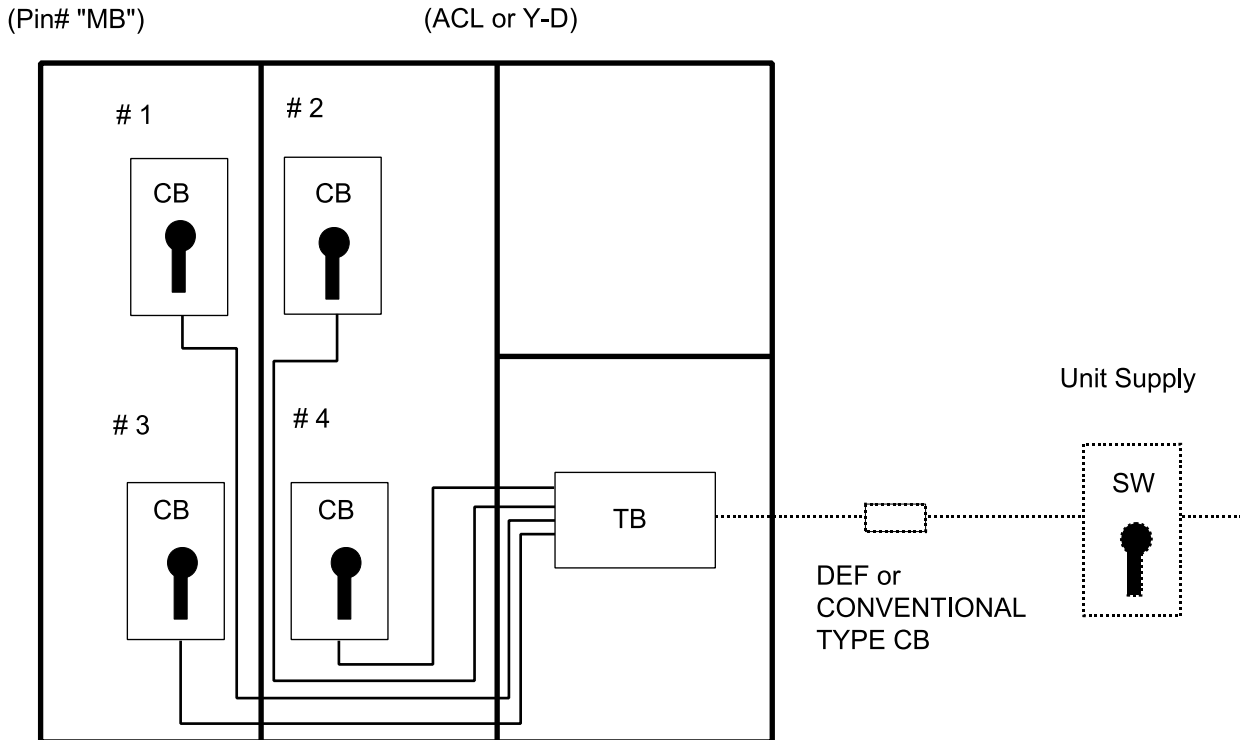


LD04620

MULTIPLE POINT NON-FUSED DISCONNECTS WITH SEPARATE SYSTEM CIRCUIT BREAKERS



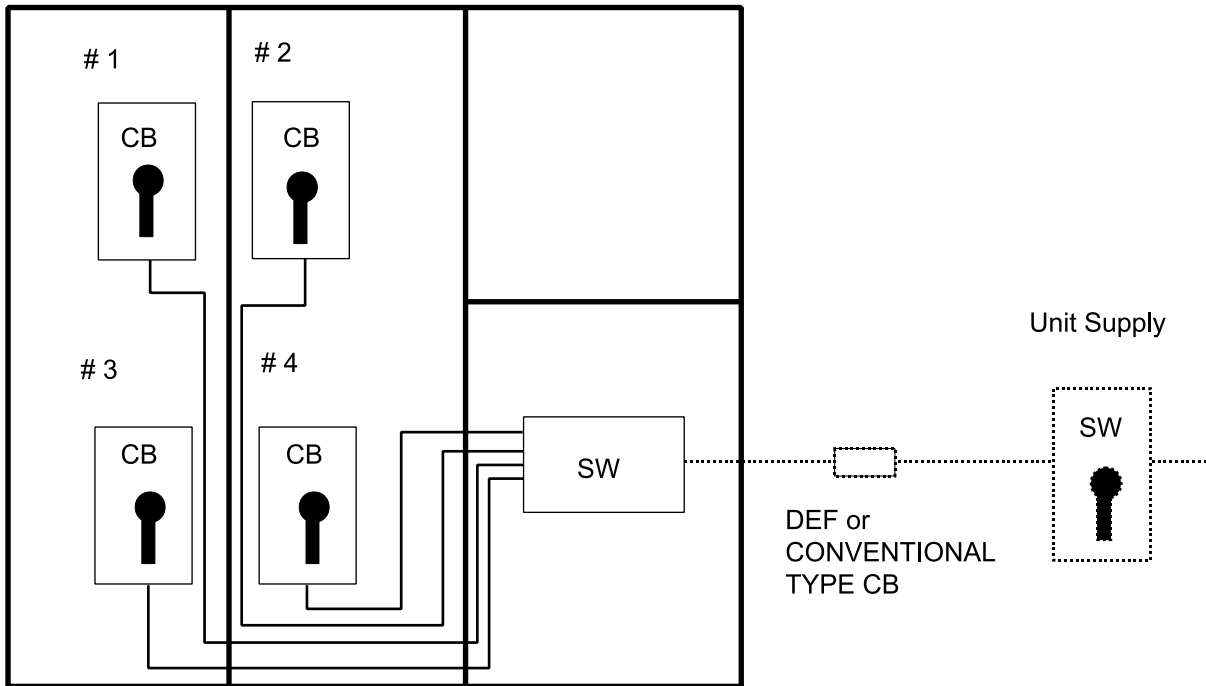
SINGLE POINT WITH SEPARATE SYSTEM CIRCUIT BREAKERS



SINGLE POINT WITH NON-FUSED DISCONNECT SWITCH & SEPARATE SYSTEM CIRCUIT BREAKERS

(Pin# "DB")

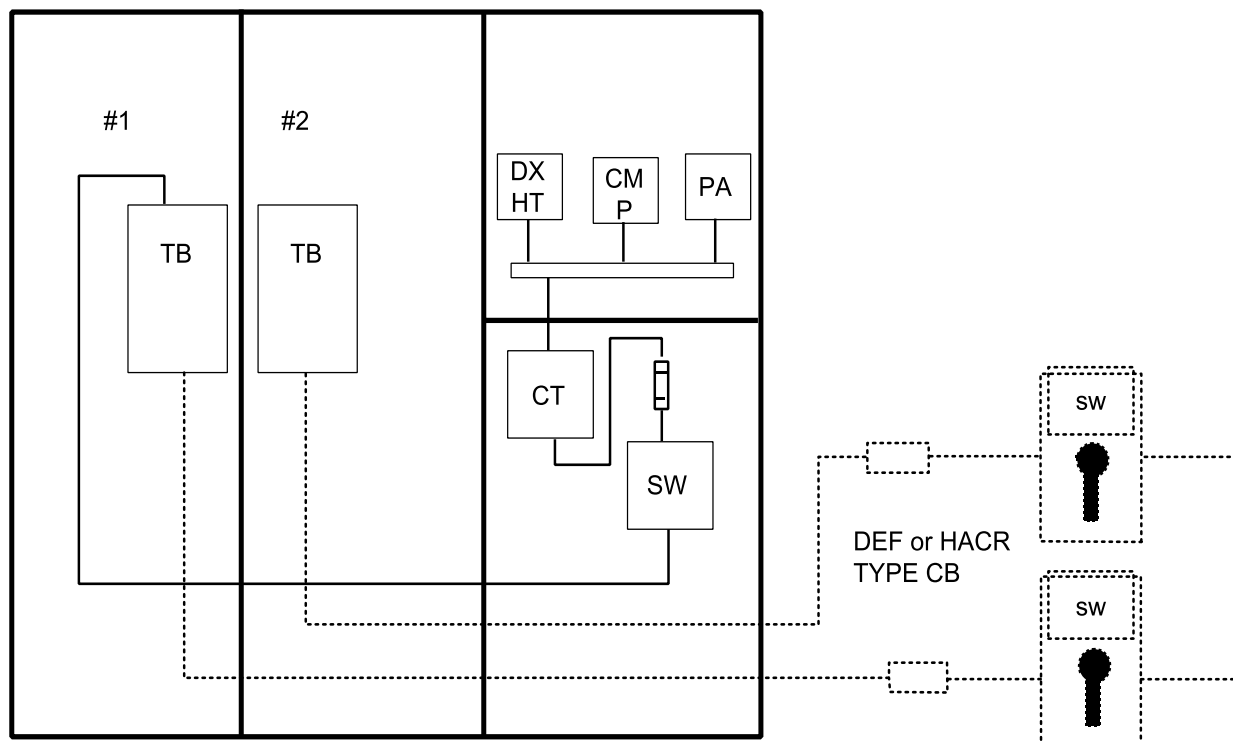
(ACL or Y-D)



LD04623

CONTROL (120-1-50/60) SUPPLY via STANDARD CONTROL TRANSFORMER

The standard system is supplied with a factory mounted control transformer, which is wired into system number one as shown in the illustration below. To help one appreciate the pros and cons of this arrangement, the key advantages and disadvantages are also included following the sketch below.



LD04624

Advantages

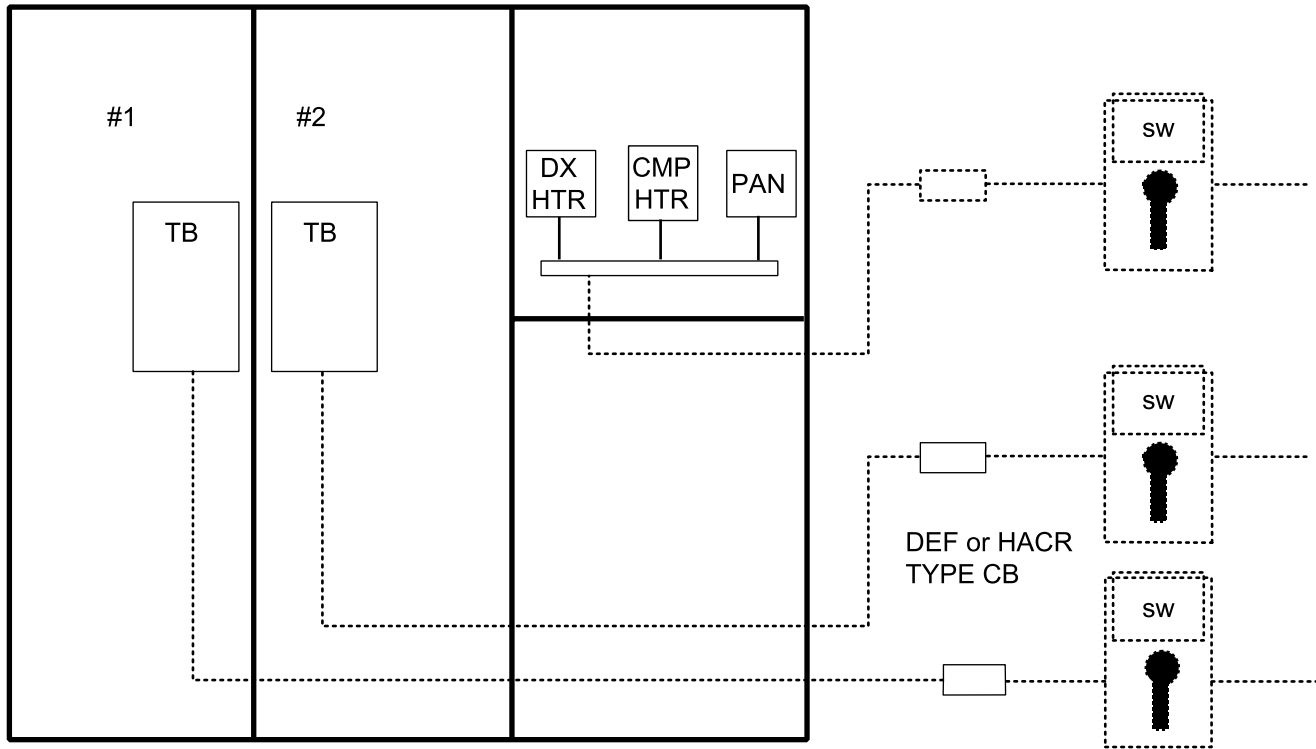
- A factory mounted and wired control transformer will make the installation easier.
- This can be good for some maintenance staff situations.
- While the first cost is slightly more, the installation cost can be lower.

Disadvantages

- The main disconnect switch must remain closed to ensure low ambient DX cooler freeze protection.
- The main disconnect switch must be closed about 24 hours to energize the compressor heaters before running the compressors.

CONTROL (120-1-50/60) POWER WITHOUT THE STANDARD CONTROL TRANSFORMER

An optional control circuit terminal strip with terminals can be provided to accept a field wired 120-1-50/60 supply in lieu of the standard factory mounted control transformer, as illustrated below.



LD04627

Advantages

- This allows separately energizing the DX cooler for low ambient freeze protection.
- Keeps the compressors warm during the winter to keep liquid refrigerant from accumulating.
- Good maintenance and service flexibility is provided.

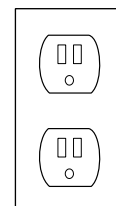
Disadvantages

- The chiller first cost is lower, but the installation cost is a little higher.
- This requires a separate 120-1-50/60 wiring circuit with fuses and disconnect switch.

OUTDOOR CONVENIENCE OUTLET

Periodically requests are made for a convenience outlet on outdoor equipment. Building power systems designed in accordance with NEC already include this near the outdoor rooftop equipment. The following is printed in NEC 210-63 regarding this.

“A 125-volt, single phase, 15- or 20-ampere-rated receptacle outlet shall be installed at an accessible location for the servicing of heating, air-conditioning, and refrigeration equipment on rooftops and in attics and crawl spaces. The receptacle shall be located on the same level and within 25 ft. (7.62 m) of the heating, air-conditioning, and refrigeration equipment. The receptacle outlet shall not be connected to the load side of the equipment disconnecting means.”



LD04628

COMPETITION

YORK has more power wiring flexibility to offer than the competition. See the chart on the last page of this Engineering Supplement. It is based on the published 60 Hz North American air cooler chiller literature and 50 Hz models have similar arrangements. Here is quick look at what is available from the competition.

Trane

Multiple Point

070 – 125 Models (200, 230, 460)	→	Not Available
130 – 215 Models (200, 230 V)	→	Standard
240 – 400 Models (200, 230 V)	→	Not Available
240 – 400 Models (460 V)	→	Standard

Single Point

070 – 125 Models (200, 230, 460)	→	Standard
130 – 215 Models (200/230 V)	→	Not Available
240 – 400 Models (200, 230 V)	→	Not Available
240 – 400 Models (460 V)	→	Not Available

Available Options

Disconnect Switches	→	Yes
Circuit Breakers	→	No

McQuay

Multiple Point

125 – 425 Models (200, 230, 460)	→	Standard
----------------------------------	---	----------

Single Point

070 – 204 Models (200, 230, 460)	→	Standard
205 – 425 Models (380, 460 V)	→	Optional

Available Options

Disconnect Switches	→	Yes
Circuit Breakers	→	Not Available with Multiple Point Standard with Single Point

Carrier

Multiple Point

080 – 265 Models (200, 230, 460)	→	Standard
----------------------------------	---	----------

Single Point


080 – 176 Models (200, 230)	→	Not Available
080 – 176 Models (460 V)	→	Optional

Available Options

Disconnect Switches	→	Yes
Circuit Breakers	→	No

The YORK single point and non-fused disconnect switch options tend to be competitive. If one does have the opportunity to be the basis of a job specification, it would be good to specify any of the YORK factory mounted and U.L. listed circuit breaker options. Since Carrier and Trane do not have these available as an option, this would be more costly and cumbersome for them to do this as a special. In addition, this would likely void their U.L. or E.T.L. listing, which can cause hassles with the local code inspector.

TYPICAL COMPETITIVE OFFERINGS

Manufacturer	Power Supply	Model Range	Quantity per Chiller (Connection Point Only)		
			Terminal	Disconnect	Circuit
			Blocks	Switches	Breakers
TRANE	200–230V / 60Hz	RTAA–70 to RTAA–125	1	1	No
		RTAA–130 to RTAA–215	2	2	No
	460–575V / 60Hz	RTAA–70 to RTAA–215	1	1	No
		RTAA–240 to RTAA–400	2	2	No
McQuay	200–230V / 60Hz	ALS–070A to ALS–204A	1	1 (to 100A only)	Yes
		ALS–125A to ALS–204A	2	—	No
		ALS–205A to ALS–280A	3	—	No
		ALS–300A to ALS–425A	2	—	No
	380–460–575V / 60Hz	ALS–070A to ALS–204A	1	1	Yes
		ALS–205A to ALS–425A	1	—	Yes
		ALS–125A to ALS–204A	2	—	No
		ALS–205A to ALS–280A	3	—	No
Carrier	208–230V	30GX–080 to 30GX–136	2	2	No
	208–230V	30GX–151, 161, 176	2	2	No
	380–460–575V	30GX–080 to 30GX–176	1	1	No
	208–230V	30GX–206 to 30GX–265	2	2	No
	380–460–575V	30GX–206 to 30GX–265	2	2	No
 YORK [®]	200–230V	YCAS–0130 to YCAS–0230	1	1	Yes
		YCAS–0130 to YCAS–0230	2	2	Yes
	380–460–575V	YCAS–0130 to YCAS–0230	1	1	Yes
		YCAS–0130 to YCAS–0230	2	2	Yes
	380–460–575V	YCAS–0240 to YCAS–0440	1	1	1
		YCAS–0240 to YCAS–0440	2	2	2



Proud Sponsor
of the 2000
U.S. Olympic Team

36USC380