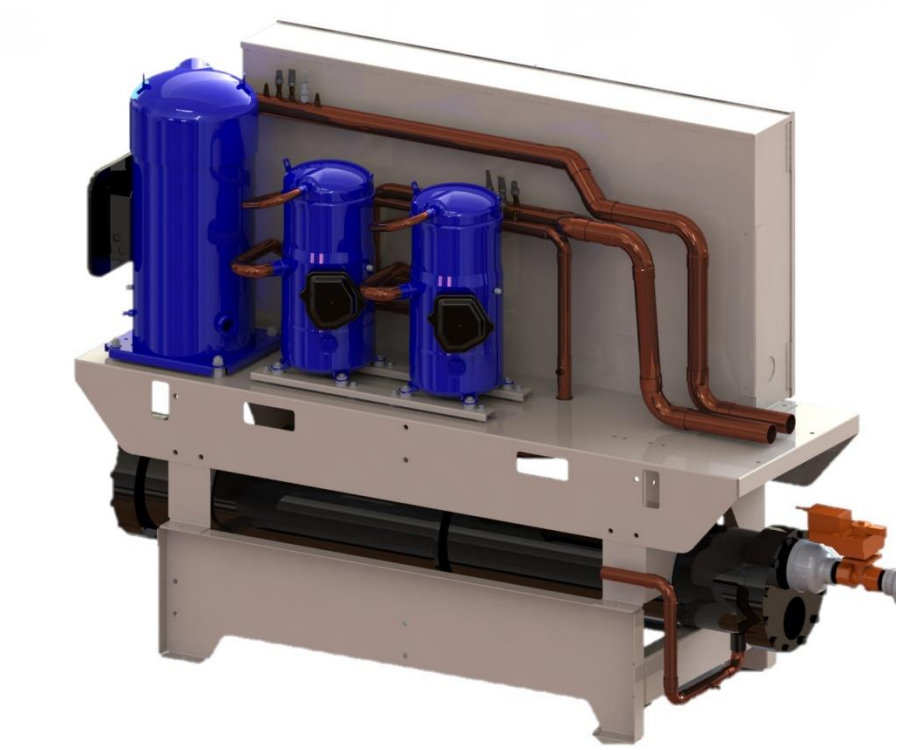
WCCU Series Condensing Units

Product Data Catalog



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Features and Benefits

NTC offers state-of-the-art, water-cooled condensing units for a wide range of comfort and process-cooling applications. These water-cooled condensing units offer ease of installation with microprocessor controllers providing maximum operating efficiency. These compact water-cooled condensing units install easily and quickly into most building layouts, making them ideal choices for retrofit or new building designs.

NTC Water-Cooled Condensing Units

Water-cooled condensing units are ideal for comfort or process cooling applications.

- Units have multiple scroll compressors.
- Available in five sizes ranging from 20 to 75 nominal tons.
- All components are mounted in a rugged, open frame for easy access.
- WCCU 20 and 30 have a single refrigerant circuit with single circuit shell-and-tube condenser. WCCU 40, 50, 65 and 75 have dual refrigerant circuits with dual circuit shell-and-tube condenser.
- Robust cleanable shell-and-tube condensers are uniquely suited for open loop cooling tower applications.
- The powerful unit controller offers complete water-cooled condensing unit control and provides a wealth of information and diagnostics.

Quick Ship Options

Quick ship options are available on selected models. Contact your local NTC representative for details.

Installation

- Single point power connection for simplified, fast field-wiring.
- The powerful unit controller provides complete water-cooled condensing unit controls and interface to a variety of platforms, including **BACnet® IP** and **Modbus™** as standard. **LonTalk®**, **Johnson N2** and **BACnet MS/TP** are available with an optional interface.
- Units are designed to fit through standard doorways.
- Factory testing ensures first-time smooth operation on start-up, and reduces follow up costs.

Service

NTC 20 to 75 ton scroll water-cooled condensing units are designed with service personnel in mind. Unit design allows replacement of all major components without complete unit teardown. All WCCU units have mechanically cleanable shell-and-tube condensers. The unit controller provides diagnostic capability and remote factory diagnostics to aid local and factory service personnel in analyzing problems quickly. Unanticipated down time is minimized.

Efficiency

The energy efficiency of NTC scroll water-cooled condensing units results in energy costs lower than most other comparable water-cooled condensing units. Superior engineered efficiencies are obtained by combining advanced scroll compressor energy efficient features with up to date heat exchanger technology and state-of-the art controls.

Reliability

NTC scroll water-cooled condensing units with many new improvements feature highly efficient and reliable scroll compressors. **Here's How:**

- Scroll compliance allows limited amounts of liquid to pass through without damaging compressor (liquid slugging resistant).
- Advanced microelectronics protect compressor and motor from typical electrical fault conditions.
- Years of laboratory testing have optimized compressor and water-cooled condensing unit systems reliability.

Application Considerations

Product Selection
WCCU products are offered in six models each ranging in capacity from 20 to 75 nominal tons. Since actual unit capacity can vary significantly from “nominal capacity”, it is important to base your selection on the actual conditions. Selection of the correct model will require attention to the minimum, as well as the full load capacity required. Selection of the proper equipment is an important part of a successful installation. Equipment sized too large will cycle more frequently and as a potential result lead to poor temperature and humidity control, shortened equipment life and higher utility costs. Equipment sized too small will not be able to meet peak cooling demands.

Unit location
Units should be installed indoors. A level foundation or flooring must be provided which will support at least 150 percent of the operating weight of the unit. Service clearance must allow for removal of compressors. All units must also allow for space to service vessels. The unit foundation must be rigid to reduce vibration transmission to a minimum. Use of optional vibration isolation pads is recommended for applications that are sensitive to vibration and noise.

Condenser Water Limitations
WCCU water-cooled condensing units start and operate satisfactorily over a wide range of load conditions. Reducing the condenser water temperature below 85°F is an effective method of lowering the power input required. Beyond certain limits, the effect of further reducing condenser water temperature causes a reduction in the pressure drop across the expansion valve to a point where system instability may occur.

WCCU products are designed for optimum performance with entering condenser water temperatures between 75°F and 130°F. As a result, a means of discharge pressure control must be considered when entering condenser water temperature falls below 65°F. The exact point at which discharge pressure control is required depends on other system parameters such as leaving chilled water temperature and flow rate, and condenser water flow rate. Contact your local representative for assistance when an application requires entering condenser water temperature less than 65°F or greater than 115°F.

Condenser Water Treatment
Use of untreated or improperly treated condenser cooling water in any water-cooled condensing unit could result in tube fouling, scaling, erosion, corrosion, algae, or slime; and, as a result cause reduced performance and increase the potential for unit failure. It is recommended that the services of a qualified water treatment specialist, be engaged to determine the proper condenser water treatment and bleed-rate. NTC assumes no responsibility for the results of untreated or improperly treated water.

Model Number Description

Digit 1, 2, 3, 4 — Unit Type
WCCU = Water-Cooled Condensing Unit

Digit 5, 6, 7 — Unit Nominal Tonnage
020 = 20 nominal tons
030 = 30 nominal tons
040 = 40 nominal tons
050 = 50 nominal tons
065 = 65 nominal tons
075 = 75 nominal tons

Digit 8 — Unit Voltage
A = 208V/60/3
B = 230V/60/3
F = 460V/60/3
G = 575V/60/3

Digit 9, 10 — Design Sequence
A0 = Factory assigned

Digit 11 — Agency Listing
N = None
E = ETL/ETL-C Listed to meet U.S. and Canadian safety standards

Digit 12 — Condenser Water Regulating Valve
0 = None
1 = With

Digit 13 — Blank
0 = None

Digit 14 — Blank
0 = None

Digit 15 — Power Connection
T = Terminal block
D = Non-fused disconnect switch
F = Fused disconnect switch

Digit 16 — Short Circuit Rating (SCCR)
0 = Standard 5 kA rating
1 = Optional 100 kA rating

Digit 17 — Sound Attenuator
0 = No sound attenuation
3 = Compressor sound blanket(s)
9 = Factory sound enclosure cabinet

Digit 18 — Local Unit Controller Interface
0 = Keypad with dot pixel display
1 = 15.4” Color touchscreen

Digit 19 — Remote BMS Interface (Digital Comm)
0 = None
2 = LonTalk®
4 = BACnet® MS/TP
5 = BACnet IP
6 = MODBUS®
8 = Johnson N2

Digit 20 — Power Monitor
0 = None
1 = With

Digit 21 — Neoprene Isolator Pads
0 = None
1 = With

Digit 22 — Blank
0 = None

Digit 23 — Blank
0 = None

Digit 24 — Condenser Fluid Type
0 = Water
2 = Ethylene glycol
3 = Propylene glycol

Digit 25 — Special Options
0 = None
1 = With

Digit 26 — Condenser Heat Recovery
0 = No heat recovery
1 = Full heat recovery

General Data

Unit Size (Nominal Tons)		**20**	**30**	**40**	**50**	**65**	**75**
Compressor							
Quantity	each	2	2	3	3	3	3
Nominal Tons @ 60 Hz[1]	tons	10/10	15/15	10/10, 20	12/12, 25	15/15, 30	15/15, 40
Steps of Unloading	%	100-50	100-50	100-75-50-25	100-75-50-25	100-75-50-25	100-79-57-21
Compressor Sound Power Data[2]	dBA	81.0	84.0	87.2	87.5	90.2	91.8
Compressor Sound Data with Sound Blankets Only[2]	dBA	75.0	78.0	82.8	83.0	85.8	87.5
Compressor Sound Data with Cabinet[2]	dBA	67.0	70.0	75.2	75.5	78.2	79.8
Shell & Tube Condenser							
Water Storage	gal	3.0	4.5	5.5	7.4	9.2	9.2
Minimum Flow	gpm	28	39	49	65	84	84
Maximum Flow	gpm	119	167	207	271	342	342
Refrigerant							
Refrigerant		R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
Number of Independent Refrigerant Circuits		1	1	2	2	2	2
Refrigerant Charge Per Circuit (approx.)[3]	lb.	25	37	24, 24	26, 26	31, 31	33, 33
Oil Type		POE 160SZ	POE 160SZ	POE 160SZ	POE 160SZ	POE 160SZ	POE 160SZ
Oil Charge (each compressor) [3]	oz	112/112	113/113	112/112, 227	112/112, 227	112/112, 227	112/112, 227

Notes:

1. Data containing information on two circuits formatted as follows: Circuit 1, Circuit 2
2. Compressor manufacturer sound power is given at rated compressor AHRI conditions measured in free space
3. Refrigerant and oil charge will vary depending on other system components including, but not limited to, refrigerant line length and diameter.

Electrical Data

		Compressor					Wiring		
Size	**Rated Voltage**	**Qty**	**# of Refrig. Cir.**	**Nom. Tons**	**RLA (each)**	**LRA (each)**	**MCA**	**Max Fuse Size**	**Recommend Dual Element Fuse Size**
20	208-230/60/3	2	1	10/10	39/39	267/267	88	125	100
	460/60/3 & 50Hz				19/19	142/142	42	60	50
	575/60/3				15/15	103/103	35	50	40
30	208-230/60/3	2	1	15/15	48/48	351/351	108	150	125
	460/60/3 & 50Hz				25/25	197/197	56	80	60
	575/60/3				22/22	135/135	50	70	60
40	208-230/60/3	3	2	10/10, 20	39/39, 67	267/267, 485	162	225	175
	460/60/3 & 50Hz				19/19, 33	142/142, 215	78	110	90
	575/60/3				15/15, 26	103/103, 175	64	80	70
50	208-230/60/3	3	2	12/12, 25	41/41, 82	304/304, 560	185	250	225
	460/60/3 & 50Hz				19/19, 40	147/147, 260	88	125	100
	575/60/3				17/17, 29	122/122, 210	69	90	80
65	208-230/60/3	3	2	15/15, 30	48/48, 109	351/351, 717	232	300	250
	460/60/3 & 50Hz				25/25, 51	197/197, 320	113	150	125
	575/60/3				22/22, 38	135/135, 235	93	125	110
75	208-230/60/3	3	2	15/20, 35	48/48, 122	351/351, 1010	248	350	300
	460/60/3 & 50Hz				25/25, 68	197/197, 344	134	200	150
	575/60/3				22/22, 46	135/135, 327	102	125	110

Notes:

1. Use copper conductors only.
2. Local codes may take precedence.
3. Data containing information on two circuits formatted as follows: Circuit 1, Circuit 2
4. Voltage Utilization Range: ± 10% of rated voltage. Rated voltage (use range): 208-230/60/3 (187-253), 460/60/3 (414-506), 575/60/3 (518-632).
5.

Selection Guide

Selection
To select an NTC water-cooled condensing unit, the following information is required:

1. Load in tons of refrigeration.
2. The saturated refrigerant suction temperature.
3. Condenser water temperature drop.
4. Leaving condenser water temperature.

Capacity Tables
Capacity tables (on following pages) are based on a saturated suction temperature and a 10°F temperature drop through the condenser.

Waterside Pressure Drop
Condenser waterside pressure drops are provided in *Figure 1. Condenser Water Pressure* Drop.

Water Flow Rates
Condenser water flow using a 10°F temperature drop is determined as follows:

GPM=2.4 {(Tons) + (0.285)(Compressor kW)}

For other than 10°F temperature drop, apply the respective performance adjustment factors from *Figure 2. GPM Adjustment Factor* ***Error! Reference source not found.*** to the GPM from the above equation.

Selection Example
System load = 50 tons; a WCCU 50 is selected.
A 40°F saturated suction temperature is needed.
Leaving condenser water temperature of 95°F and 15°F temperature drop in the condenser.

1. Select the appropriate performance table based on module to be used based on a 10°F temperature drop in the condenser.

Entering Condenser @ 10°F drop = 95°F - 10°F = 85°F

2. Read the capacity and kW of single module at the specified specifications.

   Capacity = 51.1 tons, kW=37.2

3. To determine condenser water pressure drops, first determine flow at a 10°F temperature drop.

Condenser flow = 2.4{51.1 + (0.285)(37.2)} = 148.1 gpm

4. Apply the respective performance adjustment factors from *Figure 2. GPM Adjustment Factor* to the GPM from above equation.

   For 15°F temperature drop, the table multiplier is 0.66.

Condenser flow with 15°F Drop = (148.1)(0.66) = 97.7 gpm*

5. Condenser pressure drops are read from *Figure 1. Condenser Water Pressure Drop* as follows:

Condenser = 97.7 gpm =>
Pressure Drop = 3.3 feet of water

Condenser Loop with Glycol
Ethylene Glycol adjustment factors (*Table 1 Ethylene Glycol*) should be used to adjust performance depending on the percent of ethylene glycol used in the condenser circuit.

Capacity and kW should be obtained by extrapolating no more than 20°F from the highest entering condenser water temperature shown in the capacity tables.

Adjustment factors for Propylene Glycol are shown in *Table 2 Propylene Glycol* and are used in the same way given in the following example.

Ethylene Glycol Selection Example

(WCCU 30 ton water-cooled condensing unit). A 38°F saturated suction temperature is needed. Leaving condenser water temperature of 105°F and 10°F temperature drop in the condenser.

1. Select the appropriate performance table based on module to be used based on:

10°F drop = 105°F - 10°F = 95°F

2. Read the capacity and kW of single module at the specified specifications.

Capacity = 28.4 tons, kW = 26.3

3. To determine condenser water pressure drops, first determine flow at a 10°F temperature drop.

Condenser flow = 2.4{28.4 + (0.285)(26.3)} = 86.1 gpm

4. Apply the respective performance adjustment factors from *Figure 2. GPM Adjustment Factor* to the flow from the preceding equation. For 20°F temperature drop, the table multiplier is 0.5.

Condenser flow with 20°F Drop = (86.1)(0.5) = 43.1 gpm*

From Figure 1. Condenser Water Pressure Drop; Pressure Drop = 1.2 feet of water

5. To convert flow and pressure drop for water to flow and pressure drop with ethylene glycol, read adjustment factors from *Table 1 Ethylene Glycol* at 30% glycol by weight.

   - Condenser gpm adjustment 1.10
   - Pressure Drop Adjustment 1.15

6. Calculate flow and pressure drop with 30% ethylene glycol by multiplying flow and pressure drop for water by adjustment factors.

   - *Condenser gpm 43.1 x 1.1 = 47.4 gpm*
   - *Condenser Pressure Drop 1.2 x 1.15 = 1.38 feet of water*

Performance Data

Note: Capacity table is based on a saturated suction temperature and a 10°F temperature change through the evaporator and condenser.

WCCU Model	Number of Circuits	Saturated Suction Temperature	**Entering Condenser Water = 65 °F**				
			Tons	Total Power (kW)	EER	gpm	ΔP (ft H2O)
20	1	38°F	23.72	12.62	22.5	65.3	7.47
		40°F	24.59	12.56	23.5	67.4	7.95
		45°F	27.07	12.07	26.9	73.0	9.34
30	1	38°F	33.84	18.08	22.5	94.1	7.19
		40°F	35.23	17.97	23.5	97.3	7.70
		45°F	38.69	17.76	26.1	105.6	9.06
40	2	37°F	46.25	23.73	23.4	128.0	7.91
		40°F	49.03	23.34	25.2	134.5	8.72
		45°F	53.96	22.52	28.8	145.9	10.26
50	2	37°F	53.80	28.23	22.9	149.5	8.51
		40°F	56.99	27.95	24.5	157.0	9.39
		45°F	62.63	27.30	27.5	170.2	11.04
65	2	36°F	67.75	37.34	21.8	188.7	5.92
		40°F	73.21	36.94	23.8	201.6	6.76
		45°F	80.52	36.28	26.6	218.8	7.96
75	2	35°F	75.40	43.75	20.7	211.0	3.20
		40°F	82.93	44.52	22.4	229.6	3.79
		45°F	91.06	45.53	24.0	249.8	4.49

Performance Data (cont.)

Note: Capacity table is based on a saturated suction temperature and a 10°F temperature change through the evaporator and condenser.

WCCU Model	Number of Circuits	Saturated Suction Temperature	Entering Condenser Water = 75 °F				
			Tons	Total Power (kW)	EER	gpm	ΔP (ft H2O)
20	1	38°F	22.19	14.50	18.4	63.2	6.98
		40°F	23.25	14.40	19.4	65.7	7.54
		45°F	25.49	14.14	21.6	70.9	8.77
30	1	38°F	32.30	20.66	18.8	91.8	7.15
		40°F	33.68	20.60	19.6	95.0	7.17
		45°F	36.98	20.44	21.7	102.9	8.38
40	2	37°F	44.48	28.77	18.6	126.7	8.19
		40°F	47.45	28.56	19.9	133.7	9.11
		45°F	52.24	28.11	22.3	144.9	10.70
50	2	37°F	50.72	32.94	18.5	144.5	7.96
		40°F	54.49	32.84	19.9	153.6	8.98
		45°F	59.64	32.56	22.0	165.8	10.40
65	2	36°F	64.12	41.68	18.5	182.8	5.55
		40°F	69.24	41.53	20.0	195.0	6.31
		45°F	75.89	41.22	22.1	210.8	7.36
75	2	35°F	71.69	46.61	18.5	204.0	3.00
		40°F	78.30	46.95	20.0	220.6	3.49
		45°F	86.09	47.45	21.8	239.7	4.11

Performance Data (cont.)

Note: Capacity table is based on a saturated suction temperature and a 10°F temperature change through the evaporator and condenser.

WCCU Model	Number of Circuits	Saturated Suction Temperature	Entering Condenser Water = 85 °F				
			Tons	Total Power (kW)	EER	gpm	ΔP (ft H2O)
20	1	38°F	20.90	16.48	15.2	61.6	6.62
		40°F	21.91	16.43	16.0	64.0	7.14
		45°F	24.02	16.28	17.7	69.0	8.29
30	1	38°F	30.40	23.39	15.6	89.3	6.31
		40°F	31.71	23.36	16.3	92.4	6.76
		45°F	34.83	23.26	18.0	99.9	7.88
40	2	37°F	41.78	32.65	15.4	123.1	7.72
		40°F	44.77	32.57	16.5	130.3	8.62
		45°F	49.33	32.35	18.3	141.1	10.10
50	2	37°F	47.72	37.18	15.4	140.6	7.52
		40°F	51.13	37.24	16.5	148.8	8.42
		45°F	56.24	37.20	18.1	161.2	9.84
65	2	36°F	59.97	46.95	15.3	176.9	5.19
		40°F	64.81	46.97	16.6	188.6	5.89
		45°F	71.38	46.88	18.3	204.4	6.90
75	2	35°F	67.02	52.27	15.4	197.5	2.80
		40°F	73.35	52.53	16.8	213.0	3.24
		45°F	80.73	52.91	18.3	231.1	3.80

Performance Data (cont.)

Note: Capacity table is based on a saturated suction temperature and a 10°F temperature change through the evaporator and condenser.

WCCU Model	Number of Circuits	Saturated Suction Temperature	Entering Condenser Water = 95 °F				
			Tons	Total Power (kW)	EER	gpm	ΔP (ft H2O)
20	1	38°F	19.56	18.55	12.7	59.9	6.26
		40°F	20.51	18.54	13.3	62.2	6.73
		45°F	22.50	18.48	14.6	67.0	7.79
30	1	38°F	28.41	26.34	12.9	86.7	5.94
		40°F	29.65	26.34	13.5	89.7	6.35
		45°F	32.59	26.31	14.9	96.8	7.37
40	2	37°F	39.00	36.73	12.7	119.5	7.25
		40°F	41.78	36.77	13.6	126.2	8.07
		45°F	46.24	36.73	15.1	137.0	9.47
50	2	37°F	44.42	41.66	12.8	136.0	7.02
		40°F	47.82	41.84	13.7	144.4	7.90
		45°F	52.65	42.01	15.0	156.1	9.21
65	2	36°F	55.95	52.58	12.8	171.4	4.86
		40°F	60.48	52.74	13.8	182.5	5.50
		45°F	66.65	52.85	15.1	197.5	6.42
75	2	35°F	62.31	58.80	12.7	191.1	2.61
		40°F	68.22	59.02	13.9	205.5	3.01
		45°F	75.15	59.32	15.2	222.5	3.52

Water Flow vs. Pressure Drop

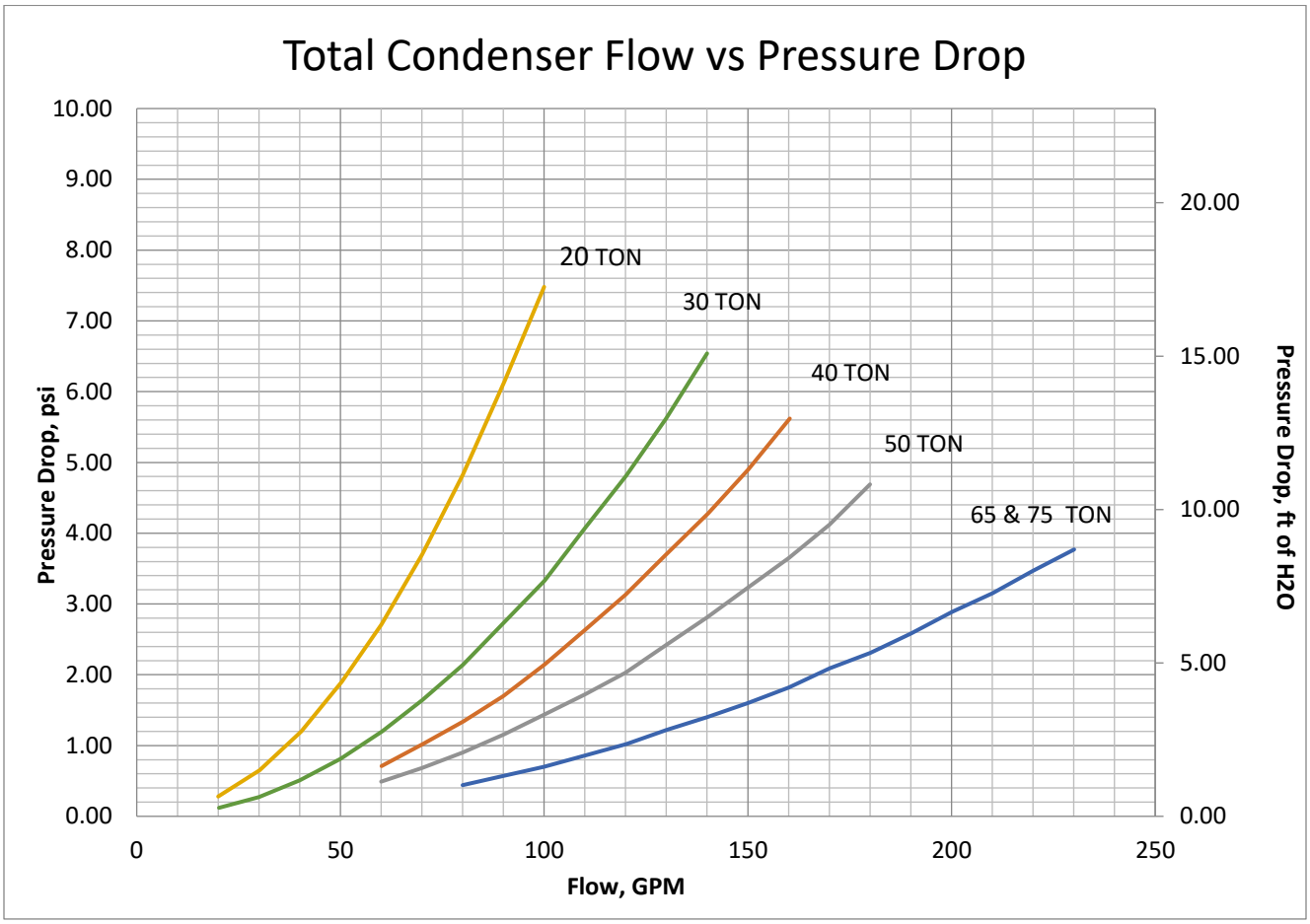


Figure 1. Condenser Water Pressure Drop

Performance Correction Factors

The correction factors in this chart are applied to the standard ratings when using ethylene glycol

Freeze Point °F	% E. G. by Wt.	Capacity	Power	Pressure Drop	Flow Factor
26	10	0.998	0.998	1.03	1.04
17	20	0.995	0.997	1.09	1.07
5	30	0.970	0.990	1.15	1.10
-10	40	0.941	0.985	1.23	1.14
-32	50	0.950	0.970	1.31	1.19

Table 1 Ethylene Glycol

The correction factors in this chart are applied to the standard ratings when using propylene glycol.

Freeze Point °F	% P. G. by Wt.	Capacity	Power	Pressure Drop	Flow Factor
26	10	0.998	0.996	1.08	1.02
19	20	0.975	0.975	1.21	1.03
9	30	0.960	0.985	1.40	1.06
-6	40	0.921	0.975	1.67	1.09
-28	50	0.910	0.965	1.98	1.14

Table 2 Propylene Glycol

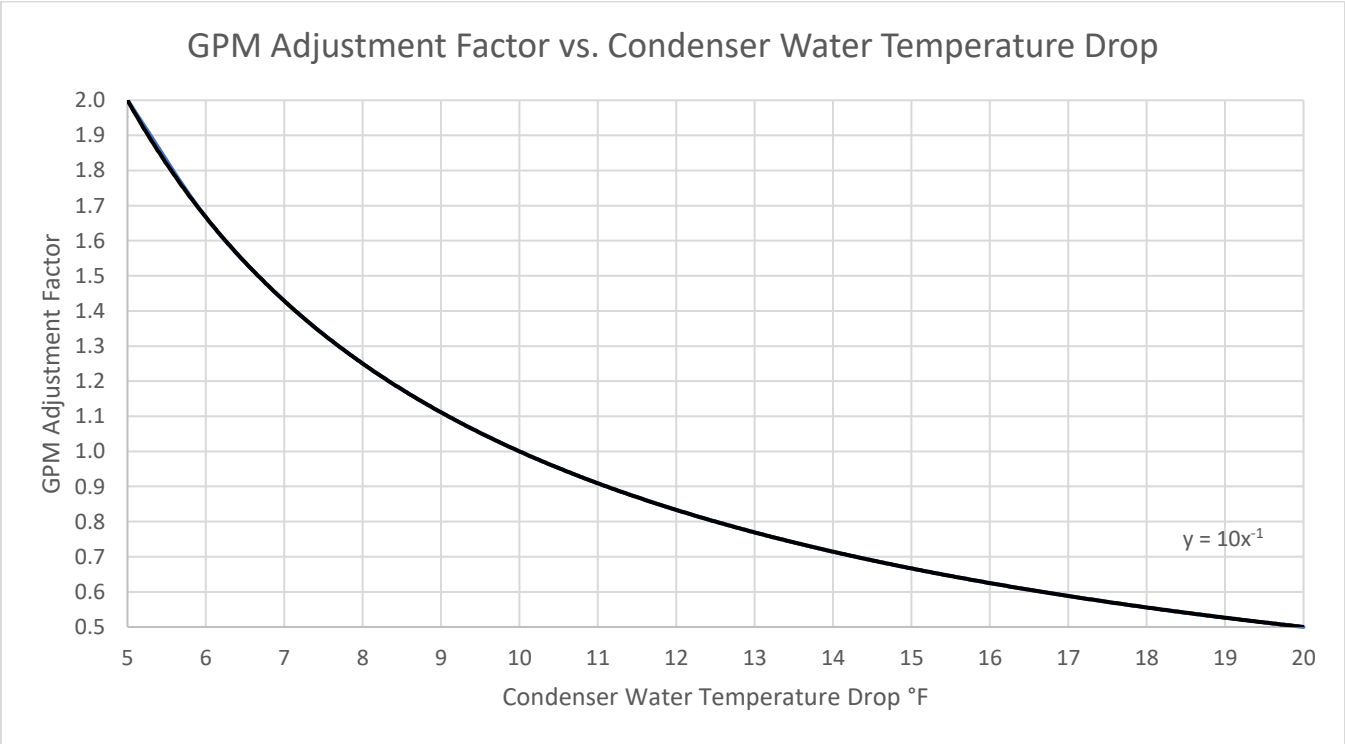


Figure 2. GPM Adjustment Factor

Unit Piping

General Water Piping Recommendations
Make water piping connections to the condenser. Isolate and support piping to prevent stress on the unit. Use flanged ells or spool-pieces to facilitate service procedures. Construct piping according to local and national codes. Insulate and flush the piping before connecting the unit.

Caution: To prevent equipment damage, bypass the unit if using an acidic flushing agent.

Use a pipe sealant of Teflon tape on all water connections. Minimize heat gain and prevent condensation by insulating all chilled water piping.

Caution: To prevent damage to water piping, do not over-tighten connections.

Condenser Water Piping
Condenser piping components and layout vary, depending on the water source and connection locations. The optional water regulating valve maintains condensing pressure and temperature by throttling water flow leaving the condenser in response to compressor discharge pressure. Adjust the regulating valve for proper operation during unit start-up. Under full load conditions the water temperature rise should be 10° F, producing a flow rate in the range of 3 gpm per ton. Condenser piping must be in accordance with all local and national codes.

Water Treatment
Using untreated or improperly treated water in these units may result in inefficient operation and possible tube damage. Consult a qualified water treatment specialist to determine if treatment is needed.

Caution: The use of untreated or improperly treated water in these units may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine if treatment is needed. NTC warranty specifically excludes liability for corrosion, erosion or deterioration of NTC equipment. NTC assumes no responsibilities for the results of the use of untreated or improperly treated water or saline/brackish water

Water Pressure Relief Valves
Install a water pressure relief valve in the condenser leaving water line. Water vessels with close-coupled shutoff valves have a high potential for hydrostatic pressure buildup on a water temperature increase. Refer to applicable codes for relief valve installation guidelines.

Refrigerant Piping

General
The refrigerant pipe sizes selected must be within the velocity and pressure drop limitations required for proper system operation. It is essential that refrigerant piping be properly sized and applied, since these factors have a significant effect on system performance and reliability.

Note: Piping should be sized and laid out according to the job plans and specifications. This should be accomplished when the system components are selected.

Caution:
Discharge lines, liquid lines, and hot gas bypass lines that are 1-3/8 inches OD and smaller, with type-L copper, are suitable for use with R-410A. These same lines sized at 1-5/8 inches OD and larger must use type-K or thicker walls. The use of lower grade tubing may cause operating problems or injury.

Liquid Line Components
Thermostatic expansion valves, refrigerant sight glasses, solenoid valves, Schrader valves and filter dryers must be installed for proper operation. Install shutoff valves in the liquid line to isolate the filter drier for service.

Liquid Line Sizing
The liquid line diameter should be as small as possible, while maintaining acceptable pressure drop. This will minimize the required refrigerant charge and increase compressor life.

Liquid risers in a system require an additional 0.5 psig pressure drop per each foot of vertical rise. If riser length exceeds 20 feet, a larger diameter and/or shorter liquid line may be required to provide required subcooling at the expansion valve. The line does not have to be pitched. Basic liquid line sizing parameters for these units are:

- Maximum Liquid velocity…600 fpm.
- Maximum allowable liquid line pressure drop …….35 psig.
- Confirm at least 5°F of subcooling at expansion device inlet.

Liquid lines are not usually insulated. If, however, the line runs through an area of high ambient temperature (e.g. boiler room), subcooling may drop below required levels. Liquid lines passing through these warm spaces should be insulated.

Suction Line Sizing
Gas velocity is another consideration when sizing suction lines. It has been found that the minimum velocity requirement to move oil in horizontal suction lines is 500 fpm. For vertical up-flow suction lines, it must be increased to 1000 fpm. Keeping all suction line velocities below 4000 fpm will avoid excessive and undesirable noise levels.

- Maximum allowable suction line pressure drop ……5 psig (2°F).

Initial Leak Test
As shipped, WCCU Condensing Units contain a holding charge of nitrogen only. Before connecting refrigerant piping, momentarily crack open a Schrader valve on the liquid line to ensure that the unit is pressurized. If no gas escapes thru the valve, leak test the unit to determine the source of the refrigerant leak prior to installation and repair any leaks located.

WARNING! Always install a pressure regulator, shutoff valves, and gauges to control pressures during leak testing procedures. Unregulated pressures may cause line ruptures, equipment damage, or an explosion, which could result in personal injury or death.

Equipment Placement

Minimize Distance Between Components

For a split air-conditioning system to perform as reliably and inexpensively as possible, the refrigerant charge must be kept to a minimum. To help accomplish this design goal:

- Site the outdoor unit as close to the indoor unit as possible.
- Route each interconnecting refrigerant line by the shortest and most direct path so that line lengths and riser heights are no longer than absolutely necessary.
- Use only horizontal and vertical piping configurations.
- Determine whether the total length of each refrigerant line requires NTC review. Be sure to account for the difference in elevations of the indoor and outdoor units when calculating the total line length.

Interconnecting lines of 150 lineal ft (45.7 m) or less do not require NTC review, but only a limited amount may be in a riser (see Figure 3. Allowable elevation difference: Compressor above evaporator and Figure 4. Allowable Elevation Difference: Evaporator above condenser).

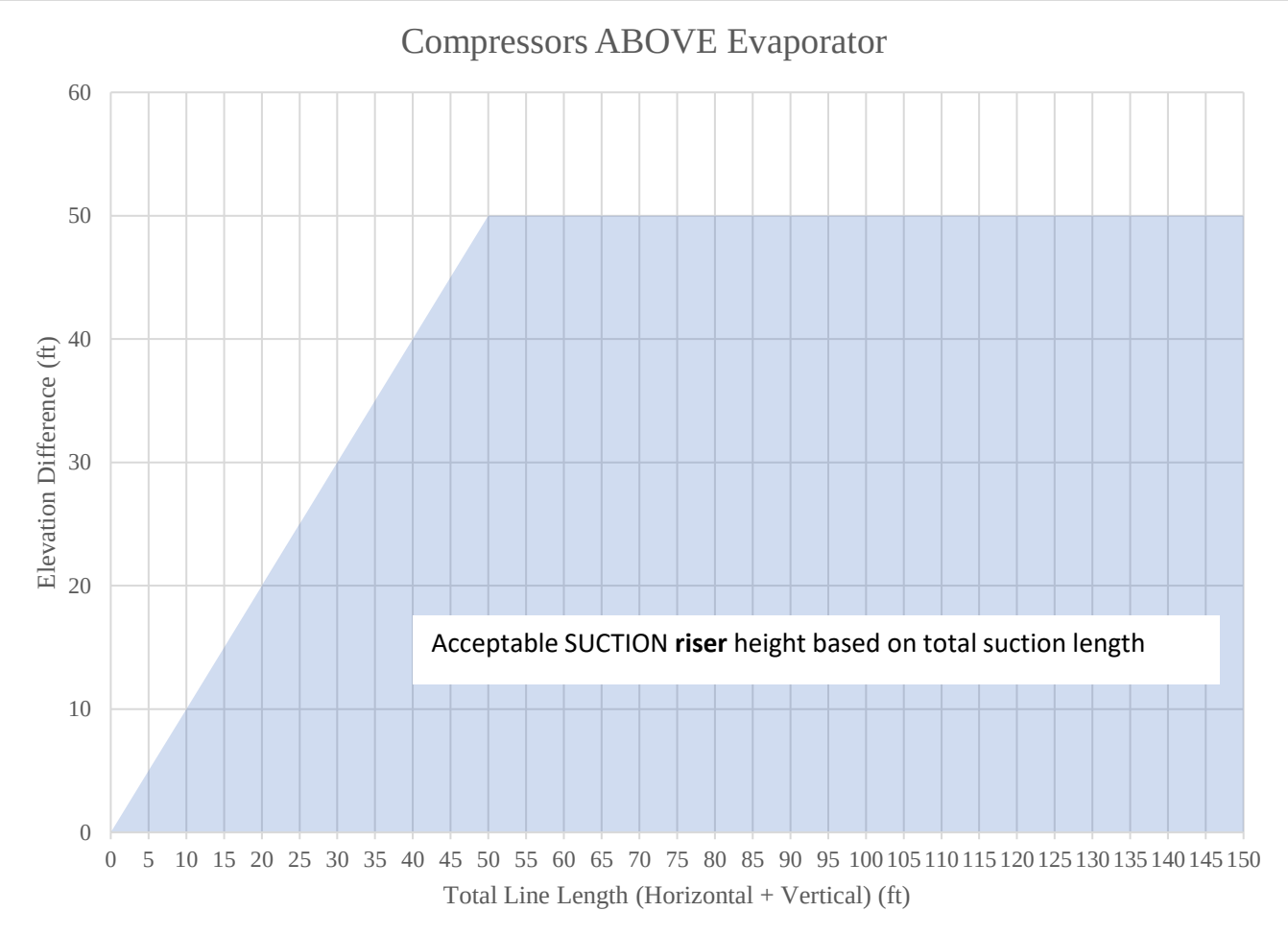


Figure 3. Allowable elevation difference: Compressor above evaporator

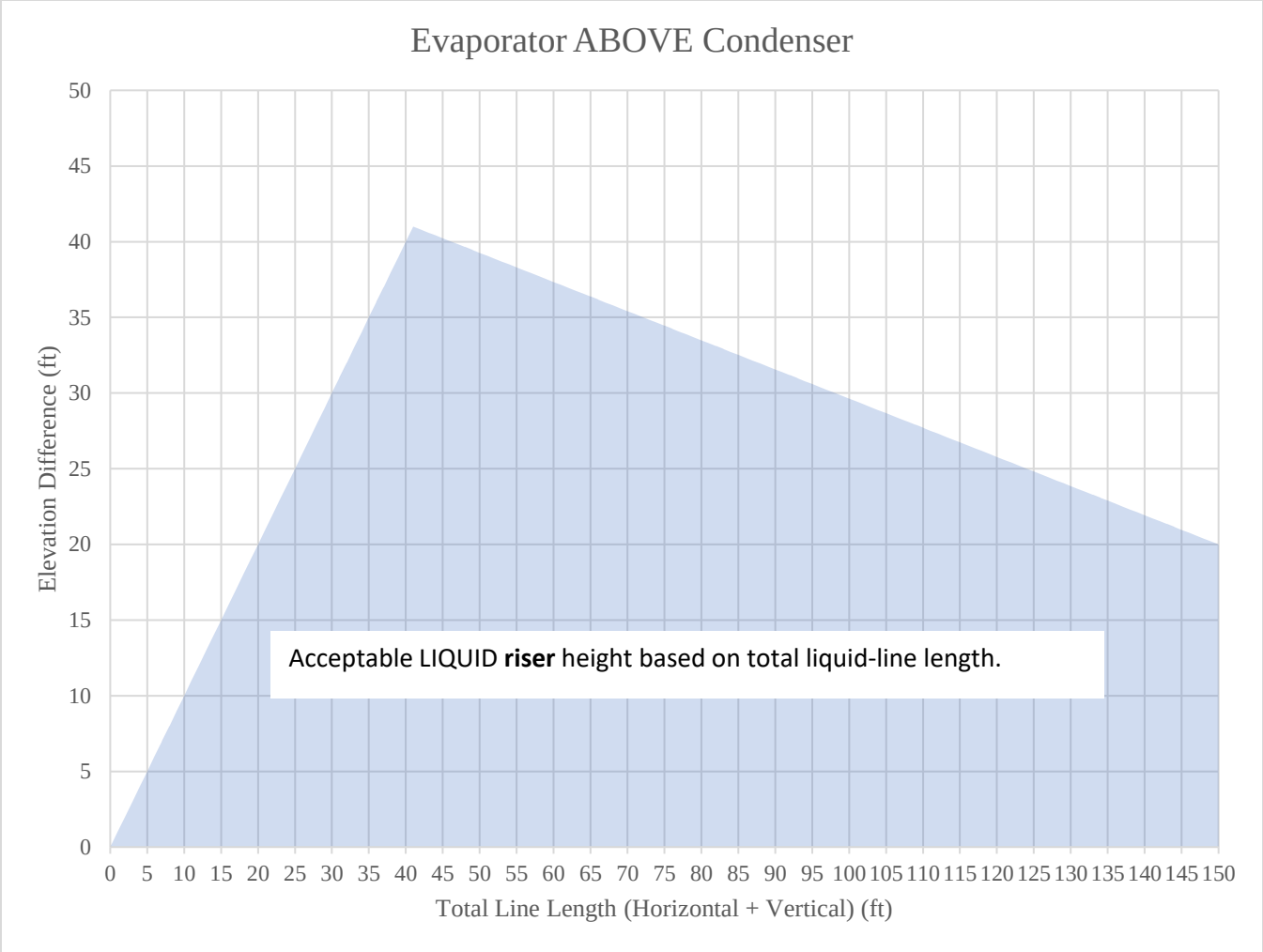


Figure 4. Allowable Elevation Difference: Evaporator above condenser

Interconnecting refrigerant piping between condensing unit and evaporator

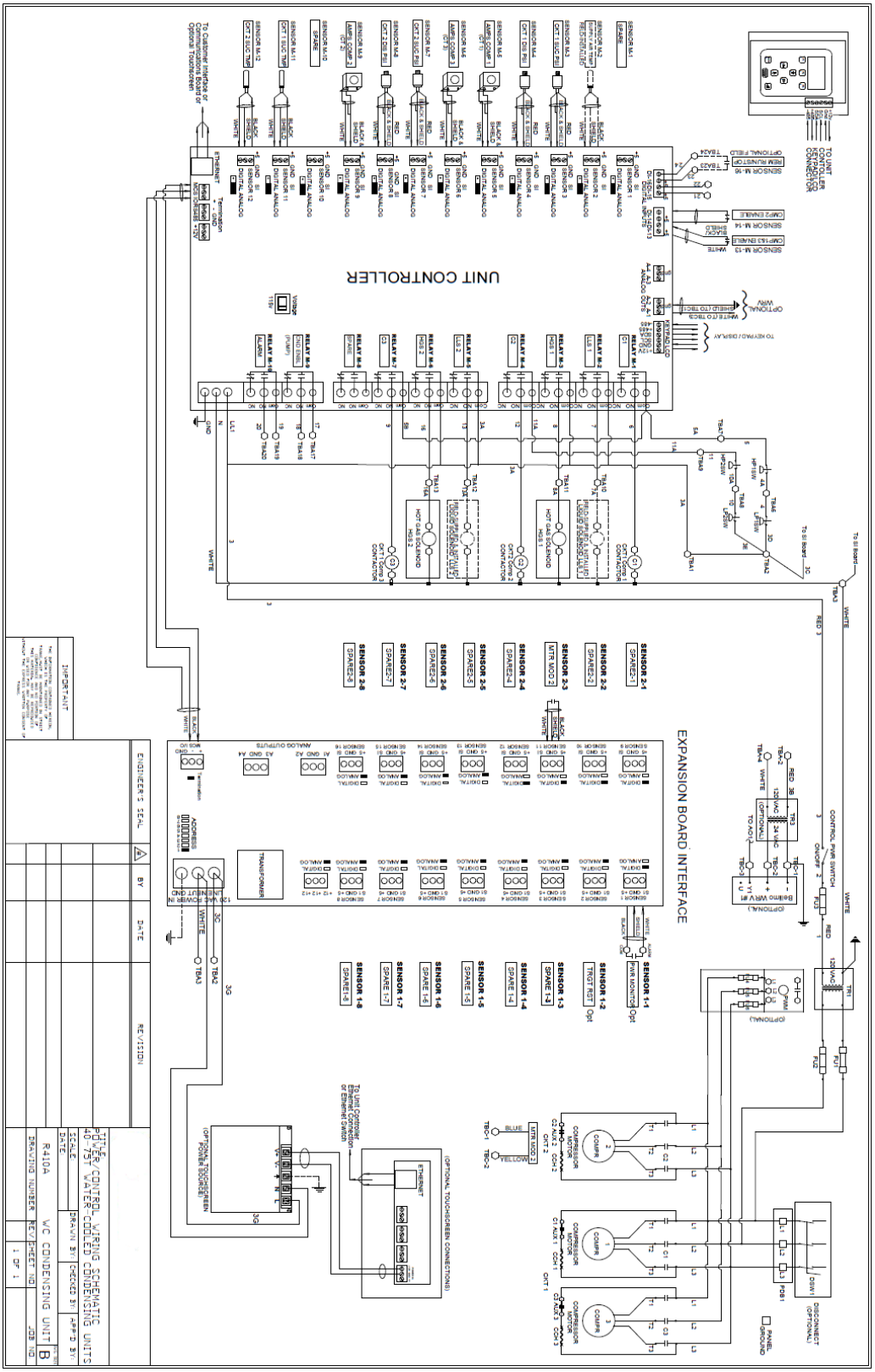
The interconnecting piping is supplied by others and good engineering practice should be used in sloping and trapping the lines. Recommended line sizes for use with specific NTC modules are:

		WCCU 20	**WCCU 30**	**WCCU 40**	**WCCU 50**	**WCCU 65**	**WCCU 75**
Refrigerant Circuits		1	1	2	2	2	2
Minimum Step (tons)		10	15	10	12.5	15	15

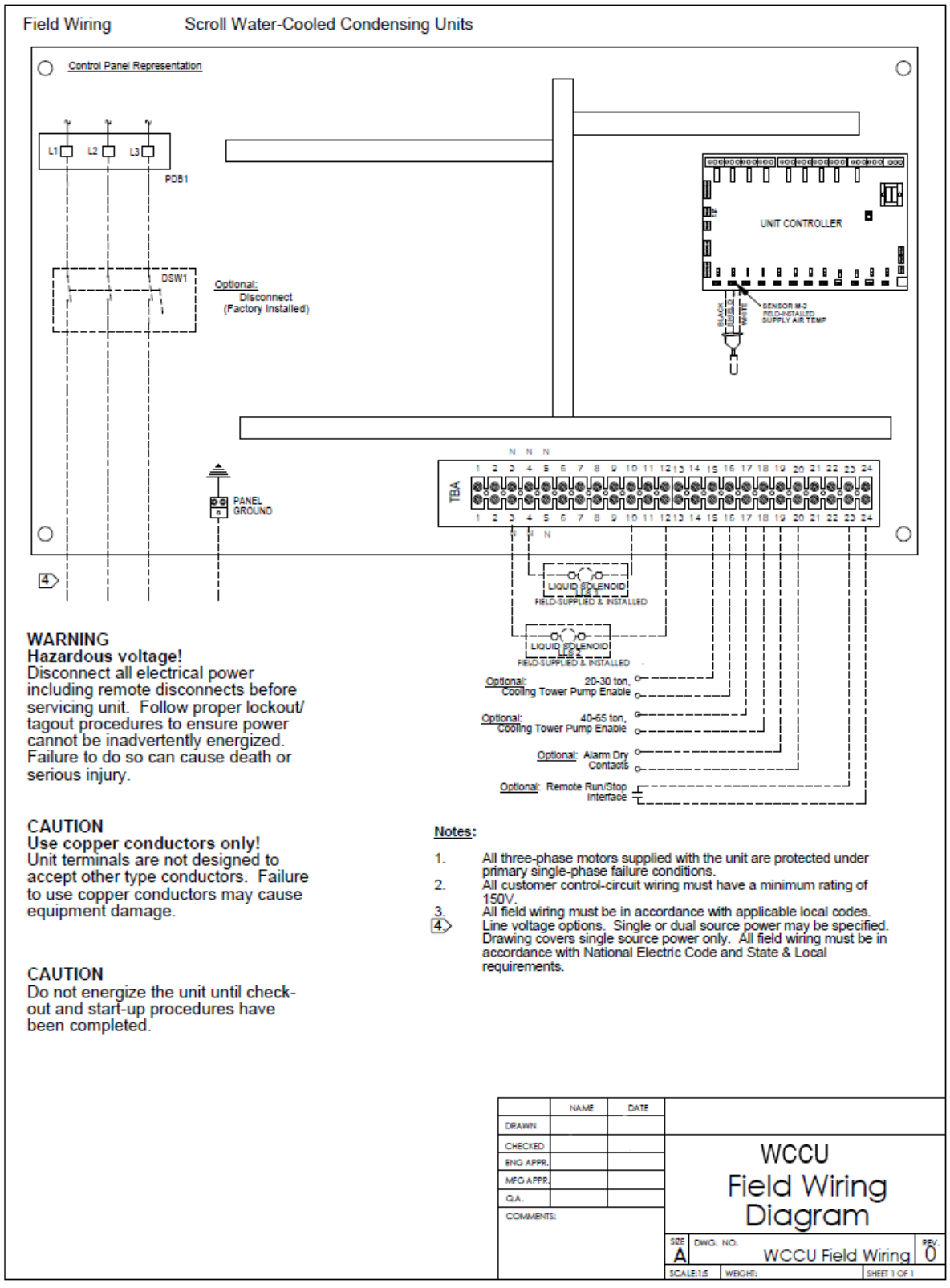
Suction Lines							
50 foot equivalent length	Horizontal (& drops)	1-5/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8
	Vertical (up)	1-5/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8
75 foot equivalent length	Horizontal (& drops)	1-5/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8
	Vertical (up)	1-5/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8
100 foot equivalent length	Horizontal (& drops)	1-5/8	2-1/8	1-5/8	2-1/8	2-1/8	2-1/8
	Vertical (up)	1-5/8	2-1/8	1-5/8	1-5/8	2-1/8	2-1/8

Liquid Lines							
50 foot equivalent length		3/4	7/8	3/4	3/4	7/8	1-1/8
75 foot equivalent length		3/4	7/8	3/4	3/4	7/8	1-1/8
100 foot equivalent length		3/4	7/8	3/4	3/4	7/8	1-1/8

Dual Circuit WCCU Wiring Diagram



Field Wiring Diagram



WARNING
Hazardous voltage!
Disconnect all electrical power including remote disconnects before servicing unit. Follow proper lockout/ tagout procedures to ensure power cannot be inadvertently energized. Failure to do so can cause death or serious injury.

CAUTION
Use copper conductors only!
Unit terminals are not designed to accept other type conductors. Failure to use copper conductors may cause equipment damage.

CAUTION
Do not energize the unit until check-out and start-up procedures have been completed.

Notes:

1. All three-phase motors supplied with the unit are protected under primary single-phase failure conditions.
2. All customer control-circuit wiring must have a minimum rating of 150V.
3. All field wiring must be in accordance with applicable local codes.
4. Line voltage options. Single or dual source power may be specified. Drawing covers single source power only. All field wiring must be in accordance with National Electric Code and State & Local requirements.

	NAME	DATE
DRAWN		
CHECKED		
ENG APPR.		
MFG APPR.		
Q.A.		
COMMENTS:		

WCCU
Field Wiring
Diagram

SIZE A | DWG. NO. WCCU Field Wiring | REV. 0
SCALE:1:5 | WEIGHT: | SHEET 1 OF 1

Mechanical Specifications

General
All WCCU water-cooled condensing units are pressure tested and dehydrated. Exposed metal surfaces and finished product are coated with paint. Units only require the field connection of liquid and suction refrigerant lines, condenser water piping and power and control wiring to control panel terminal block. Condenser water inlet and outlet connections are female pipe thread (FPT).

Agency Listing
ETL Listed to U. S. and Canadian safety standards.

Compressor – Motor
Fully hermetic direct drive scroll compressors are mounted on vibration isolators. Lubrication system – Oil distribution system includes an oil level sight glass and is arranged to ensure adequate lubrication during starting, stopping and normal operation. Motor is suction gas cooled and runs at a constant speed of 3,500 RPM at 60 Hz. Compressors nominal 15 tons and less have internal overload motor protection to protect against excessive current and temperature caused by overloading, low refrigerant flow or phase loss. Compressors nominal 20 tons and greater have a motor protection module inside the terminal box. This device provides for efficient and reliable protection against overheating and overloading as well as phase loss/reversal. WCCU products 30 nominal tons and less have two (2) compressors arranged and piped as a tandem set in a single refrigerant circuit. WCCU products 40 nominal tons and greater have two (2) compressors arranged and piped as a tandem set in one refrigerant circuit and a single compressor in the other refrigerant circuit.

Condenser
Condensers are mechanically cleanable shell-and-tube type with enhanced copper tube geometry, with 0.025-inch wall thickness, removable heads to facilitate cleaning. Shell side (refrigerant side) working pressure is 650 psig at 150 °F and bears the ASME stamp. The tube side (non-coded, water side) working pressure is 250 psig at 150 °F for WCCU 20 and 230 psig at 150 °F for WCCU 30, 40, 50, 65 and 75. WCCU 20 and 30 have a single refrigerant circuit, while the WCCU 40, 50, 65, and 75 have two refrigerant circuits. All WCCU models have a single condenser with one water inlet and outlet connections. A heat load may be connected to the condenser when simultaneous heating and cooling loads exist. A heat recovery machine with shell and tube condenser shall be capable of producing up to 125°F hot water. Machine shall control to smallest of heating or cooling load and automatically switch between heating and cooling control set points.

Refrigerant Circuit
WCCU 20 and 30 have a single refrigerant circuit, while the WCCU 40, 50, 65 and 75 have two refrigerant circuits. Each refrigerant circuit has refrigerant charging port, multiple access ports and pressure relief valve on shell and tube condenser or fusible plug on brazed plate condenser.

Control Panel
The control panel provides separation between power distribution components and the control components. Controller is located in the controls section with display mounted on the exterior of the control cabinet door. Power distribution section contains incoming power distribution block (or optional fused or non-fused disconnect which also serves this purpose) and ground lugs for customer connection, across the-line contactors, current transformers, and control power transformer with primary and secondary fuses. Controls section contains the unit controller with standard and optional expansion boards, door mounted key pad and display or optional touchscreen, optional power monitor, service friendly terminal strips to facilitate circuit diagnosis and field connection. Field connection terminal strip has connection points for the following:

- "Remote Off/Auto" (digital input)
- "Remote Alarm" (digital output)
- "Condenser Water Pump Enable" for one condenser water pump (digital output)

Unit controller monitors, displays and logs operating and fault conditions, and provides safety protection for low and high refrigerant operating pressure, low and high refrigerant superheat, low refrigerant differential pressure between low and high side, compressor over amperage and abnormal power conditions when fitted with optional power monitor. Mechanical high- and low-pressure switches, and compressor overload protection devices are monitored and reported by the controller.

The unit controller stores 1,008 packets of information taken at set time intervals. The time interval is factory set for collecting data every 15 seconds, but the time interval is adjustable. Up to 99 fault conditions are stored in the controller and 120 seconds of history is saved any time a fault occurs that results in a compressor lockout. The unit controller stages compressors to maintain the evaporator leaving water or air temperature set-point using proportional, integral and derivative (PID) logic. Unit controller has RS232, RS485 and Ethernet communications ports for user interactive communication, or for interface with Building Management System (BMS). Controller has standard BMS compatibility with BACnet® IP and Modbus™ RTU and can be fitted with an optional interface gateway for compatibility with Johnson N2, LonTalk® and BACnet MS/TP. The controller is capable of responding to a BMS signal for "Run/Stop", "Leaving Chilled Water Temperature Offset" and "Demand Limiting Reset". "Leaving Chilled Water Temperature" can also be offset using a 0 to 5 VDC input signal.

Standard Operator Interface
The exterior cabinet door of the water-cooled condensing unit control panel includes the unit controller interface with keypad and 128x64 dot pixel display screen or optional 15.4-inch color touchscreen. Controller can be accessed using the local keypad or optional touchscreen for all unit control setpoints, faults and alarm conditions with history, and operating conditions in a clear language format for easy interpretation by user/operator.

Optional Operator Interface — Touchscreen
Touchscreen replaces standard unit controller interface. Optional 15.4-inch Color Touchscreen comes with water-cooled condensing unit specific display screens allowing user to easily view water-cooled condensing unit status and operating conditions in real time for compressors and refrigerant circuits. User can also acknowledge alarms and change set points. Preloaded MCS Connect software expands interface and troubleshooting capabilities by allowing user to set and view schedules, view run history in graphical format, view 120 seconds for history leading up to compressor lockout fault, and more.

Remote Operator Interface
Unit controller can also be accessed from a remote computer, such as a laptop, using MCS Connect software. Access via a remote computer allows all the functionality of the standard local interface with the additional ability to download run and fault history and graphically display history. As an additional benefit, run and fault history can be sent to the factory from the remote computer for trouble shooting assistance.

Insulation
All cold surfaces are insulated with 0.5 inch (20mm) thick closed-cell flexible insulation with a K value of 0.26.

Communications
The powerful unit controller provides complete water-cooled condensing unit controls and provides interface to a variety of platforms including BACnet® IP and Modbus™ as standard. Available LonTalk®, Johnson N2 and BACnet MS/TP requires an optional interface.

- All units come standard Ethernet connection.
- A complete software support package is available at no charge for your PC allowing for system configuration, dynamic on-line display screens, remote communication, graphing and more. Much of this utility including preloaded software support package (MCS Connect) is available with optional touchscreen.
- Controller options allow for use of additional features such as power monitoring, control of peripherals (fans and pumps) and sensor inputs.

As standard, the controller allows factory configuration for BMS interface to either BACnet IP or Modbus. Once configured, the BMS has the ability to monitor water-cooled condensing unit operation and fault status, adjust leaving water setpoint, turn unit on or off, and allow load limiting control of the unit. As a factory installed option, additional control board(s) can be added and configured for BMS interface to Lon Talk®, Johnson N2 and BACnet® MS/TP. Once configured, the BMS has the ability to monitor water-cooled condensing unit operation and fault status, adjust leaving temperature setpoint, turn unit on or off, and allow load limiting control of the unit.

Electrical Options

Fused Disconnect
The factory installed fused disconnect has time-delay fuses rated for unit's FLA. Disconnect serves as the 3-phase power input service connection point. Disconnect has a through-the-door handle operator mechanism allowing the service to be engaged and disengaged without opening the control panel door. Handle has a provision for lockout.

Non-Fused Disconnect
The factory installed non-fused disconnect serves as the 3-phase power input service connection point. Disconnect has a through-the-door handle operator mechanism allowing the service to be engaged and disengaged without opening the control panel door. Handle has a provision for lockout.

Unit SCCR Rating
Standard WCCU units have a 5 kA Short Circuit Current Rating (SCCR) rating. Optional 100 kA SCCR is available on all models. Note: Not all voltage specific WCCU units are available with optional disconnect and 100 kA rating.

Power Monitor
The factory installed power monitor is specifically designed to protect motors and other 3-phase loads from premature failure and damage due to common voltage faults such as voltage imbalance, over/under voltage, phase loss, reversal, incorrect sequencing and rapid short cycling.

Other Options

Water Regulating Valve
Factory installed condenser water regulating valve, controlled by unit controller, is a recommended option for all WCCU water-cooled condensing units. Valves are designed to regulate outlet condenser water to maintain stable compressor discharge pressure during full and part load conditions.

Isolator Pads
This shipped loose option includes four 3/4" thick, 6" square Mason Super W pads. These pads are designed for maximum resilience and vibration isolation.

Sound Attenuation
For applications where quiet operation is required, two levels of factory-installed sound attenuation are available.

- **Cabinet** - This factory installed option includes compressor compartment cabinetry design for control of compressor noise. Factory painted to match cabinetry. Includes sound absorbing insulation liner and removable panels for access to compressors and all major components for ease of service.
- **Blankets** - This factory installed option includes insulated sound covers for each compressor designed to control compressor noise.

Literature Change History

03/25/2020 – New Literature
08/24/2020 – Fixed broken link on page 8 and corrected text on page 4

905 W. Cotton Street
Longview, TX 75604
Phone: 903-758-2900
www.JetsonHVAC.com

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