



# **Introduction to Tandem Chillers**

## TANDEM CHILLERS

Part of a group of companies that have been supplying chillers to a variety of markets for over 35 years.

### *Our core business is*

- process or industrial cooling systems
- supply chilled water, tower water or fluid cooler systems (both dry and wet)
- complete pump tank modules with double, triple or multiple pumps
- inline and side stream filtration and automatic chemical treatment packages
- our chillers are available as water cooled, indoor air cooled, remote air cooled and out door air cooled condensers
- our products are made to cool either the product, the process machine or both
- we also supply medium temperature chillers with freon 404A for skating and curling rinks as well as ice storage systems to reduce peak cooling loads on buildings
- our chiller product temperature range is from -40 F to 70 F using different refrigerants like 134a, 404A, 407C or 410A

### *For our process customers we are responsible for*

- sizing the cooling load and the type of cooling system
- selecting the number and type of chillers or cooling towers considering both current and future needs
- based on the cooling load we then select and size the pumps, the tank, the type of filtration and chemical treatment required
- in some applications we install fittings and valves on the tanks so that future pumps can be added as the company expands. Some pump systems have five pumps and circulate up to 2540 gpm

## TEMPERATURE CORPORATION

Temperature Corporation supplies the cooling equipment with the customer being responsible for the installation, or it supplies the cooling equipment with complete plant water piping drawings and the customer's installation company would install the system. In the Toronto area we do complete "Turnkey System".

## FIRST CHOICE PORTABLE CHILLERS INC.

First-Choice supplies self-contained air cooled or water cooled portable chillers (chillers complete with pump, tank set and casters) to a variety of industries where a stand-alone chiller is required to cool either the product, the machine or both.

## TANDEM CHILLERS INC.

Tandem started designing its first modular chiller in 2003 with a limited number of scroll compressor chillers and screw compressor chillers available in freon 22. We brought our vast knowledge to the design of our modular chillers:

1. The chiller would be of *sound mechanical and refrigeration design*.
2. We designed our chillers so they could be removed for service *without shutting down the rest of the chilling system*.

This design seems so natural we cannot see why our competition does not do it. If we had told our process customers that we had to shut down their plant so we could do service on the cooling system we would have been thrown out of their plant.

Why should an air-conditioning customer expect anything different?

Tandem Chillers is always developing new and innovative products for our customers. Currently we are developing:

- Air-to-Water heat pump chillers.
- Chillers using the Turbocor centrifugal 134a compressor.

*Today, we have the widest selection of chillers and freons available. In this document we will explain more about our chillers that are capable of being removed for service, new product lines and why our chillers are superior to our competitors.*

WE SUPPLY THE ONLY CHILLER THAT CAN BE REMOVED FOR SERVICE  
***WITHOUT*** SHUTTING DOWN THE REST OF THE SYSTEM.

## OTHER MODULAR CHILLERS

Other chillers are modular in assembly only but when assembled they treat the group of chillers as one large chiller with multiple compressors.

We compare other chillers to driving three cars with a long pole through the side windows connecting all the cars together, as long as all the cars are mobile you can move or travel, if one fails you are stuck.

Our approach would be to take the time and strap the pole to the bumper of the three cars, if one car fails you disconnect and the other two can go on their way.

It is an easier and less expensive design to place the headers on the front and back of the chillers but you are blocked in and cannot move, this is further compounded if you add an electrical buss bar system.

The buss bar system is installed in each chiller at the job site and they are bolted together thus making it impossible to remove the chiller. They block one end of the chiller group with a large fused disconnect not allowing any access for service on that end, and if the total system operating amps is over 500 amps they install another large fused disconnect on the other end.

Now both ends are blocked for service.

### How to Service the Competitors Chillers

No service is done until the winter shut-down and the chillers can be taken out of service long enough for the repairs to be done. In some parts of the country there is no or minimal winter time to do service on the chillers, they are needed all year round.

*OR*

All the chillers are shut-off and taken out of service, the water drained from the four main headers, if a buss bar system is used it must be disconnected before the damaged chiller can be removed. Four (4) blank headers are installed where the chiller was located, jumper cables must be installed between the chillers from where the buss bar system was removed, finally the system is filled with water and started up. This procedure has to be reversed when the chiller has been repaired and ready to be installed.

This is not a very satisfactory way to perform service, many hours are accumulated just to re and re the chiller and you have not repaired it yet. We like to give our customers the choice of when to service the chillers.

## TANDEM CHILLERS

Our chillers are modular in **ASSEMBLY** and modular in **DISASSEMBLY**, we treat our "modular chilling system" as being made up of stand-alone chillers coupled together up to a maximum of twelve chillers.

### How to Service a Tandem Chiller

If the chiller can not be repaired in place, the four (4) isolation valves on the branch headers to the evaporator and condenser are shut-off, the eight (8) uni-strut clamps holding the header to the chiller are removed, the grooved coupling between the valve and the evaporator or condenser is taken apart, the main power cable to the chiller is disconnected (disconnect main power first), the chiller lifted by using a lever and a 1" bar or water pipe placed under the chiller, the chiller is rolled forward.

Half way out you can remove either compressor, all the way out you can remove the evaporator or condenser.

Reverse this procedure to reinstall the chiller.

This can be done *when you choose* not when the system is shut-down.

## OUR PRODUCT LINE

### WATER COOLED DUAL SCROLL COMPRESSOR CHILLERS

Range – dual 10 hp up to dual 40 hp compressors. Most use freon 410A, but available in 134a and 407C

#### Water Cooled Chillers

Model WXO

- Standard Condensing Temperature chillers
- Maximum entering condenser water temperature 100°F
- \* Dimensional (same for all scroll water cooled chillers)
- \* Flow (same for all scroll water cooled chillers)

#### Water Cooled Heat Reclaim Chillers

Model WHRX

- High Temperature Heat Reclaim Chillers
- Maximum leaving condenser water temperature 140°F

#### Water Cooled Heat Reclaim Chillers

Model WHRXX

- Extra High Temperature Heat Reclaim Chillers with freon 134a
- Maximum leaving condenser water temperature 155°F

#### Water Cooled Heat Pump Chillers

Model WHPX

- High Condensing Temperature Reversing chillers
- Maximum leaving condenser water temperature 140°F

#### Water Cooled Heat Pump Chillers with MHMCV

- Main Header Movable Chiller Valves that allow some chillers to operate in heating mode while others can operate in a cooling mode.

#### Water Cooled Condensing Units

Model WCU

- Standard Condensing Temperature units
- Maximum entering condenser water temperature 100°F
- \* Dimensional (same for all scroll condensing units)

#### Condenserless Chillers

Model WCL

- Generally used with remote air cooled condenser
- Maximum entering condenser air temperature 100°F
- Option for a fan speed control or flooded condenser
- \* Dimensional (same for all scroll condenserless chillers)

Models: WX, WHRX, WHRXX, WCU, WCL – 010, 020, 030, 040, 050, 070 and 080. *X denotes new high efficiency chillers.*

### OUTDOOR AIR COOLED DUAL SCROLL COMPRESSOR CHILLERS

Range – dual 10 hp to dual 17.5 hp compressors. Most use freon 410A, but available in 134a and 407C

#### Outdoor Air Cooled Chillers

Model VO

- Standard Condensing Temperature chillers
- Maximum entering condenser air temperature 100°F
- Option for fan speed control or flooded condenser
- \* Dimensional (same for all scroll air cooled)

#### Outdoor Air Cooled Condensing Units

Model VCU

- Standard Condensing Temperature units
- Maximum entering condenser air temperature 100°F
- Option for fan speed control or flooded condenser

#### Outdoor Air Cooled Free Cool Units

- Cools from 54°F with 32°F ambient temperature or lower

Models: V, VCU – 010, 015, 020, 025, 030, 035 and 060.

We supply air cooled chillers for higher altitudes up to 6000' and higher entering air conditions up to 115°F and larger chillers up to dual 40 hp compressors, these are not modular chillers.

## OUR PRODUCT LINE ...continued

### SINGLE ROTARY SCREW COMPRESSOR CHILLERS

Range – 60 hp to 140 hp compressors. Most use freon 407C, but are available with the new high efficiency screw in 134a

#### Water Cooled Screw Compressor Chillers

Model WX

- Standard Condensing Temperature chillers
- Maximum entering condenser water temperature 100°F
  - \* Dimensional (same for all screw water cooled chillers)
  - \* Flow schematic (same for all screw water cooled chillers)

#### Water Cooled Condensing Units

Model WCU

- Standard Condensing Temperature units
- Maximum entering condenser water temperature 100°F
  - \* Dimensional (same for all screw condensing Units)

#### Condenserless Chillers

Model WCL

- Generally used with remote air cooled condenser
- Maximum entering condenser air temperature 100°F
- Option for fan speed control or a flooded condenser
  - \* Dimensional (same for all screw condenserless chillers)

Models: W, WCU, WCL – 060, 070, 080, 090, 100, 120 and 140

### SINGLE AND DOUBLE PUMP PACKAGES

Single pump package, series SP- and dual pump packages series DP-, both can be purchased for indoor applications that sit beside the chillers or roof mounted with a weatherproof housing and electrical control panel. They can be supplied for either chilled water or condenser water flow.

- Pump range from 1.5 hp to 50 hp.
- Pump flow from 30 gpm up to 1000 gpm.
- Pump pressures from 35 hf (15 psi) to 150 hf (65 psi).
- Pump motor speed 1750 rpm and 3500 rpm.
- TEFC motors, totally enclosed fan cooled.
- Indoor and outdoor packages.

## OUR PRODUCT LINE ...continued

### INLINE FILTERS

One of our competitors uses stainless steel strainers inside their inlet headers, this seems an easy fix but if they need to be cleaned the whole system needs to be shut down, the water drained out of the headers, the headers taken apart, the strainer pulled out and cleaned and the process reversed to install them.

We recommend inline strainers with isolation valves either side of the filter for service, the filter can also be located in the pump suction to protect both the pump and chillers or in the main inlet headers before the chillers to protect both the evaporator or condenser.

We offer a cast iron flanged basket strainer with a 3/64" perforated screen or an all stainless steel flanged filter with a 30 mesh screen with a manual or automatic flush.

Size range from 3" to 10" pipe size.

### CHILLER CONTROLLER

Chiller controller is a "programmable type controller" with the program developed by Tandem Chillers to operate and protect our chillers. The chiller controller is supplied with a four (4) line liquid crystal display located in the control panel door on indoor chillers and inside the panel on our outdoor chillers. The chiller controller displays the operating and fault conditions in English.

As a stand-alone chiller the controller sets each compressor's minimum run time, minimum off time based on our dead band temperature control program.

When the chiller is part of a group of chillers, the remote master controls the staging of the compressors and the chiller controller protects the chiller compressor and its components.

- Senses chilled water in and out temperature.
- Chilled water flow with a paddle type flow switch.
- Senses refrigerant high and low pressure for each circuit.
- Senses suction temperature for each circuit.
- Compressor internal fault sensor in compressor windings.
- Senses condenser water in and out on heat reclaim and heat pump.
- Senses discharge temperature on heat reclaim and heat pump chillers

### OPTIONS THAT CAN BE ADDED TO THE CHILLER CONTROLLER

- Current sensor for each compressor.
- Paddle type flow switch for condenser water.

## OUR PRODUCT LINE ...continued

### GEOTHERMAL – WATER SOURCE CHILLERS

- All of our water cooled chillers can operate on ground source water to cool their condensers with the addition of motorized condenser water regulating valve for head pressure control.
- Our heat reclaim chillers can extract the heat from the ground source water and supply hot water to the building. The leaving load side (condenser) hot water temperature is dependent on the leaving evaporator water temperature.
- Our heat pump chillers can operate on ground source water:

In the forward direction they extract the heat from the ground source water and the unit supplies hot water to the building hot water loop.

In the reverse direction the condenser heat is removed by the ground source water and the unit supplies cool water the building chilled water loop.

For both heat reclaim and heat pump chillers the lower the evaporator leaving water temperature the lower the leaving hot water temperature.

### REMOTE MASTER

- 12" x 12" x 6" deep NEMA (EEMAC) 4/12 enclosure.
- On-off switch and power on light.
- An eight (8) line liquid crystal display.
- Requires its own 120 volt supply separate from the chiller power.
- Stages up to 12 scroll compressor chillers – 24 steps of capacity control by cycling compressors.
- Stages up to 12 screw compressor chillers – 48 steps of capacity control by unloading compressors, four steps.
- Can operate as a "constant flow system" or a "stepped flow system".
- Sets minimum run time and minimum off time, stage up time and stage down time of each compressor.
- Stages compressors on a first in/first out basis with a force rotation if a compressor is 10 hours out of step.
- Temperature program is used to stage compressors on leaving water temperature, field selectable for entering. If the remote master fails, chillers automatically work on their own. When the remote master comes back on line the chillers automatically report back to it.
- Daisy chain from remote master to all the chillers, pump packages and free cool units.
- Senses and displays entering and leaving chilled water temperature.
- Senses and displays entering and leaving condenser water temperature.
- Set up to control chillers on leaving water temperature, can be changed to entering.

### Inputs

for remote start, main header chilled water and condenser water paddle type flow switch.

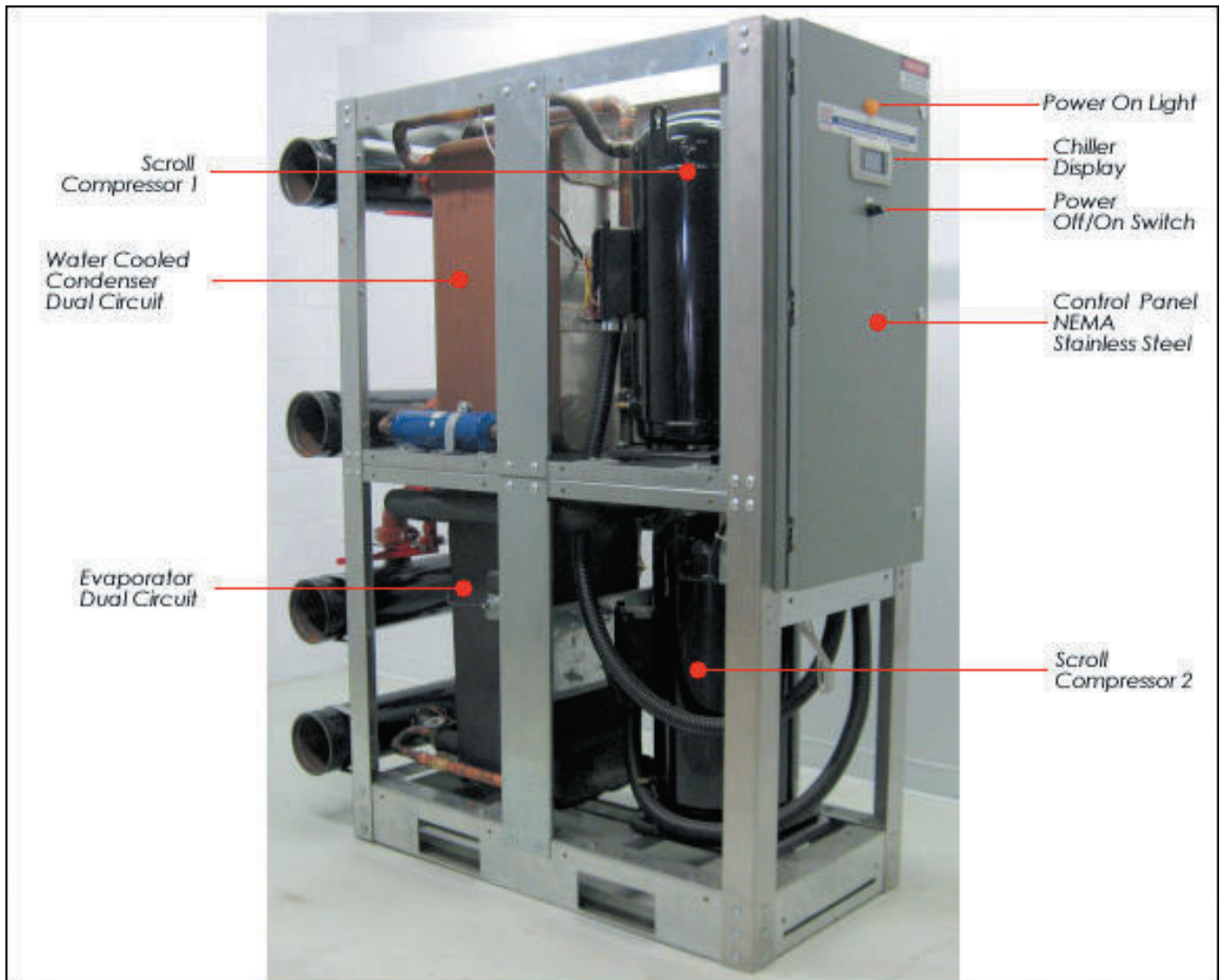
4 to 20 ma inputs for main header paddle wheel flow sensors.

### Outputs

to start chilled water pumps, condenser water pumps, other auxiliary equipment and alarm fault.

0 to 10 VDC and 4 to 20 MA outputs for proportional control.

Communications with BMS or DDC in BACnet IP, BACnet MSTP, Modbus or Lon Works.



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