# CHILLER MANUAL
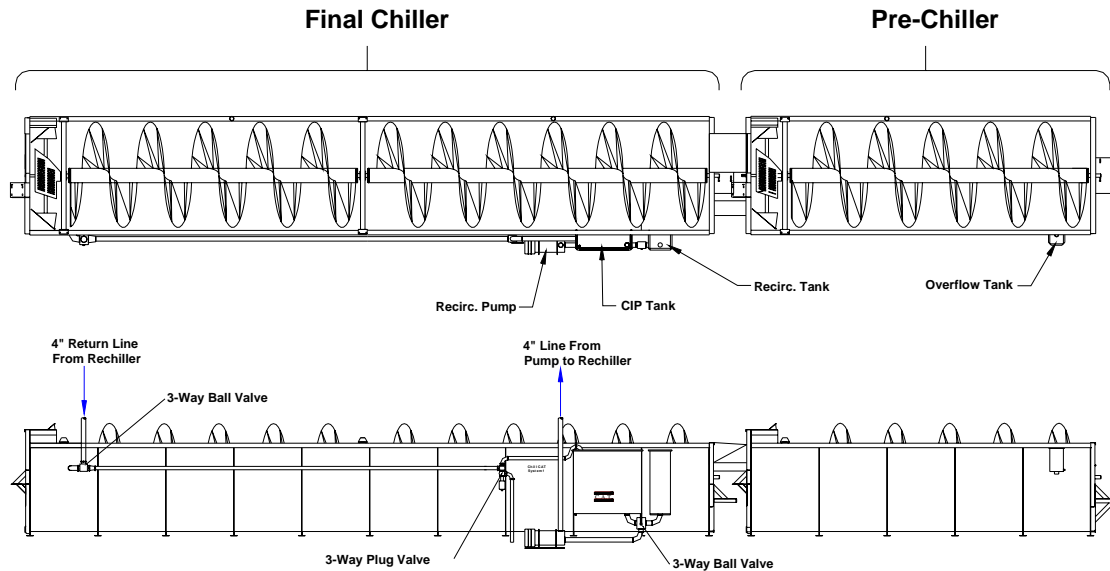
## Cooling & Applied Technology, Inc.

**Wayne Farms – Union Springs, AL**

Model # H10.5-20.0RKRR    #F10.5-75.0R
Serial  # 2590806          #2600806

Revised 7/20/2011 to Reflect Conversion of Pre-Chiller from Auger (P10.5-20.0R) to Hydraulic Rocker (H10.5-20.0RKRR) & Addition of SpinCAT to Auger Drive

# TABLE OF CONTENTS

**Final Chiller**                                   **Pre-Chiller**

Recirc. Pump — CIP Tank

Recirc. Tank          Overflow Tank —

4" Return Line
From Rechiller

3-Way Ball Valve

4" Line From
Pump to Rechiller

3-Way Plug Valve          3-Way Ball Valve

*Figure 1-1.  Overview of Typical CAT Chiller System.*

The C.A.T., Inc. chiller system, as shown in figure 1-1, is composed of a pre-chiller and final chiller.  The chiller system is used to control the temperature and aid in moisture pick-up of product as it passes through the system.  There are many factors involved in obtaining a consistent temperature and moisture content of the product, but the C.A.T., Inc. system will allow greater consistency in obtaining the production and HAACP goals once the systems unique characteristics are determined.  It is important to note that each system may have different running parameters due to changes in any of the factors involved, yet once the systems parameters are known, following an iterative trial and error process, the system should remain stable as long as these factors do not change.

The cooled water is recirculated through the chiller system in a counter-flow direction to allow the birds to be chilled to their proper temperature.  The amount of time the birds spend in the chiller, the temperature of the water, and the agitation of the birds are the main factors involved in cooling the birds to a target temperature and moisture pickup control.

The chiller shell/auger are constructed entirely of #304 series stainless steel and are seam welded for ease of cleaning and to ensure structural integrity.
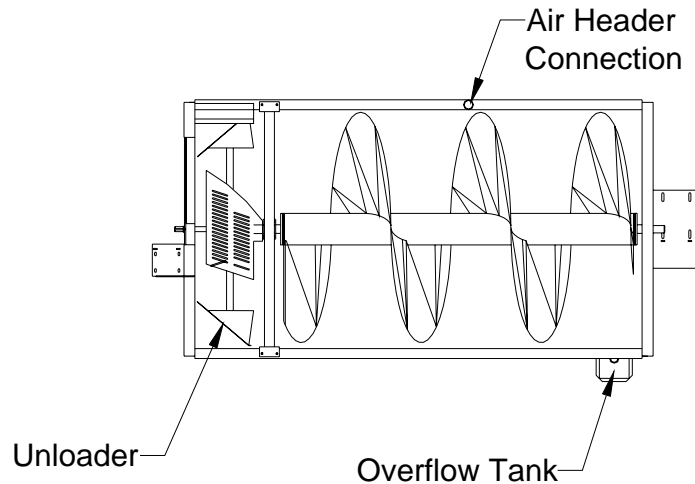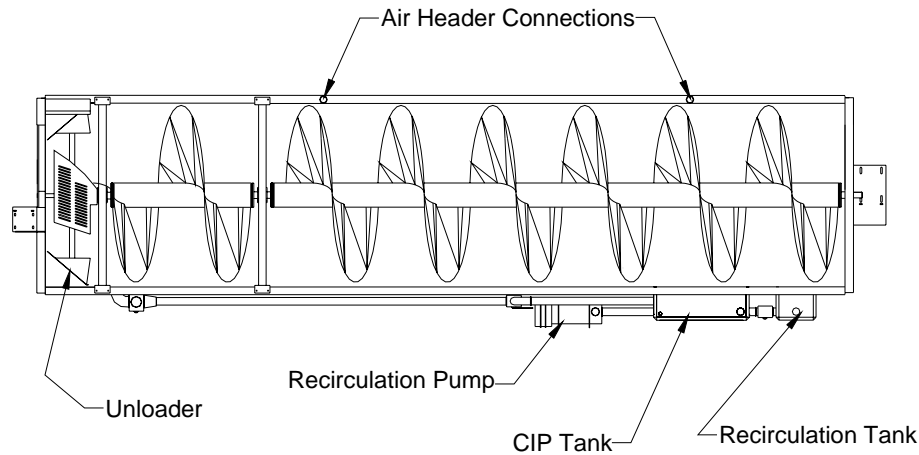
*Figure 2-1. Overview of Typical CAT Pre-Chiller.*

The pre-chiller is the entrance point for the product into the chiller system. The product is loaded into the end nearest the overflow tank (opposite from the unloader end). The temperature of the water in the pre-chiller and the amount of agitation caused by air flowing from the air nozzles on the under side of the chiller, are the overriding factors controlling the moisture pick-up of the birds

The overflow tank is used to regulate the water level in the chillers. A typical configuration will allow water to flow from the final chiller to the pre-chiller.

USDA regulation allows the overflow temperature set as high as 65°F. Once set, the overflow must not be exceeded. The temperature is regulated by the time the birds stay in the pre-chiller. The cooling effect is accomplished by the ½ gal/bird make-up water entering the prechiller at a lower temperature than the overflow temperature. Typical water enters at 36°F and out at approximately 58°F.

The moisture is typically controlled by the prechiller. Eighty-five percent of the moisture is picked up in the prechiller, with the remainder absorbed in the final chiller. The three factors that control the moisture are the amount of time in the chiller, the amount of agitation, and the water temperature in the chiller. The greater time the bird spends in the prechiller, the higher the overflow temperature will become. This action will cause bird temperature to be colder upon exiting the prechiller. Typically, as time and temperature increase, the moisture pick-up will also increase.

*Figure 2-2.  Overview of Typical CAT Final Chiller.*

The final chiller's main function is to cool the birds to the target temperature.  The main factors involved in this process are the temperature of the water, time spent in the final chiller, and agitation caused by the airflow from the nozzles.  Cooled water is added to the chiller just behind the unloader to allow the coldest water to be present at the end of the chiller cycle.  This configuration allows the bird to reach its lowest possible temperature.

The recirculation tank is used to gather the warmer water to allow it to be pumped to a rechiller for cooling.  Make-up water, the tap water that is added at a rate of 1/2 gal/bird, is also added at this point.  From this point water is drawn into the recirculation pump and pumped through the rechiller before returning the cooled water to the chiller again.  Adding make-up water at this point is used insure the temperature of cooled water is down to 32°F-33°F.
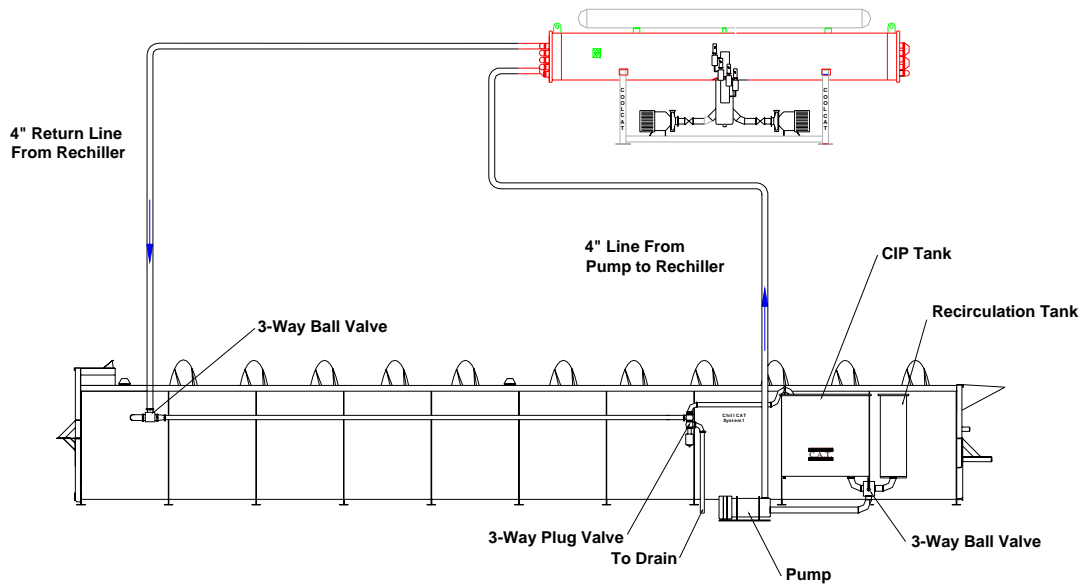
*Figure 2-3.  Piping Overview of Typical CAT Chiller-Rechiller Water System.*

The CIP (Clean-in-Place) Tank is used to hold water that is used to clean the rechiller piping once production has stopped.  A 3-way ball valve is used to direct water from the CIP tank to the recirculation pump.  After the water leaves the pump, it cycles back to the rechiller and returns to the CIP tank.  The CIP tank allows the water to be heated and soap to be added for cleaning.  Once the cleaning is finished, the CIP tank can recirculate clean water to rinse the system.  The 3-way plug valve allows water to empty from the rechiller piping system to the drain system of the plant.

*Figure 3-1.  View of Unloader End with Air Nozzle Hose.*

Moisture control is primarily controlled in the pre-chiller of the system.  The approximate operating parameters of the chiller are obtained by the physical design of the system.  The water temperature and agitation parameters may be adjusted to some degree.  The exact parameters for a system are not known until after the chiller, (and the complete system), are operational and tests for temperature and moisture content have been completed.  The system parameters may be known to a more precise degree after several iterations of testing and adjusting have been completed.  But basically, the process of obtaining consistent moisture content in the birds is one of trial and error.

The temperature of the birds exiting the chiller system is determined by a number of factors. Primarily, the temperature of the cooling water, amount of agitation, and the amount of time spent in the chiller are the factors involved in controlling the temperature of the birds.

Typically, the bird temperature will be 2°F warmer than the return water if the time in chiller and agitation are correct.

Time in the chiller varies with bird size.

| WOG Weight (lbs.) | Total Time in Chiller System (min.) |
|-------------------|--------------------------------------|
| 2.5 – 3.0 | 60 - 75 |
| 3.1 – 3.5 | 70 - 75 |
| 3.6 – 4.0 | 75 – 80 |
| 4.1 – 4.5 | 80 – 85 |
| 4.6 – 5.0 | 85 – 90 |
| 5.1 – 5.5 | 90 – 95 |
| 5.6 – 6.0 | 95 – 100 |
| 6.1 – 6.5 | 100 – 105 |
| 6.6 – 7.0 | 110 – 115 |

## Weekly

- **Grease Bearings**.

## Monthly

- **Check bolts on ends of auger for tightness.**

- **Check belts and chain for proper tension.**

GOOD!                                          BAD!

$\frac{1}{4}$" to $\frac{3}{4}$"
Slack in Chain
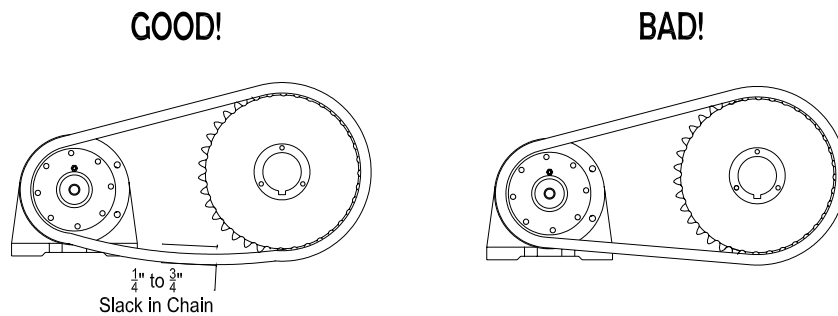
- **Check gear reducers for proper oil level.   Fill to upper level when not in use. Fill above level when in use.  *See note on double stage gear reducers below.**

UPPER MARK

LOWER MARK
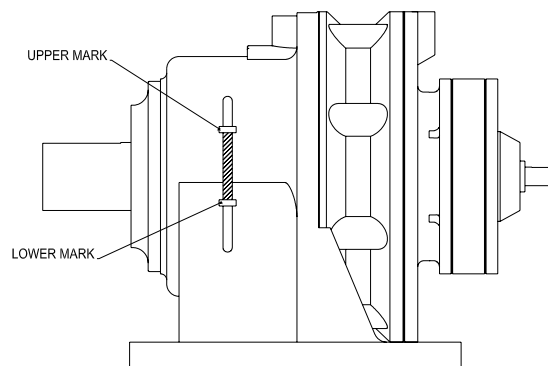
**Note:  Double Stage gear reducers:**
**1st Stage – uses grease and requires no service.**
**2nd Stage – uses oil and requires service.**

## Monthly – (cont.)

**Grease and Oil Specifications.**

### Grease Lubrication

| Ambient Temperature | Single Reduction (6:1 ~ 87:1) | | Double Reduction (88:1 ~ 7569:1) | |
|---|---|---|---|---|
| | Shell Oil | Mobile Oil | Shell Oil | Mobile Oil |
| 5°F (15°C) to 122°F(50°) | **Darina EP Grease No. 2** | **Mobilux EP2** | **Darina EP Grease No. 2** | **Mobilux EP2** |

### Oil Lubrication

| Ambient Temperature | ISO Viscosity Grade | AGMA Viscosity Grade | SAE Grade Gear Oil |
|---|---|---|---|
| **32°F - 95°F (0°C ~ 35°C)** | **100-150** | **3EP 4EP** | **85W 90** |

## Recommended Cleaning

*Thorough wash down using high pressure water every 24 hrs. of use.

*Sanitize using appropriate cleaning solution after every wash down.

**Rocker Drive Section – 10'-5" Pre Chiller**
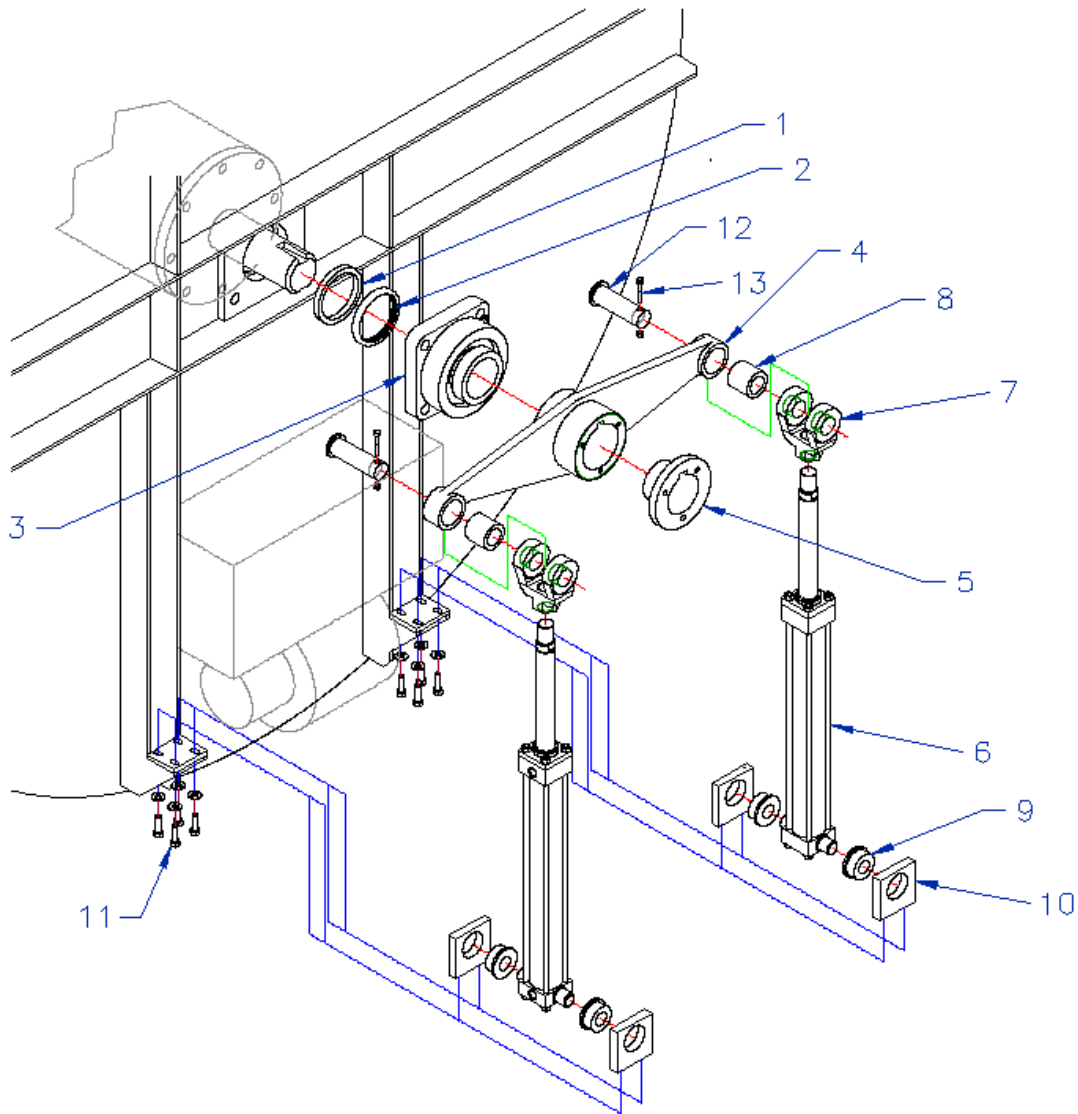


| Mark | Description | Cat Part # |
|:---:|:---|:---:|
| *1 | UHMW Bushing   5" | 50175 |
| *2 | Oil Seal   5" | 13087 |
| *3 | Bearing  - 4 1/2" | 13403 |
| 4 | Rocker Arm – 4 ½" | 52518 |
| 5 | Bushing – Rocker Arm | 17106 |
| *6 | Hydraulic Cylinder | 17115 |
| *7 | Cylinder Clevis | 17116 |
| *8 | Clevis Bushing | 52519 |
| *9 | Trunnion Bushing | 52520 |
| 10 | Trunnion Block | 52521 |
| 11 | Trunnion Bolt | ½"-13 x 1 ¼" |
| *12 | Clevis Pin | 13574 |
| 13 | Clevis Pin Bolt | 3/8"-16 x 2 ½" |

**Note: Marks that are in *bold red lettering are recommended for spare parts.**

## Auger Drive Section – 10'-6" Chillers
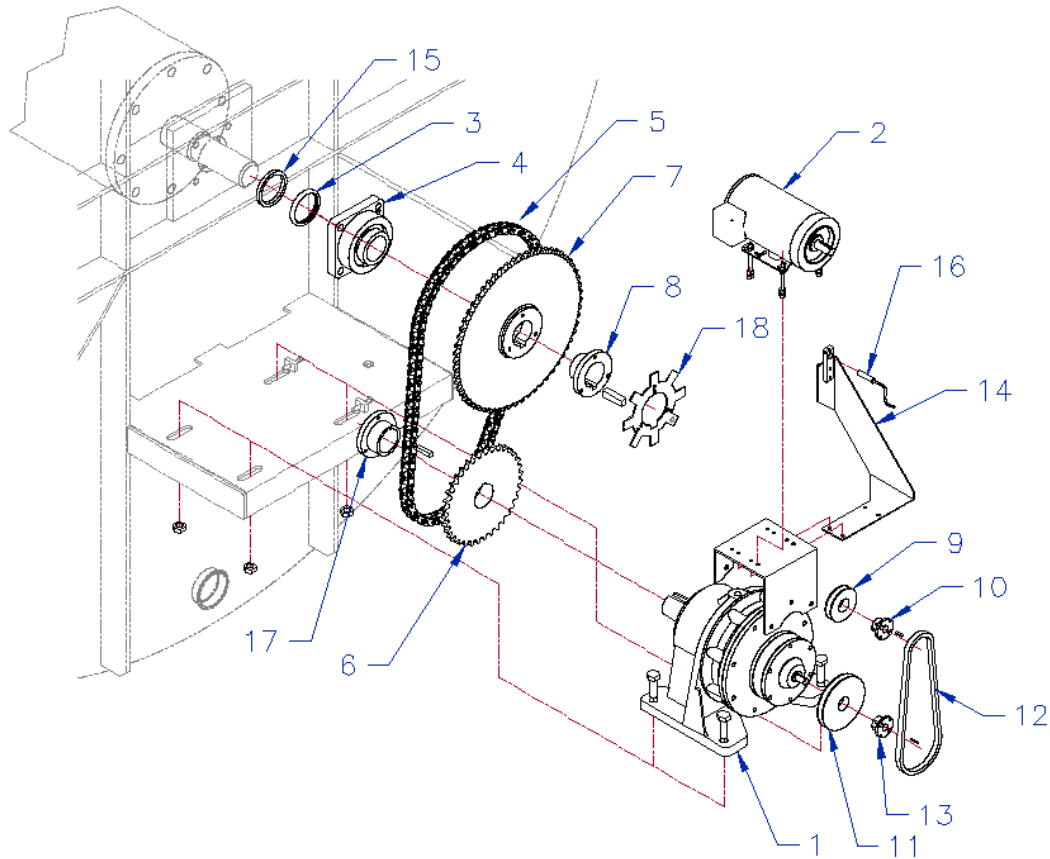


| Mark | Description | Cat Part # |
|---|---|---|
| *1 | Gear Reducer 645:1 | 11200 |
| *2 | Motor 1 ½ HP | 15841 |
| *3 | Oil Seal 4 1/2" | 13086 |
| *4 | 4 Bolt Flange Bearing – 4" | 13402 |
| *5 | Roller Chain | 13140 |
| 6 | Sprocket – Drive | 13202 |
| 7 | Sprocket – Driven | 13201 |
| 8 | Bushing – Driven Sprocket | 13528 |
| 9 | Drive Sheave | 13558 |
| 10 | Bushing – Drive Sheave | 13502 |
| 11 | Sheave – Driven | 13571 |
| *12 | V-Belt | 13594 |
| 13 | Bushing – Driven Sheave | 13502 |
| 14 | Zero Speed Prox. Bracket Ass'y | 52499 |
| *15 | Shaft Seal Bushing – 4 1/2" | 50174 |
| *16 | Prox. Sensor | 11296 |
| 17 | Bushing – Drive Sprocket | 13525 |
| 18 | Prox. Actuator Wheel | 52501 |
| 19 | | |

**Note: Marks that are in *bold red lettering are recommended for spare parts.**

## Unloader Drive Sections – 10'-6" Chiller
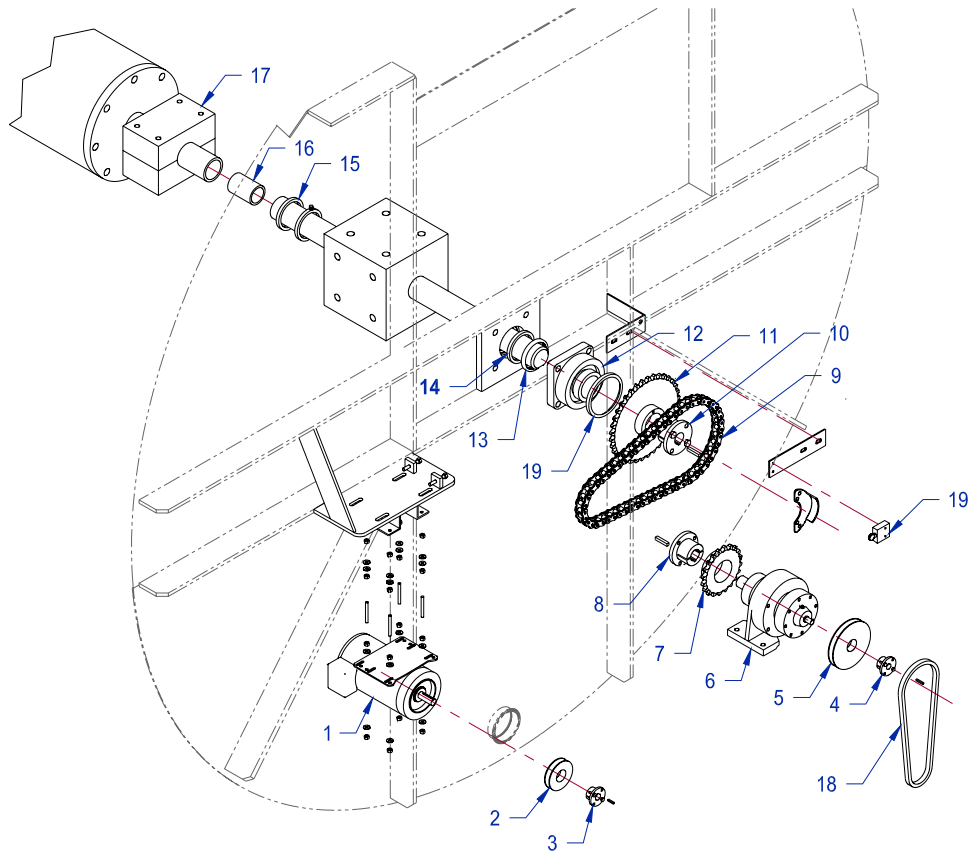


| Mark | Description | Cat Part # |
|------|-------------|------------|
| *1 | Motor 1 1/2 HP | 13304 |
| 2 | Sheave | 13558 |
| 3 | Bushing | 13502 |
| 4 | Bushing | 13500 |
| 5 | Sheave | 13564 |
| *6 | Cycloidal Gear Reducer | 13251 |
| 7 | Sprocket | 13197 |
| 8 | Bushing | 13511 |
| 9 | Chain | 13137 |
| 10 | Bushing | 13520 |
| 11 | Sprocket | 13199 |
| *12 | Bearing 2 1/2" ID | 13394 |
| *13 | Oil Seal 2 1/2" ID | 13081 |
| *14 | UHMW Bushing 2-1/2" ID | 50171 |
| *15 | UHMW Collar Bushing 2-1/2" ID | 50178 |
| *16 | UHMW Unloader Shaft Support Bearing 2-1/2" ID | 50181 |
| *17 | UHMW Auger Carrier Bearing 4" | 50185 |
| *18 | V-Belt | 13607 |
| *19 | Reed Switch | 15649 |

**Note: Marks that are in *bold red lettering are recommended for spare parts**

| **Chiller** | **Cat Part #** |
|---|---|
| Cable Pull Switch | 15648 |
| 18mm Prox | 11296 |

| **Chiller Panel** | **Cat Part #** |
|---|---|
| N/C Contact | 17978 |
| N/O Contact | 17976 |
| 3 Pos Selector Switch | 14744 |
| MSP 45-64A | 17993 |
| MSP 2.8-4A | 17988 |
| Line Reactor 2 HP | 14750 |
| Soft Start 40 HP | 18001 |
| Link Module | 17984 |
| Inverter | 19586 |
| Keypad | 15107 |

| **SpinCAT Panel** | **Cat Part #** |
|---|---|
| Jazz Controller | 19880 |
| Power Supply 1.3A | 17998 |
| Aux Contact | 14763 |
| Inverter 2 HP | 19586 |
| Keypad | 15107 |

| **Rocker Panel** | **Cat Part #** |
|---|---|
| Jazz Controller | 15994 |
| Power Supply 5A | 19854 |
| Aux Contact | 17980 |
| Inverter 2 HP | 19586 |
| Line Reactor 2 HP | 19581 |
| Keypad | 15107 |
| Contactor 15 HP | 17974 |
| Inverter 10 HP | 16541 |
| Line Reactor 10 HP | 19585 |
| MSP 11-16A | 11989 |
| Solid State Relay | 11537 |
| Fuse 2A | 14762 |
| Fuse 5A | 14773 |
| Contact NO | 18058 |
| Piezo Buzzer | 12048 |
| Red LED Module | 12581 |
| Red Pushbutton Illuminated | 15724 |
| Contact Mounting Latch | 18057 |

# SPINCAT AUGER INVERTER SETTING

| PARAMETER | SETTING | Column1 |
|-----------|---------|---------|
| P0003 | 3 | ACCESS LEVEL |
| P0010 | 1 | START QUICK COMMISSIONING |
| P0100 | 1 | INPUT FREQUENCY SETTING    0=50HZ    1=60HZ |
| P0304 | 460 | RATED MOTOR VOLTAGE FROM DATA PLATE, ADJUST IF NECESSARY |
| P0305 | 2.4 | RATED MOTOR CURRENT FROM DATA PLATE, ADJUST IF NECESSARY |
| P0307 | 1.5 | RATED MOTOR POWER (HP) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0308 | 0 | RATED MOTOR POWER FACTOR FROM DATA PLATE, ADJUST IF NECESSARY |
| P0309 | 0 | RATED MOTOR EFFICIENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0310 | 60 | RATED MOTOR FREQUENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0311 | 1750 | RATED MOTOR SPEED (RPM) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0700 | 2 | COMMAND SOURCE 2=TERMINAL STRIP |
| P1000 | 3 | FREQUENCY SETPOINT SOURCE 3=FIXED FREQUENCY |
| P1080 | 0 | MINIMUM FREQUENCY |
| P1082 | 100 | MAXIMUM FREQUENCY |
| P1120 | 5 | RAMP UP TIME |
| P1121 | 5 | RAMP DOWN TIME |
| P1300 | 0 | CONTROL MODE 0=V/F WITH LINEAR CHARACTERISTICS |
| P3900 | 3 | END QUICK COMMISSIONING (CALCULATES MOTOR DATA) |
| P0210 | 480 | SUPPLY VOLTAGE, ADJUST IF NECESSARY |
| P0290 | 1 | INVERTER OVERLOAD REACTION 1=TRIP |
| P0701 | 16 | FUNCTION OF DIGITAL INPUT 1  16=FIXED SETPOINT +ON |
| P0702 | 12 | FUNCTION OF DIGITAL INPUT 2  12=REVERSE |
| P0719 | In000-3 | SELECTION OF COMMAND AND FREQUENCY SETPOINT 3=FIXED FREQUENCY |
| P0771 | 27 | FUNCTION OF ANALOG OUTPUT 27=OUTPUT CURRENT |
| P1001 | 60 | RUN FREQUENCY, ADJUST IF NECESSARY |

| PARAMETER | SETTING | DESCRIPTION |
|---|---|---|
| P1002 | 15 | HIGH SPEED FREQUENCY ADDED TO RUN FREQUENCY, ADJUST IF NECESSARY |
| P2000 | 100 | REFERENCE FREQUENCY |
| P2002 | 10 | REFERENCE OUTPUT CURRENT FOR ANALOG OUTPUT 5.00AMPS |

# ROCKER INVERTER SETTING

| PARAMETER | SETTING | DESCRIPTION |
|---|---|---|
| P0003 | 3 | ACCESS LEVEL |
| P0010 | 1 | START QUICK COMMISSIONING |
| P0100 | 1 | INPUT FREQUENCY SETTING      0=50HZ 1=60HZ |
| P0304 | 460 | RATED MOTOR VOLTAGE FROM DATA PLATE, ADJUST IF NECESSARY |
| P0305 | 15 | RATED MOTOR CURRENT FROM DATA PLATE, ADJUST IF NECESSARY |
| P0307 | 10 | RATED MOTOR POWER (HP) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0308 | 0 | RATED MOTOR POWER FACTOR FROM DATA PLATE, ADJUST IF NECESSARY |
| P0309 | 0 | RATED MOTOR EFFICIENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0310 | 60 | RATED MOTOR FREQUENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0311 | 3450 | RATED MOTOR SPEED (RPM) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0700 | 2 | COMMAND SOURCE 2=TERMINAL STRIP |
| P1000 | 2 | FREQUENCY SETPOINT SOURCE 2=ANALOG INPUT |
| P1080 | 0 | MINIMUM FREQUENCY |
| P1082 | 100 | MAXIMUM FREQUENCY |
| P1120 | 2 (SEE NOTES) | RAMP UP TIME (MUST BE SET THE SAME AS THE RAMP TIME IN TOUCHSCREEN) |
| P1121 | 2 (SEE NOTES) | RAMP DOWN TIME (MUST BE SET THE SAME AS THE RAMP TIME IN TOUCHSCREEN) |

| PARAMETER | SETTING | DESCRIPTION |
|---|---|---|
| P1300 | 0 | CONTROL MODE 0=V/F WITH LINEAR CHARACTERISTICS |
| P3900 | 3 | END QUICK COMMISSIONING (CALCULATES MOTOR DATA) |
| P0210 | 480 | SUPPLY VOLTAGE, ADJUST IF NECESSARY |
| P0290 | 1 | INVERTER OVERLOAD REACTION 1=TRIP |
| P0701 | 1 | FUNCTION OF DIGITAL INPUT 1  1=ON/OFF |
| P0719 | In000-2 | SELECTION OF COMMAND AND FREQUENCY SETPOINT |
| P0731 | 52.2 | FUNCTION OF DIGITAL OUTPUT 1 52.2=DRIVE RUNNING |
| P2000 | 100 | REFERENCE FREQUENCY |

# UNLOADER INVERTER SETTING

| PARAMETER | SETTING | DESCRIPTION |
|---|---|---|
| P0003 | 3 | ACCESS LEVEL |
| P0010 | 1 | START QUICK COMMISSIONING |
| P0100 | 1 | INPUT FREQUENCY SETTING     0=50HZ  1=60HZ |
| P0304 | 460 | RATED MOTOR VOLTAGE FROM DATA PLATE, ADJUST IF NECESSARY |
| P0305 | 2.4 | RATED MOTOR CURRENT FROM DATA PLATE, ADJUST IF NECESSARY |
| P0307 | 1.5 | RATED MOTOR POWER (HP) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0308 | 0 | RATED MOTOR POWER FACTOR FROM DATA PLATE, ADJUST IF NECESSARY |
| P0309 | 0 | RATED MOTOR EFFICIENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0310 | 60 | RATED MOTOR FREQUENCY FROM DATA PLATE, ADJUST IF NECESSARY |
| P0311 | 1750 | RATED MOTOR SPEED (RPM) FROM DATA PLATE, ADJUST IF NECESSARY |
| P0700 | 2 | COMMAND SOURCE 2=TERMINAL STRIP |
| P1000 | 3 | FREQUENCY SETPOINT SOURCE 3=FIXED FREQUENCY |
| P1080 | 0 | MINIMUM FREQUENCY |
| P1082 | 100 | MAXIMUM FREQUENCY |
| P1120 | 5 | RAMP UP TIME |

| | | |
|---|---|---|
| P1121 | 5 | RAMP DOWN TIME |
| P1300 | 0 | CONTROL MODE 0=V/F WITH LINEAR CHARACTERISTICS |
| P3900 | 3 | END QUICK COMMISSIONING (CALCULATES MOTOR DATA) |
| P0210 | 480 | SUPPLY VOLTAGE, ADJUST IF NECESSARY |
| P0290 | 1 | INVERTER OVERLOAD REACTION 1=TRIP |
| P0701 | 16 | FUNCTION OF DIGITAL INPUT 1  16=FIXED SETPOINT +ON |
| P0702 | 15 | FUNCTION OF DIGITAL INPUT 2  15=FIXED SETPOINT |
| P0719 | In000-3 | SELECTION OF COMMAND AND FREQUENCY SETPOINT 3=FIXED FREQUENCY |
| P1001 | 60 | RUN FREQUENCY, ADJUST IF NECESSARY |
| P1002 | 15 | HIGH SPEED FREQUENCY ADDED TO RUN FREQUENCY, ADJUST IF NECESSARY |
| P2000 | 100 | REFERENCE FREQUENCY |