

Chain Disk Controller

APCD-500

User's Manual

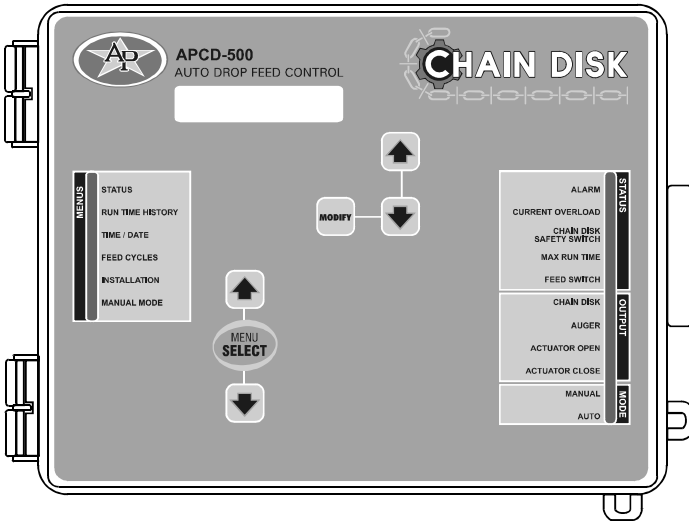


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1. PRECAUTIONS

Although fuses at the input and outputs of the controller protect its circuits in case of an overload or overvoltage, we recommend installing an additional protection device on the controller's supply circuit.

The room temperature where the controller is located **MUST ALWAYS REMAIN BETWEEN 32°F AND 104°F (0°C TO 40°C)**.
For indoor use.

To avoid exposing the controller to harmful gases or excessive humidity, it is preferable to install it in a corridor.

DO NOT SPRAY WATER ON THE CONTROLLER

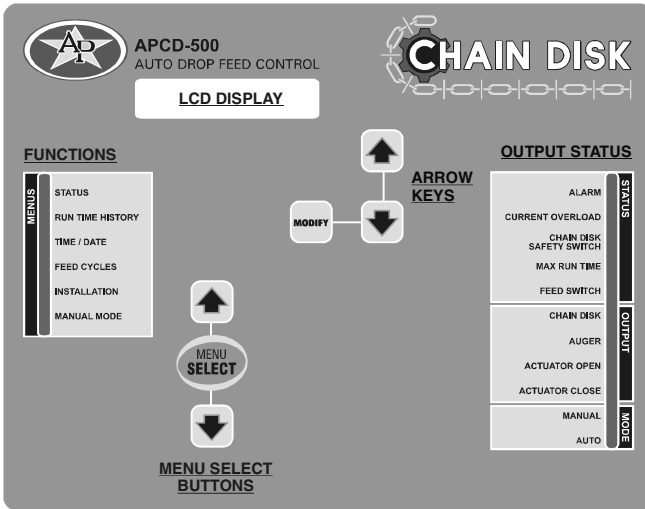
FOR CUSTOMER USE

Enter the serial number located on the side of the controller below for future reference.

Model number: **APCD-500**

Serial number: _____

2. TERMS AND SYMBOLS



LCD Display: The LCD display on the left gives the current readings and parameters to be adjusted when you select a function. The three keys at the right of the display are used to edit parameters and to navigate through the screen display. When the parameters for a given function cannot all be presented at once on the display, arrows are displayed on the right hand side to indicate that additional parameters can be displayed using the arrow keys \uparrow \downarrow . After 4 minutes of inactivity, the display returns to the STATUS display.

Arrow keys: The arrow keys that are located next to the LCD display have 2 purposes. They are first used to step through the parameters that are displayed on the display. They are also used to modify a parameter's value when a parameter flashes on the display.

Menu Select Buttons: These keys are used to select the functions that are located in the main menu.

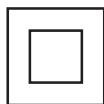
Adjusting a parameter: Use the arrow keys to select the parameter that needs to be adjusted. Once the parameter is selected, press MODIFY. The parameter then flashes on the display. It can now be adjusted with the arrow keys. Once it is properly set, Press MODIFY once again to validate the new value. If the value does not flash after having pressed the MODIFY, it means that the value is a reading. A reading cannot be modified.

Status LEDs

The LEDs at the right of the control panel give the status of each output. The following table gives the meaning of each pilot light:

LED	MEANING
ALARM	Turns on when an alarm is detected. The feeding system stops operating until the alarm is acknowledged.
CURRENT OVERLOAD	Flashes when the amperage draw of the APCD-500 feeder has exceeded the Max Current limit for the Overload Delay or flashes when this occurs to a slave feeder (APCD-500-S). Fix the problem then press and hold the RESET button to restart the system.
CHAIN DISK SAFETY SWITCH	Turns on when the drive unit of the APCD-500 has reached its safety switch; flashes when this occurs to a slave feeder (APCD-500-S).
MAX RUN TIME	Turns on when the run time of the APCD-500 feeder exceeds the Max Run Time parameter value (only if a proximity sensor is used); flashes when this occurs to a slave feeder (APCD-500-S).
FEED SWITCH	Turns on when the proximity sensor detects feed. Flashes during the <i>Feed Bypass Delay</i> .
CHAIN DISK OUTPUT	Turns on when the master Chain Disk feeder is running.
AUGER OUTPUT	Turns on when the bin auger is running; Flashes during the <i>Auger Delay</i> .
ACTUATOR OPEN	Turns on when the dumps are opened.
ACTUATOR CLOSE	Turns on when the dumps are closed.
MANUAL MODE	Turns on when an output is manually controlled.
AUTOMATIC MODE	Turns on when the automatic control mode is active.

SYMBOLS



Double insulation



Caution, risk of danger

3. INSTALLATION

3.1 Mounting Instructions

Remove the four screws in the front cover and lift the cover. Remove the black caps located on the three mounting holes. Mount the enclosure to the wall using three screws. Be sure the electrical knockouts are at the bottom of the enclosure in order to prevent water from entering the controller. Insert the screws into the mounting holes and tighten. **Fasten the black caps onto the mounting holes.**

3.2 Connections

To connect the controller, refer to the wiring diagram enclosed with this user's manual. Use the electrical knockouts provided at the bottom of the enclosure. Do not make additional holes in the enclosure, particularly on the side of the enclosure when using a computer communications module.

- Do not install rigid conduit into electrical knockouts. Only nylon cable glands are permitted for cable or wire fastening.
- A switch or circuit breaker shall be included in the building installation. It shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.
- The main supply circuit breaker for feeder motor (L1/L2 POWER IN) shall be 20 A.
- Wire gage used for mains supply (L1/L2 POWER IN) and feeder motor shall be at least 12 AWG.
- Separate circuit breaker shall be used for auger motor.
- The mains supply breaker for auger motor shall be 15 A.
- Wire gage used for auger motor shall be at least 14 AWG.



ALL WIRING MUST BE DONE BY AN AUTHORIZED ELECTRICIAN AND MUST COMPLY WITH APPLICABLE CODES, LAWS AND REGULATIONS. BE SURE POWER IS OFF BEFORE DOING ANY WIRING TO AVOID ELECTRICAL SHOCKS AND EQUIPMENT DAMAGE.

Safety may be jeopardized if the equipment is used in a manner not specified by the manufacturer.

4. CONTROLLER'S OPERATION

4.1 Controller's Description

The APCD-500 controls the feed entry into Chain Disk feeders and the distribution of feed to the animals. When used in combination with APCD-500-S auxiliary units, this controller can control up to 8 Chain Disk feeders.

Due to its great number of options, the APCD-500 controller can suit most Chain Disk setups:

- Timed or continuous feed cycles;
- With or without proximity sensors at the end of the feeders;
- With or without actuators / electric valves to open the drops;
- With one or multiple bin augers;
- With one or multiple Chain Disk feeders;
- With cascade or independent Chain Disk setups.

4.2 Feeder Setup

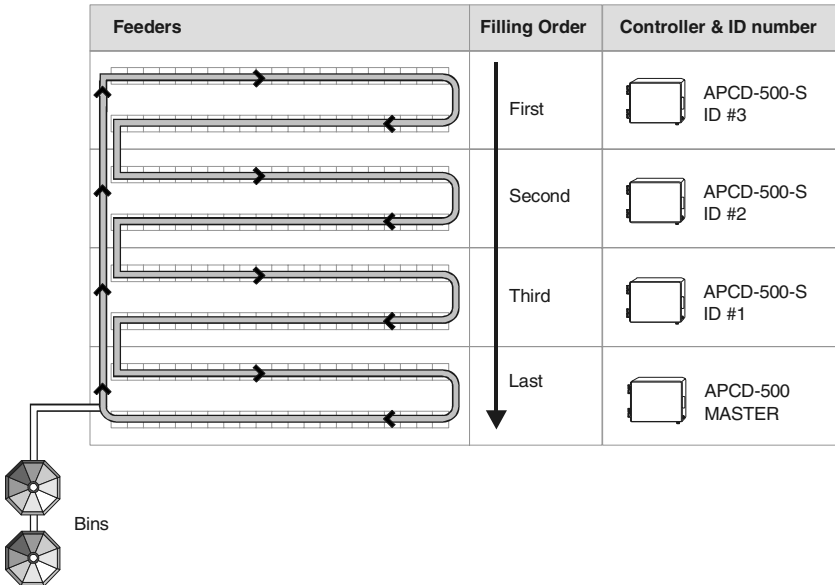
Up to 7 slave units (APCD-500S) can be used to drive additional Chain Disk feeders. These supplementary feeders can share common bin augers, they can be linked together, or they can operate independently one from another. The following section explains the three possible feeder setups that can be managed by the controller. Refer to the Installation Setup chapter to select your specific feeder setup.

4.2.1 Cascade Setup

In this setup, all feeders are connected together and share a common bin auger. When this auger starts bringing feed into the feeders, all drive units start running to send feed towards the farthest Chain Disk feeder (APCD-500-S unit with the highest ID number). When this feeder is filled-up, feed then goes toward the preceding feeder, etc.

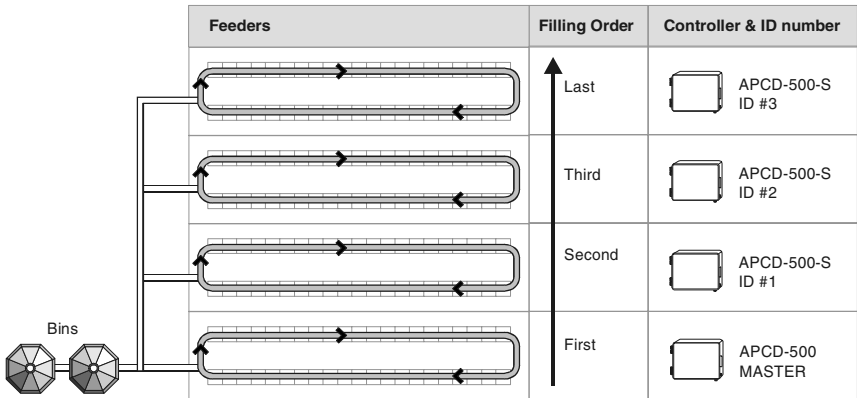


Refer to section 4.5.2.1 to get information about the filling process in this feeder setup.



4.2.2 Independent Feeders with a Common Auger

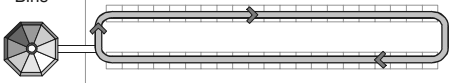

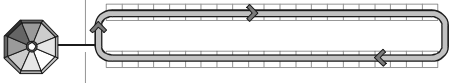

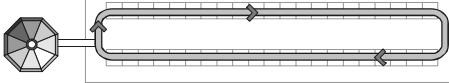

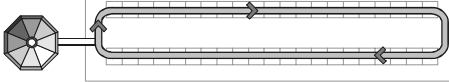

Independent feeders that share a common bin auger are filled following the numerical order: the master Chain Disk feeder is filled first, followed by slave feeder #1, slave feeder #2, etc.



Refer to section 4.5.2.2 to get information about the filling process in this feeder setup.

4.2.3 Independent Feeders with Individual Augers

Independent feeders that all have their own bin auger are being filled simultaneously when a feed cycle starts. Each feeder filled according to its respective parameter settings.

	Feeders	Filling Order	Controller & ID number
Bins		Simultaneous	 APCD-500-S ID #3
		Simultaneous	 APCD-500-S ID #2
		Simultaneous	 APCD-500-S ID #1
		Simultaneous	 APCD-500 MASTER



Refer to section 4.5.2.3 to get information about the filling process in this feeder setup.

4.3 Feed Distribution Modes

4.3.1 Timed Feed Distribution

When feed is distributed according to a timer, the user chooses at what time the feeders start being filled and at what time feed starts being delivered to the animals. Up to daily 20 feed cycles can be programmed. Refer to section 5.6 to enable the timed feed distribution method.

4.3.2 Continuous Feed Distribution Method

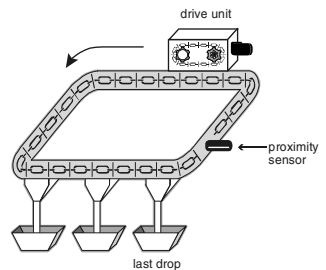
The continuous feeding method allows filling the feeders from the moment they are empty: when the proximity sensor located at the end of the master Chain Disk feeder stops detecting feed, a delay is launched to restart filling all feeders.

4.4 Proximity Sensor Location

Proximity sensors are used to detect the presence and absence of feed at the end of the feed lines.

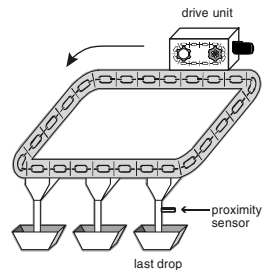
4.4.1 In Timer Mode

When feed is distributed according to a timer, optional proximity sensors can be used to stop the entry of feed when feed is detected at the end of the feed line (see illustration). If proximity sensors are used, one sensor must be located at the end of each feeder.



4.4.2 In Continuous Mode

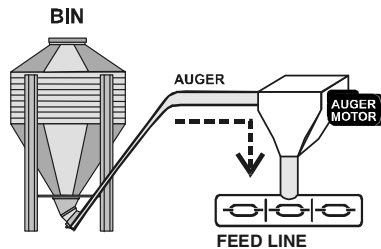
When using the continuous feed distribution mode, a proximity sensor must be located in the tube of the last drop of each feeder.



4.5 Filling Chain Disk Feeders

4.5.1 Operation of the Bin Auger

At the start-up of each feeding cycle, right after the *Auger's Delay* has elapsed, the bin auger starts bringing feed into the feeders and stops when the feeder is loaded. There are two ways the controller can detect that a feeder is full:



1. The proximity sensor located at the end of the line detects feed for 5 seconds without interruption;
2. The drive unit has been running for the *Max Run Time* parameter value (only if no proximity sensor is used).

Chain Disk Overload Protection:

The controller monitors the amperage draw of Chain Disk drive units to prevent overloading the system. If the amperage exceeds the limit (*Max Current Consumption*), the controller will temporarily shut down the bin auger while the Chain Disk keeps running in order to discharge the feed. As the feed load decreases the amperage draw also decreases; the bin auger restarts when the current consumption gets lower than the *Max Current Consumption - Window Size*.



Refer to section 5.6 to set bin auger parameters

4.5.2 Filling Process

The filling process of Chain Disk feeders is based on two factors:

1. Feeder setup:

- Cascade setup;
- Independent feeders with a common bin auger;
- Independent feeders with individual bin augers.

2. Feed Distribution Mode:

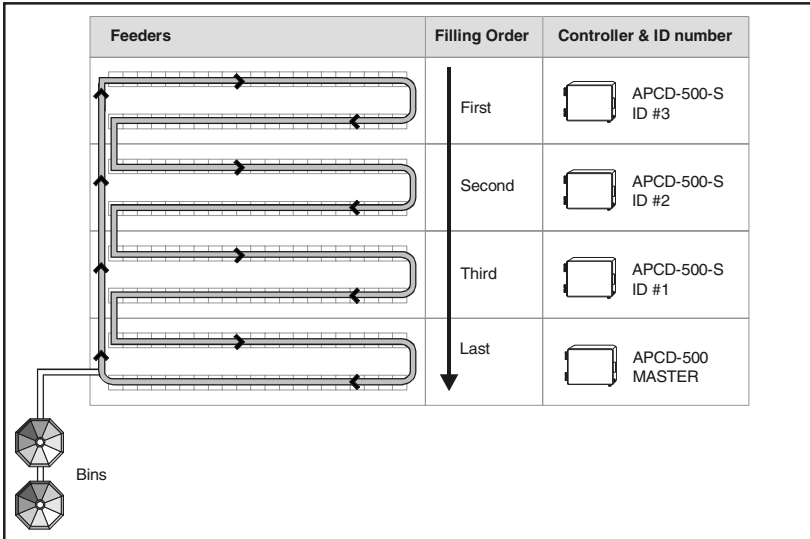
- Continuous feed distribution;
- Timed feed distribution.

The following sections explain all possible ways Chain Disk feeders can be filled. Refer to the section that suit your particular feeder setup and feed distribution method.



**PLEASE NOTE THAT THE WHOLE FEEDING SYSTEM
STOPS WHEN AN ALARM IS ACTIVE!**

4.5.2.1 Filling Cascaded Feeders



Cascade Setup

Option A – Continuous Feed Distribution

1. Beginning the Filling Process:

The filling process starts when the *Continuous Delay* has elapsed (this delay is launched when the proximity sensor located in the last drop of the master Chain Disk feeder stops detecting feed).

2. Emptying the Feeders:

Once the *Continuous Delay* has elapsed, the controller activates all drive units during the *Auger Delay* to make sure all feeders are empty before bringing new feed.

3. Filling the Farthest Chain Disk Feeder:

When the *Auger Delay* has elapsed, all drive units keep running while the bin auger brings feed into the feeders. Feed is first directed towards the farthest feeder (Chain Disk with the highest ID number).

4. The Farthest Feeder is Full:

The controller knows the farthest feeder is full when the proximity sensor located at its end detects feed for 5 seconds without interruption. When feed is detected, the drive unit of the loaded feeder stops and all other feeders continue running until they are all full.

6. The Last Feeder is Full:

When the last feeder is loaded (last feeder = master Chain Disk feeder), the bin auger stops and all drive units are off. As the animals eat, the feed load will decrease gradually; the *Continuous Delay* will be launched once again when the proximity sensor of the master Chain Disk feeder will stop detecting feed (back to step 1).

Option B – Timed Feed Distribution

1. Beginning the Filling Process:

The filling process starts at the start-up of each feed cycle.

2. Cleaning the Drops:

If actuators are used and the "Clean Drop" option is enabled in the INSTALLATION menu, the controller opens and closes the drops tree times in a row to evacuate feed leftovers from the system.

3. Emptying the Feeders:

To ensure all feeders are empty before bringing new feed, the controller activates all drive units during the *Auger Delay*.

4. Filling the Farthest Chain Disk Feeder:

When the *Auger Delay* has elapsed, all drive units keep running while the bin auger brings feed into the feeders. Feed is directed towards the farthest feeder at first (Chain Disk with the highest ID number).

5. The Farthest Feeder is Full:

- **If a proximity sensor is used:** the controller knows the feeder is full when the proximity sensor located its end detects feed for 5 seconds without interruption. When feed is detected, the controller stops the feed entry (bin auger), and stops all other drive units; the drive unit of the loaded feeder keeps running for the *Shutdown Delay* then stops.
- **If no proximity sensor is used:** when no proximity sensor is used, the controller knows the farthest feeder is full when the drive unit of this feeder has been running for its respective *Run Time* parameter value. The controller stops the drive unit of this feeder once it is full.

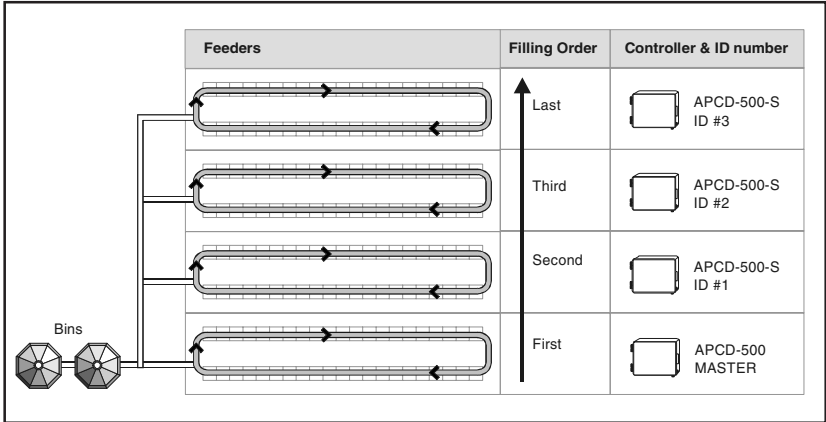
6. Filling the Next Feeder:

When the loaded feeder stops, the drive units of all empty feeders restart, and feed enters once again into the feed line. Steps 4 and 5 are repeated up until all feeders are full.

7. Feed Dumping:

When the Chain Disk system is fully loaded, feed is ready to be delivered to the animals. Step to section 4.4.

4.5.2.2 Filling Independent Feeders with a



Independent Feeders with a Common Auger

Common Bin Auger

Option A – Continuous Feed Distribution

1. Beginning the Filling Process:

The filling process starts once the *Continuous Delay* has elapsed (this delay is launched when the proximity sensor located in the last drop of the master Chain Disk feeder stops detecting feed).

2. Emptying the Bin Auger and Feeders:

Once the *Continuous Delay* has elapsed, the controller activates all drive units during the *Purge Time* and launches the *Auger Delay*. Once the *Auger Delay* has elapsed, the bin auger starts bringing feed into the feeders. Normally, the *Purge Time* should be longer than the *Auger Delay* to prevent feed accumulation at the end of the bin auger.

3. Filling the First Chain Disk Feeder:

When the *Purge Time* is over, all drive units stop except for the first feeder to be filled: the master Chain Disk feeder. When the *Auger Delay* is over, the bin auger starts bringing feed toward this feeder.

4. The Feeder is Full:

The controller knows the feeder is loaded when the proximity sensor located its end detects feed for 5 seconds without interruption. When feed is detected, the drive unit of this feeder stops.

5. Filling the Next Feeder

When a feeder is full, the drive unit of the next empty feeder starts (following numerical order) and the bin auger keeps running.

6. The Last Feeder is Full:

When the last feeder is full (slave feeder with the highest ID #), the bin auger stops and all drive units are off. As the animals eat, the feed load in the feeders will decrease gradually; the *Continuous Delay* will be launched once again when the proximity sensor of the master Chain Disk feeder will stop detecting feed (back to step 1).

Option B – Timed Feed Distribution

1. Beginning the Filling Process:


The filling process starts at the start-up of each feed cycle.

2. Cleaning the Drops:

If actuators are used and the "Clean Drop" option is enabled in the INSTALLATION menu, the controller opens and closes the drops tree times in a row to evacuate feed leftovers from the system.

3. Emptying the Bin Auger and Feeders:

To ensure the bin auger and feeders are empty before bringing new feed, the controller first activates all drive units during the *Purge Time* and launches the *Auger Delay*. Once the *Auger Delay* has elapsed,



the bin auger starts bringing feed into the feeders. Normally, the *Purge Time* should be longer than the *Auger Delay* to prevent feed accumulation at the end of the bin auger.

4. Filling the First Chain Disk Feeder:

When the *Purge Time* is over, all drive units stop except for the first feeder to be filled: the master Chain Disk feeder. When the *Auger Delay* is over, the bin auger starts bringing feed toward this feeder.

5. The Feeder is Full:

- **If a proximity sensor is used:**

The controller knows the feeder is full when the proximity sensor located its end detects feed for 5 seconds without interruption. When feed is detected, the controller stops the feed entry (bin auger) and the drive unit of the loaded feeder keeps running for the *Shutdown Delay* then stops.

- **If no proximity sensor is used:**

The controller knows the feeder is full when the drive unit has been running for its *Run Time* parameter value. The controller stops the drive unit of this feeder once it is full.

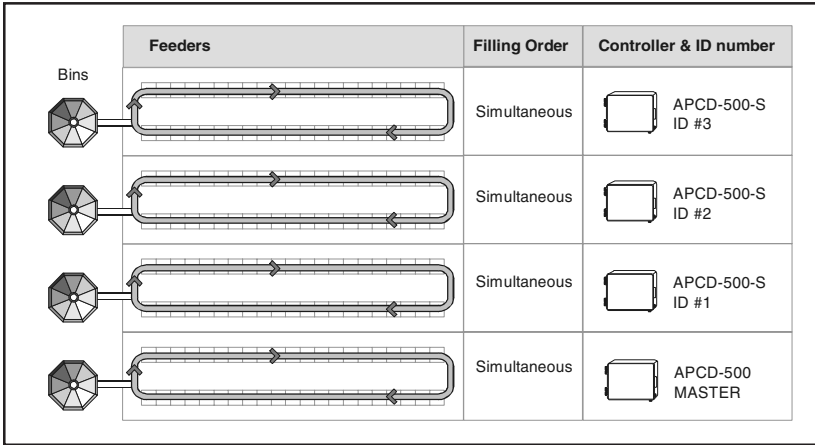
6. Loading Next Feeder:

When the loaded feeder stops, the next empty feeder starts and the bin auger starts sending feed towards this feeder. Steps 4 and 5 are repeated up until all feeders are full.

7. Feed Dumping:

When the Chain Disk system is fully loaded, feed is ready to be delivered to the animals. Step to section 4.4.

4.5.2.3 Filling Independent Feeders with Individual Bin Augers



Independent Feeders with Individual Augers

Option A – Continuous Feed Distribution

- 1. Beginning the Filling Process:** The filling process starts once the *Continuous Delay* has elapsed (this delay is launched when the proximity sensor located in the last drop of the master Chain Disk feeder stops detecting feed).
- 2. Emptying the Feeders:** Once the *Continuous Delay* has elapsed, the controller activates all drive units during their respective *Auger Delay* to make sure all feeders are empty before bringing new feed.
- 3. Filling Chain Disk Feeders:** When the *Auger Delay* of a feeder has elapsed, all feeders keep running and start being filled by their respective bin auger.
- 4. A Feeder is Full:** The controller knows a feeder is full when the proximity sensor located at its end detects feed for 5 seconds without interruption. When a feeder is full, its drive unit and associated bin auger stop.

5. All Feeders are Full:

When the last feeder is full, all bin augers and drive units are off. As the animals eat, the feed load in the feeders will decrease gradually. The *Continuous Delay* will be launched once again when the proximity sensor of the master Chain Disk feeder will stop detecting feed (back to step 1).

Option B – Timed Feed Distribution

1. Beginning the Filling Process:

The filling process starts at the start-up of each feeding cycle.

2. Cleaning the Drops:

If actuators are used and the "Clean Drop" option is enabled in the INSTALLATION menu, the controller opens and closes the drops tree times in a row to evacuate feed leftovers from the system.

3. Emptying Feeders:

To ensure all Chain Disk feeders are empty before bringing new feed, the controller activates all drive units during their respective *Auger Delay*.

4. Filling Chain Disk Feeders:

When the *Auger Delay* of a feeder has elapsed, the feeder keeps running and its respective bin auger starts filling it.

5. The Feeder is Full:

- **If a proximity sensor is used:**

The controller knows a feeder is full when the proximity sensor located at its end detects feed for 5 seconds without interruption. When feed is detected, the controller stops the feed entry (bin auger) and the drive unit keeps running for the *Shutdown Delay* then stops.

- **If no proximity sensor is used:**

The controller knows the feeder is full when the drive unit has been running for the *Run Time* parameter value. The controller stops the drive unit of this feeder once it is full.

6. Feed Dumping:

When the Chain Disk system is fully loaded, feed is ready to be delivered to the animals. Step to section 4.4.

4.6 Feed Delivery Process

After the feeders have been filled up, feed is ready to be delivered to the animals. This section explains how feed is dumped by actuators and electric valves and how feed is delivered when no actuator/electric valve is used. Note that actuators and electric valves can only be used when using the timer-based feed distribution method and note that their parameters are common to all feeders in use.

- **Feed Delivery using Actuators:**
 - a) The actuator opens the drops during the opening time.
 - b) Once the opening time has elapsed, the actuator stops moving during the *Actuator Delay*;
 - c) Once the *Actuator Delay* has elapsed, the actuator fully closes the drops during twice the opening time or until the security sensor (limit switch) is reached.
 - d) End of the feed cycle.

- **Feed Delivery using Electric Valves:**
 - a) Electric valves open the dumps at the *DumpTime*;
 - b) The dumps remain opened during the *Electric Valve Delay*;
 - c) Electric valve close after the *Electric valve Delay* has elapsed.
 - d) End of the feed cycle.

- **Feed Delivery without Actuators / Electric Valves:**

If no actuator or electric valve is used, the feed that enters into Chain Disk feeders directly falls in the drops while the feeders are being filled. Once all feeders are full, feed will unload gradually as the animals eat.

4.7 Feed Cycles

When the feed distribution is performed in timer mode, the user must program feed cycles to signal the time at which the feeders are being filled and the time at which feed is delivered to the animals. Up to 20 feed cycles can be performed every day. Refer to section 5.6 to enable the required number of cycles.

1) Feed Cycle Start Time:

This is the time at which each feed cycle starts.



The controller restrains the time at which feed cycles can start so that no cycle overlaps another.

2) Dump Time:

If actuators or electric valves are used, set the time at which the dumps must open. Make sure this dump is performed when all feeders are full (Start time + *Max Run Time* of all feeders – see below).

3) Run Time:

This is the time that is required to fill-up each feeder. This function is only available if no proximity sensor is used.

5. PARAMETER SETTINGS

5.1 Controller Status

The STATUS menu shows the ongoing operations of the controller. All alarms situations must also be acknowledged from this menu (refer to section 5.7 for further information about alarms). The controller automatically returns to this STATUS menu after 4 minutes of inactivity.

The STATUS menu tells you:

- if the test mode is active;
 - if the manual mode is active;
 - when the next feeding cycle will start;
 - when the drive units will stop (*Shut Down Delay*);
 - when the actuator will stop moving;
 - when the *Actuator Delay* ends.
 - when the *Purge Time* ends.
 - when the next dump will be performed;
 - what is the amperage draw of each drive unit;
-
- Use the menu select buttons to select the STATUS main menu.
 - Use the arrow keys to scroll the display.

5.2 Run Time History

The controller has an history menu in which the daily run time of the feeders (master and slave feeders) are logged in for the past 5 days.

- Use the menu select buttons to select the **RUN TIME HISTORY** menu.
- Press MODIFY then use the arrow keys to select the desired feeder:
Mstr = master
S#x = slave #x (APCD-500S #x)
- Press MODIFY once again to access to the run time history of the selected feeder. The run time of the last cycle performed by this feeder is displayed.
- Use the down-arrow key to scroll the display. The daily run times of the selected feeder are displayed for the past 5 days.

```
Run Time Index
  Mastr ▼
```

```
Run Time Index
  - S #1 ▲
```

```
Run Time Hist S1
LastCyc  0:35 ▲▼
```

```
Run Time Hist S1
Today    1:20 ▲▼
```

5.3 Time & Date

- Use the menu select buttons to select the TIME / DATE menu. The current time and date are displayed.

12:00:00PM
01/01/200X ▼

- Press MODIFY. The hours flash on the display. Use the arrow keys to set them to the proper value.
- Press MODIFY once again. The minutes flash on the display. Use the arrow keys to set them to the proper value.
- Press MODIFY once again. The seconds flash on the display. Use the arrow keys to set the seconds to the proper value.
- Press MODIFY then proceed in similar fashion to set the date (dd/mm/yyyy).

5.4 Feed Cycle Settings

Refer to section 4.5 to get information on feed cycles.



To facilitate feed cycle programming, fill out the feed cycle worksheet (see next page).

- Use the menu select buttons to select the FEED CYCLES menu.

This menu is only accessible if feed is distributed according to a timer (the continuous feeding mode is disabled in the installation). A password may also be required to access this menu (see sec. 5.6).
- Feeding Cycle 1
Start At 6:12A ⬆
- Press MODIFY. The start time of the first feed cycle flashes on the display. Use the arrow keys to adjust it to the proper value. Press MODIFY once again to validate.
 - Press the down-arrow key once. The dump time of the first feed cycle is displayed.

Accessible if actuators or electric valves are enabled (see sec. 5.6).
 - Press MODIFY. The dump time of the first feed cycle flashes on the display. Use the arrow keys to adjust it to the proper value. Press MODIFY once again to validate the new value.
 - Press the down-arrow key once. The start time of the second feed cycle is displayed. Proceed in similar fashion to set the start and dump times of all feed cycles in use.



CHECK FEED CYCLES

The controller automatically rearranges the feed cycles in the case of a programming error. The warning message "**Check Feed Cycles**" is displayed afterwards. The user has to validate the new arrangement of the feed cycles by scrolling down the whole Feed Cycle menu. The warning message will then disappear.

FEED CYCLE WORKSHEET

Feed Cycles	Start Time:	Feeders' Max Run Time ¹ :										Full a ² :	Dump Time ³ :
		Master Feeder	Slave Feeder 1	Slave Feeder 2	Slave Feeder 3	Slave Feeder 4	Slave Feeder 5	Slave Feeder 6	Slave Feeder 7				
Example	09:00A	01:30	00:30	00:30	N.U	N.U	N.U	N.U	N.U	N.U	N.U	11:30A	11:45A
Cycle 1													
Cycle 2													
Cycle 3													
Cycle 4													
Cycle 5													
Cycle 6													
Cycle 7													
Cycle 8													
Cycle 9													
Cycle 10													
Cycle 11													
Cycle 12													
Cycle 13													
Cycle 14													
Cycle 15													
Cycle 16													
Cycle 17													
Cycle 18													
Cycle 19													
Cycle 20													

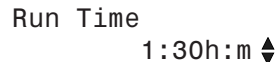
1. The *Maximum Run Time* parameter value is common to all feed cycles.
2. The time at which all feeders are full corresponds to the *Start Time + Max Run Time* of all feeders.
3. Make sure the dump is performed after all feeders are full. The *Dump Time* must only be defined if actuators or electric valves are enabled.

5.5 Run Time Settings

The run time parameter represents the time that is required to fill-up each feeder. It can be adjusted from 00:00 hh:mm to 04:00 hh:mm. Refer to section 4.5 to get information about this parameter.

- Use the menu select buttons to select the FEED CYCLES menu.
This menu is only accessible if feed is distributed according to a timer (the continuous feeding mode is disabled in the installation) and if no proximity sensor is used. A password may also be required to access this menu (see sec. 5.6).

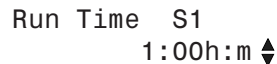
- Press the down-arrow key in order to select the first run time screen display. This is the Run Time of the master Chain Disk.



Run Time
1:30h:m ⬇

- Press MODIFY then use the arrow keys to set this parameter to the desired value. Press MODIFY once again to validate.

- If slave feeders are used, press the down-arrow key to select the Run Time of the first slave feeder.



Run Time S1
1:00h:m ⬇

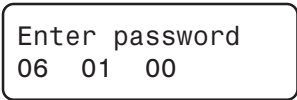
- Press MODIFY then use the arrow keys to set this parameter to the desired value. Press MODIFY once again to validate.
- Proceed in similar fashion to set the Run Time of all feeders in use.

5.6 Installation Setup

The following section describes how to customize the controller for your particular application. Normally, this setup needs to be done only once.

Enter Password

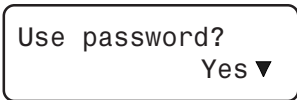
Use the menu select buttons to select the INSTALLATION main menu. A password may be required to access this menu. By default, the password is set to 6-1-0.



The following parameters are presented below in the order they appear on the display. To modify a parameter, press MODIFY then use the arrow keys to change it. When you are finished adjusting a parameter, press MODIFY once again to validate the new value and return to the display mode. Press the down-arrow key to move to the next parameter.

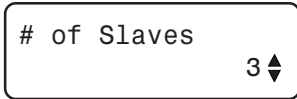
Use Password

Select "Yes" to enable a password; this password is used to restrain the access to the Installation and Feed Cycle menus.



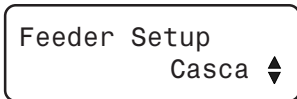
of Slaves

Enter the number of additional Chain Disk feeders in use. Up to 7 slave feeders (APCD-500S) can be controlled.

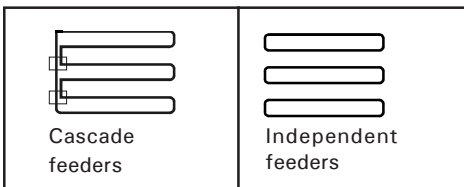


Feeder setup

If slave feeders are used, select the proper feeder setup: select *Cascade* if the feeders are connected together; select *Independent* if they are separated from one another.



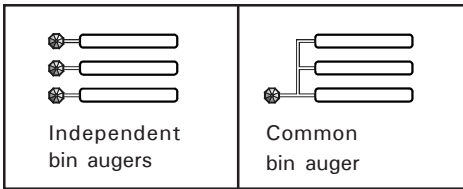
This menu is shown if slave feeders are enabled above.



Common Auger

If independent slave feeders are enabled above, select if all feeders have their own bin auger or if they share a common auger.

This menu is shown if independent slave feeders are enabled above.



Use Common
Auger? Yes ▾

Proxy Switch

Select "Yes" if proximity sensors are used to detect the presence of feed at the end of the feeders.

Use Proxy
Switch? Yes ▾

Proxy Switch Status

Choose the normal contact status of all proximity sensors in use: Normally Opened (NO) or Normally Closed (NC).

Only shown proximity sensors are enabled.

Proxy Switch
Normally Open ▾

Feed Sensor Bypass

If a proximity sensor is used, the Chain Disk stops when feed is detected at the end of the feeder. However, when a feed cycle starts, some feed leftovers from the previous cycle are likely to remain at the end of the feed line. The *Feed Sensor Bypass* delay allows ignoring the presence of these leftovers at the beginning of a feed cycle. Set this delay separately for each feeder in use: (S1, = Slave 1, S2, = Slave 2, etc.) It can be adjusted from 0 to 30 minutes.

Only shown if proximity sensors are enabled above and if feed distribution is based on a timer (if the continuous feeding mode is disabled below).

Feed Sensor
Bypass 0:30m:s ▾

Continuous Feeding / Timed Feeding

Select "Yes" to use the continuous feeding mode; select "No" to use timed feed distribution (see sec. 4.3).

Only shown proximity sensors are enabled above.

Continuous Feeding? No ▾

Continuous Feeding Delay

When using the continuous feed distribution method, the *Continuous Delay* tells when to start a feed cycle from the moment where no feed is detected at the end of the master Chain Disk feeder (see sec. 4.3.1). It can be adjusted from 1 min to 23h59 min.

Only shown if the continuous feeding mode is enabled above.

Cont. Feeding Delay 0:30 ▾

Feed Dump : Actuators / Electric Valves

Select "Actua" to enable feed dumps that are controlled by an actuator; select "Valve" to enable feed dumps that are controlled by an electric valve; select "None" to disable feed dumps.

Only shown if feed distribution is based on a timer (if the continuous feeding mode is disabled above).

Feed dump use Actua ▾

Clean Drops

This function allows cleaning the drops at the very beginning of each feed cycles: the controller uses the "Actuator Open Time" parameter to open and close the drops 3 times in a row in order to evacuate feed leftovers from the system.

Clean Drops ? Yes ▾

Actuator Open Time

Delay that is required for the actuator to open the dumps. It can be adjusted from 0 to 120 minutes.

Only shown if the actuator is enabled above.

Actuator Open Time 3:00m:s ▾

Actuator Delay

This is the time the dumps remain opened right after having been opened. It can be adjusted from 0 to 60 minutes.

Only shown if the actuator is enabled above.

Actuator Delay
3:00m:s ⬆️

Security Sensor

Select "Yes" if the actuator has a security sensor (limit switch).

Only shown if the actuator is enabled above.

Use security
Sensor? No ⬆️

Electric Valve Delay

This is the time electric valves remain opened to dump the feed. It can be adjusted from 0 to 60 minutes.

Only shown if electric valves are enabled above.

Elec.Valve Delay
Time 3:00m:s ⬆️

Maximum Current of the Master Feeder

Select the maximum allowable current that can be consumed by the drive unit of the master feeder. This parameter can be adjusted from 1 to 14 Amp.

Max Current
8.5AMP ⬆️

Window Size

This parameter is used to restart a drive unit that was stopped due to an over current condition. The drive unit restarts when its amperage draw becomes lower than its respective *Max Current Consumption - Window Size*. The window size is common to all drive units and can be adjusted from 0.5 to 3.0 Amp.

Window Size
1.5AMP ⬆️

Maximum Current of Slave Feeders


Select the maximum allowable current that can be consumed by the drive unit of each slave feeder (S1, = Slave 1, S2, = Slave 2, etc.) The *Maximum Current Consumption* can be adjusted from 1 to 14 Amp.

Available if slave feeders are enabled above.

Max Current S1
8.5AMP ⬆️


Over Current Delay


An alarm is set off when the amperage draw of a drive unit exceeds its respective maximum current limit for this time delay. The *Over Current Delay* is common to all drive units and can be adjusted from 30 seconds to 15 minutes.

Over Current
Delay 0:30m:s 

Auger Delay


When a feed cycle starts, the activation of the bin auger is postponed until the end of this delay. This allows emptying the feeders before bringing new feed into the system. If all feeder have their own bin augers, set this delay separately for each slave feeders. The *Auger Delay* can be adjusted from 0 to 60 minutes.

Auger Delay
0:15m:s 

Auger Delay S1
0:15m:s 

Max Run Time


This is the maximum allowable running time of a feeder. The controller sounds an alarm when the continuous run time of a feeder exceeds the *Max Run Time* limit of this feeder. Set this parameter separately for each feeder in use. It can be adjusted from 00:00 hh:mm to 04:00 hh:mm.

Max Run Time
2:15h:m 

of Feeding Cycles


Activate the proper number of daily feed cycles. Up to 20 cycles can be activated.

The controller automatically restrain the number of feed cycles so that no cycle overlaps another. Refer to sec. 5.4 to set the feed cycles.

of Feeding
Cycles 1 

Time Mode

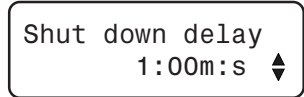
Select the desired time display format: 12h or 24h mode.

Time Mode 12h 

Shut Down Delay

When a proximity sensor detects feed at the end of a feeder, the controller stops the feed entry (bin auger) and launches the *Shutdown Delay* before stopping the drive unit. This delay can be adjusted from 0 to 10 minutes.

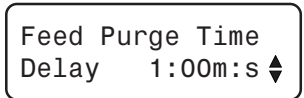
Only shown if proximity sensors are enabled above.



Feed Purge Time Delay

The Purge Delay is the amount of time required for feedlines to become empty. Set this delay to the desired value.

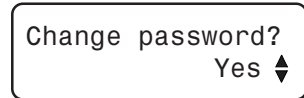
Accessible if many feeders are sharing a common bin auger.



Change password?

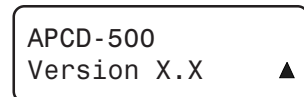
Select "Yes" if you wish to modify the controller's password then press the down-arrow key.

- Press MODIFY. The first two digits of the password flash on the display.
- The new password must be entered, one number at a time. Use the arrow keys to enter the first number. Press MODIFY to step to the next number. Use the arrow keys to enter the second number, etc.



Version

This is the current version of your controller.



5.7 Manual & Test Modes

The manual mode allows activating manually the actuators, electric valves and drive units.

5.7.1 Manual Filling of the Feeders

It is possible to fill some Chain Disk feeders without waiting for a feed cycle to start. When this manual start-up is performed, the Manual Mode pilot light turns on and the controllers activates the proper outputs in order to fill up the required feeder(s) (see the different filling methods in section 4.5.2). The manual filling process ends when the feeder is full.



If the user starts a manual fill-up of a feeder while a feed cycle is ongoing, the ongoing cycle is bypassed and replaced by the manual filling process. When the controller returns to the automatic mode, it will not resume the previous cycle but will perform the dump at the next *Dump Time* (if applicable). A manual dump can also be performed (see next section). **Do not forget to exit from the manual mode once the manual filling process is completed.**


- Use the menu select buttons to select the **MANUAL MODE** menu. *A password may be required to access this menu (see sec. 5.6).*
- Before enabling the manual filling, select which feeder must be filled: press the down-arrow key to select the *Manual Start* menu.
- Press MODIFY then use the arrow keys to select the feeder that needs to be filled manually (Master Chain Disk feeder, All feeders or slave 1-7 feeders). Press MODIFY once again to validate. Once the desired feeder is selected, activate the manual mode as shown in section 5.7.2.

Manual Start
Mastr

5.7.2 Manual Start / Stop

You can choose to start filling a feeder or to stop it manually (as explained in previous section).

- Use the menu select buttons to select the **MANUAL MODE** menu. *A password may be required to access this menu (see sec. 5.6).*
- The manual mode status is displayed on screen.
- Press MODIFY then use the arrow keys to select the desired status: select *Start* to enable the manual mode; select *Stop* to stop the Chain Disk system; select *Auto* to return to the automatic control mode.



```

Feed cycles
Mode      Auto
  
```

5.7.3 Bypassing a Feeder

If required, the controller can bypass a feeder (slave or master feeder).

- Use the menu select buttons to select the **MANUAL MODE** menu. *A password may be required to access this menu (see sec. 5.6).*
- Press the down-arrow key to select the status menu of the desired feeder. *Accessible if slave feeders are used.*
- Press MODIFY then use the arrow keys to select the desired status (Auto /Bypass). Press MODIFY again to validate.



```

APCD-500 Master
Status      Auto/Bypass
  
```



```

APCD-500S #1
Status      Auto/Bypass
  
```

5.7.4 Manual Dump


The actuator/electric valve can only be activated manually when no drive unit is running. The Manual Mode pilot light flashes while an actuator or electric valve is controlled manually.

- Use the menu select buttons to select the **MANUAL MODE** menu.
- Press the down-arrow key to select the manual mode status of the actuator.

Only shown if the actuator is enabled (see sec. 5.6).

- Press MODIFY then use the arrow keys to select the desired status (Auto /Open /Stop/ Close). Press MODIFY again to validate.

The answer is validated after 8 seconds.



Actuator
Mode: Auto

- Press the down-arrow key once. The manual mode status of the electric valve is displayed.

Only shown if the electric valve is enabled (see sec. 5.6).

- Press MODIFY then use the arrow keys to select the proper status (Auto/Open/ Close). Press MODIFY again to validate.

The answer is validated after an 8 second delay.

5.7.5 Toggle Switch

A toggle switch can be connected to the main board. This switch allows stopping the drive unit of the master Chain Disk feeder and stopping bin augers manually, without sounding the *Chain Disk is Not Running* alarm until the next feed cycle. Refer to the wiring diagram enclosed with this manual to connect the toggle switch.



THE TOGGLE SWITCH **DOES NOT** CUT THE POWER LINES TO THE CHAIN DISK MOTOR. SHUT OFF THE CIRCUIT BREAKER FOR SERVICING AND MAINTENANCE.

5.7.6 Test Mode

The test mode allows simulating the amperage draw of all drive units in order to verify the controller's performances.

- Use the menu select buttons to select the **MANUAL MODE** menu.
- Press the down-arrow key to select the amperage draw display of the drive unit of the master Chain Disk feeder or of a slave feeder.
- Press the down-arrow key to select the amperage draw of the selected drive unit.
- Press MODIFY then use the arrow keys to set the simulated current consumption. Press MODIFY to validate.

The answer is validated after an 8 second delay.



Do not forget to exit from the test mode when tests are completed.

5.8 Alarms

The following table shows the possible alarms conditions. When an alarm occurs, the whole Chain Disk system stops operating until the alarm is acknowledged.

Alarm Messages	Meaning
ACTUATOR IS NOT CLOSED	The limit switch of an actuator has not been reached after the Closing Time (this type of alarm can only occur if the safety sensor is enabled).
ACTUATOR IS NOT OPENED	The limit switch of an actuator is still detected after the Opening Time (this type of alarm can only occur if the safety sensor is enabled in the installation).
APCD-500-S #X COMM ALARM	Communication is disrupted between the main controller and an APCD-500-S slave module ID # x.
CHAIN DISK IS NOT RUNNING	The amperage draw of the master Chain Disk is lower than 2.0 Amps.
CURRENT OVERLOAD	The amperage draw of the master Chain Disk exceeded its <i>Maximum Current Consumption</i> limit for the <i>Over Current Delay</i> .
CURRENT OVERLOAD APCD-500-S #X	The amperage draw of slave feeder ID # X exceeded the <i>Maximum Current Consumption</i> limit for the <i>Over Current Delay</i> .
MAX RUN TIME	The running time of the master Chain Disk drive unit exceeded the <i>Max.Run Time</i> parameter value.
MAX RUN TIME APCD-500-S #X	The running time of slave feeder ID #X exceeded the <i>Max.Run Time</i> parameter value.
CHAIN DISK SAFETY SWITCH	The safety switch of the master Chain Disk feeder has been reached.
CHAIN DISK SAFETY SWITCH APCD-500-S #X	The safety switch of slave feeder ID #X has been reached.

TROUBLE LIGHT:

It is possible to connect a trouble light to the main controller. This light turns on whenever an alarm occurs. Refer to the wiring diagram enclosed with this manual to connect this light.

5.8.1 Acknowledging an alarm

- Use the menu select buttons to select the STATUS menu. The current alarm acknowledgment menu is displayed.
- Press MODIFY. The acknowledgment status flashes on the display.
- Press the up-arrow key to acknowledge the alarm then press MODIFY to validate. The alarm is now acknowledged.



6. TECHNICAL SPECIFICATIONS

Type	APCD-500
Main supply fuse F1	F 1A, 250V, fast-blow
Main supply/frequency	230V + 10% -20%, 12A, 50/60Hz
Housing	Plastic casing
Operating temperature	0 to 40°C
Storage temperature	-15 to 50°C
Ambient relative humidity	MAX 95% (non condensing)
Alarm	10mA to 2A, 24 VAC or DC MAX
Chain disk motor	230 VAC / 2HP MAX
Auger motor	230VAC / 1HP MAX 115 VAC / 1/2 HP MAX
Actuator/Electric valve	230VAC MAX, 5A MAX
Trouble light	500W MAX, 115VAC
Installation category	Categorie II : Overvoltage category
Pollution degree	2
Altitude	Up to 2000m

The room temperature where the controller is located **MUST ALWAYS REMAIN BETWEEN 32° AND 104°F (0° AND 40°C)**.
For indoor use.

7. MEMORY CARD

The memory card is used to create a backup copy of your controller's configuration. The card is also useful to transfer the configuration of one controller to another controller of the same type.

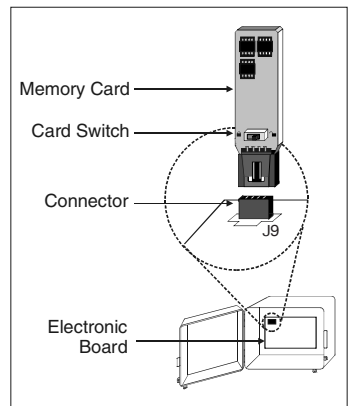
The switch at the bottom of the card is used to lock or to unlock the card ( = locked,  = unlocked).



Turn off power each time you open the controller's enclosure. This prevents accidental exposure to areas of high voltage.

TO TRANSFER A CONFIGURATION:

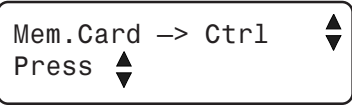
1. Turn off power to the controller.
2. Open the latch and lift the controller's cover.
3. If you are about to copy the controller's configuration on the memory card, make sure the card's switch is at the unlocked position.
4. Insert the card in the J9 connector located on the electronic board inside the controller. Components of the memory card must face down as illustrated.
5. Close the cover then reapply power to the controller. The transfer menu should be shown on screen (if this is not the case, simultaneously press the MENU SELECT up and down-arrow keys for 3 seconds to display this menu).



6. Use the ADJUSTMENT up- and down-arrow keys to select the proper type of transfer:

MEMORY CARD → CONTROLLER:

To transfer the memory card's content into the controller, select the "**Mem.Card to Control**". Once it is selected, simultaneously press the ADJUSTMENT up- and down-arrow keys to start the transfer.



Mem.Card -> Ctrl
Press

CONTROLLER → MEMORY CARD:

To save the controller's configuration into the memory card, select the "**Control to Mem.Card**" menu. Once it is selected, simultaneously press the ADJUSTMENT up- and down-arrow keys to start the transfer.



Ctrl -> Mem. Card
Press

7. Once the transfer is over, simultaneously press and hold the MENU SELECT up- and down-arrow keys for 5 seconds to exit the transfer menu, then remove the memory card from the connector as follows:

- Turn off power to the controller;
- Open the controller's cover;
- Remove the card from the connector;
- Close the cover then reapply power to the controller.



IMPORTANT:

**REMOVE THE
MEMORY CARD
FROM THE
CONNECTOR WHEN
THE TRANSFER
IS OVER!**

8. Lock the card's switch () if required.

TRANSFER ERROR



The controller will not warn you if the transfer is incorrect. Respect the following rules to make sure the transfer works properly:

- Make sure the card switch is at the unlocked position before transferring a configuration on the card.
- Do not move or hold the card while a transfer is ongoing.

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