

# ***AUcontrols***

**DC Motor Speed Controls  
and Drives  
For the industry.**

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**Thank you for purchasing our DC Controls & Drives we guaranty you will have years of dependable operation with our equipments.**

**Our drives have a 1-year Warranty under normal operations conditions.**

**Our goal is to keep your machines and production moving.**

Ver. Jan. 2021

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**Our DC controls & drives had being designed with the customer in mind, to meet their expectations for industry, to give them the best quality and service for their investment.**

**We have years working with our customers and we know their needs.**

**That is why we offer the best solution to meet their needs in speed, power and torque control for their DC motors.**

**We offer controls and drives for DC motors from: 1/25 HP to 5 HP, for single phase power: 115 VAC / 230 VAC input. And outputs: 90 VDC / 180 VDC & Custom DC Voltages.**

**We offer different versions depending in the application.**

**DC controllers/drives are used in many machines because they are best choice for full torque and/or speed control applications.**

# Operation manual

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## **IMPORTANT NOTE:**

**A QUALIFIED TECHNICIAN MUST INSTALL THIS EQUIPMENT; THERE IS A RISK OF ELECTRIC SHOCK, WHICH CAN BE FATAL IF THE PERSON INSTALLING THE DRIVE IS NOT FAMILIAR WITH DC DRIVES.**

**WE ARE NOT RESPONSIBLE FOR WRONG CONNECTIONS, ALTERATIONS, CHANGES AND/OR DAMAGES ARISING FROM THEM.**

### **Installing the DC control: Install it in a clean, dry and well ventilated place!**

1. Make sure your DC Drive's HP & Voltage matches the DC Motor's. If the drive is smaller than the motor's HP, it may not run. If it is bigger, you may have problems too; you could burn your motor.
2. Is the motor's voltage: 90 VDC or 180 VDC? Check the power supply you have available (115 V or 230 V AC) and install a Breaker to feed your Drive and **DO NOT TURN IT "ON" YET**. If your motor is 90 VDC, feed your drive with 115 VAC +/- 10% (100 ~ 130 VAC). If your motor is 180 VDC feed your drive with 230 VAC +/- 10% (195 ~ 250). **ALWAYS USE THE RIGHT VOLTAGE and BREAKER** to feed the Drive! **DO NOT feed the control with higher voltage than what it is for**. You could burn the motor or the drive or both!
3. Identify the motor wires you will connect to the DC control, for the motor's armature you will have **A+** and **A-** and If your motor has FIELD, you'll use **F+** & **F-**. If it has permanent magnets, you will not use them. If your motor has a build in thermo-switch, you need to add an external relay to control your drive, to have extra protection.
4. Install the right fuse(s) between the AC power and the drive as shown in the figure; use the right ones for your application. (See "Fuses" Chart)

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5. Now, connect the power supply **L1** to the drive's **L1** terminal using a fuse, do the same with **L2**, this is for 230 Volts AC input. If you will be using 115 Volts AC, connect **L2** to the neutral or to ground.  
Make sure all wires are in "Good condition" and well tighten. Do not leave any wire loose for it can start a fire.
6. Connect the Speed & Torque\* potentiometer's wires to the drive, "**0**", "**5**" and "**10**". Leave the speed potentiometer turned fully to the left (counter clockwise). If you leave it somewhere else, it will cause the motor to start running as soon as you apply power to the drive. \*(Drives with both pots.)
7. If you will be using the drive's "Enable" feature, use a relay or switch. The drive will run with the terminals "**E**" open. It will stop the motor if those terminals are "Closed" or "Shorted".
8. The Standard Drives have an internal shut down control "Instantaneous Over-Current Protection" (IOCP) that will operate, if the motor's current exceeds the maximum set in the "**CL**" preset and will cause the motor to stop. To reset it, you need to reset power to the drive. Disconnect AC Power to the drive momentary and reconnect it. Make sure to turn the speed potentiometer back to "**0**" before reconnecting power to the drive.  
Drives with Speed & Torque control do not have this protection, they have only fuses.

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9. Make sure your machine is “cleared” before apply power to the DC control. Now you can start your DC motor by turning the breaker “ON” and turning the speed pot to the desired speed; you can make changes to the drive settings if needed.

### **IMPORTANT NOTE:**

If you need to use Tachometer feedback, **remove the jumper marked as “AF” in the electronic board** (to disable the armature feedback) **and turn IR totally to the left** before you apply any power to the DC control.

## **ADJUSTING THE TRIM POTS**

The DC control/drive has six “Trim pots” to set the way the drive will behave and respond.

**MIN:** (Minimum Speed): To set the minimum (offset) speed that the motor will run with the “pot” turned all the way to the left, (Clock counter clockwise). It will adjust the motor’s minimum speed from 0 to 30%.

**DEC:** (Deceleration): To set the time to bring the motor’s speed down to zero or to a lower speed. It will go from 0 second turned all the way to the left and when turned all the way to the right it will take 5 seconds. You can adjust it according to your needs. **(Factory set at 0)**

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**ACC:** (Acceleration): To set the time, from 0 to 5 seconds to reach motor's full speed, 0 seconds all the way to the left and 5 seconds all the way to the right. (It is pre-set to 2 sec.) Adjust it according to your needs.

**IR:** To compensate torque, (Pre-Adjusted) if the motor's speed drops down more than acceptable while operating. This one will add extra "Amps" to the motor but will be limited by the "CL" as well.

**NOTE:** If you use "Tachometer" for feedback, you MUST turn this "preset" all the way to the left. (Do not use IR with Tachometer feedback).

**CL:** Limits the maximum current the motor will draw from the drive, this was preset already according to the motor's power you requested. Turning it to the left will decrease the current that will be delivered to the motor; turning it to the right will increase that current. **BE CAREFUL WITH THIS ONE**, for if set it too high you can damage your motor or your Drive.

**MAX:** (Maximum Speed): Sets the maximum voltage to be delivered to the motor (or the maximum speed). The output voltage to the motor has to be set according to the motor's name plate. You can adjust the speed from 70% ~ 110 %.

**NOTE:**

**IF you use the tachogenerator and want the motor to run forward / reversing application, the tacho wires MUST be also reversed so that the positive (+) stays always (+) on the board. Use a relay to switch the tacho wires. (See Pg. 17)**



**WARNING!**

**Disconnect Power from the DC Control BEFORE connecting wires or changing fuses!**

**ARMATURE FUSE CHART FOR  
90 VDC MOTORS**

<b>MOTOR HP</b>	<b>FIELD AMPS. (50/100VDC)</b>	<b>A+ FUSE RATING DC Amps.</b>	<b>L1 FUSE RATING AC Amps.</b>
1/25 HP	-	0.75	1.5
1/15 HP	-	1.0	2
1/8 HP	-	2	3
1/6 HP	-	2.5	4
1/4 HP	0.6 / 0.3	4	6
1/3 HP	1 / 0.5	5	8
1/2 HP	0.5 / 1	8	10
3/4 HP	1.2 / 0.6	10	15
1 HP	1.2 / 0.6	15	20
1.5 HP	1.2 / 0.6	20	25
2 HP	2	30	40
3 HP	2	40	50

**Use only 250V fast acting fuses for AC (L1)  
Input power and for Armature (A+).**

## ARMATURE FUSE CHART FOR 180 VDC MOTORS

MOTOR HP	FIELD AMPS. (100/200VDC)	A+ FUSE RATING DC Amps.	L1 FUSE RATING AC Amps.
1/15 HP	-	0.6	2
1/8 HP	-	1.0	3
1/4 HP	0.6 / 0.3	2	4
1/3 HP	0.5 / 0.25	2.5	5
1/2 HP	0.5 / 0.55	4	6
3/4 HP	0.6 / 0.3	5	8
1 HP	0.5 / 0.25	8	10
1.5 HP	0.5 / 0.25	10	15
2 HP	0.4 / 0.8	15	20
3 HP	1.2 / 0.6	20	25
5 HP	2.6 / 1.3	30	40

**Always use 250V fast acting fuses for AC Input power and for Output to Armature.**

### Minimum wire size recommended

Motor HP 90 VDC	Motor HP 180 VDC	Motor Amperes	Max. @ 50' run	Max. @ 100' run
1/2	1	6	16	14
1	2	12	14	12
1 1/2	3	16	12	10
2	5	25	8	6
3	-	30	8	6

## Performance Specifications

Load regulation Armature Feedback	1% base speed*	MIN. Speed range	0 ~ 30% Full Speed
Load regulation Tachometer Feedback	1% set speed*	Decel. time range	0 ~ 7 Sec.
Speed Range	50:1	Accel. time range	0 ~ 7 Sec.
Maximum operating temperature at full rating	50°C / 122°F	CL / torque range	150% Full load
Tachometer feedback input Volts DC @ 1000 RPM	50**	IR compensation	0 ~ 20%
Maximum number of Start/Stops (Reverse) per minute with break time of 1 second	30	MAX. Speed range	70 ~ 110% Full Speed

\* Performance is for SCR rated PM motors only, performance can change with other motor types.

\*\* Other voltages can be use, contact us at:

**info@aucontrols.com.**

## General Specifications

<b>AC Line Voltage</b>	115 VAC / 230 VAC, 50/60 Hz. Single Phase
<b>Armature Voltage Output</b>	For 115 VAC Input: 0 ~ 90 VDC. For 230 VAC Input: 0 ~ 180 VDC.
<b>Field Voltage F+ / F-</b>	For 115 VAC Input: 100 VDC. For 230 VAC Input: 200 VDC.
<b>Field Voltage F+ to L1</b>	For 115 VAC Input: 50 VDC. For 230 VAC Input: 100 VDC.
<b>Field Max. Current</b>	1 Amp. Or 3 Amp. DC.
<b>Tachogenerator Voltage @ 1000 RPM.</b>	50 VDC. An AC Tachogenerator can be used with a bridge rectifier, contact Factory for details.
<b>Analog Voltage Input (Reference)</b>	0 ~ 10 V DC applied between terminals: 0 – 5. <b><u>Signal MUST be isolated.</u></b> <b><u>Contact Factory for details.</u></b>
<b>Maximum operating temperature</b>	50°C / 122°F

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There are many ways to connect DC motor speed controllers for different applications and voltages; they can be connected as Standalone motor, “Master – Slave” configuration, Voltage followers configuration, Torque, power or Speed control, and can be controlled by a PLC / CNC or any external control using signal insulation boards, etc.

We make custom drives according to your needs if you tell us what are your needs or requirements we can help.

This manual only gives the general illustration for the connection of the drives in the following schematics; if you need more details we can help you,

We offer DC motor Speed controls (drives) in many presentations.

Open Chassis, Boxed in NEMA 1 enclosure, reversible drives, regenerative drives, custom input and output voltages, etc.

**Contact us at:**

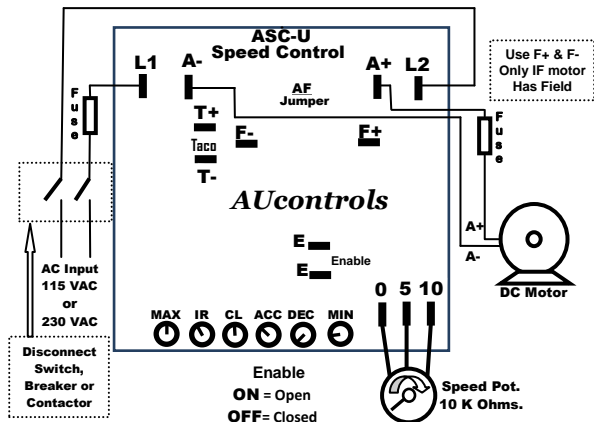
**[Info@aucontrols.com](mailto:Info@aucontrols.com).**

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## NON-REGENERATIVE MODELS.

### IMPORTANT NOTE:

For 115 VAC Models bigger than 1/2 HP and for 230 VAC Models bigger than 1 HP are mounted on bigger heat sink.



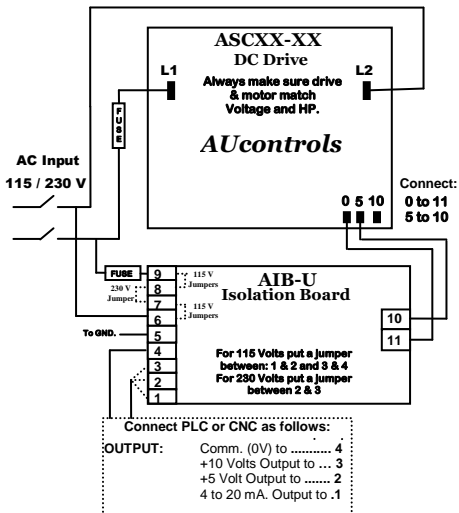
Wiring diagram (one-way rotation only).

**WARNING:** DC Controls can NOT be use with Instant Reverse, if you need to reverse the motor use contactors and **MAKE SURE the motor is completely STOP before running it backwards**, to prevent damage to the DC Control! or You can purchase our **REVERSIBLE Drives!**

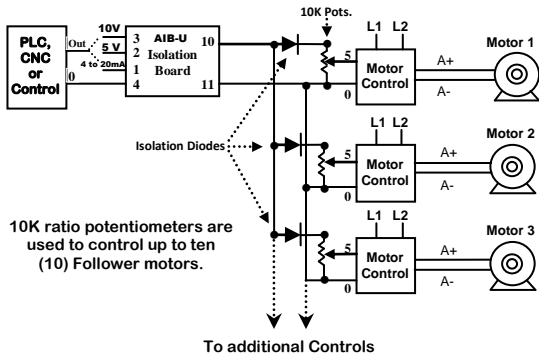
**NOTE:** If you need to RUN and STOP the Motor during Normal operation, use the ENABLE "E" terminals, instead of the ON/Off Switch.

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To use the ASCXX-XX with a PLC or CNC you need to install an Isolation board, as shown in the drawing, single unit.



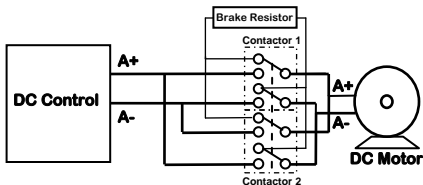
**Warning!** To avoid erratic operation DO NOT bundle AC Line and motor wires with potentiometer, PLC / CNC control wires, voltage following, enable, inhibit or other signal wires. Use shielded cable on ALL signal wiring and ground the shielded cable on motor side only!



**WARNING!** For the signal Isolator connections to multiple speed controls.

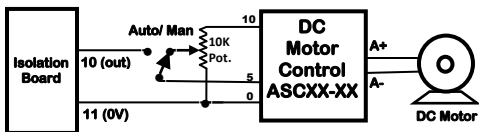
1. Multiple controls must be powered from **THE SAME PHASE OF AC LINE**, and **DO NOT** mix L1 and L2, always connect L1 with all L1's and L2 with all L2.
2. The positive input terminal to each speed control must be installed with a 1 Amperes / 600 Volts (1N4005) isolation diode as shown.
3. Multiple speed controls **CAN NOT** be used with: PWM, Regenerative or Variable Frequency Drives (Inverters). You will need another isolation board if you want to connect different controllers or drives.



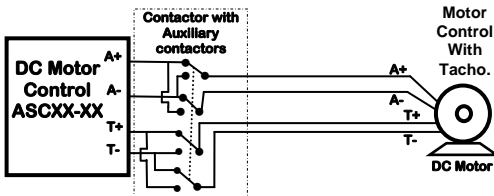


**WARNING.**  
**THESE ARE ILLUSTRATIONS ONLY FOR HOW TO DO IT.**  
 If you need help to calculate the brake resistor, contactors, etc. contact us!  
**WE ARE NOT RESPONSABLES FOR WRONG CALCULATIONS AND DAMAGES ARISING FROM THEM.**

**DC Control & motor with reverse contactor**



**Process control with Auto / Man Switch**



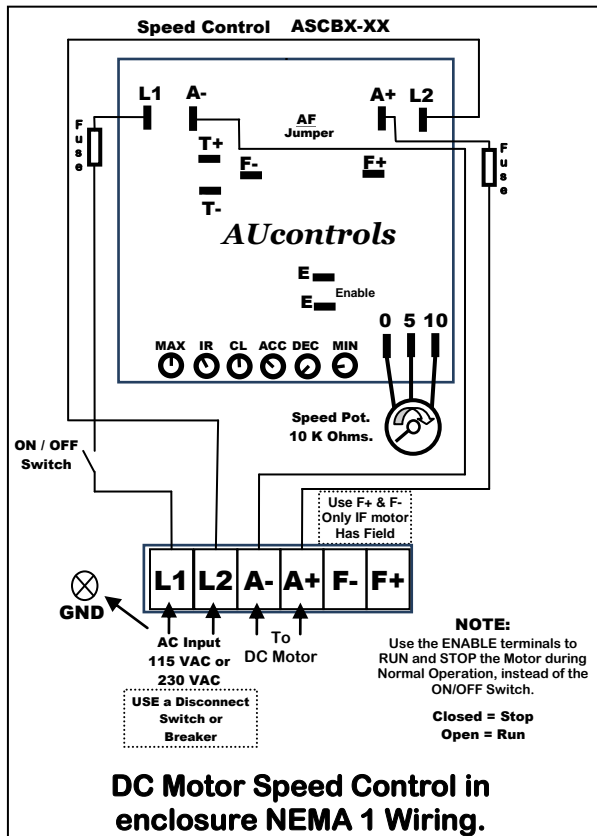
**NOTE:**

**CONTACTOR MUST BE 50% HIGHER IN AMPS THAN MOTOR'S!  
 STOP THE MOTOR BEFORE REVERSING.**

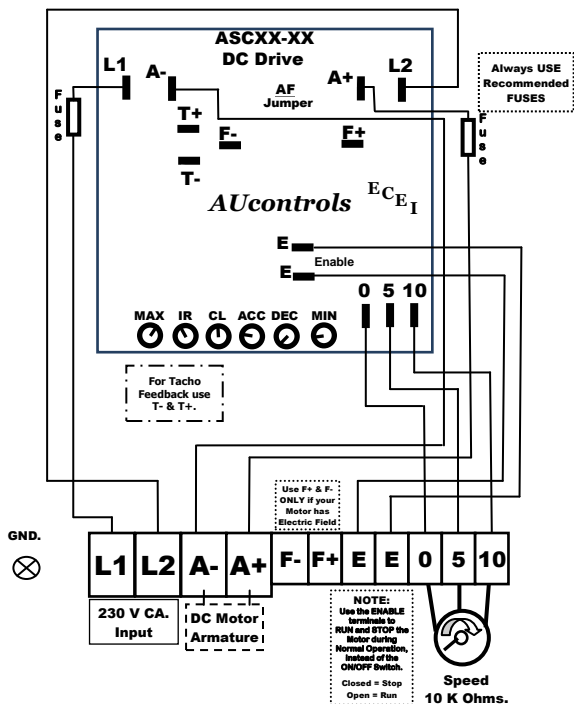
**Use Auxiliary contactors to reverse the Tachogenerator.**

**Fwr / Rvs DC Motor with Tacho connections.**

**These DC Drives can NOT be used with Instant Reverse.**



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**DC Speed Controllers 5 HP Open.**

**WARNING!**

**The Field output is for shunt wound motors only. Do not connect F+ and F- when using a permanent magnet motor.**

**WARNING!**

**Under NO circumstance should power and signal wires be bundled together. Induced voltages can cause erratic behavior in any electronic equipment.**

**WARNING!**

**DO NOT connect this equipment with power applied!  
Failure to heed this instruction may result in fire or serious injury.**

**Install a Disconnect Switch in the Voltage input line, rated 200% of motor nameplate.**

**You can use a contactor after the Disconnect Switch.**

**TROUBLESHOOTING**

<b>Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
Breaker trips or blows fuses	Bad Drive or Bad Motor	*Check/Change Drive or Motor
Motor doesn't run	*Check fuses and Input Voltage L1- L2 *Check Motor wires and brushes	*Reset Breaker *Change fuses *Change brushes
Motor stops with load	* <b>CL</b> trim pot set too low. *Drive too small for motor's HP. * Over Loaded	*Check Motor and drive nameplate HP * <b>CL</b> pot (see Pg 8)
Motor runs backwards	*Field wires backwards *Armature wires backwards	*Check Field connection, (IF Used). *Switch Armature wires
Motor hums but doesn't run	*Not enough reference input voltage to run. *Load too big for the motor * <b>CL</b> trim pot not set properly	*Verify the input voltage in terminal 5 has to be >0 and <+10 *Reduce load *Adjust <b>CL</b> trim pot

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<b>Symptom</b>	<b>Possible Cause</b>	<b>Solution</b>
Motor doesn't stop totally.	* <b>MIN</b> trim pot set too high.	*Adjust trim pot <b>MIN</b> (see Pg. 7)
Motor runs slow or does not reach maximum speed	* Load too big for the motor * <b>MAX</b> trim pot set too low	*Reduce load *Adjust <b>MAX</b> trim pot (See Pg. 8)
Motor speeds up as soon as it starts and has no speed control.	*Tachogenerator's wires backwards *No Feedback	*Check Tacho's polarity. *Put jumper AF in ASC-U Board
Motor doesn't have enough torque or stops as speeds up.	* <b>CL</b> trim pot set too low * Instantaneous OC protection. (IOCP)	* Reset power and Check Motor's nameplate Amperage, adjust <b>CL</b> not exceed max motor's amperage *DC Control too small for the motor.
Motor oscillates	* <b>IR</b> trim pot set too high	*Turn <b>IR</b> to the left (see pg. 8)

If you need help with your applications contact us at: [info@aucontrols.com](mailto:info@aucontrols.com) and we will help you with your specific needs.