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Technical Specifications

**Power Supply**
Linear, transformer based for high reliability and low noise. 110 or 220 VAC input, switch selectable. 50/60 Hz. 50 W max.

**Output Voltages**
- 24 VDC ±5%, 100 mA max. Self resetting fuse.
- 5 VDC ±5%, 100 mA max, including MMI which draws 45 mA.
  
**Inputs**
IN 1-4, CW JOG, CCW JOG, CW LIMIT, CCW LIMIT: Optically isolated, 5 - 24V. Can be configured to accept sourcing (PNP) or sinking (NPN) signals. 2200 ohms input impedance.

**Outputs**
Optically isolated. 24V, 100 mA max. Can be individually configured to provide sourcing (PNP) or sinking (NPN) signals.

**Microstepping**
15 software selectable resolutions. Steps per revolution with 1.8 motor: 200, 400, 2000, 5000, 10000, 12800, 18000, 20000, 25000, 25400, 25600, 36000, 50000, 50800.

**Motion Update**
12800 Hz.

**Physical**
Constructed with heavy gauge steel housing. 1.25 x 8 x 3.86 inches overall. 2 lbs. 0 - 70°C ambient temperature range. Power/status LED. Mounting brackets included. See page 17 for detailed drawing.

**Connectors**

**Fuses**
Wickman TR-5 style, 0.25A fast acting. Order from Digikey (1-800-DIGIKEY), P/N WK3035.

**Agency Approvals**
CE [Complies with EN 55011A, EN 50082-1 (1996), EN 50178 (1997)] and TUV

Features
- Powerful, flexible, easy to use indexer.
- Microsoft Windows™ based software for easy setup and programming.
- Reliable, efficient, low noise linear power supplies provide 5V and 24V to the user, 100mA each.
- Connects by a simple cable to your PC for programming (cable included).
- Eight inputs for interacting with the user and other equipment.
- Three programmable outputs for coordinating external equipment.
- High speed, differential step & direction outputs interface easily to popular step motor and servo motor drives.
- Pulse rates to 2.5 MHz for high speeds at high resolutions.
- Accepts 110 or 220 volt AC power (factory preset for 110 volts).
- Sturdy 1.25 x 8 x 3.86 inch metal case with integral heat sink. Mounting brackets included.
- Pluggable screw terminal connectors for I/O and AC power (all mating connectors included).
- Bi-color (red/green) LED indicates power and indexer status.
- Optional man machine interface (MMI) allows operator to enter distances, speeds, loop counts, and more.

Block Diagram
Getting Started

To use your FSC-01 motor control, you will need the following:

- a power cable (line cord)
- a compatible pulse & direction servo drive (PHD part number FSA-01)
- a small flat blade screwdriver for tightening the connectors - a screwdriver suitable for this purpose is included with your drive.
- a personal computer running Windows 3.1, 95, 98 or NT with a 9 pin serial port (486 or better with 8 MB ram recommended)
- the PHD Programmer software that came with your FSC-01
- PHD Programmer Manual (part #6441-333)
- PHD Quickstart Manual (part #6441-334)

The sketch below shows where to find the important connection and adjustment points. Please examine it now.

All mating connectors are included.
Flush Mounting
When you remove the MMI from the shipping carton, you will notice that it has two parts. The first is a fairly thin section that contains the keypad, display, and some circuit boards. The other part is thicker and contains the telephone jack and a cable that connects to the thin part.

When you flush mount the MMI in a panel, only the thin section will stick out from your panel - the large portion mounts behind your panel. You'll need to cut a precise section from your panel. There is a cardboard template in your box for this purpose.

If you want the MMI to be dust proof and watertight, you must place the black rubber gasket between the thin part of the MMI and your panel. Assemble the two halves using the eight small screws.

Surface Mounting
An easier way to mount the MMI is to bolt the two halves together ahead of time, using the eight small screws. If you want the MMI to be dust proof and watertight, put the black rubber gasket between the two halves before screwing them together.

Then cut a hole in your panel for the cable that runs between the MMI and the controller. The hole must be at least 5/8” in diameter for the connector to fit through. You will also need two holes that line up with the big mounting holes in the MMI. The mechanical outline on page 19 shows the location of the big mounting holes.

When you mount the MMI to your panel, you will need to use some kind of sealant to keep dust and liquid out. Silicone or latex caulking is okay, or you can make your own gasket from a sheet of compliant material like rubber or RTV.

Connecting AC Power
If you plan to operate the FSC-01 at 220 volts, you must change the setting of the 110/220V switch before applying power to the FSC-01. The FSC-01 is factory preset for 110 volts.

Connecting to 110 Volts
The FSC-01 is set for 110 volt operation at the factory. All you need to do is connect an AC power cord and the AC Power connector that comes with the FSC-01. If you want to directly wire the FSC-01 to AC power, you must consult a qualified electrician and observe all building and electrical codes.

The AC cord you can install yourself, but be careful: AC power can be dangerous.

Connecting to 220 Volts
The FSC-01 is set for 110 volt operation at the factory. In order to use 220 volts, you'll need to change a switch setting inside the case. You will need a medium sized phillips screwdriver to remove the cover.

Before you can change the 110/220 volt switch setting, you must remove all the connectors from the FSC-01 front panel. Remove the four screws from the cover, as shown below.
Mounting the PHD Optional MMI

Part Number 64725 MMI

The MMI is an easy to use, flexible device that allows an operator to enter move speeds, move distances, or repeat loop counts. Messages can also be displayed and the program can be paused until the user presses a key or presses the program cable. No special wiring is required. It has a 4-line, 20 character per line LCD display, and a 20 key keypad.

There are two ways to mount the MMI in your application. No matter which method you choose, you'll need to connect the MMI to your FSC-01 with the programming cable. You will not, however, need the adapter plug. The MMI has the same telephone style connector as the FSC-01.

Depending on how you mount the MMI and cable in your application, you may find that it is difficult to remove the cable from the back of the MMI. If this is the case, and you need to reprogram the FSC-01, you can use any telephone line cord as a programming cable. Please be careful not to lose the adapter plug that connects the telephone cord to the COM port of your PC.

Installing an AC Line Cord

Remove about 5 mm (3/16 inches) of insulation from each of the three wires of your line cord. (That's right, three wires. For safety, always use a three wire power cord on anything with a metal case.) Depending on where you got your power cord, it may have black, white, and green wires or brown/blue/green.

The AC power plug that was shipped with your FSC-01 also comes with an insulating rubber boot.

Always unplug the line cord from the wall before attaching it to the FSC-01

- Connect the black or brown wire to the FSC-01 “L1” terminal of the AC power connector. That is the line, or “hot” connection.
- Connect the white or blue wire to neutral. That's the “L2/N” terminal.
- Finally, and most importantly, connect the green wire to the GND terminal. That connects the FSC-01 metal enclosure and DC power supply ground to earth ground.

Installing the AC Line Cord

Once you've done that, find the 110/220V switch, which is next to the AC Power connector. Slide the switch toward the label marked “220V”, as shown in the sketch. Then replace the cover and secure it with the four screws.

Mounting the FSC-01

The FSC-01 has two mounting slots in the back panel. They're 0.2 inches wide, large enough for number 10 screws. (No screws are included with the FSC-01. You'll have to supply your own.)

The FSC-01 is not heavy, nor does it generate much heat. Your only concern for placement should be:

- routing wires to and from the FSC-01: keep signal wires away from motor wires and AC power cables
- protecting the FSC-01 from anything that might short out the internal circuitry, like water or metal chips.

Never use your drive in a space where there is no air flow or where the ambient temperature exceeds 70°C.

Never put the drive where it can get wet.

Never allow metal particles near the drive.

Mounting the PHD Optional MMI

Part Number 64725 MMI

The MMI is an easy to use, flexible device that allows an operator to enter move speeds, move distances, or repeat loop counts. Messages can also be displayed and the program can be paused until the user presses a key, such as ENTER, YES, or NO. Program branching can be accomplished based on the response of YES or NO. The MMI connects directly to the FSC-01 motion controller using the standard programming cable. No special wiring is required. It has a 4-line, 20 character per line LCD display, and a 20 key keypad.

There are two ways to mount the MMI in your application. No matter which method you choose, you'll need to connect the MMI to your FSC-01 with the programming cable. You will not, however, need the adapter plug. The MMI has the same telephone style connector as the FSC-01.

Depending on how you mount the MMI and cable in your application, you may find that it is difficult to remove the cable from the back of the MMI. If this is the case, and you need to reprogram the FSC-01, you can use any telephone line cord as a programming cable. Please be careful not to lose the adapter plug that connects the telephone cord to the COM port of your PC.
Microstep Resolution

The microstep resolution of the FSC-01 is set by the PHD Programmer software. Make sure the step resolution of the FSC-01 is the same as the servo drive it is connected to.

Consult the PHD Quick Start Manual for additional information (part #6441-334).

Connecting the Step and Direction Outputs

The FSC-01 Motion Controller can work with most pulse and direction step motors or servo drives. Different step motor drives use different input configurations. There are three basic types that the FSC-01 can be used with:

- Differential: Driver has STEP+, STEP-, DIR+, and DIR- inputs. Many high speed microstep drivers use differential inputs.
- Common anode: Driver has STEP and DIR inputs that require sinking signals and a common terminal named “VCPTO” or “+5V”
- Common cathode: Driver inputs are STEP and DIR (requiring sourcing signals) and a common terminal named “common” or “ground.”

Wiring diagrams for each type of driver are shown below and on the next page. The first sketch shows the output circuits for the FSC-01.

Typical diagram for interfacing an FSC-01 output to an NPN type PLC input. (Note: Power supply may be built into PLC and internally wired to the common)
**Wiring Outputs**

Before we discuss the output conditions, we need to talk about the circuitry. All three FSC-01 outputs are optically isolated. That means that there is no electrical connection between the motion controller and the output terminals. The signal is transmitted to the output as light. What you “see” is a transistor (NPN type) that closes, or conducts current, when the output is “low.” When the output is high, the transistor is open.

At power-up, the FSC-01 sets all three programmable outputs high (open circuit).

The maximum voltage between any pair of + and - output terminals is 24 volts DC. Never connect AC voltages to the FSC-01 output terminals. Maximum current is 100 mA per output.

Since there is no electrical connection to the FSC-01, you must provide the source of current and voltage, typically from an external power supply. You must also limit the current to less than 100 mA so that the output transistor is not damaged. You would normally use a resistor for this, but some loads (such as PLC inputs) limit the current automatically.

The diagrams below show how to connect an FSC-01 output to various types of optically isolated PLC inputs.

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**Installing the PHD Programmer Software**

- Please refer to the PHD Programmer Software Manual under “Installing the Programmer Software” for detailed installation instructions.

**Connecting to the PC**

- Locate your computer within 6 feet of the FSC-01.
- Your FSC-01 was shipped with a black adapter plug. It has a telephone style jack at one end and a larger 9 pin connector at the other. Plug the large end into the COM1 serial port of your PC. Secure the adapter with the screws on the sides. If the COM1 port on your PC is already used by something else, you may use the COM2 port for the FSC-01. On some PCs, COM2 will have a 25 pin connector that does not fit the black adapter plug. If this is the case, and you must use COM2, you will have to purchase a 25 to 9 pin serial adapter at your local computer store.
- Your FSC-01 was also shipped with a 7 foot telephone line cord. Plug one end into the adapter we just attached to your PC, and the other end into the RS232 jack on your FSC-01.

Never connect the FSC-01 to a telephone circuit. It uses the same connectors and cords as telephones and modems, but the voltages are not compatible.

Programming Note: Always apply power to FSC-01 after the PHD Programmer software is running on your PC.
Limit Switches

The FSC-01 has two limit switch inputs, LIMIT CW and LIMIT CCW. By connecting switches or sensors that are triggered by the motion of the motor or load, you can force the FSC-01 to operate within certain limits. This is useful if a program error could cause damage to your system by traveling too far.

The limit inputs are optically isolated. This allows you to choose a voltage for your limit circuits of 5 to 24 volts DC. It also allows you to have long wires on limit sensors that may be far from the FSC-01 with less risk of introducing noise to the FSC-01. The schematic diagram of the limit input circuit is shown below.

Front Panel Stop Button

On the front panel of the FSC-01 is a button marked “STOP.” This button can be used to interrupt motion at any time. After pressing the STOP button, the output pulses to the motor driver will stop. The front panel Power LED will then flash until the AC power is removed from the indexer. If the FSC-01 is connected to a PC running the Windows Programming Software, the software will alert the user on screen to the condition, and ask if you want to reset the indexer from the PC.

Jogging

Two of the FSC-01 input terminals are provided for jogging the motor. The inputs are labeled “JOG CW” and “JOG CCW.” Selecting one of the inputs low commands the drive to move the motor at a pre-defined speed until the contact is opened. A relay or mechanical switch can be used to activate the jog inputs. 5 volt circuitry can also be used. The schematic diagram of the input circuit is shown below.

- If you're using a switch or relay, wire one end to the JG input and the other to the 24V GND terminal. Then connect the IN/JOG COM and +24 VDC terminals.

Limit Switches

The FSC-01 has two limit switch inputs, LIMIT CW and LIMIT CCW. By connecting switches or sensors that are triggered by the motion of the motor or load, you can force the FSC-01 to operate within certain limits. This is useful if a program error could cause damage to your system by traveling too far.

The limit inputs are optically isolated. This allows you to choose a voltage for your limit circuits of 5 to 24 volts DC. It also allows you to have long wires on limit sensors that may be far from the FSC-01 with less risk of introducing noise to the FSC-01. The schematic diagram of the limit input circuit is shown below.
**Wiring a Mechanical Limit Switch**

You can use normally open or normally closed limit switches. Either way, wire them as shown here.

**Limit Sensors**

Some systems use active limit sensors that produce a voltage output rather than a switch or relay closure. These devices must be wired differently than switches.

If your sensor has an open collector output or a sinking output, wire it like this:

If the sensor output goes high at the limit, choose the program option “closed.” If the output is low at the limit, select “open.”

Other sensors have sourcing outputs. That means that current can flow out of the sensor output, but not into it. In that case, wire the sensor this way:

If the sensor output goes low at the limit, choose the program option “closed.” If the output is high voltage, choose “open.”

**Limit Sensor Outputs**

Some systems use active limit sensors that produce a voltage output rather than a switch or relay closure. These devices must be wired differently than switches.

- Wiring for Sinking or Open Collector Output
  - If the sensor output goes low at the limit, select the option “closed.” If the output is open, or high voltage, choose “open.”

- Wiring for Sourcing Output
  - If the sensor output goes high at the limit, choose the program option “closed.” If the output is low at the limit, select “open.”

**Limit Sensors**

Some systems use active limit sensors that produce a voltage output rather than a switch or relay closure. These devices must be wired differently than switches.

- Wiring for Sinking or Open Collector Output
  - If the sensor output goes low at the limit, select the option “closed.” If the output is open, or high voltage, choose “open.”

- Wiring for Sourcing Output
  - If the sensor output goes high at the limit, choose the program option “closed.” If the output is low at the limit, select “open.”

**Wiring Inputs**

The FSC-01 input circuits can be used with sourcing or sinking signals, 5 to 24 volts. This allows connection to TTL circuits, PLCs, relays, and mechanical switches. Because the input circuits are isolated, they require a source of power. If you are connecting to a TTL circuit or to a PLC, you should be able to get power from the PLC or TTL power supply. If you are using relays or mechanical switches, you can use the FSC-01’s built-in 24 volt power supply.

Note: If current is flowing into or out of an FSC-01 input, the logic state of that input is low. If no current is flowing, or the input is not connected, the logic state is high.

The diagrams on the following pages show how to connect the FSC-01 inputs to various devices.

The maximum voltage that can be applied to an input terminal is 24 volts DC. Never apply AC voltage to an input terminal.

Connecting an Input to a Switch or Relay

Use normally open momentary switch to trigger FSC-01 using Wait Input instruction.

Use single throw switch for parameter selection using If Input instruction.

Use normally open momentary switch for jogging.
Wiring a Mechanical Limit Switch

You can use normally open or normally closed limit switches. Either way, wire them as shown here.

Limit Sensors

Some systems use active limit sensors that produce a voltage output rather than a switch or relay closure. These devices must be wired differently than switches.

If your sensor has an open collector output or a sinking output, wire it like this:

Other sensors have sourcing outputs. That means that current can flow out of the sensor output, but not into it. In that case, wire the sensor this way:

Wiring for Sinking or Open Collector Output

If the sensor output goes low at the limit, select the option “closed.” If the output is open, or high voltage, choose “open.”

Wiring for Sourcing Output

If the sensor output goes high at the limit, choose the program option “closed.” If the output is low at the limit, select “open.”

Wiring Inputs

The FSC-01 input circuits can be used with sourcing or sinking signals, 5 to 24 volts. This allows connection to TTL circuits, PLCs, relays, and mechanical switches. Because the input circuits are isolated, they require a source of power. If you are connecting to a TTL circuit or to a PLC, you should be able to get power from the PLC or TTL power supply. If you are using relays or mechanical switches, you can use the FSC-01’s built-in 24 volt power supply.

Note: If current is flowing into or out of an FSC-01 input, the logic state of that input is low. If no current is flowing, or the input is not connected, the logic state is high.

The diagrams on the following pages show how to connect the FSC-01 inputs to various devices.

The maximum voltage that can be applied to an input terminal is 24 volts DC. Never apply AC voltage to an input terminal.

Connecting an Input to a Switch or Relay

Use normally open momentary switch to trigger FSC-01 using Wait Input instruction.

Use single throw switch for parameter selection using If Input instruction.

Use normally open momentary switch for jogging.
Limit Switches

The FSC-01 has two limit switch inputs, LIMIT CW and LIMIT CCW. By connecting switches or sensors that are triggered by the motion of the motor or load, you can force the FSC-01 to operate within certain limits. This is useful if a program error could cause damage to your system by traveling too far.

The limit inputs are optically isolated. This allows you to choose a voltage for your limit circuits of 5 to 24 volts DC. It also allows you to have long wires on limit sensors that may be far from the FSC-01 with less risk of introducing noise to the FSC-01. The schematic diagram of the limit input circuit is shown below.

Front Panel Stop Button

On the front panel of the FSC-01 is a button marked “STOP.” This button can be used to interrupt motion at any time. After pressing the STOP button, the output pulses to the motor driver will stop. The front panel Power LED will then flash until the AC power is removed from the indexer. If the FSC-01 is connected to a PC running the Windows Programming Software, the software will alert the user on screen to the condition, and ask if you want to reset the indexer from the PC.

Jogging

Two of the FSC-01 input terminals are provided for jogging the motor. The inputs are labeled “JOG CW” and “JOG CCW.” These inputs can be used to jog the motor in either direction. A relay or mechanical switch can be used to activate the jog inputs. 5 volt circuitry can also be used. The schematic diagram of the input circuit is shown below.

- If you’re using a switch or relay, wire one end to the JOG input and the other to the 24V GND terminal. Then connect the IN/JOG COM and +24 VDC terminals.

Limit Switches

The FSC-01 has two limit switch inputs, LIMIT CW and LIMIT CCW. By connecting switches or sensors that are triggered by the motion of the motor or load, you can force the FSC-01 to operate within certain limits. This is useful if a program error could cause damage to your system by traveling too far.

The limit inputs are optically isolated. This allows you to choose a voltage for your limit circuits of 5 to 24 volts DC. It also allows you to have long wires on limit sensors that may be far from the FSC-01 with less risk of introducing noise to the FSC-01. The schematic diagram of the limit input circuit is shown below.

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Jogging

Two of the FSC-01 input terminals are provided for jogging the motor. The inputs are labeled “JOG CW” and “JOG CCW.” These inputs can be used to jog the motor in either direction. A relay or mechanical switch can be used to activate the jog inputs. 5 volt circuitry can also be used. The schematic diagram of the input circuit is shown below.

- If you’re using a switch or relay, wire one end to the JOG input and the other to the 24V GND terminal. Then connect the IN/JOG COM and +24 VDC terminals.
Wiring Outputs

Before we discuss the output conditions, we need to talk about the circuitry. All three FSC-01 outputs are optically isolated. That means that there is no electrical connection between the motion controller and the output terminals. The signal is transmitted to the output as light. What you "see" is a transistor (NPN type) that closes, or conducts current, when the output is "low." When the output is high, the transistor is open.

At power-up, the FSC-01 sets all three programmable outputs high (open circuit).

The maximum voltage between any pair of + and - output terminals is 24 volts DC. Never connect AC voltages to the FSC-01 output terminals. Maximum current is 100 mA per output.

Since there is no electrical connection to the FSC-01, you must provide the source of current and voltage, typically from an external power supply. You must also limit the current to less than 100 mA so that the output transistor is not damaged. You would normally use a resistor for this, but some loads (such as PLC inputs) limit the current automatically.

Diagram continued on next page.
**Microstep Resolution**

The microstep resolution of the FSC-01 is set by the PHD Programmer software. Make sure the step resolution of the FSC-01 is the same as the servo drive it is connected to.

Consult the PHD Quick Start Manual for additional information (part #6441-334).

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**Connecting the Step and Direction Outputs**

The FSC-01 Motion Controller can work with most pulse and direction step motors or servo drives. Different step motor drives use different input configurations. There are three basic types that the FSC-01 can be used with:

- **Differential**: Driver has STEP+, STEP-, DIR+, and DIR- inputs. Many high speed microstep drivers use differential inputs.
- **Common anode**: Driver has STEP and DIR inputs that require sinking signals and a common terminal named "VCPTO" or "+5V".
- **Common cathode**: Driver inputs are STEP and DIR (requiring sourcing signals) and a common terminal named "common" or "ground."

Wiring diagrams for each type of driver are shown below and on the next page. The first sketch shows the output circuits for the FSC-01.

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**Connecting to a Driver with Differential Inputs**

Note: Please consult the PHD Quickstart Manual (part number #6441-334) for connection details.
Mounting the PHD Optional MMI

Part Number 64725 MMI

The MMI is an easy to use, flexible device that allows an operator to enter move speeds, move distances, or repeat loop counts. Messages can also be displayed and the program can be paused until the user presses a ... programming cable. No special wiring is required. It has a 4line, 20 character per line LCD display, and a 20 key keypad.

There are two ways to mount the MMI in your application. No matter which method you choose, you'll need to connect the MMI to your FSC-01 with the programming cable. You will not, however, need the adapter plug. The MMI has the same telephone style connector as the FSC-01.

Depending on how you mount the MMI and cable in your application, you may find that it is difficult to remove the cable from the back of the MMI. If this is the case, and you need to reprogram the FSC-01, you can use any telephone line cord as a programming cable. Please be careful not to lose the adapter plug that connects the telephone cord to the COM port of your PC.
Flush Mounting
When you remove the MMI from the shipping carton, you will notice that it has two parts. The first is a fairly thin section that contains the keypad, display, and some circuit boards. The other part is thicker and contains the telephone jack and a cable that connects to the thin part.

When you flush mount the MMI in a panel, only the thin section will stick out from your panel - the large portion mounts behind your panel. You'll need to cut a precise section from your panel. There is a cardboard template in your box for this purpose.

If you want the MMI to be dust proof and watertight, you must place the black rubber gasket between the thin part of the MMI and your panel. Assemble the two halves using the eight small screws.

Surface Mounting
An easier way to mount the MMI is to bolt the two halves together ahead of time, using the eight small screws. If you want the MMI to be dust proof and watertight, put the black rubber gasket between the two halves before screwing them together.

Then cut a hole in your panel for the cable that runs between the MMI and the controller. The hole must be at least 5/8" in diameter for the connector to fit through. You will also need two holes that line up with the big mounting holes in the MMI. The mechanical outline on page 19 shows the location of the big mounting holes.

When you mount the MMI to your panel, you will need to use some kind of sealant to keep dust and liquid out. Silicone or latex caulk/king is okay, or you can make your own gasket from a sheet of compliant material like rubber or RTV.

Connecting AC Power
If you plan to operate the FSC-01 at 220 volts, you must change the setting of the 110/220V switch before applying power to the FSC-01. The FSC-01 is factory preset for 110 volts.

Connecting to 110 Volts
The FSC-01 is set for 110 volt operation at the factory. All you need to do is connect an AC power cord and the AC Power connector that comes with the FSC-01. If you want to directly wire the FSC-01 to AC power, you must consult a qualified electrician and observe all building and electrical codes.

The AC cord you can install yourself, but be careful: AC power can be dangerous.

Connecting to 220 Volts
The FSC-01 is set for 110 volt operation at the factory. In order to use 220 volts, you'll need to change a switch setting inside the case. You will need a medium sized phillips screwdriver to remove the cover.

Before you can change the 110/220 volt switch setting, you must remove all the connectors from the FSC-01 front panel. Remove the four screws from the cover, as shown below.
Getting Started

To use your FSC-01 motor control, you will need the following:

- a power cable (line cord)
- a compatible pulse & direction servo drive (PHD part number FSA-01)
- a small flat blade screwdriver for tightening the connectors - a screwdriver suitable for this purpose is included with your drive.
- a personal computer running Windows 3.1, 95, 98 or NT with a 9 pin serial port (486 or better with 8 MB ram recommended)
- the PHD Programmer software that came with your FSC-01
- the programming cable that came with your FSC-01
- PHD Programmer Manual (part #6441-333)
- PHD Quickstart Manual (part #6441-334)

The sketch below shows where to find the important connection and adjustment points. Please examine it now.

All mating connectors are included.

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Mechanical Outline: FSC-01

I/O connector
+24V out, 100mA
+5V out, 100mA
step & dir out to driver

I/O connector
output 1,2,3
input 1

I/O connector
input 2,3,4
ccw jog
cw jog
cw limit
ccw limit

LED
green = power on/status ok
flashing red = error

AC power connector

STOP button

RS232 connector
PC or MMI
Technical Specifications

**Power Supply**  Linear, transformer based for high reliability and low noise. 110 or 220 VAC input, switch selectable, 50/60 Hz. 50 W max.

**Output Voltages**  24 VDC ± 5%, 100 mA max. Self resetting fuse.

**Inputs**  IN 1-4, CW JOG, CCW JOG, CW LIMIT, CCW LIMIT: Optically isolated, 5 - 24V. Can be configured to accept sourcing (PNP) or sinking (NPN) signals. 2200 ohms input impedance.

**Outputs**  Optically isolated, 24V, 100 mA max. Can be individually configured to provide sourcing (PNP) or sinking (NPN) signals.

**Microstepping**  15 software selectable resolutions. Steps per revolution with 1.8 motor: 200, 400, 2000, 5000, 10000, 12800, 18000, 20000, 25000, 25400, 25600, 36000, 50000, 50800.

**Motion Update**  12800 Hz.

**Physical**  Constructed with heavy gauge steel housing. 1.25 x 8 x 3.86 inches overall, 2 lbs. 0 - 70°C ambient temperature range. Power/status LED. Mounting brackets included. See page 17 for detailed drawing.


**Fuses**  Wickman TR-5 style, 0.25A fast acting. Order from Digikey (1-800-DIGIKEY), P/N WK3035.

**Agency Approvals**  CE [Complies with EN 55011A, EN 50082-1 (1996), EN 50178 (1997)] and TUV

Features

- Powerful, flexible, easy to use indexer.
- Microsoft Windows™ based software for easy set up and programming.
- Reliable, efficient, low noise linear power supplies provide 5V and 24V to the user, 100mA each.
- Connects by a simple cable to your PC for programming (cable included).
- Eight inputs for interacting with the user and other equipment.
- Three programmable outputs for coordinating external equipment.
- High speed, differential step & direction outputs interface easily to popular step motor and servo motor drives.
- Pulse rates to 2.5 MHz for high speeds at high resolutions.
- Accepts 110 or 220 volt AC power (factory preset for 110 volts).
- Sturdy 1.25 x 8 x 3.86 inch metal case with integral heat sink. Mounting brackets included.
- Pluggable screw terminal connectors for I/O and AC power (all mating connectors included).
- Bi-color (red/green) LED indicates power and indexer status.
- Optional man machine interface (MMI) allows operator to enter distances, speeds, loop counts, and more.

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