QUICK START GUIDE

MC-01

SINGLE-AXIS MOTION CONTROLLER
FOR BIPOLAR AND UNIPOLAR STEP MOTORS

INTERINAR ELECTRONICS
http://www.interinar.com

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1 GETTING STARTED

1.1.1 WELCOME!

The MC-01 is designed to work with all Step Motor Drivers manufactured by Interinar Electronics. This manual will focus on how to use it with BSD-01v2, BSD-02 and BSD-02LH drivers.

1.1.2 SAFETY INFORMATION

Do not plug/unplug any wires and connectors from/to the MC-01 while power in on.
Do not make any modification to the board or components.
Always remove power and discharge the circuit before touching it.
Various electronic components used on this controller are classified as ESD sensitive devices, so MC-01 must be handled in accordance to procedures specified for ESD devices.

1.1.3 TECHNICAL SUPPORT

Interinar Electronics is happy to respond to any question or concern regarding the MC-01 or any other product it manufactures or sells. Contact Technical Support Staff by sending email to support@interinar.com

2 CONNECT THE MC-01

2.1 BASIC STEP MOTOR SETUP ON MC-01

2.1.1 CONNECTING POWER SUPPLY

There is no need for connecting external power supply to MC-01 if used with any of BSD-series Step Motor Drivers. BSD driver through driver-controller ribbon cable provides the power to MC-01.
Never connect/disconnect any port from MC-01 while power in on.

2.1.2 CONNECTING STEP MOTOR DRIVER

The BSD series Step Motor Driver can be connected directly to port J2 (DRIVER) using ribbon cable. No other connection to the driver is required. Customer must make sure that Step Motor Driver is connected to the power supply and all motor leads are tightly connected to the driver. The jumpers on BSD drivers need to be set as follows:

- **BSD-01v2**
  JP3 – OFF
  JP4 – OFF
  JP12 – 2-3
  JP5 and JP6 – OFF
- **BSD-02 and BSD-02LH**
  JP5 and JP6 – OFF

2.1.3 CONNECTING LIMIT SWITCHES AND PROXIMITY SENSORS.

The MC-01 will not send any signal to the motor if one or more limit switch terminal is left disconnected. All switches and sensors connected to J4 (LIMIT SWITCHES) port must be NC (Normal Closed) type. **In case when MC-01 is used for testing and evaluation purposes or limits switches are not available, then all terminals of port J4 must be shorted to GND using wire jumpers.**

2.1.4 CONNECTING AUXILIARY OUTPUTS

The MC-01 may set or clear up to 5 signals on J3 (AUX) port. These signals can be used as flags to trigger any external process. These signals cannot be used to drive directly relays or any load that exceeds 20mA per output. Only TTL level interface can be used in connection with this port. If not used, this port may be left disconnected.

2.1.5 CONNECTING PC

Any PC equipped with RS232 port may be connected directly to RS232 port of MC-01. The cable required for this connection should be Null-Modem type (available from Interinar Electronics , P/N **NMDB9F/F-6**). If PC has no RS232 port available, then RS232/USB converter must be used. Both Null-Modem cable and RS232/USB converter are available from Interinar Electronics.

2.1.6 POWER ON PROCEDURE

Make sure all ports are connected as desired. Turn on the power to the Step Motor Driver and **WAIT ABOUT 3 SECONDS FOR THE GREEN LED ON MC-01 BOARD TO TURN ON**. This initial 3 seconds period is required for bootloader to pass control to the program. After the green LED turns ON you may start windows program.

2.1.7 TROUBLESHOOTING

If after 5 seconds the green LED is still OFF, then turn OFF the power, wait 10 seconds and repeat power-on procedure. If green LED fails to light again, turn OFF the power and check connection to the driver. Make sure the ribbon cable does not show any damage and plugs are inserted into the headers properly. Turn ON the power again and observe presence of 5V (min 4.5V, max 5.2V) on pin #2 of J3 (AUX) in reference to GND. As a GND connection you may use metal shield and screws of the RS232 port connector. If min of 4.5V is not present, then disconnect all ports but J2 (DRIVER) and check the voltage again. Presence of correct voltage in this condition suggest that problems are associated with shorts on other ports. Look for damaged connectors and wires.
In cases the MC-01 shows no sign of "live" contact our Technical Support by sending email to support@interinar.com

3 SOFTWARE

3.1.1.1 SPREADSHEET EDITING SOFTWARE

The .xls is a default extension for all motion programs created in MC01 IDE. The .xls extension belongs to Microsoft Excel program. The Microsoft Excel may be used to edit existing motion programs or create new ones. Any other software with capability of editing .xls files may also be used.
There will be a case where using Microsoft Excel will be required to modify exact number of code lines. For that reason, it is recommended to install the MC-01 on computers where Microsoft Excel is already installed.

3.1.1.2 INSTALLATION

Download and install a newest version of the software from our website. During the installation process, follow the instructions displayed on screen. The program will be saved as default on drive C: or you may choose a different location.
At this point, make sure that MC-01 controller is properly connected and Green LED is ON.

3.2 LOADING THE SAMPLE FILE

Start the program by clicking on MC01.
Click on **File** in the Menu Bar and select **Open**.
You should be directed to the same folder where you installed the software. If for some reason you saved the sample programs in a different folder, navigate to that location.
You will see displayed files with .xls extension only.
Select **S004.xls** and click **Open**.
The S004 sample will be loaded into Project Workspace.

3.2.1 OPENING THE COMMUNICATION PORT

In the Communication Port section of the screen, select the COM port number to which the MC-01 is connected.
Click large button **OPEN** in the same section. The **OPEN** button will become inactive and **CLOSE** button will become active. There will be also a change in the open/close check boxes, next to the buttons.
If communication with MC-01 was successful then you should see two field in this section filled in with new information.
The **Controller Model** field should display MC-01.
The **Firmware Version** field should display the current version of the firmware loaded to the MC-01.
Now, most of the screen will become active allowing access to all available features of IDE.

3.2.2 RUNNING THE SAMPLE PROGRAM

Now, you are ready to see for the first time MC-01 in action. The S004 sample contains simple motion profile causing motor to move in both directions with acceleration and deceleration.
For safety, make sure the coupler is disconnected from the motor's shaft when running this code for the first time. Once you know the mechanical limits of your assembly, you may modify the number of steps and connect the coupler back.
In the IDE section of the screen make only one modification – select **1/8 Step** mode for the driver.
Since S004 is already loaded and the port is open you may click **Run Program** button to see the results.
As program is being executed, you will notice that fields in the IDE section of the screen are filled out with new information. Same applies to the Status section where preset counter display is located. During program execution most of the screen becomes inactive.
After program execution ends, the screen becomes active again.

3.2.3 GETTING TO KNOW THE CAPABILITIES OF MC-01

Since you executed the first program successfully all motion parameters are filled in the fields of the IDE section. Now, it is the good time to become familiar with features of the MC-01.

3.2.3.1 STARTING AND STOPPING FROM IDE

Click on the **R0 SEND** button. The displayed value of the 22000 steps will be send again to MC-01.
Click on the **Driver DISABLED** button to enable the driver. You will notice the torque on the shaft of the motor.
Click on the **Start Command Enabled** check box to start the motor. Motor will immediately start accelerating from FL to FH speed, execute all 22000 steps, and then decelerate to stop.
Disable the Start command by unchecking **Start Command Enabled** box and disable the driver by clicking on the **Driver ENABLED** button.

3.2.3.2 CHANGING THE NUMBER OF STEPS AND DIRECTION

Now, if you wish, you may change the number of steps in the field **Preset Counter** from 1 to a maximum of 262143. You may also change the direction by selecting **+DIR** or **–DIR**. Repeat driver enable and start commands to see new results in motion.

Changing to a different that 1/8 step mode is not recommended at this point. All parameters for S004 sample are selected for low performance motor working in 1/8 step mode. The acceleration and deceleration rates are set high to clearly demonstrate these features.
Any changes to External Signals section are not recommended as we assumed that at this point all terminals of J4 are shorted to GND.

3.2.3.3 CHANGING TO CONTINUOUS MODE

Now, let us switch to continuous mode by selecting the **CONTINUOUS** button. This will allow us to see the effects of other features without having to enter number of steps each time.
Once, continuous mode is selected, enable the driver by clicking on the **Driver DISABLED** button.
Next, click on the **Start Command Enabled** check box to start the motor. Motor will start rotating indefinitely until you uncheck the **Start Command Enabled** check box.
While motor is running, you may change direction by selecting **+DIR** or **–DIR.** Motor will change direction without stopping.

3.2.3.4 CHANGING THE SPEED RATE

You may also change the speed by selecting **FL** or **FH** rate. You will notice that motor slowly decelerates from **FH** to **FL** and accelerates from **FL** to **FH** rate. This is a result of selected **Varied Speed Mode**.

3.2.3.5 CHANGING BETWEEN CONSTANT AND VARIED SPEED

Click on **Constant Speed** mode button. Now, changing between **FL** and **FH** rate does not involves acceleration/deceleration. Select back the **Varied Speed** Mode and make sure **FH** rate is selected.

3.2.3.6 USING DECELERATED STOP COMMAND

Now, click on **STOP Command Enabled** and motor will stop after decelerating to **FL**.
To restart the motor, unchecking **STOP Command** is not enough. You must reset also **Start Command** by unchecking it first and checking again. Motor will start accelerating from **FL** to **FH** rate.

3.2.3.7 CHANGING BETWEEN DRIVER'S STEP MODES

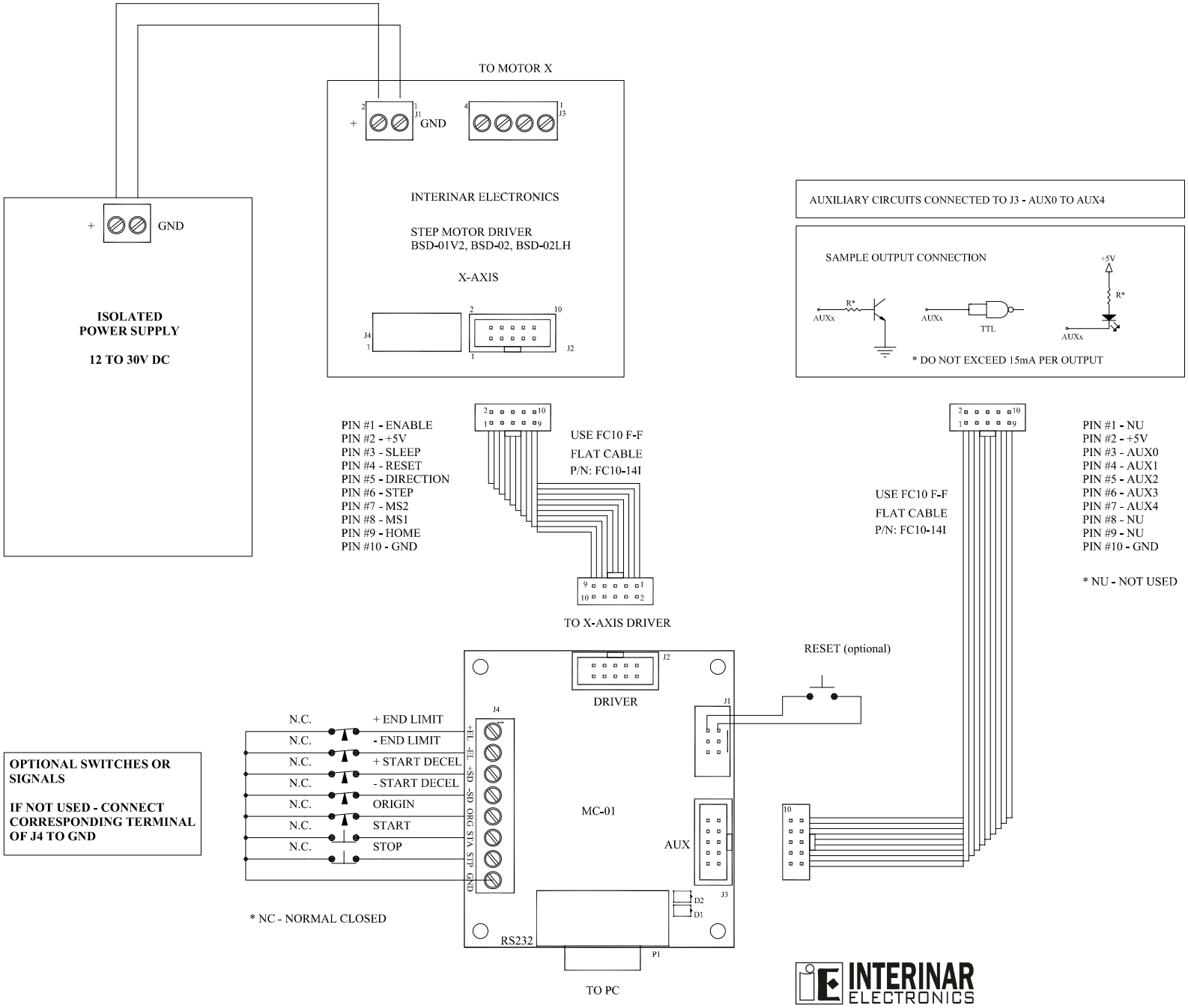
The S004 sample was intended for low performance motor working in 1/8 step mode. When operating at FH rate the changes to step mode may cause motor to stall. So, first change the speed to FL rate. While operating at FL rate select ¼ , ½ and full step modes. You will notice that speed is changing.
While operating at FL rate, the decelerated STOP is not possible and motor will stop immediately.

3.2.3.8 STATUS SECTION

You may notice that when operating in IDE section the Status screen is not being updated. To get a momentary status you may click on Get Status button.

3.2.4 OTHER FEATURES OF MC-01

The above information was provided to get the user to become familiar with MC-01, the driver and the motor. Once the user feels that understands the basic principles of operating MC-01 it is recommended to study the User Manual for more information.


TO MOTOR X
+
GND
J1
J3
INTERINAR ELECTRONICS
STEP MOTOR DRIVER
BSD-01V2, BSD-02, BSD-02LH
X-AXIS
J4
J2
+
GND
ISOLATED
POWER SUPPLY
12 TO 30V DC
AUXILIARY CIRCUITS CONNECTED TO J3 - AUX0 TO AUX4
SAMPLE OUTPUT CONNECTION
R*
AUXx
TTL
+5V
* DO NOT EXCEED 15mA PER OUTPUT
PIN #1 - ENABLE
PIN #2 - +5V
PIN #3 - SLEEP
PIN #4 - RESET
PIN #5 - DIRECTION
PIN #6 - STEP
PIN #7 - MS2
PIN #8 - MS1
PIN #9 - HOME
PIN #10 - GND
USE FC10 F-F
FLAT CABLE
P/N: FC10-14I
TO X-AXIS DRIVER
USE FC10 F-F
FLAT CABLE
P/N: FC10-14I
PIN #1 - NU
PIN #2 - +5V
PIN #3 - AUX0
PIN #4 - AUX1
PIN #5 - AUX2
PIN #6 - AUX3
PIN #7 - AUX4
PIN #8 - NU
PIN #9 - NU
PIN #10 - GND
* NU - NOT USED
RESET (optional)
DRIVER
J2
J1
J4
MC-01
AUX
J3
D2
D1
RS232
P1
TO PC
N.C.
+ END LIMIT
- END LIMIT
+ START DECEL
- START DECEL
ORIGIN
START
STOP
+EL
-EL
-SD
SD
ORG
STA
STP
GND
* NC - NORMAL CLOSED
OPTIONAL SWITCHES OR SIGNALS
IF NOT USED - CONNECT CORRESPONDING TERMINAL OF J4 TO GND
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