<u>Purchase Requisition No. 1000011951</u>

<u>Technical Specifications of Motorized Stages with Integrated Controllers</u>

1. **Linear motor stage, 110mm travel, built-in controller, analog linear encoder, integrated IO**

    Purpose : Fiber pulling

    Quantity required : 2

    Specifications : Linear translational stage

    Accuracy - 1 um (or better)

    Travel range - 100 mm (or higher)

    Velocity achievable - 0.2 mm/s(or higher)

    Acceleration achievable - $1mm/s^2$(or higher)

    Built-in encoder with repeatability of 80 nm(or lower)

    Centered load - 100N(or higher)

    Built-in controller preferred

2. **Linear motor stage, 0150 mm travel, built-in controller, analog linear encoder, with IO with Accessory kit**

    Purpose : Flame translation (bottom-most stage)

    Quantity required : 1

    Specifications : Linear translational stage

    Accuracy - 1.5 um(or better)

    Travel range - 100 mm (or higher)

    Velocity achievable - 4 mm/s(or higher)

    Acceleration achievable - 800 mm/s^2(or higher)

    Centered load - 250N(or higher)

    Built-in controller preferred

3. **Motorized stage, integrated encoder and controller, 200mm travel, fine resolution, with manual control**

    Purpose : Flame positioning

    Quantity required : 1

Specifications : Stepper motorized translational stage

Accuracy - 50 um(or better)

Travel range - 150 mm (or higher)

Velocity achievable - 50mm/s(or higher)

Centered load - 100N(or higher)

Built-in controller preferred

4. **Adaptor plate, bottom compatible with linear stage, anodized**

Quantity required : 2

5. **Adaptor plates, top compatible with motorized stage, anodized**

Quantity required : 1

6. **Data cable 2 feet**

Quantity required : 1

7. **Data cable 6 feet**

Quantity required : 1

8. **Data cable 2 feet, comms only and no power**

Quantity required : 1

NOTE :

- Mount compatibility between each of the stages is mandatory
- Interface and adapter cables to be included
- Power cords and supply needs to be compatible with Indian standard
- Power cords need to be portable with the Indian socket standards for 7A/15A
- Controlling software for all stages should be provided for Windows 7 or higher
- All the above mentioned stages are required to use a unique protocol that uses a command-reply model, such that:
    - The user must initiate all communication by sending a device a command.
    - Unless explicitly disabled, a device always responds with one reply immediately after a command has been received
    - Unless explicitly enabled, a device never sends a message unless in response to a command
    - The unique command protocol should be inclusive of the following:
        1. **Message type**: The message type for a command has to be a required field and always be the same, eg: '/'.
        2. **Device address**: The address indicates which device number should perform the command
        3. **Axis number**: The axis number indicates which axis within a device should perform the command

4. **Command**: The command message data contains the command information

5. **Command Parameters**: This message data contains command parameters and data. The contents need to be space-delimited and case-sensitive.

6. **Message checksum**: The message checksum causes a device to reject a message that has been corrupted during transmission.

7. **Message Footer**: The footer indicates end-of-message

8. **Message ID**: It causes responses (including reply and info responses) to the command to include the same message ID

The reply protocol should be inclusive of the following:

1. **Message type**: The message type for a reply should always be the same.

2. **Device address**: The device address contains the address of the device sending the reply and should always be formatted in a fixed number of digits.

3. **Axis number**: The axis number limits the scope of the reply

4. **Reply flag**: The reply flag indicates if the message was accepted or rejected

5. **Status**: The status contains different states when the axis is moving and otherwise

6. **Warning Flag**: The warning flag contains the highest priority warning currently active for the device or axis

7. **Message Checksum**: A reply checksum provides a method for error detection

8. **Message Footer**: Indicates the end of reply