

Mechatronics Cylinder

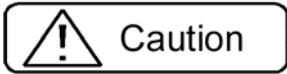
SCN Series

SCL Series

Operation Manual

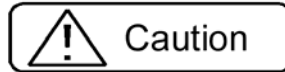


《For Safety》



If this product is to be used in any application which has a potentially serious effect on human life and health by the failure and/or accidental movement of this product, such as machines relating to Nuclear Power, Aerospace, Transportation, Medical and safety systems, etc., please consult us.

In case of incorrect handling, some level of damage to the product may occur. This damage may lead to poor product performance.



[General]

- Please do not use this product in explosive environments.
- Please do not move, work on wiring, or conduct any maintenance while the Power is ON. Wait several minutes after the Power is OFF to conduct any of the above tasks.
- Please have experts to do the job of transportation, installation, wiring, operation and maintenance, etc.
- Please use this product within the specifications.
- Please do not use damaged product.
- Any modification or reconstruction of the product by the customers voids warranty and transfers responsibility for all results to the customer.

[Mounting, Start Up]

- Please make sure that there is no Flammable material and/or product in the vicinity of the Mechatronics Cylinder.
- Please make sure that there is no obstruction to ventilation for cooling.
Ensure appropriate assemblies guide any loading on the Mechatronics Cylinder. In case of direct coupling to the mechanism, please pay attention to the accuracy to minimize radial loading.
- Check that the direction of the movement is correct before mounting of our product.
- The Mechatronics Cylinder doesn't have mechanical protection for over load. Please provide mechanical over load protection.

[Wiring]

- Please make sure that the wiring is correct and completed with strong connections.
- Please do not bend, pull or pinch cables.
- Please make sure that the ground wires and terminals are grounded.

[Running]

- The Mechatronics Cylinder may run at high temperatures. Please do not touch with bare skin.
- The Mechatronics Cylinder has its own control built in. Please do not use other control.
- Please do not use our product without additional protection in the presence of water splashes, corrosive gas or material, or flammable material.

[Maintenance/Inspection]

- Please do not measure open circuit resistance.

[Storage]

- Please store the Mechatronics Cylinder in a cool, dry environment free of corrosive gas and liquids.

[Transportation/Receiving]

- Please pay extra caution for any damage during the transportation.
- Please check if the delivered product is the right one.

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1. Summary

The Mechatronics Cylinder consists of a rotary-linear motion transfer mechanism, a stepper motor, an encoder, and a servo controller. Manufactured by Dyadic Systems, this product can be a replacement for pneumatic cylinders. Motion is programmed and controlled using Dyadic's simple interfaces, allowing for a wide variety of inputs and inter-operability.

1.1. Features

1.1.1 Overcoming weaknesses of Pneumatic Cylinders

- (1) Simplifying wiring and related equipment.

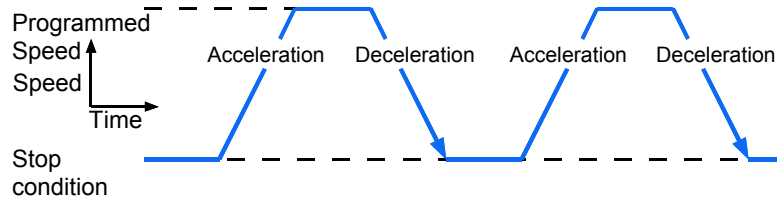
MODEL	SCLT4-015 -X X X A S	SCLT4-030 -X X X A S	SCLT6-025 -X X X A B	SCLT6-050 -X X X A B
Arm Miller	R-444444	R-444444	R-444444	R-444444
Stroke (mm)	50 / 100 / 150 / 200 / 300	100 / 200	50 / 100 / 150 / 200 / 300 / 400 / 500 / 700	500 / 700
Max. Thrust (N) / (kg)	150 / 15	300 / 30	250 / 25	500 / 50
Max. Thrust (N) / (kg) (100% duty)	100 / 10	200 / 20	150 / 15	300 / 30
Max. Stroke Load (mm)	500	1000	500	1000
Max. Speed (mm/s) * note 1	50 (500 mm/s for 100mm stroke)	100 (300 mm/s for 100mm stroke)	100 (500 mm/s for 100mm stroke)	100 (500 mm/s for 100mm stroke)
Responsibility (mm)	0.02	0.02	0.02	0.02
Resolution (mm)	0.01	0.01	0.01	0.01
Max. Vertical Load (kg)	5	10	5	10
Max. Moment (Nm) / (kg-cm) / 2	Mp: 1.2 / 120, My: 1.2 / 120, Mz: 3.1 / 310	Mp: 1.2 / 120, My: 1.2 / 120, Mz: 3.1 / 310	Mp: 2.5 / 257, My: 2.5 / 257, Mz: 6.8 / 680	Mp: 2.5 / 257, My: 2.5 / 257, Mz: 6.8 / 680
Life	10,000,000	10,000,000	10,000,000	10,000,000
Input	Names: 1) Pulse Input, 2) Position Select Input, 3) Alarm (ALM) Position Complete (P.FIN/INP.)	Names: 1) Pulse Input, 2) Position Select Input, 3) Alarm (ALM) Position Complete (P.FIN/INP.)	Names: 1) Pulse Input, 2) Position Select Input, 3) Alarm (ALM) Position Complete (P.FIN/INP.)	Names: 1) Pulse Input, 2) Position Select Input, 3) Alarm (ALM) Position Complete (P.FIN/INP.)
Output	Names: 1) Home Signal (Z.FIN), 2) Zero Signal (Z.ONE), 3) Alarm (ALM), 4) Position Complete (P.FIN/INP.)	Names: 1) Home Signal (Z.FIN), 2) Zero Signal (Z.ONE), 3) Alarm (ALM), 4) Position Complete (P.FIN/INP.)	Names: 1) Home Signal (Z.FIN), 2) Zero Signal (Z.ONE), 3) Alarm (ALM), 4) Position Complete (P.FIN/INP.)	Names: 1) Home Signal (Z.FIN), 2) Zero Signal (Z.ONE), 3) Alarm (ALM), 4) Position Complete (P.FIN/INP.)
Protection Function	Over speed, Main power over voltage, abnormal voltage	Over speed, Main power over voltage, abnormal voltage	Over speed, Main power over voltage, abnormal voltage	Over speed, Main power over voltage, abnormal voltage
Ambience	0 to 40°C	0 to 40°C	0 to 40°C	0 to 40°C
Weight (kg)	1.4/2.1/3.0/4.1/7.4/11.9/12.1/24	2.7/2.9/3.1/3.3/3.7/4.1/4.5/5.0/5.4	2.7/2.9/3.1/3.3/3.7/4.1/4.5/5.0/5.4	2.7/2.9/3.1/3.3/3.7/4.1/4.5/5.0/5.4

Notes: (1) Typical data. (2) This is a load that the motor is generated by the overhang (L) from the motor side.

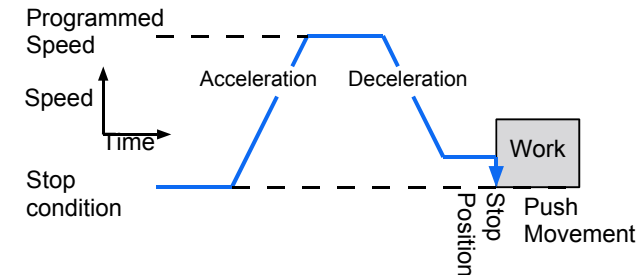
The calculation of the load moment (kg-cm) is: $L (kg) \times L (cm) = M (kg \cdot cm)$

The actual moment will be combinations of above moment (Mp, My, Mz).

- (2) Multiple positioning: Easy program for up to 16 motions per axis

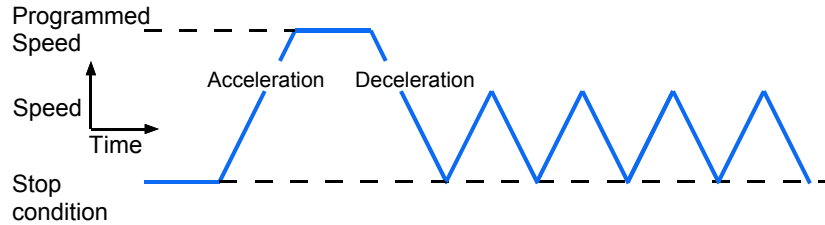


- (3) Programmable Push Force

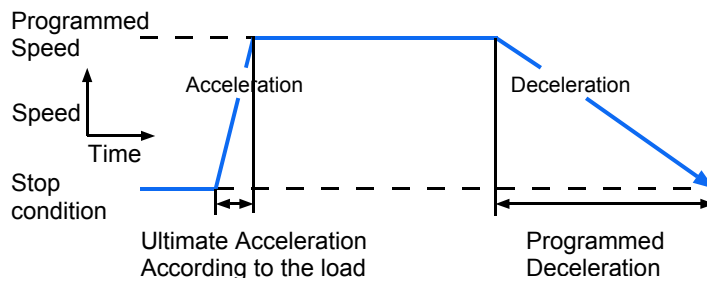


(4) *Programmable Positioning Speed: Very Slow Speed is possible, which is very difficult with Air Cylinder.*

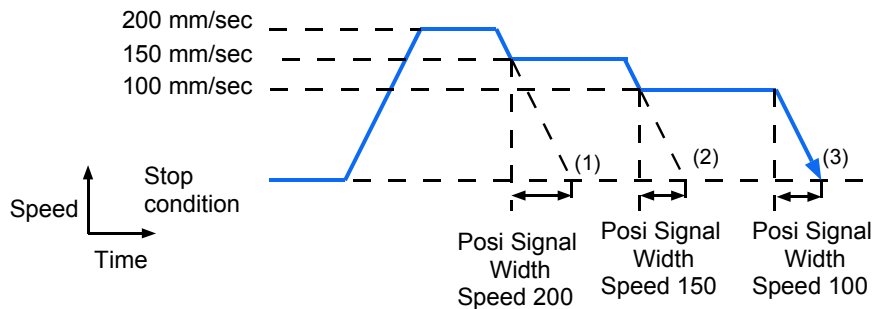
(5) *Incremental Movement: Starting from the current position. Multiple incremental moves can be used together to simulate a “Step & Direction” type of control.*



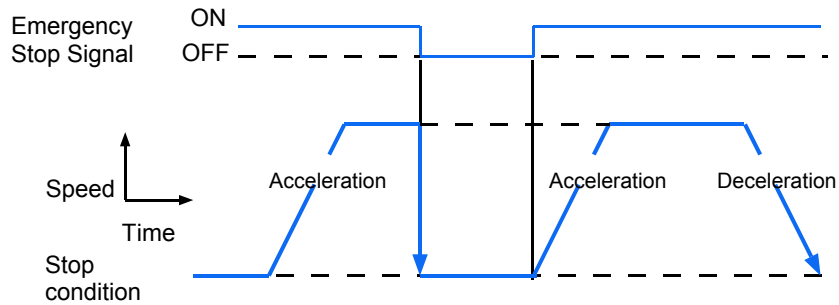
(6) *Programmable Acceleration and Deceleration: Same Acceleration and Deceleration can be programmed. Optimum Acceleration and desired Deceleration can be set respectively.*



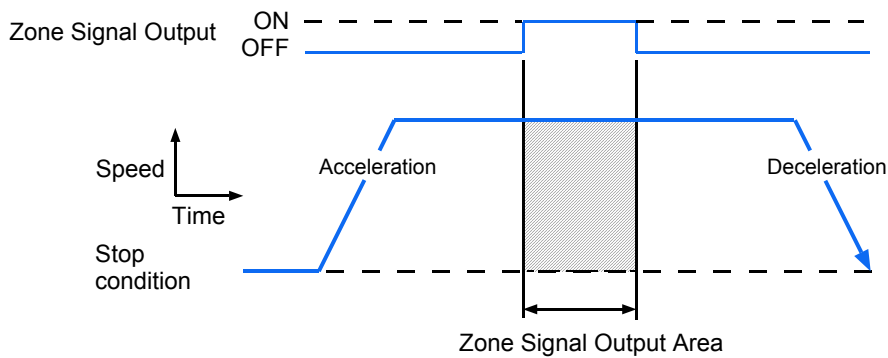
(7) *Programmable Flexible Speed Profiles: Speed can be changed without stopping.*



(8) *Emergency Stop: During the movement of Mechatronics Cylinder, the movement will stop if the Interlock signal is interrupted.*



(9) *Programmable Zone Signal Output: Mechatronics Cylinders can be programmed to output a Zone Signal.*



(10) *An air compressor is not needed so that systems using Mechatronics Cylinders will have high energy efficiency.*

(11) *Oil waste is not generated so that oil collection equipment is not needed.*

(12) *Dampers (Shock absorbers) are not needed.*

1.1.2. This section is to introduce some product features and notes in detail:

- (1) SCN-5 All-In-One Actuator: The Mechatronics Cylinder model SCN5 is a fully integrated actuator including linear actuation mechanism, motor, servo drive and controller. Therefore after connecting the power supply and some signal wiring, the SCN5 is ready for operation. Other models (SCN6, SCLL, some SCLT models) have external controllers but the programming software and ease of use are the same and the controllers are included in the part number.
- (2) All actuators can be set such that the home position is at either end. The default home position is the return (motor) end. The PC tool software allows the user to change homing parameters such as speed and target thrust. The coordinate system is negative for the return home position and positive for the forward home position.
- (3) There is a close correlation between thrust and speed. If the necessary thrust is large, the max speed is reduced. Please consult with the speed-thrust curve.
- (4) Thrust capacity is the same for forward motion and return motion.
- (5) The "Push Force" mode uses a high-speed, position-controlled approach move, followed by a lower speed force controlled move. The speed of the force-controlled part of the move can be changed on some Dyadic actuators. However, the max speed of the force controlled move will be limited by the amount of current allowed for the target force (ie the actuator will not achieve full speed in this mode if the target force is low). Also please keep in mind that high-speed impact to a hard target may shorten the life of the actuator.
- (6) In vertical use, the max load at power-up is lower. This value is published in the specs for each actuator.
- (7) There are 3 types of power saving functions (PC tool software is necessary to access these modes):
 - 1 Current setting at homing
 - 2 Current setting during positioning motion
 - 3 Current shut off after positioning
- (8) Mechatronics Cylinder amplifiers have PNP models and NPN models. Please wire carefully following the correct schematics.
- (9) Mechatronics Cylinder outputs are open collector type. In case of driving a load like a coil, please provide a surge absorber diode.
- (10) The shafts of rod-type actuators are not designed for radial loading. Please provide external guides and ensure proper alignment as poor alignment will transfer radial stress to the shaft nut and reduce actuator life.
- (11) Linear guides should be aligned within 0.1mm over the length of travel. Rough installation will reduce the product life.
- (12) The short cables protruding from the actuator motor are not flex-rated. If the application requires cable motion, please use high flex cables (marked with "R" after the cable part number).
- (13) Tightening torque for shaft-tip nuts is as follows: 30 kg-cm for SCN5, 45 kg-cm for SCN6
- (14) Clean room actuators may be available depending on the requirement.
- (15) Stroke limits for both directions can be set.
- (16) The shaft tip screw is: M10, 1.25mm pitch for SCN5, M14, 1.5mm pitch for SCN6 models
- (17) The front mounting block has a pilot diameter to make centering easily. (for SCN5 and SCN6)
- (18) Shafts are anti-rotational. Please do not turn the shaft. (for SCN5 and SCN6)
- (19) Multiple axis operation through serial communication is possible. DeviceNET, ccLink, and ASCII interfaces can be used.

The operational PLC are; Mitsubishi, Keyence, OMRON as follows:

Mitsubishi PLC - MELSEC-A series (PC link unit)

AJ71UC24, A1SJ71US24-R2/R4/PRF, A1SJ71C24-R2/R4/PRF, A1SCPUC24-R2, A2CCPUC24(PRF)

Mitsubishi PLC - MELSEC-F series (Communication board)

FX2N-232-BD, FX1N-232-BD, FX2NC-232-ADP

Notes: Sample programs can be provided in the project file of Mitsubishi GX Developer Version 7, therefore the customer must have the program GX Developer Version 7 or newer.

Keyence PLC – KV-700 (Communication unit) KV-L20 attached

OMRON PLC – CS/CJ series (CPU unit)

CS1H-CPU*H, CS1G-CPU4*H, CS1H-CPU6*-V1, CS1G-CPU4*-V1, CJ1H-CPU6*H,

Internal RS232 communication port for CJ1G-CPU4*H, CJ1M-CPU2*, CJ1M-CPU1*

Notes: The DLL file is available for PC-based applications.

(20) Dyadic programming tools can configure many advanced parameters as follows:

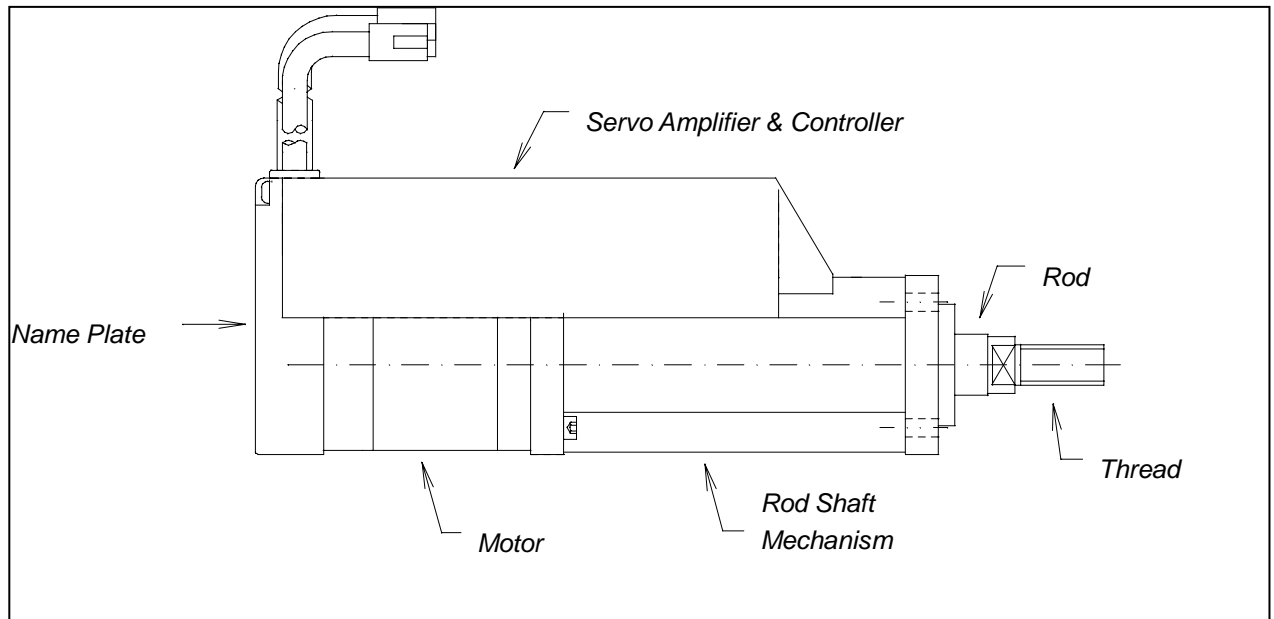
Available function	PC software	Teach pendant
Stopping position, Max. speed, Acceleration, Push force	O	O
Maximum acceleration (with user-defined decel.)	O	O
Incremental motion	O	O
Position complete (PFIN) window width	O	O
Servo gain	O	O
Home position direction change	O	O
Stroke limit	O	O
Zone output range	O	O
ILK signal operation (motion can be paused or cancelled)	O	O
Homing motion speed and thrust	O	X
Selection of position completion signal or in-position signal	O	X
Choose operating mode (Normal, Air 1, Air 2)	O	X

(21) 24VDC I/O can be configured for different operation in “Normal”, “Air replaceable 1”, or “Air Replaceable 2” modes using the TBVST software. In normal mode the cylinder uses the PC1, 2, 4, and 8 inputs in BCD combination to run 16 different motions and needs a CSTR pulse to initiate each move. In the “Air Replaceable” modes the cylinder can run up to 3 motions as commanded by the PC1, PC2, or PC4 inputs. The different modes control whether the inputs must be maintained during motion, or can be pulsed. Please see the TBVST manual for more information on the “Air Replaceable” modes.

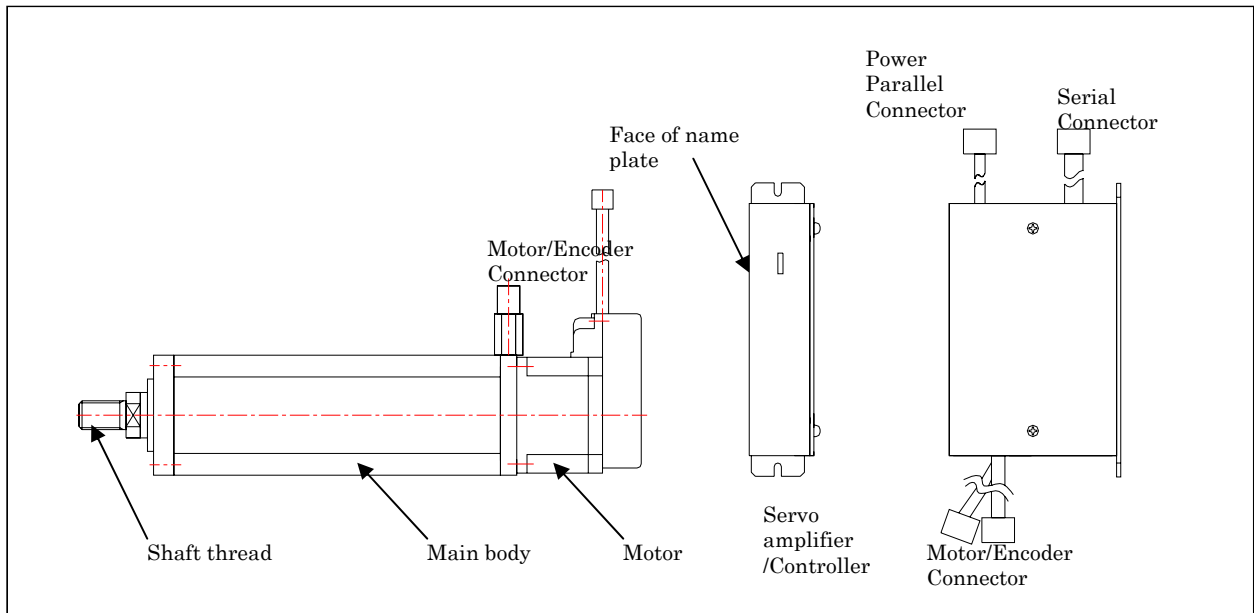
1.2 Names of Parts

1.2.1 Names

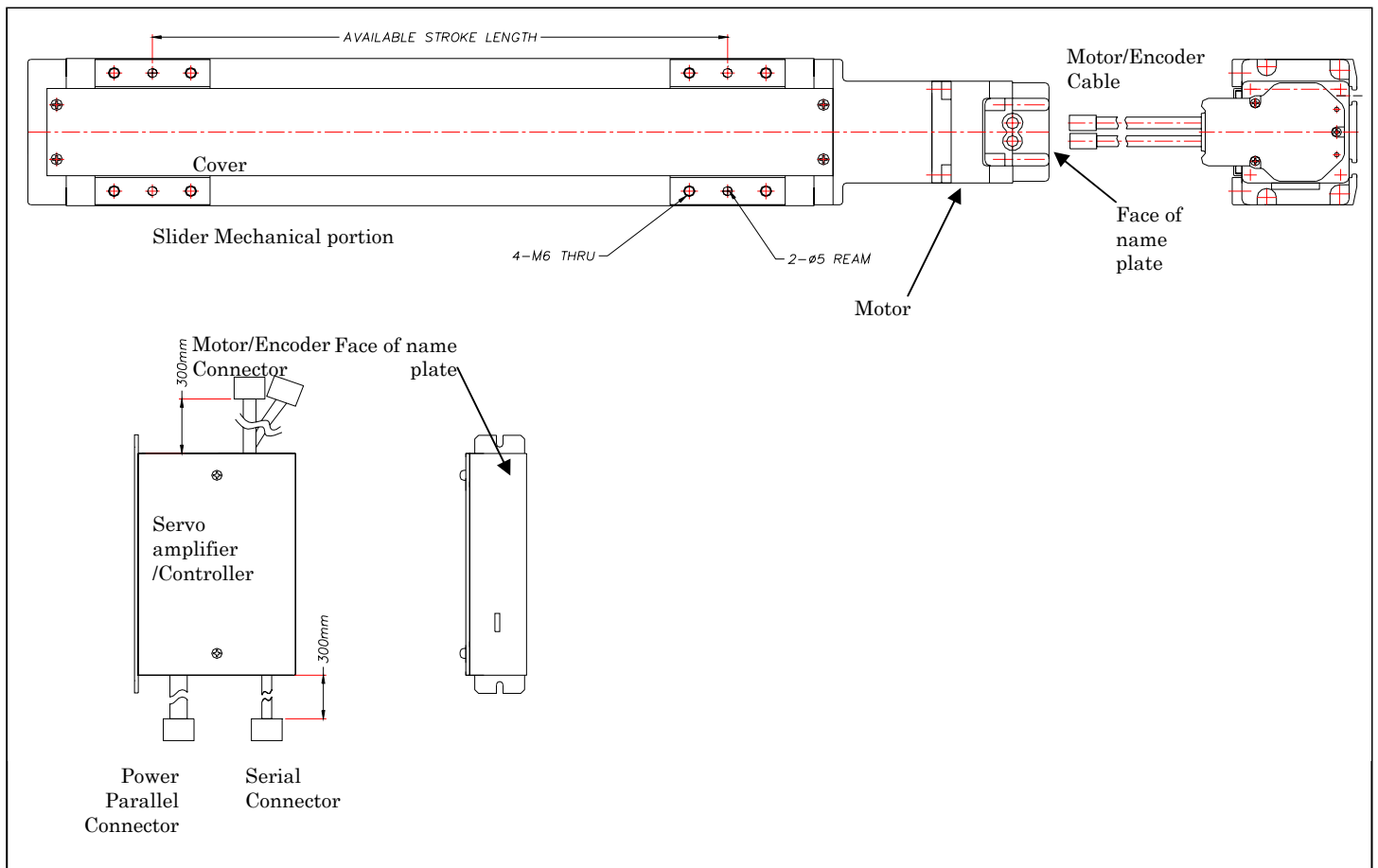
SCN5 Model (10Kgf Type)



SCN6 Model (20Kgf & 50Kgf Type)

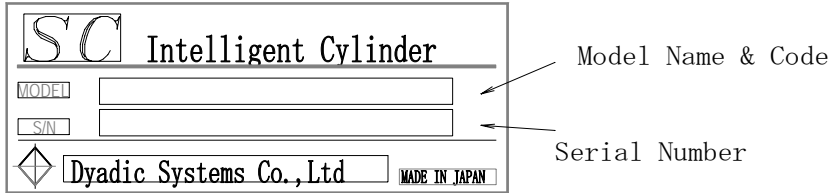


SCLL6 Model (Slider 20Kgf Type)



1.2.2 Name Plate

The name plate is located at the back of the Mech. Cylinder. (Please refer to 1.2.1)



2. Safety Notes

- (1) Please use the following voltages and power supplies of sufficient capacity:

Models	Power type	Power
SCN5- Built-in Amp, SCLL5- Built-in Amp, SCLG5- Built-in Amp, SCLT4- Built-in Amp		DC24V+/-10% (Max. 2A)
SCN6, SCLL6, SCLT6	Motor	DC24V+/-10% (Max. 3A)
	Control	DC24V+/-10% (Max. 0.2A)
SCLL5- External Amp, SCLG5- External Amp, SCLT4- External Amp	Motor	DC24V+/-10% (Max. 2A)
	Control	DC24V+/-10% (Max. 0.2A)

Using N axes, 2 x N (amps) power supply capacity is not necessary if the timing of axis movements varies slightly.

- (2) Incorrect wiring may damage the equipment.
- (3) Please do not change wiring when the power is on. Please remove and/or plug in parallel connectors (PIO) when the power is turned off.
- (4) Please install the unit in a good place for sensitive electrical equipment. (Good thermal radiation, low vibration, low shock)
- (5) Please make sure to provide protection from electrical noise. If the unit receives noise, the cylinder may vibrate and/or make inaccurate movement.
- (6) Please do not test the unit for voltage durability or electro-magnetic susceptibility.
- (7) Please hold the connector when disconnecting the cables.
- (8) Please note that the coordinate system for the forward homing mode is negative and the reverse homing mode is positive. This also applies to the push force mode. This is especially important to keep in mind for Teach Pendant operation.
- (9) The short cables protruding from the motor are not high flex cables.

Notes for SCLL6 Model

- (10) Ensure the system is designed within the specifications of max moment load on the slider table.
- (11) The acme screw in the SCLL6 is exposed to the ambient environment. Therefore it requires an application of grease approximately every 6 months. The recommended grease is Lithium type No.2. Remove the top cover by removing the 4 cover screws, and apply grease on the slider screw. Move the carriage back and forth several times to distribute the grease. Please do not apply grease to the guide bushings of the carriage.

3. Start Up

3.1. Preparation

3.1.1. Check if there is any damage

Please check the appearance of the product to ensure no damage occurred during transportation.

3.1.2 Check if the product is correct

Please verify that the product is the same as ordered.

3.1.3 Power Supply

Please provide a power source. (Regulated DC24V)

3.1.4. Tools

Tools will be required to work on wiring and connecting. (Wire Stripper, Wire connectors, etc.)

3.1.5. Programming Tool

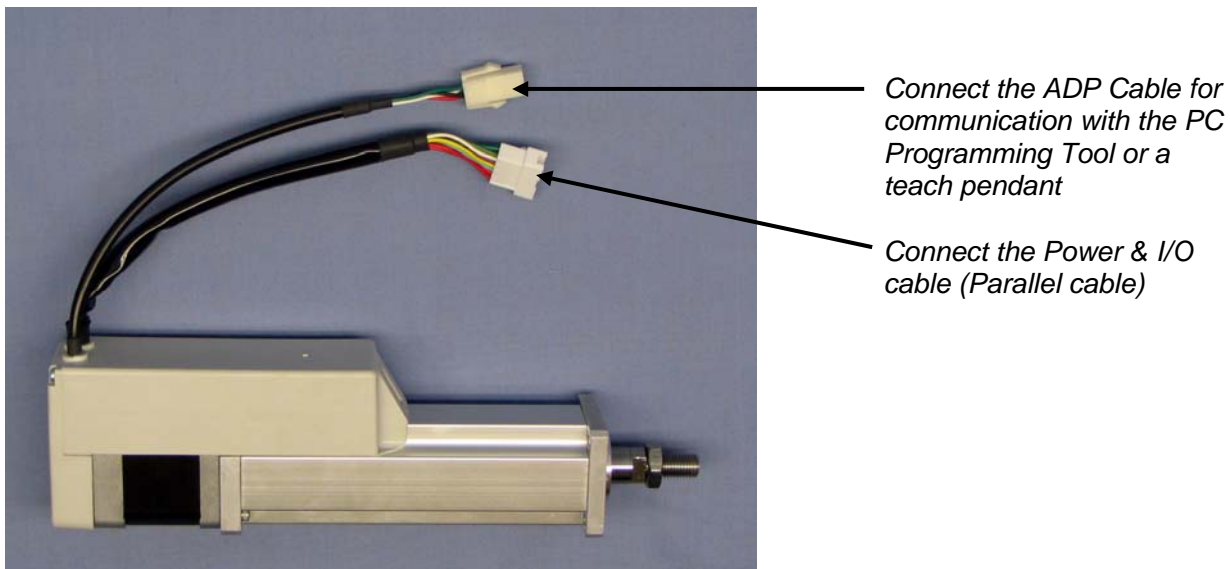
An individual Mechatronics Cylinder doesn't include programming tools such as the Teach Pendant or PC Tool (TBVST-EN). These items are sold separately.

3.2. Wire the Power/I/O cable and run from the PC programming tool

3.2.1. Check the Power & I/O cable:

Models	Power cable
SCN5-Amp built-in:	RP9100-XXX
SCN6 and all SCL actuators:	RP9120-XXX

Connection Example (SCN5 Model)



3.2.2. Check Parallel Connector Cable

The parallel cable includes the power and signal cable required to run the Mechatronics Cylinder from a PLC and/or switches.

Cable For SCN5 Actuators (RP9100-XXX)



I/O cable to connect with PLC and/or switches (Thicker cable)

Power connection cable (Thinner cable)

Cable For All Actuators Other Than SCN5



Signal cable to connect with PLC and/or switches (Thicker cable)

Power connection cable (Thinner cable)

Connect to the power & I/O connection of the actuator or controller

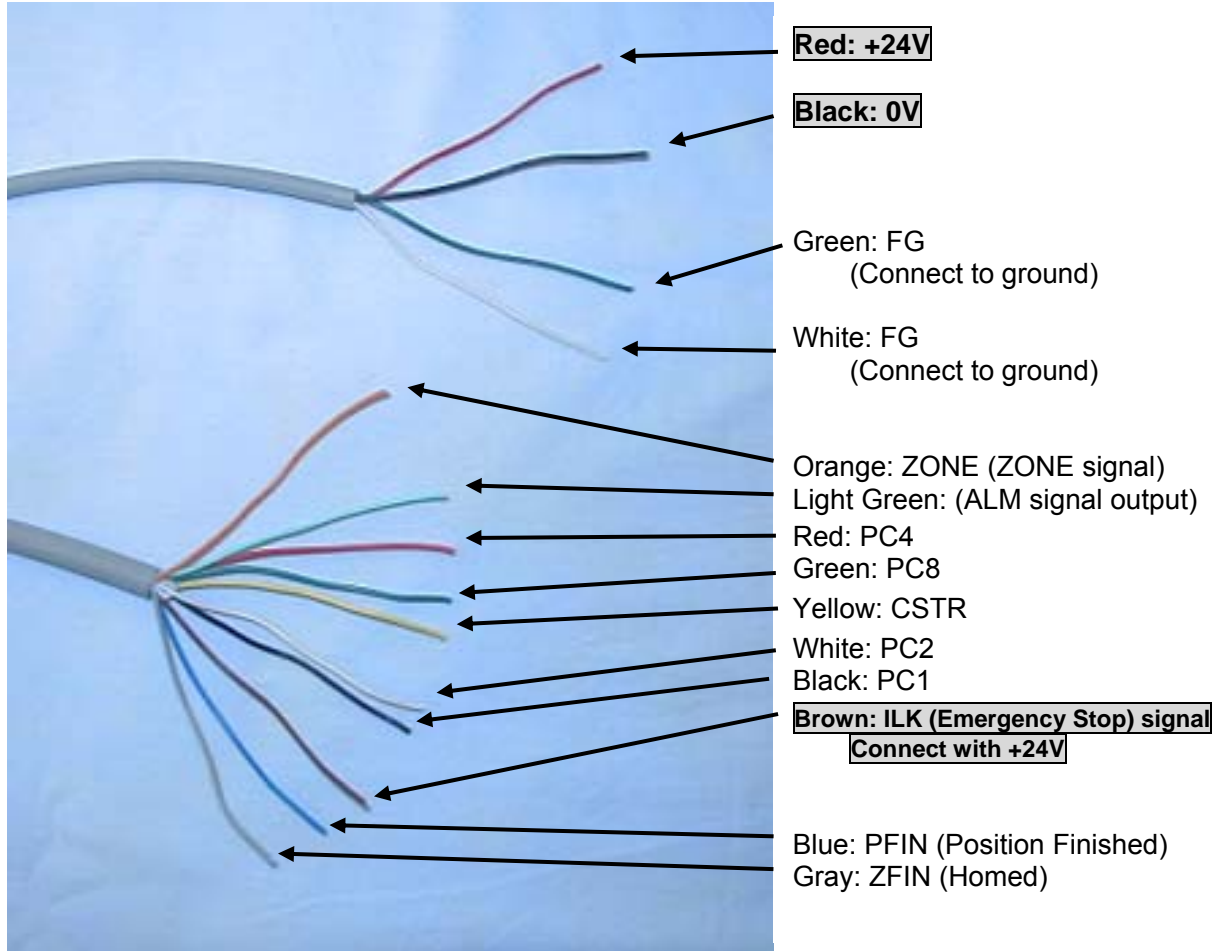
3.2.3. Parallel Cable Preparation

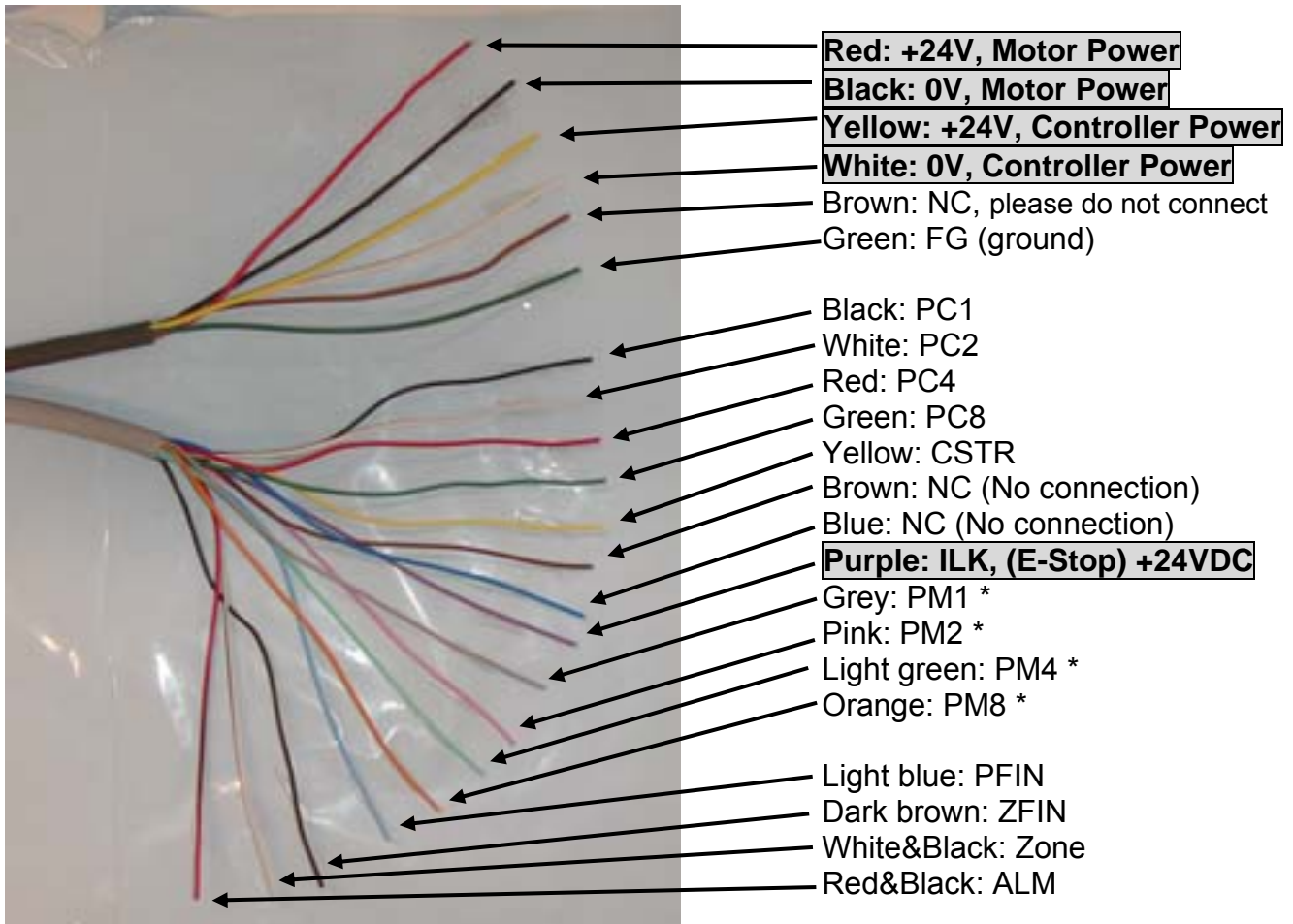
PNP Type

Please use tips for stranded wire on the ends of all connections.

SCN5 Models (10Kgf Type)

To run from PC Tool Kit (sold separately) only, please connect the power wires (Red: +24V, Black: 0V) and ILK (Brown: +24V) at this time (see below)



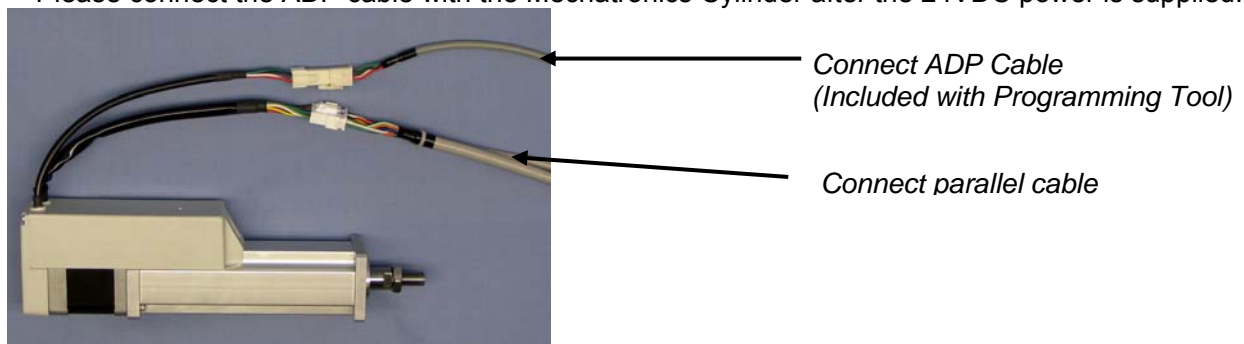


* SCL actuators with amp built-in do not use the PM1, PM2, PM4 and PM8 outputs.

3.2.4. Connect Parallel cable and ADP Cable with Mechatronics Cylinder

SCN5 Models (10Kgf Type)

The ADP Cable is supplied with your Programming Tool (PC Tool Software, Teach Pendant Tool). Please connect the ADP cable with the Mechatronics Cylinder after the 24VDC power is supplied.



SCN6 Model (20Kgf & 50Kgf Type)

SCL Models (Slider Type)



Connect ADP Cable
(Included with Programming Tool)

Connect parallel cable

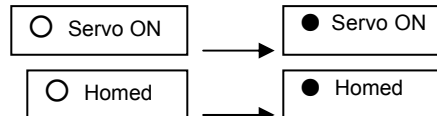
3.2.5. Teach Pendant Programming – Quick Start and Simple Cycling

- (1) Please connect the the ADP cable with the Teach Pendant as per figure below.

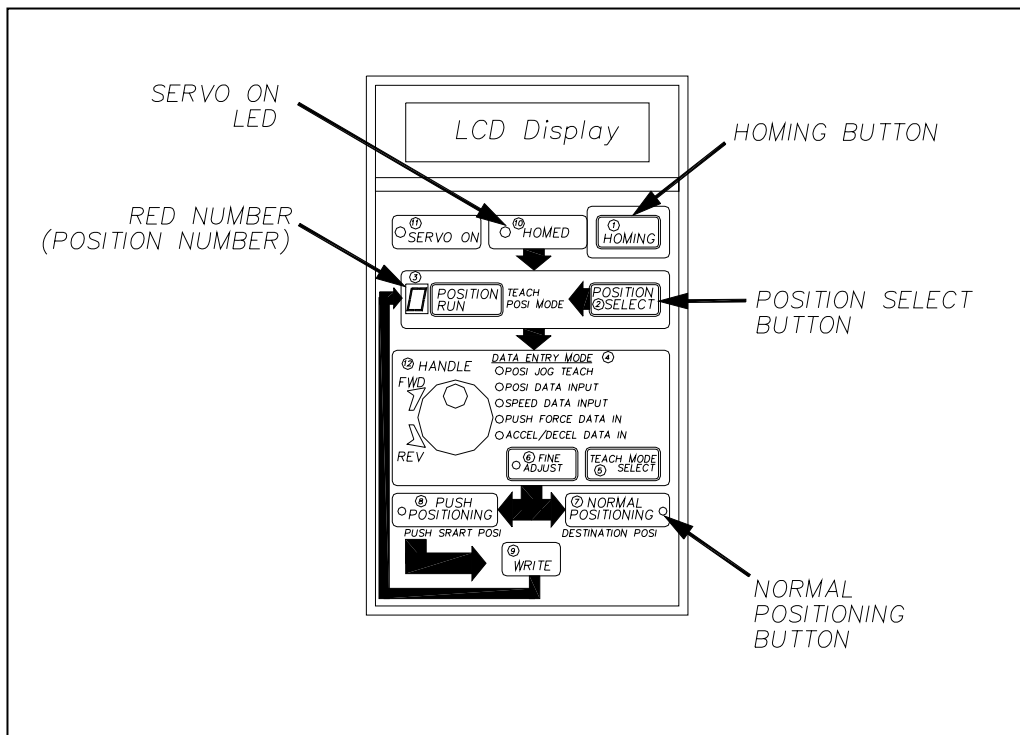


Connect ADP cable to actuator serial
connector

- (2) Apply 24VDC power to the actuator.
- (3) Approx. 4 to 5 seconds after the power is turned ON, the **Servo ON LED** will be turned ON and the LCD Display of the Teach Pendant will show “Make Homing” with Teach Position [0] flashing.
Please press and hold the **HOMING button until the “HOMED” LED illuminates.**



- (4) When the axis has been homed, if the jog wheel on the Teach Pendant is turned to clockwise, the rod of Mechatronics Cylinder will extend. if the jog wheel is turned counterclockwise, the Mechatronics Cylinder will retract.
- (5) Please press the “POSITION SELECT” button while pressing the “NORMAL POSITIONING” button. This will download the demo data from the teach pendant to Mechatronics Cylinder.
- (6) Please press the “POSITION SELECT” button once - the position number will show [1].
- (7) Please hold the “NORMAL POSITIONING” button and press the “HOMING” button. This will cause position 0 and position 1 to cycle repeatedly with a small delay between. The motions will cycle from 0 to whatever number is displayed when the demo mode is initiated.
- (8) Please press the “NORMAL POSITIONING” button to stop the motion.
- (9) Please use the operation manual of Teaching Pendant for more details, or see the next section to try programming some simple positions.



3.2.6. Quick Start – Program some Position-Controlled Motions With the Teach Pendant

	Stop position	Speed	Note
Position 0	- 5 mm	50 mm/sec	Please enter the data close to the value. Exact value is not needed.
Position 1	- 45 mm	10 mm/sec	
Position 2	- 25 mm	25 mm/sec	

Note: The default position coordinate is negative. If the home position was changed to the forward side, the position coordinate is positive.

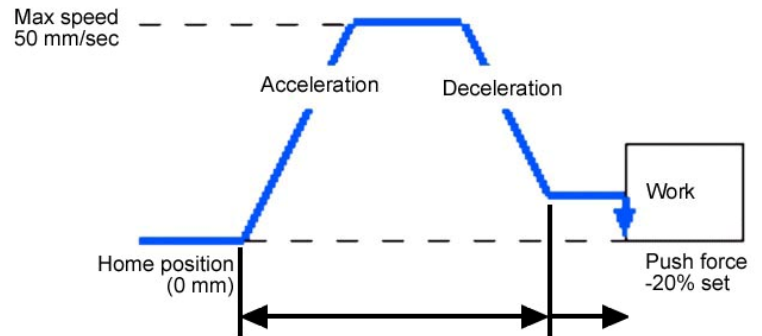
- (1) Connect the ADP cable to the Teach Pendant and the serial connector on the servo controller.
- (2) Wire the power cable as follows:
RP9100 power cable:
Red (Drive) with +24VDC, Black (Drive) with 0V, Brown (ILK) with +24VDC

RP9120 power cable:
Red (Drive) with +24VDC, Black (Drive) with 0V, Yellow (Control) with +24VDC, White (Control) with 0V, Purple (ILK) with +24VDC
- (3) Please turn the power ON.
- (4) 4-5 seconds after the power is turned ON, the Servo ON LED of the Teach Pendant will be ON and the LCD will be display "Make Homing". Please press and hold the "homing" button until the display shows the "Homed" message.
- (5) Please turn the jog wheel clockwise, so that the Mechatronics Cylinder shaft will extend.
- (6) Program Position number 0
Confirm that Position 0 is displayed and the "Pos. Jog/Teach" indicator is lit. Please turn the wheel to make the LCD display [-5mm] then press "WRITE".
Please press the "DATA ENTRY MODE" button twice to cycle to the "SPEED DATA INPUT" parameter, then turn the wheel to set the speed to 50mm/sec. Please press "WRITE" to save the change.
Now position 0 has a position target of -5mm and a speed target of 50mm/sec.
- (7) Program Position number 1
Please press the "POSITION SELECT" button once so that position 1 is displayed in the red seven-segment display. Now position 1 is available to change. Check that the "Pos. Jog/Teach" indicator is lit, and turn the wheel to make the LCD display [-45mm], then press the "WRITE" button. Please press the "DATA ENTRY MODE" button twice to cycle to the "SPEED DATA INPUT" parameter, then turn the wheel to set the speed to 10mm/sec. Please press "WRITE" to save the change.
Now position 1 has a position target of -45mm and a speed target of 10mm/sec.
- (8) Program Position number 2
Please press the "POSITION SELECT" button once so that position 1 is displayed in the red seven-segment display. Now position 1 is available to change. Check that the "Pos. Jog/Teach" indicator is lit, and turn the wheel to make the LCD display [-45mm], then press the "WRITE" button. Please press the "DATA ENTRY MODE" button twice to cycle to the "SPEED DATA INPUT" parameter, then turn the wheel to set the speed to 10mm/sec. Please press "WRITE" to save the change.
Now position 2 has a position target of -25mm and a speed target of 25mm/sec.
- (9) Please hold the "NORMAL POSITIONING" button and press the "HOMING" button. This will cause position 0, position 1, and position 2 to cycle repeatedly with a small delay between. Please press the "NORMAL POSITIONING" button to stop the execution.

3.2.7. Quick Start – Program a Force-Controlled Motion With the Teach Pendant

Let's program the motion as per the figure on the right, such that the actuator moves 20mm at higher speed, then switches to low speed to look for a pre-set force.

Please note that the force value is negative (-) for the extend direction, positive (+) for the retract direction.



- (1) Connect the ADP cable to the Teach Pendant and the serial connector on the servo controller.
- (2) Wire the power cable as follows:
 - RP9100 power cable:
 - Red (Drive) with +24VDC, Black (Drive) with 0V, Brown (ILK) with +24VDC
 - RP9120 power cable:
 - Red (Drive) with +24VDC, Black (Drive) with 0V, Yellow (Control) with +24VDC, White (Control) with 0V, Purple (ILK) with +24VDC
- (3) Please turn the power ON.
- (4) 4-5 seconds after the power is turned ON, the Servo ON LED of the Teach Pendant will be ON and the LCD will be display "Make Homing". Please press and hold the "homing" button until the display shows the "Homed" message.
- (5) Please turn the JOG handle clockwise and verify that the actuator shaft moves forward.
- (6) The following will store push force parameters in position 4.
 - Please press the "POSITION SELECT" button 4 times such that the position number display indicates [4]. Now position 4 can be programmed.
 - Please press the "PUSH POSITIONING" button. Now position 4 is in push force mode.

Check that the "POS. JOG TEACH" LED is lit, and turn the JOG handle to extend the actuator until the LCD displays position [-20mm]. Press "SAVE" button. This is the position at which the higher speed part of the move will end and the force controlled part of the move will begin. This is also referred to as the "Approach Point".

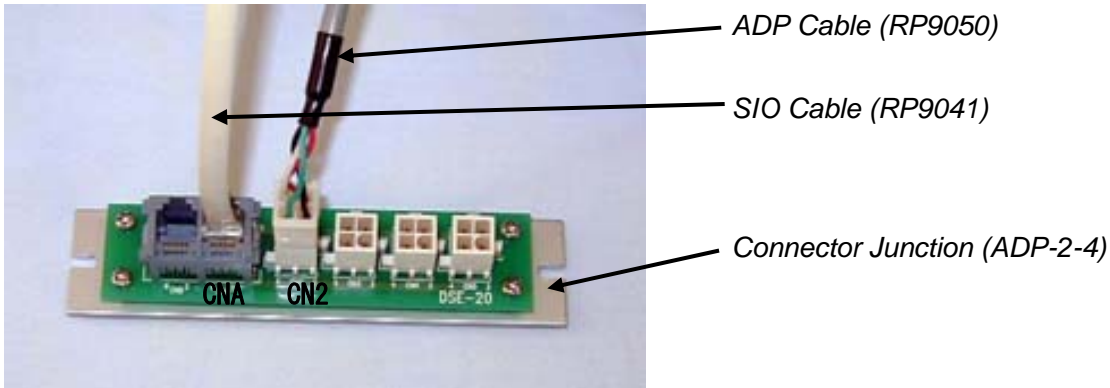
Please press the "DATA ENTRY MODE" button twice to access the "SPEED DATA INPUT" parameter. Change the speed to 50mm/sec by turning the JOG handle, then press the SAVE button. Press the "DATA ENTRY MODE" button 3 times to access the "PUSH FORCE DATA IN" parameter. Set the push force to -20% by turning the JOG handle, then press the "SAVE" button. Now, position 4 has a force-controlled motion programmed as shown in the above figure.

- (7) Turn the JOG handle counter clockwise to retract the shaft. Press and hold the "POSITION RUN" button with number 4 displayed in the seven segment display, and the actuator will operate the push force motion. If the button is released the motion will stop.

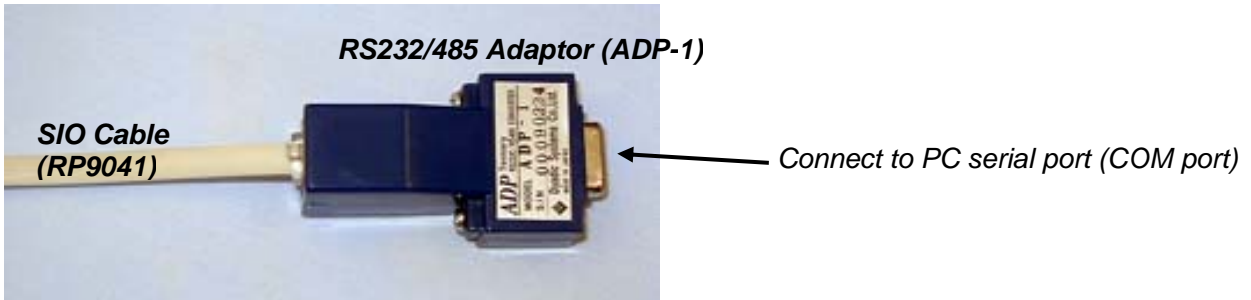
3.2.8. Quick Start – Set Up of Basic Parameters Using the PC Tool (TBVST-EN-SET)

The following sequence of operations will allow you to download a default program into your Mechatronics Cylinder Controller. This program will over-write any other program currently in the controller.

- (1) Connect the ADP cable to the CN2 jack of the Connector Junction (ADP-2-4) as per figure below. Connect the SIO cable to the CNA jack of the Connector Junction (ADP-2-4) as per figure below.



- (2) Power up the Mechatronics Cylinder, and connect the SIO cable to the RS232/485 adaptor (ADP-1) and connect it to the serial port (COM port) of your PC as per the figure below.



- (3) Start the PC Tool software (TBVST-EN).
- (4) The first menu is for communication setup – please select the serial port Number that the ADP-1 is plugged in to, then click **Set**. After few seconds, the operation menu will come up as follows.
- (5) Please click the HOMING button, so that the Mechatronics Cylinder will home itself.

Click **[FILE]**

[HOMING] button

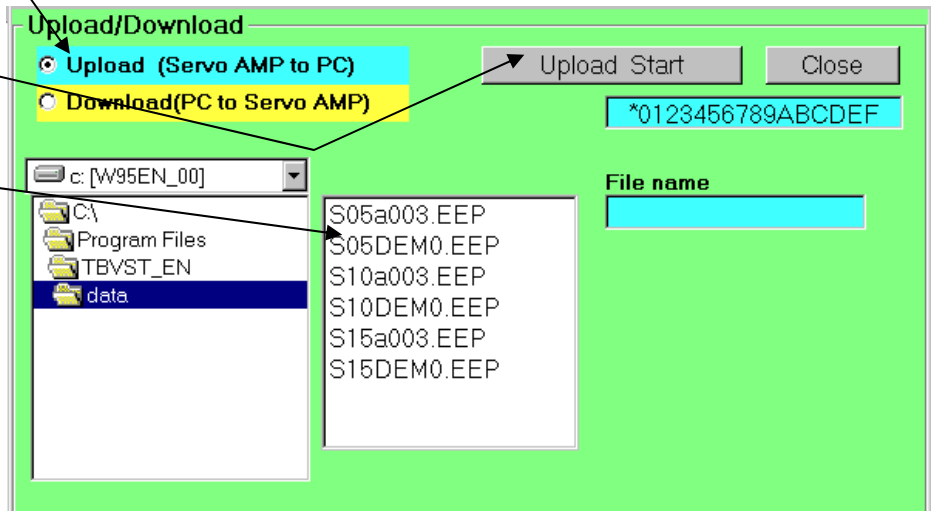
If this block is dragged and moved right or left, the Cylinder will move accordingly.

(6) Please click **【FILE】** at left top on the screen, so that following Menu will be displayed.

① Select **【Download (PC⇒Amp.)】**

③ Click **【Download Start】**

② File Selection



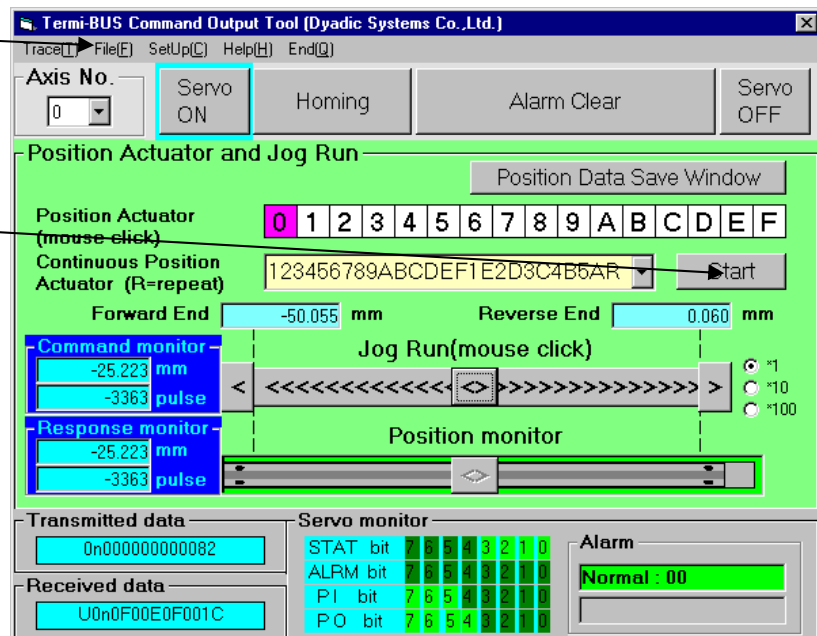
(7) ① Please select **【Download (PC→SERVO AMP)】** and select the file which is suitable for the stroke of the Mechatronics Cylinder being used. Click the **【Download start】** button, so that the demo program will be copied to the Mechatronics Cylinder controller.

(8) Click **【Close】** at the top right of the screen to return to the previous menu. Click the **【Start】** button to initiate the sequence entered in the text box to the left of the Start button. The Mechatronics Cylinder will repeat this sequence of moves from the downloaded demo program if there is a letter "R" at the end of the sequence.

Please click the **【STOP】** button to stop the demo movement.

Click **【FILE】** so that the File Menu will appear on the screen

Click **【START】** so that the Mechatronics Cylinder will run the selected demo program.



(9) Please refer to **【HELP】** for details.

4. Installation and Test Running

4.1. Installation

If the installation and/or environment of the Mechatronics Cylinder are poor, the life of the actuator may be artificially shortened, or the Mechatronics Cylinder may malfunction. Please install the Mechatronics Cylinder with the following care:

4.1.1. The Installation Environment

The Mechatronics Cylinder is generally intended for use indoors. Please provide a place for cylinder installation that meets the following requirements:

- ① Free of corrosive and/or explosive gas.
- ② Minimal moisture and/or dust
- ③ Ambient temperature between 0 ° C ~ 40 ° C.
- ④ Ambient humidity is 90%RH or less and there is no condensation.
- ⑤ Accessible for maintenance.
- ⑥ Safe from water splashing and/or oils.

4.1.2. Recommended mounting of Mechatronics Cylinder

SCN5 Model (10Kgf Type) SCN6 Model (20Kgf, 40kgf, 50Kgf Type and 60 kgf)

The Mechatronics Cylinder is intended to be mounted with a flat washer, a split washer and an M5 cap screw at the 4 holes in the mounting Flange. Placing the flat washer before the Spring washer is important to avoid scratching the Mounting Flange.

The recommended screw torque is 20 kg-cm for SCN5 models, 45 kg-cm for SCN6 models. Foot mounting brackets are available.

SCL Models

Please mount the slider on a flat surface with the M6 nuts located on the bottom face slots.

4.1.3. Use of the shaft tip screw

SCN5 Model (10Kgf Type) SCN6 Model (20Kgf, 40kgf, 50Kgf Type and 60 kgf)

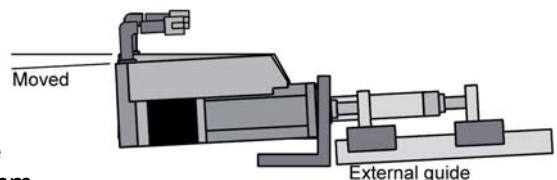
The Mechatronics Cylinder uses a non-rotating Linear Actuation Mechanism. However it is not designed to withstand significant torque. Please use a wrench to hold the shaft flats while the nut is tightened onto the rod tip threads.

The recommended nut tightening torque is 30 kg-cm for SCN5 models, 45 kg-cm for SCN6 models. If the rotary moment load is big and/or the backlash of the rotary direction is critical, please use an anti-rotating mechanism.

4.1.4. Load installation accuracy

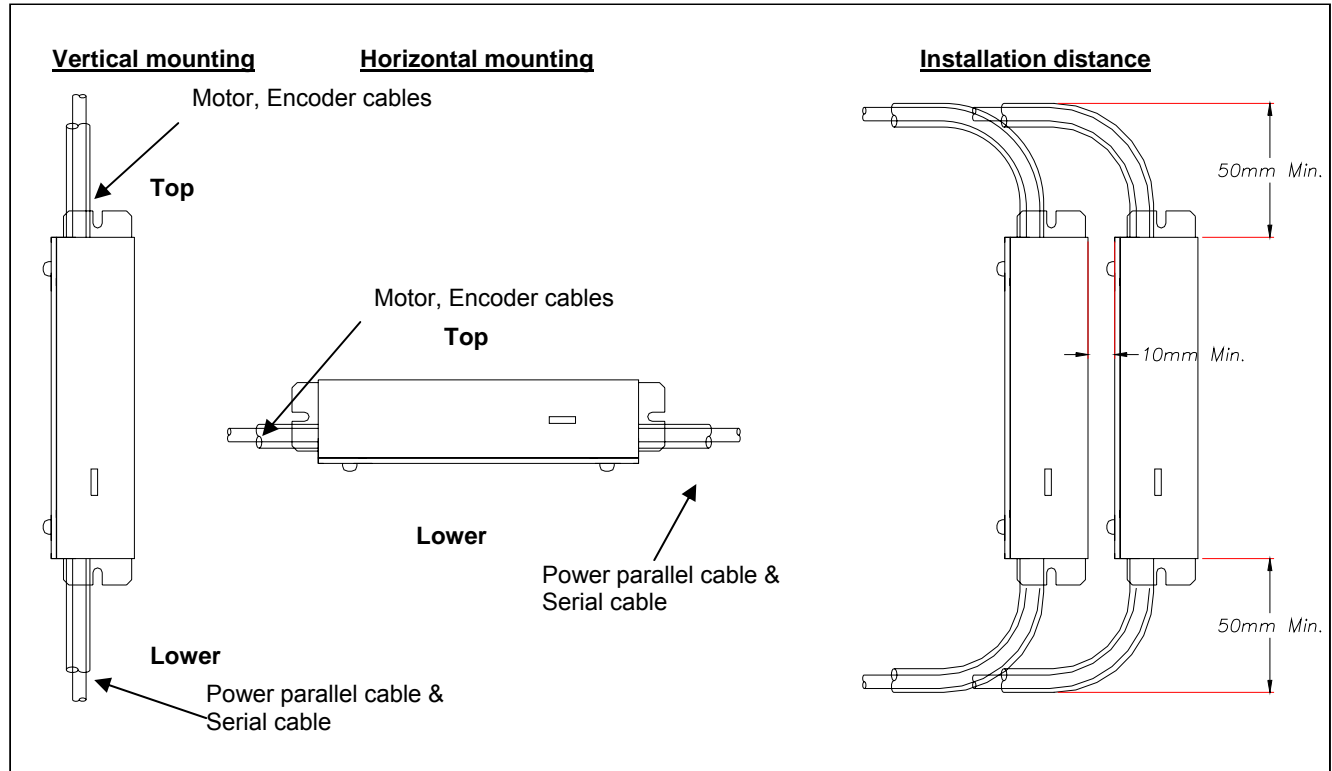
SCN5 Model (10Kgf Type) SCN6 Model (20Kgf, 40kgf, 50Kgf Type and 60 kgf)

Please ensure your guide is parallel to the rod of the Mechatronics Cylinder to within 0.1mm along the entire length of stroke. A simple way to check this dimension is to install the actuator with loose mounting screws (at the flange), then move the shaft through its stroke. If the back of the Mechatronics Cylinder moves less than 0.1mm, it is acceptable.



4.1.5. Servo Amplifier Mounting and Environmental Installation Limits

- (1) Ambient temperature under 40°C.
- (2) Minimal shock and vibration. (should be lower than 0.5G)
- (3) Environment free of corrosive gas and dust.
- (4) Ambient humidity under 90%RH, non condensing.
- (5) Please use 2 ea of M3 screws to mount amplifiers as per the sketch below. Please leave 10mm distance or greater between amplifiers, and leave 50mm or greater space for cables:



4.2. Wiring

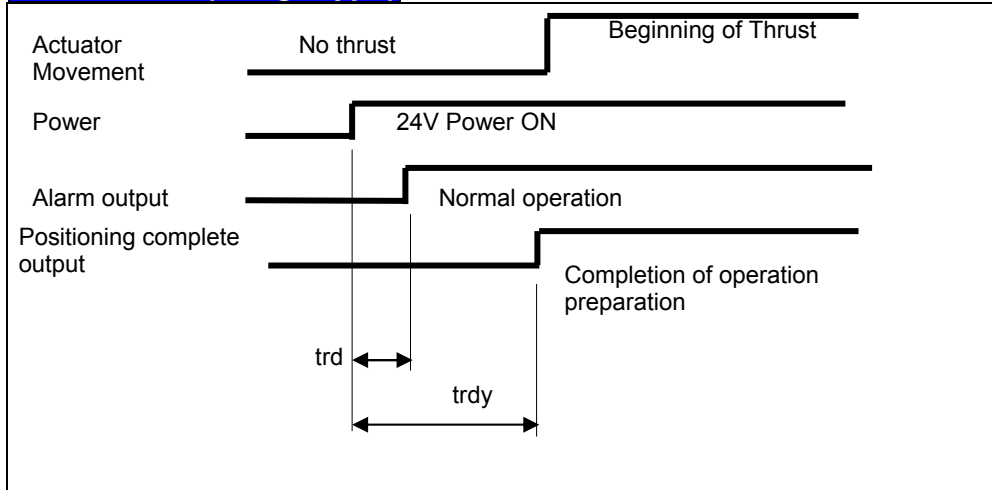
PNP Type

Please wire with reference to section 3.2.3.

4.2.1. Wiring

- (1) The following precautions may help to avoid problems with electrical noise:
 - ① The wires from the Controller to the PLC and noise filter should be as short as possible.
 - ② Power to coils of relays and solenoids should be managed by surge hardware.
 - ③ Separate the wiring from other equipment.
- (2) When the Mechatronics Cylinder system is being controlled by 24V I/O:
 - ① Design the system to allow shut off of the 24V line to the actuator in case of "SERVO ALARM".
 - ② The sequences of power up and down should be as follows:

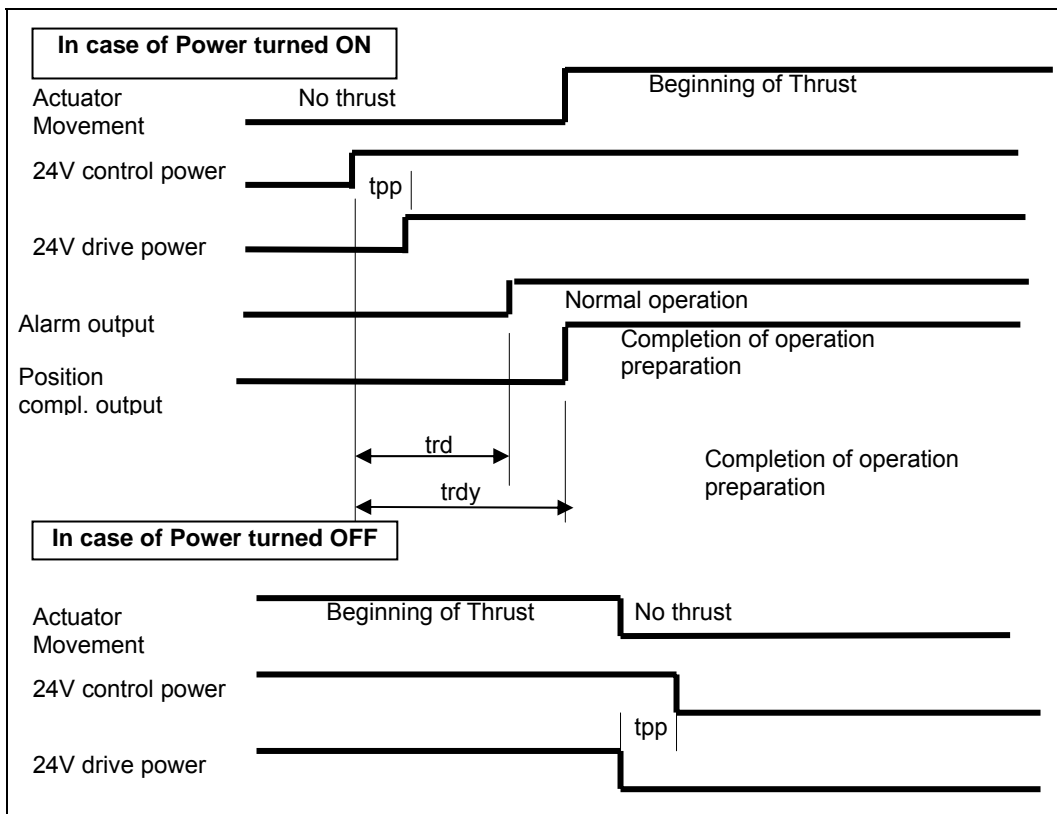
SCN5 Model (10Kgf Type)



Names	Time	Application
Trd	50msec Max.	Power ON=> ALM signal start up
trdy	250msec (normal)	Power ON=> Completion of operation prep.

SCN6 Models, SCLL models, SCLT models

SCLL6 Model (Slider 20Kgf Type)



Names	Time	Application
Tpp	0msec Min.	Control power ON=> Drive power ON Drive power OFF=> Control power OFF
Trd	50msec Max.	Control power ON=> ALM signal start up
trdy	250msec (general value)	Control power ON=> Completion of operation prep.

(3)Wiring for Serial Control

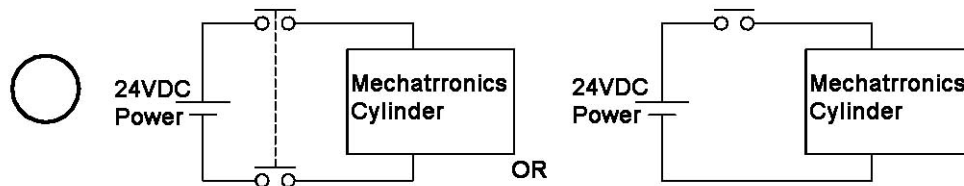
- ① When planning a RS232C interface with the main control system, the ADP-1 (RS232C/RS485 converter) is necessary. Please refer to section 6.3 regarding the ADP-1.

4.3. Notes for wiring and connections

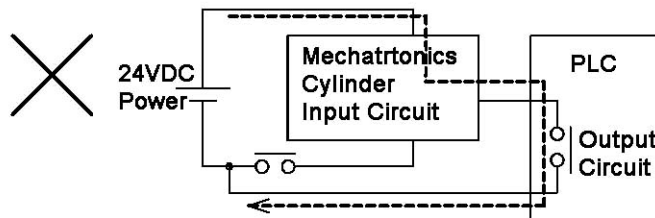
PNP Type

4.3.1. Power shut down

When shutting down 24VDC power to the Mechatronics Cylinder, please open both 24V and 0V lines from the power supply, or open the 24V side.



If 0V of 24 VDC power supply is shut down, the power circuit of the Mechatronics Cylinder may be damaged.



4.3.2. +24VDC Ground

Please do not connect +24VDC power to ground.

PNP Type

4.3.3. Power input circuit

Ensure all I/O of the Mechatronics Cylinder are connected to either 0VDC or 24VDC±10%. Connection to any voltage in between these values may result in damage to the input or output.

The input circuits of the Mechatronics Cylinder are designed as non-isolated dedicated source drive circuits as described below. Therefore it is necessary to connect (ON) with +24V terminal, or open (OFF) with +24V terminal by using source type output circuit.

As shown below, **the input circuit will receive over current and the internal circuit will be damaged if a PNP input is driven by a sinking output circuit or connected with 0V directly.**

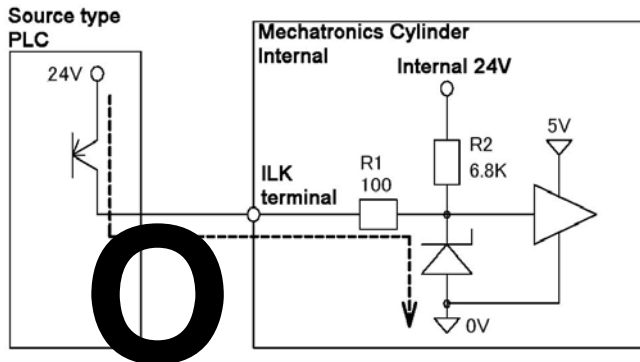


Fig. 2 Good PNP Input Circuit

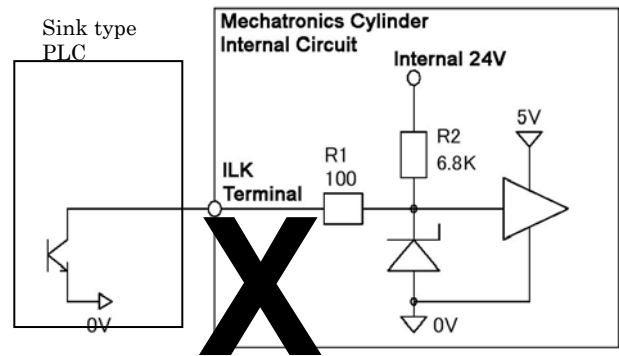
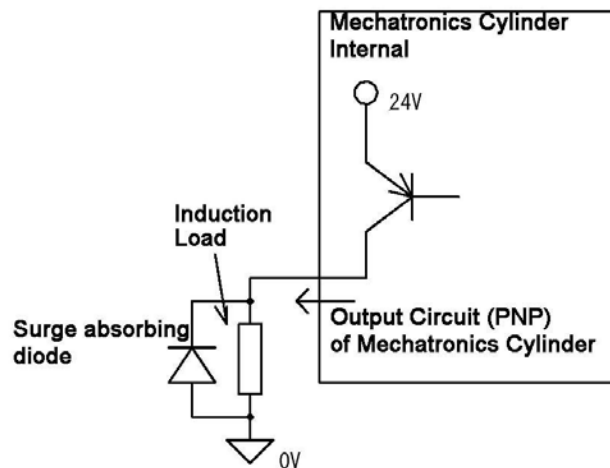


Fig. 3 Bad circuit (PNP) example

4.3.4. When Driving Coils or Other Inductive Loads

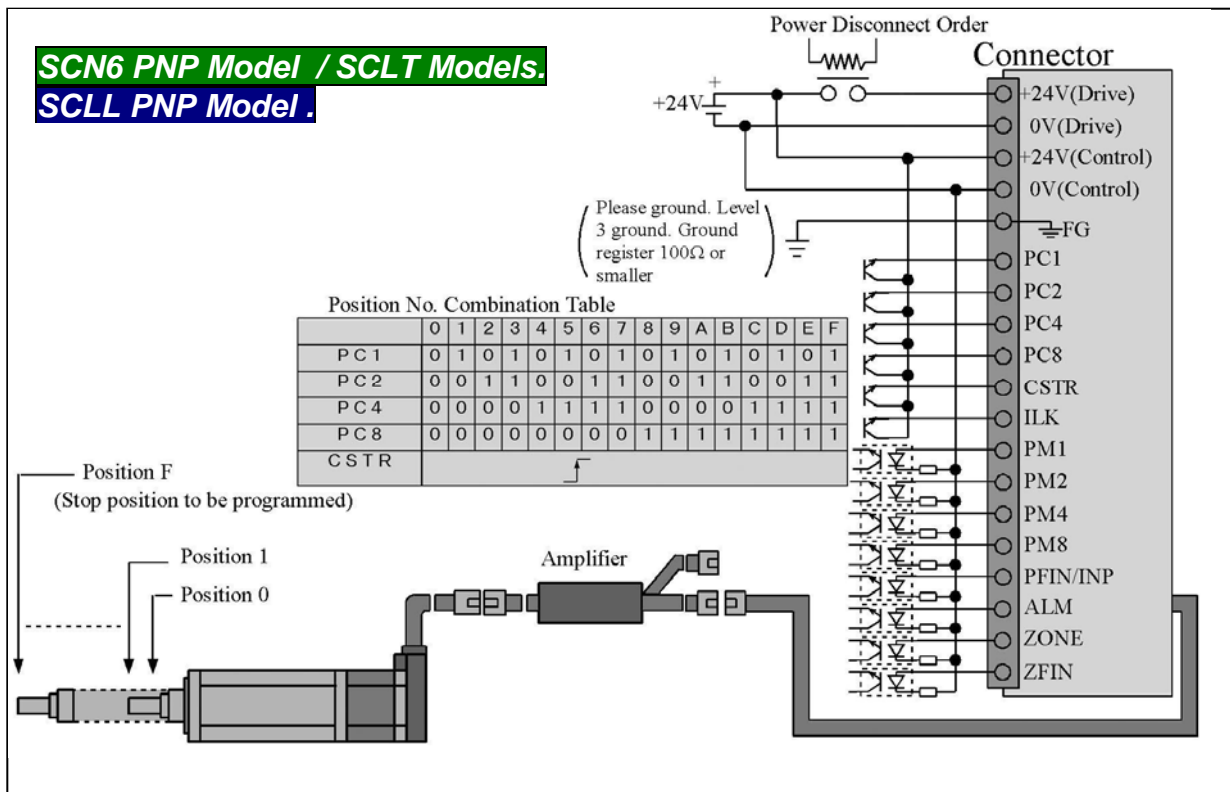
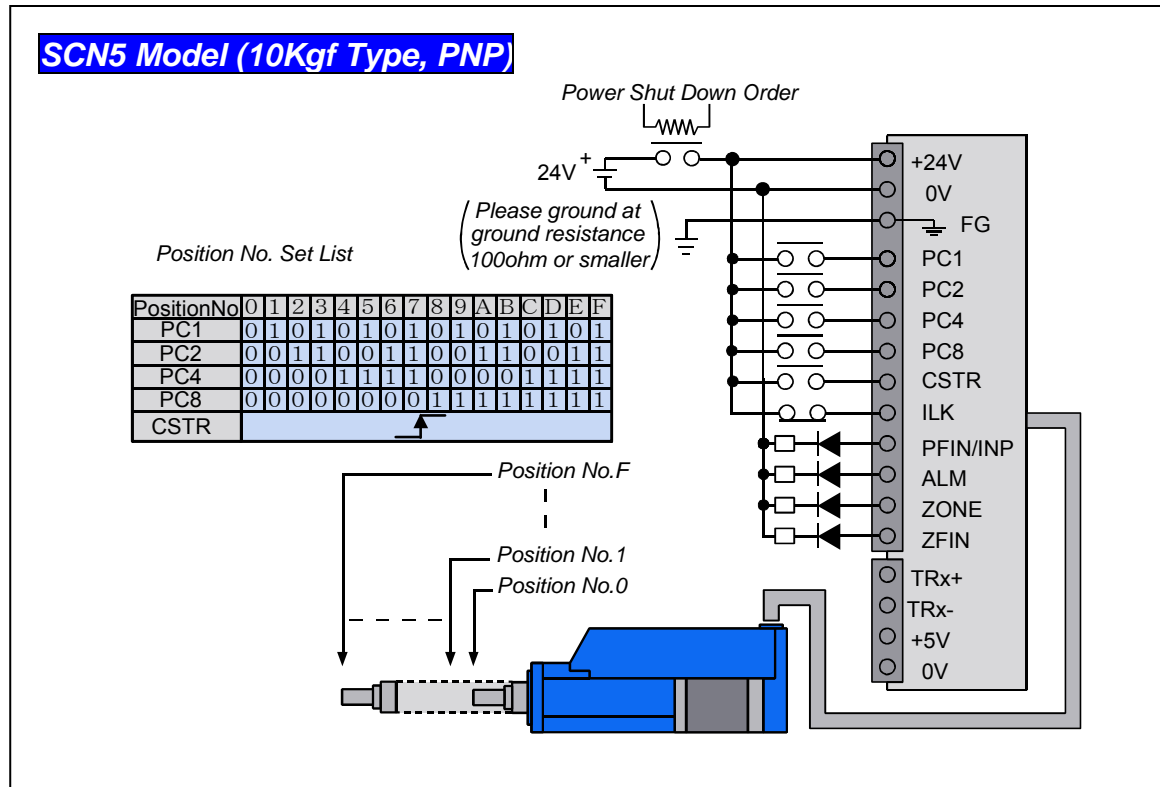
When using outputs to drive induction loads:

The output circuits of the Mechatronics Cylinder are open collector outputs as shown below. Therefore when driving an external load (such as a coil), please use an external surge diode or solid state relay. Surge voltage can damage the output circuit.

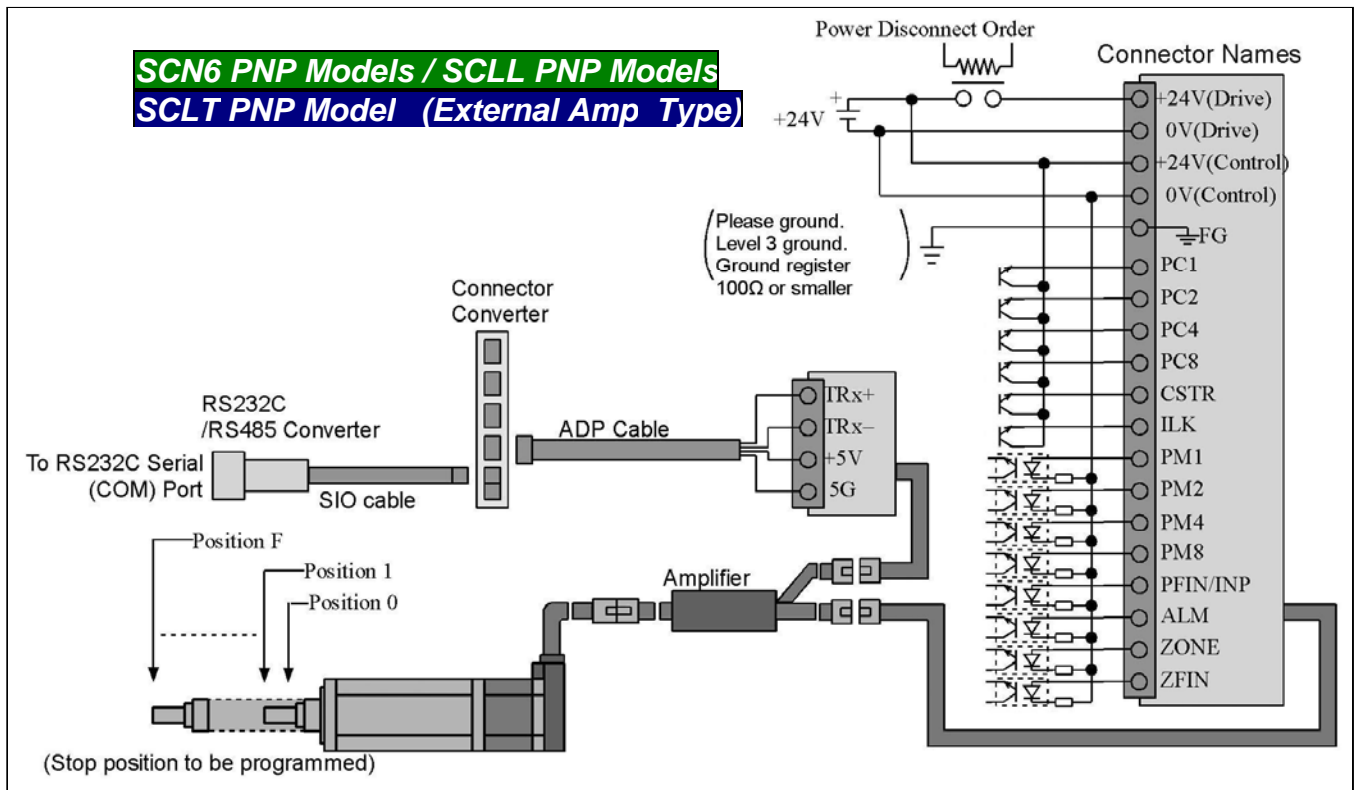
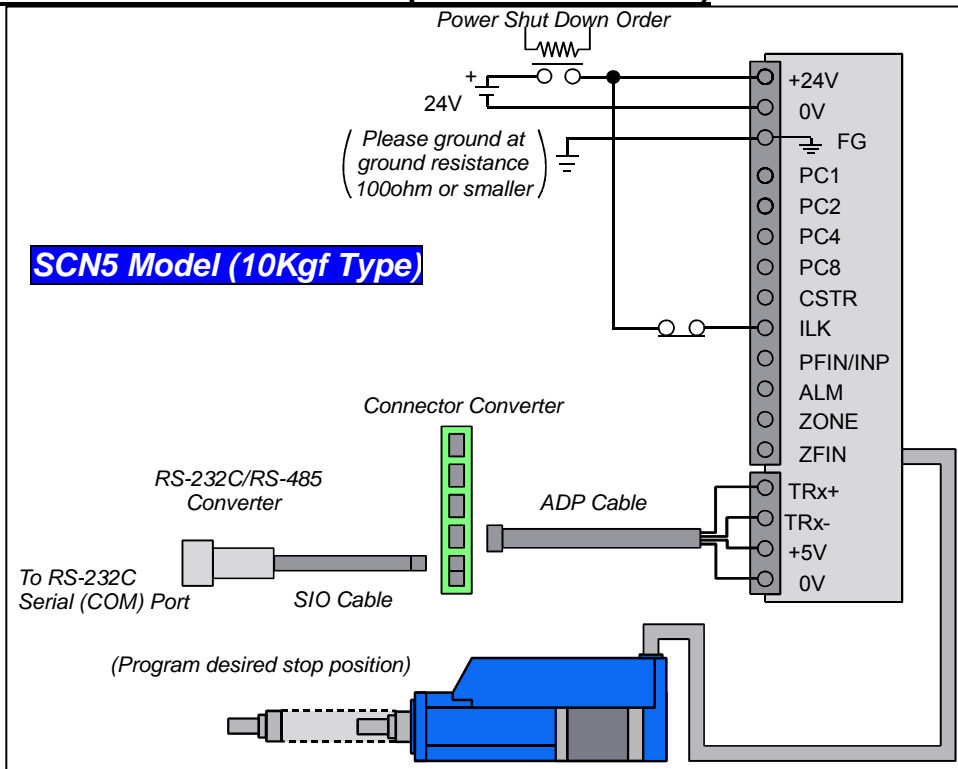


4.4. Wiring examples of outside connections

Connection of Parallel Interface (Parallel cable, I/O Control – PIO Connection)



Connection of Serial Interface (SIO Connection)



- (Note 1) For serial (SIO) control of one or more Mechatronics Cylinders using the RS-485 protocol, requirements are one ADP cable per cylinder, one connector converter (ADP-2 or ADP-2-4) for every 4 axes, and one SIO cable for every 4 axes. Networks of up to 16 axes can be connected. When using RS-232C to control one or more Mechatronics Cylinders the ADP-1 RS232C/RS485 protocol converter is recommended as a simple solution for connecting to your 9-pin RS232 port.
- (Note 2) It is recommended to program the system to cycle power if an alarm condition occurs. Follow guidelines shown in Section 4.3.1.
- (Note 3) It is recommended to use a solid-state relay to turn ON/Off main power to minimize electrical spikes.
- (Note 4) Power required is DC 24V+/-10%, Max 3A.
- (Note 5) Power, I/O and programming cables and converters are not included. Please purchase separately.
- (Note 6) The Mechatronics Cylinder and cables are not water resistant.
- (Note 7) The SIO cable is generally intended for use inside a panel.

4.5. Trial run

The user may wish to complete a trial run with no load connected to ensure the cylinder program is as expected. Please follow the steps below:

- (1) Power up the cylinder and controller, then complete the serial connection.
- (2) Ensure the cylinder is not connected to any load
- (3) Check the wiring to ensure all connections are tight and all connectors are securely connected. In using serial control (SIO) for a multiple cylinder network, ensure a unique number is assigned to each axis (using the Axis Number Change software utility).
- (4) Check each movement individually.
- (5) After checking individual movements, operate the system.

5. Specifications of Mechatronics Cylinder

5.1. Specification of Servo Cylinder

5.1.1. Specifications

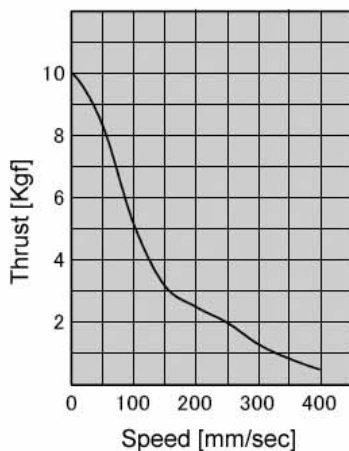
SCN5 Model (10Kgf Type)

Models		-010-050	-010-100	-010-150	-010-200	-010-250	-010-300
Life		3 years after delivery or 10,000 km operation when applied within published specs					
Stroke (mm)		50	100	150	200	250	300
Max thrust (N)/(kgf)		100/10.2					
Max. thrust at push mode (N)/(kgf)		70/7.1					
Max. speed (mm/s): typ. data		400		200		160	
Speed at push force mode (mm/s)		7.5					
Repeatability (mm)		+/-0.01 (when homing to hard stop and pushing on same side)					
Backlash (mm)		0.3					
Radial load (N)		15	10	5	4	3	2.5
Shaft diameter (mm)		15 Dia					
Shaft tip screw thread		Standard: M10 Pitch 1.25 (303 SS)					
Housing		Extruded Aluminum					
Positioning capacity		16 motions, each with programmable acceleration, velocity, position					
Power		DC24V+/-10% (max. 2.0 A)					
Input /Output signal	Parallel input signal	DC24V type DI/DO Interface (Connector PIO), Position number (4bit binary: PC1,PC2,PC4,PC8) Start (CSTR), Axis Movement Interlock (ILK)					
	Input Current	Max. 4mA / port					
	Parallel output signal	Position complete (PFIN/INP), Homed signal (ZFIN), Zone signal(ZONE), Alarm (ALM), 24VDC Digital I/O Interface, PNP Standard					
	Output Current	Max. 10mA / port					
	Serial signal	Serial Interface (Connector SIO) +5V, 5G, S+, S-					
Protection		Over speed, Main power over voltage, Voltage fault, Overload, Sensor fault, Servo fault, Encoder wire disconnected					
Ambient conditions	Operation Temperature	0 ° C ~ 40 ° C.					
	Storage temperature	-20 ° C ~ 60 ° C.					
	Operation/Storage moisture	≤90%RH, non condensing					
Weight (kg)		1.1	1.2	1.4	1.6	1.8	2.0

Note 1) Specifications are subject to change without notice.

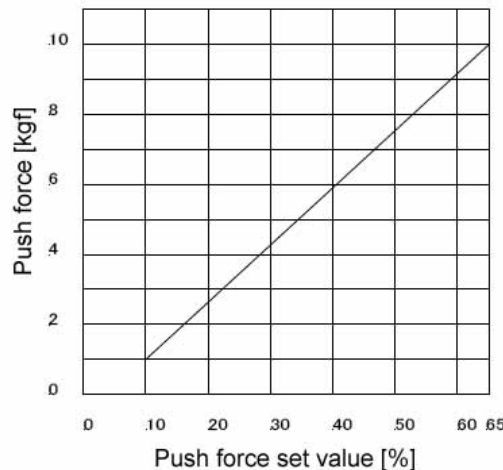
Note 2) Push force value as figure below is typical value. Actual value may vary.

Thrust vs speed



Notes: The max vertical load force is 7 kgf.

Push force set value vs Actual Push force



Notes: Push force set is negative (-) value for the shaft forward direction, positive (+) value for the opposite direction.

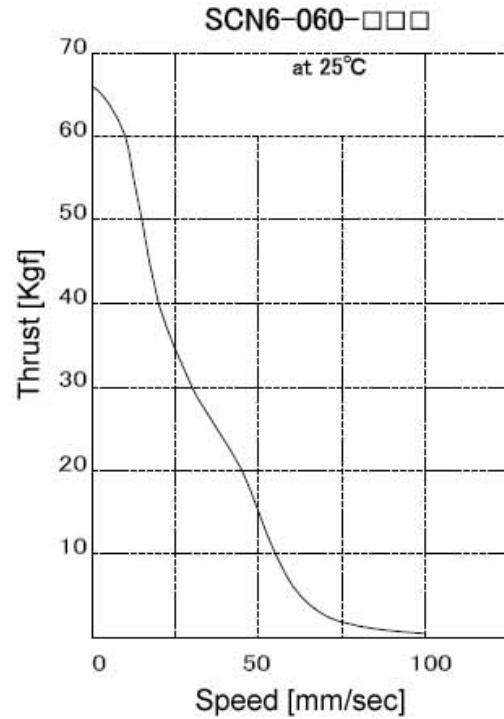
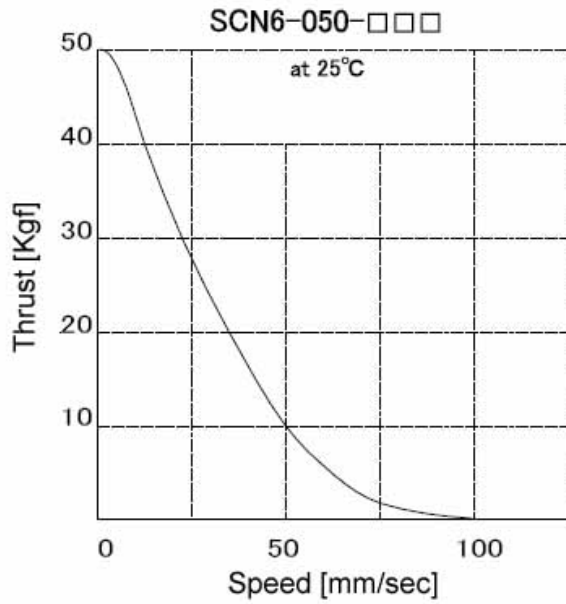
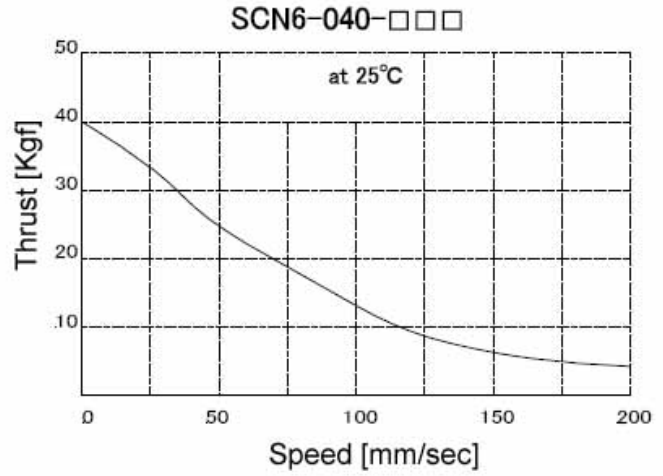
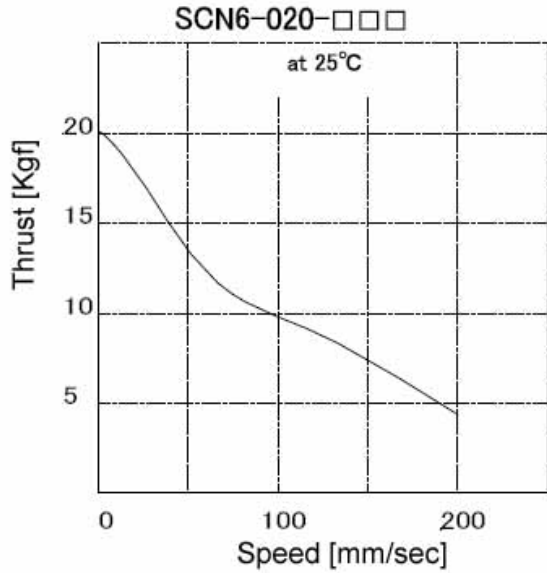
SCN6 Models (20Kgf, 40kgf, 50kgf & 60kgf Types)

MODEL	SCN6-020						SCN6-040						SCN6-050						SCN6-060						
	050	100	150	200	250	300	050	100	150	200	250	300	050	100	150	200	250	300	050	100	150	200	250	300	
Stroke (mm)	50	100	150	200	250	300	50	100	150	200	250	300	50	100	150	200	250	300	50	100	150	200	250	300	
Life	Other than seal Seals 3 years after the delivery, or 10,000 km operation under the use within the specs. 6 months, or 2,500 km run (Dust Proof Model Only)																								
Max. Thrust (N) / (kgf)	200 / 20.2						400 / 40.8						500 / 51.0						650 / 66.3						
Max. vertical carryable wt at power ON	14						28						30						45						
Push mode max. Thrust (N)/(kgf)	140 / 14.2						280 / 28.5						350 / 35.5						450 / 45.9						
Max. Speed (mm/s) * note 1	200						100						100						100						
Repeatability (mm)	± 0.1																								
Backlash (mm)	0.3																								
Radial Load Capacity (N)	30	20	10	10	10	10	30	20	10	10	10	10	75	50	25	18	15	12	75	50	25	18	15	12	
Rod Diameter (mm)	Ø 22																								
Rod Tip Thread	M14 Pitch 1.5 (303SS)																								
Program Capacity	16 Motions																								
Power Supply	DC24V ± 10% (Drive Power max. 3.0 Amps, Control power max. 0.2A)																								
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO)																						
		Input current	Max. 4mA / port																						
	Parallel Output	Names	DC24V type DI/DO Interface (Connector PIO), Position complete(PFIN/INP), Completed Position Number (4bit binary: PM1,PM2,PM4,PM8), Homed signal(ZFIN), Zone signal(ZONE), Alarm (ALM)																						
		Output current	Max. 10mA / port																						
Serial Signal	Serial Interface (Connector SIO) +5V, 0V, S+, S-																								
Protection function	Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected																								
Ambience	Operate Temperature	0 ~ 40°C																							
	Storage Temperature	-20 ~ 60°C																							
	Oper/Storage Humidity	≤ 90% RH, non-condensing																							
	Vib./shock Durability Protection	2G/10 times																							
Weight (kgs)	1.6	1.9	2.2	2.5	2.8	3.1	1.9	2.2	2.5	2.8	3.1	3.4	1.9	2.2	2.5	2.8	3.1	3.4	1.9	2.2	2.5	2.8	3.1	3.4	
Functions	- Positioning with speed, Accel						- Increment movement						- Stroke Limit end set						- Zone Signal output						
	- Home Direction Set						- Suitable Auto Max. Accel						- Zone Signal output						- Complete signal range set						

Notes: (*1) Typical data (*2) Stroke 200mm, 250mm and 300mm are available.

SCN6 Models (20Kgf, 40kgf, 50kgf & 60kgf Types)

Speed vs Thrust Curves



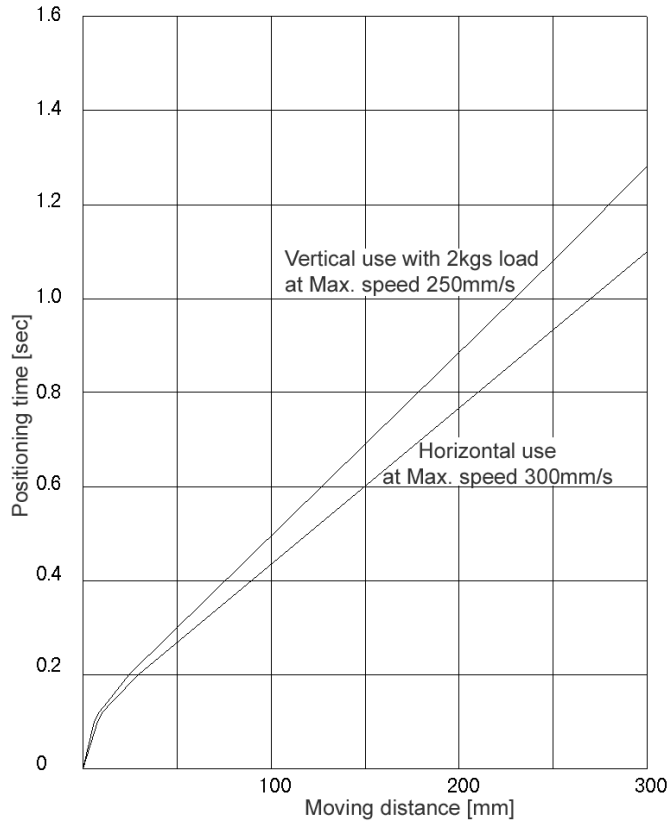
SCLL6 Model (Slider 20Kgf Type)

MODEL	SCLL6-020-300A	SCLL6-020-400A	SCLL6-020-500A	SCLL6-020-600A	SCLL6-020-700A	SCLL6-020-800A	SCLL6-020-900A	SCLL6-020-A00A	
Stroke (mm)	300	400	500	600	700	800	900	1000	
Max. Thrust (N) / (kgf)	200 / 20.4								
Max. vertical carriable wt at power ON	2.5 kgs								
Push mode max. Thrust (N)/(kgf)	140 / 14.2								
Max. Speed (mm/s) * note 1	300			280		220	180	150	
Repeatability (mm)	± 0.1								
Backlash (mm)	0.3								
Max. Load weight (kgs)	5			2		1			
Max. vertical load (kgs)	2.5			2		1			
Load moment (kgf-m)	Mp=0.5, My=0.5, Mr=0.5			Mp=0.3, My=0.3, Mr=0.3		Mp=0.2, My=0.2, Mr=0.2			
Overhang length (mm)	150 or shorter								
Program Capacity	16 Positionings								
Power Supply	DC24V ± 10% (Drive Power max. 3.0 Amps, Control power max. 0.2A)								
Life	3 years after the delivery, or 10,000 km operation under the use within the specs.								
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO)						
		Input current	Max. 4mA / port						
	Parallel Output	Names	DC24V type DI/DO Interface (Connector PIO)						
		Output current	Completed Position Number (4bit binary: PM1,PM2,PM4,PM8), Positioning complete(PFIN/INP), Homed signal(ZFIN), Zone signal(ZONE), Alarm (ALM)						
	Serial Signal		Serial Interface (Connector SIO)						
			+5V, 0V, S+, S-						
Protection function			Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected						
Ambience	Operate Temperature		0 ~ 40°C						
	Storage Temperature		-20 ~ 60°C						
	Ope/Storage Humidity		≤ 90% RH, not dew on the products						
Weight (kgs)	Actuator	3.7	4.7	5.7	6.7	7.7	8.7	9.7	10.7
	Amplifier	0.5							
Functions			Positioning with speed, Accele/Decel			Servo Gain Adjust			
			Push Force Mode			Stroke Limit end set			
			Home Direction Set			Zone Signal output			
			Speed Profile						
			Suitable Auto Max. Accel						

Notes: (*) Typical data, (**) Rodless Actuators with stroke of 600 ~ 1,000mm are not stock items. Please call for delivery.

5.1.2. Rod speed-thrust curve

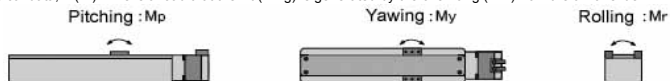
SCLL6 Model (Slider 20Kgf Type)



SCLL5 Model (Slider 10Kgf Type)

MODEL	SCLL5-010-050A	SCLL5-010-100A	SCLL5-010-150A	SCLL5-010-200A	SCLL5-010-300A			
Stroke (mm)	50	100	150	200	300			
Max. Thrust (N) / (kgf)	50 / 5							
Max. vertical carriable wt at power ON	1 kg							
Push mode max. Thrust (N)/(kgf)	30 / 3							
Max. Speed (mm/s) * note 1	300							
Repeatability (mm)	± 0.1							
Backlash (mm)	0.3							
Max. Load weight (kgs)	5 (Horizontal)							
Max. vertical load (kgs)	2.5							
Load moment (N-m) (kgf-cm)	Mp=0.5 / 5.1, My=0.5 / 5.1, Mr=2 / 20.4 (* note 2)							
Overhang length (mm) * note 3	100 or shorter							
Program Capacity	16 Motions							
Power Supply	DC24V ± 10% (Drive Power max. 3.0 Amps, Control power max. 0.2A)							
Life	3 years after the delivery, or 10,000 km operation under the use within the specs.							
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO) Position number (4 bit binary: PC1,PC2,PC4,PC8) Start (CSTR), Axis Movement Interlock (ILK)					
		Input current				Max. 4mA / port		
	Parallel Output	Names				DC24V type DI/DO Interface (Connector PIO), Position complete (PFIN/INP) Completed Position Number (4bit binary: PM1,PM2,PM4,PM8), Homed signal(ZFIN), Zone signal(ZONE), Alarm (ALM)		
		Output current						
Serial Signal		Serial Interface (Connector SIO) +5V, 0V, S+, S-						
Protection function		Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected						
Ambience	Operate Temperature		0 ~ 40°C					
	Storage Temperature		-20 ~ 60°C					
	Open/Storage Humidity		=< 90% RH, non-condensing					
Weight (kgs)	Actuator		1.0	1.2	1.3			
	Amplifier		0.5					
Functions		Positioning with speed, Accel/Decel Push Force Mode Home Direction Set Speed Profile Suitable Auto Max. Accel			Servo Gain Adjust Stroke Limit end set Zone Signal output			

Notes: (*1) Typical data, (*2) This is a load that the wt (m kg) is generated by the overhang (L m) from the arrior slider.

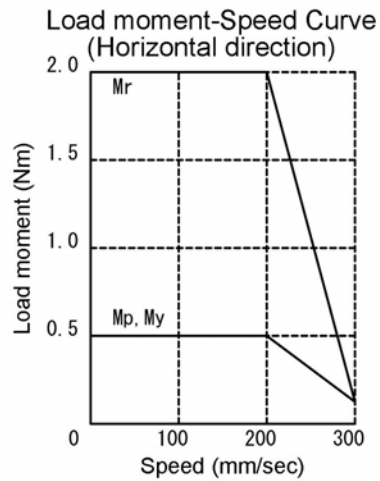
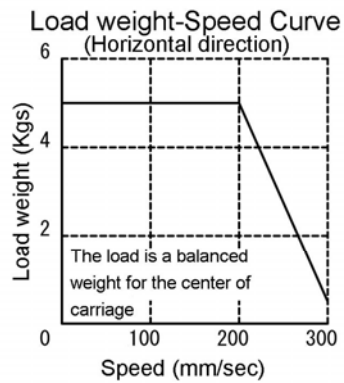
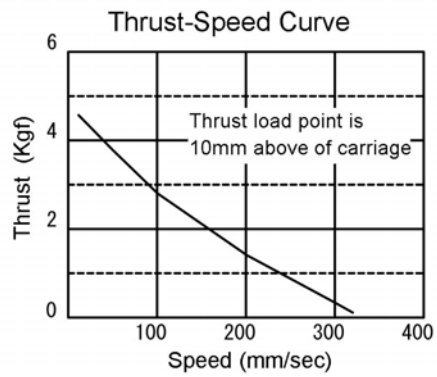


(The calculation of the load moement (kgf-cm) is: $m \text{ (kg)} \times L \text{ (cm)} < Mp, My, Mr$)

The actual moment will be combinations of those moments (Mp, Py, Mr).

Notes: (*3) This is the acceptable over hand length from the slider carriage.

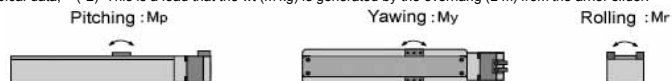
SCLL5 Model (Slider 10Kgf Type)



SCLG5 Model (Slider High Rigidity Type)

MODEL	SCLG5-010-050A	SCLG5-010-100A	SCLG5-010-150A	SCLG5-010-200A	SCLG5-010-300A
Stroke (mm)	50	100	150	200	300
Max. Thrust (N) / (kgf)	100 / 10.2				
Max. vertical carriable wt at power ON	3 kgs				
Push mode max. Thrust (N)/(kgf)	70 / 70.1				
Max. Speed (mm/s) * note 1	300				
Repeatability (mm)	± 0.1				
Backlash (mm)	0.3				
Max. Load weight (kgs)	10 (Horizontal)				
Max. vertical load (kgs)	2.5				
Load moment (N-m) (kgf-cm)	Mp=1.5 / 15, My=1.5 / 15, Mr=5 / 51 (* note 2)				
Overhang length (mm) * note 3	150 or shorter				
Program Capacity	16 Motions				
Power Supply	DC24V ± 10% (Drive Power max. 3.0 Amps, Control power max. 0.2A)				
Life	3 years after the delivery, or 10,000 km operation under the use within the specs.				
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO) Position number (4 bit binary: PC1,PC2,PC4,PC8) Start (CSTR), Axis Movement Interlock (ILK)		
		Input current			
	Parallel Output	Names	DC24V type DI/DO Interface (Connector PIO), Position complete (PFIN/INP) Completed Position Number (4bit binary: PM1,PM2,PM4,PM8), Homed signal(ZFIN), Zone signal(ZONE), Alarm (ALM)		
		Output current			
	Serial Signal		Serial Interface (Connector SIO) +5V, 0V, S+, S-		
Protection function	Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected				
Ambience	Operate Temperature		0 ~ 40°C		
	Storage Temperature		-20 ~ 60°C		
	Open/Storage Humidity		=< 90% RH, non-condensing		
Weight (kgs)	Actuator	1.3	1.5	1.7	1.9
	Amplifier	0.5			
Functions	Positioning with speed, Accel/Decel Push Force Mode Home Direction Set Speed Profile Suitable Auto Max. Accel		Servo Gain Adjust Stroke Limit end set Zone Signal output		

Notes: (*1) Typical data, (*2) This is a load that the wt (m kg) is generated by the overhang (L m) from the arrior slider.

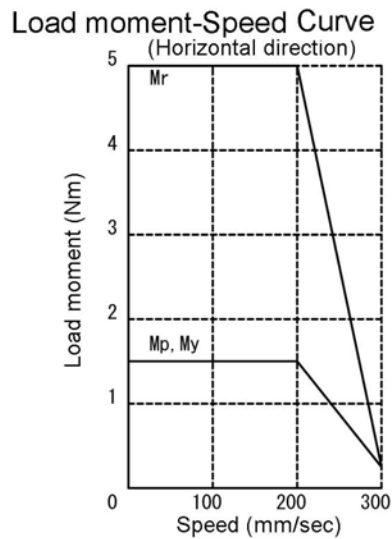
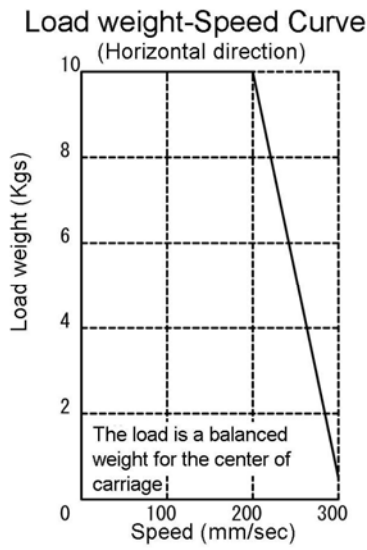
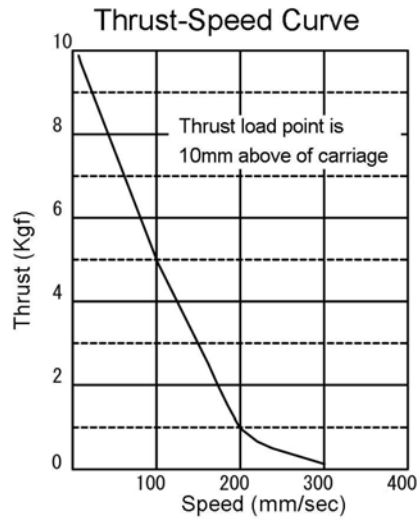


(The calculation of the load moement (kgf-cm) is: m (kg) x L (cm) < Mp, My, Mr)

The actual moment will be combinations of those moments (Mp, Py, Mr).

Notes: (*3) This is the acceptable over hand length from the slider carriage.

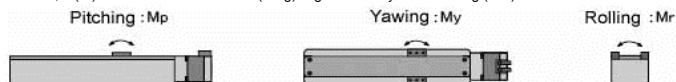
SCLG5 Model (Slider High Rigidity Type)



SCLT Models (15Kgf, 25kgf, 30kgf & 50kgf Types)

MODEL	SCLT4-015 -XXX AS	SCLT4-030 -XXX AS	SCLT6-025 -XXX AB	SCLT6-050 -XXX AB
Amplifier	Built-in to actuator		External	
Stroke (mm)	50 / 100 / 150 / 200 / 300 / 400 / 500		50 / 100 / 150 / 200 / 300 / 400 / 500 / 600 / 700	
Max. Thrust (N) / (kgf)	150 / 15	300 / 30	250 / 25	500 / 50
Max. carriable wt at pwr ON (kg)	1.5	2.5	4	6
Push mode max. Thrust (N)/(kgf)	105 / 10.5	210 / 21	175 / 17.5	350 / 35
Ball screw lead (mm)	12	6	12	6
Max. Speed (mm/s) * note 1	700 (680mm/s for 500mm stroke)	400 (340mm/s for 500mm stroke)	600 (500mm/s for for 700mm stroke)	350 (600mm: 340mm/s) (700mm: 250mm/s)
Repeatability (mm)	± 0.02	± 0.02	± 0.2	± 0.2
Backlash (mm)	0.1	0.1	0.1	0.1
Max. Hor Load weight (kg)	5	10	16	30
Max. vertical load (kg)	1.5	2.5	4	6
Load moment (Nm / kgf-cm) *2	Mp=12 / 120, My=12 / 120, Mr=31 / 310		Mp=25.7 / 257, My=25.7 / 257, Mr=58 / 580	
Program Capacity	16 Positions			
Power Supply	DC24V ± 10% (Drive Power max. 2.0 Amps, Control power max. 0.2A)			
Life	3 years after delivery, or 10,000 km operation when used within all specs.			
I/O	Parallel Input	Names	DC24V type Digital Input Interface Position select bits (4 bit binary coded decimal: PC1,PC2,PC4,PC8) Start (CSTR), Movement Interlock (ILK)	
		Input current	Max. 4mA / port, PNP Standard	Max. 4mA / port, PNP Standard
	Parallel Output	Names	DC24V type Digital Output Interface Completed Position Number (4bit binary: PM1,PM2,PM4,PM8) : (SCLT6 Only) Homed signal (ZFIN), Zone signal(ZONE), Alarm (ALM), Position complete (PFIN/INP)	
		Output current	Max. 10mA / port, PNP Standard	Max. 10mA / port, PNP Standard
	Serial Signal	Serial Interface (Connector SIO) +5V, 0V, S+, S-, ASCII Protocol Freely Available		
Protection function	Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected			
Ambience	Operate Temperature	0 ~ 40°C		
	Storage Temperature	-20 ~ 60°C		
	Ope/Storage Humidity	=< 90% RH, non-condensing		
Weight (kgs)	1.42/1.53/1.64/1.74/1.96/2.18/2.4		2.7 / 2.9 / 3.1 / 3.3 / 3.7 / 4.1 / 4.5 / 5.0 / 5.4	

Notes: (*1) Typical data, (*2) This is a load that the wt (m kg) is generated by the overhang (L m) from the arrior slider.



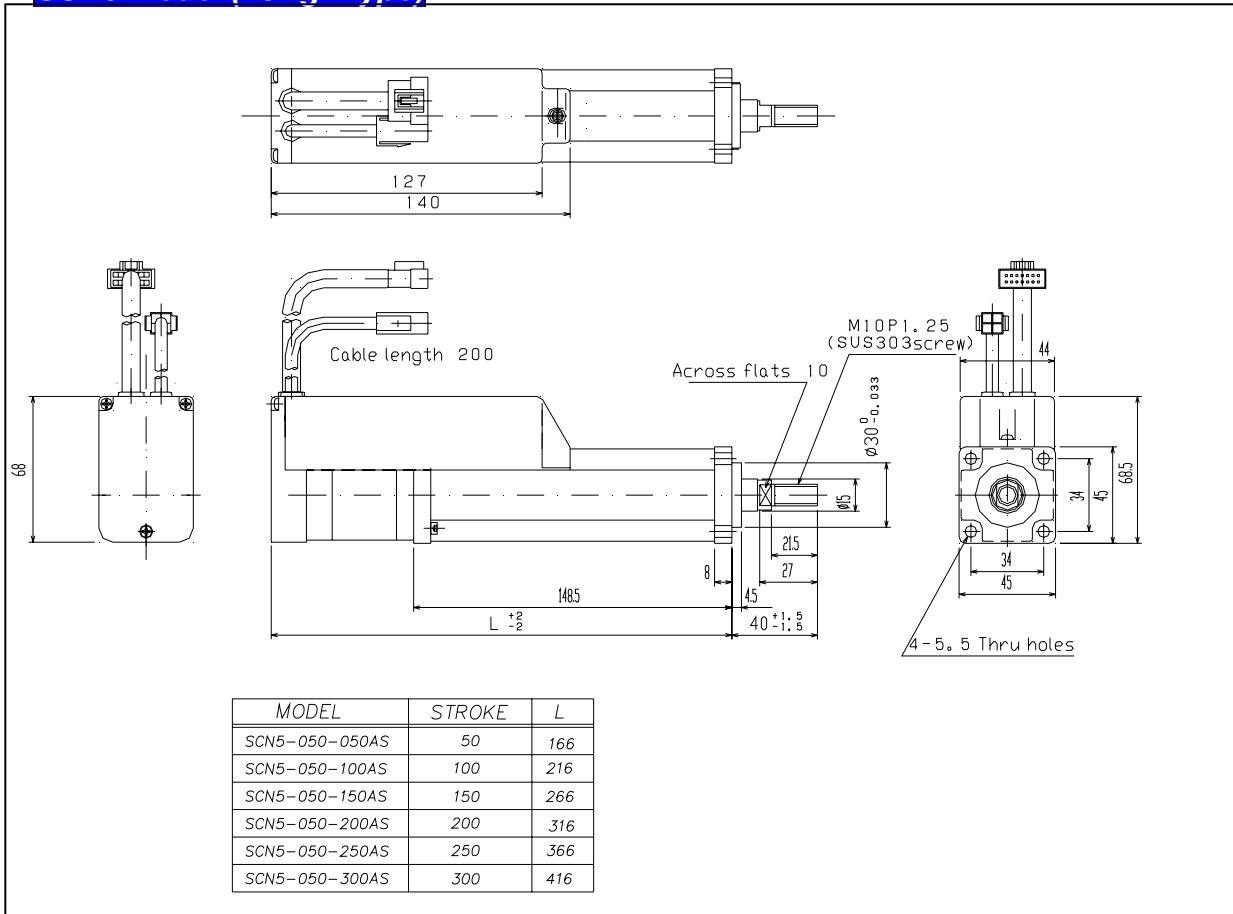
(The calculation of the load moement (kgf-cm) is: m (kg) x L (cm) < Mp, My, Mr)

The actual moment will be combinations of those moments (Mp, Py, Mr).

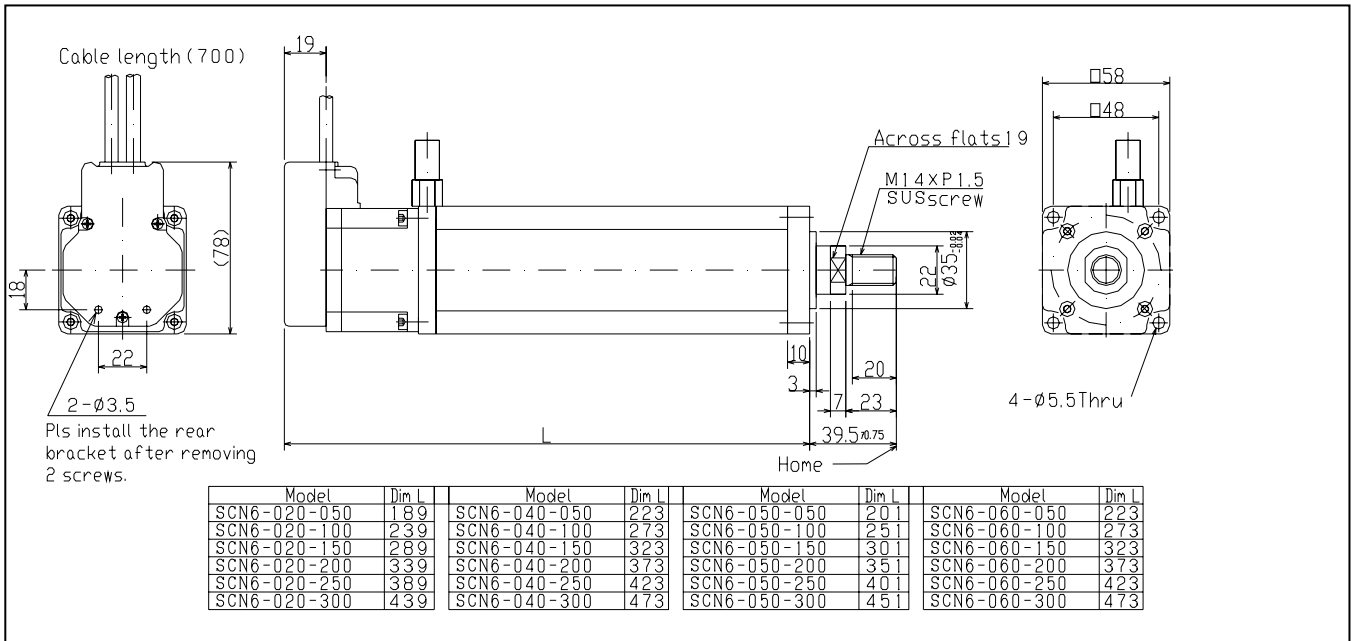
5.1.3. Dimensions

Actuator layout drawings:

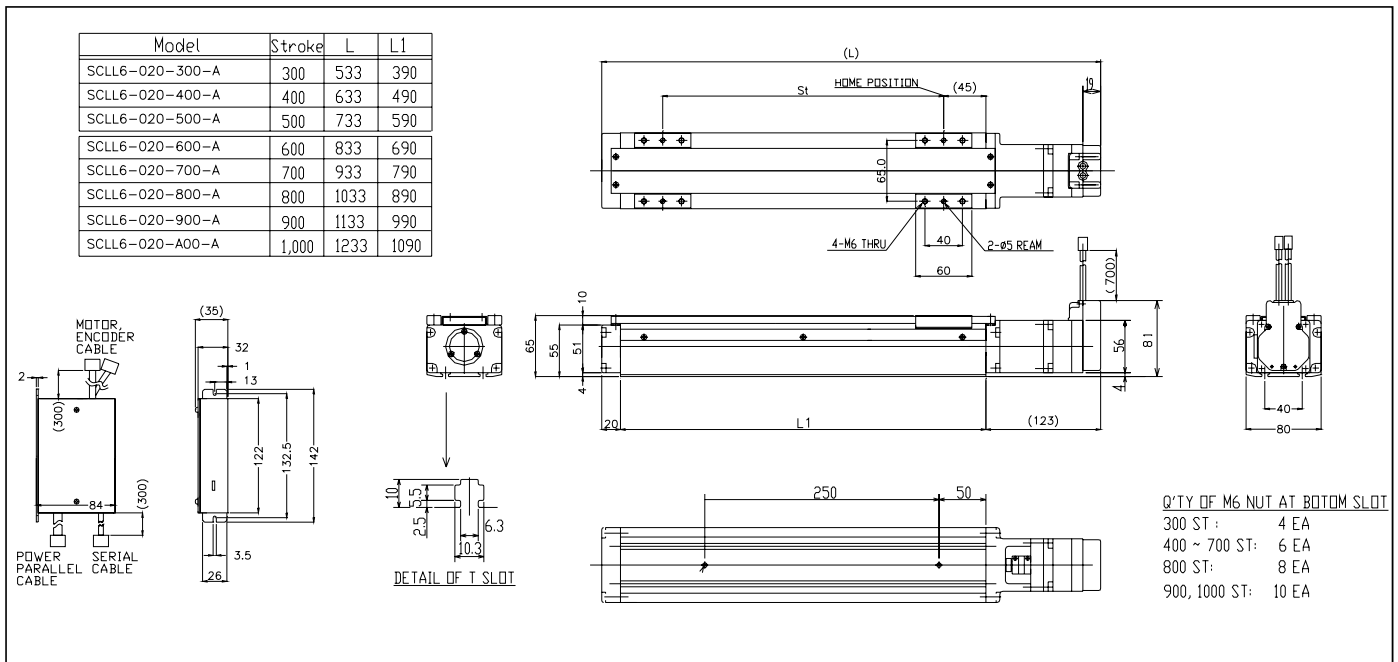
SCN5 Model (10Kgf Type)



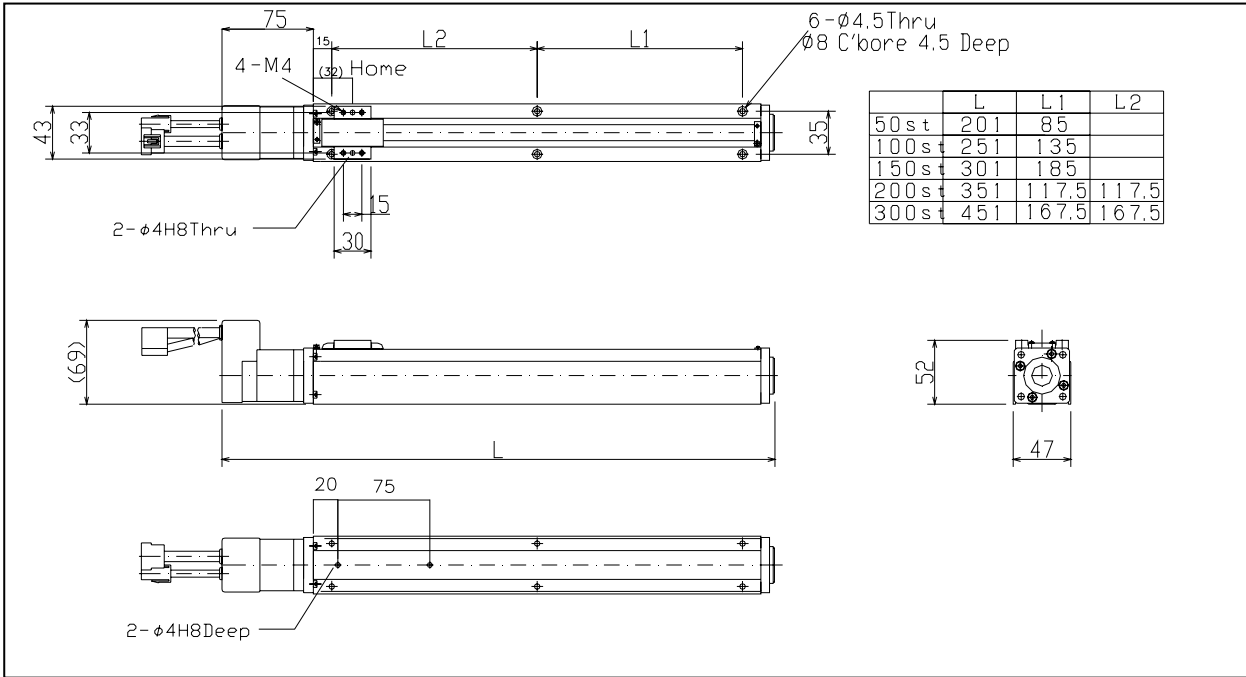
SCN6 Models (20Kgf, 40kgf, 50kgf & 60kgf Types)



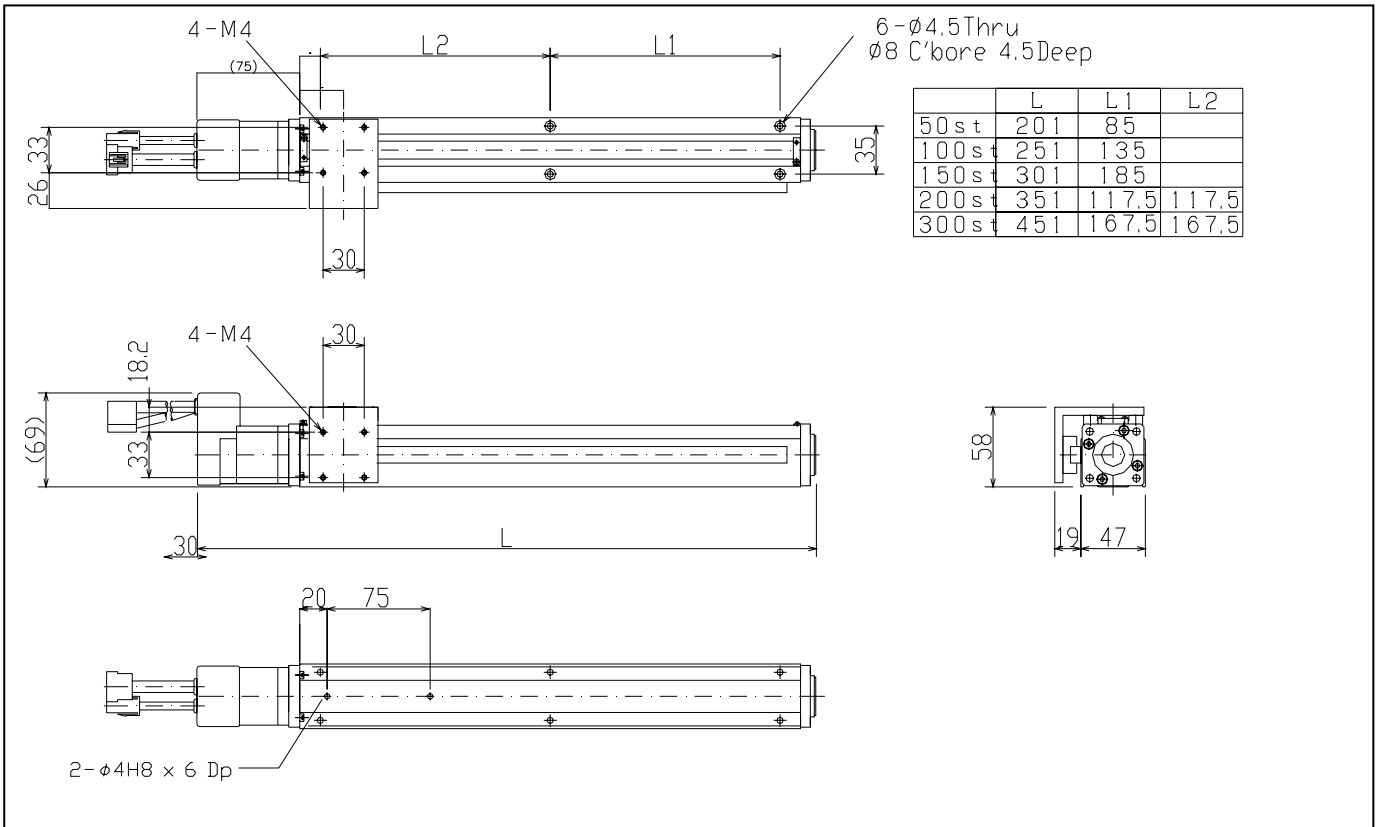
SCLL6 Model (Slider 20Kgf Type)



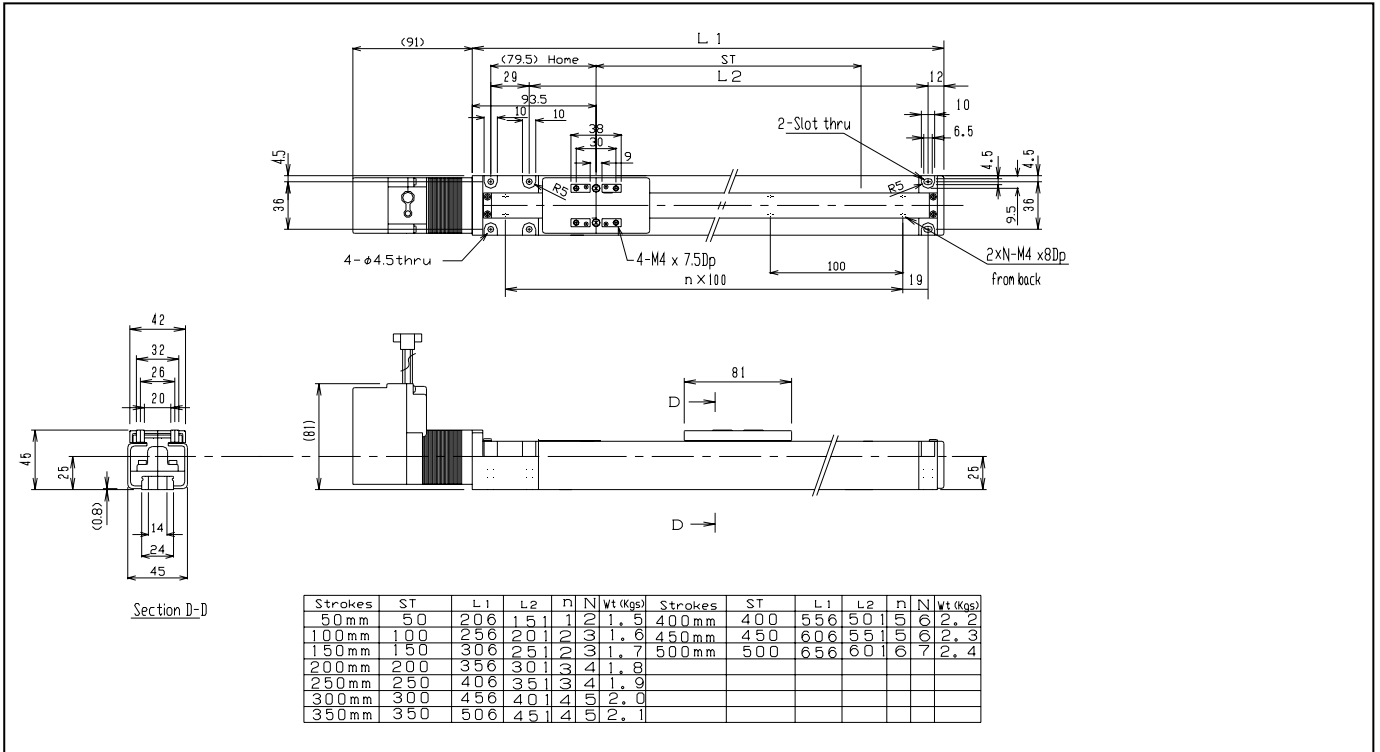
SCLL5 Model (Slider 10Kgf Type)



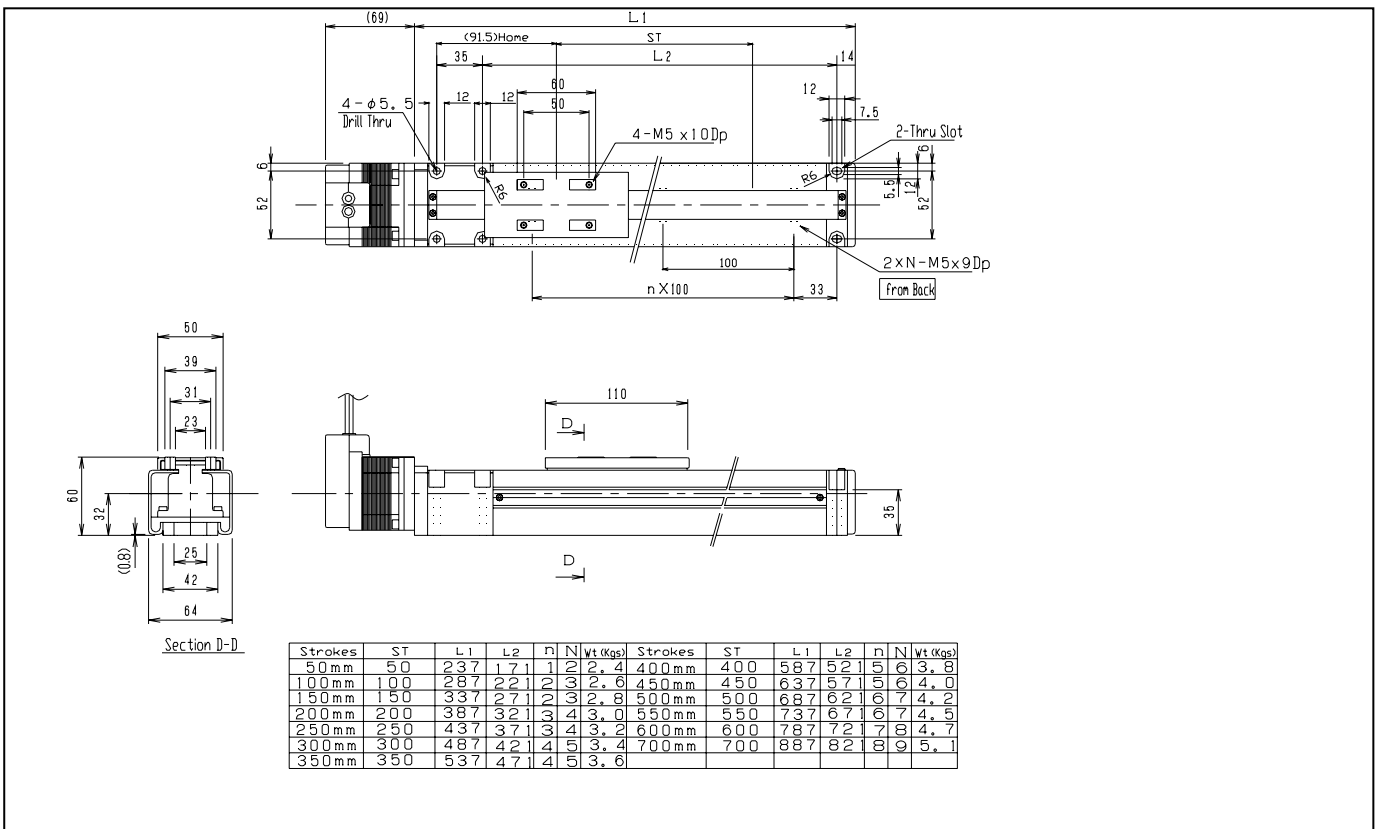
SCLG5 Model (Slider High Rigidity Type)



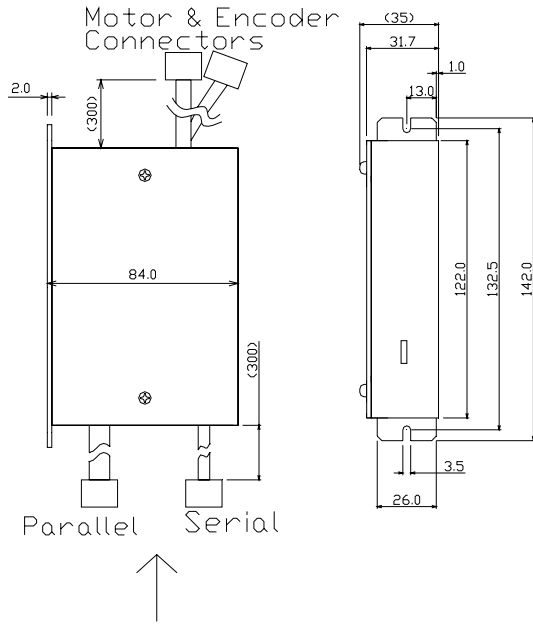
SCLT4 Models (15Kgf & 30kgf Types)



SCLT6 Models (25Kgf & 50kgf Types)



External Amplifier (SCN6, SCLL, SCLT)



Pin No.	Signals
1	A
2	/A
3	B
4	/B



Pin No.	Signals
1	ENA
2	/ENA
3	ENB
4	/ENB
5	-
6	-
7	0V
8	5V
9	FG



Pin No.	Signals
1	24V(Drive)
2	0V(Drive)
3	24V(Control)
4	0V(Control)
5	PC1
6	PC2
7	PC4
8	PC8
9	CSTR
10	(NC)
11	(NC)
12	ILK
13	(NC)
14	(NC)
15	PM1
16	PM2
17	PM4
18	PMB
19	PFIN
20	ZFIN
21	ZDNE
22	ALM
23	(NC)
24	FG



Pin No.	Signals
5V	
2	TRX+
3	0V
4	TRX-

Note: Above connector layout is according to the face from the arrow at Amplifier drawing.

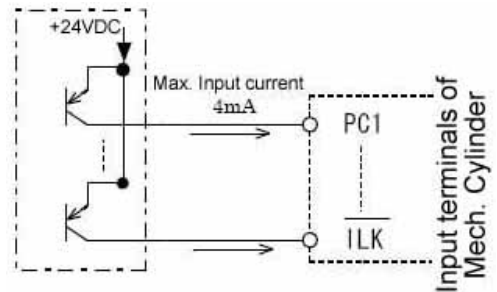
6. Interface specifications

6.1. Circuit Diagrams for 24VDC I/O (PNP)

(1) PIO (24VDC) Input circuit

Input signal ON is defined as electrical connection of +24V with Input signal.

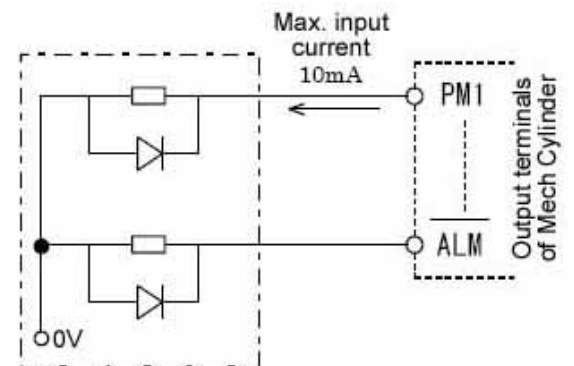
Input signal OFF is electrical open of Input signal. The max. input current is 4mA.



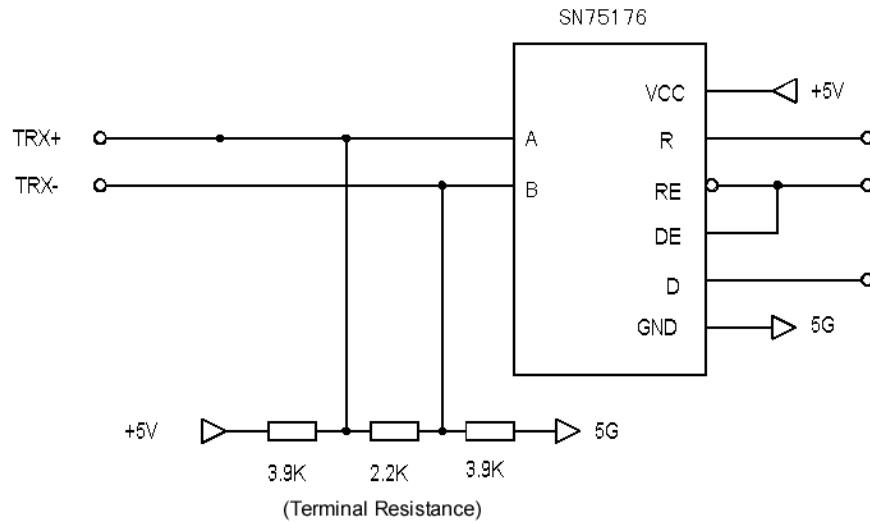
(2) PIO (24VDC) Output Circuit

Output signal ON is defined as electrical connection of OVDC with Output signal.

Definition of Output signal OFF is electrical open of Output signal



(3) SIO (Serial I/O) Circuit



6.2. PIO specifications

6.2.1. Input signals

SCN5 Model (10Kgf Type)

Number	Symbol	Functions
1	+24V	Power DC24V, positive
2	0VDC	Power DC24V, common
3	PC1	Input of Position registration number: Total of PC1 to PC8 ON means 1, OFF means 0
4	PC2	Input of Position registration number: Total of PC1 to PC8 ON means 2, OFF means 0
5	PC4	Input of Position registration number: Total of PC1 to PC8 ON means 4, OFF means 0
6	PC8	Input of Position registration number: Total of PC1 to PC8 ON means 8, OFF means 0
7	CSTR	Strobe input for Input of Position registration number 1. At the edge of OFF=>ON, the controller reads the sum of PC1~8, then it will move the cylinder to the target position. (same as positioning order) 2. At the edge of OFF=>ON of when Home is unknown, it will move the cylinder to home, then move it to the target position.
8	ILK	Axis movement Interlock input 1. If turned OFF during a move, the cylinder will stop, then register the position where the cylinder stopped as the temporary target position, maintaining the original target position in memory. 2. When the <u>ILK</u> signal is turned ON, the registered temporary position will be deleted and the original target position will become the target position. Motion will resume immediately. ("Cancel" function is also available)

SCN6 Models / SCLT Models.
SCLL Model (External amplifier type)

Number	Symbol	Functions
1	+24V	Main Power DC24V, positive
2	0V	Main Power DC24V, common
3	+24V	Control Power DC24V, positive
4	0V	Control Power DC24V, common
5	PC1	Input of Position registration number: Total of PC1 to PC8 ON means 1, OFF means 0
6	PC2	Input of Position registration number: Total of PC1 to PC8 ON means 2, OFF means 0
7	PC4	Input of Position registration number: Total of PC1 to PC8 ON means 4, OFF means 0
8	PC8	Input of Position registration number: Total of PC1 to PC8 ON means 8, OFF means 0
9	CSTR	Strobe input for Input of Position registration number 1. At the edge of OFF=>ON, the controller reads the sum of PC1~8, then it will move the cylinder to the target position. 2. At the edge of OFF=>ON of when Home is unknown, the cylinder will move to home, then move to the target position automatically.
10	NC	No connection
11	NC	No connection
12	ILK	Axis movement Interlock input E-Stop Input Mode 1. If the ILK signal is interrupted (switched to OFF) during the rotation, it will stop the cylinder with full power and register the position where the cylinder stopped as its temporary target position. 2. When the <u>ILK</u> signal is resumed, the registered temporary position will be deleted and the axis will immediately resume the previously commanded motion to the original target position. ("Cancel" function is also available)
13	NC	No connection
14	NC	No connection

Reference : Position number combination Table (for all models)

Position Number Register	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
PC1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
PC2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
PC4	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
PC8	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
CSTR	<div style="display: flex; align-items: center;"> <div style="border-bottom: 1px solid black; width: 20px; height: 10px; margin-right: 5px;"></div> ↑ (At Starting up, Data of PC1 to PC8 will be read) </div>															

6.2.2. Input signal details

[+24V]

Power input. The control power for the Mechatronics Cylinder is +5V generated within the servo controller.

The alarm signal will be reset by turning OFF the main power input and CSTR signal turning ON after the cause of the alarm is fixed.

[0V]

Common. This is common with the lower voltage (Ground) of the control power circuit and the lower voltage side of serial interface.

[PC1] [PC2] [PC4] [PC8]

These are the destination position number inputs. When the input signal edge of CSTR changes (OFF => ON), the destination position numbers inputs are checked (their bit weight is 2^0 of PC1, 2^1 of PC2, 2^2 of PC4 and 2^3 of PC8). Please note that the inputs of PC1 to PC8 must be ready when the CSTR signal changes from OFF to ON. If the input conditions of PC1 to PC8 change after the rising edge of the CSTR input, there won't be any influence to the motion (when the cylinder is configured in Normal mode)

If the application requires only 2 places, only any one of the position number inputs is needed.

For example:

[PC1] input can select position numbers 0 and 1.

[PC2] input can select position numbers 0 and 2.

[PC4] input can select position numbers 0 and 4.

[PC8] input can select position numbers 0 and 8.

[CSTR]

This is a strobe input. When CSTR goes high (OFF => ON), the destination position numbers (PC1, 2, 4, and 8) are read in 4-bit binary and summed to determine which motion to run. Due to the internal filter, the CSTR signal must be ON for 4ms or longer. If this signal edge is detected before homing has been completed (when ZFIN output is turned OFF), the homing operation will be executed automatically, after which the actuator will immediately run the requested motion.

The CSTR and PC1, 2, 4, and 8 inputs can theoretically be turned on at the same time, however, some PLCs may have slight delays in the response of their outputs, in which case the PC1, 2, 4, and 8 inputs may not finish switching before the rising edge of the CSTR input is registered. To be safe it is recommended to switch the PC1 to 8 inputs at least 4ms before the CSTR input is turned ON.

When the CSTR signal is turned ON, the PFIN signal will be turned OFF. If the CSTR signal is kept ON when the actuator has reached its destination, the PFIN signal won't be turned ON. Please keep the CSTR signal ON for at least 4ms and turn it off before the actuator finishes its move.

[ILK]

The ILK input will either cancel or pause the motion of the actuator when the input status drops to 0VDC. The teach pendant or PC Tool software can change this behavior. The default setting is the "Pause" mode. The ILK input should be always turned ON for normal operation.

Details for the Pause mode (Default):

If the ILK signal is turned OFF during motion, the actuator will start to decelerate (at maximum or programmed decel) then stop. This stop position is designated as the temporary destination position but the original destination position is still stored.

When the ILK signal turns back ON, the temporary destination position is deleted, and the original destination position is set to the current destination. The moves restarts to the original destination position.

If a new position command is executed (using PC1, 2, 4, 8 and CSTR) while the ILK signal is turned OFF, the actuator will move to the new position after the ILK signal is turned back ON.

If the ILK signal is turned OFF and the actuator stops, the PFIN signal stays OFF, however, the PFIN signal will turn ON after the ILK signal is resumed (ON) and the actuator reaches the destination position.

Move command cancel input mode:

If the new MOVE command is entered when the ILK signal is turned OFF and the actuator stops, the new MOVE command will be disregarded.

If the ILK signal is turned OFF and the actuator stops, the PFIN signal is turned ON. The PFIN signal stays ON when the ILK signal is turned back ON.

6.2.3 Output signal

SCN5 Model (10Kgf Type)

Number	Symbol	Functions
9	PFIN	<p>Position completion output</p> <p>① ON: The output goes high when the Mechatronics Cylinder has moved to within the position width tolerance of the target position. Please note that PFIN signal won't be turned ON until the CSTR signal is turned OFF.</p> <p>② OFF: The output goes low when motion to a new target position is initiated.</p> <p>Notes: -The tolerance used to determine when the PFIN output goes high is set by the "At Position Width" variable in the programming device. -This output will not operate properly if the "CSTR" signal is left high. The CSTR signal should be pulsed OFF-ON-OFF to initiate motion, and therefore is expected to be OFF when motion finishes.</p>
10	ZFIN	<p>Homing completion output</p> <p>① ON: The output will be ON after homing completion.</p> <p>② OFF: The output is OFF after the Mechatronics Cylinder is first powered up and /or when an encoder-related alarm occurs. ZFIN won't be turned ON until the homing is completed.</p>
11	ZONE	<p>Zone signal output</p> <p>① ON: The output will be ON when the position of the axis is within the range programmed to be the "Zone".</p> <p>② OFF: The output will be OFF if the axis has not been homed or if the rod is outside the programmed zone.</p>
12	ALM	<p>Controller alarm output</p> <p>① ON: The output will be ON during normal operation.</p> <p>② OFF: The output will be OFF in case of Alarm.</p>

SCN6 Models / SCLT Models
SCLL Model (External amplifier type)

No.	Symbol	Functions
15	PM1	Completion signal output: Total of PM1 to PM8 ON means 1, OFF means 0
16	PM2	Completion signal output: Total of PM1 to PM8 ON means 2, OFF means 0
17	PM4	Completion signal output: Total of PM1 to PM8 ON means 4, OFF means 0
18	PM8	Completion signal output: Total of PM1 to PM8 ON means 8, OFF means 0
19	PFIN	<p>Position completion output</p> <p>① ON: The output goes high when the Mechatronics Cylinder has moved to within the position width tolerance of the target position. Please note that PFIN signal won't be turned ON till CSTR signal is turned OFF.</p> <p>② OFF: The output goes low when motion to a new target position is initiated.</p> <p>Notes: -The tolerance used to determine when the PFIN output goes high is set by the "At Position Width" variable in the programming device. -This output will not operate properly if the "CSTR" signal is left high. The CSTR signal should be pulsed OFF-ON-OFF to initiate motion, and therefore is expected to be OFF when motion finishes.</p>
20	ZFIN	<p>Homing completion output</p> <p>① ON: The output will be ON after homing completion.</p> <p>② OFF: The output is OFF after the Mechatronics Cylinder is first powered up and /or when an encoder-related alarm occurs. ZFIN won't be turned ON until the homing is completed.</p>
21	ZONE	<p>Zone signal output</p> <p>① ON: The output will be ON when the position of the axis is within the range programmed to be the "Zone".</p> <p>② OFF: The output will be OFF if the axis has not been homed or if the rod is outside the programmed zone.</p>
22	ALM	<p>Controller alarm output</p> <p>① ON: The output will be ON during normal operation.</p> <p>② OFF: The output will be OFF in case of Alarm occurs.</p>
23	NC	No connection
24	FG	Frame Ground

6.2.4. Output signal details

[PFIN]

This is the position completion signal.

The output first goes high after the power supply is turned ON and the servo amplifier is ready for operation. The PFIN signal will be turned OFF when the CSTR signal is turned ON to command a move. PFIN will be turned back ON when the current actuator position is within the range of the "At Position Width" parameter (set in the programming package) from the programmed destination position if the CSTR signal has been turned OFF.

The PFIN signal will also be turned OFF if the actuator is beyond the software stroke limit.

[ZFIN]

This is the homing completion output.

This output will be low when the power is turned ON and if any error/alarm relating to encoder has occurred.

This output will be high after the homing operation is completed.

The ZFIN signal won't be turned OFF during operation except in case of position feedback errors or control power shut down.

[ZONE]

This output signal will be high when the actuator position is within the zone boundaries set in the programming software or teach pendant.

This output will be low before homing completion (when the ZFIN output signal is OFF) and when the actuator is outside of the programmed ZONE range.

The ZONE output won't be affected by alarm conditions.

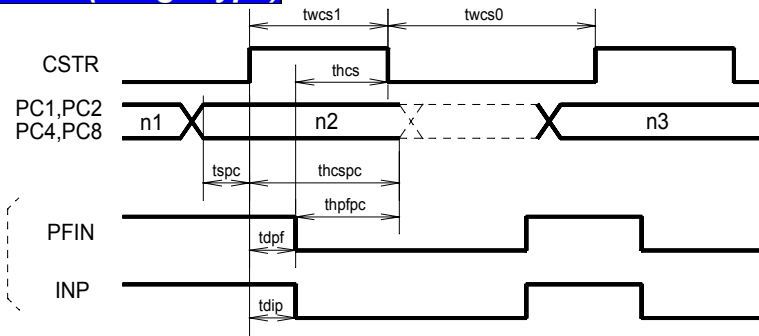
[ALM]

This is the alarm output and this output signal will be high when the operation is under normal conditions. This output signal will be low when an error has occurred. Alarm codes can be read from the pendant or software and referenced in section 9.

6.2.5. Timing Chart

Following is timing chart of the operation with parallel interface connection (PIO connection):

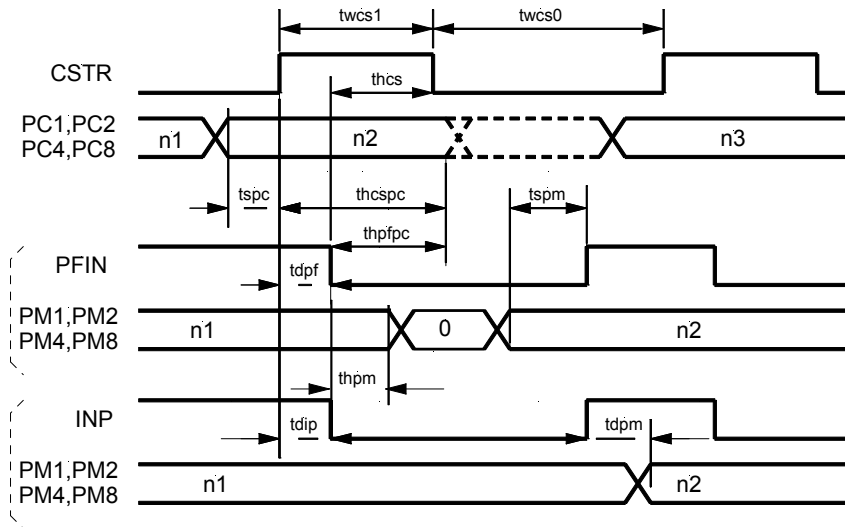
SCN5 Model (10Kgf Type)



Name	Min.	Max.	Descriptions
twcs1	4 msec		CSTR ON shortest timing duration
twcs0	4 msec		CSTR OFF shortest timing duration
thcs	0 msec		PFIN OFF=>PC1 holding time
tspc	0 msec		CSTR ON=>PC1-PC8 set up time
thcspc	4 msec		CSTR ON=>PC1-PC8 holding time
thpfpc	0 msec		PFIN OFF=>PC1-PC8 holding time
tdpf		4 msec	CSTR ON=>PFIN OFF delay time
tdip		4 msec	CSTR ON=>INP OFF delay time

(Note 1) Above is timing in case of 10K Ω load or smaller of output circuit.

SCN6 Models / SCLT Models
SCLL Model (External amplifier type)



Name	Min.	Max.	Descriptions
<i>twcs1</i>	4 msec		CSTR ON shortest timing duration
<i>twcs0</i>	4 msec		CSTR OFF shortest timing duration
<i>thcs</i>	0 msec		PFIN OFF=>CSTR holding time
<i>tspc</i>	0 msec		CSTR ON=>PC1~PC8 set up time
<i>thcspc</i>	4 msec		CSTR ON=>PC1~PC8 holding time
<i>thpfpc</i>	0 msec		PFIN OFF=>PC1~PC8 holding time
<i>tdpf</i>		4 msec	CSTR ON=>PFIN OFF delay time
<i>tspm</i>	0 msec		PFIN ON=>PM1~PM8 set up time
<i>thpm</i>		4 msec	PFIN OFF=>PM1~PM8 0 Output delay time
<i>tdip</i>		4 msec	CSTR ON=>INP OFF delay time
<i>tdpm</i>		4 msec	INP ON=> PM1 ~ PM8 establishment delay time

(Note 1) Above is timing in case of 10K Ω load of output circuit or smaller.

6.3. Specification of SIO

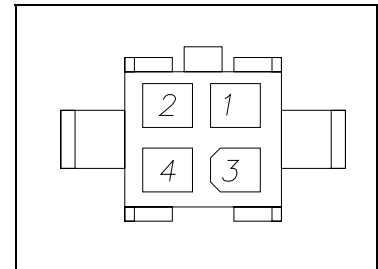
In case of use of SIO, please refer the enclosed manual of “Termi-BUS Interface”.

6.3.1. Summary

Electrical specification: Compatible with RS485
 Speed: Selectable in the range of 9.6 kbps ~ 115.2 kbps
 (9.6 kbps only after the BREAK order)
 Synchronizing method: Micro timing adjusting method
 Data (1 character) length: 8 bit
 Parity: None
 Start/Stop bit: 1 bit
 Xon/Xoff: Non
 Pallet length: 16 characters
 (Structure: STX + data 12 characters + check sum 2 characters x etx)
 Connection type: BUS connection (multi point connections: Max 16 axes)
 Connectors: Connectors made by AMP company

Mechatronics Cylinder Connector Pin Layout

No.	Name	Functions
1	+5V	
2	TRx+	Transmitter/Receiver+
3	5G	Signal Ground
4	TRx-	Transmitter/Receiver-



7. Support equipment

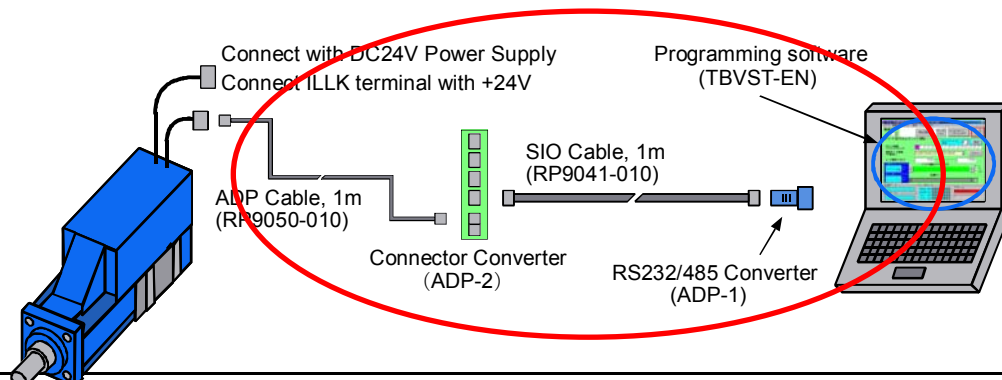
7.1. PC Tool (Model: TBVST-EN-SET)

PC Tool is a PC software kit to operate JOG and other set up for single axis.

(1) Contents of PC Tool, Model: TBVST-EN-SET (see red circle in the following figure)

- ①-1 PC Setting Tool : TBVST-EN (to install it in PC for Online operation)
- ①-2 Offline Setting Tool : CTA-1EX (to install it in PC for Online/Offline operation)
- ①-3 PC PLC Software : CTC-Tool (to install it in PC for sequence program)
- ①-4 Motor Set Up Tool : MVST-EN (to install it in PC for RSA servo motor set up)
- ② RS232/RS485 Adaptor : ADP-1 (to connect with PC serial port)
- ③ Connector Junction : ADP-2-4 (Junction for cables)
- ④ ADP Cable (1m) : RP9050-010 (to connect Mechatronics Cylinder and ADP-2-4)
- ⑤ SIO Cable (1m) : RP9041-010 (to connect ADP-1 and ADP-2-4)

Tool kit Circled in Red



Refer to the PC-Tool Manual for more information.

(2) How to install

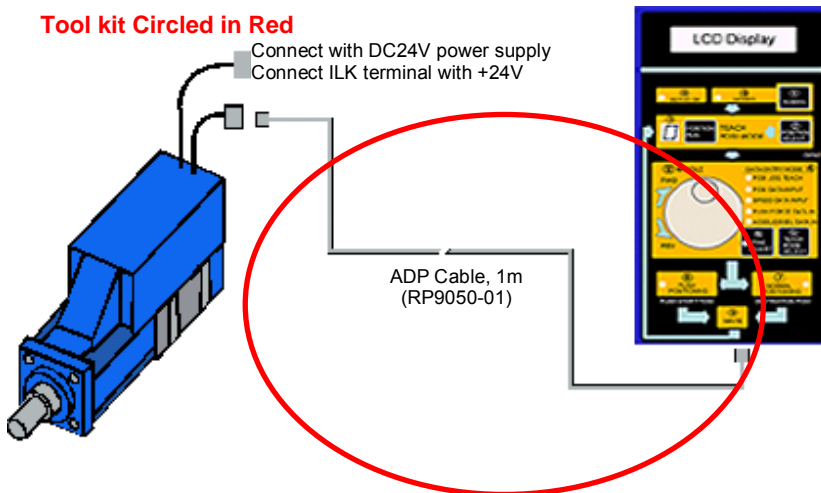
Installation condition of PC is as follows:
WINDOWS 95, 98, 2000, NT 4.0

Please click the program button to start installation.

7.2. Teaching Pendant Tool (Model: CTA-23EN-SET)

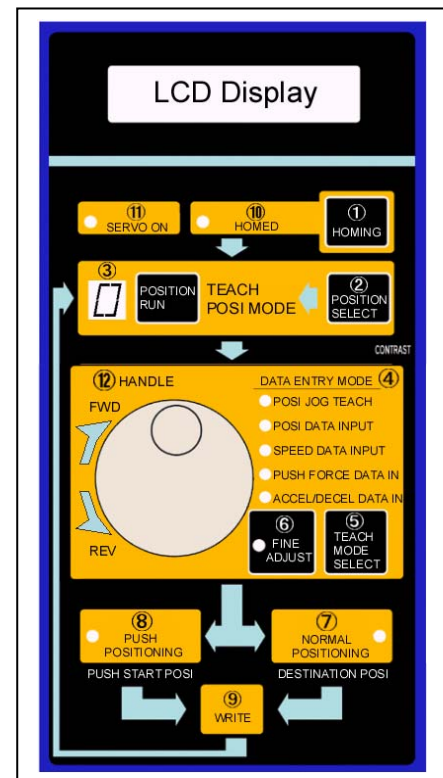
(1) Contents of Teaching Pendant tool kit, Model: CTA-23ENS-SET (see red circle in the following figure)

- ① Teaching Pendant : CTA-23EN (to connect with Mechatronics Cylinder)
- ② ADP Cable (1m) : RP9050-010 (to connect Mechatronics Cylinder and CTA-23)



(2) View of Teaching Pendant

(3) Please refer to the Teaching Pendant operation manual for details.

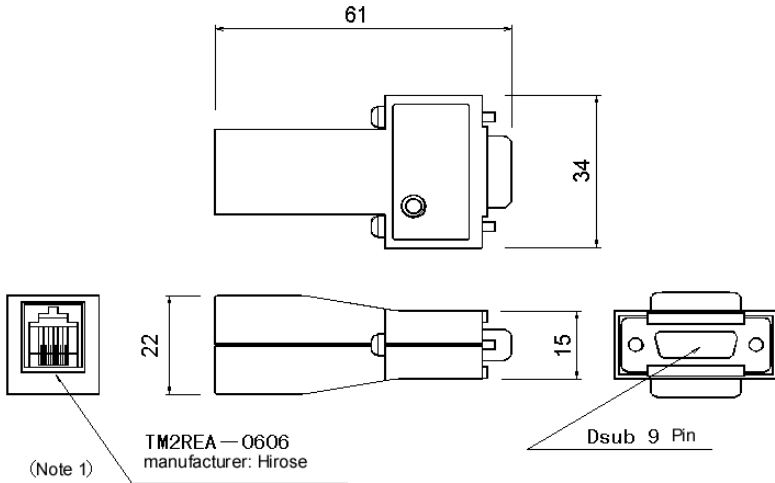


7.3. RS232C/RS485 Junction Converter Circuit

(Model: ADP-1)

(1) Model No.: ADP-1

(2) Dimensions

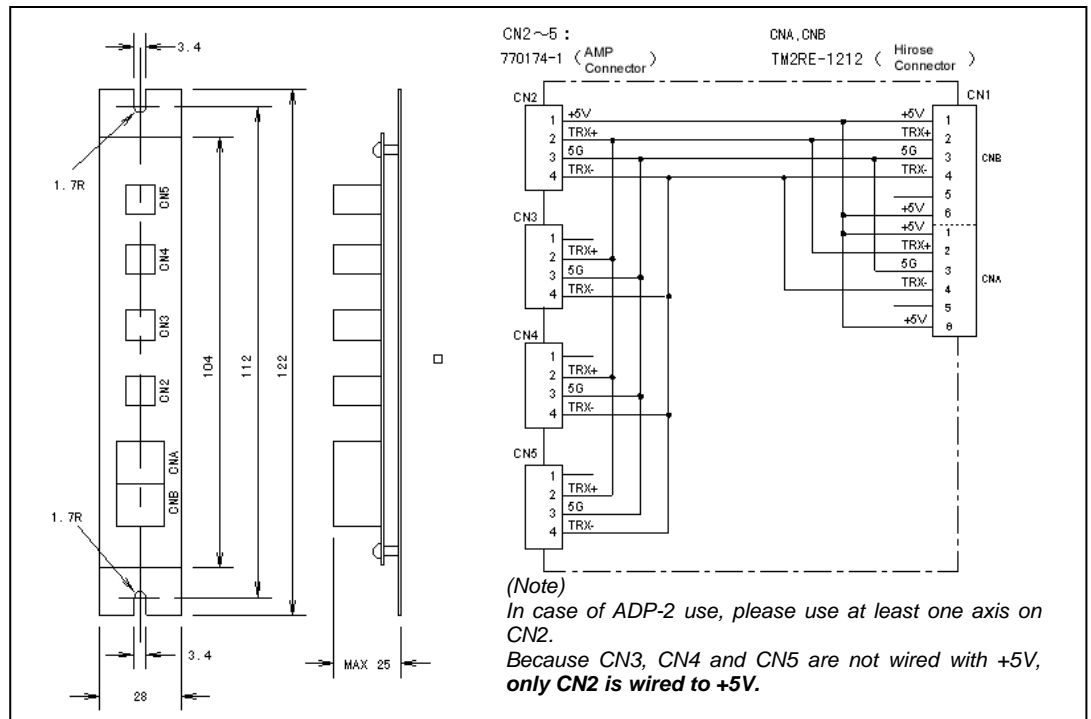


Please refer to 4.4 (wiring examples of outside connections) for connector connection. Please use SIO cable (6 conductors) for connector cable.

7.4. Connector Converter: ADP-2-4

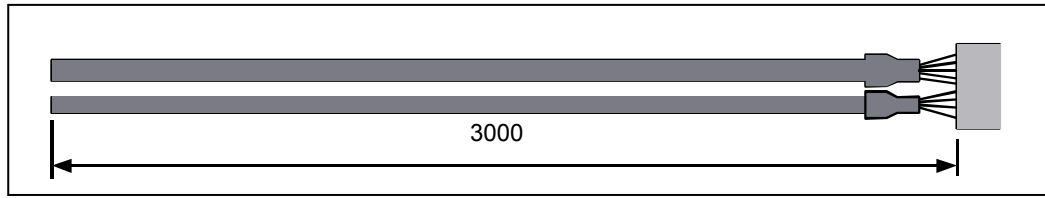
(1) model: ADP-2

(2) Dimensions and circuit diagram



7.5. Cables

(1) Parallel connector cable



SCN5 Model (10Kgf Type)

(Model: RP9100-030)

Connector	Made by Hirose
Socket	DF1B-14DES-2. 5RC
Pin	DF1B-2022SC (AWG22-20) DF1B-2428SC (AWG26-24)

3	PC1	Black
4	PC2	White
5	PC4	Red
6	PC8	Green
7	CSTR	Yellow
8	ILK	Brown
9	PFIN	Blue
10	ZFIN	Gray
11	ZONE	Orange
12	ALM	Light green

1	+24V	Red
2	0V	Black
13	FG	Green
14	FG	White

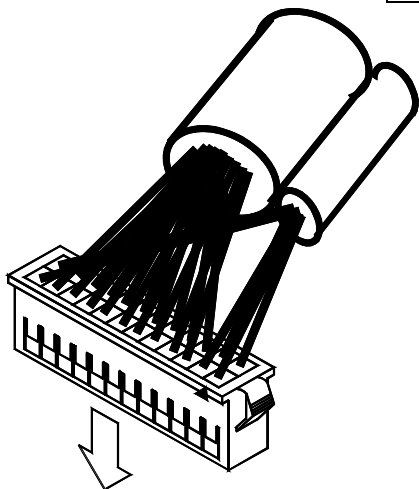
SCN6 Models / SCLT Models. SCLL Model (External amplifier type)

(Model: RP9120-030)

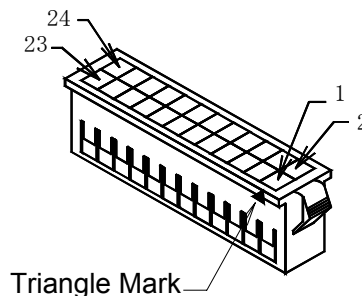
Connector	Made by Hirose
Socket	DF1B-24DES-2. 5RC
Pin	DF1B-2022SC (AWG22-20) DF1B-2428SC (AWG28-24)

5	PC1	Black	15	PM1	Grey
6	PC2	White	16	PM2	Pink
7	PC4	Red	17	PM4	Light Green
8	PC8	Green	18	PM8	Orange
9	CSTR	Yellow	19	PFIN	Light blue
10	NC	Brown	20	ZFIN	Dark Brown
11	NC	Blue	21	ZONE	White/Black
12	ILK	Purple	22	ALM	Red/Black

1	+24V	Red	4	0V	White
2	0V	Black	23	NC (No connection)	Brown
3	+24V	Yellow	24	Ground	Green



Parallel cable pin number locations of RP9120)



To the Mechatronics Cylinder Controller

(2) Serial connector cable (model: RP9050-030)
(applicable for any Mechatronics Cylinders)



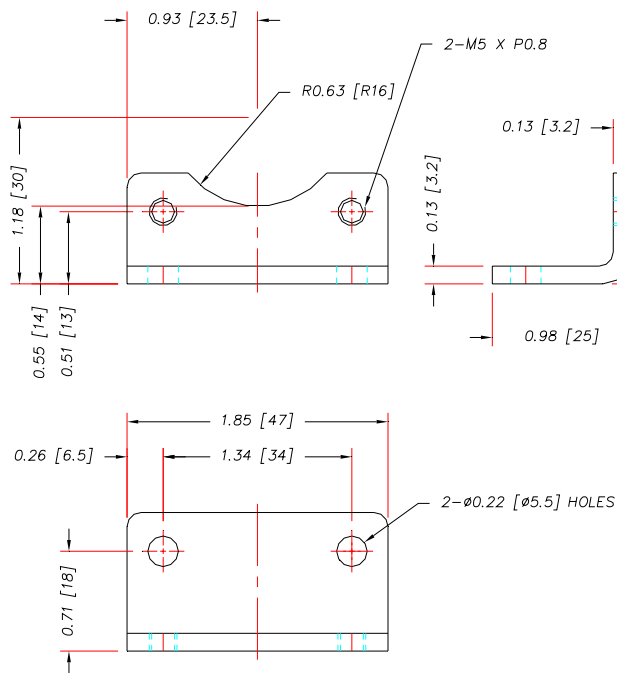
1	+5V	Red
2	TRx+	White
3	0V	Black
4	TRx-	Green

Connector	Made by AMP Co.
Socket	172167-1
Plug	170365-1

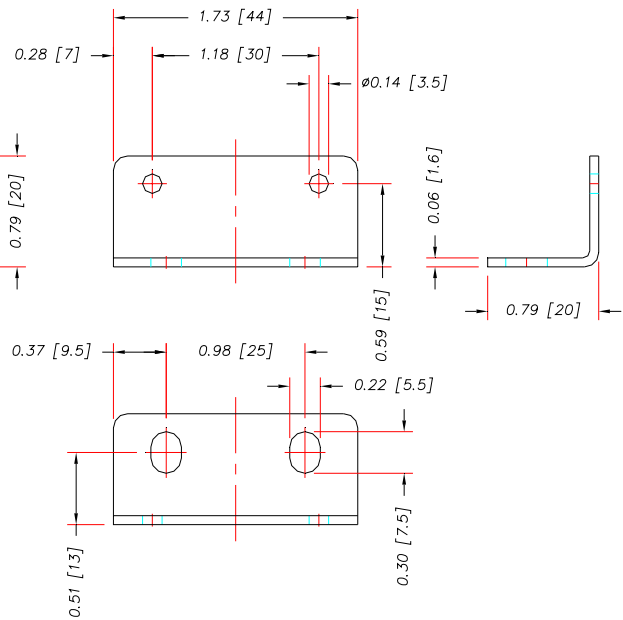
7.6. Foot mounting brackets

FT001: for SCN5

FRONT BRACKET

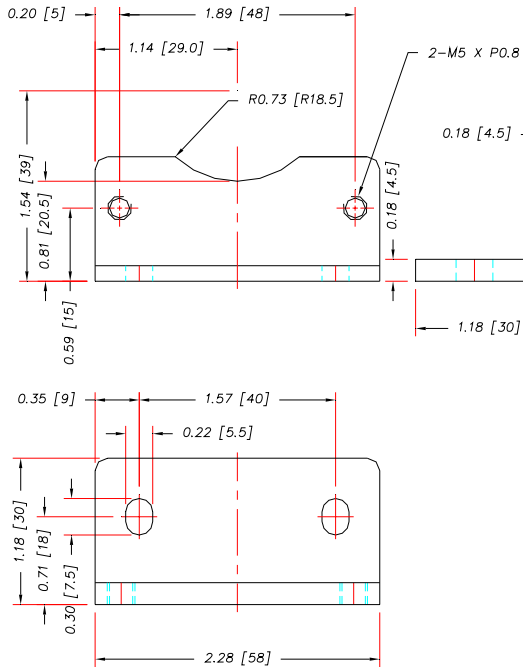


REAR BRACKET

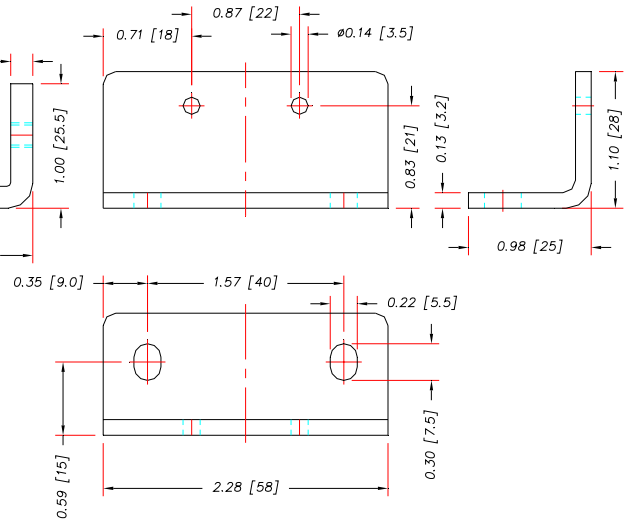


FT002: for SCN6

FRONT BRACKET



REAR BRACKET



8. Maintenance

8.1. Maintenance & Inspection

Please inspect your Mechatronics Cylinder periodically following the chart below.

	<i>Check Up Items</i>	<i>Points</i>	<i>Notes</i>
<i>Mechatronics Cylinder</i>	<i>Vibration and sound</i>	<i>Sound level should not be higher than usual</i>	<i>Check if there is no noise increase from regular operations.</i>
	<i>Appearance</i>	<i>Clean with cloths and/or air</i>	
	<i>Parts clean up</i>	<i>No major dust, dirt, oil, etc.</i>	<i>Clean with cloths and/or air</i>
	<i>Tightness of screws</i>	<i>No loose screws</i>	<i>Tighten screws</i>

Notes: Ambient temperature should be within the specification. If the actual ambient temperature is greater than the specification, the actuator life will be shortened.

8.2. Warranty

In case of defects discovered upon delivery of your actuator, Mirai Inter-Technologies will replace the defective products. This warranty doesn't cover damage to products caused by the customer or incorrect orders by the customer.

9. Diagnosis of Abnormal Operation

9.1. Diagnosis by Alarm Codes

If an Alarm is detected, please investigate it using the following chart, and then remove the cause.

The controller will send an Alarm code (see following chart) through the SIO line.

Name of Alarm	Alarm Code	Conditions	Cause	Action
Bank 30 data error	B0	Occurs when bad data was entered	Out of range data entered	Modify data to fall within the range
Bank 31 data error	B1			
Encoder stall judge error	B8	Occurs when power was turned ON	Defective controller	Replace product
			Defective motor	Replace product
		Occurs other than above case	Defective controller	Replace product
Encoder counter error	B9	Occur when power was turned ON	Defective controller	Replace product
			Defective motor	Replace product
			Shaft seized	See Below (Action 1)
Homing time out error	BE	Occurs when homing	ILK signal is not turned ON	Turn ILK signal ON
			Defective motor	Replace product
Over speed	C0	Occurred when power was turned ON	Defective controller	Replace product
		Occurs during Cylinder operation	Defective motor encoder	Replace product
Servo error	C1	Occurred when power was turned ON	Defective controller	Replace product
Main power over voltage	D0	Occurred when power was ON	Defective controller	Replace product
		Occurred when power was ON	Over voltage of supply power	Correct supply power within the specification
		Occurs during Cylinder operation	Over load	Correct the load within the specification
Regenerative Voltage error	D1	Occurred when power was ON	Defective controller	Replace product
			Over voltage of supply power	Correct supply power within the specification
		Occurs during Cylinder operation	Over load	- Review mechanical design of customer to reduce load within the specification - Reduce the acceleration
			Incorrect parameter	Check parameter
Deviation counter error	D8	Occur when power was turned ON	Defective controller	Replace product
		Occurs during Cylinder operation	Over load	Check load
			Cylinder is being locked	Unlock
Over heat	E0	Occurred when power was turned ON	Defective controller	Replace product
		Occurs during Cylinder operation	Over load	Check load
			High ambient temperature	Cool down ambient temperature under 40°C
			Shaft is seized	See Below (Action 1)

		<i>Cylinder runs for a while but not enough thrust, after a while, cylinder stall</i>	<i>Over load</i>	<i>Check load</i>
		<i>Occurs even though low thrust</i>	<i>Over load</i>	<i>Check load</i>
<i>Encoder wire disconnected (Both A wire, B wire)</i>	<i>E8</i>	<i>Occurred when power was turned ON</i>	<i>Wiring mistake of encoder</i>	<i>Repair wiring</i>
			<i>Defective amplifier</i>	<i>Replace amplifier</i>
			<i>Defective encoder of Cylinder motor</i>	<i>Replace product</i>
		<i>Occurs during Cylinder operation</i>	<i>Wiring mistake of encoder (defective connection)</i>	<i>Repair wiring</i>
<i>Encoder wire disconnected (A wire)</i>	<i>E9</i>	<i>Occurred when power was turned ON</i>	<i>Wiring mistake of encoder</i>	<i>Repair wiring</i>
			<i>Defective amplifier</i>	<i>Replace amplifier</i>
			<i>Defective encoder of Cylinder motor</i>	<i>Replace product</i>
		<i>Occurs during Cylinder operation</i>	<i>Wiring mistake of encoder (defective connection)</i>	<i>Repair wiring</i>
<i>Encoder wire disconnected (B wire)</i>	<i>EA</i>	<i>Occurred when power was turned ON</i>	<i>Wiring mistake of encoder</i>	<i>Repair wiring</i>
			<i>Defective amplifier</i>	<i>Replace amplifier</i>
			<i>Defective encoder of Cylinder motor</i>	<i>Replace product</i>
		<i>Occurs during Cylinder operation</i>	<i>Wiring mistake of encoder (defective connection)</i>	<i>Repair wiring</i>
<i>EEPROM Check Sum Error</i>	<i>F8</i>	<i>Occurred when power was turned ON, or during Cylinder operation</i>	<i>Defective control</i>	<i>Reset power (Turn power OFF, then turn power ON) If this error occurs again, replace product</i>

9.2. Error Diagnosis by error operation of Mechatronics Cylinder

In case of error operation of Mechatronics Cylinder with no Alarm detection, please investigate the problem using the following chart.

Error Operation	Cause	How to check	Action
<i>Cylinder doesn't start</i>	<i>Power is not turned ON or connected</i>	<i>- Check the voltage of power supply - Check the wiring of power</i>	<i>Power wiring to be corrected</i>
	<i>Loose connectors</i>	<i>Check connectors</i>	<i>Tighten loose connectors</i>
	<i>Shaft seized</i>	<i>Check if external load causing the shaft seized.</i>	<i>See Below (Action 1)</i>
	<i>External wiring mistake of connector</i>	<i>Check external wiring</i>	<i>Repair wiring</i>

	<i>Over load</i>	<i>Try to run Cylinder only without any load</i>	<i>Load to be within specs</i>
	<i>No movement signal</i>	<i>Check position program</i>	<i>Position program to be corrected</i>
<i>Cylinder moved just a moment but stalled</i>	<i>Wiring is wrong</i>		<i>Wiring to be corrected</i>
<i>Unstable Cylinder motion</i>	<i>Wiring connections are not stable</i>	<i>Check connections (Terminals, connectors, etc.) and wiring</i>	<i>Wiring to be corrected</i>
<i>Cylinder vibrates</i>	<i>Servo Gain is too high</i>	<i>Check Gain</i>	<i>Reduce Gain – factory default is 6</i>
	<i>Cable gets noise from other equipment</i>	<i>Test with other equipment off or isolated</i>	<i>Route cable away from noise source and/or Cable to be shielded</i>
<i>Cylinder heats up</i>	<i>Ambient temperature is too high</i>	<i>Check the ambient temperature</i>	<i>Lower the ambient temperature to under 40°C</i>
	<i>Cylinder surface is not clean</i>	<i>Check the appearance of Cylinder</i>	<i>Remove dust, oil etc. on the surface of Cylinder</i>
	<i>Overload</i>	<i>Try to run Cylinder without any load</i>	<i>Reduce the load and/or review the guiding design</i>
<i>Abnormal noise</i>	<i>Mounting is loose</i>	<i>Check the mounting of Cylinder and other machine, Loose mounting screws, incorrect concentricity, etc.</i>	<i>Correct the mounting and/or joint to load</i>
	<i>Other machine /equipment is vibrating</i>	<i>Check the moving parts of other machine</i>	<i>Check with the manufacturer of other machine</i>
	<i>Defective Cylinder</i>	<i>Try to use other good Cylinder</i>	<i>Replace product</i>
	<i>Cylinder hits the over stroke limit end due to over run</i>	<i>Reduce the Acceleration/Deceleration of Cylinder</i>	<i>Correct position accel /Deceleration</i>
<i>SIO communication is not valid</i>	<i>Communication method is not suitable</i>	<i>Check if output of main control system is RS485</i>	<i>In case of main control system RS232C, use a protocol converter for communication</i>
	<i>Output port # is set wrong</i>		<i>Correct output port number and setting</i>
	<i>Wrong axis number</i>		<i>Correct axis number</i>
	<i>Reply time of Cylinder is longer than receiving time of upper control System (PC)</i>	<i>Check if longer receiving time of main control system (PC) helps to communicate</i>	<i>Set shorter reply time of Cylinder</i>

REFERENCE:

Action 1 – Shaft Seized

1. In this condition the actuator won't move. If this condition continues, the over-load alarm (code E0) will be output. If the problem (shaft seized) is not resolved when the main power is cycled (shut down and turned back ON), the encoder counter error (code B9) will be output.

2. Remedy

Please turn the power OFF and remove the external load to the actuator.

Please turn the power back ON, and try to run the actuator without any load.

If the shaft remains seized, please turn OFF the power and try several times to move the actuator manually in the direction that the actuator was trying to move.

If the problem cannot be resolved, please replace the actuator.

Manufactured by:



Dyadic Systems Co.,Ltd.

2-60 Uneda-Nishi, Kanazawa
Ishikawa-Ken, 920-0342 Japan
Tel: 81-76-267-9103, Fax: 81-76-267-9104

Imported by:



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30 Pollard St.
Richmond Hill, ON L4B 1C3 Canada
Tel: 905-763-9442
Fax: 905-763-9766