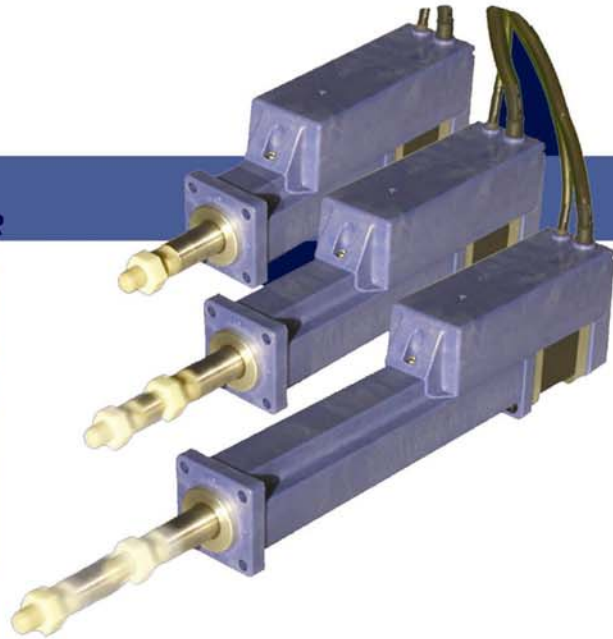
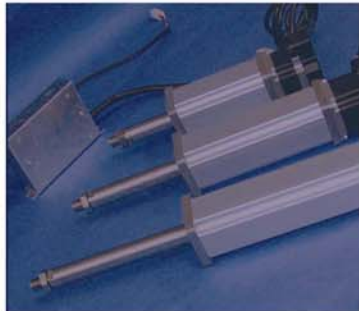
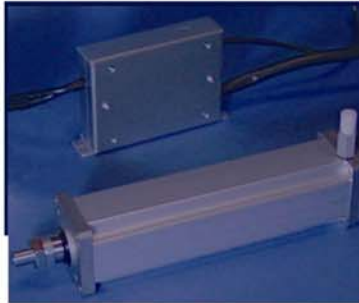
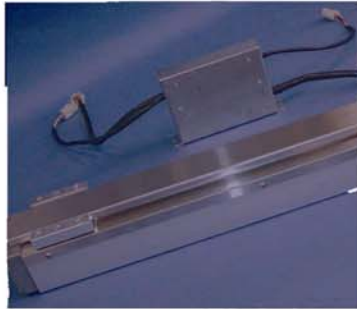




Dyadic
MECHATRONICS CYLINDER



Mechatronics Cylinder

SCN4 Series

SCN5 Series

SCN6 Series

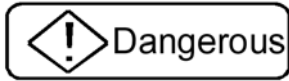
SCLL6 Series

Operation Manual

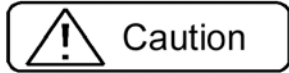
MIRAI INTER-TECHNOLOGIES

《For Safety》

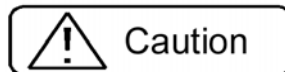
Please read this manual before use, and make the Mechatronics Cylinder run safely and correctly.



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 range of the specification.
- 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 on the accuracy to minimize radial loading.
- Check that the direction of the movement is correct before mounting of our product.

[Wiring]

- The Mechatronics Cylinder doesn't have mechanical protection for over load. Please build own mechanical over load protection.
- Please make sure that the wiring is correct and completed with strong connections.
- Please do not bend, pull nor pinch cables.
- Please make sure that the all earth wires and terminals are ground.

[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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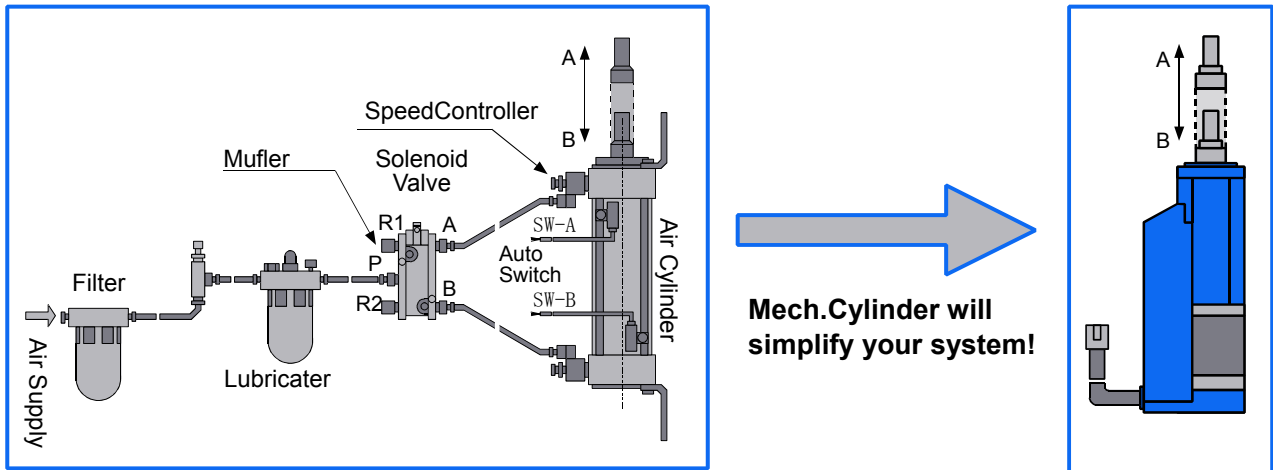
1. Summary

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.

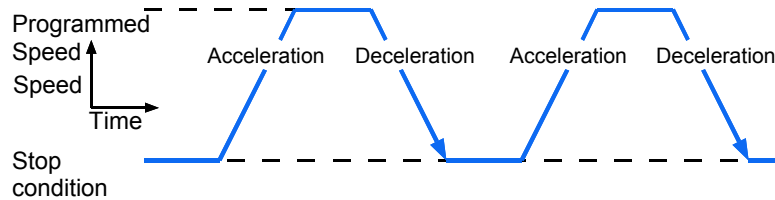
1.1. Features

1.1.1 Overcoming weaknesses of Pneumatic Cylinders

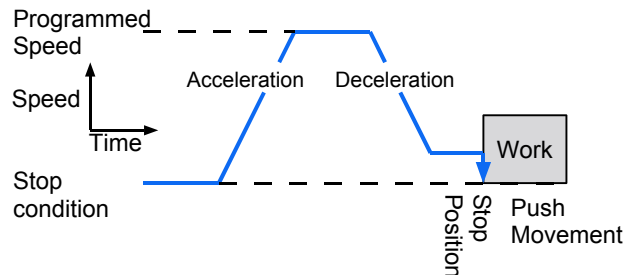
(1) Simplifying wiring and related equipment.



(1) Multiple positioning: Easy program for Max. 16 positions per axis

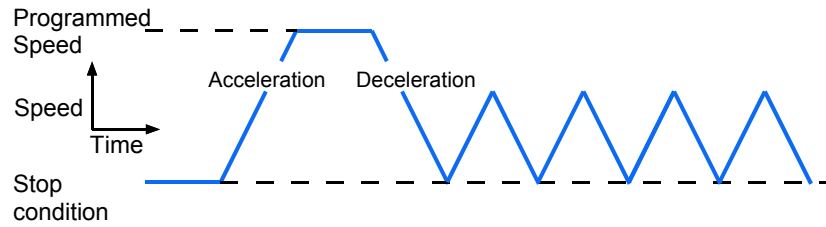


(2) Programmable Push Force

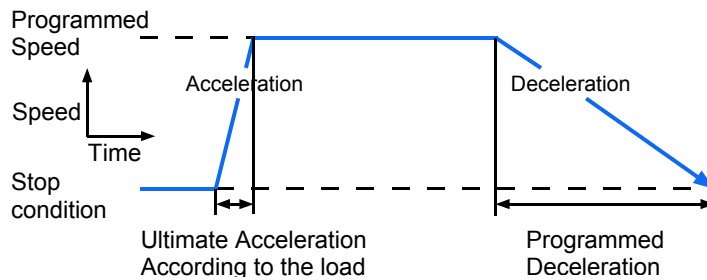


(3) *Programmable Positioning Speed: Very Slow Speed is possible, which is very difficult with Air Cylinder.*

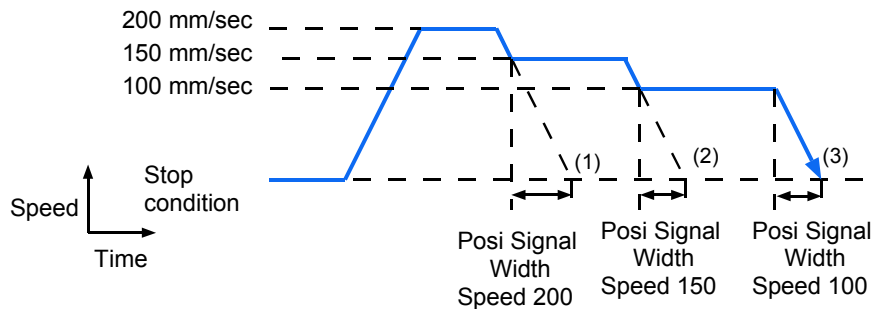
(4) *Incremental Movement: Starting from the current position.*



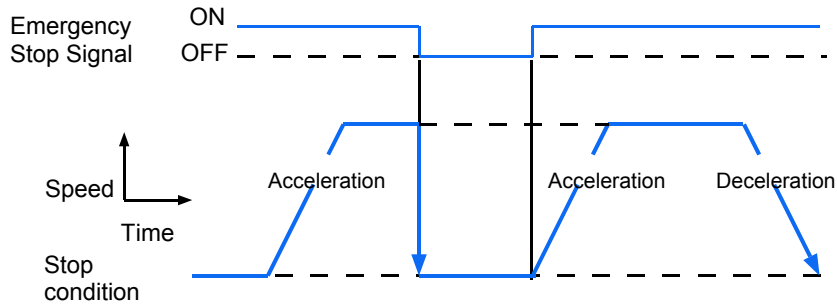
(5) *Programmable Acceleration and Deceleration: Same Acceleration and Deceleration can be programmed. Optimum Acceleration and desired Deceleration can be set respectively.*



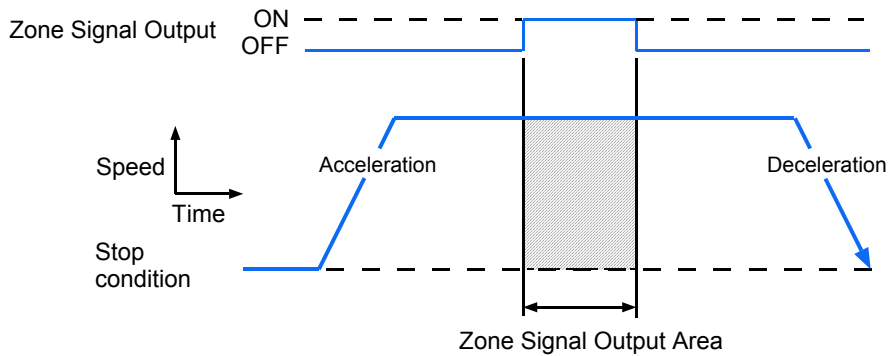
(6) *Programmable Flexible Speed Profiles: Speed can be changed without stopping.*



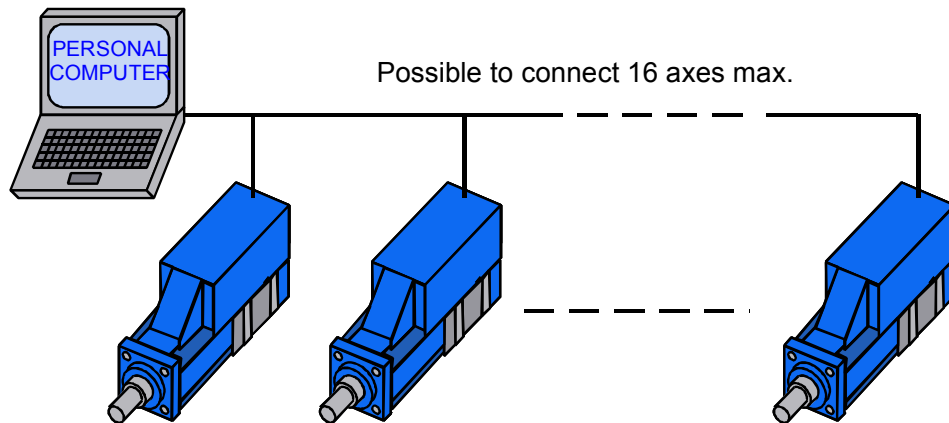
(7) *Emergency Stop: During the movement of Mechatronics Cylinder, the movement will stop if the Interlock signal is interrupted.*



(8) *Programmable Zone Signal Output: Mechatronics Cylinder can be programmed to output the Zone Signal.*



(9) *Synchronized multiple axis movement: Easy to operate through PC*

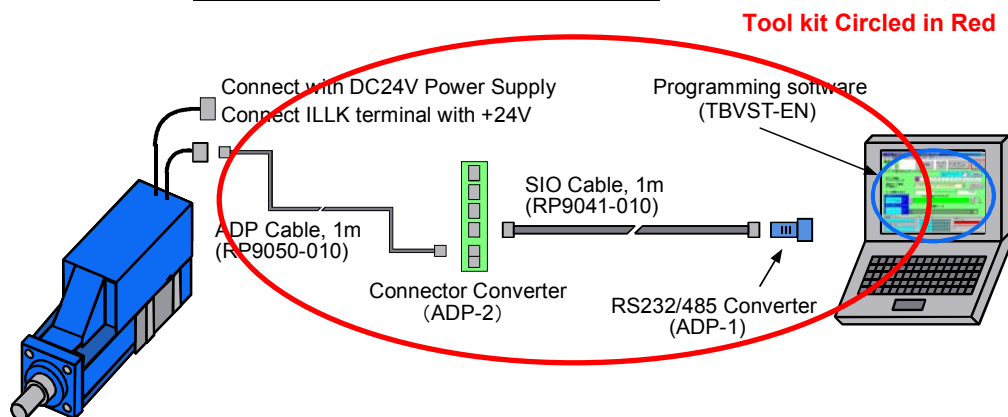


(10) *Air compressor, Filter/Regulator/Lubricator are not needed.*

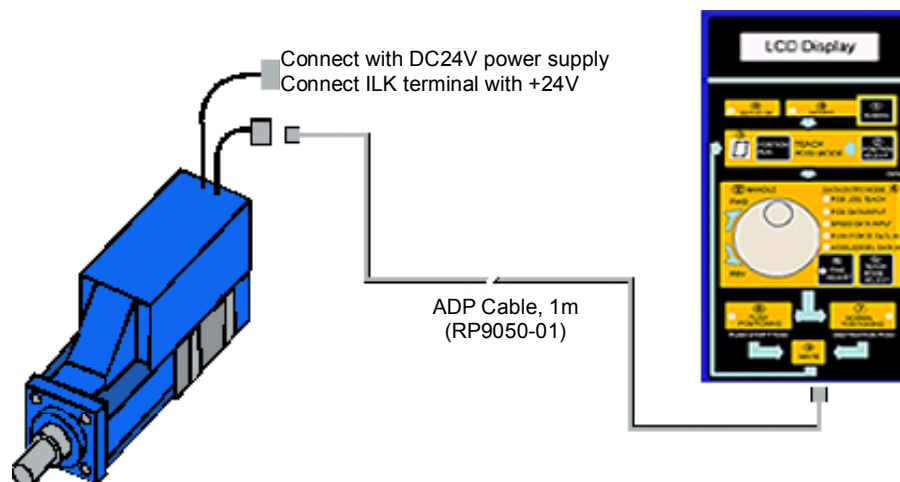
1.1.2. This section is to introduce some product features in detail:

- (1) SCN-4 / SCN-5 All-In-One Module: The Mechatronics Cylinder models SCN4 and SCN5 are all-in-one products including linear actuation mechanism, motor, servo drive and controller. Therefore after connecting the power supply and some signal wiring, they will be operational.
- (2) SCN6 and SCLL6 models: external controller type, capable of higher loads and longer strokes
- (3) Complete performance can be programmed through 3 tools (sold separately): PC Tool Software, CTA-23 Teach Pendant and CTC-33 Sequencing Pendant as follows:

(i) PC Set Tool Kit (TBVST-EN-SET)

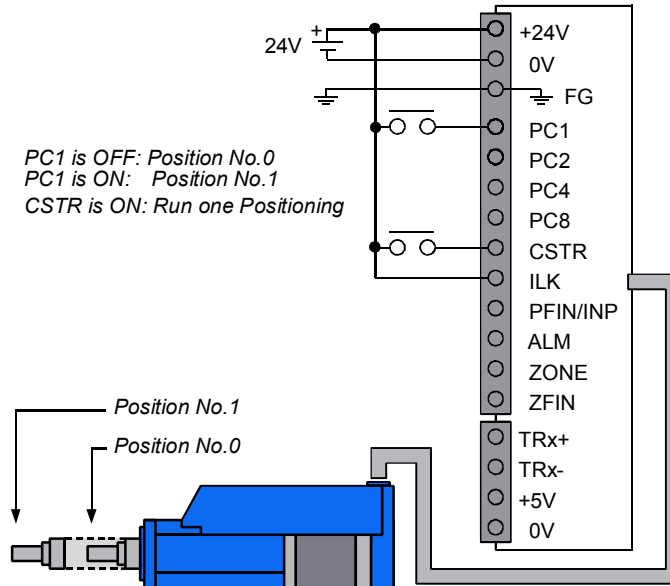


(ii) Teaching Pendant Tool Kit (CTA-23EN-SET)

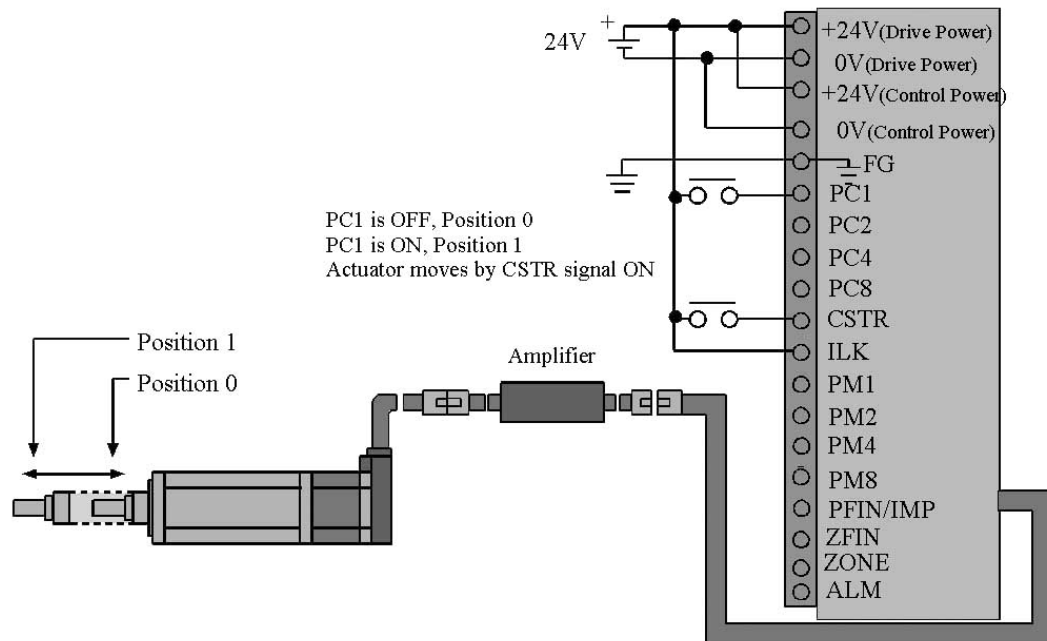


(3) Wiring is so easy that only 6 connections for SCN4 / SCN5 and 8 connections for SCN6 and SCLL6 are enough for 2 position operation (same operation as pneumatic cylinders).

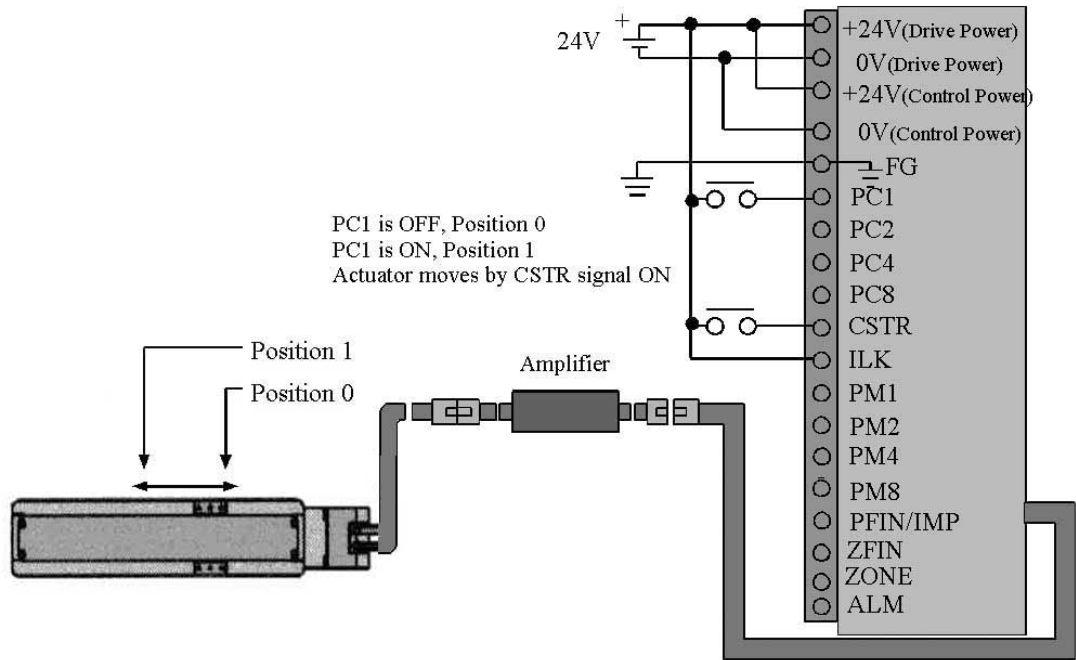
SCN4 / SCN5 Model



SCN6 Model



SCLL6 Model



(5) The standard rod tip is:

(SCN4)

Plastic thread of M10 x P1.5 with plastic nut (Nylon) as standard, and 303 SS is an option.

(SCN5)

303 SS thread of M10 x P1.25

(SCN6)

303 SS thread of M14 x P1.5

(SCLL6)

There is a slider table with 4 M6 tapped holes and 2 reamed $\varnothing 5$ mm holes.

(6) Mounting

(SCN4, SCN5 AND SCN6)

Flange mounted or foot mounted (feet sold separately)

(SCLL6)

Mounted from 2 T-grooves with M6 nuts in the bottom face of the body.

(7)

(SCN4 AND SCN6)

Unique design of rod guide mechanism prevents rod from turning.

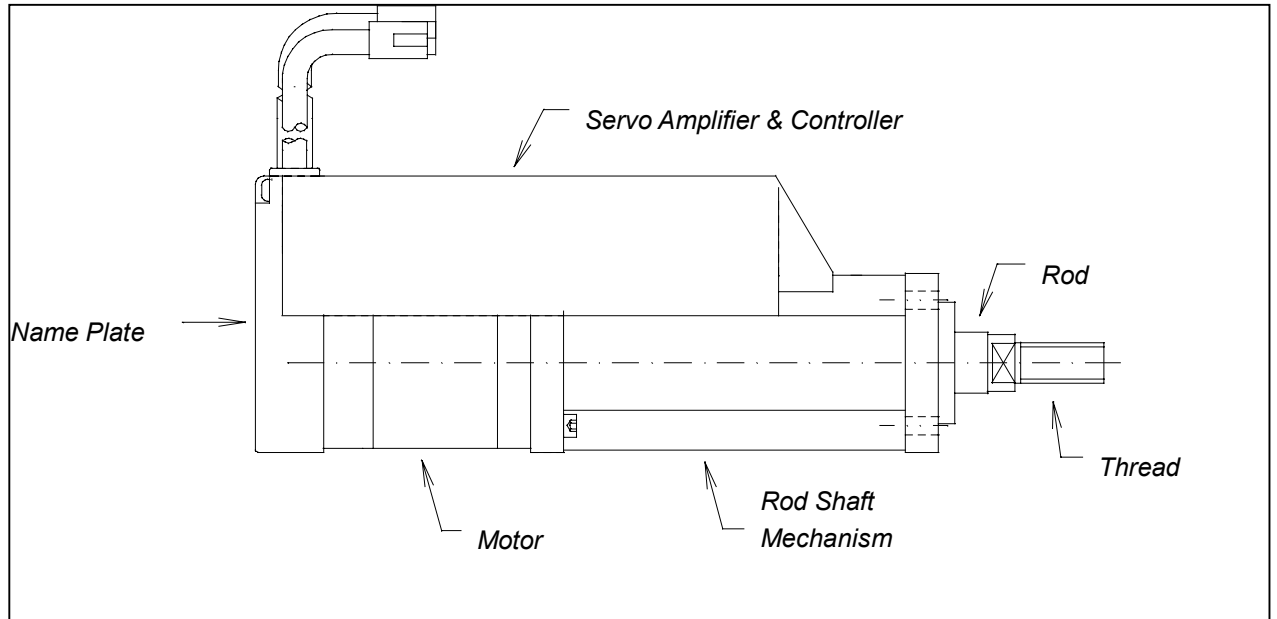
(SCLL6)

Please design the mountings on the slider table within the range of specification, such as load, load moment, overhang, etc.

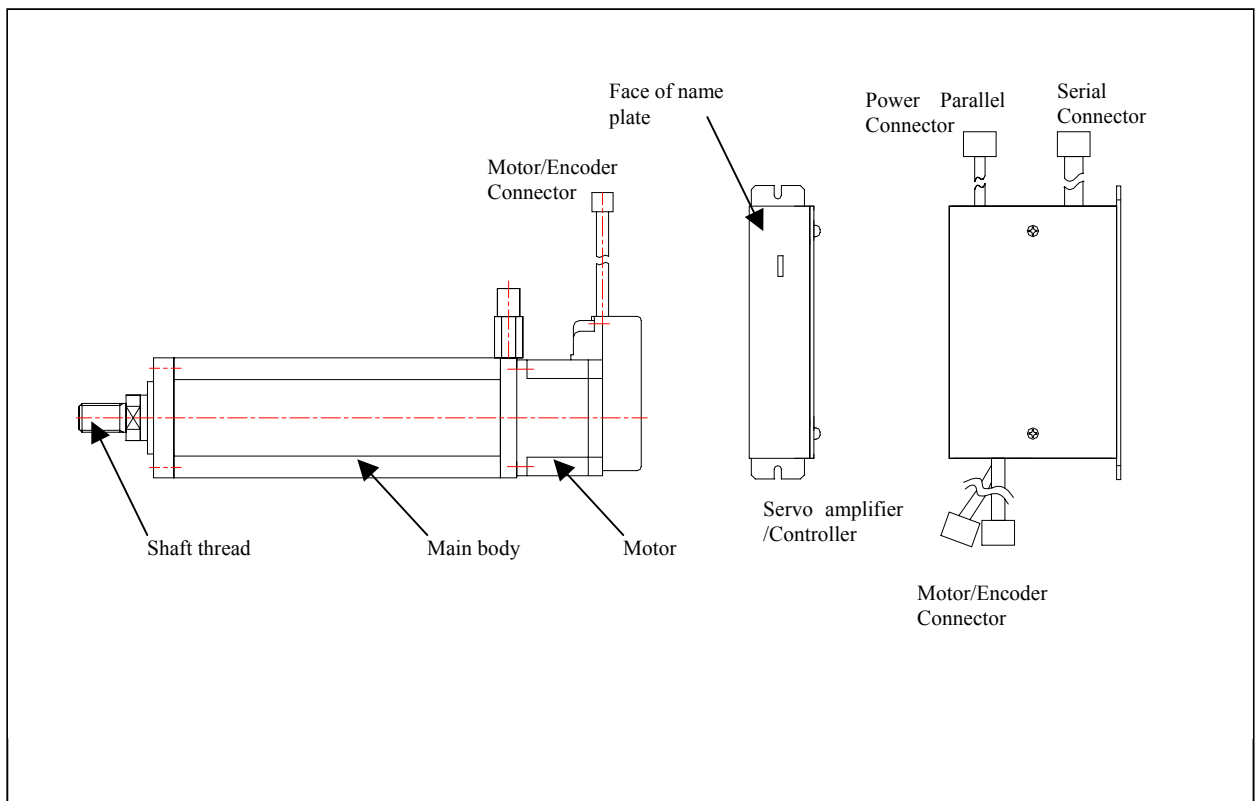
1.2 Names of Parts

1.2.1 Names

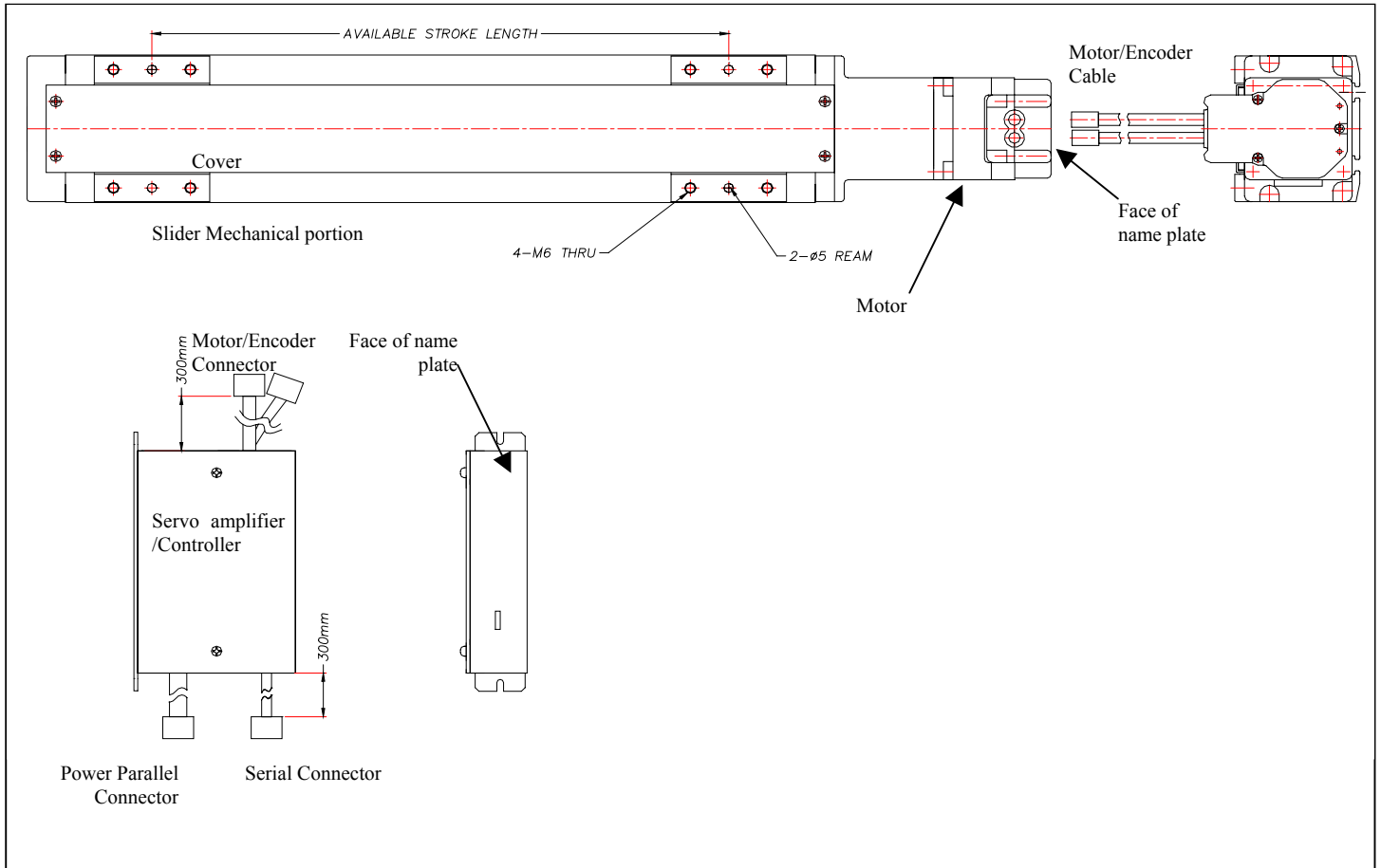
SCN4 /SCN5 Model (10Kgf Type)



SCN6 Model (20Kgf & 50Kgf Type)

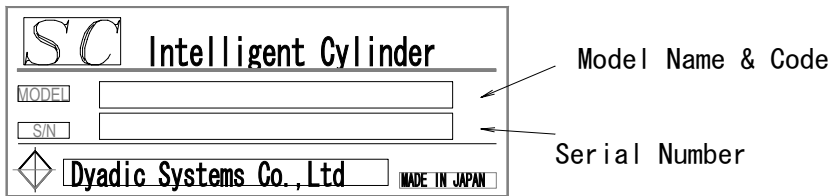


SCLL6 Model (Slider 20Kgf Type)



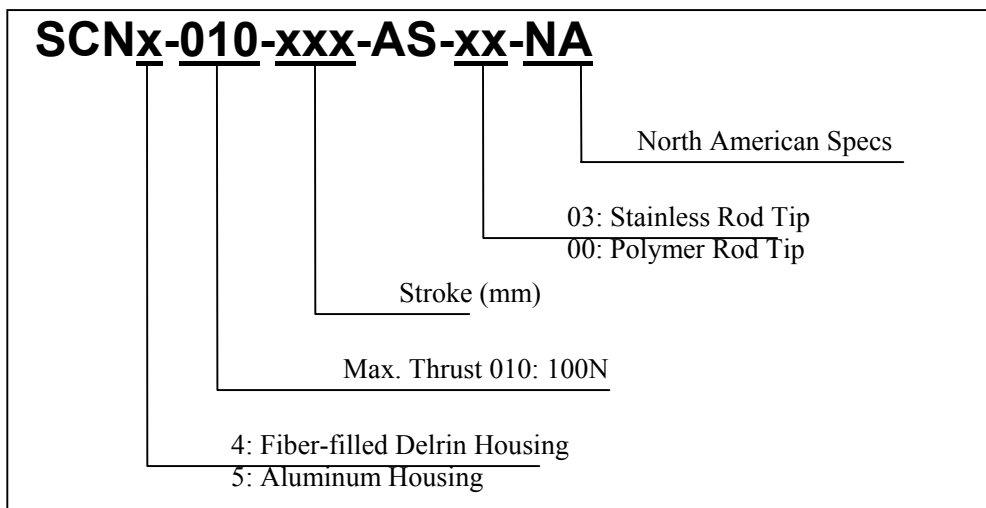
1.2.2 Name Plate

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

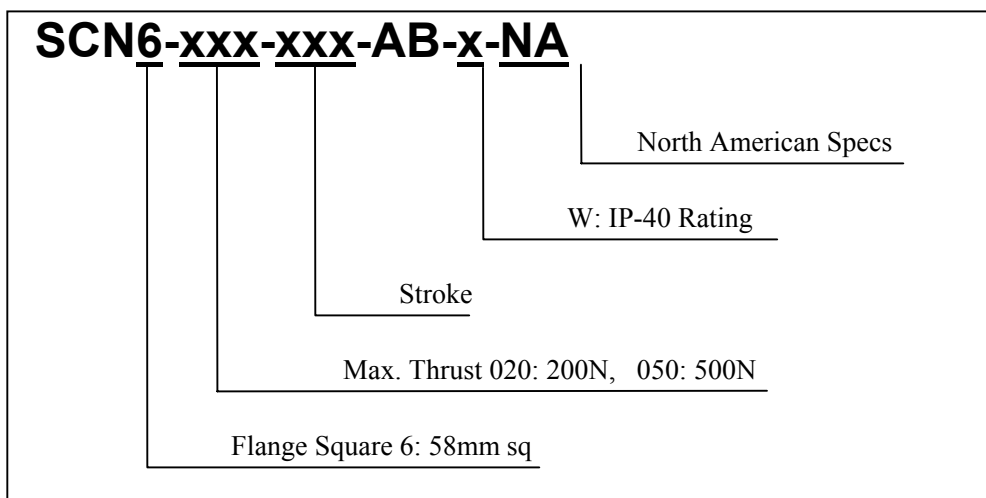


1.2.3 Coding

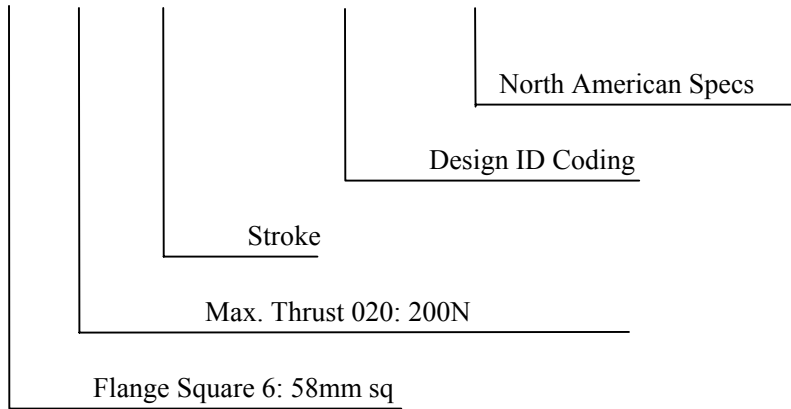
SCN4 / SCN5 Model (10Kgf Type)



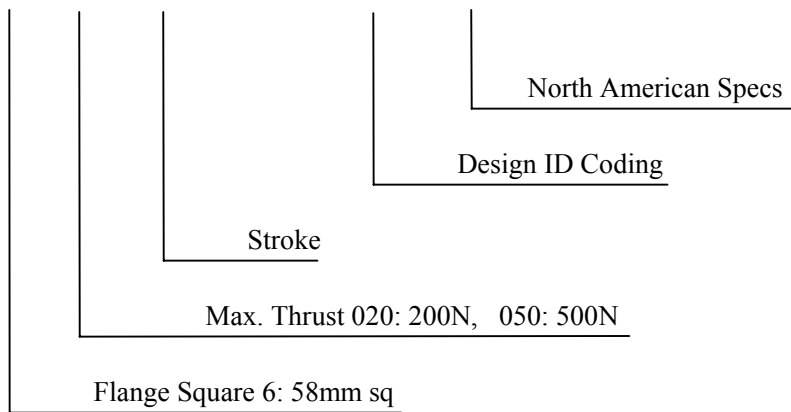
SCN6 Model (20Kgf & 50Kgf Type)



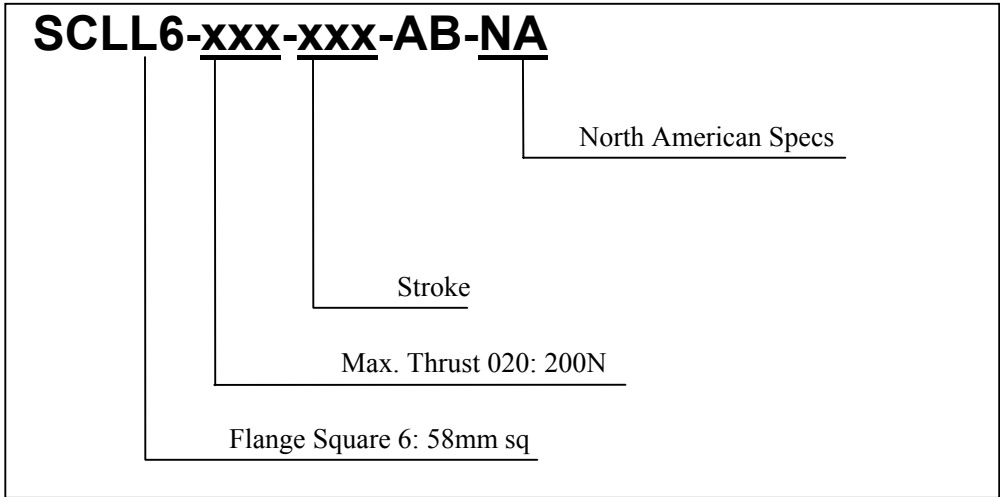
(1) Mech. Cylinder Coding
SCN6-xxx-xxx-AB-Mxxx-NA



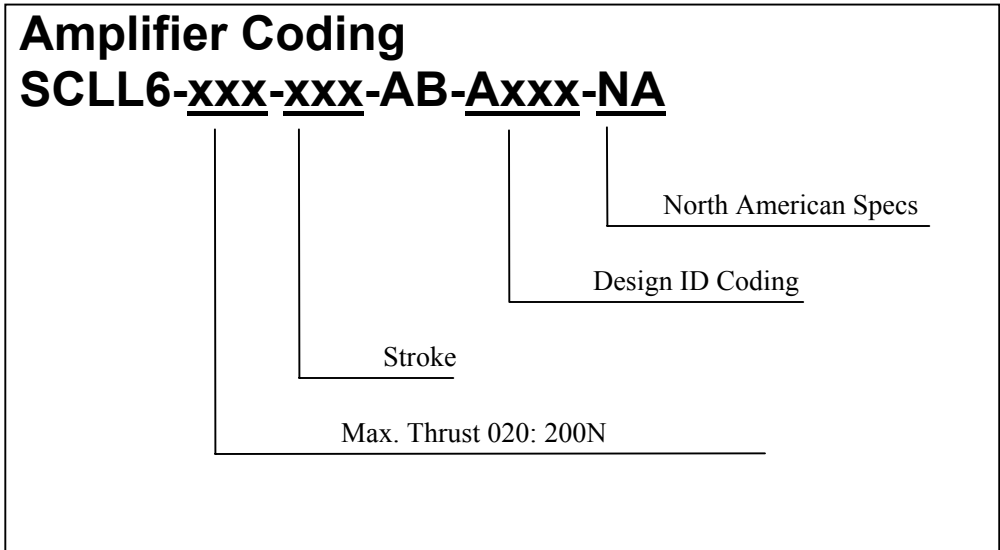
(2) Amplifier Coding
SCN6-xxx-xxx-AB-Axxx-NA



SCLL6 Model (Slider 20Kgf Type)



Amplifier of SCLL6 Model



2. Safety Notes

- (1) Please use following Voltage:
Main Power: DC +24V+/-10% (Max. 2A Amps)
Using more than 2 axis less than N axis, 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.

Notes for SCLL6 Model

- (8) Ensure the system is designed within the specifications of max moment load on the slider table.
- (9) 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. Preparations

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 ordered product

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.)

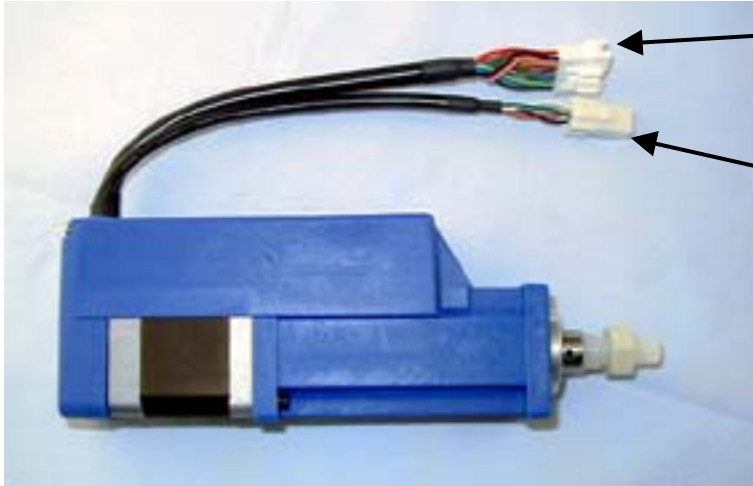
3.1.5. Programming Tool

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. Wiring

3.2.1. Check the connector

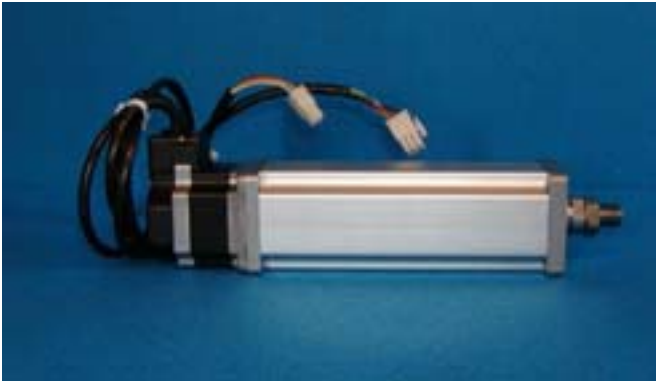
SCN4 / SCN5 Model (10Kgf Type)



To connect Parallel connector cable

To connect ADP Cable in case of Programming Tool

SCN6 Model (20Kgf & 50Kgf Type)

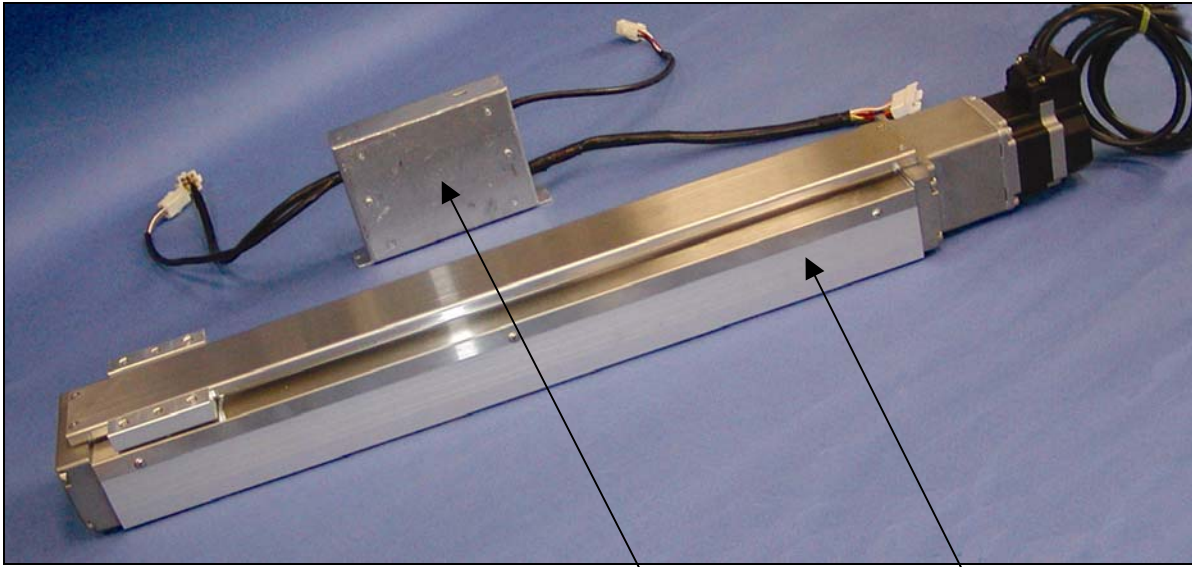


SCN6 Main Body



External Amplifier

SCLL6 Model (Slider 20Kgf Type)



External Amplifier

SCLL6 Main Body

3.2.2. Check Parallel Connector Cable

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

SCN4 / SCN5 Model (10Kgf Type)



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

Power connection cable
(Thinner cable)

Connect to
Mechatronics Cylinder

SCN6 Model (20Kgf & 50Kgf Type) | SCLL6 Model (Slider 20Kgf Type)



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

Power connection cable (Thinner cable)

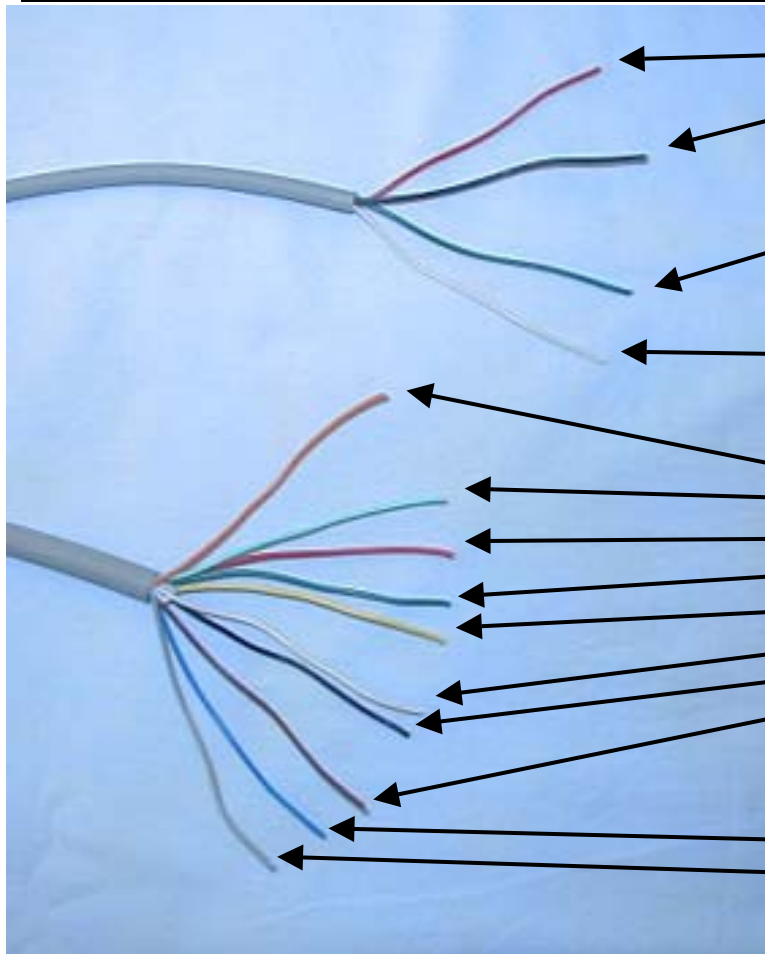
Connect with SCN6 or SCLL6

3.2.3. Parallel Cable Preparation

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

SCN4 / SCN5 Models (10Kgf Type)

In case of use of Programming Tools (sold separately) only, please connect power wire (Red: +24V, Black: 0V) and ILK (Brown: +24V) at this moment (Please refer following pictures)



Red: +24V
To connect Power +24V

Black: 24G
To connect Power 0V

Green: FG
(Connect to ground)

White: FG
(Connect to ground)

Orange: ZONE (ZONE signal)
Light Green: (ALM signal output)

Red: PC4

Green: PC8

Yellow: CSTR

White: PC2

Black: PC1

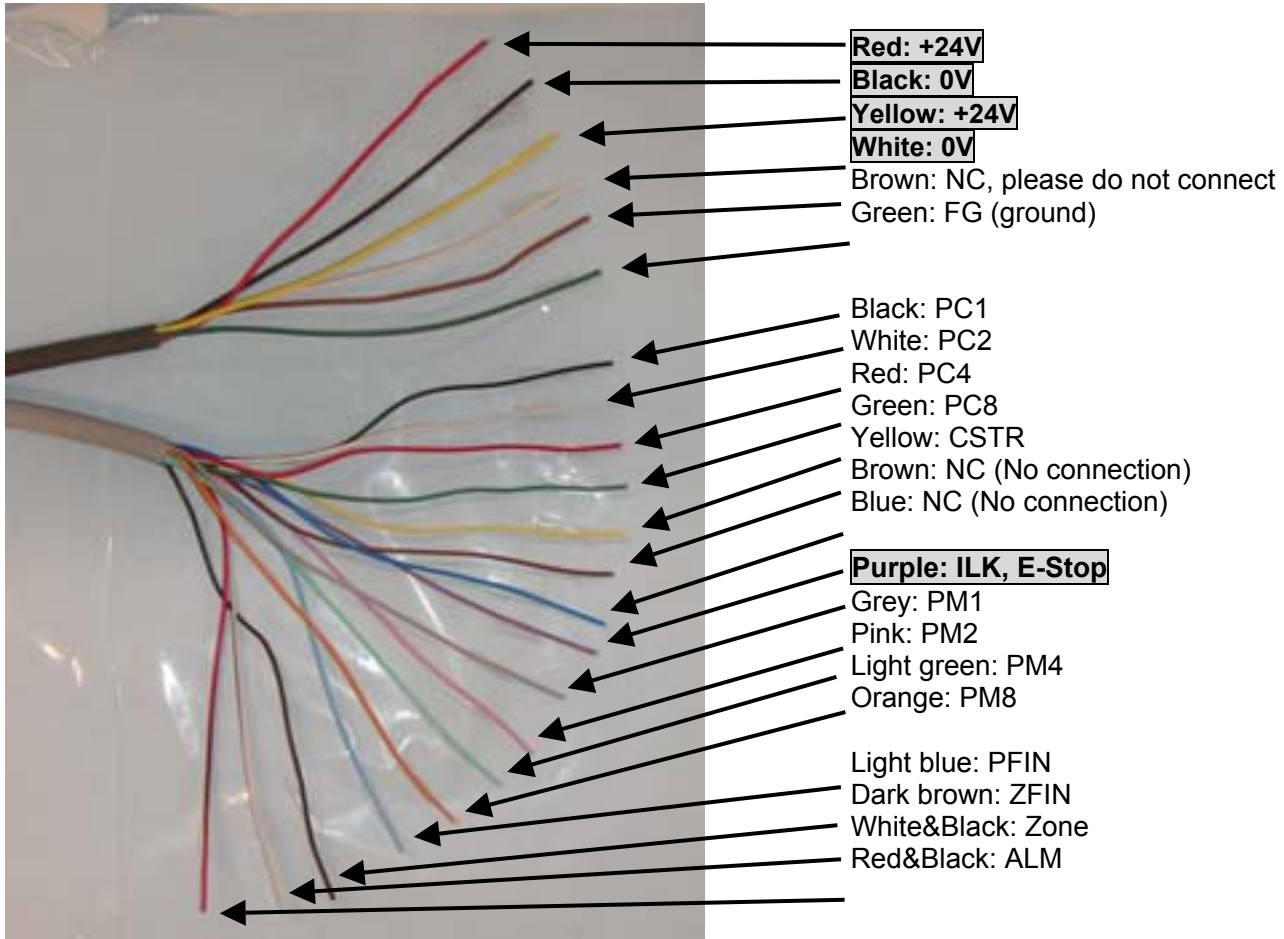
Brown: ILK (Emergency Stop) signal
Connect with +24V

Blue: PFIN (Position Finished)

Gray: ZFIN (Homed)

SCN6 Model (20Kgf & 50Kgf Type)

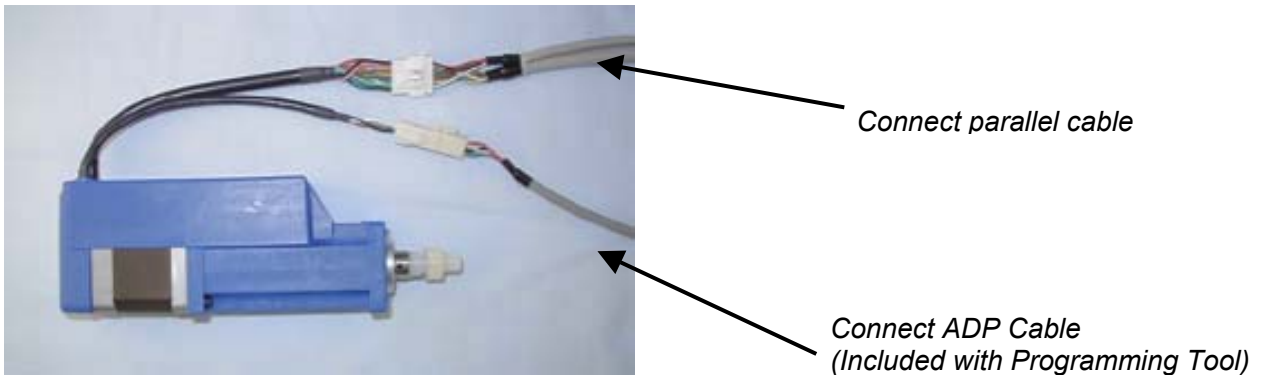
SCLL6 Model (Slider 20Kgf Type)



3.2.4. Connect Parallel cable and ADP Cable with Mechatronics Cylinder

SCN4 / 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 with the power not yet supplied.



SCN6 Model (20Kgf & 50Kgf Type)

SCLL6 Model (Slider 20Kgf Type)



Connect ADP Cable
(Included with Programming Tool)

Connect parallel cable

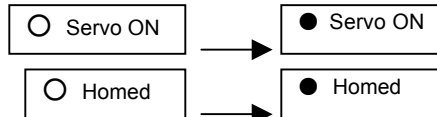
3.2.5. Demo operation of Teaching Pendant

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

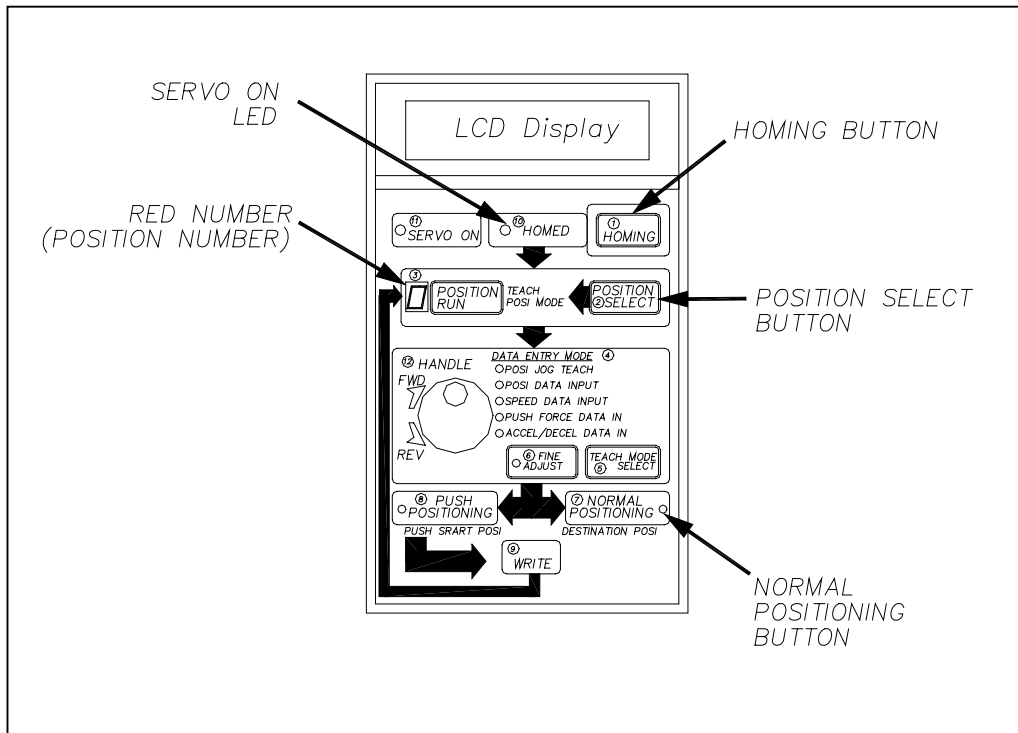


Connect ADP cable

- (2) Turn the power ON.
- (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.**



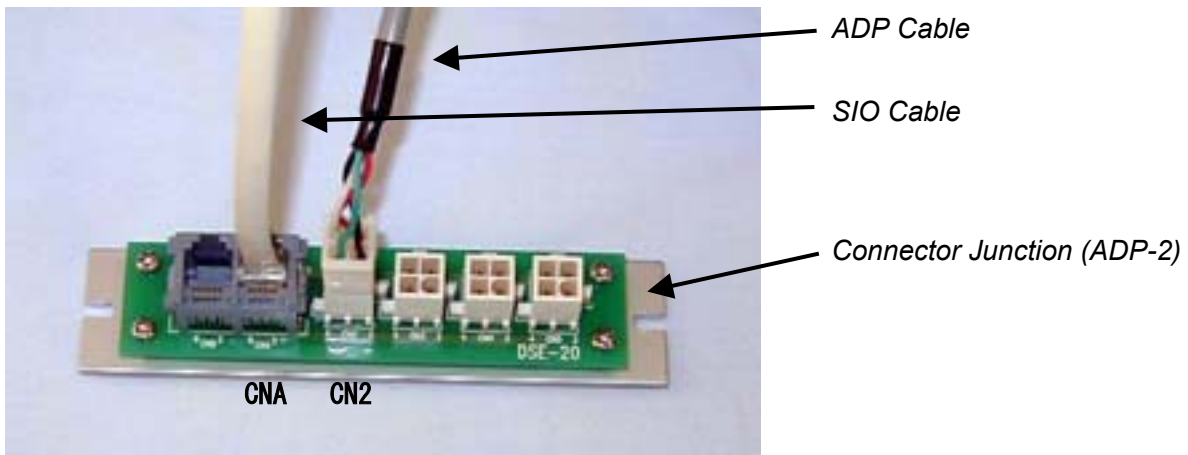
- (4) When the axis has been homed, if the jog wheel on the Teach Pendant is turned to clockwise, the rod of Mechatronics Cylinder will move forward. if the jog wheel is turned anticlockwise, the Mechatronics Cylinder will retract.
- (5) Please use the operation manual of Teaching Pendant for more details, including information on writing the demo settings to your axis from the Teach Pendant, and using the Teach Pendant to run a simple looped sequence of positions.



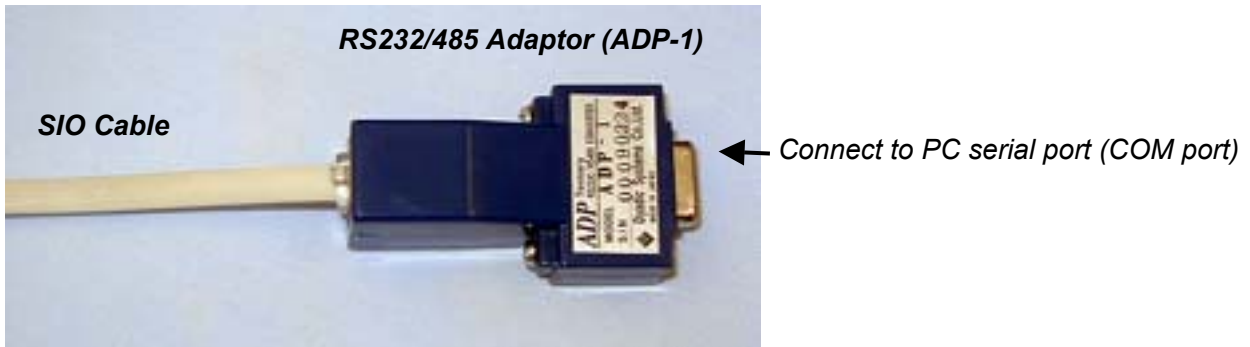
3.2.6. Demo operation of PC Tool (TBVST-EN-SET)

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.

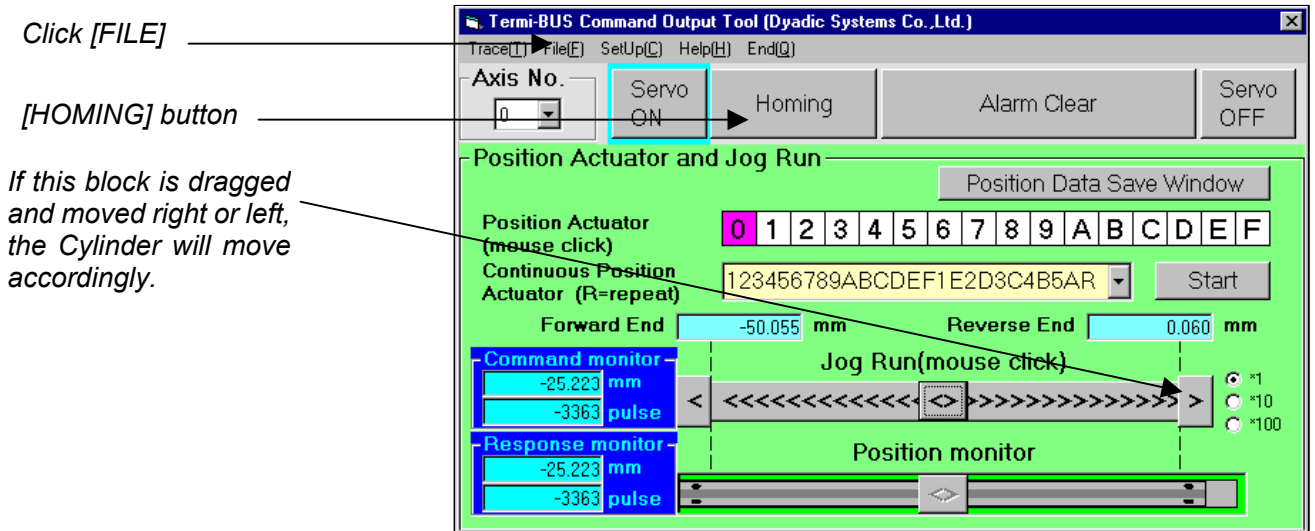
- (1) Connect the ADP cable to the CN2 jack of the Connector Junction (ADP-2) as per figure below. Connect the SIO cable to the CNA jack of the Connector Junction (ADP-2) as per figure below.



- (2) 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) Power up the Mechatronics Cylinder and 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.



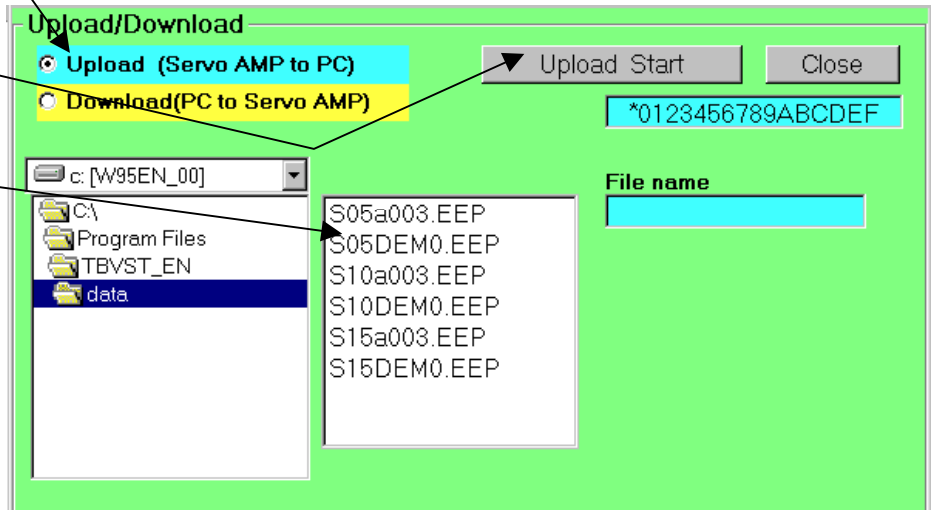
(6) Please click **FILE** at left top on the screen, so that following Menu will be displayed.

① Select **Download (PC⇒Amp.)**

③ Click **Download Start**

② File Selection

Cylinder Stroke	File Name
SCN4-010-050	S05dem*
SCN4-010-100	S10dem*
SCN4-010-150	S15dem*
SCN6-020-050	T05dem*
SCN6-020-100	T10dem*
SCN6-020-150	T15dem*
SCN6-050-050	R05dem*
SCN6-050-100	R10dem*
SCN6-050-150	R15dem*
SCLL6-020-300	L30dem*
SCLL6-020-400	L40dem*
SCLL6-020-400	L40dem*



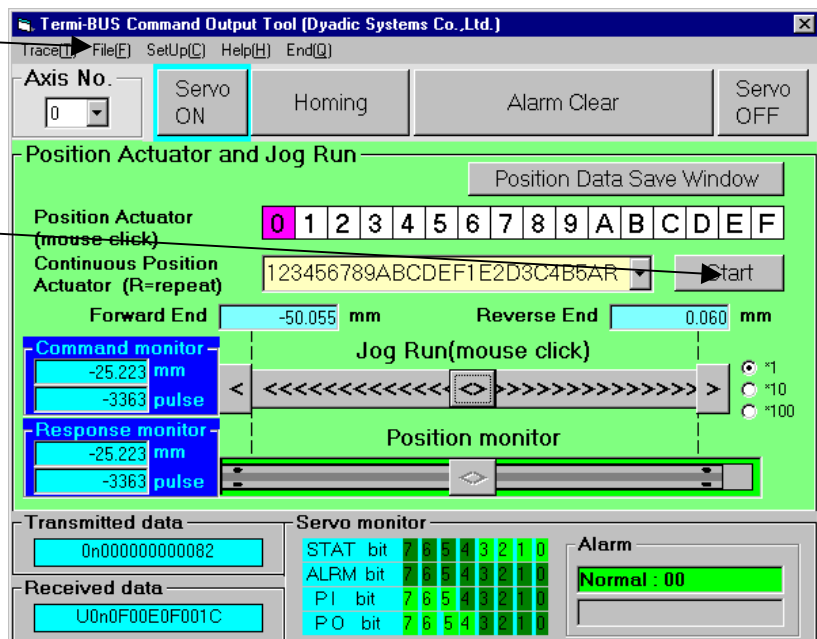
(7) ① Please select **Download (PC→SERVO AMP)** and select the suitable demo file for the Mechatronics Cylinder stroke being used. Click the **Download start** button, so that the demo program will be copied to the Mechatronics Cylinder controller.

(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. Check the product when it is received

- Please check received products with following care:
- (1) Are the products the same as what you ordered?
 - (2) Is there any damage to the products?

4.2. Installation

4.2.1. Mechatronics Cylinder Installation

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

- (1) The Mechatronics Cylinder is designed for use indoors. Please find 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.

- (2) *Mounting*

SCN4 / SCN5 Model (10Kgf Type)

SCN6 Model (20Kgf & 50Kgf Type)

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.

SCLL6 Model (Slider 20Kgf Type)

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

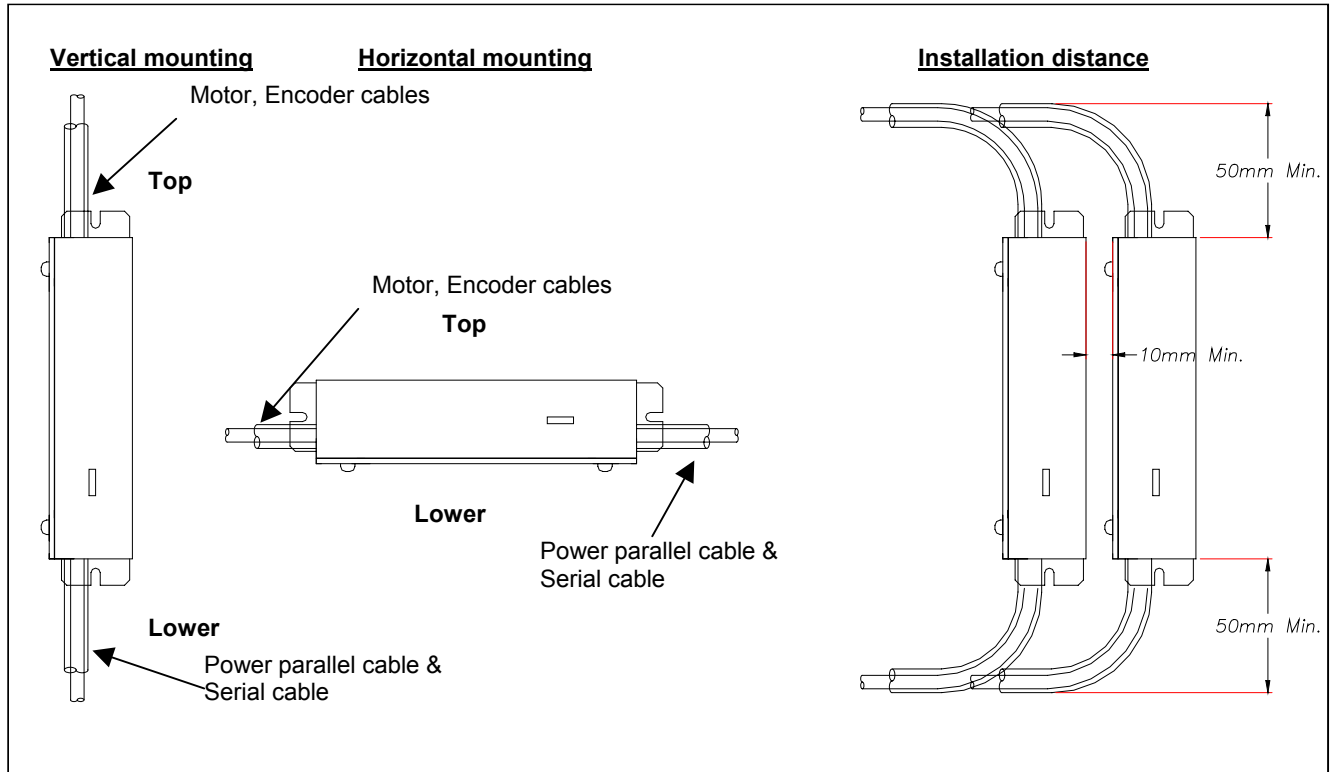
- (3) The Mechatronics Cylinder uses a non-rotating Linear Actuation Mechanism. However, if your application has a significant rotary moment please use an external guide.

SCN6 Model (20Kgf & 50Kgf Type)

SCLL6 Model (Slider 20Kgf Type)

4.2.2. 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 3 ea of M3 screws to mount amplifiers as per the sketch below. Please leave 10mm distances or greater between amplifiers, and leave 50mm or greater spaces for cables:



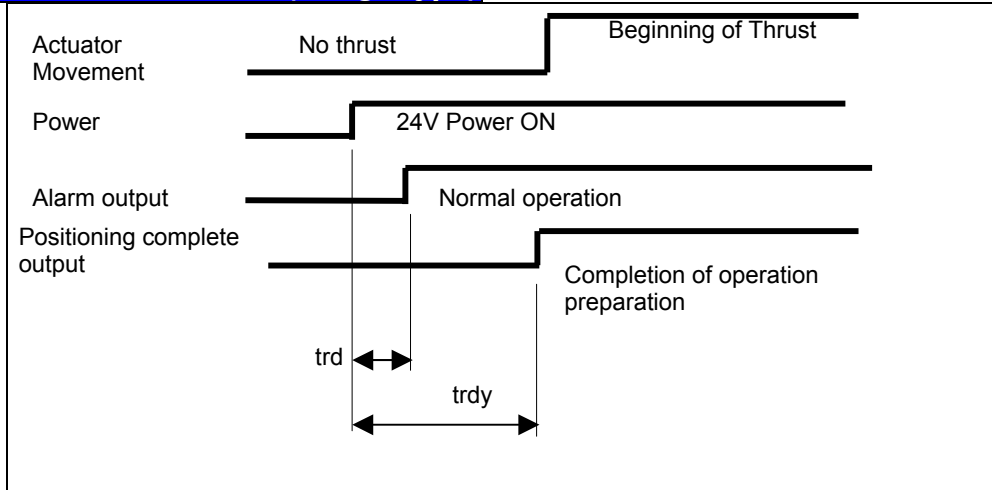
4.3. Wiring

Please wire with the reference to section 3.2.3.

4.3.1. 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 controlling the Mechatronics Cylinder using 24VDC I/O:
 - ① **The max current capacity of the Mechatronics Cylinder I/O is as follows:**
Inputs: 4mA per input
Outputs: 10 mA per output
 - ② Power should be supplied such that it can be cycled in the event of an Alarm (Note: an alarm condition will be indicated by OVDC from the Mechatronics Cylinder controller Alarm Output).
 - ③ The programmed timing of power-up should be as follows:

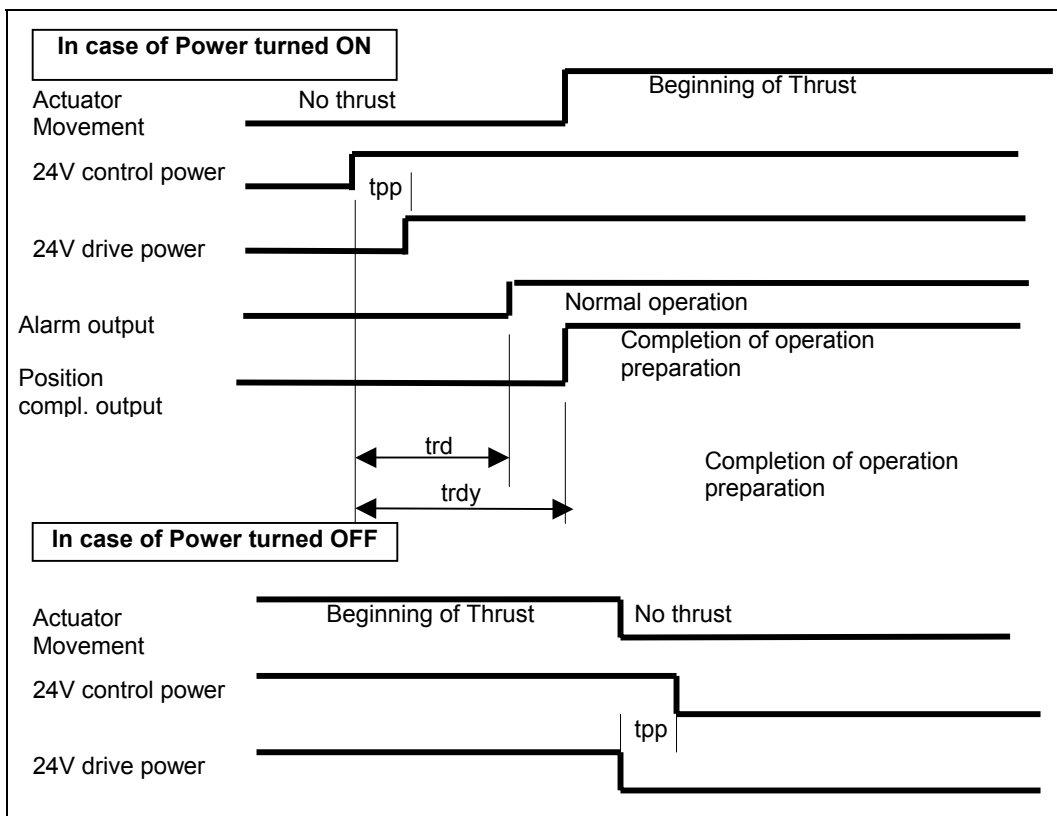
SCN4 / SCN5 Model (10Kgf Type)



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

SCN6 Model (20Kgf & 50Kgf Type)

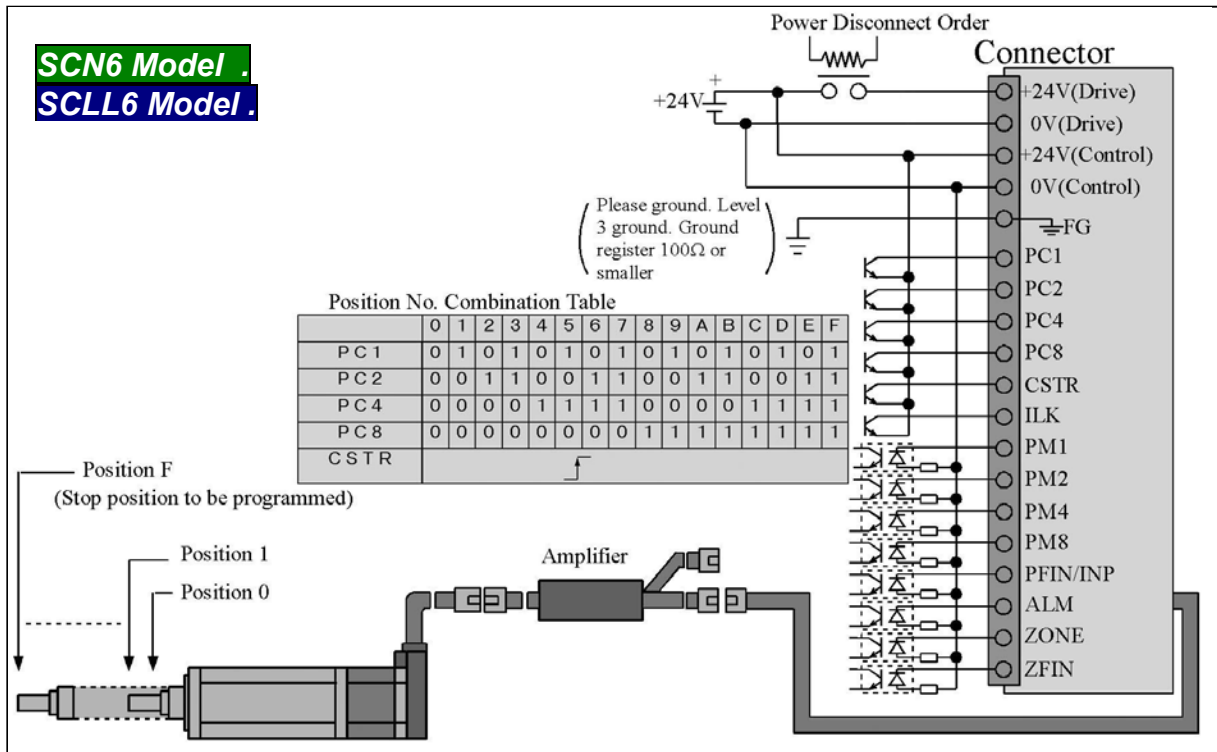
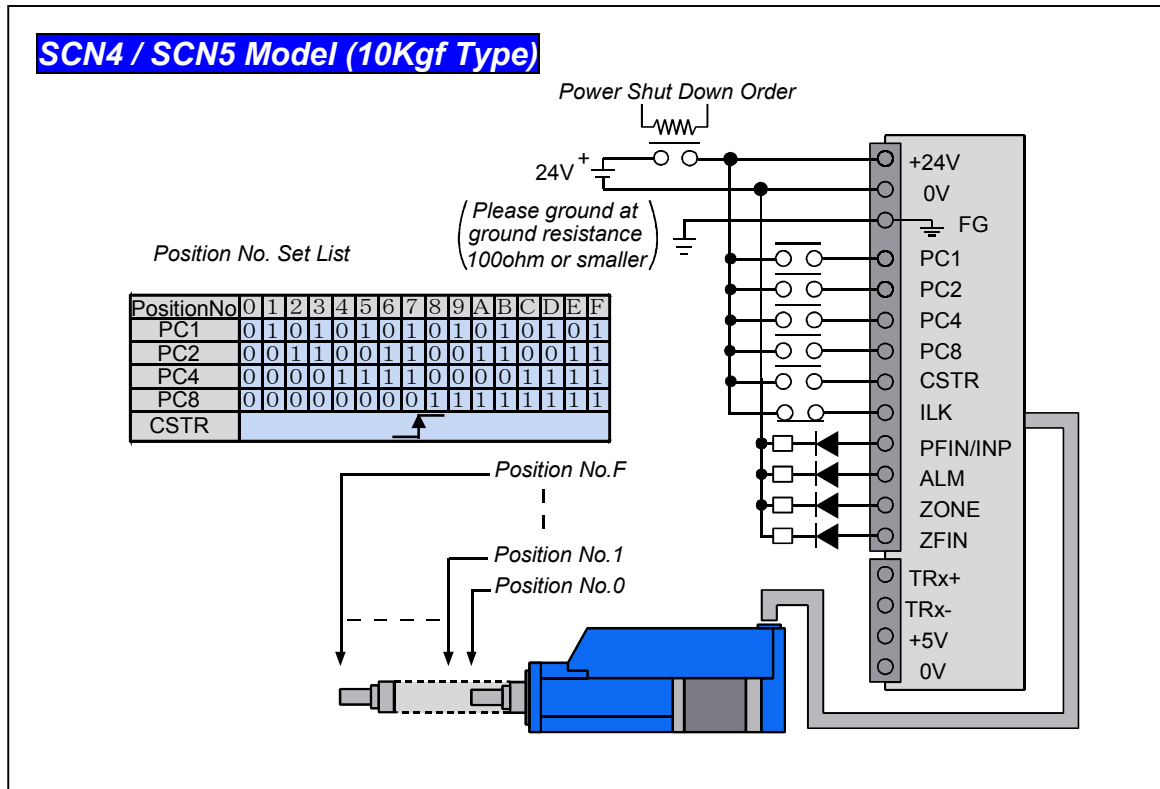
SCLL6 Model (Slider 20Kgf Type)



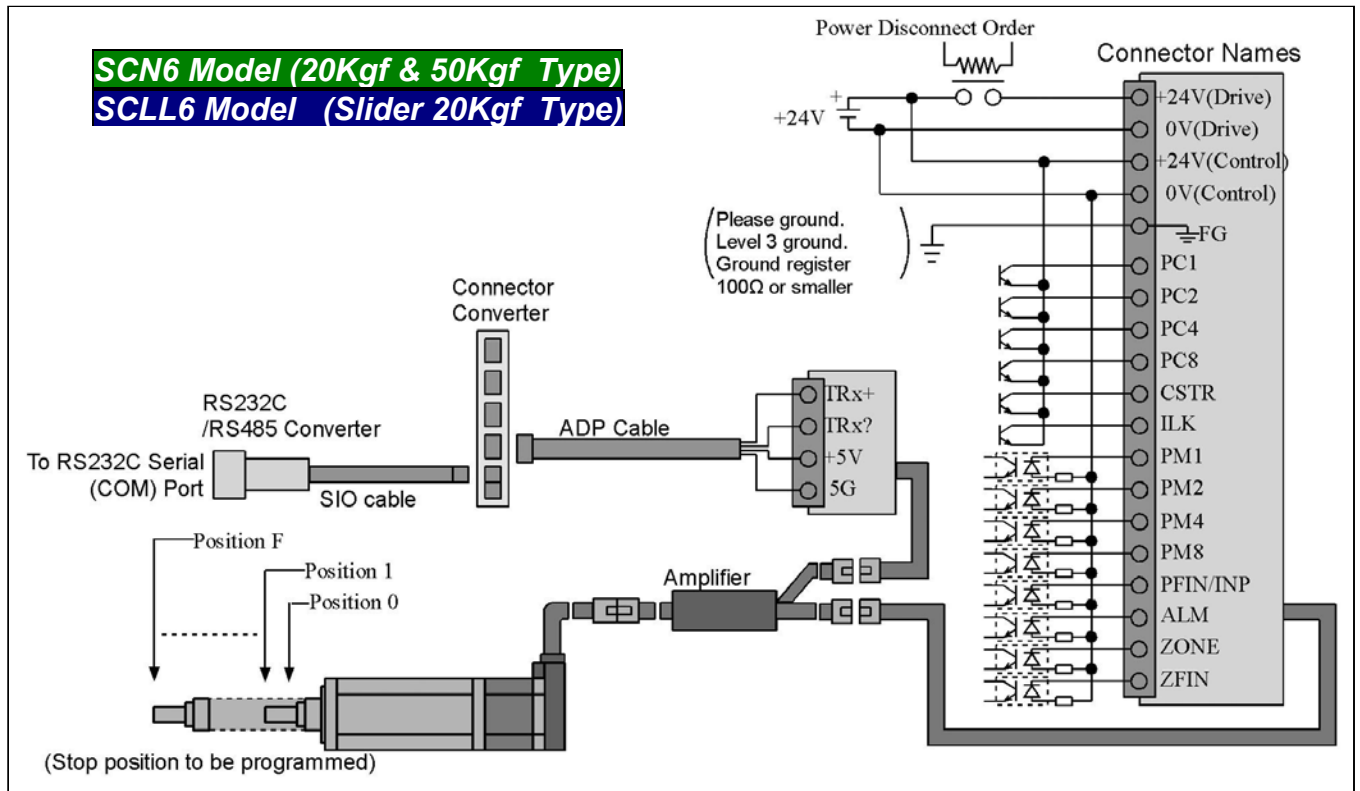
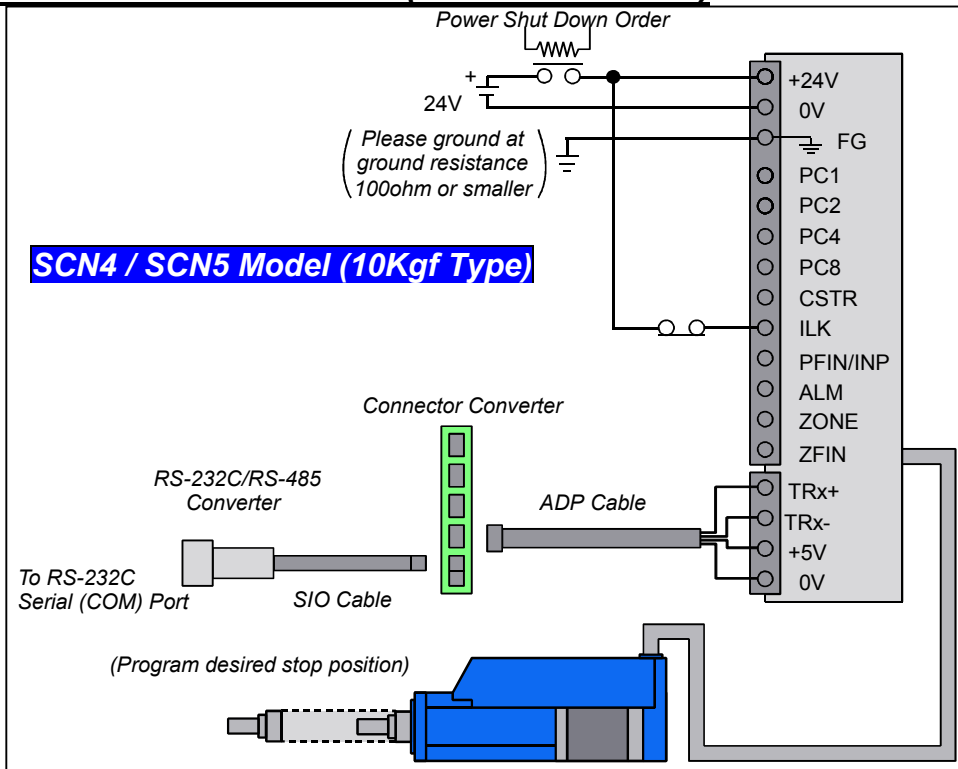
Names	Time	Application
tpp	0msec Min.	Control power ON=> Drive Power ON Drive Power OFF=> Control Power OFF
Trd	50msec Max.	Control power ON=> ALM signal start up
trdy	250msec (Typ)	Control power ON=> Completion of operation prep.

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 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) Please do not connect or disconnect any cables while the power is on.
- (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 CTA-1 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

SCN4 / SCN5 Model (10Kgf Type)

Model		SCN4-010-050-AS	SCN4-010-100-AS	SCN4-010-150-AS
Stroke (mm)		50	100	150
Max thrust (N)/(kgf)		100/10.2		
Max. thrust at push mode (N)/(kgf)		70/7.1		
Max. speed (mm/s): typ. data		400		
Repeatability (mm)		+/-0.1		
Backlash (mm)		0.3		
Radial load (N)		15	10	5
Rod diameter (mm)		15		
Rod tip thread		Standard: M10 Pitch 1.5 (Nylon), Option: M10 Pitch 1.25 (303 SS),		
Housing		Fiber impregnated Delrin (Blue color)		
Positioning capacity		16 positioning		
Power		DC24V+/-10% (max. 2.0 A)		
Life		3 years after delivery or 10,000 km operation when applied within published specs		
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	DI/DO interface of DC24V type (connector PIO) Positioning completion (PFIN/INP), Alarm (ALM), Zone signal (ZONE), Homing completion (ZFIN)		
	Output Current	Max. 10mA / port		
	Serial signal	Serial Interface (Connector SIO) +5V, 5G, S+, S-		
Protection		Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected IP-40 equivalent		
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	1.2

SCN6 Model (20Kgf & 50Kgf Type)

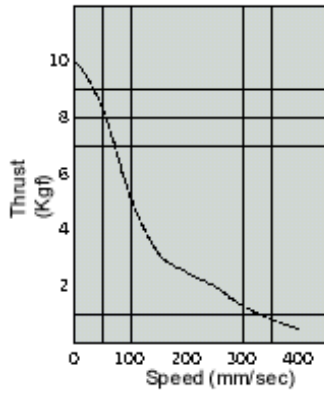
MODEL		SCN6-020-050	SCN6-020-100	SCN6-020-150	SCN6-020-200	SCN6-020-250	SCN6-020-300	SCN6-050-050	SCN6-050-100	SCN6-050-150	SCN6-050-200	SCN6-050-250	SCN6-050-300
Price	Standard -AB												
	Dustproof -ABW												
Stroke (mm)		50	100	150	200	250	300	50	100	150	200	250	300
Max. Thrust (N) / (kgf)		200 / 20.4						500 / 51.0					
Push mode max. Thrust (N)/(kgf)		140 / 14.2						350 / 35.5					
Max. Speed (mm/s) * Typ.		200						100					
Radial Load Capacity (N)		30	20	10	10	10	10	75	50	25	18	15	12
Rod Diameter (mm)		Ø 22											
Rod Tip Thread		M14 Pitch 1.5 (303SS)											
Program Capacity		16 Positionings											
Power Supply		DC24V ± 10%											
		Current		Drive Power max. 3.0 Amps, Control power max. 0.2A									
Life	Other than seal	3 years after delivery or 10,000 km operation when applied within published specs											
	Seals	6 months, or 2,500 km run (Dust Proof Model Only)											
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO), Position number (4bit binary: PC1,PC2,PC4,PC8)										
		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, 5G, S+, S-											
Protection function		Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected											
Ambience	Temp., Humidity	Operating Temp.: 0 ~ 40°C, Storage Temp.: -20 ~ 60°C, Ope/Storage Humidity: Smaller than 90% RH, Non-condensing											
	Vibration	2.5G / 10G (2 times)											
	Protection	IP-40 equivalent (Standard),						IP-54 equivalent (Dust proof models)					
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
Functions		- Positioning with speed, Accele.				- Stroke Limit end set				- Push Force Mode			
		- Home Direction Set				- Zone Signal output				- Servo Gain Adjust			
		- Incremental movement				- Complete signal width set				- Suitable Auto Max. Accel.			

SCLL6 Model (Slider 20Kgf Type)

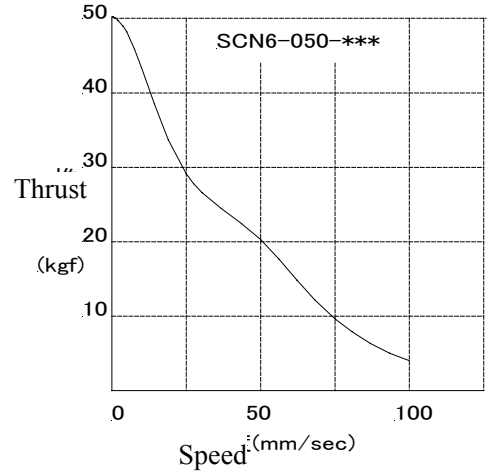
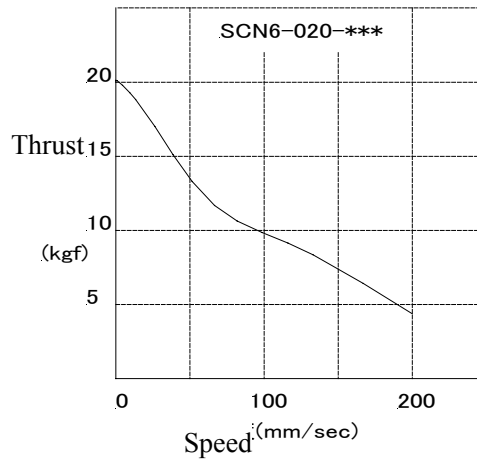
MODEL	SCLL6-020-300AB	SCLL6-020-400AB	SCLL6-020-500AB	SCLL6-020-600AB	SCLL6-020-700AB	SCLL6-020-800AB	SCLL6-020-900AB	SCLL6-020-A00AB
Stroke (mm)	300	400	500	600	700	800	900	1,000
Max. Thrust (N) / (kgf)	200 / 20							
Push mode max. Thrust (N)/(kgf)	140 / 14.3							
Max. Speed (mm/s) * Typ. Data	300							
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							
Actuator weight (kgs)	3.7	4.7	5.7	6.7	7.7	8.7	9.7	10.7
Servo amplifier weight (kgs)	0.5							
Program Capacity	16 Positionings							
Power Supply	DC24V ± 10%							
Life	Current	Drive Power max. 3.0 Amps, Control power max. 0.2A						
	Other than seal	3 years after delivery or 10,000 km operation when applied within published specs						
	Seals	6 months, or 2,500 km run (Dust Proof Model Only)						
I/O	Parallel Input	Names	DC24V type DI/DO Interface (Connector PIO), Position number (4bit binary: PC1,PC2,PC4,PC8)					
		Input current	Start (CSTR), Axis Movement Interlock (ILK) 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, 5G, S+, S-							
Protection function	Over speed, Main power over voltage, abnormal voltage, Overload, Sensor abnormal, Servo abnormal, Encoder wire disconnected							
Ambience	Temp., Humidity	Operating Ter Storage Temp.: -20 ~ 60°C, Ope/Storage Humidity: Smaller than 90% RH, Non-condensing						
	Vibration	2.5G / 10G (2 times)						
Actuator weight (kgs)	3.7	4.7	5.7	6.7	7.7	8.7	9.7	10.7
Servo amplifier weight (kgs)	0.5							
Functions	- Positioning with speed, Accele. - Home Direction Set - Incremental movement		- Stroke Limit end set - Zone Signal output - Complete signal width set			- Push Force Mode - Servo Gain Adjust - Suitable Auto Max. Accel.		

5.1.2. Rod speed-thrust curve

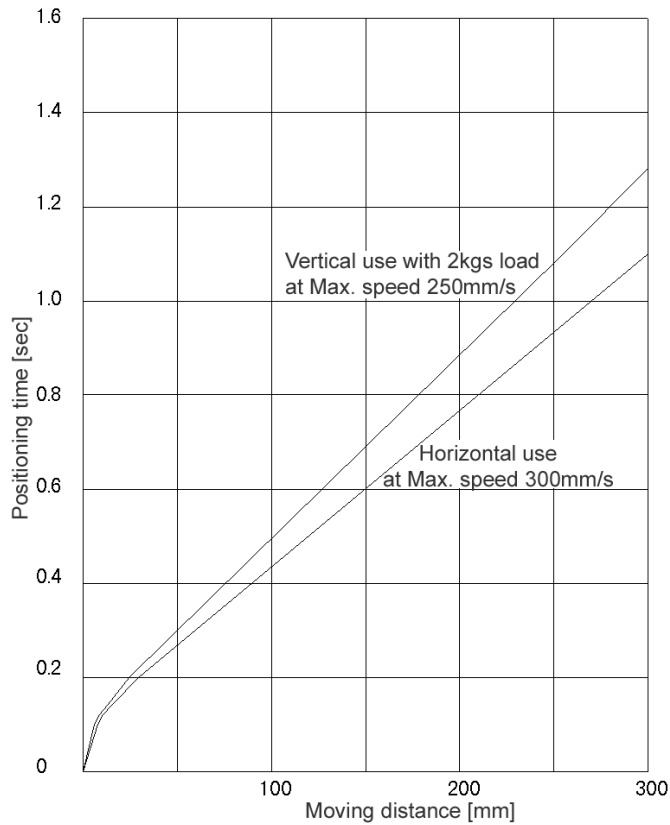
SCN4 /SCN5 Model (10Kgf Type)



SCN6 Model (20Kgf & 50Kgf Type)

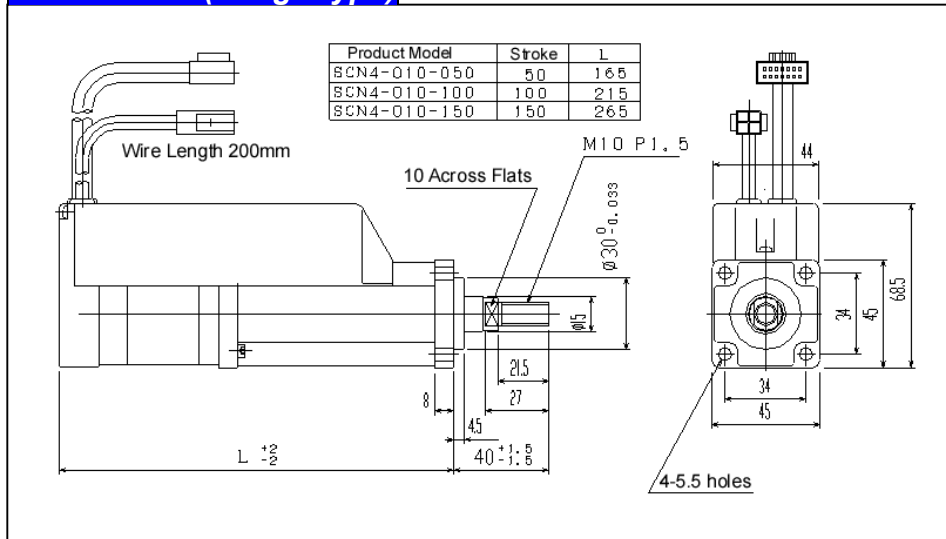


SCLL6 Model (Slider 20Kgf Type)

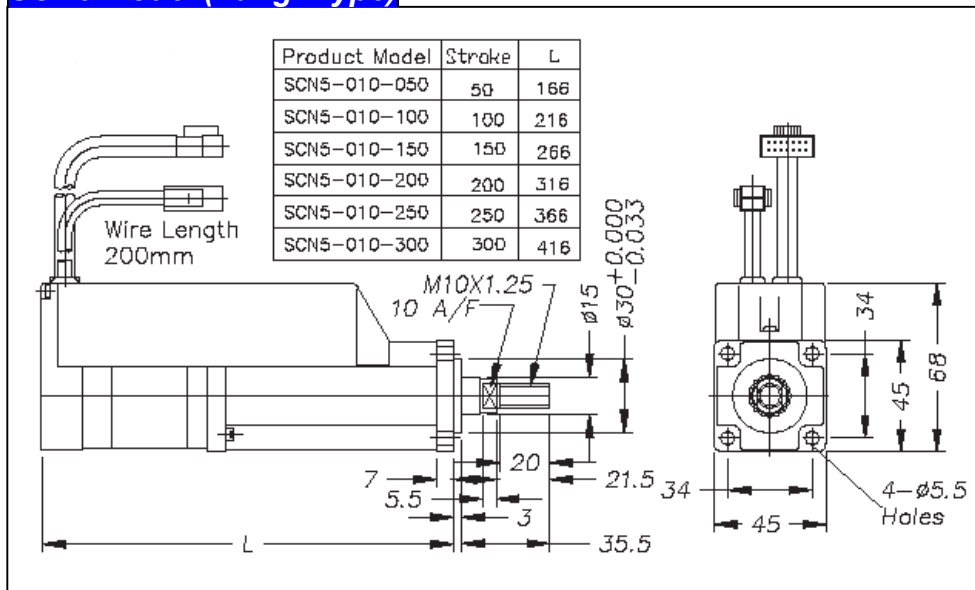


5.1.3. Dimensions

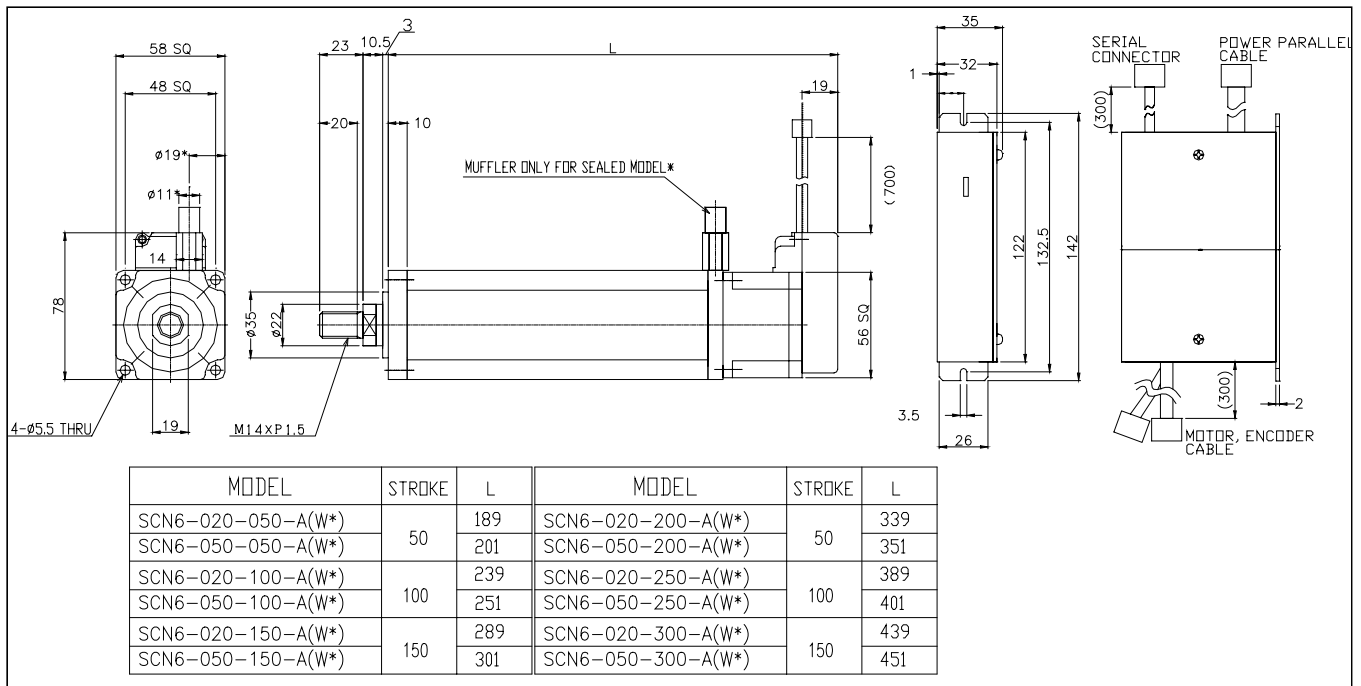
SCN4 Model (10Kgf Type)



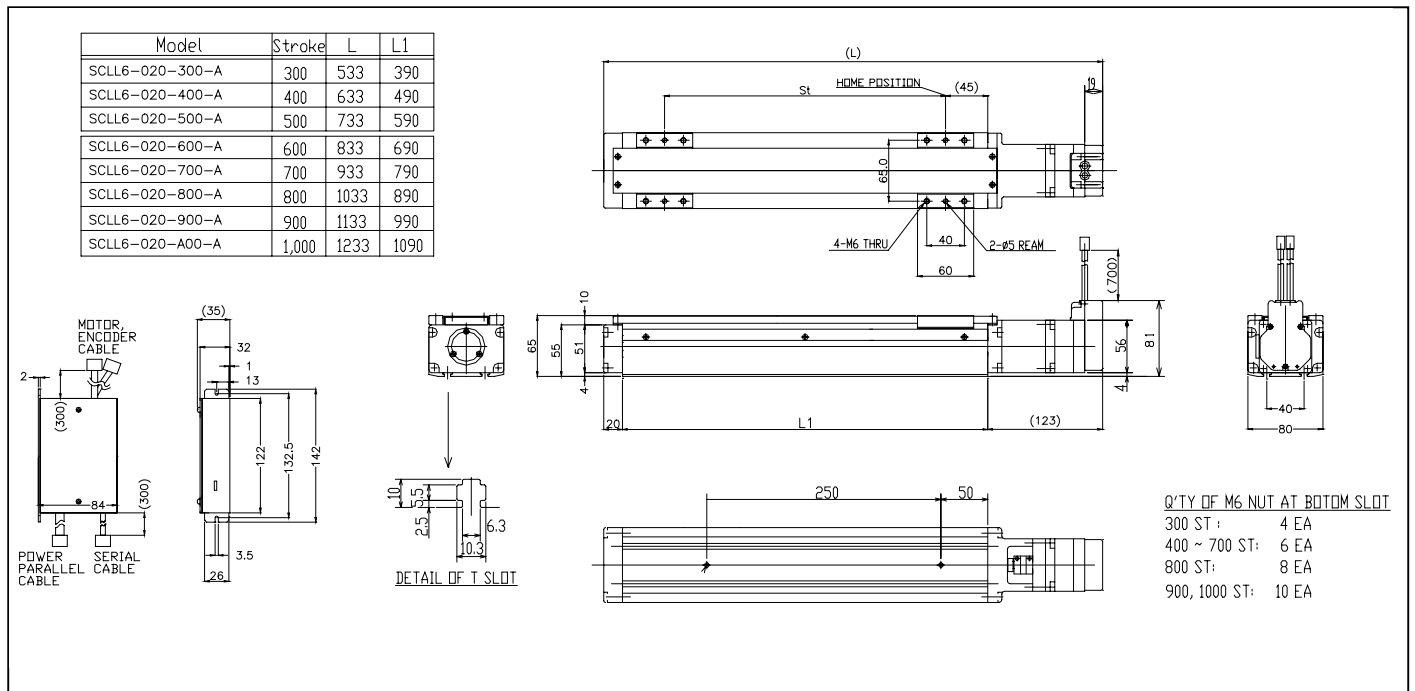
SCN5 Model (10Kgf Type)



SCN6 Model (20Kgf & 50Kgf Type)



SCLL6 Model (Slider 20Kgf Type)



6. Interface specifications

6.1. Input/Output circuit of Interface signal

(1) PIO Input circuit

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

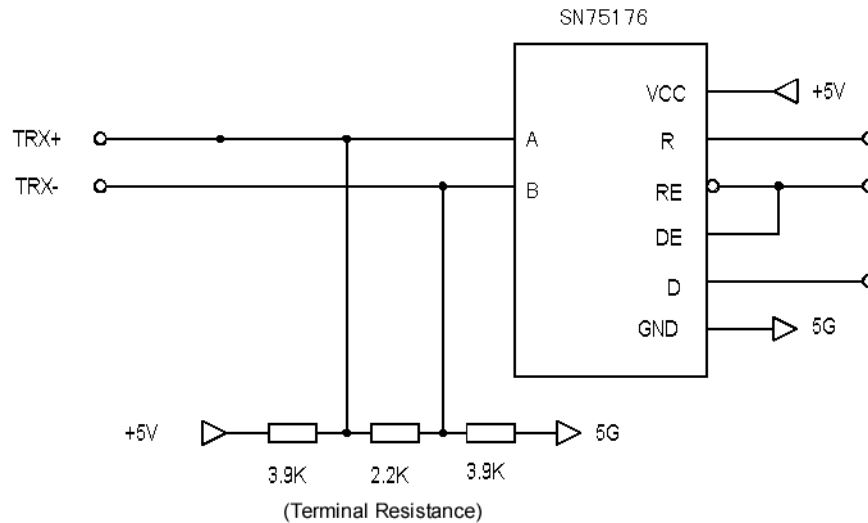
Definition of Input signal OFF is electrical open of Input signal.

(2) PIO Output Circuit

Definition of Output signal ON is electrical connection of +24V with Output signal.

Definition of Output signal OFF is electrical open of Output signal

(3) SIO Circuit



6.2. PIO specifications

6.2.1. Input signals

SCN4 / 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. In case of OFF during the rotation, it will stop the cylinder with full

		<p>power, then register the position where the cylinder stopped as temporary target position, maintaining the original target position in memory.</p> <p>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.</p>
--	--	--


Reference : Position number combination Table

Position Number Resister	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	<p style="text-align: center;">▲ (At Starting up, Data of PC1 to PC8 will be read)</p>															

SCN6 Model (20Kaf & 50Kaf Type)
SCLL6 Model (Slider 20Kgf 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.
13	NC	No connection
14	NC	No connection

Reference : Position number combination Table

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	 (At Starting up, Data of PC1 to PC8 will be read)															

6.2.2 Output signal

SCN4 / SCN5 Model (10Kgf Type)

Number	Symbol	Functions
9	PFIN/INP	<p>Position completion output (In position 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.</p> <p>② OFF: The output goes low when motion to a new target position is initiated.</p> <p>Notes:</p> <ul style="list-style-type: none"> -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.
10	ZFIN	<p>Homing completion output</p> <p>① OFF: The output is OFF after the Mechatronics Cylinder is first powered up and /or when an encoder-related alarm occurs.</p> <p>② ON: The output will be ON if the axis has been homed since it was last powered up. If the output is not ON when a CSTR pulse is sent the axis will home itself before executing the command</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 occurs.</p>

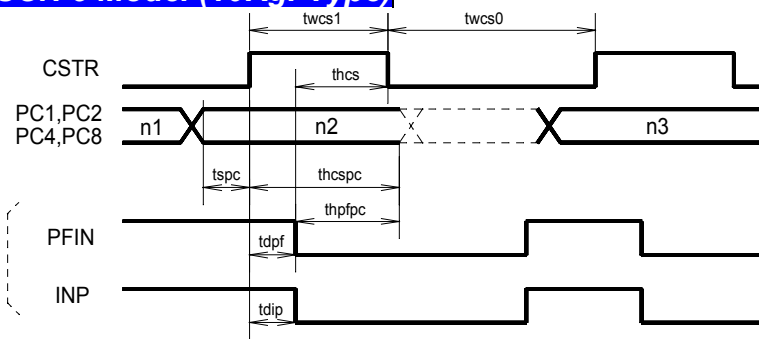
SCN6 Model (20Kaf & 50Kaf Type)
SCLL6 Model (Slider 20Kgf Type)

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/INP	Position completion output (In position output) ① ON: The output goes high when the Mechatronics Cylinder has moved to within the position width tolerance of the target position. ② OFF: The output goes low when motion to a new target position is initiated. 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.
20	ZFIN	Homing completion output ① OFF: The output is OFF after the Mechatronics Cylinder is first powered up and /or when an encoder-related alarm occurs. ② ON: The output will be ON if the axis has been homed since it was last powered up. If the output is not ON when a CSTR pulse is sent the axis will home itself before executing the command
21	ZONE	Zone signal output ① ON: The output will be ON when the position of the axis is within the range programmed to be the "Zone". ② OFF: The output will be OFF if the axis has not been homed or if the rod is outside the programmed zone.
22	ALM	Controller alarm output ① ON: The output will be ON during normal operation. ② OFF: The output will be OFF in case of Alarm occurs.
23	NC	No connection
24	FG	Frame Ground

6.2.3. Timing Chart

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

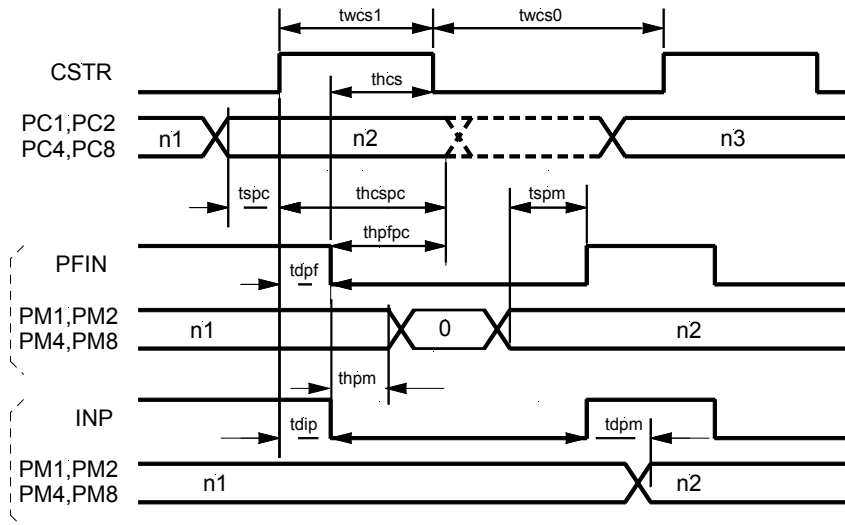
SCN4 / SCN 5 Model (10Kgf Type)



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
tdjp		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 Model (20Kaf & 50Kaf Type)
SCLL6 Model (Slider 20Kgf 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=>CSTR 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
tspm	0 msec		PFIN ON=>PM1~PM8 set up time
thpm		4 msec	PFIN OFF=>PM1~PM8 0 Output delay time
tdip		4 msec	CSTR ON=>INP OFF delay time
tdpm		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 Serial Input / Output

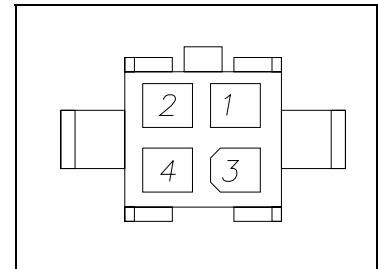
In case of use of SIO, please refer the enclosed manual of “Termi-BUS Interface”.

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 etc)
 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-

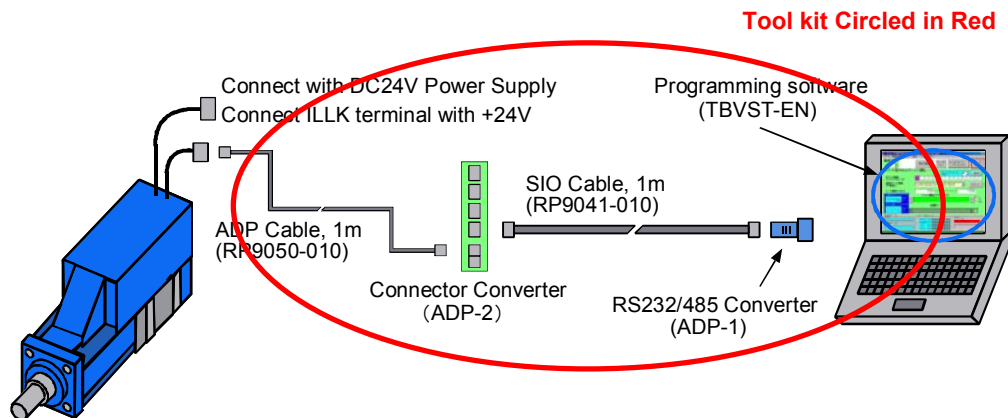


7. Support equipment

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

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

- ① PC Setting Tool : TBVST-EN (to install it in PC)
- ② RS232/RS485 Adaptor : ADP-1 (to connect with PC serial port)
- ③ Connector Junction : ADP-2 (Junction for cables)
- ④ ADP Cable (1m) : RP9050-010 (to connect Mechatronics Cylinder and ADP-2)
- ⑤ SIO Cable (1m) : RP9041-010 (to connect ADP-1 and ADP-2)

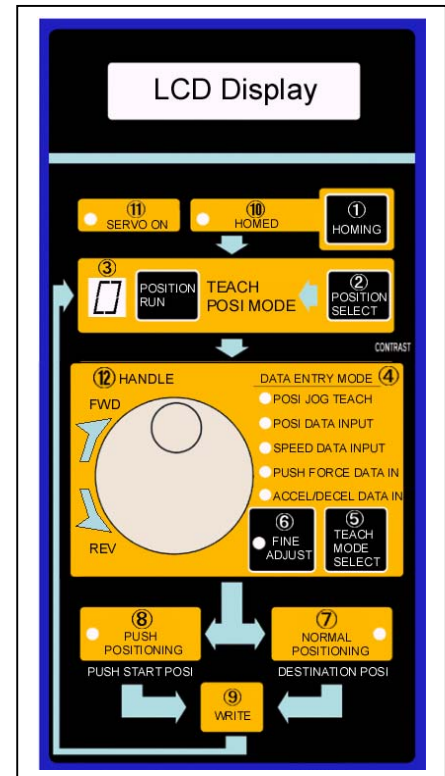
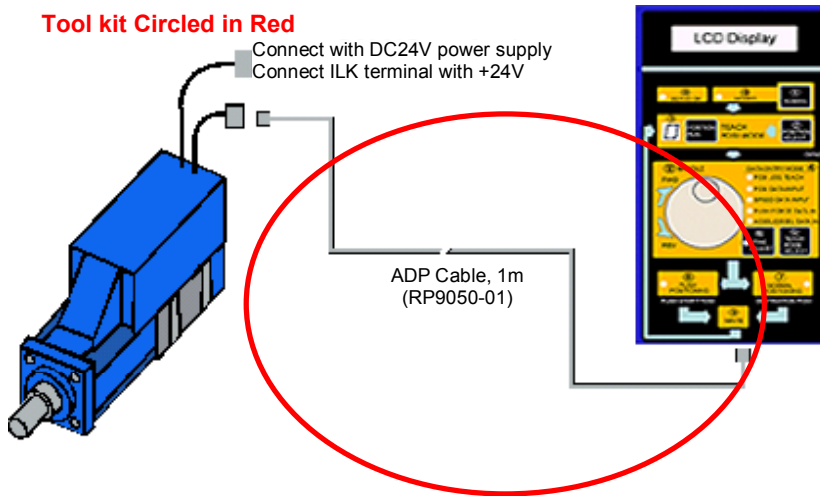


Refer to the PC-Tool Manual for more information.

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

(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

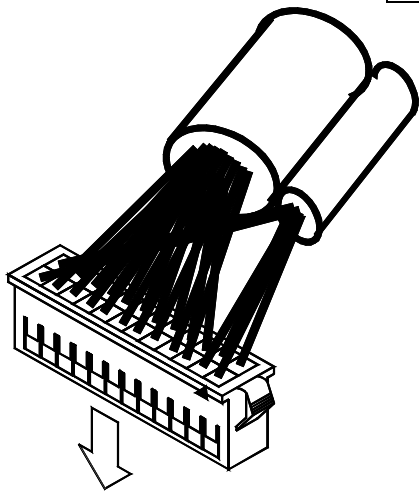
SCN6 Model (20Kgf & 50Kgf Force Type)
SCLL6 Model (Slider 20Kgf Force Type)

(Model: RP9120-030)

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

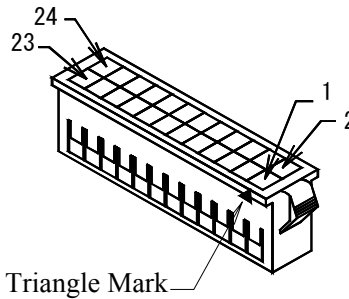
5	PC1	Black	15	PM1	Grey
6	PC2	White	16	PM2	Pink
7	PC4	Red	17	PM4	Light Green
8	PC8	Green	18	PM8	Orange
9	CSTR	Yellow	19	PFIN	Light blue
10	NC	Brown	20	ZFIN	Dark Brown
11	NC	Blue	21	ZONE	White/Black
12	ILK	Purple	22	ALM	Red/Black

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



To the Mechatronics Cylinder Controller

Parallel cable pin number locations of RP9120)



Triangle Mark

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



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

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

8. Maintenance

8.1. Maintenance & Inspection

Please inspect your Mechatronics Cylinder periodically following the chart below.

	Check Up Items	Points	Notes
Mechatronics Cylinder	Vibration and sound	Sound level should not be higher than usual	
	Appearance	Clean with cloths and/or air	
	Parts clean up	No major dust, dirt, oil, etc.	Clean with cloths and/or air
	Tightness of screws	No loose screws	Tighten screws

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 with good ones. This 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 Defective motor	Replace product Replace product
		Occurs other than above case	Defective controller / cable not connected	Replace product / connect cables
Encoder counter abnormal	B9	Occur when power was turned ON	Defective controller Defective motor	Replace product Replace product
		Occurs other than above case	Defective controller / cable not connected	Replace product / connect cables
Datum position detect impossible	BE	Occurs when homing	Too short time out signal time set	Change data
			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 abnormal	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
Circulation Voltage abnormal	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 abnormal	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	Over load	Check load

		<i>operation</i>	<i>High ambient temperature</i>	<i>Cool down ambient temperature under 40°C</i>
		<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>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. Abnormal Diagnosis by abnormal operation of Mechatronics Cylinder

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

Abnormal 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 - 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>Wiring wrong</i>	<i>Check wiring</i>	<i>Wiring to be corrected</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 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 connection 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>Cylinder hits the over stroke limit end due to over run</i>	<i>Reduce the 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>

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