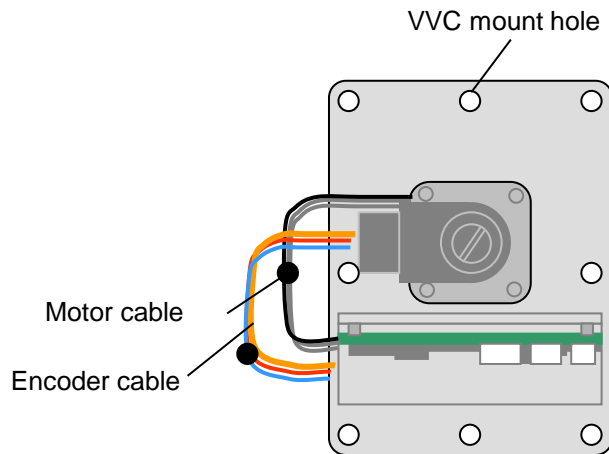
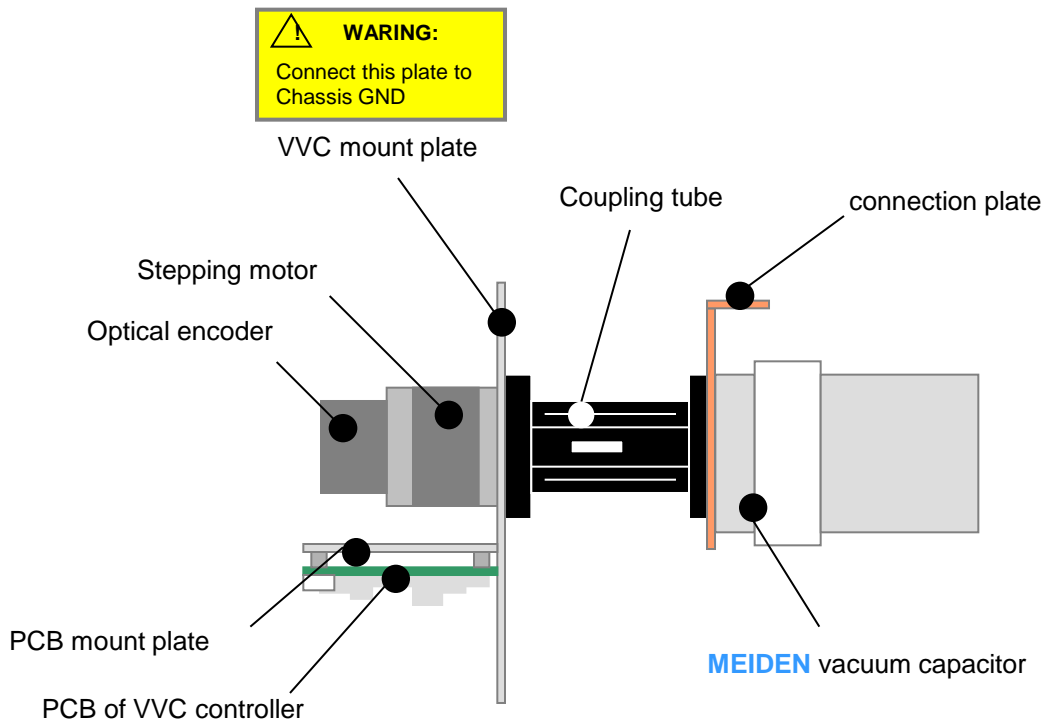


MEIDEN

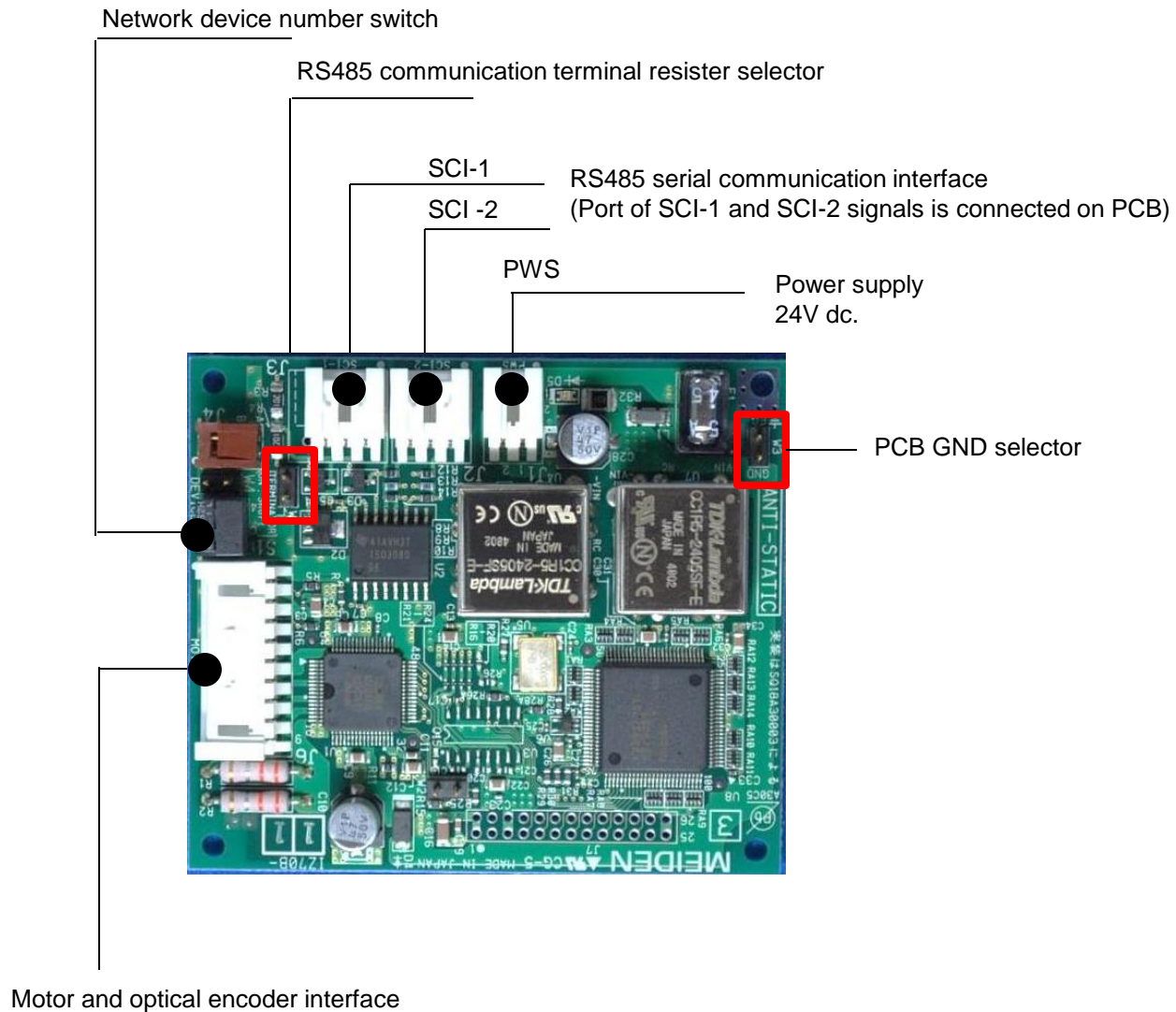
Motorized variable vacuum capacitor

Installation Manual

Name of the component



Interface of VC controller



Common spec. of motorized VVC

Following is the common specification of motorized variable vacuum capacitors. This common specification is just for explaining the a model of our product. please see the specification sheet for each of your motorized VVC.

Specification of electrical characteristics of vacuum capacitor depend on your capacitor. please see the products catalog or specification sheet of vacuum capacitor you selected.

Common specification

Power supply:

Voltage	24VDC (+5% / -5%) *1
Current	1Arms maximum 0.1Arms idle

Mechanical :

Type of motor	Stepping motor with optical encoder
Number of control step	400step/rotation
Rotation speed	240rpm default (360rpm maximum *2)

Interface:

Type of serial communication protocol	RS-485 half-duplex using balanced 2-wire
Maximum number of network device	16units
Communication signal rate	9600bps
Resistance value of terminal	100 [ohm]

Notes.

*1 *2. If the voltage of power supply on VC controller is low, motor shaft will slip frequently because of motor torque is low .When you increase the motor speed from default 240rpm, the voltage at the VC controller power supply need to keep 24V(+5%/-0%).

Assign of Signals

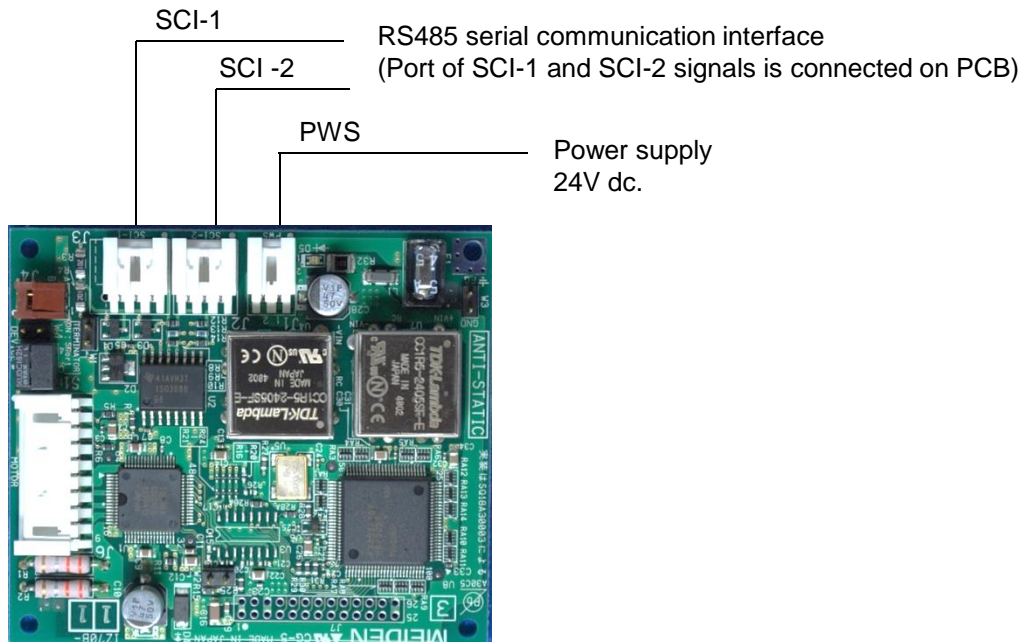
(1) Power supply (PWS : on board indicated)

PIN	Signal	Type of connector
1.	+24V	Housing: Molex 51103-0200
2.	0V (Return)	Terminal Molex 50351- 8000(Loose) OR 50351-8100(Reel)

(2) Serial communication interface (SCI-1 and SCI-2 : on board indicate)

PIN	Signal	Type of connector
1.	SD/RD+	Housing: Molex 51103-0300
2.	SD/RD-	Terminal Molex 50351- 8000(Loose) OR 50351-8100(Reel)
3.	GND	

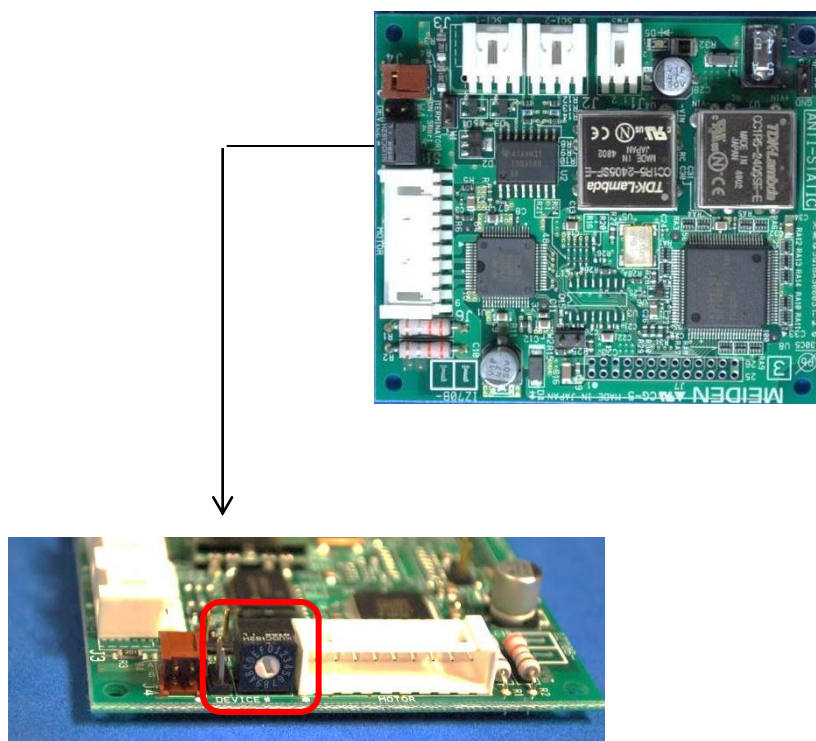
The serial interface circuit is electrically isolated from PCB signals. GND of communication signal need to connect the Host site GND.



VVC controller PCB

Setting the network device number

The network device number is used to recognize each of motorized VVC on the RS485 serial communication network. you need to select the unique number for each device between 0 to 15 (F).



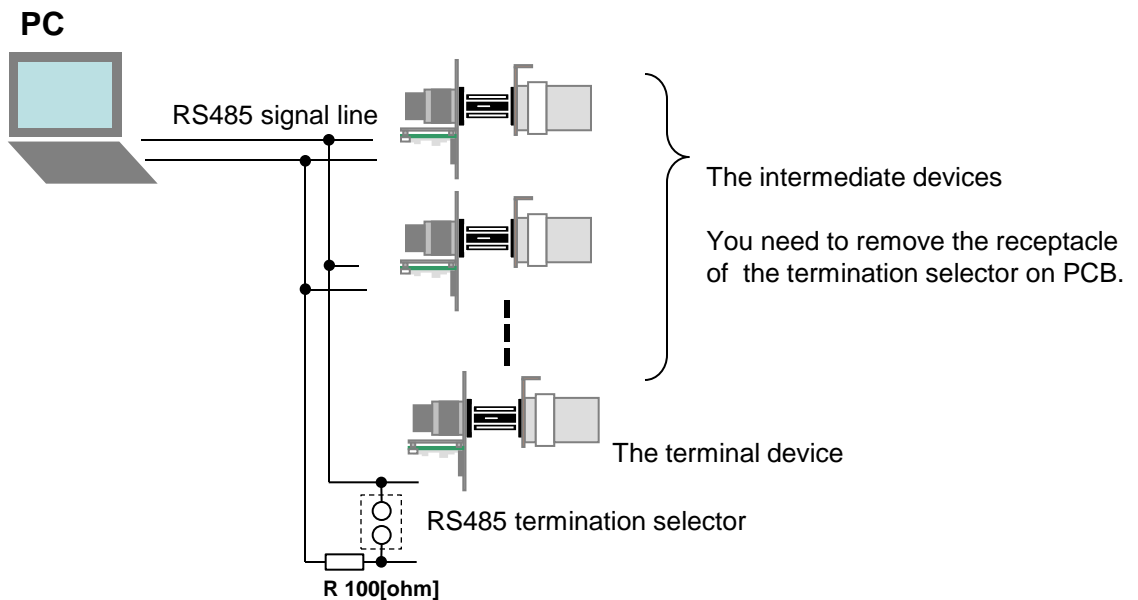
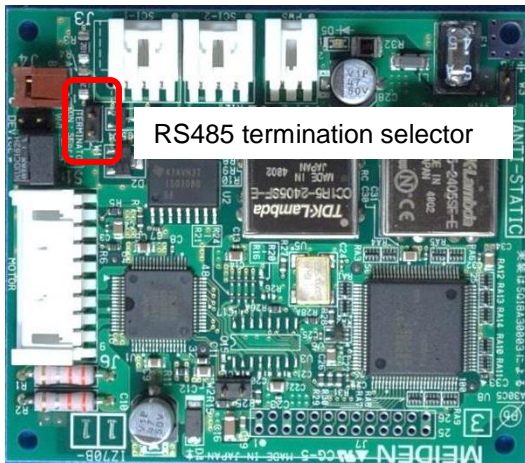
Network device number switch

You can select from 0 to F (15) any device number for each device except same number of other device.

Setting the terminal resistor for RS485 communication

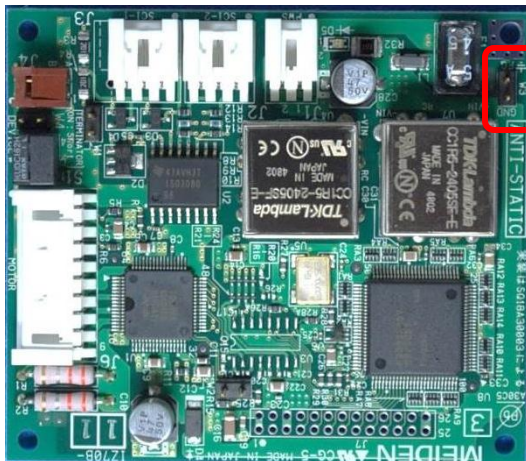
The terminal device on the serial communication network need the resistance for termination between the signal lines to prevent the influence of signal reflection.

RS485 termination selector is on board. Default setting of VC controller PCB is connected terminator by the receptacle.

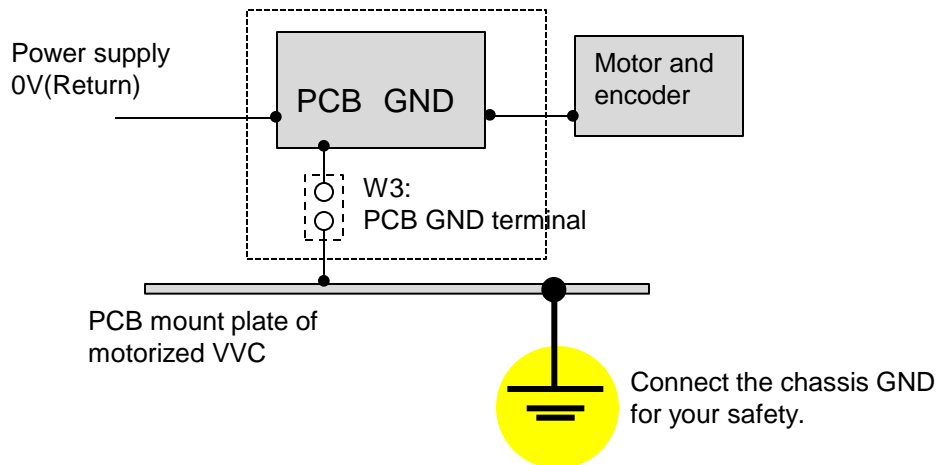


Setting the PCB GND

PCB GND selector is the terminal of decide the GND point of PCB. On default setting, PCB GND is connected to the chassis of motorized VVC.



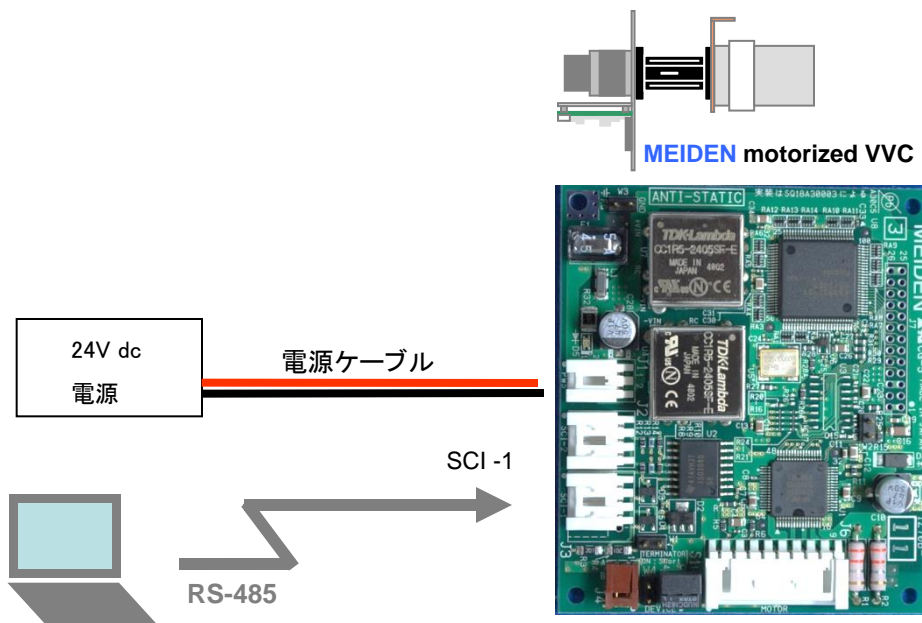
W3: PCB GND terminal
Default ON: connected by the receptacle



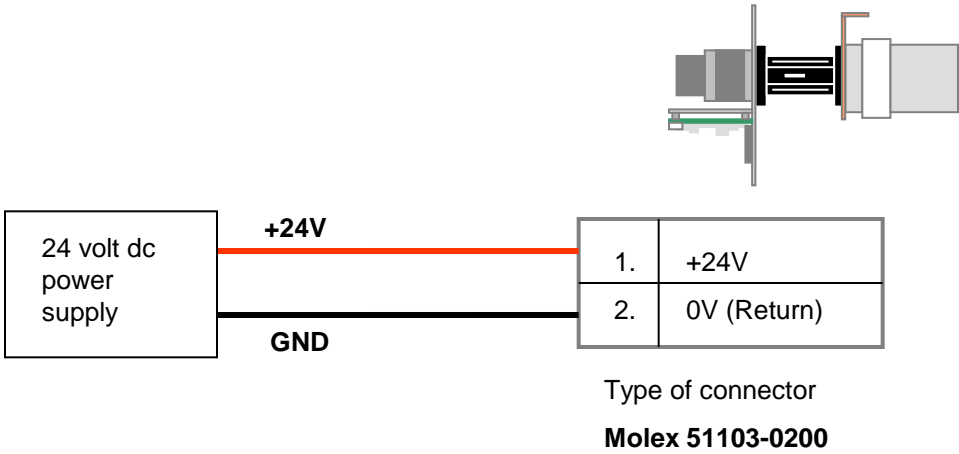
For example of minimum setting

Following is the minimum set up of motorized VVC.

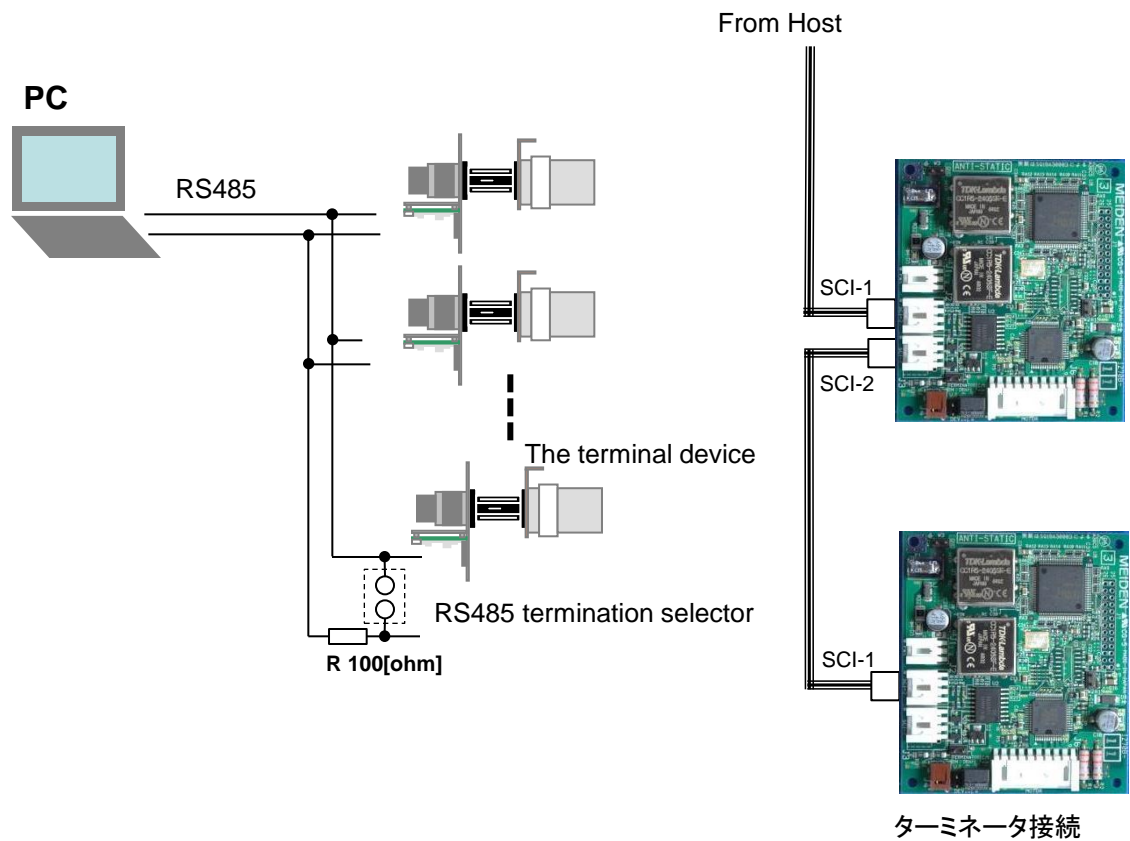
You need to prepare the 24 volt dc power supply and RS485 serial communication Host computer.



Regarding to power supply cable



For example of motorized VVC communication network



The serial communication port of SCI-1 and SCI-2 signals are connected on PCB.

The setting of serial communication port

The setting of serial communication port

Following is communication port setting for the host side. Please see the install manual of your host computer and the communication software.

Property	value
Baud rate	9600bps
Data length	8bit
Parity	non
Stop bit	1bit
Flow control	non

Regarding to the communication protocol 1/2

Master slave communication

Host computer sends some control command to motorized VVC. Motorized VVC sends the reply of the command from host computer.

Half-duplex communication

2-wire method of half duplex communication is done.

Network device number

The network device number is used to recognize each of motorized VVC on the RS485 serial communication network. by following, you can check the connection between the host computer and the device.

For example

Checking the #00 device connect situation

send	reply
00[CR]	>00[CR][LF]

Regarding to the communication protocol 2/2

Delimiter

Delimiter of host computer command	[CR]
Delimiter of motorized VVC reply	[CR][LF]

> Reply

The symbol of '>' is used at the beginning of the reply from motorized.

For example

A command from host computer	00CAP01234[CR]
A echo reply from device #00 motorized VVC	>00CAP01234[CR][LF]

mismatch of command

In case of the recognise the device	nn?[CR][LF]
In case of unknown device	(non reply)

Format of numeric value

numerical values are expressed by decimal number and following

nn	2 digit number (Network device number)
xxxxx yyyy zzzzz aaaaa	5 digit number (set value, current value)
uuuuuuu vvvvvv	unknown length strings

1. CAP (CAPacitance)

CAP is the command for capacitance control. CAP is the most basic command for realize auto variable capacitor. numerical set value is 5 digit number. The lowest digit number represents the capacitance 0.1pF. For example, in case of setting the device #02 motorized VVC on 234.5 pF capacitance, you will send following command from host computer, 02CAP02345[CR].

If higher than mechanical maximum(minimum) capacitance is commended, capacitor set to it's maximum (minimum) capacitance.

Using 'nnCAP?' command, the current capacitance of #nn device can be read.

Command	Reply	
nnCAPxxxxx	>nnCAPxxxxx	Command for set capacitance
nnCAP?	>nnCAPxxxxx	Read the current capacitance

2. POS (motor POSition)

POS is the command for motor position control by using motor control axis. motor control resolution is 400 steps a rotation. the maximum value of motor position depend on the type of vacuum capacitor you are using. For example, motor position range of UW type VVC is from 0 to 4000 position.

Using 'nnPOS?' command, the current motor position of #nn device can be read.

Command	Reply	
nnPOSxxxxx	>nnPOSxxxxx	Command for set position
nnPOS?	>nnPOSxxxxx	Read the current position

3. SPD (motor SPeeD)

SPD is the command for setting motor maximum rotation speed. The default motor speed is 240rpm. you can set the motor rotation speed from 30rpm to 360rpm using SPD command.

Command	Reply	
nnSPDxxxxx	>nnSPDxxxxx	set the motor maximum speed
nnSPD?	>nnSPDxxxxx	read the current max speed.

4. INF (INFormation)

INF is the command for read the motor control situation.

Command	Reply
nnINF?	>nnINFxxxxx/yyyyy/zzzzz/aaaaa

xxxxx: flags of the situation (flag0)(frag1)(frag2)(frag3)(frag4)

frag0 0: non indexed 1: index finished

frag1 0: motor stop 1: motor is running

frag2 0: without ERR 1: with ERR

frag3 production use only

frag4 production use only

yyyyy current motor position

zzzzz current capacitance

aaaaa current maximum motor rotation speed

5. ORG (set ORiGin)

ORG is the command for perform the index of motor control axis.

Command	Reply	
nnORG	>nnORG	start the index

6. ERR (ERRor)

ERR is the command for check the error.

Command	Reply
nnERR?	without error : >nnERR00000
	with error : >nnERR00001

7. PIN (PIN number)

PIN is the command for read the PIN number from the each of motorized VVC.

Command	Reply
nnPIN?	>nnPINuuuuuuuu

uuuuuuuu	PIN number of motorized VVC
vvvvvvvv	manufacture use only >nnPINuuuuuuuu/vvvvvvvv

8. TYP (TYPe)

TYP is the command for read the type of the motorized VVC.

Command	Reply
nnTYP?	>nnTYPuuuuuuuuuu

uuuuuuuuuu	Type of mtorized VVC
vvvvvvvv	manufacture use only >nnTYPuuuuuuuuuu/vvvvvvvv

For example of communication 1/2

MODEL for explanation

4 units motorized VVC is connected the same serial communication network. Each of device number is 00, 01, 02, 03. Each of capacitor, maximum capacitance is 950pF and minimum capacitance is 150pF.

(1) check the connect

command	reply
00	>00
01	>01
02	>02
03	>03

(2) set #00 device on 250pF

command	reply
00CAP02500	>00CAP02500
00CAP?	>00CAP02345 motor is on running
00CAP?	>00CAP02500 after finish the setting

(3) set #01 device on motor position 3450 and read the capacitance of it.

command	reply
01POS03450	>01POS03450
01CAP?	>01CAP02567

(4) set #02 device on minimum capacitance. and check the capacitance.

Host	reply
02CAP00000	>02CAP00000
02CAP?	>02CAP01500

For example of communication 2/2

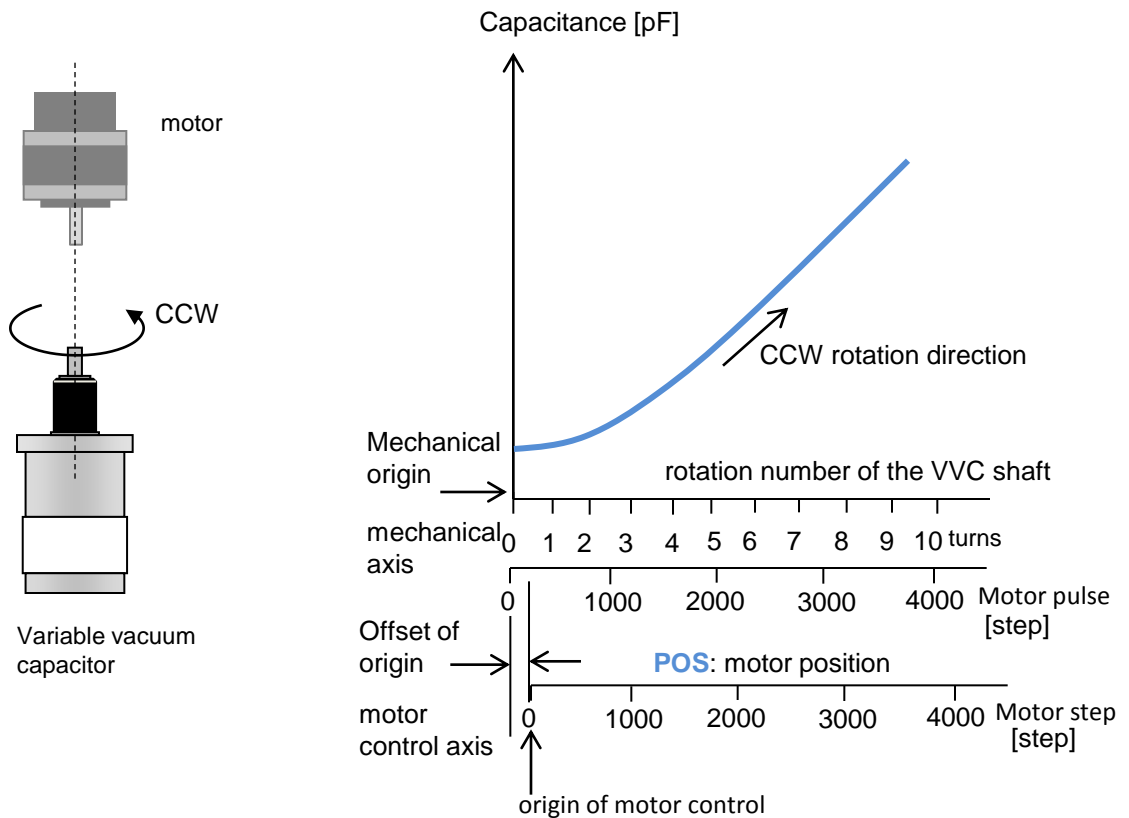
(5) read the control situation on #03 device

command	reply
03INF?	>INF10000/03500/07843/00240
[1000	Index is finished / motor stop / without ERR
03500	motor position is 3500
07843	capacitance is 784.3pF
00240	motor maximum rotation speed is 240rpm

(6) set #03 device to maximum capacitance. and check the capacitance.

host	reply
03CAP99999	>02CAP99999
02CAP?	>02CAP09500

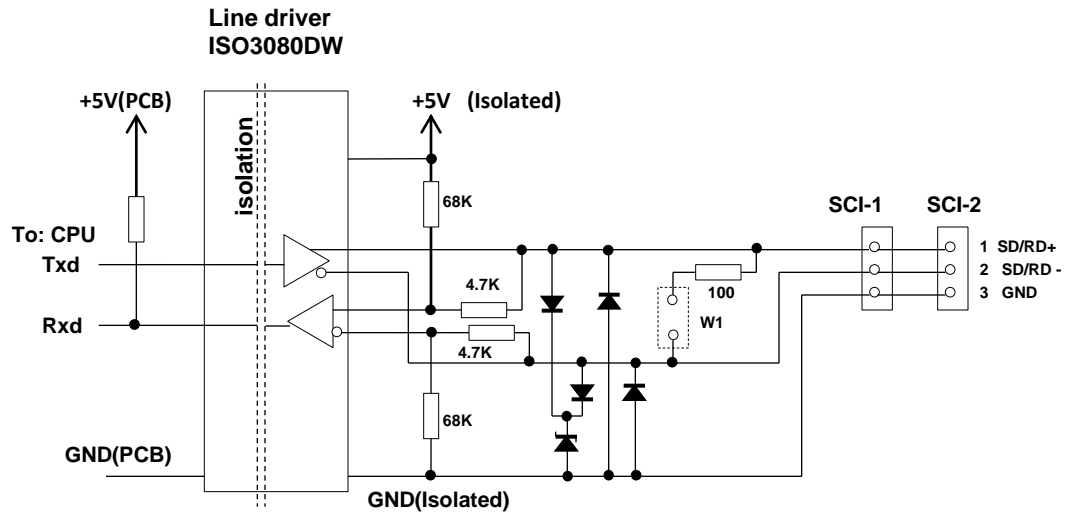
Regarding to POS command



POS is the command for motor position control.

There is the mechanical limit stopper at the end of CW rotation direction. This point is the mechanical origin. motor is controlled by using motor control axis.

The circuit diagrams of serial communication interface



EIA-485(RS485) circuit diagrams of serial communication interface

Timing of communication signals

