OPC-50TS
OPC-100TS

DIGITAL PARTS FEEDER
CONTROLLER

User Manual

ORAND Co., LTD

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Bowl Feeder And Hopper

Precautions for Usage

● This equipment cannot be used with feeders for piezoelectric parts.

● Do not use in places with explosives or flammables.

There is danger of explosion or fire.

● Do not use in locations where dust is abundant or moisture can enter equipment.

This product is neither dustproof nor waterproof. In particular, separate measures against dust are required in locations with large amounts of metallic dust.

● Do not switch the power ON/OFF too frequently.

Otherwise, the internal electronic components will deteriorate significantly, resulting in malfunction. In particular, do not control ON/OFF of parts feeders by switching the equipment's input power through a relay(control should be performed by connecting external control signal to the EXS terminal)

● Do not switch ON/Off at output side.

Switching ON/OFF the drive unit by connecting a relay to the output should be avoided in all cases ;otherwise, the controller will be damaged(control should be performed by connecting an external control signal to the EXS terminal)

● Do not perform welding on feeder while drive unit and controller are connected.

Leakage current from the welder might damage the controller.

● Do not use the output of a PWM inverter as the input power of this product.

Otherwise, the product will be damaged.

● Use equipment within rated input voltage and current range.

● Do not perform unauthorized disassembly, repairs or modifications on equipment.

Otherwise, product may sustain malfunction or damage.

● Perform wiring with power turned OFF.

Otherwise, there is danger of product damage or electrical injuries.

● Connect the ground terminal of input/output power to earth ground.

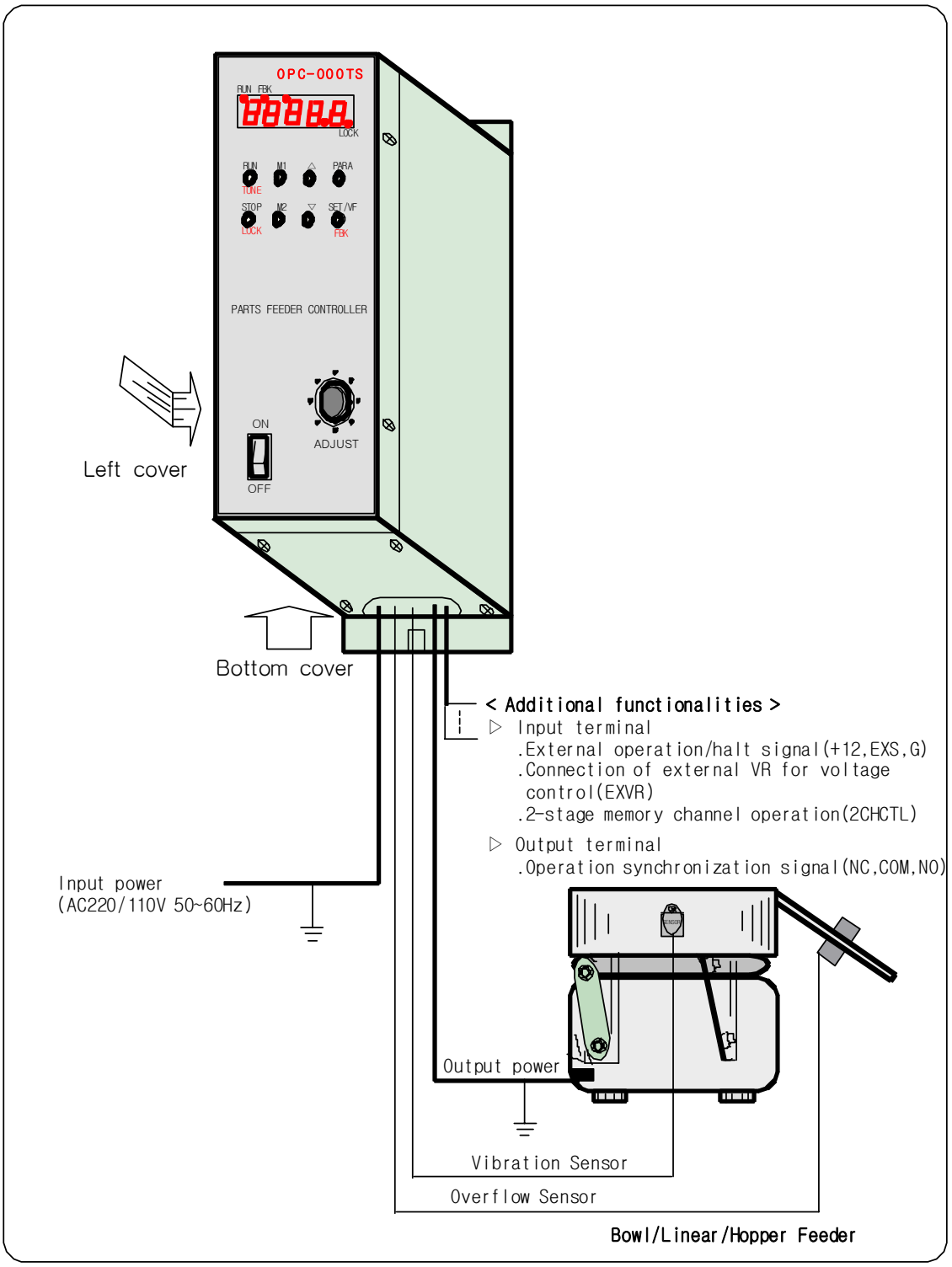
This is required to prevent electrical shock in case of power leakage and to reduce power noise.

● Select the setting of the product's internal input power selection switch according to the input power voltage to be used.

Otherwise, the product may sustain damage or malfunction.

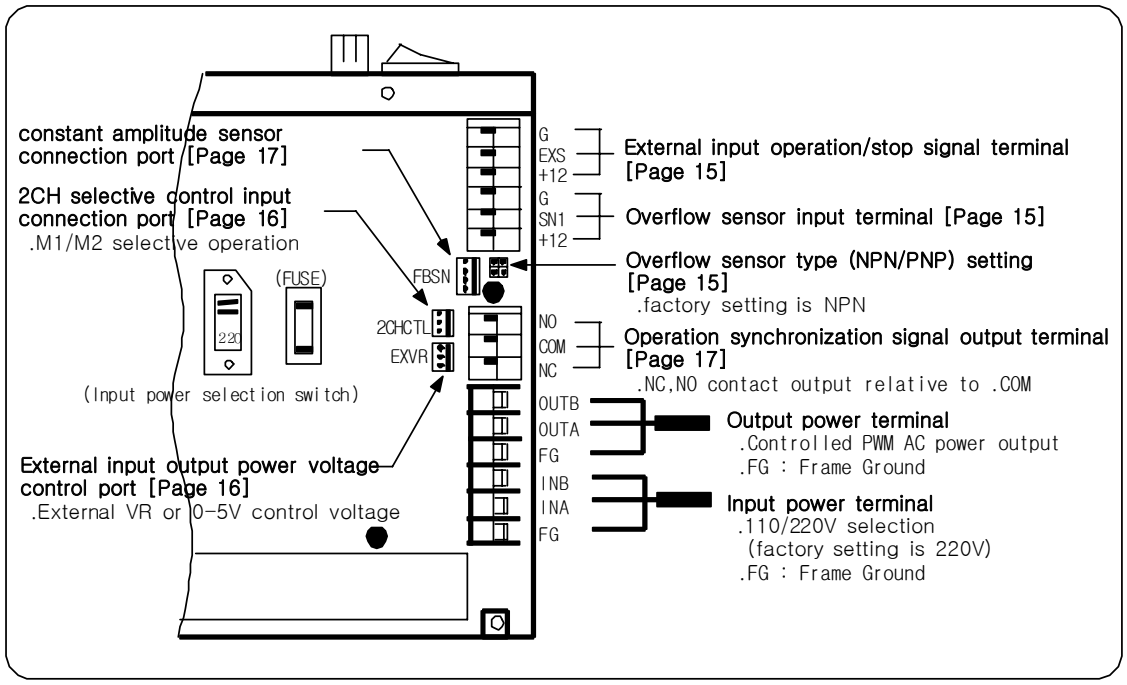
1.Wiring

The wiring between controller and feeder can be summarized as follows.



Connect the internal connectors according the following procedure:

① Open the bottom cover where the exit of the controller's connection cable is located. If the setting of input power supply selection switch is to be changed or the fuse is to be exchanged, the left cover should be also opened.
② According to the picture below, connect input/output power and required additional equipment.
③ Arrange cables so that the cables can exit through the cable exit of the bottom cover; then, close the bottom cover.



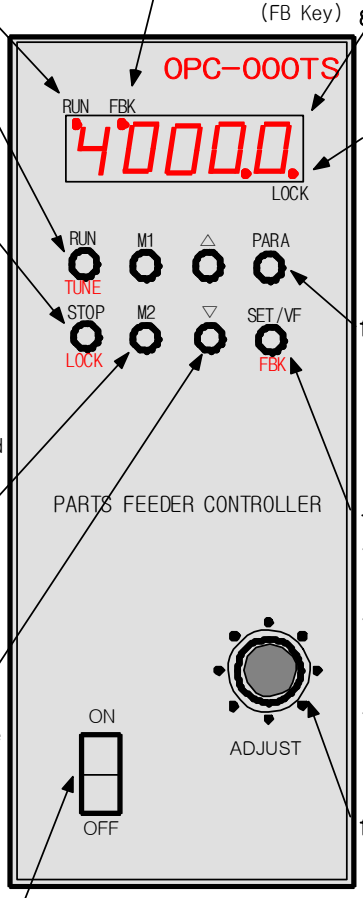
The factory setting of this product's rated power supply voltage is 220V. If you intend to use this product at 110V, set the input power selection switch located inside the product to 110V.

<Note>

1.Always disconnect input power when opening the cover.
2.The ground connection(FG:Frame Ground) of the input/output power terminals should always be connected to earth ground in order to prevent electrical shocks and to guarantee safe operation/
If the ground connections are not connected, the stable operation of constant amplitude/auto tuning functionalities according to feedback sensor(vibration sensor) input cannot be guaranteed, in particular.
3.Equipment should be always operated with the cover closed.

2.Basic Panel Operation

2.1 Name and Function of Each Part



6. Operation state indicator LED
.On: during operation
.Flash: temporary stop(OVF sensor)
.Off: full stop

7. Feedback status display LED
.On: constant amplitude operation in progress (if FB sensor connected)
.Flashing: Constant amplitude operation temporarily stopped(if FB sensor connected)
.Off: FB Sensor not connected/FB function disable (FB Key)

1.RUN/TUNE Key
.RUN: press briefly to run does not function during error condition
.TUNE:press and hold to select auto tuning (only possible with FB sensor connected)

2.STOP/LOCK Key
.STOP:press briefly while running to stop
.LOCK:toggles between lock/unlock of setting whenever pressed and held for short time (refer to Lock LED)
.Initialization: Voltage/frequency/parameter values are set to factory set values if this button is pressed while power turned ON.

3.Memory Key1/Memory Key2
.write:press and hold to store current frequency/voltage/ parameters on key
.read:The key's channel number is displayed as "rd-0x" if pressed briefly; here, if the SET key is pressed, the data stored in the displayed channel('x') is changed to the current operational value

4.UP/Down Key
.Use to change the values of currently displayed frequency, voltage or parameter.
.If kept in pressed state while changing frequency or voltage, fast send function is enabled

5.Power switch

8.Data display window (7segment display)
.Frequency, voltage, parameter ,error code etc. are displayed in alphanumerical format.

9.LOCK indicator LED
.On: LOCK enabled (refer to LOCK key) Modification disabled for all values(read-only)
.Flash: Only voltage can be adjusted
.Off: LOCK disabled

10.Parameter setting key
.Parameter setting mode entered whenever button is pushed; actual parameter item is changed after each push of button.
.Returns to frequency display mode if no operation has been performed for a certain time.

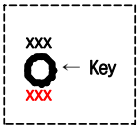
11.SET/VF/FBK Key
.SET:Currently displayed value is stored as set value if pushed in parameter set mode
.V/F:Voltage/frequency mode toggled whenever pushed briefly in voltage display/frequency display mode
.FBK:enable/disable of constant amplitude operation function toggled if pushed for longer time(supported only with FB sensor connected)

12. Setting ENCODER
.Used with up/down keys to change settings of Voltage/frequency/ parameter settings
.Amount of change per Step
-Frequency: 0.1Hz,fixed
-Voltage: Variable from 0.1V to 5.0V according to parameter (Ev-x.x) setting (factory default setting is 0.5V/step)

[Function display arrangement of keys]

Function if key pressed for short time →

Function if key pressed for long time →



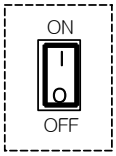
2.2 Run/Stop

1.Turn ON the power switch.

◆ Initial condition after power switch ON

.RUN condition: If external run/stop signal(EXS) is set to ON(Active)
If power switch has been turned OFF at previous RUN condition

.STOP condition: Other than the abovementioned RUN condition



2.'Run' or 'Temporary stop' is entered if RUN key is pressed.

◆ Run condition

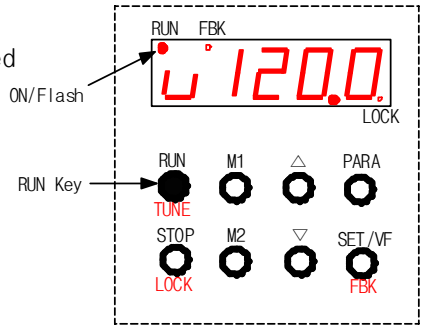
.If overflow sensor is not operating or not used

.RUN LED is turned ON

◆ Temporary stop condition

.If overflow sensor is activated

.RUN LED is Flash



3.'Stop' condition is entered if STOP key is pressed.

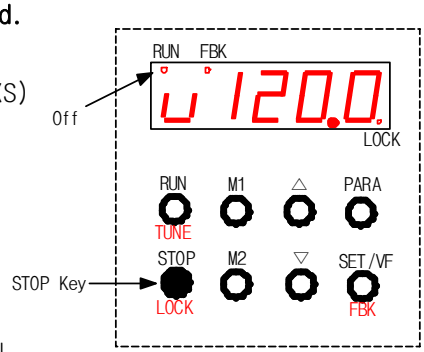
◆ Stop condition entered in any case

.Regardless of the external run/stop signal(EXS)

.Regardless of overflow sensor operation

.RUN LED turned OFF

(Note) If the 'STOP' key is pressed at 'Run' condition according to external run/stop input signal(EXS), an emergency stop is performed ; if power is turned off then turned on again, run/stop is determined according to the state of the 'EXS' signal.



◎ If the parts feeder doesn't vibrate despite the RUN LED being turned on, check the following:

① Is the voltage set to "0" or to a value too low?

→ Set the voltage to an appropriate value.
Enter the voltage set/display mode by pressing "SET/VF" key so that "vxxx.x" is output on the display.

② Is the frequency shifted away too much from the resonant frequency?

→ Change the frequency to a value at which large vibrations can be perceived.
To enter frequency display/set mode, press "SET/VF" key; "Fxxx.x" will be output on the display.

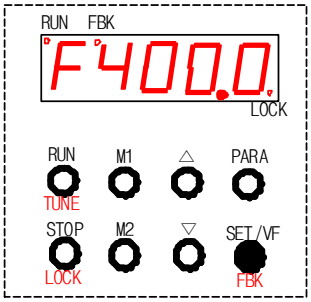
③ Is the controller in error condition?

→ Perform error corrections according to the error code details displayed on the display window.

2.3 Setting Frequency

1.Change to frequency display/setting mode.
.Press the 'SET/VF' key so that 'Fxxx.x' is displayed on the display window.

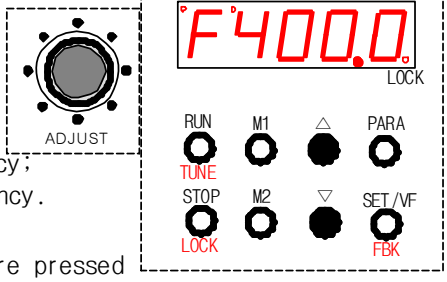
※Whenever the 'SET/VF' key is pressed, the display alternates between 'Fxxx.x' and 'vxxx.x'; 'Fxxx.x' is the frequency display/set mode while 'vxxx.x' is the voltage display/set mode.
Change to voltage display/set mode if no operation has been performed for certain time to frequency display and setting mode.(basic mode)



2. Change the frequency using '△' ,'▽' key and the setting encoder('ADJUST').

◆'△' Key : Press to increase frequency.
◆'▽' Key : Press to decrease frequency.
◆'ADJUST' : Turn to the left to decrease frequency; turn to the right to increase frequency.

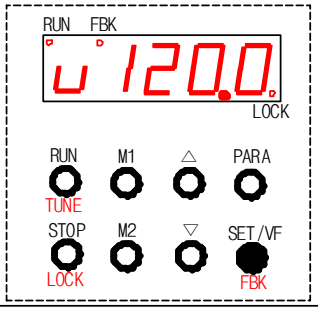
※ Fast send is performed if '△' and '▽' keys are pressed for long time.



2.4 Setting the voltage

1.Change to voltage display/setting mode.
.Press the 'SET/VF' key so that 'vxxx.x' is displayed on the display window.

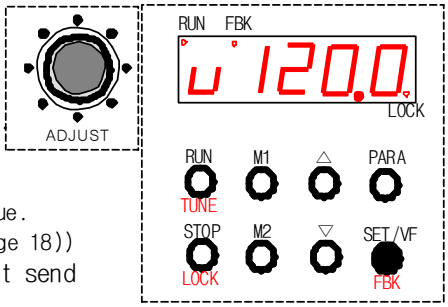
※Whenever the 'SET/VF' key is pressed, the display alternates between 'Fxxx.x' and 'vxxx.x'; 'Fxxx.x' is the frequency display/set mode while 'vxxx.x' is the voltage display/set mode.



2.Change the voltage by using '△' ,'▽'keys and the setting encoder('ADJUST').

◆'△'Key : Press to increase voltage.
◆'▽'Key : Press to decrease voltage.
◆'ADJUST': Turn to the left to decrease voltage; turn to the right to increase voltage.
The amount of change per step can be changed from 0.1V to 5.0V in increments of 0.1V by setting of'Ev-x.x' item's value.
(Refer to 'Parameter Function Table' (Page 18))

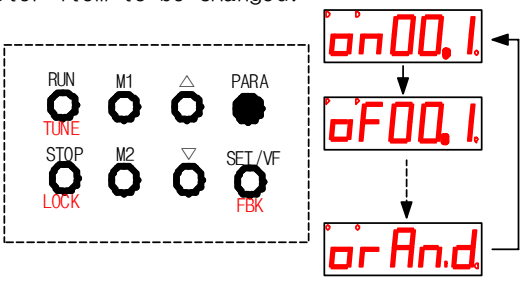
※ Keep '△' and '▽' keys pressed to enable fast send function.



2.5 Setting Parameters

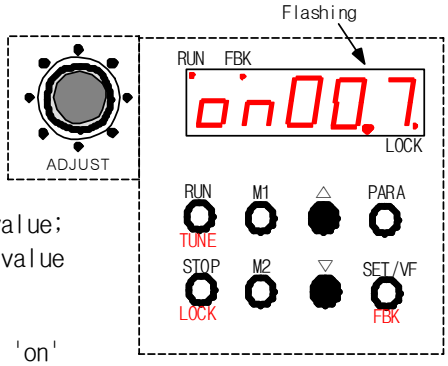
1.Press the 'PARA' key to move to the parameter item to be changed.
.Whenever the 'PARA' key is pressed,
the parameter item is changed in sequence.

※ Refer to [Parameter Function Table] (Page 18) for the parameter change sequence and functional details.



2.Change the displayed data by using '△' ,'▽' key and the setting encoder('ADJUST'). The data displayed in the display window flashes if data is changed.

◆'△' Key : Press to increase value.
◆'▽' Key : Press to decrease value.
◆'ADJUST' : Turn to the left to decrease data value; turn to the right to increase data value

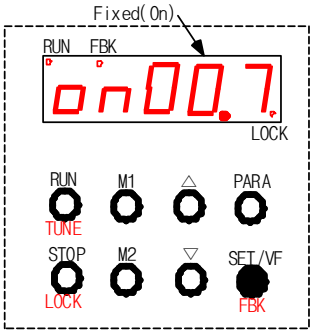


(Example of setting On delay time)

※1. the set values consist of the two values of 'on' and 'oF' only, 'on' and 'oF' will alternate.
2. If the set values are numeric, pressing '△' and '▽' key for a long time will activate fast send function.

3.Press 'SET/VF' key to change data to the value displayed in flashing mode; display mode is changed from flashing to illuminated(fixed).

※1.If 'SET/VF' key is not pressed, the data displayed in flashing mode is invalidated and the old setting maintained.
2.Press 'PARA' key after setting changes to move 사 next item.

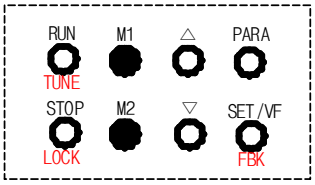


※ If a certain time elapses without any settings or one of the following keys: 'STOP','RUN','M1','M2' are pressed, the controller returns to previous mode

2.6 Storing into Memory(WRITE)

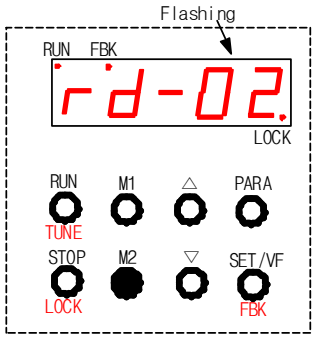
1.Press the memory key to be stored ('M1' or 'M2') for more than 3 seconds ; an alarm sound will be output and current voltage, frequency and each parameter values will be stored.

Memory channels('M1' and 'M2') are supported.



2.7 Reading from Memory(READ)

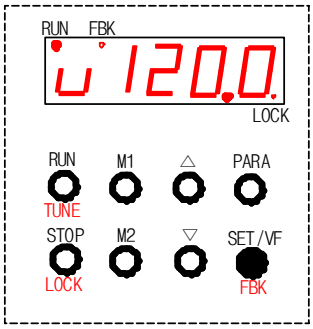
1.Press and then release the memory key button ('M1' or 'M2') for the value stored in memory; the memory channel number will be displayed in 'rd-xx' in flashing mode.



(Example of reading 'M2' key)

2.Press the 'SET' key to change the voltage,frequency and parameter values to the current operating values. The current operating values can be changed.

※ Invalidated if a certain time elapses without pressing 'SET' key or a different key pressed while "rd-xx" is displayed.

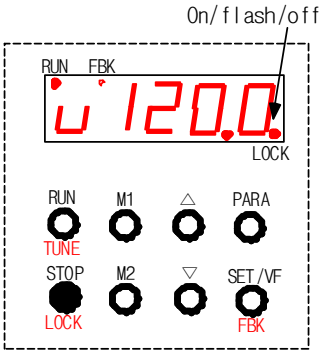


2.8 Setting and Releasing LOCK

◆ LOCK : 'LOCK' LED turned ON
.Press LOCK key for 3 seconds if LOCK is disabled
.Change/update of all data disabled, read-only

◆ SEMI LOCK : 'LOCK' LED flashes
.Press LOCK key for more than 6 seconds in lock disabled state
.Only voltage can be changed,except data can be read-only.

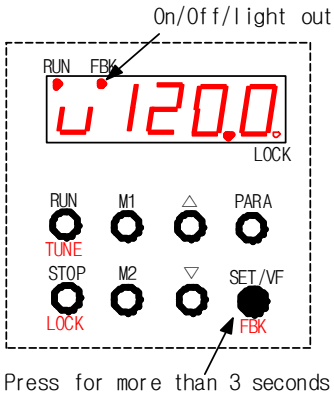
◆ LOCK released : 'LOCK' LED is turned OFF
.Press LOCK key form more than 3 seconds while under LOCK or SEMI LOCK state
.All data can be changed/updated and queried



2.9 Enable and disable constant amplitude operation function(FBK)

If connect vibration sensor(FB-sensor), constant amplitude operation function is enabled automatically without control of user.
But for operate manually to stop(disable)/run(enable) of this function is as follows.

An alarm sound is output whenever the 'FBK' key is pressed for more than 3 seconds; the 'FBK' LED within the display window alternates between ON (enable) and OFF(disable).



◆ Constant amplitude operation function disable state
: 'FBK' LED turn OFF.

.The vibration sensor(FB sensor) is connected but constant amplitude operation function is disable.

◆ Constant amplitude operation function enable state
: 'FBK' LED is turned ON or FLASH
.State in effect of constant amplitude operation function.

※ This functionality can be only used if the constant amplitude sensor(FB sensor) is connected(refer to Page 17). If not connected, the 'FBK' LED is always turn OFF.
※ The vibration sensor is connected controller but in case operating not attaching to vibrator.

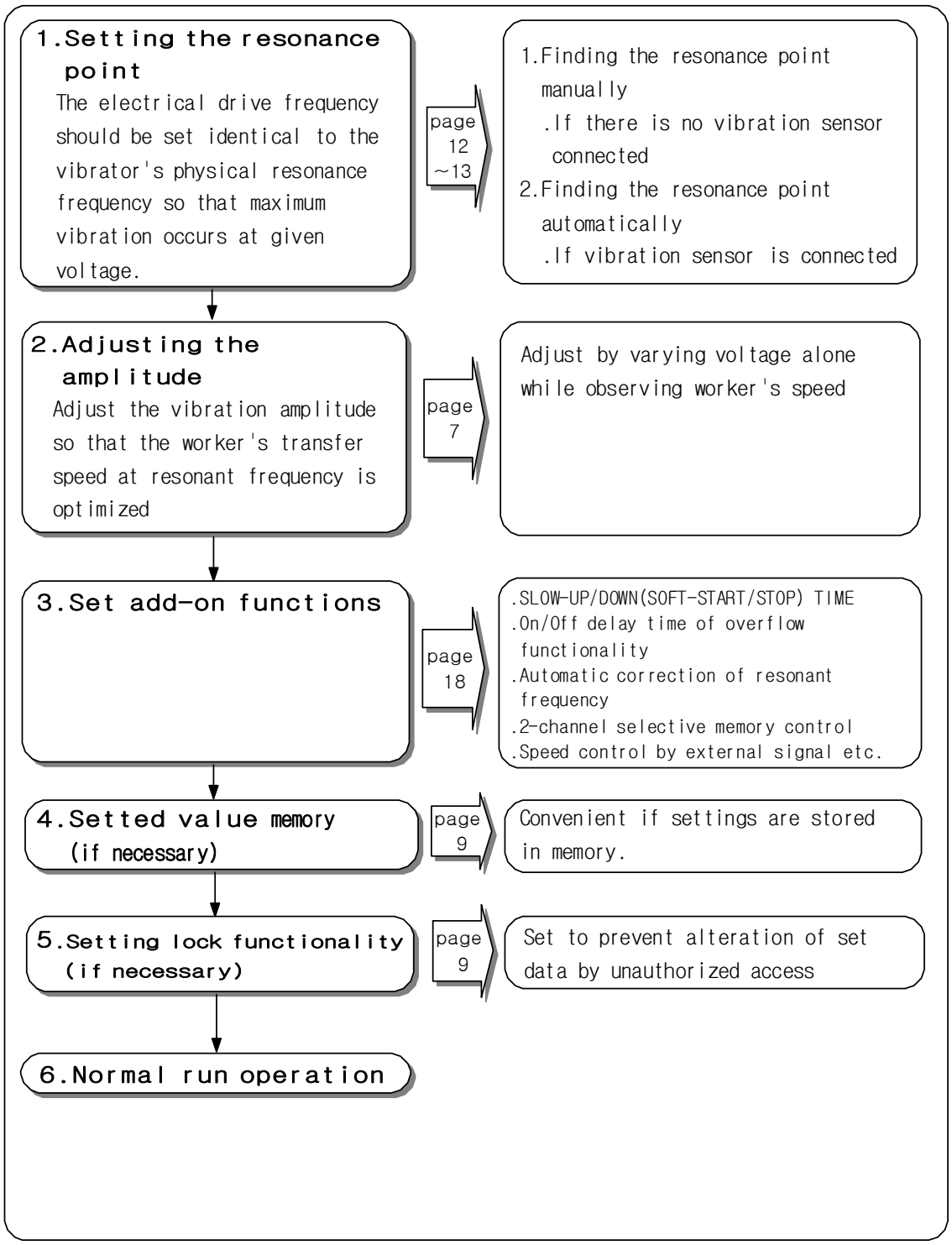
◆ Related parameters

1.Automatic frequency correction on/off (factory default setting is 'Fc-on')
.Fc-on: The change in mechanical resonance frequency is automatically sensed to maintain resonance point at all times
.Fc-oF: The initially set frequency is maintained.

2.Feedback interval setting(factory default setting is 'Fb100' mS)
.Fbxxx : The interval of applying the error sensed by the constant amplitude sensor to control
.Set according to the physical size of the vibrator (adjust during amplitude hunting)

3.Operating Procedure After Initial Vibrator Connection

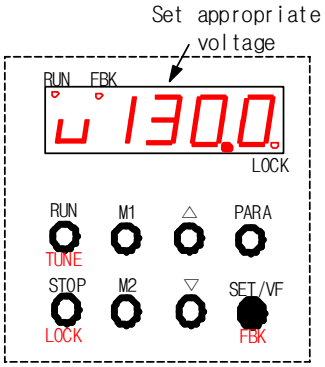
Below is the summary of the flow of settings to be taken for the first run after connecting the vibrator. For details, refer to the relevant pages.



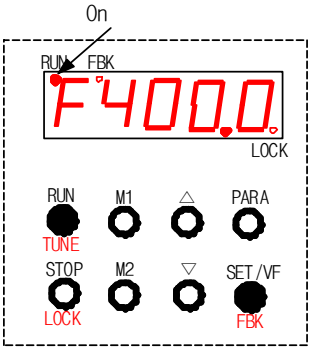
4.Manual adjustment of Resonance Point

Used if vibration sensor(FB-Sensor) is not connected or if resonant frequency should be found manually even if sensor is connected.

1.Push 'SET/VF' key to enter voltage display/set mode (vxxx.x); set a voltage at which vibrator can enter vibrations according to the vibrator's characteristics.

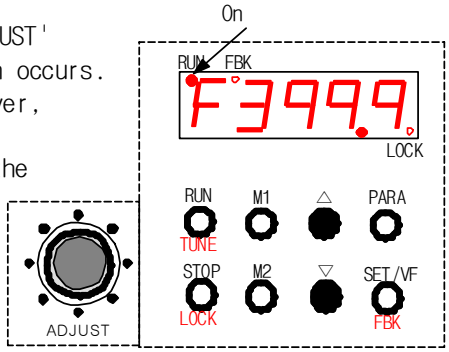


2.Press 'SET/VF' key again to enter frequency display/set mode(uxxx.x); set frequency to 400.0Hz then press 'RUN" key enter run mode.



3.Under constant voltage, reduce frequency using '△','▽' Key and 'ADJUST' Encoderkey and the 'ADJUST' encoder to fond the point where maximum vibration occurs.
.Vibration can occur at more than 2 points; however, find the point of maximum vibration.
.If the vibration is too large, slightly reduce the voltage and find the point of maximum vibration.

※ The resonant frequency is the frequency at which maximum vibration occurs under constant voltage.



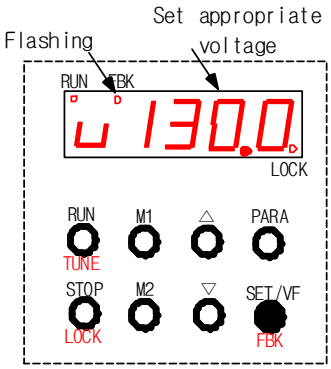
4. After finding the maximum vibration point by varying frequency at constant voltage, adjust the voltage to get optimal vibration amplitude.

※ At the resonance point, there is large variation in vibration due to external influence; therefore, if constant amplitude run mode is not selected, the frequency should be set slightly away from the resonance point.

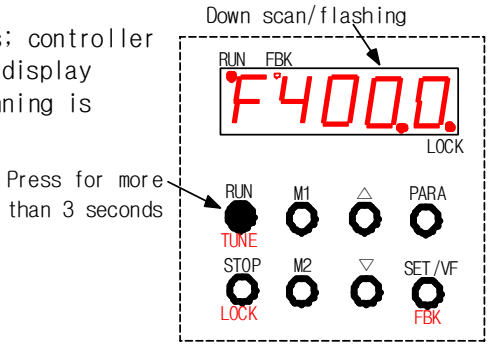
5.Automatic adjustment of Resonance Point (AUTO-TUNING:TUNE)

It is Function to find resonance point automatically when the vibration sensor(FB-Sensor) connected.

1.Press 'SET/VF' key to enter voltage display/set mode; set the approximate voltage at which the vibrator's vibrations might occur, considering the vibrator's specifications.



2.Press the 'TUNE' key for more than 3 seconds; controller changes to frequency display/set mode , the display flashes and run state is entered . Down scanning is started at 400Hz.

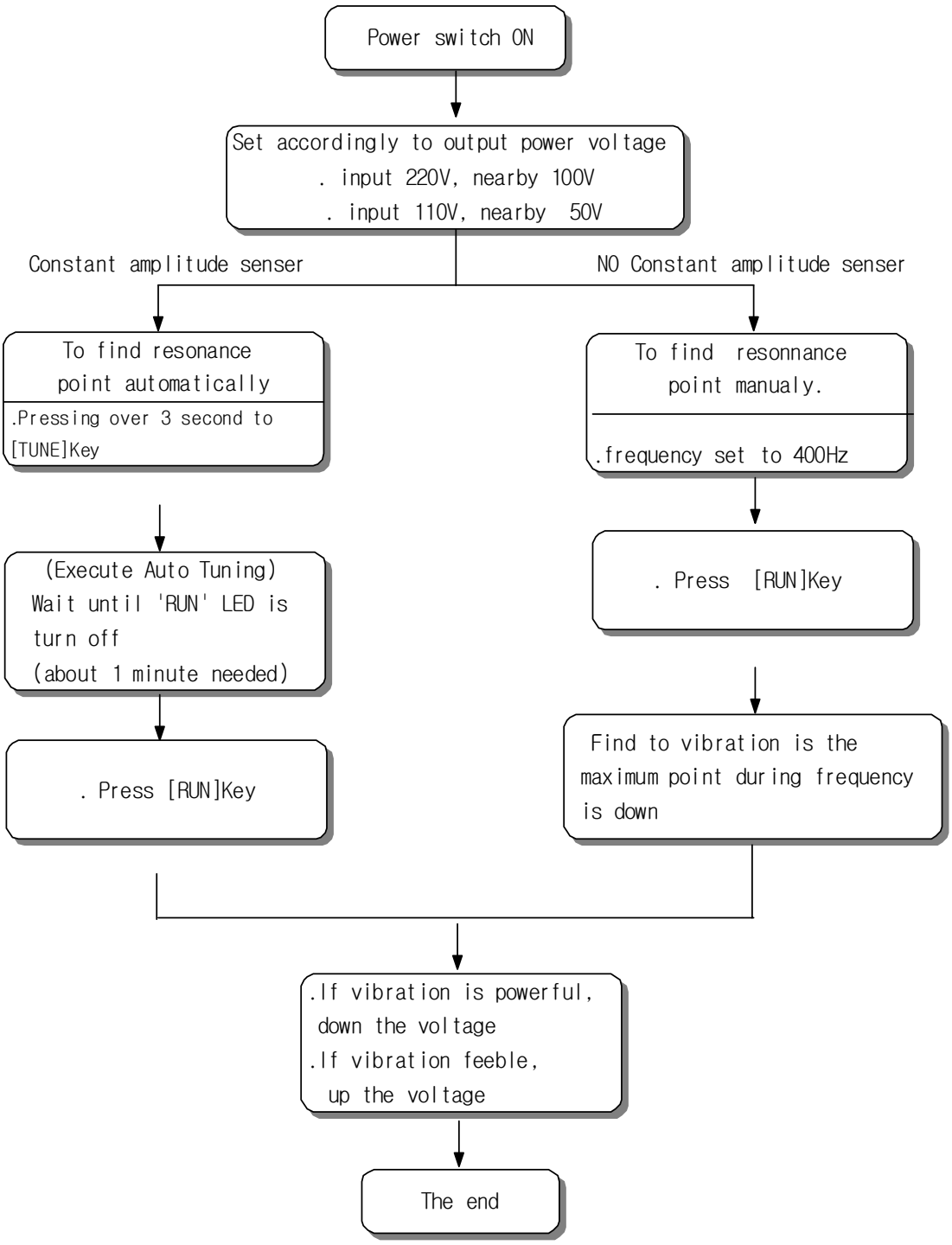


3.When auto tuning is completed, display changes from frequency became flashing to ON then stops with a warning sound.
. Takes about 1 minutes to complete.
. Check RUN LED turn off.

4.Press the 'RUN' key, check the vibration status and adjust the voltage to obtain proper vibration amplitude.
◆ The vibration amplitude should be adjusted by voltage only.

※ If the resonance point could not be found, retry or find manually adjustment of voltage.

6.Basic run Simple guide

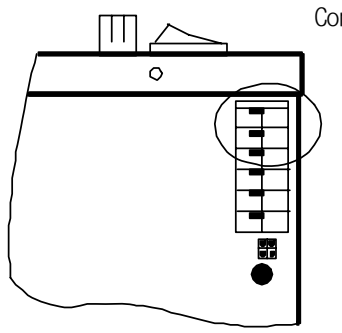


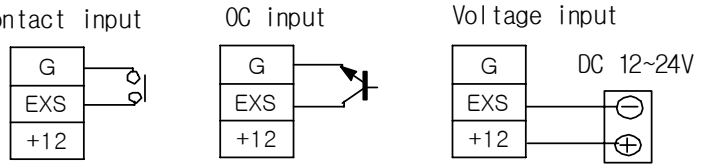
※additional function set is refer to the relevant parts.

7.Additional Functionalities

7.1 External Input Run/Stop Control(EXS)

Run/stop control through contact input or voltage input is possible; the logical polarity of operation is changed according to the parameter's 'ES-xx' setting.





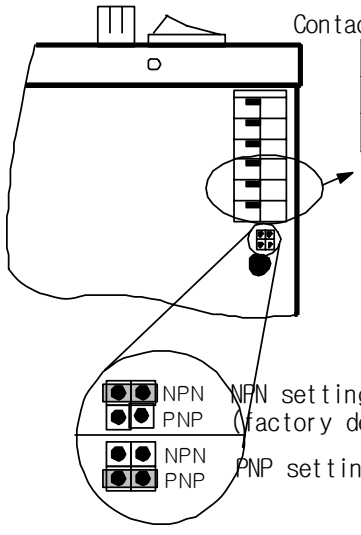
Condition		ES-no	ES-nc
Contact input	CLOSE	RUN	STOP
	OPEN	STOP	RUN
Voltage input	+12(24)V	RUN	STOP
	0V	STOP	RUN
※ Factory default setting is 'Es-no'			

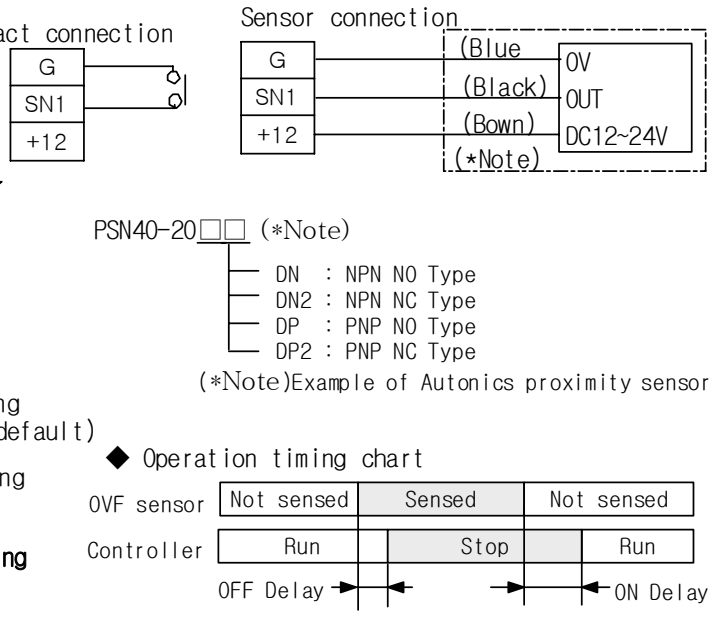
7.2 Overflow Sensor Control(SN1)

Run/temporary stop control according to overflow during run condition

◆ Parameter setting ('PARA' Key)
.Sn-no/nc : Set sensor output type(factory default setting is 'Sn-no')
.onxx.x,oFxx.x : Set on/off delay time(factory default setting is 'onO0.1','oF00.1')

◆ Jumper setting : NPN/PNP jumper cap position(factory default setting is 'NPN')





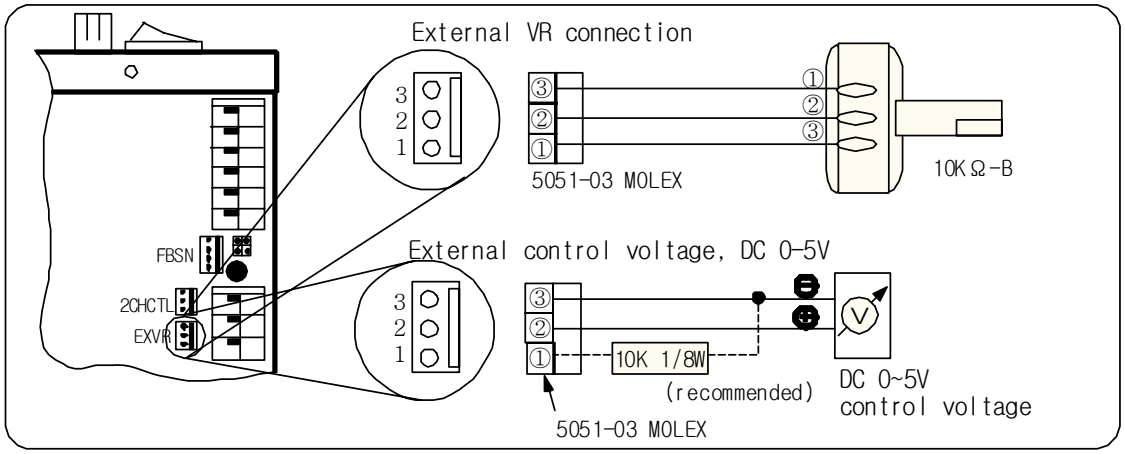
7.3 Output Voltage control through external input(EXVR: External VR/DC 0-5V)

Output voltage controlled through externally connected VR or 0-5V control voltage input

◆ Control through externally connected VR
. Voltage control through OP panel automatically inhibited if external VR connected

◆ Control through 0-5V external voltage input
.If the control circuit's impedance is very high while supplying 0V, we recommend connecting a fixed resistor over 10KW, 1/8W as shown in the figure below.

※The controller will be damaged if external control voltage exceeds 5V; therefore, voltage should be not higher than 5V.



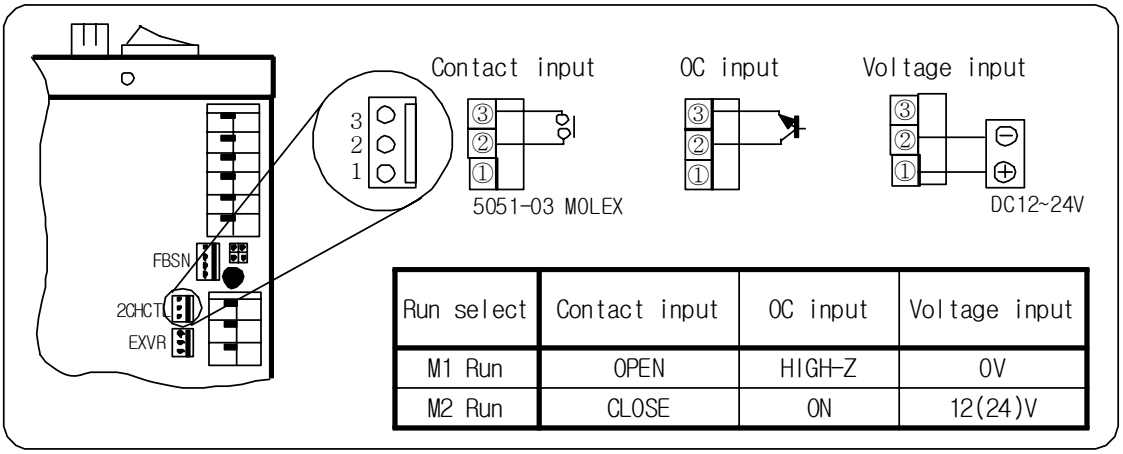
7.4 Memory 2-ch Selective Control(2CHCTL)

Run performed using stored data of M1-CH or M2-Ch according to external control signal input

.Parameter setting('PARA' key): 2c-xx set to '2c-on'.
(factory default setting is '2c-oF')

.Stored voltage, frequency and all parameters of the selected channel are set as current run values

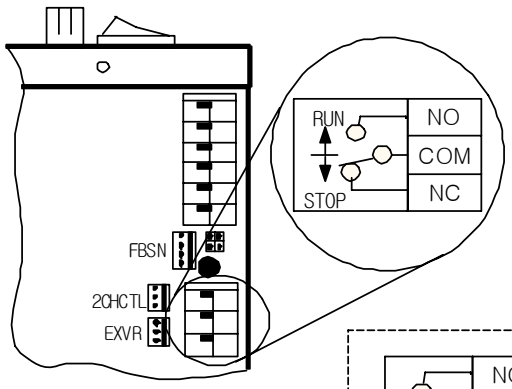
.If only 2-stage speed control is to be performed, M1 and M2 only differ in voltage ; identical values are stored for frequency and all other parameters.



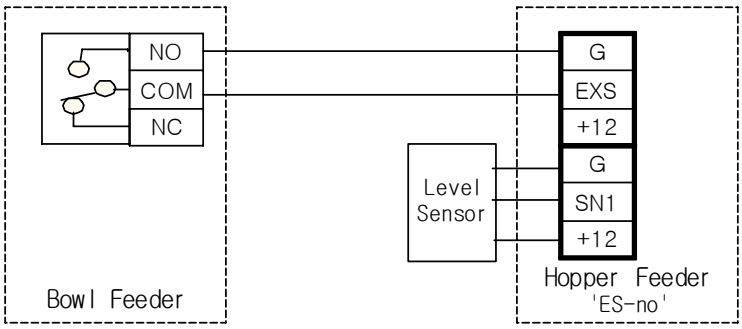
Run select	Contact input	OC input	Voltage input
M1 Run	OPEN	HIGH-Z	0V
M2 Run	CLOSE	ON	12(24)V

7.5 Run Synchronization Output Signal(NO/COM/NC)

Outputs contact signal according to run/stop status of controller
.Used for linked operation with hopper and bowl feeder



Controller status	COM-NO	COM-NC
RUN	CLOSE	OPEN
STOP	OPEN	CLOSE

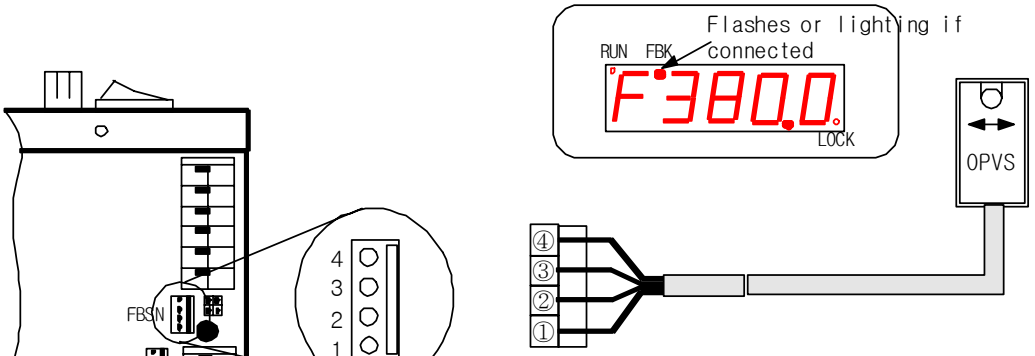


* Hopper can operate only if bowl feeder is running

Example of linked operation between bowl feeder and hopper

7.6 Connection of Constant Amplitude Sensor(FBSN)

If vibration sensor is connected to 'FBSN' connector, it is execute automatically constant amplitude operation. For stopped the function artificially, refer to [enable and disable constant amplitude operation function(FBK)] (page 10)



* When connecting sensor to vibrator, be sure to match arrow(↔)to direction of worker's movement.

8.Parameter Function Table

Refer to [Setting Parameters](page 8) about how to set the parameters.

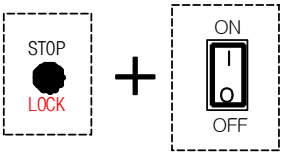
No	Display (mode)	Description of Function	Set range	default setting
1	onxx.x	☐ On Delay Timer setting .The delay time from not sensing OVF sensor to start of run * OVF:Overflow	0.1~30.0Sec (0.1Sec Units)	0.1
2	oFxx.x	☐ Off Delay Timer setting .The delay time from sensing OVF sensor to stop running	0.1~30.0 Sec (0.1Sec Units)	0.1
3	Sn-xx	☐ Setting logical polarity of OVF sensor .no : Normal Open .nc : Normal Close	no nc	no
4	ES-xx	☐ Setting logical polarity of external run/stop input signal .no : Normally Open .nc : Normally Close	no nc	no
5	SLux.x	☐ Setting of slow up(softstart) time	0.1~3.0 Sec (0.1Sec Units)	0.1
6	SLdx.x	☐ Setting of slow down(soft stop) time	0.1~3.0 Sec (0.1Sec Units)	0.1
7	Fc-xx	☐ Set auto frequency correction functionality on/off .Set whether to use automatic frequency correction during constant amplitude operation	on : Enabled oF : Disabled	on
8	Fbxxx	☐ Set feedback interval for constant amplitude operation .The larger the bowl, the longer the interval	0~999 mSec (1 mSec Units)	100
9	bp-xx	☐ Set beep sound on/off	on : Yes oF : No	on
10	En-x.x	☐ Set voltage variation range per encoder(ADJUST) step	0.1~5.0V (0.1V Units)	0.5
11	2c-xx	☐ Set whether to use 2 channel(M1,M2) control	on : Enabled oFF : Disabled	oF
12	Lnxxx	☐ Display selected input power voltage .Display Selected Line Voltage .Set position of the product's internal power voltage selection switch	220 110	220
13	IQOTS SQ-t5	☐ Display product model (for administration)	-	-
14	vErx.x	☐ Display version of internal firmware (for administration)	-	-
15	orAnd	☐ Display manufacturer(for administration)	-	-

◆ Initialization of set data

Press [STOP] key and turn on power to set all parameter values to factory default settings

.Frequency set at factory : 400.0Hz

.Voltage set at factory : 0.0V



9.Product Specifications

Item			OPC-50TS	OPC-100TS	Remarks
Rated Input			.AC110V/220V 50-60Hz,set by internal selection switch		
OUTPUT	Voltage	Setting method	Up/down key,encoder.external VR,0-5V control signal		
		Set range	0~100V/0~200V		
		Resolution of setting	0.1V		
	Frequency	Setting method	Up/Down Key and Encoder		
		Set range	40~400Hz		
		Resolution of setting	0.1Hz		
	Maximum allowed current		5A	10A	
	Drive method		PWM method		
CONTROL	Control method		Full digital control using RISC CPU		
	Run/ stop Control	Externalinput ON/OFF control	.On/off control by external input(such as PLC) .Dry/wet contact(12V,24V) .Input polarity selection:Positive/negative		
		OVF sensorinput temporary stop control	.Temporary stop function in RUN condition(overflow) .Change input setting:Positive/negative, PNP/NPN .On delay timer setting:0.1-30.0sec,in 0.1sec increments .Off delay timer setting: 0.1-30.0sec,in 0.1sec increments .Sensor power:DC12V 80mA		
		Panel operation	RUN,STOP Key		
	Amplitude control	Constant amplitude control	.Feedback control using vibration sensor(optional) .Automatic frequency correction function		
		Analog input	.DC 0-5V analog input/output voltage control		
		External VRcontrol	Output voltage control through externally connected VR		
		2CH selective control	.M1/M2 selective run according to external input (2-stage control) .M1/M2 memory 2 channel		
	Run synchronization signals		3 lead(COM,NC,NO) contact output		
	Soft Start		0.1-3.0sec(in 0.1sec increments)		
	Soft Stop		0.1-3.0 sec(in 0.1sec increments)		
Memory functionality			.2 Channels(M1/M2 key) .Voltage, frequency, parameters read/write		
Access control			Data input/change inhibit function(lock key)		
Dis play	7-Segment		Voltage, frequency, parameter, error code display		
	Dot LED		Run, feedback, lock display		
Protection functionality			Stops operation and generates alarm at overcurrent and overheat conditions		
Alarm method			.Error code and alarm sound output		
Cooling method			natural air cooling		
Use conditions		Ambient temperature	0 ~ 40℃		
		Ambient humidity	10 ~ 90%		
Weight			1.5 Kg	1.75Kg	
Dimensions(mm)			61(W)×152(D)×150(H)	78(W)×152(D)×150(H)	

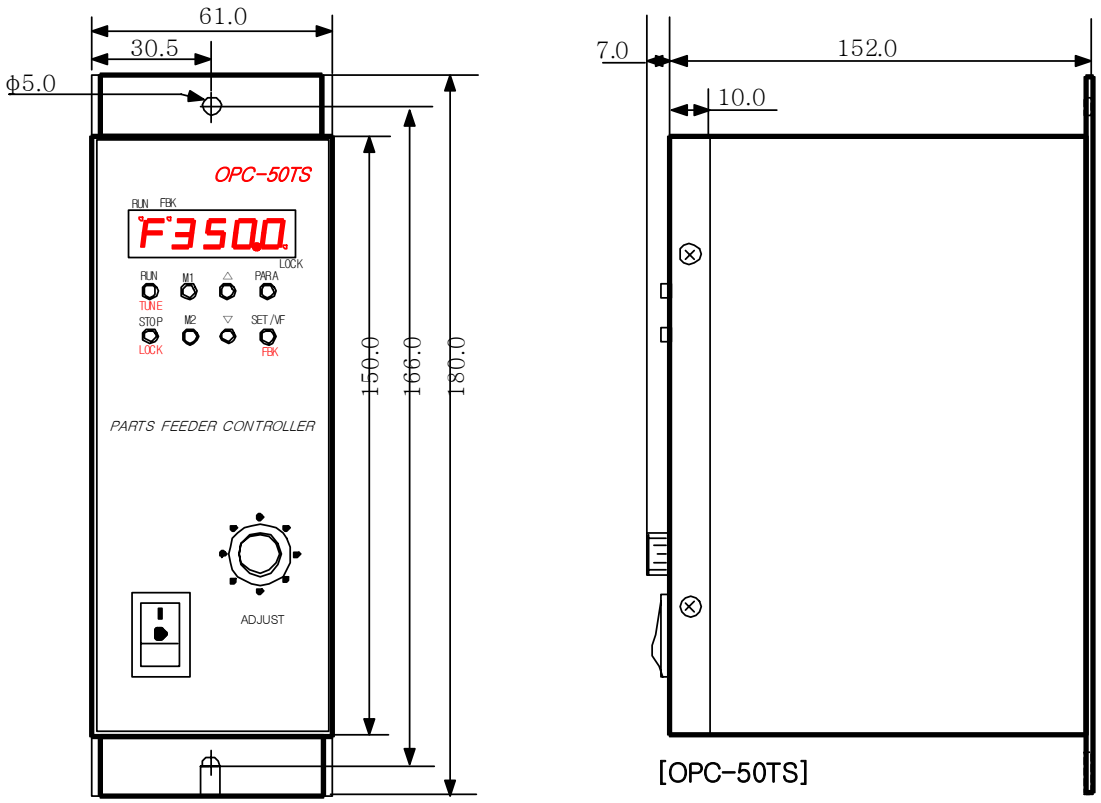
10.Protection and Alarm Functions

This product activates protection functionality if error condition occurs due to user's fault or environmental causes; the error code is displayed on the display window and an audible alarm is output.

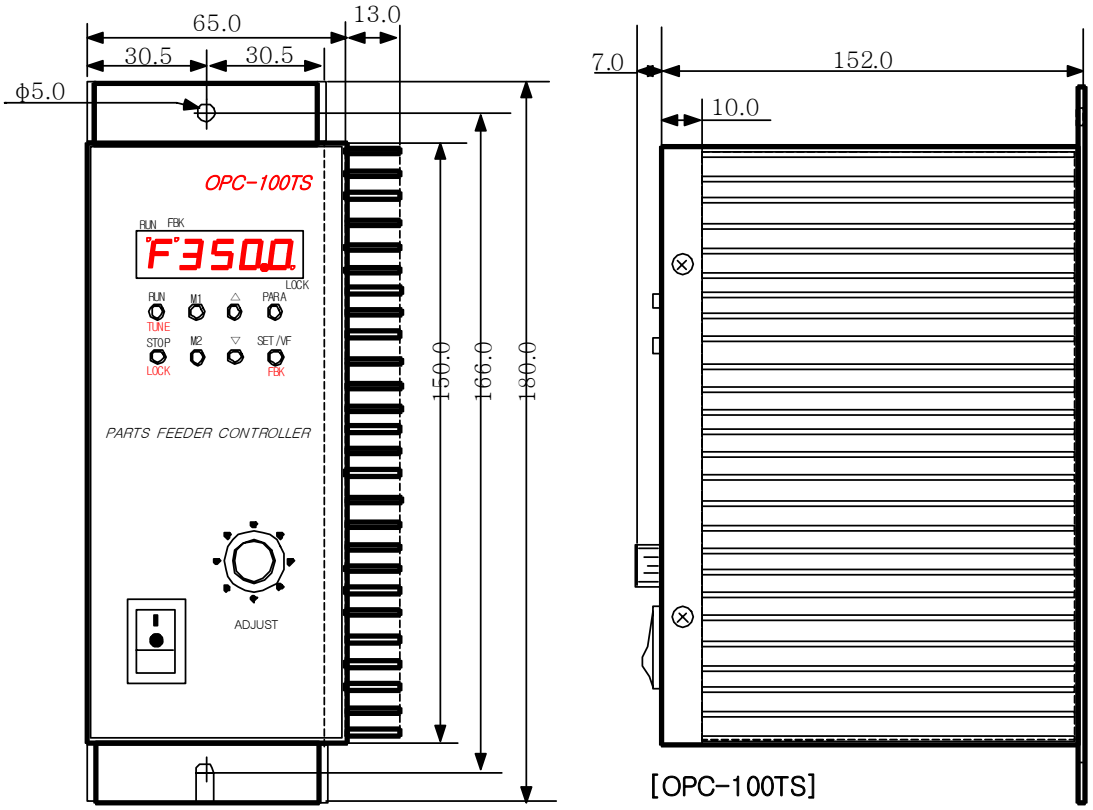
The error details and measures to be taken according to error codes are as follows.

Error display	Detail of error	Measure to be taken
Err01	☐ EEPROM Write Error .problem with writing on EEPROM	.Repair required
Err02	☐ Overheat error(Over Heat) .Internal heatsink overheated	.Turn power OFF, remove cause of overheat, wait until controller has cooled off naturally, before use
Err03	☐ Overcurrent error(Over Current) .Current flow exceeds capacity	.Turn power OFF, remove cause of overcurrent before using
Err05	☐ Excessive feedback sensor level error .Excessive vibration of FB sensor	.Adjust the sensor output level by changing position/direction of FB sensor

[External View]



[OPC-50TS]



[OPC-100TS]

[Wiring Diagram For Linked Operation Between Bowl Feeder And Hopper]

· Hopper runs only when bowl feeder is RUN State.