OPC-50TU

DIGITAL PARTS FEEDER CONTROLLER

USER MANUAL

ORAND CO., LTD

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Precautions

- **Do not use this product to parts feeder of piezoelectric method**

- **Never use this product in a place where there are ignitable materials or inflammables**
  There is a risk of an explosion or a fire

- **Do not use this product in a place where there are a lot of dust or moisture**
  This product is not dustproof or waterproof. Particularly, a separate measure for protection is required in a place where there are a lot of metal powders.

- **Do not turn on/off input power frequently.**
  It may cause a failure by remarkably deteriorating internal electronic components. Particularly, avoid using the on/off control method on the parts feeder by intermitting the input power of this product with a magnetic switch (Relay)(It is necessary to use an external signal control method using an EXS terminal).

- **Do not turn on/off this product in the output part.**
  It is because the controller is damaged when the driving part is operated/stopped by inserting the magnetic switch (RELAY) in the output part(It is necessary to use an external signal control method using an EXS terminal).

- **Do not perform welding process on the FEEDER in the state that the driving part is connected to the controller.**
  The leak current on welding may damage the controller.

- **Do not use the output of the PWM inverter as an input power of this product.**
  It may cause damage of this product.

- **Use this product within rated voltage and rated current of input/output power.**

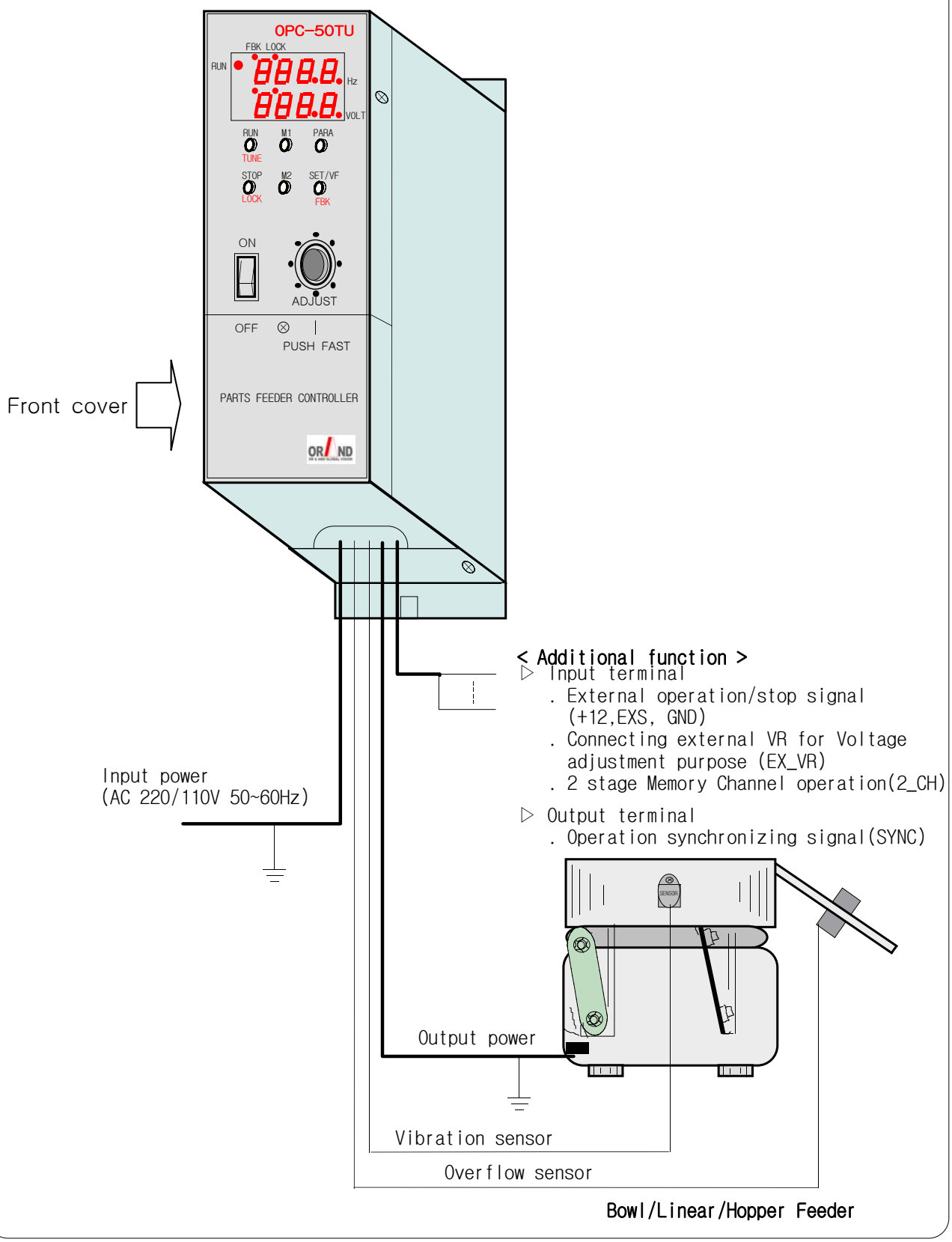
- **Do not disassemble, repair and convert this product carelessly.**
  It may cause damage or malfunction of this product.

- **Perform wiring work when power is turned off.**
  There is a possibility of product damage or an electric shock.

- **Connect the ground terminal of the input/output power to the ground necessarily.**
  It prevents the electric shock in the leakage of electricity and reduce power noise.

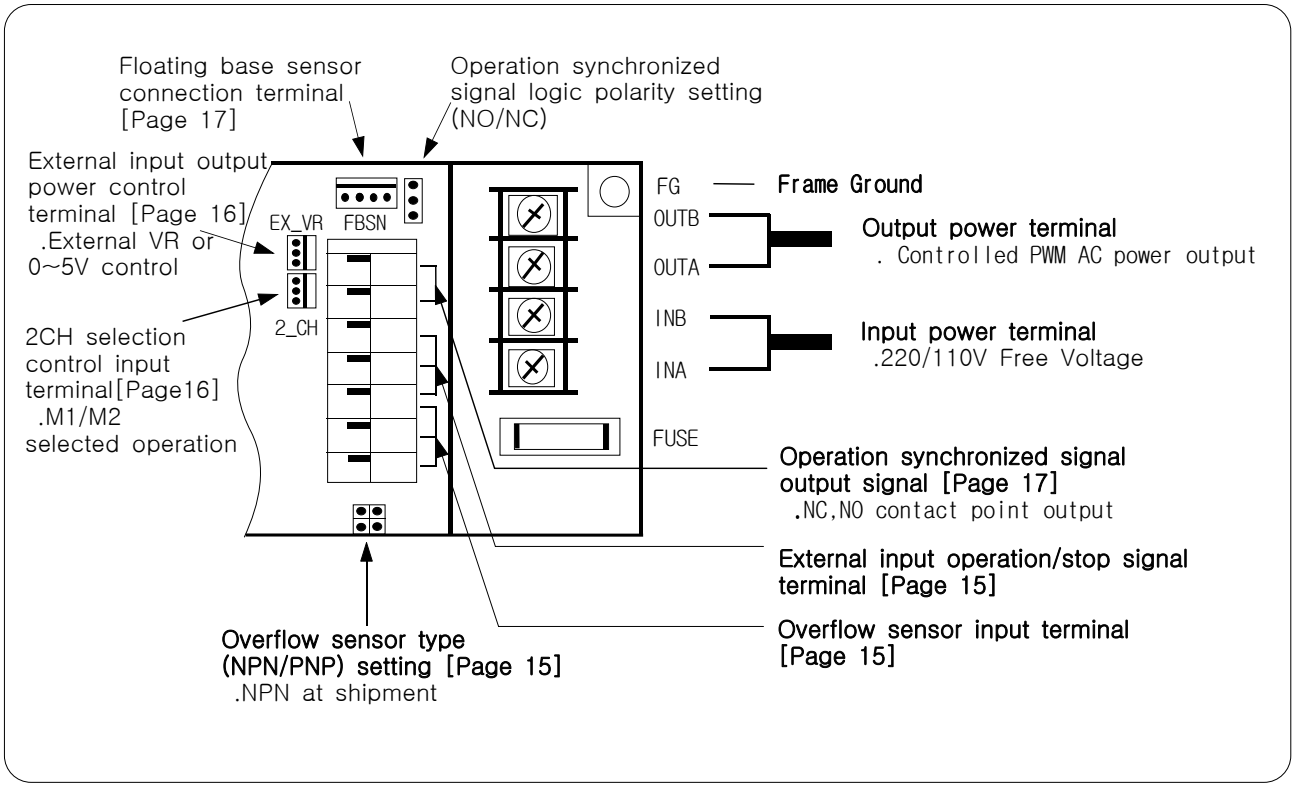
1. Wiring

Wiring between the controller and feeder is roughly shown as below.



Internal connector connection shall be carried out in the following order.

① Take off the front cover where outlet of controller's connection cable is located.
② Referring to following figure, connect input/output power and its necessary additional equipment.
③ Arrange them for the cable so as to come out from the cable outlet of front cover and attach the taken-off cover.



As this product is designed for AC100V~240V and FREE - VOLTAGE, it can be used for input power without mechanical or electrical setting change.

<Notice>

1. When the cover is taken off, isolate the input power necessarily.
2. (FG:Frame Ground) for input and output power terminals shall be connected necessarily for the prevention of electric short and stable operation.
   Otherwise, in particular, stable operation of feedback sensor(vibration sensor) shall not be guaranteed against floating base/auto tuning.
3. Operation shall be carried out only when the cover is closed completely.

2. Basic adjustment of Panel

2.1 Names and functions of panel

6. Feedback status indicating LED
.Light on: Floating base function is operated(In case of FB Sensor connection)
.Flickering: Floating base function is stopped temporarily(In case of FB Sensor connection)
.Light off: FB function is forbidden(FBK Key)

5. Operation status indicating LED
.Light on: Under operation
.Flickering: Temporarily stopped(OVF sensor)
.Light off: Completely stopped

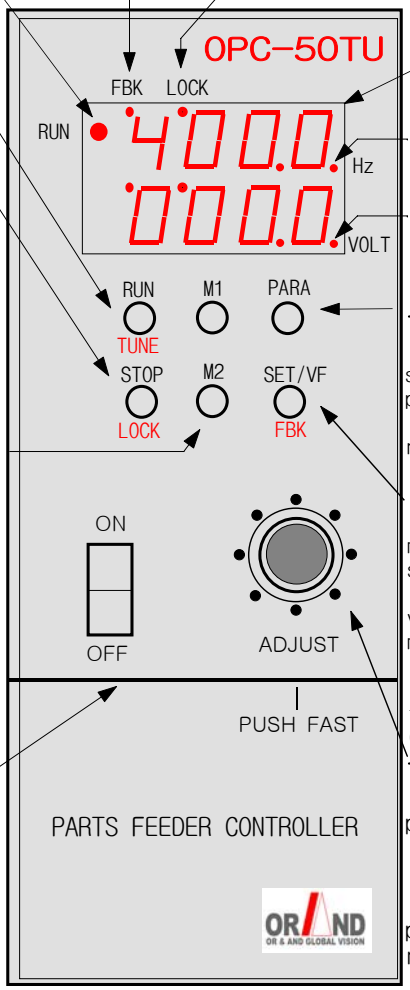
7.LOCK indicating LED
.Light on: Change of all values of Lock status (Refer to LOCK Key) is forbidden (Inquiry possible)
.Flickering: Possible to adjust only voltage
.Light off: LOCK release status

1.RUN/TUNE Key
.RUN: Short press for operation
Not operated during error
.TUNE: Long press for Auto Tuning
(Possible only when FB Sensor is connected)

2.STOP/LOCK Key
.STOP: Short press for stop when being operated
.LOCK: Setting forbidden/release repeated whenever pressing long (Refer to Lock LED)
.Initialization: If power is turned on when pressing,voltage/ frequency /parameter setting value is initialized to the values at shipment

3.Memory Key1/Memory Key2
.write: When pressing long, present frequency/voltage parameters are memorized to the key.
.read : When pressing short, key channel number is indicated as "LoAd-Ox". At this moment, if you press SET key, data memorized to channel('x') is converted to present operation value.

4. Power switch



8. Date indicating window(7-SEG indicator)
.Frequency, voltage, parameter, error code, etc are indicated by numbers and characters.

9. Frequency setting selection LED
.Light on when setting frequency

10. Voltage setting selection LED
.Light on when setting voltage

11.Parameter setting Key
.When you press, it turns to parameter setting mode. Every time you press, parameter items are changed.
.If not adjusted within a fixed time, it returns to voltage/frequency indicating mode.

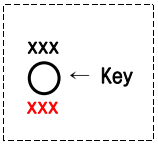
12.SET/VF/FBK Key
.SET:If you press at parameter setting mode, present indicated value is set to setting value.
.V/F:Every time you press short at voltage indication/frequency indication mode, voltage indication/frequency indication mode is repeatedly converted.
.FBK:Every time you press long, forbid/permission function is repeated. (Possible when FB Sensor is connected.)

13.ENCODER for setting purpose
.Used when voltage/frequency/ parameter setting values are changed.
.Variation per step
-Frequency/voltage :0.1 Hz/VOLT
-When setting purpose encoder is pushed, frequency/voltage 1 Hz/VOLT, respectively

[Arrangement of Key function indication]

Function when pressing Key for a short time →

Function when pressing Key for a long time →



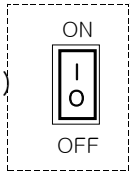
2.2 Operation and Stop

1.Turn ON the power switch.

◆ Initial status after turning power switch on

.RUN status: In case that external input operation/stop signal(EXS) is ON(Active)
In case that power switch is turned off when running

.STOP status: In cases other than above running conditions



2.If you press RUN Key, it turns to 'Operation' or 'Operation temporary stop'.

◆ Operation status

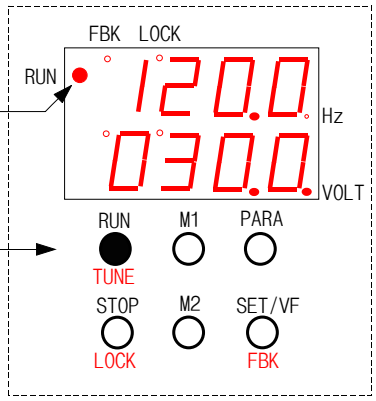
.When Over Flow Sensor is not operated or not used

.RUN LED light on Light on/Fliickering

◆ Operation temporary stop status

.When Over Flow Sensor is operated

.RUN LED flickered



3.If you press STOP Key, it turns to 'Stop'.

◆ It turns to operation stop status, without failure.

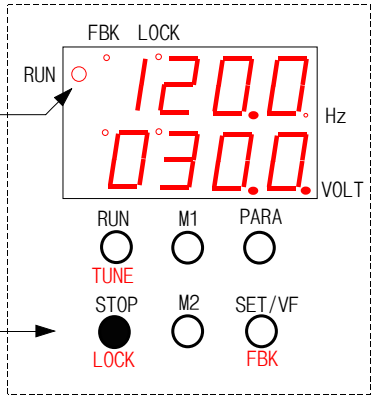
.Not related to external input operation/stop signal(EXS)

.Not related to the movement of Over Flow Sensor

.RUN LED Light off

Light off

(Note) If you press 'STOP' Key 'operation'status by external input operation/stop signal(EXS), it stops on emergency, and if being input again after power off, whether operated or stopped is decided in accordance with the 'EXS' signal status.



◎ If RUN LED lights on, but Parts Feeder is not vibrated, please check followings.

① Is voltage set to be "0" or too low?

→ Set voltage properly.
For voltage setting mode, push "SET/VF" Key so that voltage setting selection LED can be lighted on.

② Is frequency deviated from resonant frequency too much?

→ Change frequency to set frequency where strong vibration can be felt.
For frequency setting mode, push "SET/VF" Key so that frequency setting selection LED can b lighted on.

③ Is it in error status?

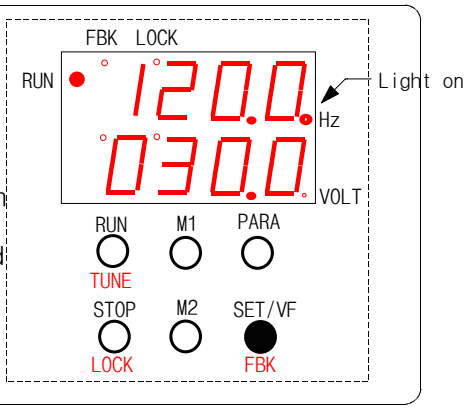
→ In accordance with error code as shown on indicating window, take an appropriate countermeasure.

2.3 Frequency setting

1.Change to frequency setting mode.

.Press 'SET/VF' Key so that frequency setting selection LED can be lighted on.

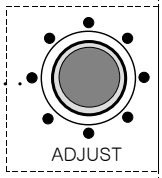
※Every time you press'SET/VF' Key, frequency setting selection LED and voltage setting selection LED is repeatedly lighted on, frequency setting selection LED is in frequency setting mode, and voltage setting selection LED is in voltage setting mode.
If not adjusted within a fixed time at frequency setting mode, it turns to voltage setting mode.(Basic mode)

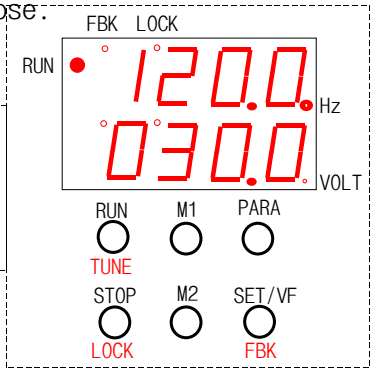


2.Change frequency with ENCODER('ADJUST') for setting purpose.

◆'ADJUST':if turned left, frequency goes up.,
if turned right, frequency goes down.

※If you press 'ADJUST', it is adjusted by 1Hz.
(Base : 0.1Hz unit)



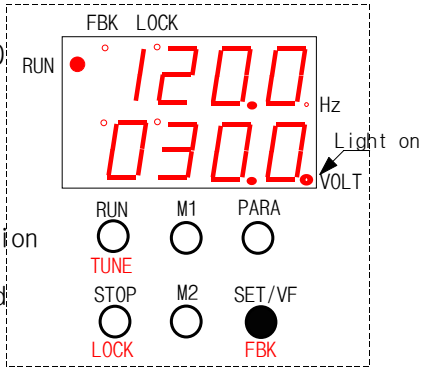


2.4 Voltage setting

1.Change to voltage setting mode.

.Press 'SET/VF' Key so that voltage setting selection LED can be lighted on.

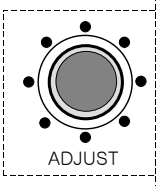
※※Every time you press'SET/VF' Key, frequency setting selection LED and voltage setting selection LED is repeatedly lighted on, frequency setting selection LED is in frequency setting mode, and voltage setting selection LED is in voltage setting mode.

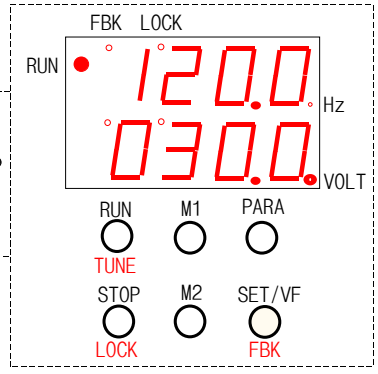


2.Change voltage with ENCODER('ADJUST') for setting purpose

◆'ADJUST':if turned left, voltage goes down.,
if turned right, voltage goes up.

※If you press 'ADJUST', it is adjusted by 1V.
(Base : 0.1V unit)

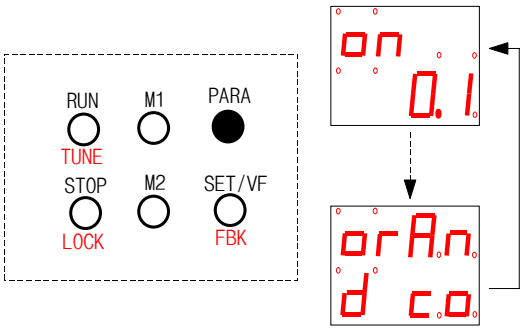




2.5 Parameter setting

1. Move to a parameter item to be changed by pressing 'PARA' Key.
. Every time you press 'PARA' Key, each parameter item shall be displayed in order.

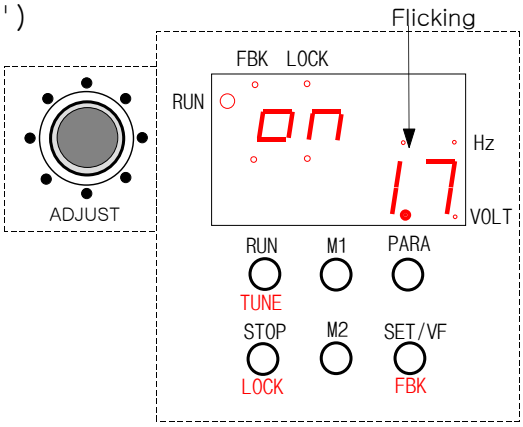
※ Refer to [parameter function list] (Page 18) for sequence of parameter movement and its function.



2. Change date being displayed as ENCODER ('ADJUST') for setting. When changing a value, Data display on the display window will be flickering.

◆'ADJUST': Data value will be decreased by turning it to right and data value will be increased by turning it to left

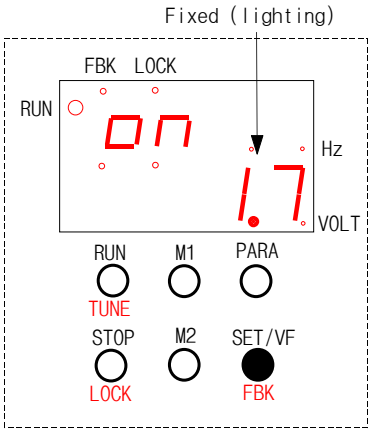
※ In case of only 'on','oF' being available for setting values, 'on','oF' will be repeated.



(Example of On Delay Time setting)

3. When you press 'SET/VF' Key, setting shall be changed to flickering data and flickering display will be changed to lighting (Fixed) display.

※1. In case of not pressing 'SET/VF' Key, flicking data will be cancelled and previous setting value will be maintained.
2. When you press 'PARA' Key after changing the setting value, it will move to the next item.

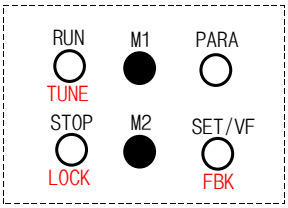


※ If a fixed time is being passed without any operation or 'STOP','RUN','M1','M2' Key will be inputted while setting, it shall be returned to the previous mode.

2.6 Writing on MEMORY (WRITE)

1.When you press a Memory Key('M1' or 'M2') to be written on MEMORY for more than 3 seconds, an alarm will sound and all current voltage, frequency and each parameter value will be written on the pressed Key.

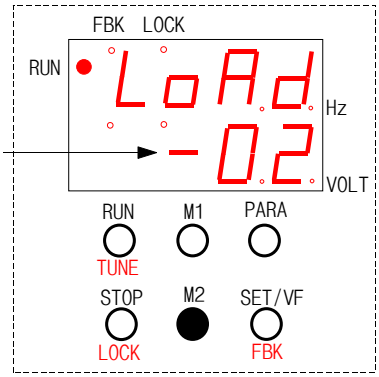
Up to 2 MEMORY CHANNELS ('M1' and 'M2') can be possible.



2.7 Reading a value from MEMORY (READ)

1. When you press and release Memory Key ('M1' and 'M2') to read a written value, Number of Memory Channel shall be flickering in the form of 'LoAd-xx'.

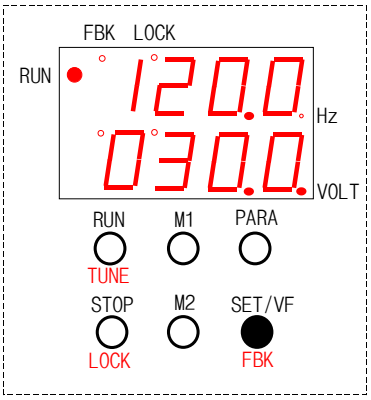
Flicking



(Example of 'M2' Key Read)

2. When you press 'SET' Key, voltage, frequency and each parameter value being written on Memory Channel will be converted to present operating values.
.Converted present operating values can be changed.

※ If a fixed time is being passed without any operation or other keys is pressed when 'LoAd-xx' is being displayed, it will be cancelled.



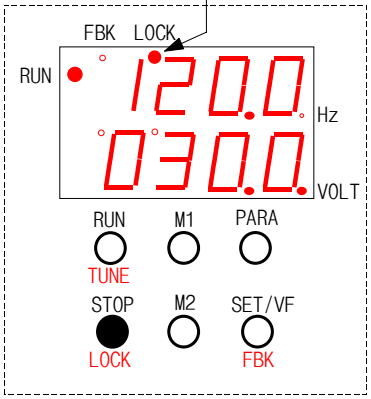
2.8 LOCK setting and releasing (LOCK)

◆ LOCK: 'LOCK' LED will be lighted on.
.Press LOCK Key for 3 seconds in LOCK released condition.
.Changing all data setting is impossible.
Only inquiry of data setting is possible.

◆ SEMI LOCK: 'LOCK' LED will be flickering
.Press LOCK Key for more than 6 seconds in LOCK released condition.
.Only changing voltage is possible.
.And inquiry of other data is possible.

◆ LOCK release: 'LOCK' LED will be lighted off.
.Press LOCK Key for more than 3 seconds in LOCK or SEMI LOCK condition
. Changing and inquiry of all data setting are possible

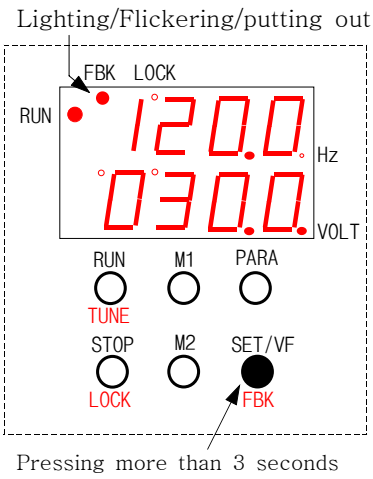
Lighting/Flickering/Putting out



2.9 Approving and prohibiting Floating Base operating function (FBK)

When connecting FB-SENSOR for the first time, Floating Base operating function will be executed automatically without any separate operation by user. (Approval)

Whenever pressing 'FBK' Key more than 3 seconds, alarm will sound and lighting or flickering (approval) and putting out 'FBK' LED inside of display window will be repeated.



◆ Condition of floating Base operating function prohibited:
'FBK' LED will be lighting
.FB-SENSOR (FB SENSOR) is connected but Floating Base operating function is stopped.

◆ Condition of floating Base operating function approved:
'FBK' LED will be lighting or flickering
. Floating Base operating function is approved and being executed.

※ This function is possible only when Floating Base sensor (FB SENSOR) is connected. (Refer to Page 17) In case of not being connected,'FBK' LED is lighting always.

※ In case of operating FB-SENSOR connected to controller but not fixed to vibrator, floating base operating function should be set to "Prohibited".

◆ Relevant parameters

1. Automatic frequency Correction on/off
(Frequency Correction: 'Frco-on' at the time of shipping)
.Frco-on: Maintaining resonance point always by detecting changes of mechanical resonance frequency automatically
.Frco-oF: Maintaining initial setting frequency continuously

2. Feedback period setting ('Fbt 100'ms at the time of shipping)
.Fbt xxx: Period being applied to control tolerance being detected on Floating Base sensor
. Adjust it according physical size of vibrator (Adjust it in case of amplitude Hunting)

3.Operation sequence after the initial connection to vibrator

This explains the setting flow when operating at the first time after connecting to the vibrator. For details, please refer to related pages.

1.Adjustment of vibration point
Fit physical natural frequency of vibrator to electrical driving frequency so that the greatest vibration can be made in a same voltage.

page 12 ~13

1.Manual resonance point tuning
.In case that vibration sensor is not connected
2.Automatic resonance point tuning)
.In case that vibration sensor is connected

↓

2.Adjustment of vibration amplitude
Adjust the vibration amplitude so that moving speed of worker can be optimized in the resonance frequency.

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Adjust in an appropriate manner only with voltage while checking worker's moving speed.

↓

3.Setting of additional functions

page 18

.Slow-up/down(soft-start/stop) time
.On/off delay time in over flow function
.Automatic calibration function of resonant frequency
.Memory 2CH selection control
.Speed control by external signal, etc

↓

4.Setting value memory
(if necessary)

page 9

Convenient if Memorized

↓

5.LOCK function setting
(if necessary)

page 9

Set to prevent voluntary change of set data due to access by others

↓

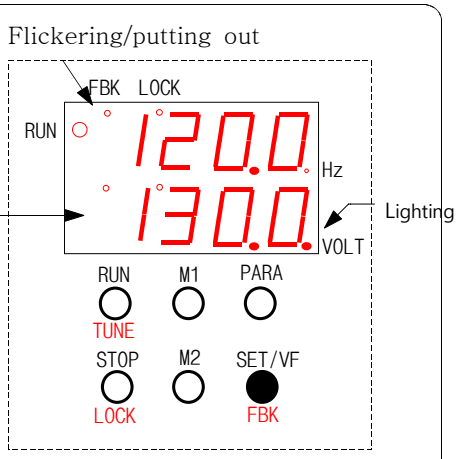
6.Normal operation

4. Resonance point manual tuning

It is a method of finding resonance frequency manually even if FB-SENSOR is not connected or connected

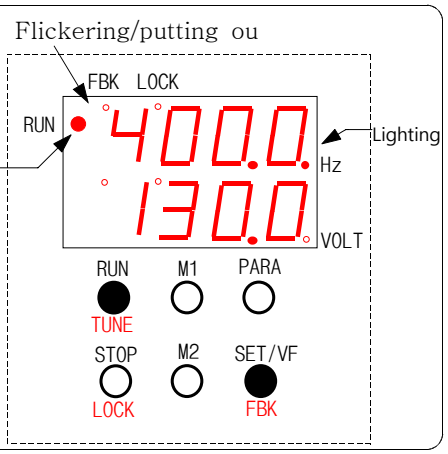
1. Set appropriate voltage for generating vibration by considering specifications of vibrator after changing to voltage setting mode by pressing 'SET/VF' Key.

Appropriate voltage setting



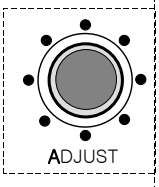
2. Set frequency to 400.0Hz and press 'RUN' key to change to operating condition after changing to frequency setting mode by pressing 'SET/VF' Key again

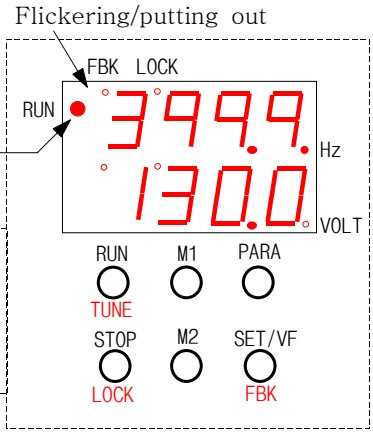
Lighting



3. Find maximum vibrating point in fixed voltage condition by lowering frequency with 'ADJUST' Encoder.
   . More than 2 vibrating points can be appeared, but maximum vibrating point should be found.
   . Find maximum vibrating point by lowering voltage if vibration is too big.

※ A frequency with maximum vibration in fixed voltage condition is resonance frequency.





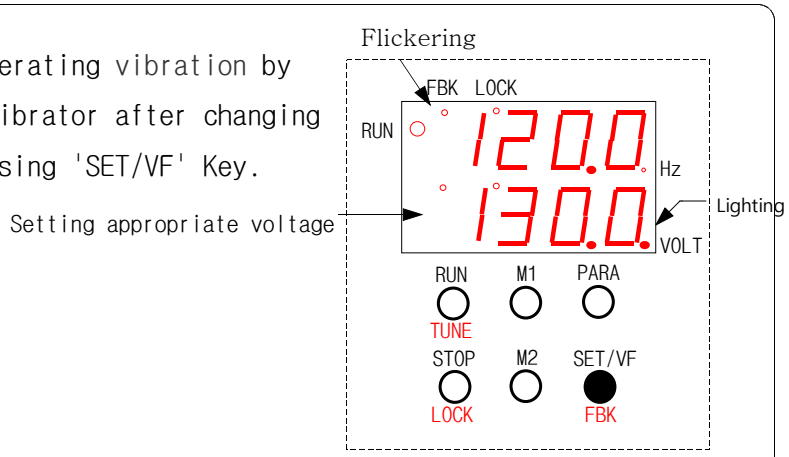
4. Adjust voltage to make ideal vibration size when maximum vibrating point is found in fixed voltage condition by changing frequency.

※ Set frequency to be contrary to resonance point a little bit in case of not executing Floating Base operation since variation of vibration due to external factors is pretty intense on resonance point.

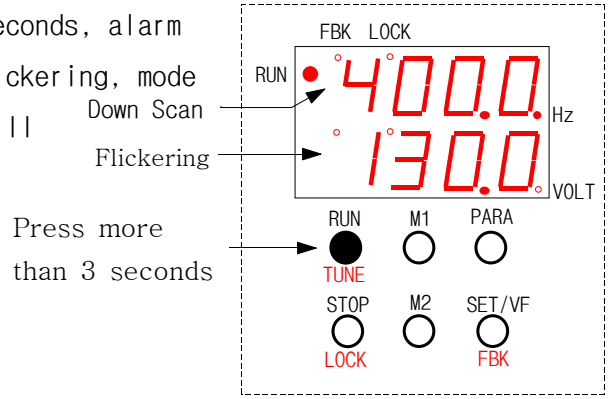
5. Resonance point auto-tuning(AUTO-TUNING:TUNE)

It is a function of finding resonance frequency automatically when FB-SENSOR is connected.

1. Set approximate voltage for generating vibration by considering specifications of vibrator after changing to voltage setting mode by pressing 'SET/VF' Key.



2. When pressing 'TUNE' Key more than 3 seconds, alarm will sound, voltage display will be flickering, mode will be changed to RUN and Down Scan will be started in 400Hz.



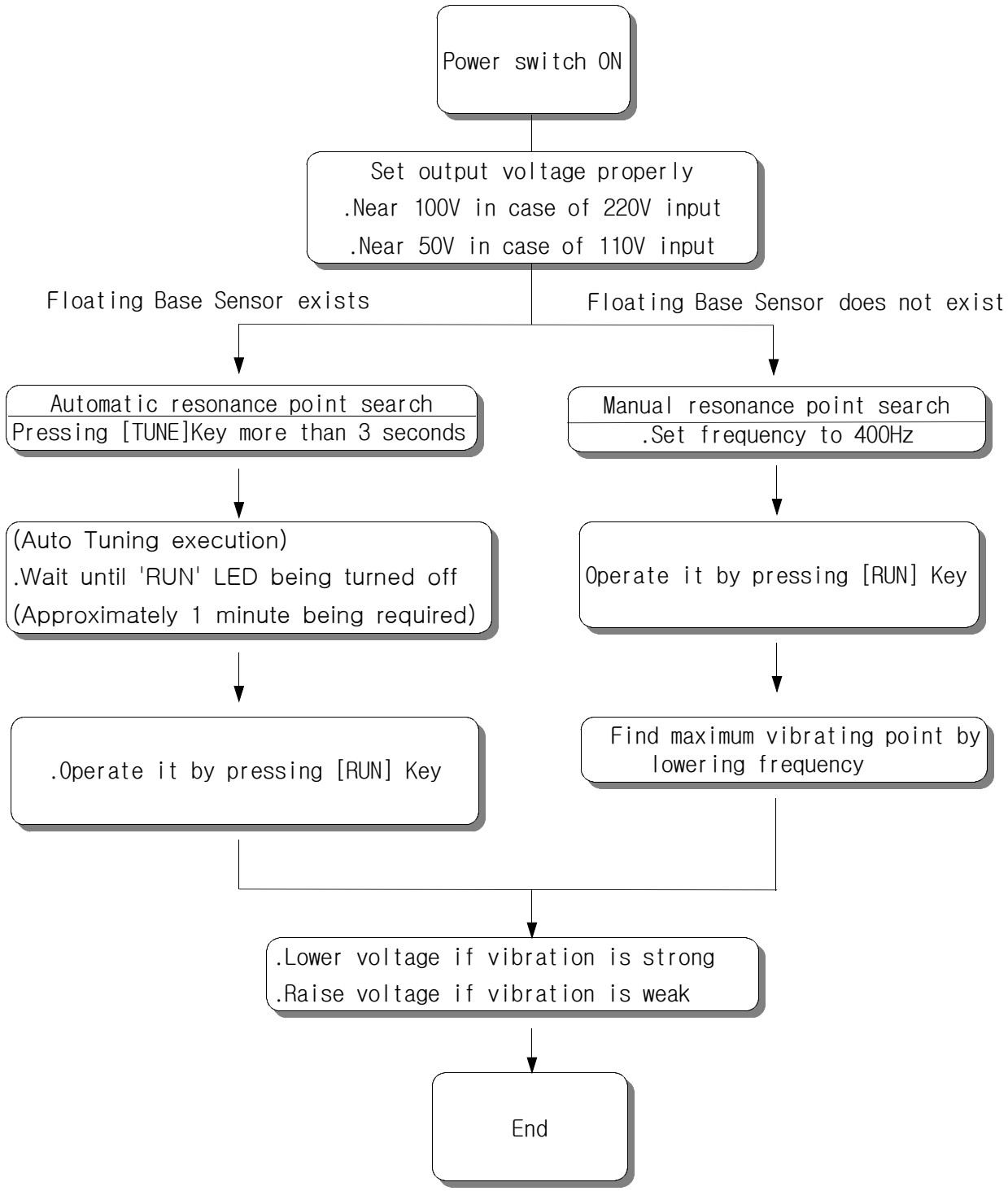
3. When Auto Tuning is completed, flickering display will be changed to lighting display and operation will be stopped ('STOP') with alarm sound.
   .Approximately 1 minute will be required until the completion.
   . Confirm RUN LED being turned off.

4. Observe vibrating condition by pressing 'RUN'Key and adjust voltage to make the size of vibration to be appropriate.

◆ The size of vibration should be adjusted only by voltage

※ Try it again by changing voltage or find resonance point manually if failed to find resonance frequency.

6. Simple guide of basic operation

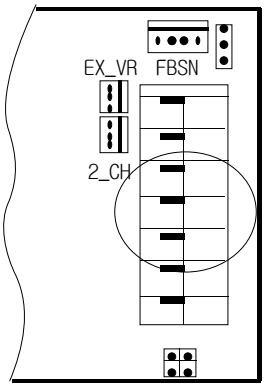


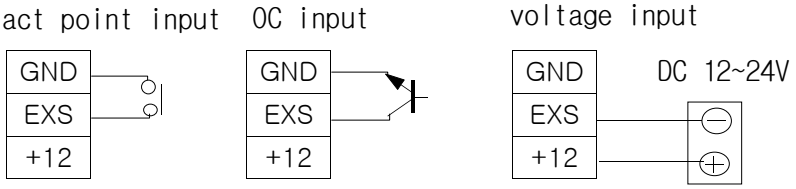
※Refer to related part for additional function setting

7.Additional functions

7.1 External input operation/stop control(EXS)

It is possible to carry out operation/stop control by contact point input or voltage input,the logic polarity of movement is changed according to setting of parameter 'Erun-xx'.





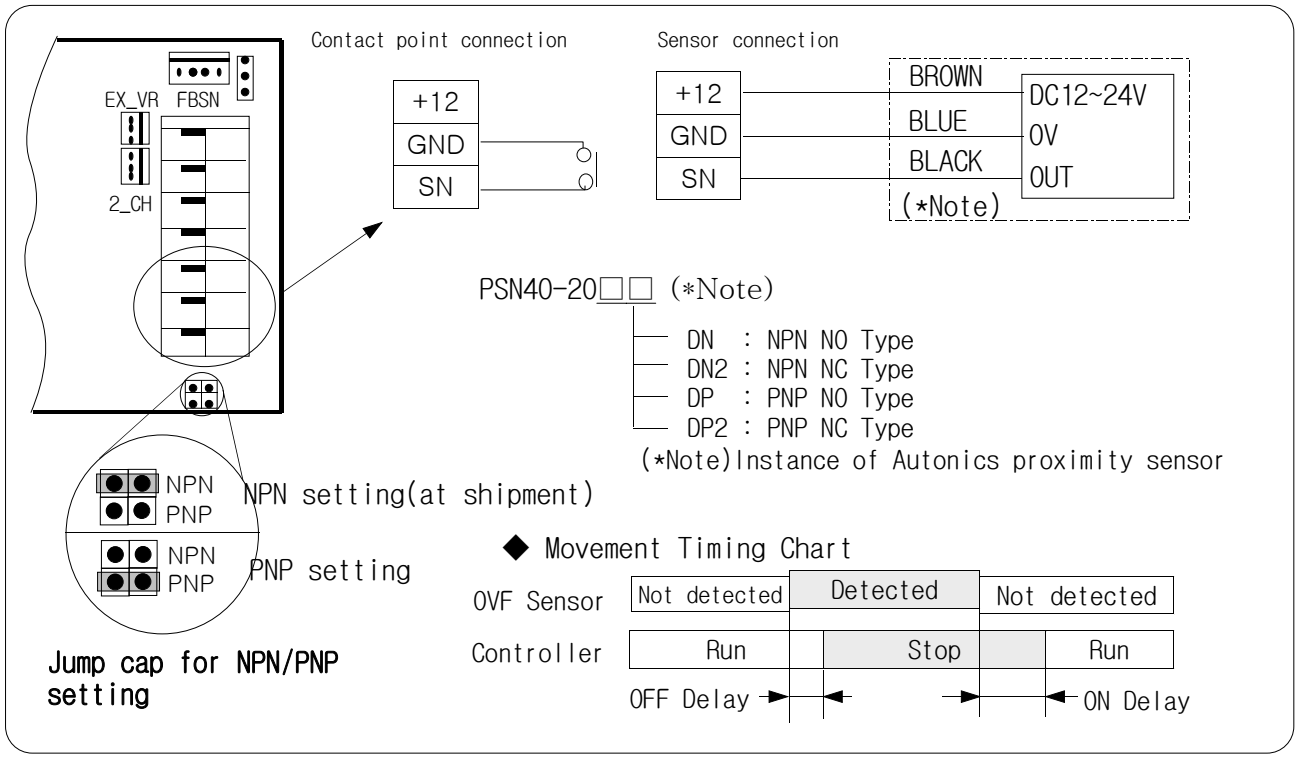
Condition		Erun-no	Erun-nc
Contact point input	CLOSE	Run	Stop
	OPEN	Stop	Run
Voltage input	+12(24)V	Run	Stop
	0V	Stop	Run
※ Set to 'Erun-no" at shipment			

7.2 Over-flow sensor control(SN)

Run/temporary stop control due to overflow during operation

◆ Parameter setting ('PARA' Key)
.SEn-no/nc : Setting output type of sensor ('SEn-no' at shipment)
.on xx.x,oFF xx.x : on/off delay time setting ('on 0.1','off 0.1' at shipment)

◆ Jumper setting : NPN/PNP Jumper Cap position ('NPN' at shipment)



7.3 External output voltage control(EX_VR: external VR/DC 0~5V)

Control output voltage by using external VR connection or control voltage of 0~5V

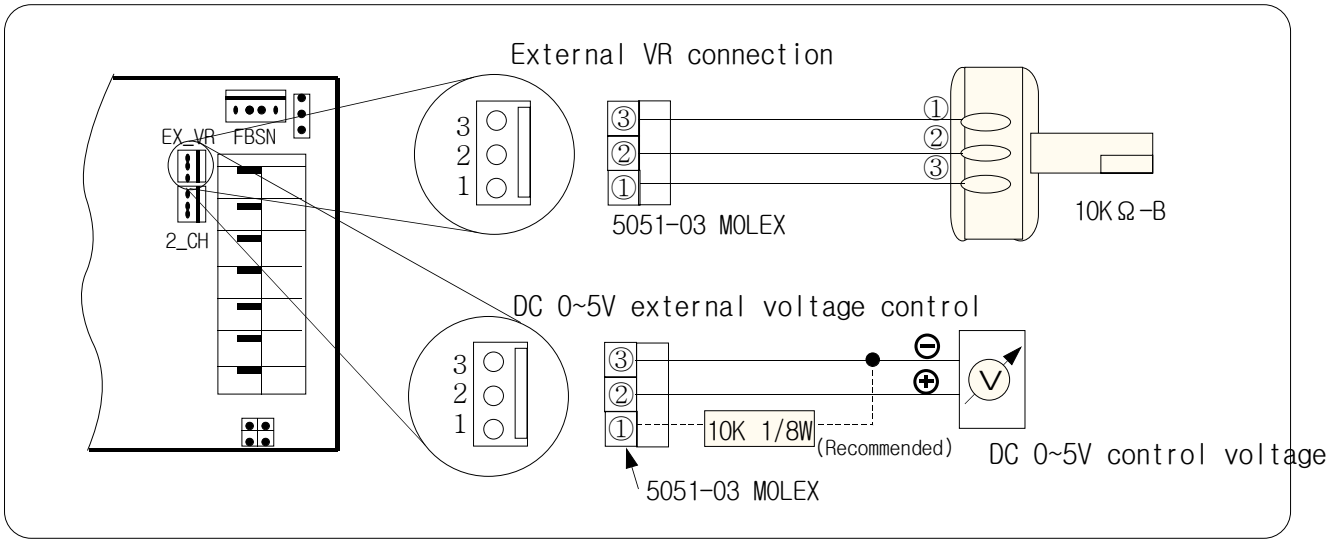
◆ External VR connection

. In case of external VR connection, voltage control from OP is forbidden automatically.

◆ 0~5V external voltage control

. In case that the impedance of control power is very high when 0V is supplied, it is recommended to connect the fixed resistance higher than 10KΩ 1/8W as illustrated below.

※As the controller may be damaged when external control voltage exceeds 5V, voltage not higher than 5V shall be applied.



7.4 Memory 2-channel selection control(2_CH)

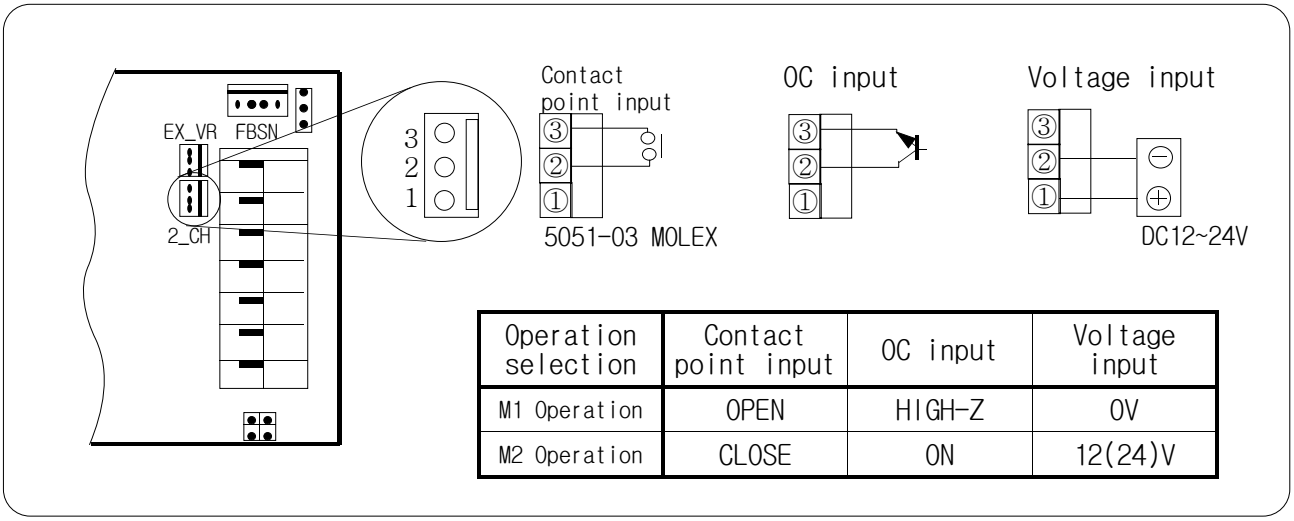
Converted to data that memorized in M1-CH or M2-CH for operation by external input control signal

.Parameter setting ('PARA' Key): 2ch-xx' is set to '2ch-on' ('2ch-oFF' at shipment)

.All parameters such as voltage, frequency, etc memorized in the selected channel are converted to present operation value.

.When only 2 step speed control is carried out, memorize different values only for voltages of M1 and M2, and other parameters including frequency shall be memorized in same value.

In this mode, external VR use is automatically intercepted.

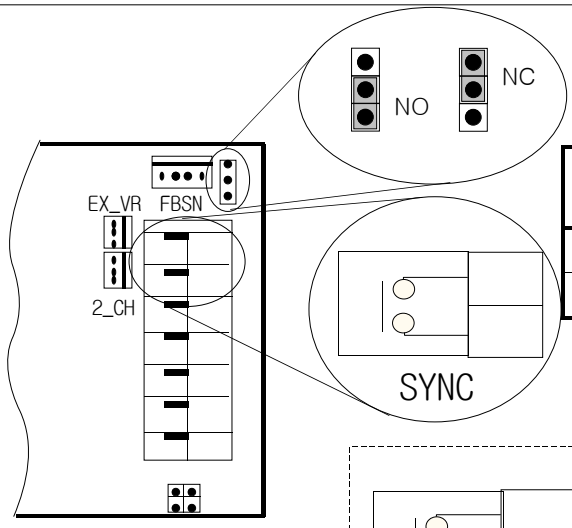


Operation selection	Contact point input	OC input	Voltage input
M1 Operation	OPEN	HIGH-Z	0V
M2 Operation	CLOSE	ON	12(24)V

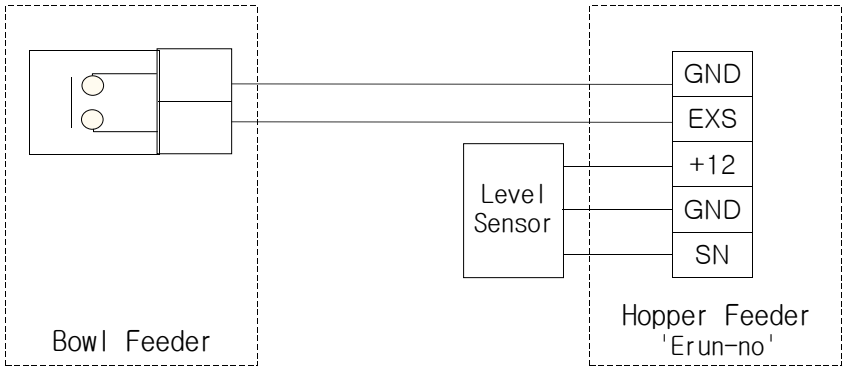
7.5 Operation synchronized output signal (SYNC)

Output contact signal according to operation and suspension of controller

.Use it on connected operation between Hopper and Bowl Feeder



Status of controller	NO	NC
Operation	CLOSE	OPEN
Suspension	OPEN	CLOSE



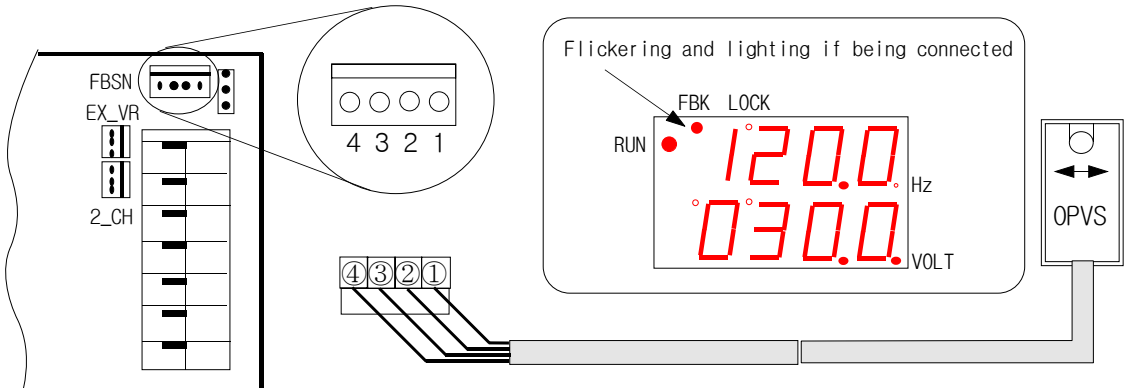
* Hopper can be moved only if Bowl Feeder is being operated.

Example of connected operation between Hopper and Bowl Feeder

7.6 Floating Base Sensor Network (FBSN)

Floating Base operation will be executed automatically if connecting FB-SENSOR to 'FBSN' Connector

Refer to [Approval and prohibit Floating Base operating function (FBK)] for a method of stopping that function manually. (page10)



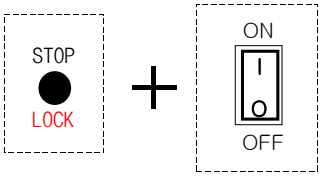
* In case of connecting sensor to vibrator, arrow(↔) should correspond to moving direction of WORKER

8. List of parameter functions

Refer to [parameter setting] for setting method (Page 8)

Sequence of display	Display (mode)	Explanation of functions	Setting range	Initial value when shipping
1	onx.x	☐ On Delay Timer setting . Delay time until beginning of operation after OVF Sensor not detected OVF:Overflow	0.1~30.0 Sec (0.1Sec unit)	0.1
2	oFFx.x	☐ Off Delay Timer setting . Delay time until beginning of operation after OVF Sensor detected	0.1~30.0 Sec (0.1Sec unit)	0.1
3	SEnxx	☐ Logic polarity of OVF Sensor setting .no : Normal Open .nc : Normal Close	no nc	no
4	Erunxx	☐ logic polarity external input operating and suspending signal setting (EXS) .no : Normal Open .nc : Normal Close	no nc	no
5	SLuPx.x	☐ Slow up(Soft Start) time setting	0.1~3.0 Sec (0.1Sec unit)	0.1
6	SLdnx.x	☐ Slow Down(Soft Stop) time setting	0.1~3.0 Sec (0.1Sec unit)	0.1
7	Frcoxx	☐ Auto Frequency Correction setting . Auto Frequency Correction in case of Floating Base operation	on : Correction oF : No Correction	on
8	Fbtxxx	☐ Feed Back period setting in case of Floating Base operation .Period is longer as Bowl is bigger	0~999 mSec (1 mSec unit)	100
9	bEEPxx	☐ Beep setting	on : existing oF : not existing	on
10	2chxx	☐ 2 Channel(M1,M2) Control setting	on : existing oF : not existing	oFF
11	LInExxx	☐ Input power condition display .Display Selected Line Voltage	220 110	-
12	oPc- SOtu	☐ Product model display (for control)	-	-
13	vErx.x	☐ Internal Firmware Version display (for control)	-	-
14	orAnd co	☐ Manufacturer display (for control)	-	-

◆ Initialization of setting data
When you press [STOP] Key and Turning on POWER, all parameter setting values will be changed to initial values at the time of shipping
.Frequency at the time of shipping: 400.0Hz
.Voltage at the time of shipping: 0.0V



9. Product Specifications

Items			OPC-50TU	Remarks
Rated input			.AC 220/110V 50~60Hz Free Voltage	
Output	Voltage	setting method	Encoder, external VR, 0~5V control signal	
		setting range	0~100V/0~200V	
		setting angular resolution	0.1V	
	Frequency	setting method	Encoder	
		setting range	40~400Hz	
		setting angular resolution	0.1Hz	
	Max. allowable current		5A	
	Driving method		PWM type	
Control	Control type		Full digital control by RISC CPU	
	Run stop control	External input ON/OFF control	.on/off control(PLC, etc) by external input .Dry/Wet contact (12V,24V) .Change setting of input polarity : Positive/Negative	
		OVF sensor input temporary stop control	.Temporary stop/operation at the status of over flow .Input change setting : Positive/Negative, PNP/NPN .On Delay Timer setting : 0~30.0sec,0.1sec unit .Off Delay Timer setting: 0~30.0sec,0.1sec unit .Sensor power : DC12V 80mA	
		Panel adjustment	RUN,STOP Key	
	Vibration amplitude control	Floating base control	.Feed-back control by vibration sensor(Option) .Automatic calibration function of frequency(Auto Frequency Correction)	
		Analog input	.DC 0~5V input output voltage control	
		External VR control	.External VR connection output voltage control	
		2CH selection control	.M1/M2 selection operation (2 stage control) by external input .M1/M2 Memory 2 Channel	
	Operation synchronizing signal		2 terminal (SYNC) contact point output	
	Soft Start		0.1~3.0 Sec setting(0.1s unit)	
	Soft Stop		0.1~3.0 Sec setting(0.1s unit)	
Memory function			.2-Channel(M1/M2 Key) .Voltage, frequency, parameter WRITE/READ	
Access restriction			Function of forbidding data changing input(Lock Key)	
Indication	7-Segment		Indicate voltage, frequency, parameter and error code	
	Dot LED		Indicate run, feed-back, lock	
Protection function			Operation stop and alarm in case of over current, over temperature, Raises alarm	
Alarm method			Indicate error code and generate alarm sound	
Cooling method			Natural air cooling	
Condition foruse		Surrounding temperature	0 ~ 40℃	
		Surrounding humidity	10 ~ 90%	
Spec	Weight		1.1Kg	
	Dimension		61(W)×115(D)×150(H)	

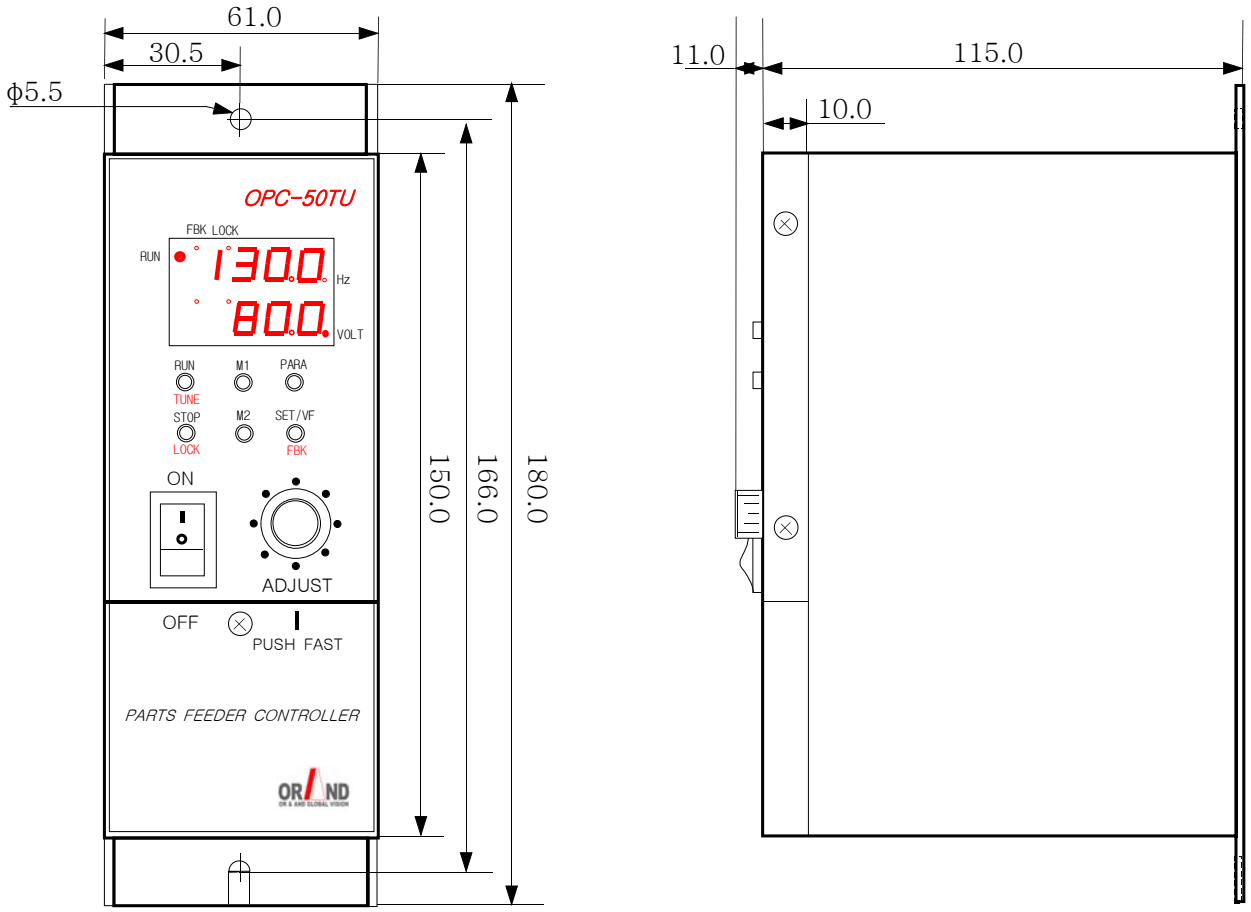
10. Protection and alarm function

This product is designed specifically so that when Error is being occurred due to carelessness of user or an environmental factor, a protecting function will be operated, Error Code will be displayed on display window and alarm will sound for protection of product.

Contents of error and its measure according to ERROR CODE shall be as follows.

Error display	Contents of error	Measures
Err01	☐ EEPROM Write Error .Write error of EEPROM	.Repair will be required
Err02	☐ Over Heat Error .Internal Heat-Sink is overheated	.Turn off POWER, remove an overheating factor, wait certain time for natural cooling
Err03	☐ Over Current Error .Over Current exceeding its capacity flows	.Turn off POWER, remove an Over Current factor
Err05	☐ Excessive level of Feedback sensor level Error .Vibration of FB Sensor is too big	.Adjust sensor output level by changing location and direction of FB Sensor

[Outline Drawing]



[Wiring diagram of Interlock operation of BOWL Feeder and Hopper]

Hopper will work only when operating Bowl Feeder.