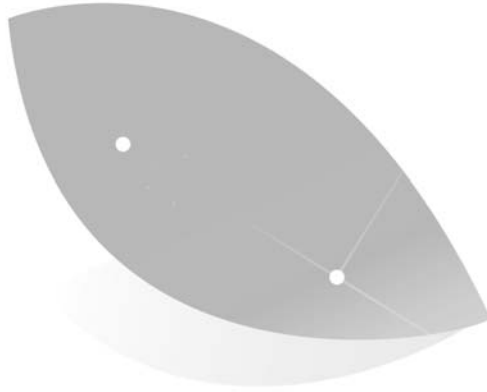




smartcon(FDS③)

FEBA DIGITAL SOFT STARTER

Operational Manual



- ※ Contents of this manual can be modified for the quality improvement.
- ※ Please be well-informed of this manual before using our products



smartcon(FDS③) **One-way / BY-PASS Type**

FDS③ type SMARTCON, which is as a FEBA DIGITAL SOFT STARTER, is a non-contact induction motor controller. FDS③ type SMARTCON changes FDS type KEY PAD method to a multifunctional display panel so that it can be handled more easily, and with a protect function and a durability, you can use it more conveniently and safely than the FDS type SMARTCON.

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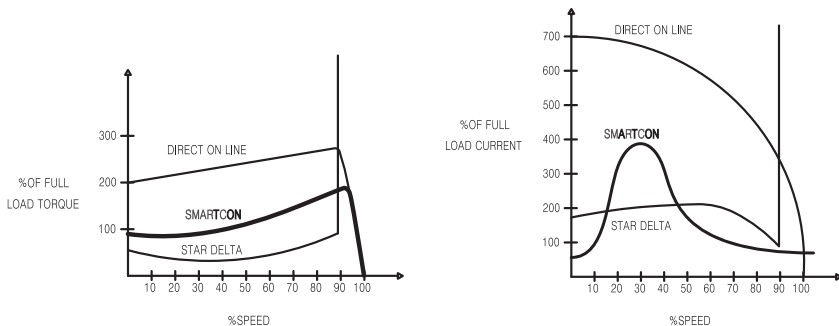
1. Introduction of SMARTCON

1-1 Innovation of Motor Starting

- FDS③ Series Soft Starter uses a self-diagnosis control style non-contacting movement type, one level higher than motor direct start movement, star-delta movement and reactor movement. It provides the optimal movement condition. In case of movement and stop, soft operation and stop are possible and it does not burden motor. Therefore its lifecycle is extended and its semi-permanent use reduces maintenance cost. Also, it has innovated motor movement by an electronized motor movement type, reduced operation cost by non-contact, convenient installation and replacement, minimized installation space, highly reliable blocking performance by abnormal current, compact size and light weight, etc.

1-2 Comparison of a full voltage starting and a SOFT START

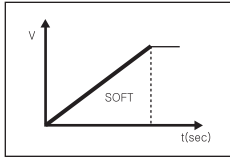
Division	Full voltage starting	SOFT START
Terminal voltage	Full voltage is applied consistently.	When starting a motor, the voltage increases gradually.
Starting torque	When putting the voltage in, the torque twice of rated torque makes vibration,	As the torque increases gradually by the applied voltage of phase control method, there is no occurrence of excessive torque.
Starting current	When starting, huge current 6~10 times of the max rated current is applied.	An occurred starting current from when starting a full voltage is reduced in half.
Starting characteristic	When starting, as the huge torque multiple times of the rated torque makes vibration, excessive mechanical stress is applied on equipments like motor spindle and coupling, etc.	As limiting the starting current and torque, the noise and vibration is reduced so that it moves softly.
Application	Generally, small size machines below than 5.5kW and some high voltage motors	Applied to the loads across the board, such as fan, pump, conveyor, etc.



1. Introduction of SMARTCON

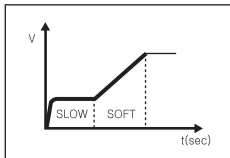
1-3 Features and strengths of SMARTCON

1-3-1 Various starting characteristic



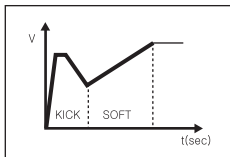
■ SOFT START (STANDARD)

Starting softly as providing the low voltage for the starting torque of the motor to the full voltage where the maximum torque is occurred.



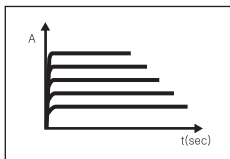
■ SLOW START

Applied to make big cylindrical loads which need long time to make the max RPM like a spin dryer or a blower start.



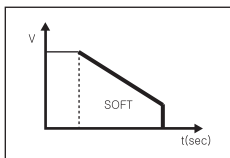
■ KICK START

Applied to load starting which needs big starting torque over the stop torque like a mixer of high viscosity or a crusher.



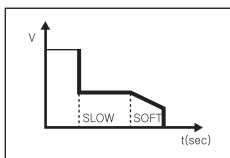
■ CURRENT LIMIT

Applied when wanting to limit the starting current and start it.



■ SOFT STOP

Prevents the transferred material from falling or shaking on the conveyor, and prevents pipe or impeller from damaging by backward flow on the pump.



■ SLOW STOP

Applied to the motor which needs to stop after maintaining a constant speed and make it stop softly.

1. Introduction of SMARTCON

1-3-2 High visibility

- Displaying the three-phase voltage and current
- When an error is occurred, displays the voltage and the current
- Understanding the starting status and parameter simply
- Error memory

R : 230 V	S : 226 V	T : 231 V
F U L L	60.0 Hz	R : 1 A
R U N		S : 1 A
L O C A L - S M C		T : 1 A

1-3-3 Simple Interface

- Connecting a main PCB board and a display as using the USB cable



1-3-4 Perfect protection & durability	1-3-5 High economic feasibility	1-3-6 Various model composition
· 3-phase unbalance detection · Instantaneous trip by abnormal current · Continuous monitoring by motor current · Earth protection · loss Phase/Low current detection · Prevention of over heat · Low voltage/Over voltage protection	· When starting, the peak current is reduced · Lifespan of a motor and load is lengthened by the optimal starting and driving · Minimization of semipermanent lifespan and installation space	· A model only for one-way : minimization of the size · BY-PASS function model

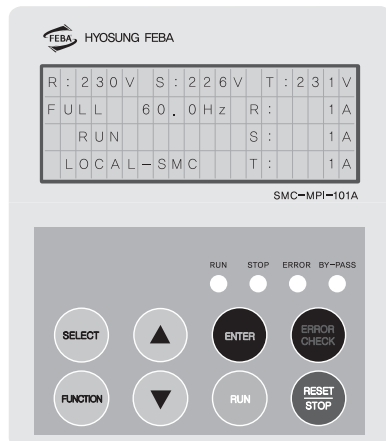
1-3-7 Simple controlling

- Simple controlling by using the 8 buttons of the DISPLAY PANEL.

► Equipping the maximum size LCD

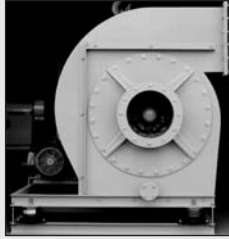
- Displays 4X20letters.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1																				
2																				
3																				
4																				



1-4 Major Uses

- Fan (blower), Pump, Mixer



- Conveying machinery



- For up/down, for/backward driving such as a Hoist, Crane.



- A conveyor which needs a characteristic of a quiet starting and stopping.



2. Name Form of Products & Specification

2. Name Form of Products & Specification

2-1 Name Form of Products

FDS③ - □□□□□-□

- C : Modbus (OPTION) / P : Profibus (OPTION)
- S : One-way / BPS : By-PASS (Magnet Contactor embedded)
- Applied motor capacity (HP)
- Source voltage (2 : AC220V / 3 : AC380V / 4 : AC440V)
- HYOSUNG FEBA Digital Soft starter ③

2-2 Product order name

FDS③	2	003	S	01000
FEBA Digital Soft Starter	Voltage	MODEL (kW)	Operation Type	Option
	2 220	003 2,2 130 98	S One-way	1. Communication
	3 380	005 3,7 150 112	BPS By-Pass (M,C embedded)	0 None
	4 440	007 5,5 200 150		P Profibus
		010 7,5 250 187		C Modbus
		015 11 260 195		2. Operating power
		020 15 300 225		1 110 V
		030 22 320 240		2 220 V
		040 30 400 300		3. Display mounting type
		050 37 500 375		0 Basic
		070 56 600 450		1 Detachable
		075 56 800 600		4. Cable length(m)
		100 75 1100 800		0 0,3
				1 1
				2 2
				3 3
				5. frequency
				5 50Hz
				6 60Hz

* Models 003, 070, 130, 250 and 300 are limited to 220V only.

* Models 075 and 260 are limited to only 380V and 440V.

* MODEL 800 and 1100 are limited to operation type one-way type.

* Option Cable length is applicable only when display mounting type is detachable.
Cable length is 0,3m when display mounting type is basic type.

2-3 Basic Specification

Basic specification	Description
Power voltage	AC 3 ϕ 220V, 3 ϕ 380V, 3 ϕ 440V(dedicated) +10%, -15%
Input frequency	60Hz $\pm$ 5% (50Hz Option)
Usage place	Indoor (Place without corrosive gas, dust, etc)
Surrounding temperature	-10~+50℃
Humidity	Under 90% RH (no dew)
Operation status display	It displays operation status and problem status with multi-function input device.
Power noise	Square wave input by noise simulator R phase, T phase $\pm$ 2000V 1us (between power terminals)
Cooling type	Natural cooling by heat sink and compulsory cooling using heat sink and fan
Over heat sensor	Thermostatic sensor operation, operation temperature 85℃ $\pm$ 5℃
Insulation resistance	Over 1000V 5M Ω

2. Name Form of Products & Specification

2-4 Specification of product

- AC 220V One-way Type

Type \ Description	kW	A
FDS③-203S	2,2	9
FDS③-205S	3,7	15
FDS③-207S	5,5	22
FDS③-210S	7,5	30
FDS③-215S	11	45
FDS③-220S	15	60
FDS③-230S	22	88
FDS③-240S	30	120
FDS③-250S	37	150
FDS③-270S	56	225
FDS③-2100S	75	300
FDS③-2130S	98	390
FDS③-2150S	112	450
FDS③-2200S	150	600
FDS③-2250S	187	740
FDS③-2300S	225	900

- AC 380V/440V One-way Type

Type \ Description	kW	A
FDS③-305S/405S	3,7	7,5
FDS③-307S/407S	5,5	11
FDS③-310S/410S	7,5	15
FDS③-315S/415S	11	22
FDS③-320S/420S	15	30
FDS③-330S/430S	22	45
FDS③-340S/440S	30	60
FDS③-350S/450S	37	75
FDS③-375S/475S	56	112
FDS③-3100S/4100S	75	150
FDS③-3150S/4150S	112	225
FDS③-3200S/4200S	150	300
FDS③-3260S/4260S	195	390
FDS③-3320S/4320S	240	480
FDS③-3400S/4400S	300	600
FDS③-3500S/4500S	375	750
FDS③-3600S/4600S	450	900
FDS③-3800S/4800S	600	1200
FDS③-31100S/41100S	800	1600

※ When using 600kW / 800kW, please configure external BY-PASS circuit.

- AC 220V BY-PASS Type

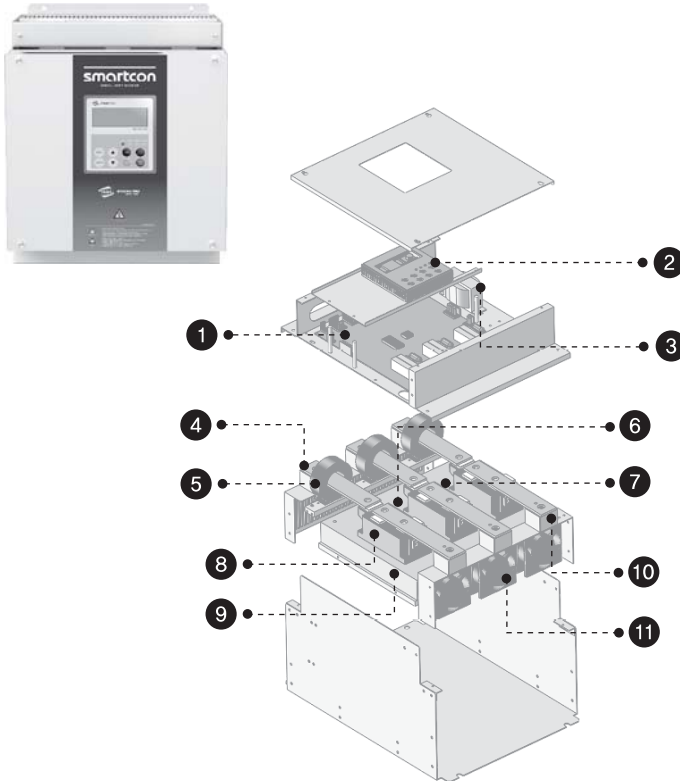
Type \ Description	kW	A
FDS③-203BPS	2,2	9
FDS③-205BPS	3,7	15
FDS③-207BPS	5,5	22
FDS③-210BPS	7,5	30
FDS③-215BPS	11	45
FDS③-220BPS	15	60
FDS③-230BPS	22	88
FDS③-240BPS	30	120
FDS③-250BPS	37	150
FDS③-270BPS	56	225
FDS③-2100BPS	75	300
FDS③-2130BPS	98	390
FDS③-2150BPS	112	450
FDS③-2200BPS	150	600

- AC 380V/440V BY-PASS Type

Type \ Description	kW	A
FDS③-305BPS/405BPS	3,7	7,5
FDS③-307BPS/407BPS	5,5	11
FDS③-310BPS/410BPS	7,5	15
FDS③-315BPS/415BPS	11	22
FDS③-320BPS/420BPS	15	30
FDS③-330BPS/430BPS	22	45
FDS③-340BPS/440BPS	30	60
FDS③-350BPS/450BPS	37	75
FDS③-375BPS/475BPS	56	112
FDS③-3100BPS/4100BPS	75	150
FDS③-3150BPS/4150BPS	112	225
FDS③-3200BPS/4200BPS	150	300
FDS③-3260BPS/4260BPS	195	390
FDS③-3320BPS/4320BPS	240	480
FDS③-3400BPS/4400BPS	300	600
FDS③-3500BPS/4500BPS	375	750
FDS③-3600BPS/4600BPS	450	900

3. Inside Layout

3. Inside Layout



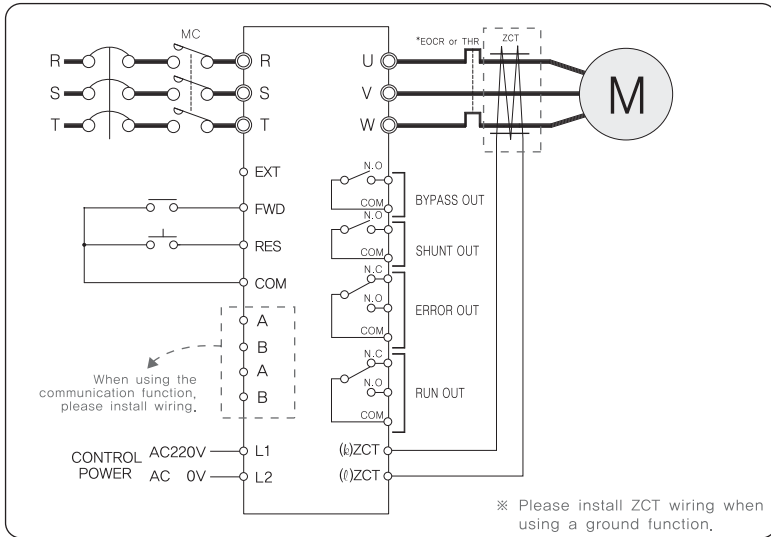
item	Description	Item	Description
1	Main Control Board	7	Temperature sensor switch(85°C)
2	Display PANEL	8	SCR
3	TRANS	9	HeatSink
4	Input and output busbar	10	Insulator
5	Ring CT	11	FAN
6	Temperature sensor switch(55°C)	12	

※ Internal distribution and structure might be different depending on model.

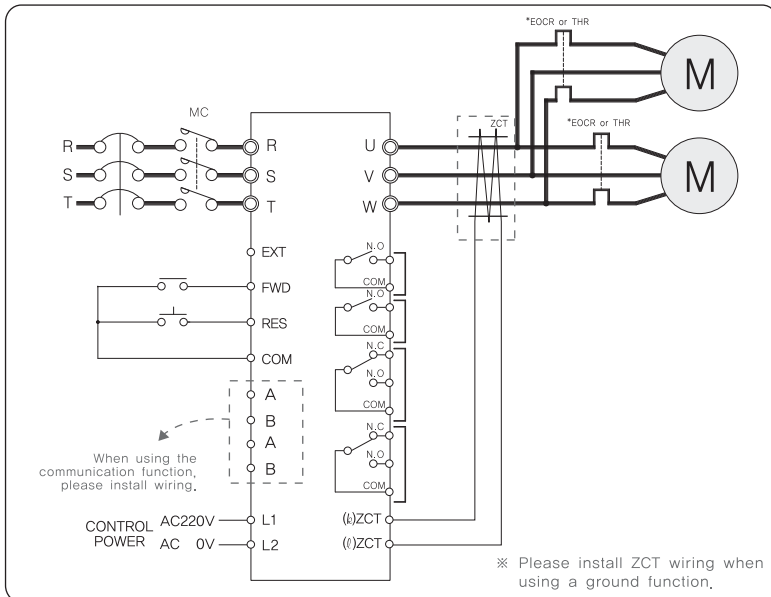
4. Cautions when power connecting and installing

4. Cautions when power connecting and installing

4-1 Standard Connection Diagram

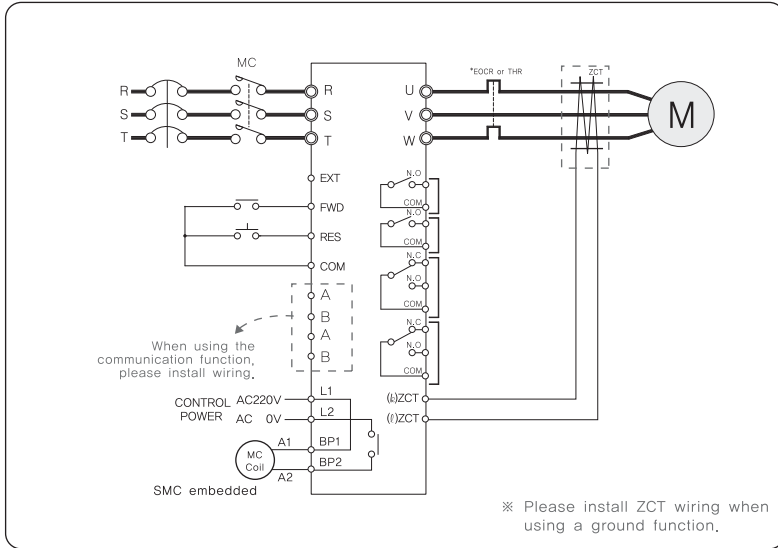


4-2 Connection Diagram When Using Over 2 Motors

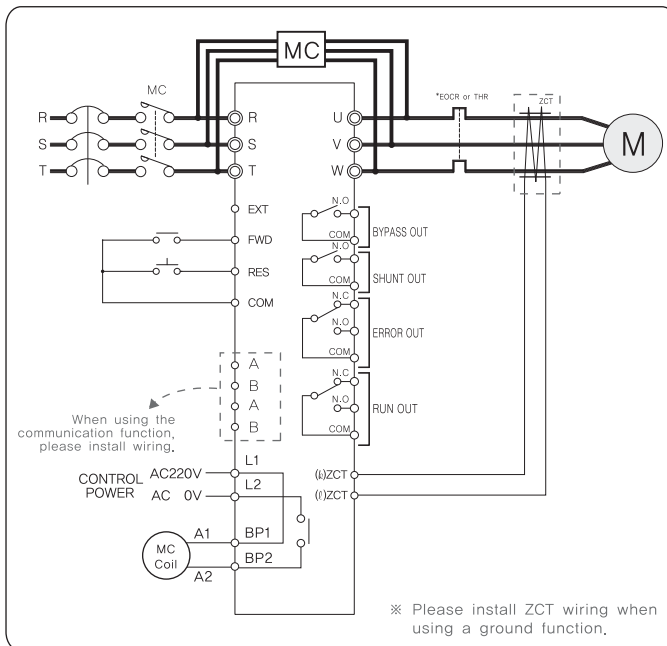


4. Cautions when power connecting and installing

4-3 Connection Diagram of BY-PASS built-in type

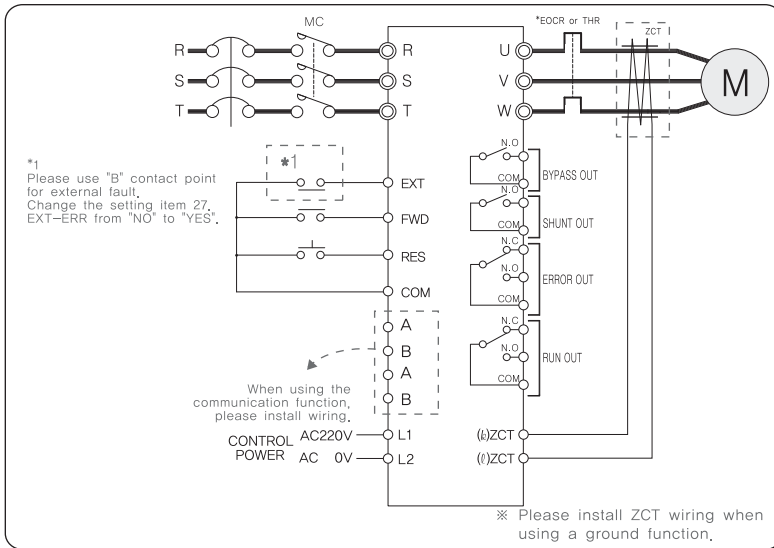


4-4 Connection Diagram When Using the External M.C and BY-PASS

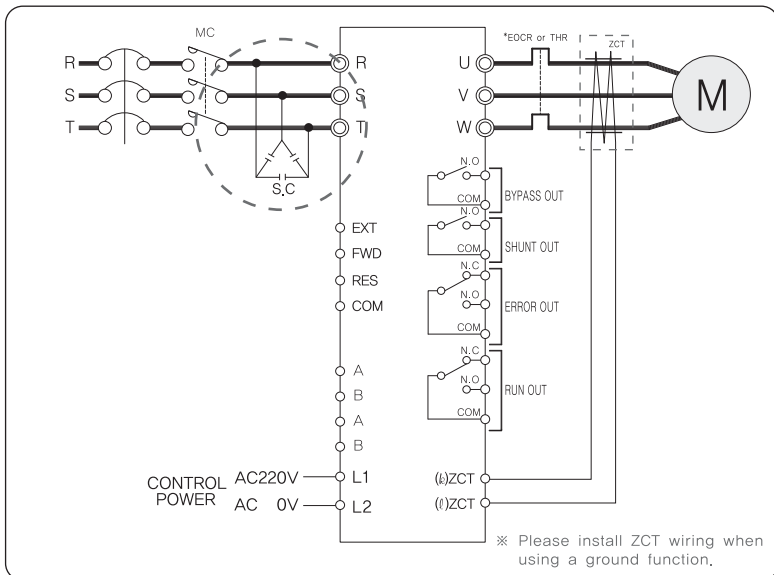


4. Cautions when power connecting and installing

4-5 Connection Diagram When Using the External FAULT(EXT)

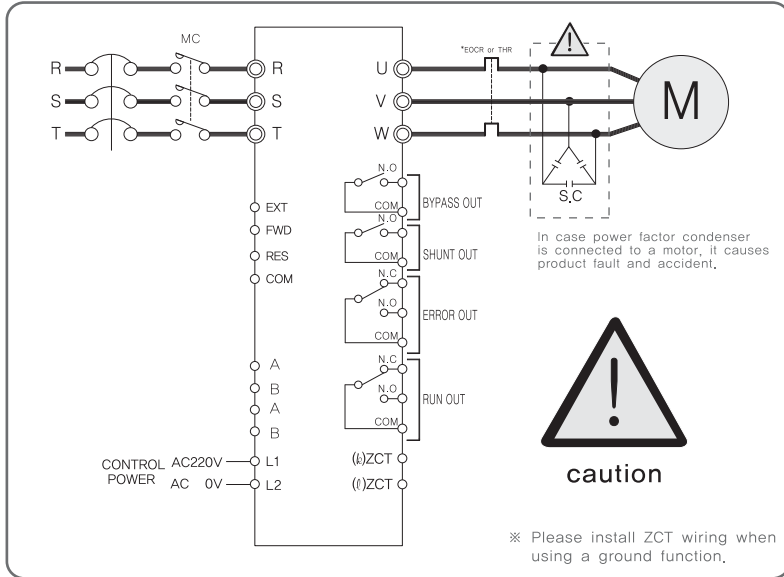


4-6 Connection Diagram When Forming a Condenser of Power-factor Improvement

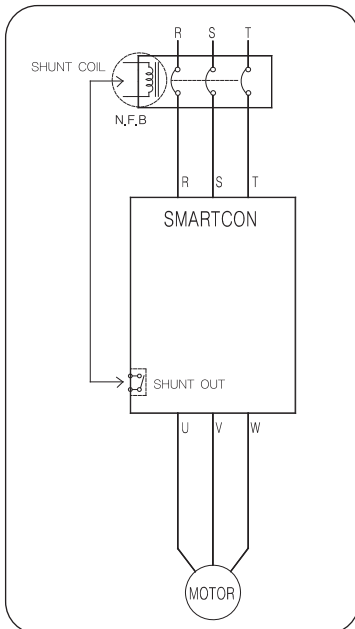


4. Cautions when power connecting and installing

4-7 Misuse examples of a Condenser of Power-factor Improvement



4-8 Connection Diagram of SHUNT OUT



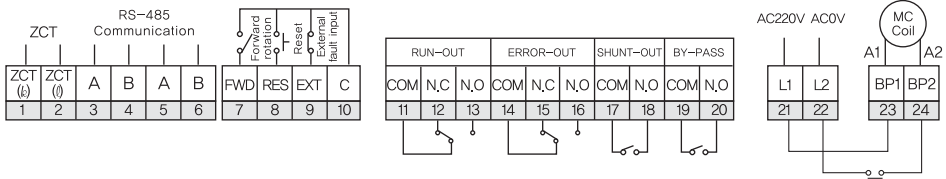
In case of SCR short circuit, SHUNT OUT Relay, as a function of protecting the motor, can block main power.

When the motor stops, SHUNT OUT Relay is operated if there was over current more than 2 sec because of short of Thyristor(SCR), and protects motor by making main power trip as blocking NFB when SHUNT OUT is output.

In case of not using MC of the SMARTCON input socket, you can protect the motor if using SHUNT OUT Relay.

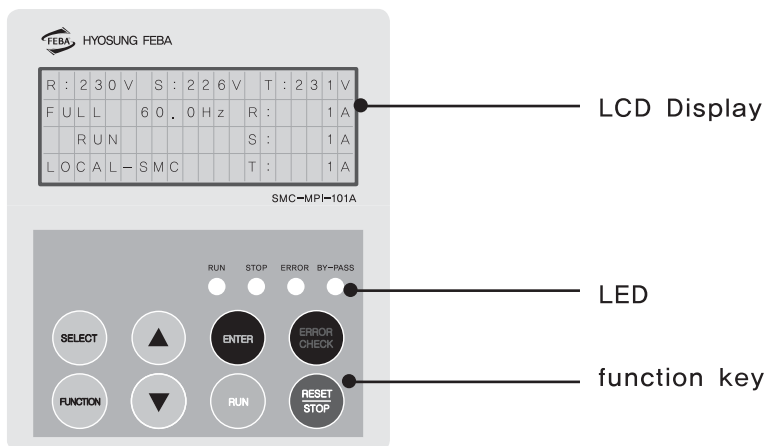
5. CONTROL Connection Diagram & description of a socket function

5. CONTROL Connection Diagram & description of a socket function



NO	Abbreviation	Name	Function	Nominal value
1	ZCT(k)	Second ZCT (k)	Earth detection input	200mA 100mV
2	ZCT(l)	Second ZCT (l)		
3	A	DATA+	RS-485 Communication	
4	B	DATA-		
5	A	DATA+		
6	B	DATA-		
7	FWD	Forward	Forward rotation	
8	RES	Reset	In case of error, it resets,	
9	EXT	External fault	Input of external fault * In case of its use, please use 'B' contact point,	
10	C	COMMON	Common input	
11	COM	RELAY COMMON	Run out : In case of running, N,O output is displayed. At normal times, N,C output is displayed,	AC250V 3A
12	N,C	RELAY COMMON		
13	N,O	RELAY COMMON		
14	COM	RELAY COMMON	Error out : In case of running, N,O output is displayed. At normal times, N,C output is displayed,	
15	N,C	NORMAL CLOSE		
16	N,O	NORMAL OPEN		
17	COM	RELAY COMMON	Shunt out : It operates at shunt error,	
18	N,O	NORMAL OPEN		
19	COM	RELAY COMMON	By-pass out : It is a terminal to connect when external by-pass function is used,	
20	N,O	NORMAL OPEN		
21	L1	AC 220V	Input of operational power (AC220V)	
22	L2	AC 0V		
23	BP1	A1	In case of By-pass use, it connects MC coil, * Do not use in any because of connected coil inside	
24	BP2	A2		

※ In case operational power input 110V is used, please inquire separately.



- SMARTCON(FDS③) provides an LCD DISPLAY of 4X20 letters. The function of each line is as below.

Division	Function
1 zone	During starting and driving, displays input voltage and output current
2 zone	Displays current status of starting and driving, and so on Displays ERROR occurrence Displays frequency
3 zone	Displays current MODE Displays ERROR contents

6. DISPLAY PANEL(multifunction)

6-2 LED description

LED mark	LED color	Function
RUN	RED	Lighting when driving
STOP	BLUE	Lighting when stopping
ERROR	YELLOW	Lighting when an ERROR occurs
BY-PASS	BLUE	Lighting when BY-PASS operating

6-3 KEY description

KEY	Function
SELECT	Screen converting button. If pushing the SELECT KEY once, the screen is converted from MAIN screen to SETTING MODE, and if pushing it again, coming back to the MAIN screen.
FUNCTION	Fine control function (consumers doesn't use it)
▲(UP)	1. Moves to the parameter of the upper line on the SETTING MODE 2. After choosing the parameter by the ENTER KEY, if pushing the ▲(UP) KEY, increases by 0,1 or 1.
▼(DOWN)	1. Moves to the parameter of the below line on the SETTING MODE 2. After choosing the parameter by the ENTER KEY, if pushing the ▼(DOWN) KEY, decreases by 0,1 or 1.
ENTER	1. selecting a parameter 2. saving the parameter value
ERROR CHECK	Checking the ERROR occurrence records
RUN	START on a LOCAL-SMC, LOCAL-BPS mode
RESET/STOP	1. STOP on a LOCAL-SMC, LOCAL-BPS mode 2. ERROR RESET

※ It is shipped out after setting the basic values by products

7. LCD DISPLAY

7. LCD DISPLAY

7-1 LCD display contents when starting and driving

Mark	Description	DISPLAY
3-phase voltage	Displays R,S,T phases input voltage	
3-phase current	Displays R,S,T phases output voltage	
NO POWER	Displays ON, MAIN POWER OFF statuses of a controlled power	
MODE	Displays driving MODE 1. REMOTE-SMC 2. REMOTE-BPS 3. LOCAL-SMC 4. LOCAL-BPS 5. SERIAL-COM 6. TEST MODE	
STOP	Displays preparation of driving status (MAIN POWER ON)	
NO RUN	Displays NO RUN when starting on a status of OFF of MAIN POWER	

7. LCD DISPLAY

Mark	Description	DISPLAY
FULL RUN	Displays driving status	
ERROR # #####	Displays an abnormal status by inside or outside Displays an applied ERROR contents	
ACCEL #.# SEC	Displays the acceleration process	
DECEL #.# SEC	Displays deceleration process	
COM ERROR	Displays MAIN BOARD and DISPLAY communication ERROR status	

※ When COM ERROR occurs, please contact our office immediately.

7. LCD DISPLAY

7-2 Driving MODE

Mark	Description
REMOTE-SMC (R-SMC)	· REMOTE SMARTCON · REMOTE control MODE of a standard product · Controlling START and STOP of SMARTCON using an external controller
REMOTE-BPS (R-BPS)	· REMOTE BY-PASS · REMOTE control MODE when using the BY-PASS TYPE or BY-PASS outside · Controlling ON and OFF of Magnet Contactor for BY-PASS using an external controller
LOCAL-SMC (L-SMC)	· LOCAL SMARTCON · Controlling START and STOP of a SMARTCON using RUN, STOP keys of a DISPLAY KEY PAD
LOCAL-BPS (L-BPS)	· LOCAL BY-PASS · The MODE when using a BY-PASS TYPE or a BY-PASS outside · Controlling ON and OFF of a Magnet Contactor for BY-PASS using RUN, STOP KEYS of a DISPLAY KEY PAD
SERIAL-COM (S-COM)	· SERIAL-COMMUNICATION
TEST MODE	· TEST MODE

※ BPS mode to use in an emergency, so should not be used continuously.
If you do not continue to start normally, please contact the office immediately.

8. PARAMETER & classified movement features

8. PARAMETER & classified movement features

8-1 Parameter

Mark		Parameter	Input range	Function
1	MODE	DRIVE MODE	R-SMC R-BPS L-SMC L-BPS S-COM TEST MODE	R-SMC : controls SMC START, STOP by the external control R-BPS : controls M/C ON, OFF for BY-PASS by the external control L-SMC : controls START, STOP by using the input display which is attached to SMC, L-BPS : controls BY-PASS ON, OFF by using the input display which is attached to SMC, S-COM : communication MODE TEST MODE : Enter sequence test mode
2	ACCEL	ACCEL TIME	0~300sec	The time which is taken to be applied till the full voltage of the motor, and if you make the acceleration time too short, be careful as the starting current increases.
3	SD-TIME	START DELAY TIME	0~9.9sec	When starting, begin to start after the setting time. Generally sets-up as 2sec.
4	HUNT-JP	HUNTING JUMP TIME	0~300sec	Jump value is set after checking based on time shown in the Display when there is shunting at motor driving. In case of setting, full voltage is applied without shunting. Generally, it is set in the same way with the acceleration time.
5	OFF SET	Initial voltage	0~100%	It sets initial voltage in case of motor driving.
6	K-VOLT	KICK START VOLT	0~100%	In case of kick start use, it sets pre voltage value.
7	K-TIME	KICK START TIME	0~300sec	In case of kick start use, it sets pre voltage application time.
8	DECEL	DECEL TIME	0~300sec	It refers to the time to stop at the full voltage of a motor. In case deceleration stop is not necessary, it is set as '0'.
9	DD-VOLT	DECEL DELAY VOLT	0~100%	To delay deceleration, it sets voltage for deceleration delay.
10	DD-TIME	DECEL DELAY TIME	0~300sec	It sets time to keep deceleration delay.
11	C-LIMIT	CURRENT LIMIT	0~9000A	It drives by limiting load current not to flow over the set value. In case too small current is set, it burdens motor. Set between 3 to 4 times or nominal value.
12	CL-TIME	CURRENT LIMIT TIME	0~300sec	If current is limited even after setting time, fault is generated.
13	OVER-C1	OVER CURRENT 1	0~9000A	It senses instant over current with instantaneous over current detection function. Generally, it sets 600% (6 times) of motor nominal current.
14	OVER-C1T	OVER CURRENT 1 TIME	0~9.9sec	It sets the time of instantaneous over current OVER-C1. If current over OVER-C1 setting value flows and OVER-C1T is kept, it is sensed as an error. Generally, it is set as 0.5 seconds.

8. PARAMETER & classified movement features

8-1 Parameter

Mark		Parameter	Input range	Function
15	OVER-C2	OVER CURRENT 2	0~9000A	Over current detection function during the driving senses driving current and continuous over load. Generally, it is set as 400% of nominal motor current.
16	OVER-C2T	OVER CURRENT 2 TIME	0~100sec	If current over OVER-C2 setting value flows and OVER-C2T is kept, it is sensed as an error. Generally, it is set as 2/3 accel time.
17	OVER-C3	OVER CURRENT 3	0~9000A	After accel time, it senses over current at RUN range. If load current is over the setting value by sensing motor's continuous overload, it is sensed as an error. Generally, it is set as 120 % of a nominal motor.
18	OVER-C3T	OVER CURRENT 3 TIME	0~100sec	If current over OVER-C3 setting value flows and OVER-C3T is kept, it is sensed as an error. Generally, it is set as 5 seconds.
19	SHUNT	SHUNT CURRENT	0~1000A	If load current is over the setting value at STP status and SCR short-circuit protection, it is sensed as an error.
20	UNBALANCE	3 PHASE UNBALANCE	0~1000A	It sets inter-phase unbalance current difference.
21	U-TIME	3PHASE UNBALANCE TIME	0~100sec	It sets inter-phase current detection time. Fault is generated after setting time.
22	E-TIME	EARTH TIME	0~9.9sec	It sets earth detection time. Fault is generated after detection time.
23	LL-CUR	LOW LOAD CURRENT	0~1000A	It sets low load current.
24	LLC-TIME	LOW LOAD CURRENT TIME	0~100sec	It sets low load detection time. Fault is generated after setting time.
25	LO-VOLT	LOW VOLTAGE	0~1000V	If input voltage is under the setting value, it is sensed as an error.
26	HI-VOLT	HIGH VOLTAGE	0~1000V	If input voltage is over the setting value, it is sensed as an error.
27	EXT-ERR	EXTERNAL FAULT ERROR	YES/NO	It sets the use of external fault. Set No for not using and Yes for using.
28	BPS-ERR	BY-PASS Fault ERROR	YES/NO	As a function of setting when using the MC by BPS type, sets up as 'YES' when using the BPS.
29	AH-JUMP	AUTO HUNTING JUMP	YES/NO	Displays whether being able to use the AUTO JUMP. Sets up as 'YES' for the basic setting.
30	LOSS-PHA	LOSS Phase	YES/NO	Mark whether detecting open-phase. Set up basic setting as 'NO' (detected in case of YES).
31	NODE	NODE	0~99	Setting up the communication NODE number.
32	USE-TIME	TOTAL USE TIME	—	Total use time after installing the product.
33	Version	CPU Version	—	Displays the CPU Version which is being used currently.
34	DATA	DATA UP/DOWN	READ/WRITE	Parameter save and copy function

8. PARAMETER & classified movement features

8-2 Classified movement features

Mark	Parameter	Input range	Movement graph
ACCEL	ACCEL TIME	0~300sec	
SD-TIME	START DELAY TIME	0~9.9sec	
OFF SET	INITIAL VOLTAGE	0~100%	SD-TIME : 0
			SD-TIME : "t"
K-VOLT	KICK START VOLT	0~100%	SD-TIME : 0
			SD-TIME : "t"

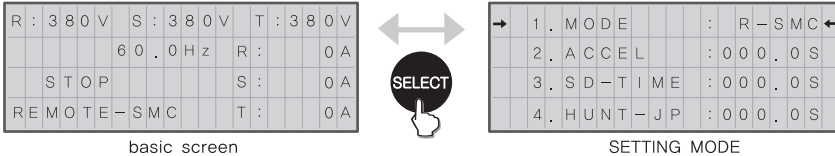
8. PARAMETER & classified movement features

Mark	Parameter	Input range	Movement graph
K-TIME	KICK START TIME	0~100sec	
DECEL	DECEL TIME	0~300sec	
DD-VOLT	DECEL DELAY VOLT	0~100%	
DD-TIME	DECEL DELAY TIME	0~300sec	
C-LIMIT	CURRENT LIMIT	0~2000A	
CL-TIME	CURRENT LIMIT TIME	0~300sec	

9. SETTING & starting method

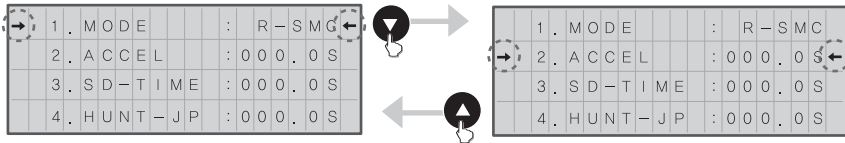
9-1 Entering SELECT[SETTING] MODE

- If pushing the SELECT KEY on the basic screen, it is converted to a SETTING MODE, and if pushing it again, it comes back to the basic screen again.



9-2 Selecting SELECT[SETTING] MODE parameter

- As pushing the UP(▲), DOWN(▼) key, you can move to the item that you want to go.

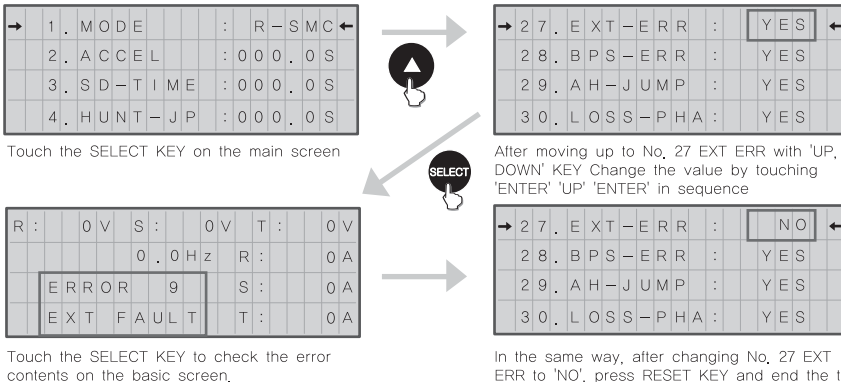


9-3 Parameter Data Setting

1. After making arrow heads locate left and right of the parameter that wants to input data, push the ENTER KEY, and if the arrows which are on left and right of the parameter flash, it means that the applied parameter is chosen.
2. Input the data that you want to enter by using the UP(▲) and DOWN(▼) keys.
3. Save the set up data by pushing the ENTER KEY.

9-4 ERROR TEST

1. Press 'SELECT KEY' on the basic screen to switch to SETTING MODE.
2. Change No. 27 EXT ERR to 'YES' by using the UP(▲) and DOWN(▼) keys.
3. After saving the changed value, return to the basic screen and check the ERROR status.
4. In the same way, after changing No. 27 EXT ERR to 'NO', touch the RESET KEY.
5. After switching to the base screen by pressing the SELECT KEY, check whether the ERROR is reset and end the test.



9. SETTING & starting method

[Data input example]

Order	Screen display	KEY	Description
1			Push the SELECT KEY on the MAIN screen.
2		 	Move to the desirable item by using the UP, DOWN KEY.
3			If selecting the item by pushing the ENTER KEY, as the left and right arrows (→ ←) are flashing, changes the parameter value.
4		 	Change the parameter value by using the UP, DOWN KEY.
5			Save the parameter value.
6			Move to the starting MAIN screen by pushing the SELECT KEY. Caution) 1. When LOCAL-SMC, LOCAL-BPS MODE, START, STOP are possible on the MAIN screen, START, STOP are impossible on the SELECT screen. 2. REMOTE MODE is possible to START, STOP on the SELECT MODE,
7		Completion of setting & preparation of starting	After completing to set up, preparing to start.

9. SETTING & starting method

9-5 Basic setting table by motor capacity

Parameter		Input range	Below 30HP (2.2kW~22kW)	Below 60HP (30kW~37kW)	Below 200HP (56kW~150kW)	Below 1100HP (195kW~800kW)
1	MODE	R-SMC	R-SMC	R-SMC	R-SMC	R-SMC
		R-BPS				
		L-SMC				
		L-BPS				
		S-COM				
		TEST MODE				
2	ACCEL	0~300sec	10	25	55	55
3	SD-TIME	0~9.9sec	1.5	1.5	1.5	1.5
4	HUNT-JP	0~300sec	10	25	55	55
5	OFFSET	0~100%	30	30	30	30
6	K-VOLT	0~100%	0	0	0	0
7	K-TIME	0~300sec	0	0	0	0
8	DECEL	0~300sec	0	0	0	0
9	DD-VOLT	0~100%	0	0	0	0
10	DD-TIME	0~300sec	0	0	0	0
11	C-LIMIT	0~9000A	0	0	0	0
12	CL-TIME	0~300sec	0	0	0	0
13	OVER-C1	0~9000A	Rated current*6	Rated current*6	Rated current*6	Rated current*6
14	OVER-C1T	0~9.9sec	0.5	0.5	0.5	0.5
15	OVER-C2	0~9000A	Rated current*3	Rated current*3	Rated current*3	Rated current*3
16	OVER-C2T	0~100sec	6	17	32	35
17	OVER-C3	0~9000A	Rated current*1.2	Rated current*1.2	Rated current*1.2	Rated current*1.2
18	OVER-C3T	0~100sec	5	5	5	5
19	SHUNT	0~1000A	Rated current*0.5	Rated current*0.5	Rated current*0.5	Rated current*0.5
20	UNBALANCE	0~1000A	Rated current*0.5	Rated current*0.5	Rated current*0.5	Rated current*0.5
21	U-TIME	0~100sec	6	6	6	6
22	E-TIME	0~9.9sec	0	0	0	0
23	LL-CUR	0~1000A	0	0	0	0
24	LLC-TIME	0~100sec	0	0	0	0
25	LO-VOLT	0~1000V	Rated voltage*0.8	Rated voltage*0.8	Rated voltage*0.8	Rated voltage*0.8
26	HI-VOLT	0~1000V	Rated voltage*1.2	Rated voltage*1.2	Rated voltage*1.2	Rated voltage*1.2
27	EXT-ERR	YES/NO	NO	NO	NO	NO
28	BPS-ERR	YES/NO	NO (When using the BY-PASS MC, "YES")			
29	AH-JUMP	YES/NO	YES	YES	YES	YES
30	LOSS-PHA	YES/NO	NO	NO	NO	NO
31	NODE	0~99	0	0	0	0
32	USE-TIME	—	0	0	0	0
33	VERSION	—	4.0	4.0	4.0	4.0
34	DATA	READ/WRITE	—	—	—	—

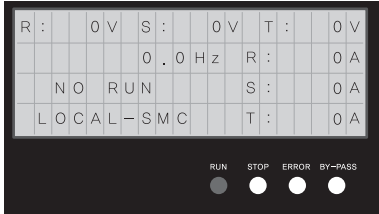
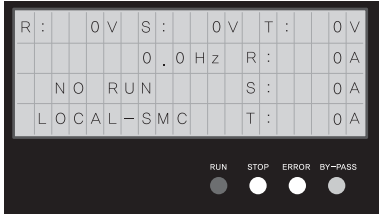
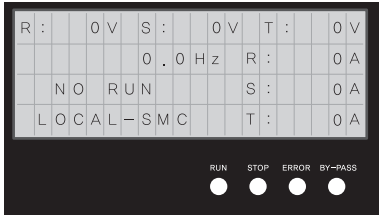
※ Please inquire at the office, setting parameter is changed at the environment.

9. SETTING & starting method

9-6 Control Test

- SMARTCON can sequence test only with the controlled power without MAIN power apply.

[Control test order]

Order		Description
1	MODE	Set to TEST MODE
2	PARAMETER SETTING	SETTING DATA 1. ACCEL : 10 sec
3	F contact signal input in TEST MODE	
4	After 10sec of the set up ACCEL TIME after RUN, BY-PASS OUR RELAY is operated.	
5	When an ERROR is occurred, ERROR OUT RELAY is operated.	

9. SETTING & starting method

9-7 SMARTCON starting

9-7-1 LOCAL MODE (L-SMC , L-BPS)

MAIN screen	SELECT screen
SMC-MPI-101A	SMC-MPI-101A
START, STOP are possible on the MAIN screen.	START, STOP are impossible on the SELECT screen. If clicking the RUN, STOP KEY, not moving.

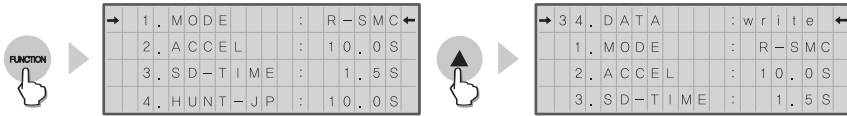
9-7-2 REMOTE MODE (R-SMC , R-BPS)

MAIN screen	SELECT screen
SMC-MPI-101A	SMC-MPI-101A
Operate by contact input	START, STOP are possible. However, in case during the starting, MODE change is impossible on the SELECT screen.

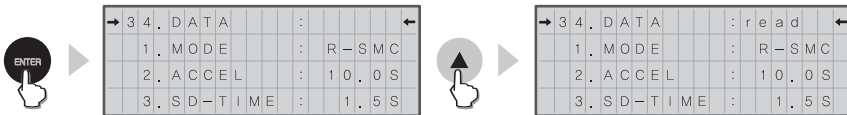
9-8 DATA UP/DOWN (Parameter 34)

9-8-1 DATA READ (Mainboard ► Display panel)

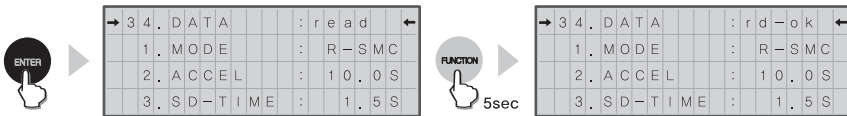
- ① After entering the setting mode by pressing the 'FUNCTION' key, place it in the DATA parameter with the '▲, ▼' keys.



- ② After pressing 'ENTER' key, select read with '▲, ▼' keys.

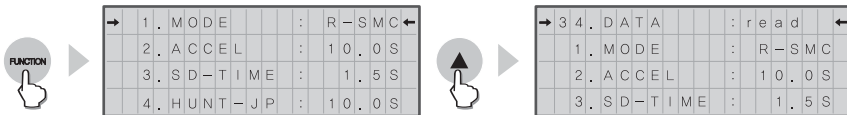


- ③ After saving with the 'ENTER' key, press the 'FUNCTION' key for 5 seconds to display the message rd-ok, and it's done.

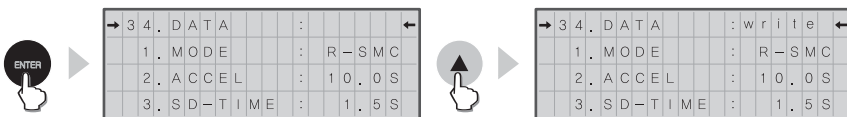


9-8-2 DATA WRITE (Display panel ► Mainboard)

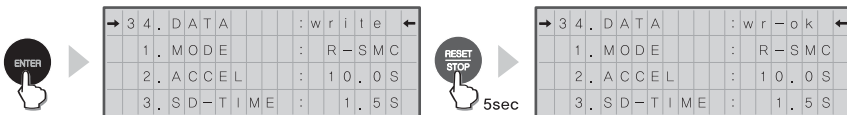
- ① After entering the setting mode by pressing the 'FUNCTION' key, place it in the DATA parameter with the '▲, ▼' keys.



- ② After pressing 'ENTER' key, select write with '▲, ▼' keys.



- ③ After saving with the 'ENTER' key, press the 'RESET/STOP' key for 5 seconds to display the message wr-ok, and it's done.



10. Communication type

10-1 Parameter input

10-1-1 Node setting

3	0	.	L	O	S	S	-	P	H	A	:					N	O
→	3	1	.	N	O	D	E				:					1	←
	3	2	.	U	S	E	-	T	I	M	E	:				0	H
	3	3	.	V	E	R	S	I	O	N	:			0	.	0	A

setting range 0 ~ 99

10-1-2 Mode setting when starting with communication.

→	1	.	M	O	D	E			:	S	-	C	O	M	←	
	2	.	A	C	C	E	L		:	0	1	0	.	0	S	
	3	.	S	D	-	T	I	M	E	:	0	0	1	.	0	S
	4	.	H	U	N	T	-	J	P	:	1	0	0	.	0	S

10-2 Communication connection method

A	B	A	B
3	4	5	6

Name	Description	Note
A	DATA +	
B	DATA -	
A	DATA +	
B	DATA -	

※ Modbus Communication cable Must be used shield cable.

10. Communication type

10. Communication type

10-3 Communication Protocol

10-3-1 Parameter address & description

Read Holding Registers (0x03)

Address	Contents	Name	Range	Note
1	Driving mode	Rmode	0~4	
2	Acceleration time	accel	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
3	Acceleration delay time	sdtim	0~9,9	Input values/10, ex) 10 Input → 1,0 recognized as
4	Hunting jump	hunjp	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
5	Initial voltage	offse	0~100,0	Input values/10, ex) 10 Input → 1,0 recognized as
6	Quick voltage	kvolt	0~100,0	Input values/10, ex) 10 Input → 1,0 recognized as
7	Quick time	ktime	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
8	Deceleration time	decel	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
9	Deceleration delay voltage	ddvol	0~100,0	Input values/10, ex) 10 Input → 1,0 recognized as
10	Deceleration delay time	ddtim	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
11	Current limit	clrim	0~5000	
12	Current limit time	cltim	0~300,0	Input values/10, ex) 10 Input → 1,0 recognized as
13	Over current1	cur1	0~5000	
14	Over current1 time	cur1t	0~9,9	Input values/10, ex) 10 Input → 1,0 recognized as
15	Over current2	cur2	0~5000	
16	Over current2 time	cur2t	0~100	
17	Over current3	cur3	0~5000	
18	Over current3 time	cur3t	0~100	
19	Shunt current	shunt	0~1000	
20	Interphase current	uncur	0~1000	
21	Interphase current time	uncut	0~100,0	
22	Grounding time	eatim	0~9,9	Input values/10, ex) 10 Input → 1,0 recognized as
23	Low load current	llcur	0~1000	
24	Low load current time	llcut	0~100,0	
25	Low voltage	lvolt	0~1000	
26	High voltage	hvolt	0~1000	
27	External fault	fault	0~1	0 – NO, 1 – YES
28	BY-PASS error	byper	0~1	0 – NO, 1 – YES
29	Auto hunting jump		0~1	0 – NO, 1 – YES
30	Loss Phase		0~1	0 – NO, 1 – YES
31	NODE	node	0~99	
32	Total use time	total	0	
33	Version display	ver	0	
50	Others write			Write-only / Can not be read

10. Communication type

10. Communication type

10-3 Communication Protocol

10-3-1 Parameter address & description

Read Input Registers(0x04) – Drive Status

Address	Contents	Name	Note
1	R-phase voltage	rpVOLTL,H	
2	S-phase voltage	rpVOLTL,H	
3	T-phase voltage	rpVOLTL,H	
4	R-phase current	rpCURRL,H	
5	S-phase current	spCURRL,H	
6	T-phase current	tpCURRL,H	
7	Run mode	rnMODEL,H	
8	Run time	rnTIMEL,H	
9	Error number	errNUML,H	
10	Using time	BtotL,H	Time units recorded

10. Communication type

10. Communication type

10-3 Communication Protocol

10-3-2 Read Input Registers(0x04) – Drive Status No.7 : Run mode details

bit	3dig		runFLAG
0	3xh	Run	r_run
1	3xh	Acceleration	r_accel
2	3xh	Full	r_full
3	3xh	Deceleration	r_decel
bit	2dig		
0	3xh		
1	3xh		
2	3xh		fg_err
3	3xh	Power(0) , No Power(1)	no_power
bit	1dig		
0	3xh		
1	3xh		
2	3xh		
3	3xh		
bit	0dig		
0	3xh	Setting value change flag is occurred on COM2.	
1	3xh		
2	3xh		
3	3xh		

10. Communication type

10. Communication type

10-3 Communication Protocol

10-3-3 Read Holding Registers (0x03) No.50 Others write for details

bit	3dig		
0	3xh	Reset	31h
1	3xh	Error list reset	32h
2	3xh		
3	3xh		
bit	2dig		
0	3xh	Using time reset	31h
1	3xh		
2	3xh		
3	3xh		
bit	1dig		
0	3xh	STOP(Manual mode)	31h
1	3xh		
2	3xh		
3	3xh		
bit	0dig		
0	3xh	START(Manual mode)	32h
1	3xh		
2	3xh		
3	3xh		

10. Communication type

10-3 Communication Protocol

10-3-4 Error records check address description

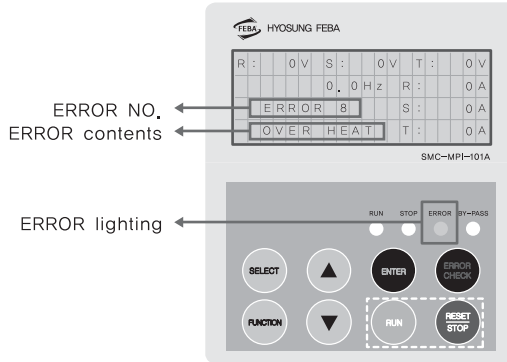
Read Input Registers(0x04) – Error List

Address	Contents	Name	Note
30	Error 1	erDA0aL	
31	R-phase	erDA0bL	
32	S-phase	erDA0cL	
33	T-phase	erDA0dL	
34	Error 2	erDA1aL	
35	R-phase	erDA1bL	
36	S-phase	erDA1cL	
37	T-phase	erDA1dL	
38	Error 3	erDA2aL	
39	R-phase	erDA2bL	
40	S-phase	erDA2cL	
41	T-phase	erDA2dL	
42	Error 4	erDA3aL	
43	R-phase	erDA3bL	
44	S-phase	erDA3cL	
45	T-phase	erDA3dL	
46	Error 5	erDA4aL	
47	R-phase	erDA4bL	
48	S-phase	erDA4cL	
49	T-phase	erDA4dL	
50	Error 6	erDA5aL	
51	R-phase	erDA5bL	
52	S-phase	erDA5cL	
53	T-phase	erDA5dL	
54	Error 7	erDA6aL	
55	R-phase	erDA6bL	
56	S-phase	erDA6cL	
57	T-phase	erDA6dL	
58	Error 8	erDA7aL	
59	R-phase	erDA7bL	
60	S-phase	erDA7cL	
61	T-phase	erDA7dL	
62	Error 9	erDA8aL	
63	R-phase	erDA8bL	
64	S-phase	erDA8cL	
65	T-phase	erDA8dL	
66	Error 10	erDA9aL	
67	R-phase	erDA9bL	
68	S-phase	erDA9cL	
69	T-phase	erDA9dL	

11. ERROR occurring & Measures

11. ERROR occurring & Measures

11-1 Checking error occurring and contents of measure



11-2 ERROR MEMORY

Diagram of the SMC-MPI-101A control panel. The display shows the following data: <table border="1"> <tr> <td>1.</td> <td>ERROR 14</td> </tr> <tr> <td>R:</td> <td>1A</td> <td>S:</td> <td>0A</td> <td>T:</td> <td>4A</td> </tr> <tr> <td>2.</td> <td>ERROR 8</td> </tr> <tr> <td>R:</td> <td>2A</td> <td>S:</td> <td>1A</td> <td>T:</td> <td>3A</td> </tr> </table> Buttons shown: SELECT, FUNCTION, UP, DOWN, ENTER, RUN, ERROR CHECK, RESET STOP.	1.	ERROR 14	R:	1A	S:	0A	T:	4A	2.	ERROR 8	R:	2A	S:	1A	T:	3A	Diagram of the SMC-MPI-101A control panel. The display shows the following data: <table border="1"> <tr> <td>1.</td> <td>ERROR 14</td> </tr> <tr> <td>R:</td> <td>1A</td> <td>S:</td> <td>0A</td> <td>T:</td> <td>4A</td> </tr> <tr> <td>2.</td> <td>ERROR 8</td> </tr> <tr> <td>R:</td> <td>2A</td> <td>S:</td> <td>1A</td> <td>T:</td> <td>3A</td> </tr> </table> Buttons shown: SELECT, FUNCTION, UP, DOWN, ENTER, RUN, ERROR CHECK, RESET STOP.	1.	ERROR 14	R:	1A	S:	0A	T:	4A	2.	ERROR 8	R:	2A	S:	1A	T:	3A
1.	ERROR 14																																
R:	1A	S:	0A	T:	4A																												
2.	ERROR 8																																
R:	2A	S:	1A	T:	3A																												
1.	ERROR 14																																
R:	1A	S:	0A	T:	4A																												
2.	ERROR 8																																
R:	2A	S:	1A	T:	3A																												
To check the ERROR occurrence records, click the ERROR CHECK KEY	When an ERROR CODE or an ERROR is occurred and the error content is applied to the current, if the 3-phase current is applied to the voltage, the voltage is displayed. Can check the occurrence records by using the UP/DOWN KEY, and it can remember the recent 10 errors. *no.1 is the latest occurred error.																																

- After selecting the ERROR CHECK, if clicking the UP/DOWN key at the same time, it becomes reset.



11. ERROR occurring & Measures

11-3 ERROR CODE & measures

Type	Display	Error	Measures
ERROR 1	OVER CURR 1	OVER CURR1 (Instant over current)	1. Check of load
			2. Check of SCR
			3. Check of Parameter (OVER-C1, OVER-C1T)
ERROR 2	OVER CURR 2	OVER CURR2 (Over current during the movement)	1. Check of load
			2. Check of Parameter (OVER-C2, OVER-C2T)
			3. Check of load current
ERROR 3	OVER CURR 3	OVER CURR3 (Over current during the operation)	1. Check of load
			2. Check of Parameter (OVER-C3, OVER-C3T)
			3. Check of load current
ERROR 70	DATA FALL	SETTING DATA ERROR	1. Check of parameter
ERROR 5	LOSS PHASE	LOSS PHASE	1. Check of input voltage
			2. Check of internal entering line
ERROR 6	SHUNT	SHUNT	1. Check of SCR
			2. Check of parameter (Shunt)
ERROR 7	UNBALANCE	3 ϕ PHASE UNBALANCE	1. Check of load
			2. Check of Parameter (Unbalance U-Time)
			3. Check of SCR
ERROR 8	OVER HEAT	SMARTCON OVER HEAT	1. Check of internal temperature of control board
			2. Check of cooling fan
ERROR 9	EXT FAULT	EXTERNAL FAULT ERROR	1. Check of motor temperature
			2. Check of EOCR
			3. Check of external fault
ERROR 10	LOW LOAD	LOW LOAD	1. Check of load
			2. Check of SMC display current
			3. Check of parameter (LL-CUR, LLC-TIME)
ERROR 11	EARTH	EARTH	1. Check of earth
			2. Check of ZCT
ERROR 12	LOW VOLT	LOW VOLTAGE	1. Check of input voltage
			2. Check of SMC display voltage
			3. Check of parameter (LO-VOLT)
ERROR 13	HIGH VOLT	HIGH VOLTAGE	1. Check of input voltage
			2. Check of SMC display voltage
			3. Check of parameter (HI-VOLT)
ERROR 14	CURR LIMIT	CURRENT LIMIT	1. Check of load at driving
			2. Check of parameter (CC-LIMIT, CL-TIME)
ERROR 15	BPS Fault	BY-PASS MC failure	1. Check bypass MC

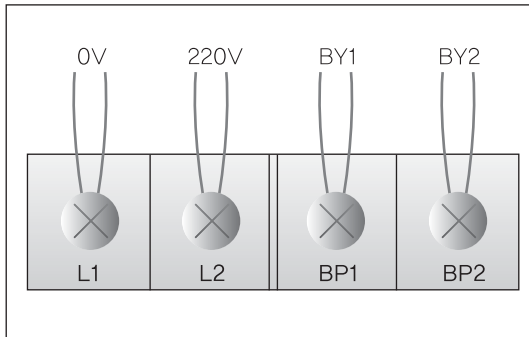
※ In the event of ERROR8 during start, after the restart with sufficient time to cool.
Without sufficient cooling to restart the product can cause burnout.

11. ERROR occurring & Measures

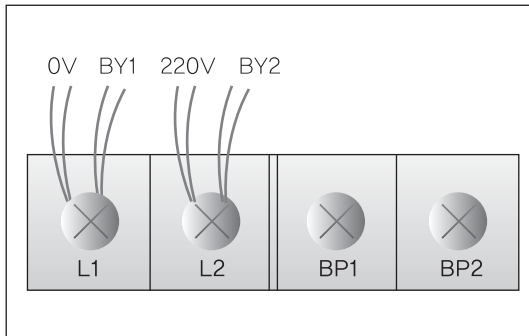
11-4 BY-PASS type line starting method

- When using the SMARTCON, if you cannot see the input LCD screen, do line-start as below.

normal wiring



wiring when line-starting

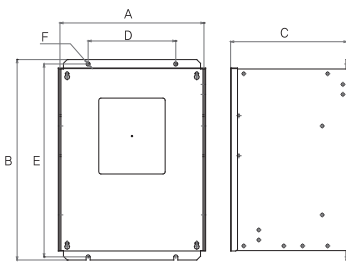


- If starting after connecting the controlled power cable and BY1, 2 cables to the controlled power socket like these pictures, the motor becomes line-start.

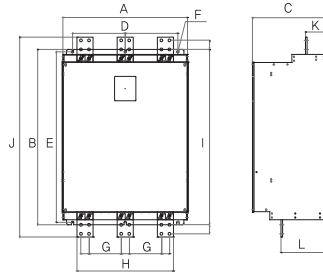
12. Product Size and fit-up

12. Product Size and fit-up

12-1 One-way / BY-PASS Type



FDS3-405S~4600S
FDS3-405BPS~4400BPS



FDS3-4800S~41100S
FDS3-4600BPS

unit : mm

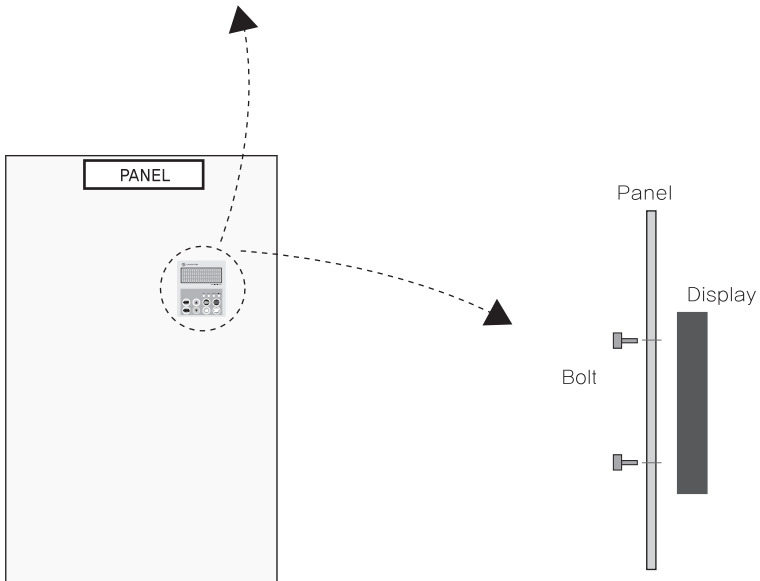
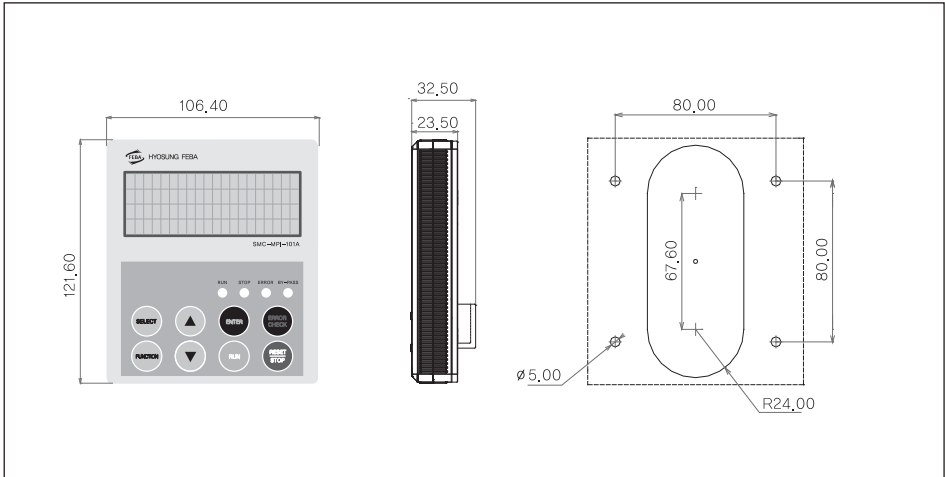
TYPE	Applicable model						Width	Height	Depth	Wide attach-ment	Long attach-ment	Mounting hole ϕ
							A	B	C	D	E	F
	220V		380V		440V		busbar distance	busbar wide maximum length	busbar Hole long distance	busbar long maximum length	R,S,T side busbar height	U,V,W side busbar height
	MODEL(HP)	KW	MODEL(HP)	KW	MODEL(HP)	KW	G	H	I	J	K	L
One-way	FDS3-203S	2.2	FDS3-305S	3.7	FDS3-405S	3.7	230	320	186	140	308	6.5
	FDS3-205S	3.7	FDS3-307S	5.5	FDS3-407S	5.5						
	FDS3-207S	5.5	FDS3-310S	7.5	FDS3-410S	7.5						
	FDS3-210S	7.5	FDS3-315S	11	FDS3-415S	11						
	FDS3-215S	11	FDS3-320S	15	FDS3-420S	15	257	379	249	205	364	9
	FDS3-220S	15	FDS3-330S	22	FDS3-430S	22						
	FDS3-220S	15	FDS3-340S	30	FDS3-440S	30						
	FDS3-230S	22	FDS3-350S	37	FDS3-450S	37						
	FDS3-240S	30	FDS3-375S	56	FDS3-475S	56	257	417	249	205	402	9
	FDS3-250S	37	FDS3-3100S	75	FDS3-4100S	75						
	FDS3-270S	56	FDS3-3150S	112	FDS3-4150S	112						
	FDS3-2100S	75	FDS3-3200S	150	FDS3-4200S	150	314	429	249	240	415	9
	FDS3-2130S	98	FDS3-3260S	195	FDS3-4260S	195						
	FDS3-2150S	112	FDS3-3320S	240	FDS3-4320S	240						
	FDS3-2200S	150	FDS3-3400S	300	FDS3-4400S	300	344	483	279	264	467	9
	FDS3-2250S	187	FDS3-3500S	375	FDS3-4500S	375						
	FDS3-2300S	225	FDS3-3600S	450	FDS3-4600S	450						
			FDS3-3800S	600	FDS3-4800S	600	620	872	374	262/524	848	12
							200	480	962	1002	110	232
			FDS3-31100S	800	FDS3-41100S	800	620	1072	374	200/524	1048	12
							200	480	1162	1202	112	234
BY-PASS	FDS3-203BPS	2.2	FDS3-305BPS	3.7	FDS3-405BPS	3.7	256	443	223	196	429	9
	FDS3-205BPS	3.7	FDS3-307BPS	5.5	FDS3-407BPS	5.5						
	FDS3-207BPS	5.5	FDS3-310BPS	7.5	FDS3-410BPS	7.5						
	FDS3-210BPS	7.5	FDS3-315BPS	11	FDS3-415BPS	11						
	FDS3-215BPS	11	FDS3-320BPS	15	FDS3-420BPS	15	335	506	263	276	492	9
	FDS3-220BPS	15	FDS3-330BPS	22	FDS3-430BPS	22						
	FDS3-220BPS	15	FDS3-340BPS	30	FDS3-440BPS	30						
	FDS3-230BPS	22	FDS3-350BPS	37	FDS3-450BPS	37						
	FDS3-240BPS	30	FDS3-375BPS	56	FDS3-475BPS	56	335	543	263	261	529	9
	FDS3-250BPS	37	FDS3-3100BPS	75	FDS3-4100BPS	75						
	FDS3-270BPS	56	FDS3-3150BPS	112	FDS3-4150BPS	112						
	FDS3-2100BPS	75	FDS3-3200BPS	150	FDS3-4200BPS	150	334	638	323	261	624	9
	FDS3-2130BPS	98	FDS3-3260BPS	195	FDS3-4260BPS	195						
	FDS3-2150BPS	112	FDS3-3320BPS	240	FDS3-4320BPS	240						
	FDS3-2200BPS	150	FDS3-3400BPS	300	FDS3-4400BPS	300	480	707	311	408	693	9
			FDS3-3500BPS	375	FDS3-4500BPS	375	500	950	391	204/408	930	11
			FDS3-3600BPS	450	FDS3-4600BPS	450	160	370	1040	1080	179	181

※ For product quality improvement, external dimension might be changed without prior notice.
Please inquire it when you make an order. (Refer to homepage)

※ 600kW / 800kW Please configure necessarily external bypass circuit.

12. Product Size and fit-up

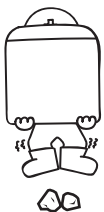
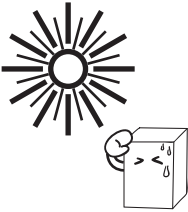
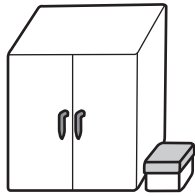
12-2 Input display fit-up dimension



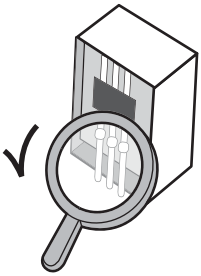
13. Cautions when installing and test driving

13. Cautions when installing and test driving

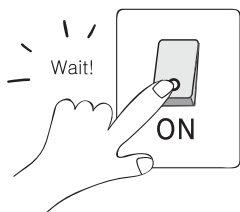
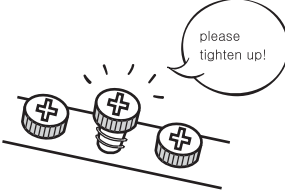
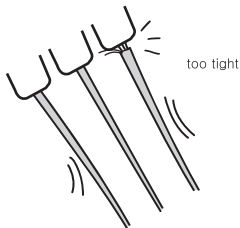
13-1 Installation

			
When moving the product, please always be careful.	Avoid any of places where have water, oil, dirt, or too high temperature.		Install it where check and repair are easy, and keep spare parts near the control board.

13-2 External wiring

	▶ Use power capacity, main circuit power to be fit with the load.
	▶ It cannot be operated if the rating is wrong, so wire it after checking.
	▶ Wire the order input wire making be separated with strong electronic circuit.

13-3 Check matters before power up

		
Check again if there is wrong wiring before power up.	Check if sockets and screws are well tightened.	Check if there is any severe distribution.

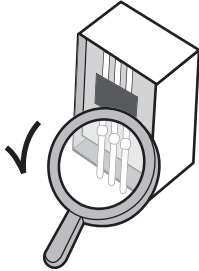
13. Cautions when installing and test driving

13-4 Cautions at trial operation

13-4-1 Surrounding environment check

- ※ There should not be any foreign substance inside of the cabinet.
There is a danger of short.

13-4-2 In/output cable connecting status check

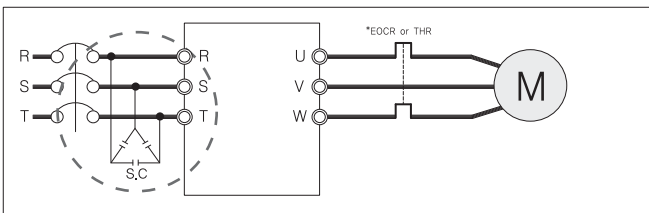
	▶ R, S, T sockets: connect MAIN power ▶ U, V, W: connect MOTOR
---	--

13-4-3 Rated voltage check

- ※ Rated power and input power of the product should be same.
Check the specification and the input power of the product again.

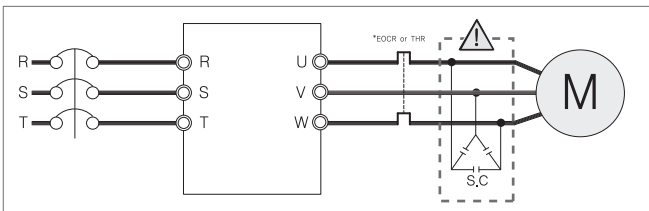
13-4-4 DRIVER output part check

power factor condenser composition



O

wrong using example of power factor condenser.



X

- ※ If it is operated abnormally when test driving, please ask to the head office or our branch office.

14. FQA

Q1) Even though I didn't do smartcon starting, the voltage is occurred on the output side, Is it normal?

A1) At first, you should check whether it is connected with a load. If it is not connected with the load, as there is no discharge route of a current which flows through the snubber, the output side voltage is measured. So, it is normal.

Q2) How should the motor be connected among Y or Δ in the smartcon?

A2) ① Check whether the motor is for 380V or 220V/380V first.

② If it is for 380V, you should wire it with Δ .

③ If it is for 220V/380V, Δ wiring when using 220V, and Y wiring when using 380V.

15. Notice

15-1 Notice



1. Avoid any of places where have water, oil, dirt, or direct sunlight.
2. Avoid a sealed place or a place where has severe temperature increase.
3. Avoid places where has strong vibration or impacts.
4. Do not install it if the product is damaged in appearance or does not work when test driving.
5. Use power voltage and frequency within rating value.
6. Power cable should be tightened and grounded safely.
7. Install it after checking input voltage.
8. Be careful if foreign substances are not coming inside of the product.

- ※ Please read this manual carefully to before installing the product.
 - Malfunction and accidents cause by improper installation.
- ※ Please use the proper cables and connect the wires to the tightening torque requirements.
 - Overheating or fire could be occur.
- ※ Product installation and maintenance: leave it to a professional qualified.
 - Malfunctions and accidents caused by incorrect installation.

15-2 Warranty & After-service (A/S)

The range of warranty

- In case of troubles that occurs within warranty period with a status that using and managing the product that you bought normally as the specifications of the operational manual that we have given, if it is found that it is because of quality of each component or faults of producing process by technical analysis, we repair those products without compensation.

Warranty period

- One of these, for 18 months from the produced day, or for a year from the bought day, that comes first is considered to an expiration of warranty period.

Exceptions of warranty

- We do not warranty it if it is applied one of these exceptions even though within warranty period.
 1. Breakdown from random modification.
 2. Damage from excessive driving or mistakes from users.
 3. Using product with extra usages from normal.
 4. Product that is damaged its product number.
 5. Consumables such as fuse, etc.
 6. Troubles from improper choice.
 7. Putting on too much voltage out of range or breakdowns from lightening or flood, etc.
 8. Breakdowns from natural disasters.
 9. Non-operation expenses except applied components and wages when warranty repairing.
i.e., expenses such as transportation, staying, stoppage loss or taxes and the public utilities' charge.

Appendix

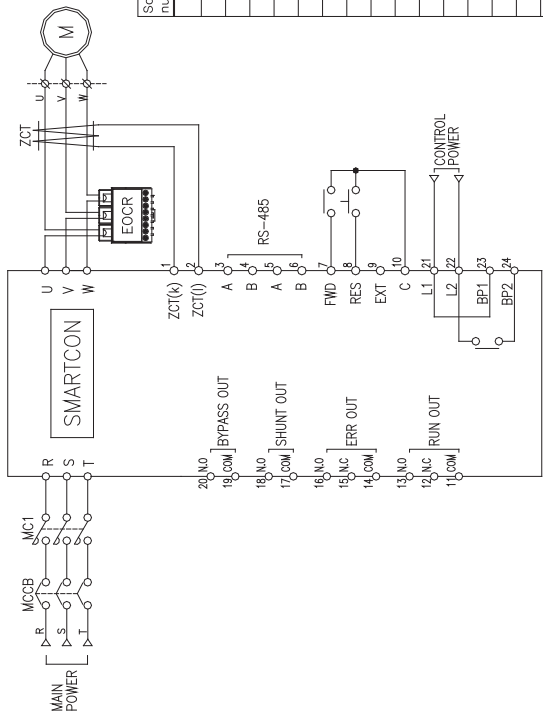
[Detailed Connection Diagram]

SMARTCON One-way

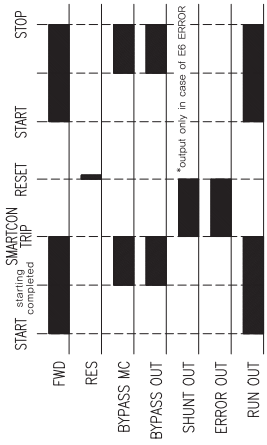
SMARTCON One-way	310	Appendix A-1
SMARTCON One-way – BPS MC not include	311	Appendix A-2
SMARTCON One-way – BPS MC Outside-attached	312	Appendix A-3

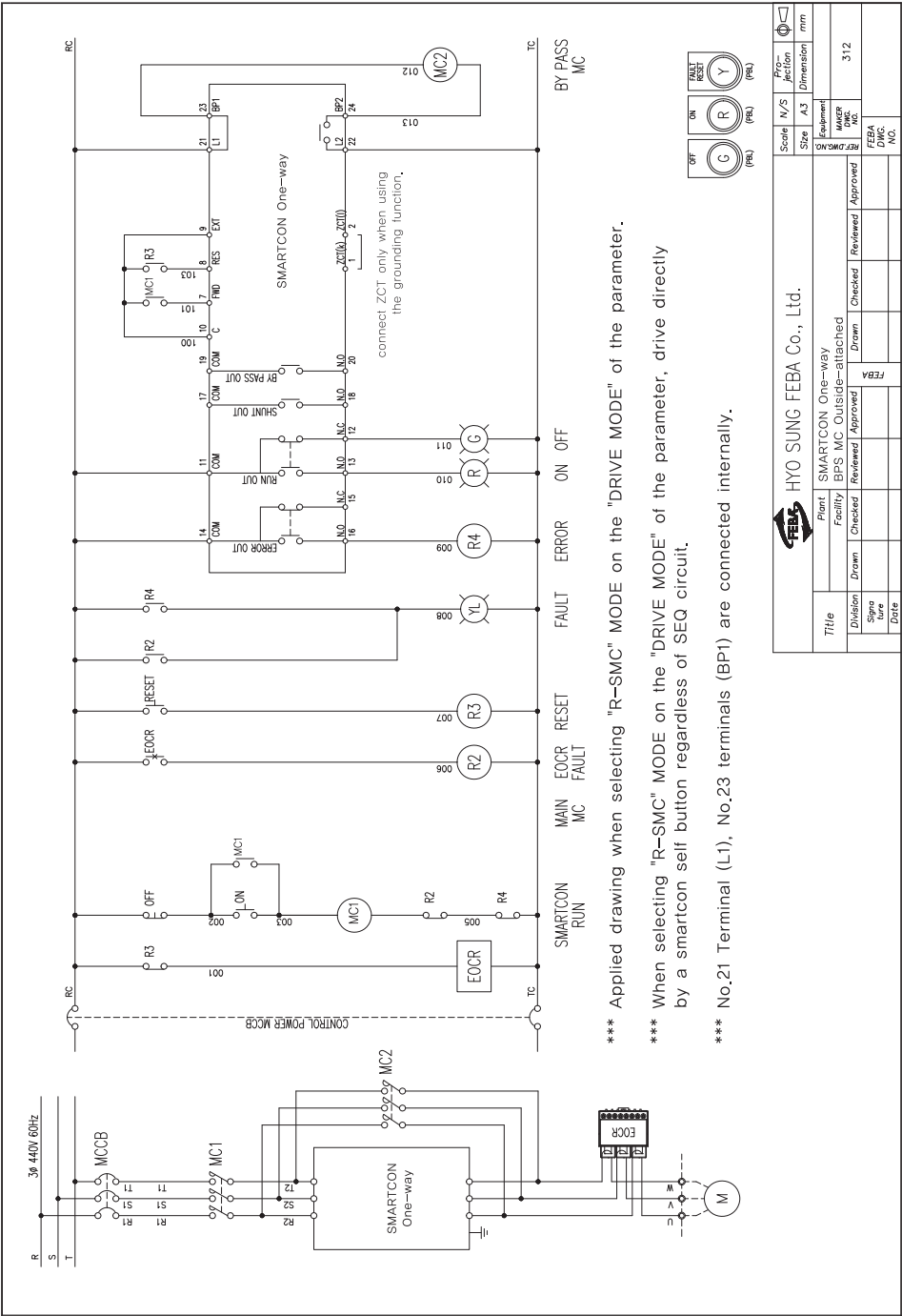
SMARTCON BY-PASS Embedded Type

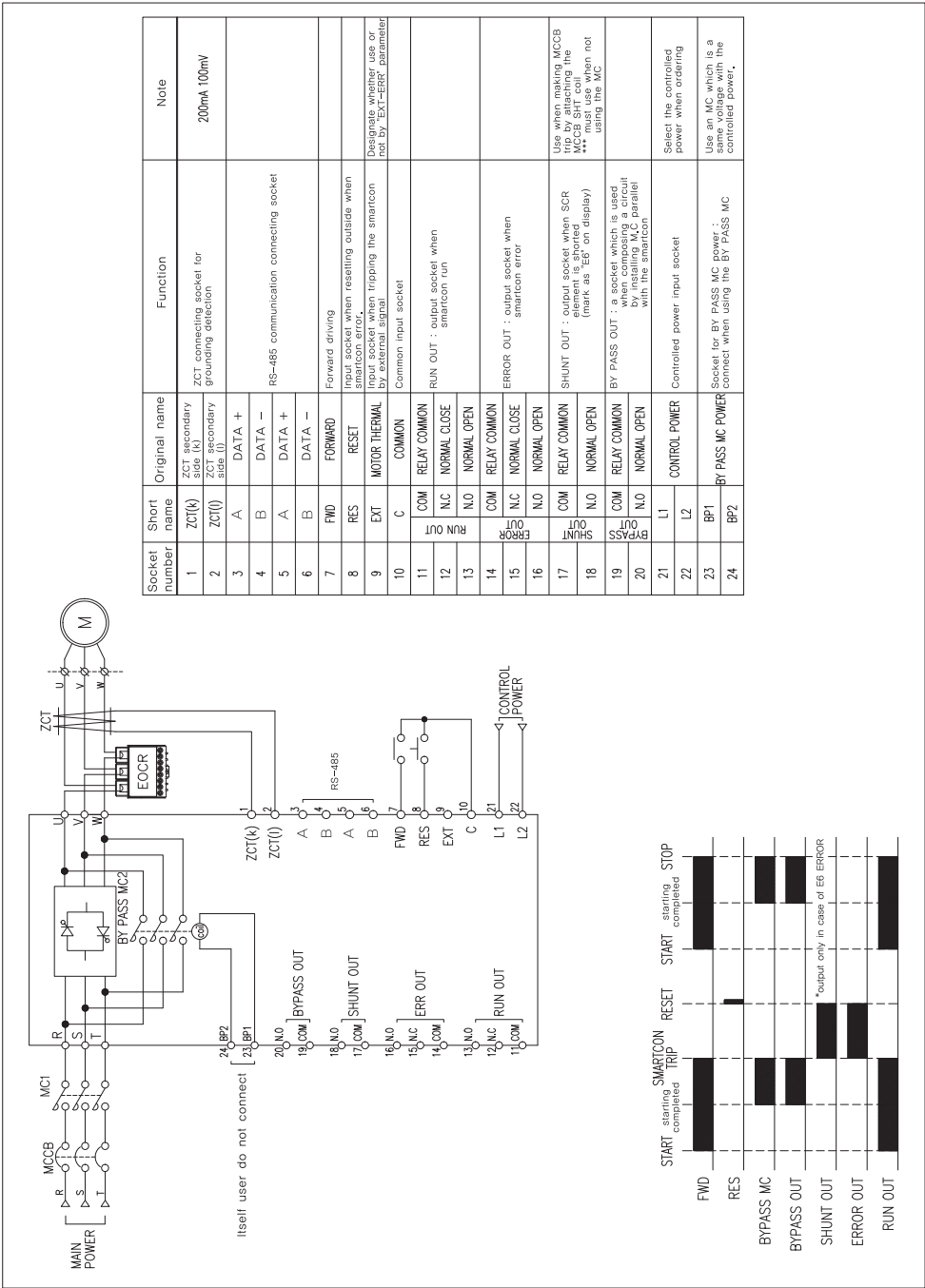
SMARTCON BY-PASS Embedded type	330	Appendix B-1
SMARTCON BY-PASS Embedded type – One-way	331	Appendix B-2
SMARTCON BY-PASS Embedded type – Two-way	332	Appendix B-3

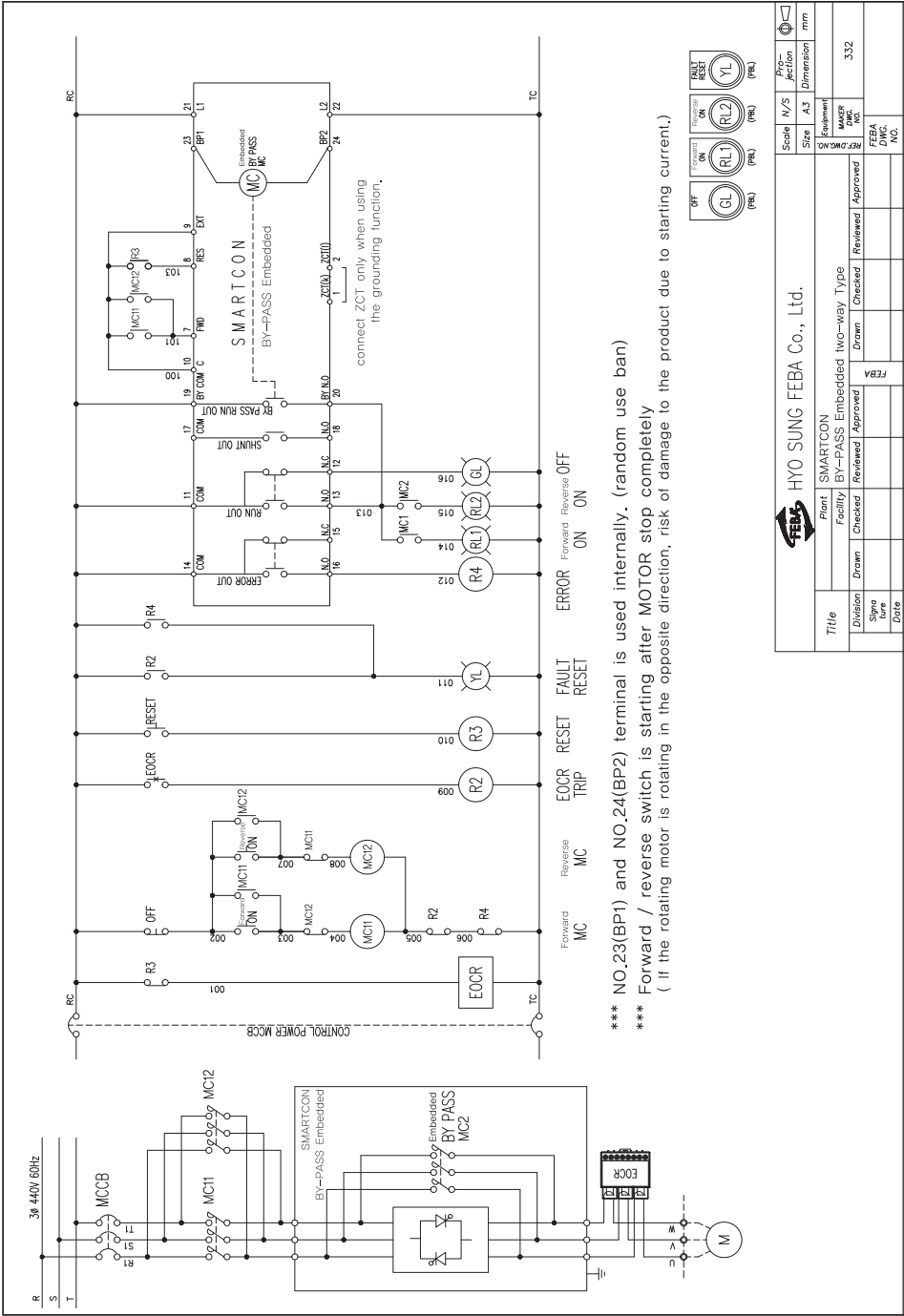


Socket number	Short name	Original name	Function	Note
1	ZC1(A)	ZC1 secondary side (A)	ZC1 connecting socket for grounding detection	20mA 100mV
2	ZC1(O)	ZC1 secondary side (I)		
3	A	DATA +		
4	B	DATA -		
5	A	DATA +		
6	B	DATA -		
7	FWD	FORWARD	Forward driving	
8	RES	RESET	Input socket when resetting outside when smartcon error	
9	EXT	MOTOR THERMAL	Input socket when tripping the smartcon by external signal	Designate whether use or not by EXT=EXT parameter
10	C	COMMON	Common input socket	
11	COM RUN OUT	COM RELAY COMMON		
12	N.C	NORMAL CLOSE	RUN OUT : output socket when smartcon run	
13	N.O	NORMAL OPEN		
14	COM ERROR OUT	COM RELAY COMMON		
15	N.C	NORMAL CLOSE	ERROR OUT : output socket when smartcon error	
16	N.O	NORMAL OPEN		
17	COM SHUNT OUT	COM RELAY COMMON		
18	N.O	NORMAL OPEN	SHUNT OUT : output socket when SCR trip by attaching the *** must use when not using the MC	Use when making MCCB trip by attaching the *** must use when not using the MC
19	COM BYPASS OUT	COM RELAY COMMON		
20	N.O	NORMAL OPEN	BY PASS OUT : a socket which is used when connecting with the smartcon by installing M.G parallel	
21	L1		Controlled power input socket	Select the controlled power when ordering
22	L2			
23	BP1		Socket for BY PASS MC power : connect when using the BY PASS MC	Use an MC which is a same voltage with the controlled power.
24	BP2			









HYO SUNG FEBA Co., Ltd.		Scale	N/S	Pro- jection	mm
Plant		Size	A3	Dimension	
Facility		Implementation	3	Image	332
Title		BY-PASS Embedded Two-way Type			
Division	Drawn	Checked	Reviewed	Approved	
	Shiga	Shiga	Shiga	Shiga	
Date					

MEMO



SMARTCON operational manual revision records

Version	Revision date	Revisions
FDS③_EM-G4-01	2017.04.17	First edition completed
FDS③_EM-G7-02	2017.07.14	Fix 300 kW BPS External Dimension
FDS③_EM-H2-03	2018.02.28	Add FDS③-2150BPS
FDS③_EM-H4-04	2018.04.10	Error correction of external dimension table
FDS③_EM-HB-05	2018.11.09	Modify a name form
FDS③_EM-A4-06	2020.04.28	Modifying motion characteristics
FDS③_EM-B8-07	2021.08.31	Add parameter
FDS③_EM-C4-08	2022.04.06	Modify parameter input range

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