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IMC-III

Intelligent Motor Controller

LS ELECTRIC

Digital motor protection control device is suited for multiple motor starting method with a single model

IMC-III

Intelligent Motor Controller

- 1 model can be used on various motor start methods
- Wide range of protection functions
- Variety of remote surveillance control functions according to the sequence structure

Contents

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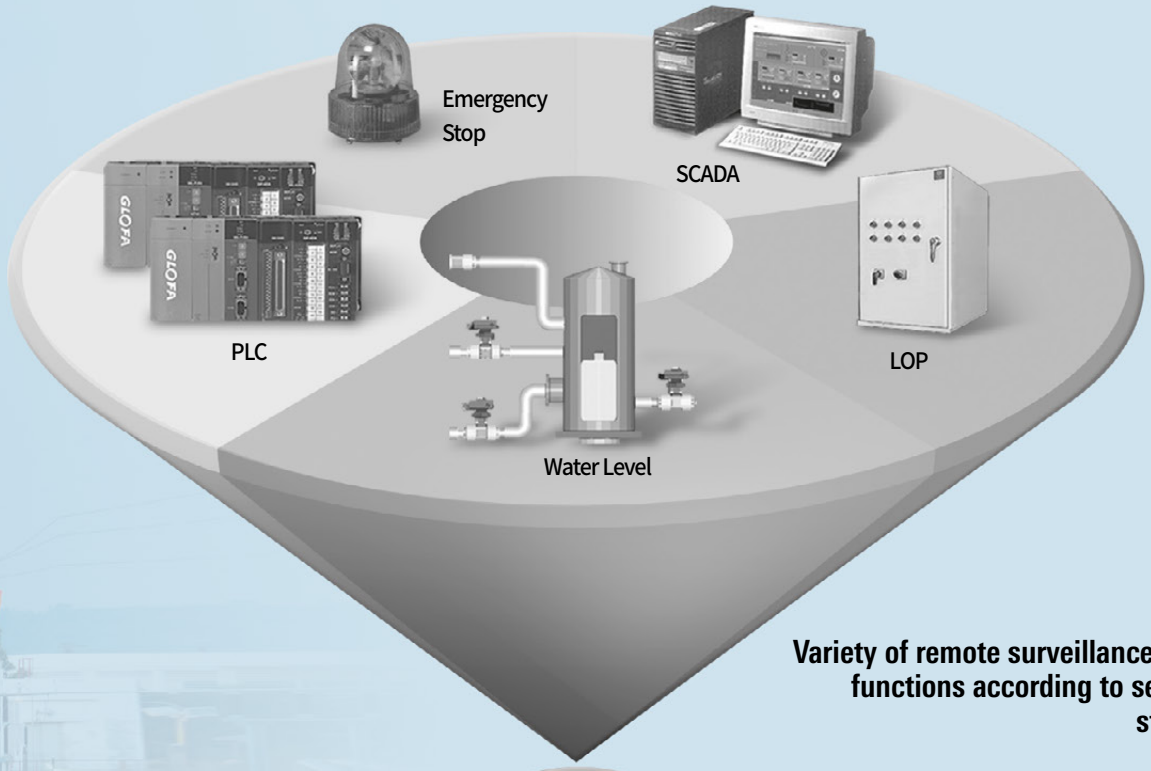
Intelligent Motor Controller

1 model can be used on various motor starting methods

1 IMC-III model can be applied on direct input drive, Y-△ drive, reversible drive, reactor drive, inverter drive and S/V drive, and it is also easy to respond to sequence changes.

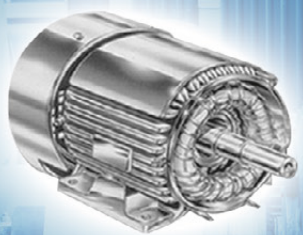
Wide range of protection functions

Overcurrent, undercurrent, open phase, reverse phase, unbalance, stall/lock, ground fault protection and alarm functions protect the motor safely.



Variety of remote surveillance control functions according to sequence structure

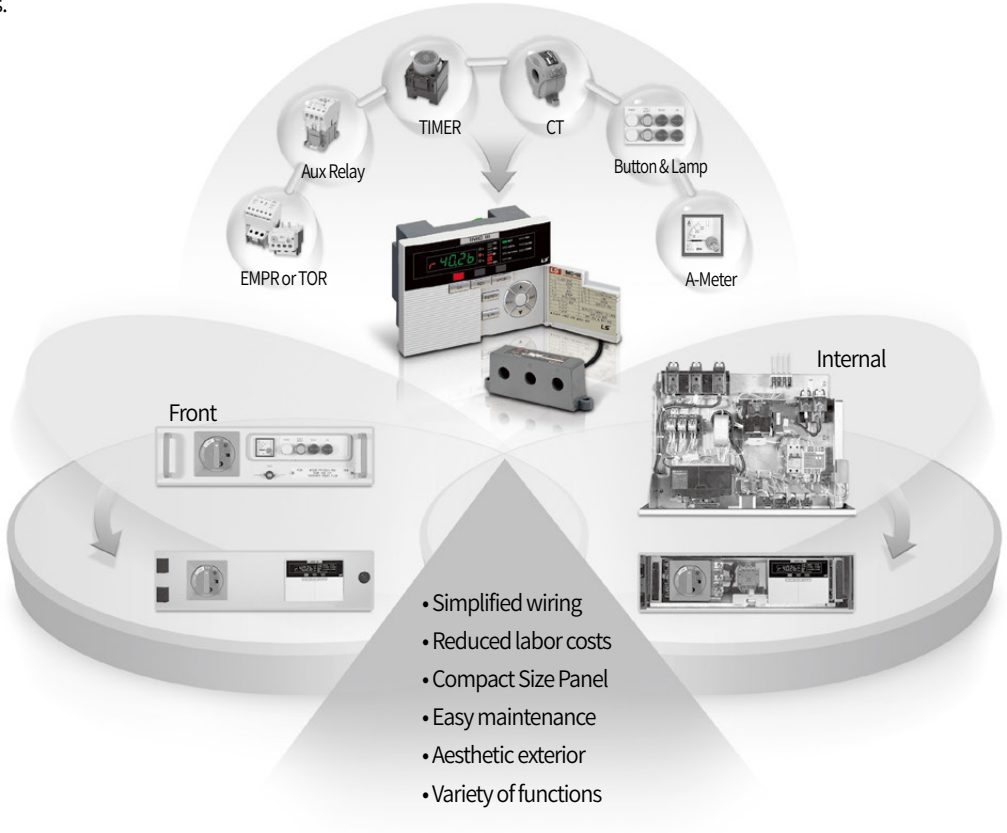
Simple sequence structures can not only enable local operation (LOP) and MCC control, but this also enables remote surveillance control using PLC or DCS-based auto operation and auto-operation and communication according to level changes.



Product characteristics

Ease of Use and Installation

By separating the main body with MCT and inserting it in the front panel, it allows the user to check various fault causes/fault current value as well as operating the motor, and it also allows current/operation time and various functions to be set with simple button controls without taking out the MCC unit. Furthermore, minimized installation space and simplified wiring creates a compact MCC unit and achieves easy maintenance and reduced labor costs.

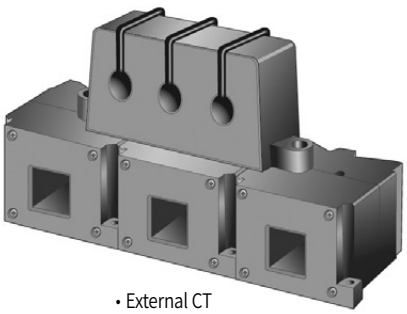


Available on Inverter Circuits

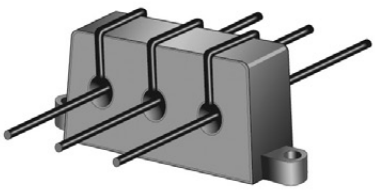
Due to the outstanding current detection capabilities according to frequency change, the system can be used on secondary circuits of inverters.
The operable frequency range is 20~200Hz, and for details of other specifications, please contact the manufacturer.
However, ground fault protection function is only available at 50/60Hz, so if the ground fault protection function is enabled, it cannot be used with an inverter.
If the start frequency is 20Hz, the system may malfunction.

Wide Current Adjustment Range: 1 model is capable of covering 0.125-1000A

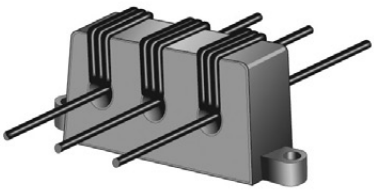
Adjust the Dip S/W to modify the current adjustment range from 0.5-6A to 5-60A, and depending on the MCT wire penetration count, the current can be adjusted up to 0.125A. If a separate external CT is used, it can be adjusted up to 1000A.



• External CT



• 2times(0.25 ~ 3A)



• 4 times(0.125 ~ 1.5A)

* External CT: Refer to supplementary devices (sold separately)
* MCT: Molded Current Transformer(must be purchased separately)

The moment stopping of power supply compensation and Restart

- **The moment stopping of power supply compensation**
  - Line current reduces under 65% of rated voltage.
  - When the moment stopping of power supply within 10S, IMC-IIIa makes it restart same as before condition.
- **Restart delayed time(0 ~ 300S)**
  - When the line voltage recovers over 75% rated voltage, it can be restarted.
  - when it restarted, IMC-IIIa makes it sequence restart 0~300s for prohibition overload.
  - Indication of Restart delayed time countdown.
- **Operating condition and maintain operation mode**
  - It can be maintained before the moment stopping power supply condition(Local, MCC, Auto, Remote)

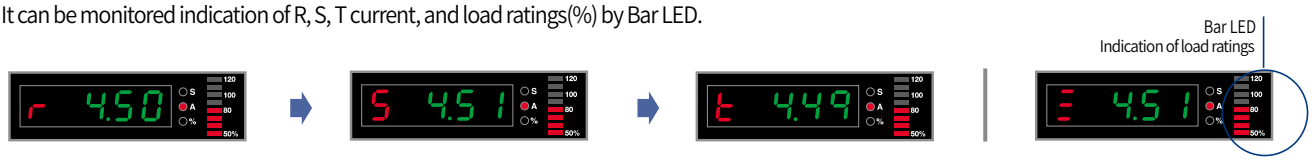
Ex) Incase of restarting delayed time 30S

Information

- It can be changed operation mode (ON, OFF) and count time during countdown
- Changed operation mode can be applied after finishing count.
- When the short stopping power supply generates under 100ms, IMC-IIIa dose not detect, so the motor will maintain normal condition

Digital Ampere-Meter

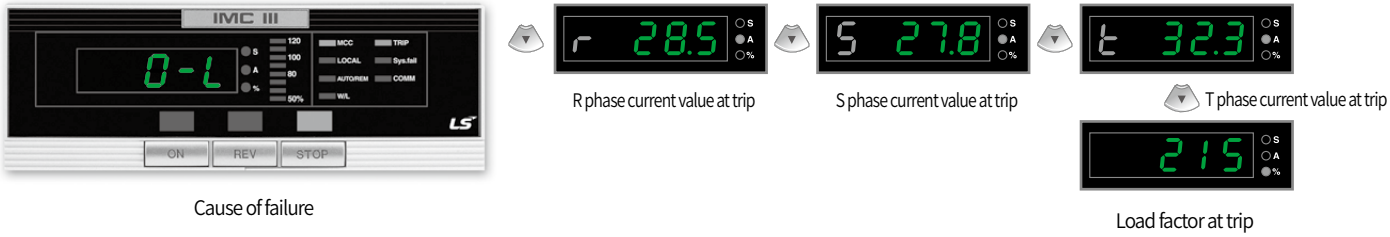
It can be monitored indication of R, S, T current, and load ratings(%) by Bar LED.



R-phase S-phase T-phase Max current

Fault analysis and Recording

It can be indicated fault cause and fault current value by 7-segment and LED.
At the moment of instantaneous stopping of power supply, it can solve the problem. Because of the fault storage.



Cause of failure

R phase current value at trip

S phase current value at trip

T phase current value at trip

Load factor at trip

Self-supervision and contactor failure function

IMC-IIIa can be checked self-supervision like a memory fault. When the motor starts/stops, that indicates Error.No and turn on Sys.Fail LED by supervising Input/output condition.

Total operation time setting and storage

The total time the motor has been operated is stored for up to 10 years, so it is easy to manage the motor by checking the total operation time of the motor, Continuous operation time can be stored and set for up to one year (8760 hours) without stopping, and the contact output and "OrH" are displayed when the set operation time has elapsed It can be conveniently used for maintenance such as replacing the bearing of the motor and oiling cycle.

Information

When the user contact mode is normal mode, even if indicating “OrH Alarm, motor operates in normal condition

Communication function

It’s possible to communicate with other system and organize various communication Network by MODBUS/RS-485. And it’s also possible to communicate with system by Analog current signal(4 ~ 20mA). So that makes it possible to interchange by using TD(Transducer).

- **4 ~ 20mA output**

0.5 ~ 6A TYPE		External current transformer (Secondary Current)		5 ~ 60A TYPE	
Under 0.35A	Over 6A	Under 0.35A	Over 5A	Under 3.5A	Over 60A
4mA	20mA	4mA	20mA	4mA	20mA

Product characteristics

Motor protection

Type		Operating condition	Operating Time	Remark
Over current	Inverse	Over 110% setting current	1 ~ 60s/1s	600% standard operating time
	Definite	Over 105% setting current	1 ~ 60s/1s	Delay time 1 ~ 200s
Phase fault		Over 70% current phase unbalance	Within 1.5s	Phase fault rate = $\frac{\text{Maximum Phase Current - Minimum Phase Current}}{\text{Maximum Phase Current}} \times 100(\%)$
Phase unbalance		Current phase unbalance 30 ~ 50%	Within 5s	
Reverse phase		Reverse the current phase	Within 0.1s	Over 110% minimum ratings
Under current		Rating current 30 ~ 70%	Within 3s	
Holding	Stall	Rating current 150 ~ 300%	Within 5s	Detection after over current setting time
	Lock	Rating current 200 ~ 700%	Within 0.5s	
Ground fault		The current rating 0.1 ~ 2.5A setting	0.05 ~ 1.0s setting	Ground fault delay operation
Pre-Alarm		Over 120% setting value		Bar-LED blinking

Sequence function

Type			Contents	Remark
Operating type	Direct operation		Non-reversible direct operation	
	Y-Δ operation	Y operation time	1 ~ 120sec / 1sec	
		Y-Δ switching time	0.05, 0.1, 0.2sec	
	Forward / Reverse operating		Reversible direct operation	
	Reactor	Reactor time	1 ~ 120sec / 1sec	
	Inverter	Inverter delayed time	0 ~ 1sec / 0.1sec	
Instantaneous power failure compensation	Compensation time		OFF, 1 ~ 20sec / 1sec	
	Re-operation delay time		0 ~ 300sec / 1sec	
	Under voltage detection		(Rating control voltage × 65%) ± 10%	
	Recovering voltage detection		(Rating control voltage × 75%) ± 10%	
	I / O Guaranteed Voltage		(Rating control voltage × 60%) ±10%	
User contact mode	Normal (nor)		Normal Mode	
	Time Delay (t-d)	ON Delay Timer	0 ~ 300sec / 1sec	MC-IIIa exclusion
		OFF Delay Timer		
	Flow Switch (F-S)	ON Delay Timer (T3)	0 ~ 300sec / 1sec	Compare Timer › ON Delay Timer MC-IIIa exclusion
		OFF Delay Timer (T1)		
		Compare Timer Timer (T2)		
Remote control	Local		LOP(Local Operation Panel)	
	MCC		Motor Control Center(IMC-III)	
	Auto		PLC, DDC, DCS auto operation	
	W/L		Water Level	
	Remote		Modbus/RS485 communication	
	Emergency Stop		External Trip 1, 2	IMC-IIIa exclusion

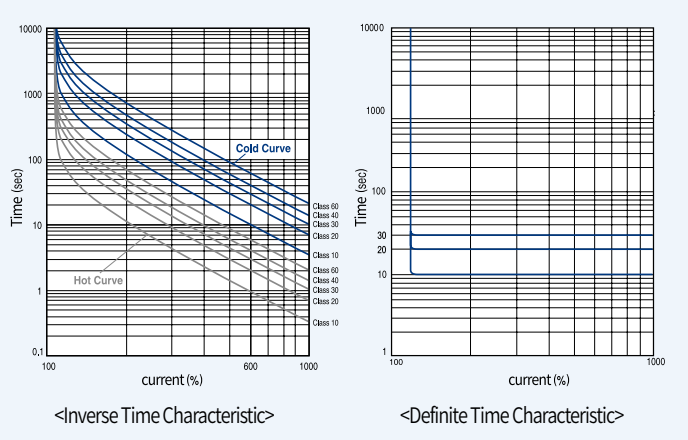
Communication function

Type	Contents	Specification	Remark
MODBUS / RS485	Protocol	MODBUS_RTU	
	Communication	RS485	
	Operation	Differential	
	Baud rate	9600, 19200, 38400bps	
	Length	Max 1.2km	Different from local situation
	Cable	RS-485 Shielded twist 2-pair cable	
	Transmission	Half-Duplex	
	Max in/Output voltage	-7V ~ +12V	

Protection function

- **Overload protection (Overload-49)**

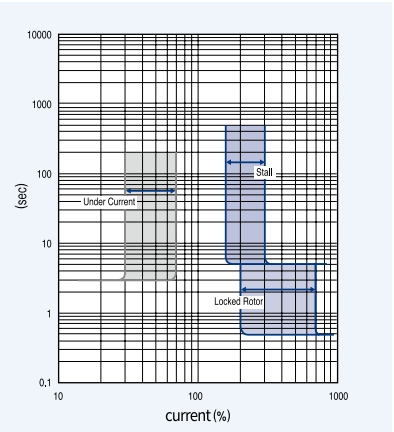
Overload protection function of IMC-III detects currents flowing in a motor and tracks the thermal capacity of the motor to protect the motor from overheating. If 100% of the thermal capacity is reached, an overload trip occurs, and the thermal capacity is then calculated based upon the selected overload characteristic curve and accumulated I2t value. By setting the rated current of the motor and considering the motor start time, with 600% of the set current as reference, 1-60 seconds are set as operation time in 1sec units to determine an overload characteristic curve of Class1-Class60. If definite time characteristic is selected, overcurrent is detected after the operation delay time (D-Time) regardless of the motor's thermal capacity and if overcurrent continues to be applied beyond the operation time (O-Time), a power trip occurs.



<Inverse Time Characteristic> <Definite Time Characteristic>

- **Stall/Locked rotor protection (Stall/Locked Rotor-48/51LR)**

Equipment such as pumps or fans can be easily damaged if fault occurs due to which the rotor locking occurs. IMC-III prevents rotor locking or failure or constant supply of large starting current due to operation delay, and it also features blocking the circuit by detecting drastic increase in load current due to overheating or overload during start, or detecting motor torque exceeding load torques. It ensures that delay time is set so the functions do not trip due to operation current during motor operation.



- **Under Current protection (Under Current-37)**

It is commonly used to prevent motor overheating by performing surveillance on unload status due to the motor drive shaft dislocation or damage, pump's continued idle (unload) status, or overheating due to coolant or fan-based cooling damage. It can be set at 30-70% of the rated current, and it operates within 3 seconds.

- **Phase failure/ Unbalance protection (Phase Fail/Phase Unbalance-47P)**

If open phase occurs due to internal faults of the motor or wiring issues, the motor cannot rotate or continues to rotate. In such case, large reverse phase current flows into the rotor of the motor causing overheating. IMC-III calculates the imbalance ratio of 3-phase current, operates as open phase at imbalance ratio of 70% or higher that trips within 1.5 seconds, and if the imbalance ratio is 30-50%, it operates as phase imbalance that trips within 5 seconds. If a single-phase motor is used, please set it as OFF because open phase and imbalance protection are impossible.

- **Reverse Phase protection (Reverse Phase)**

This function is to prevent the input current phase changing during motor start operation, in other words, reverse rotation. If the input 3-phase current changes its phase order when comparing the phase differences, the function operates within 0.1 seconds. However, reverse phase can be detected at 110% of the minimum set current of IMC-III, and it only checks reverse phases during motor operation. If a single-phase motor is used, please set it as OFF because open phase and unbalance protection are impossible.

- **Ground Fault protection (Ground Fault - 51G)**

This function is used to prevent secondary accidents (short circuit, electrocution) due to electrical shorting by detecting short circuit or short circuit current running in a motor. Depending on the protection system or protection purpose, the current sensitivity and operation time must be set differently. Ground fault current sensitivity can be set between 100 and 2500mA, and ground fault operation time can be set between 0.05 and 1.0 second. To detect the ground fault current, a separate ZCT (Zero phase Current Transformer) is used. However, during inverter start, ground fault protection is unavailable, so one needs to set the function OFF in such a case.

Product characteristics

Various Fault Cause, Display and Save Fault Value

With UP/DOWN[▲/▼] button, fault current values of each phase can be checked. and Fault Recording can be checked by pressing the [ESC+ENT] combination.

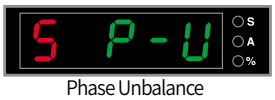
Overload

Under Current

Locked Rotor

Stall

Phase Loss



Phase Unbalance

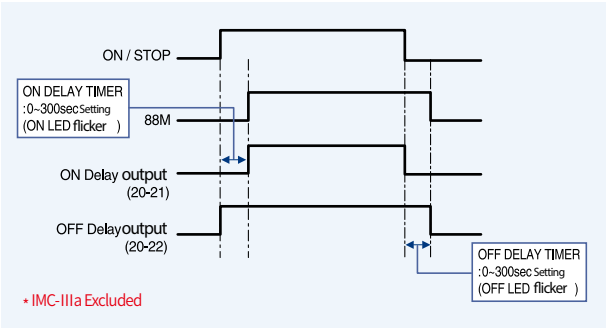
Reverse Phase

Ground Fault

If no F/S input is made within the set time,

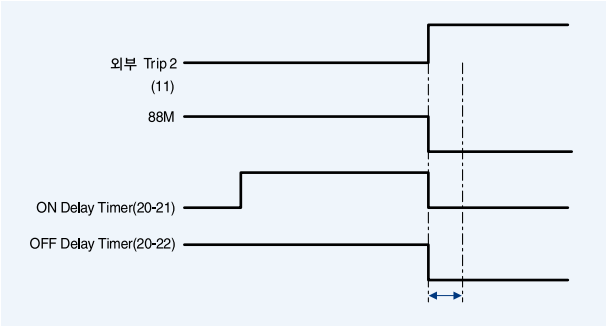
If set operation time is exceeded

Time Delay (t-d) Mode



1) Once ON Delay Time passes after ON control, 88M turns On and the motor starts.
2) Once OFF Delay Time passes after OFF control. 88M turns OFF and the motor stops.

External Trip Input



*External TRIP 1 (Terminal 10) is designed to suit FO/FC vale operation.
*External TRIP 2 (Terminal 11) executes trip and displays "Etrp" on the screen after receiving a signal. (Remove external TRIP 2 signal, reset to release, and resume normal operation)

Self-diagnostic function

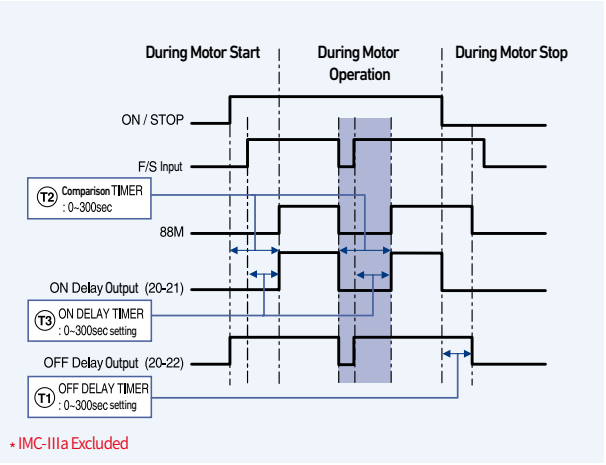
MC status after Output Contact OFF control If input contact is ON

MC status after Output Contact OFF control If input contact is ON

External contact inputs "FOR" and "REV" are made simultaneously

EEPROM Fault

Flow Switch (F-S) Mode



During Motor Start

1) After ON control, if the F/S (Flow Switch) input is made within the set comparison timer - On delay timer duration, the motor starts after ON Delay Time.
2) If F/S input is not provided, the ON execution is canceled, "t2-F" is displayed, and OFF continues.

During Motor Operation

1) If F/S input disappears during motor operation, 88M turns OFF and the motor stops.
2) Then, the comparison timing operates, and if F/S input is made within the comparison Time - On Delay Time duration, the motor restarts after ON Delay Time.
3) If F/S input is not made within the comparison Time - On Delay Time, "t2-F" is displayed, and OFF status continues.
4) If OFF control is made, 88M turns OFF after the predefined OFF Delay Time and the motor stops.

ex) Motor operates normally with T1 Timer: 1S, T2 Timer: 10S, T3 Timer: 5S setting After F/S input is turned OFF, the re-input must be made within 10S-5S=5S in order to resume motor operation without displaying "t2-F."

Note) Comparison Timer must be larger than the ON Delay Timer.

Rated specifications & model numbering system

Rated specifications

Type				IMC-III(a)
Operating time				Inverse time / Definite time
Current				0.125~60A (Within 1 model)
Indication				4 digit, 7-Segment
Control power				AC 110/220V (50/60Hz)
Return method	Auto			1~20min
	Manual			Return immediately
Installation				Panel purchase installation
Tolerance	Current			±5%
	Time			±5%
	4~20mA			±5%
Time setting	Inverse time			1~60sec/1s
	Definite time	D-Time		1~200sec/1s
		O-Time		1~60sec/1s
Output contact (9EA)	Capacity			5A/250VAC impedance load
	Composition	Operating contact	3a	Forward/Reverse, Y-Δ, Reactor, Inverter start
		Condition contact	3a	Local, Auto, W/L Status display (W/L: IMC-IIIa exclusion)
		Timer contact	2a	ON Delay, OFF Delay (IMC-IIIa exclusion)
		Trip contact	1a	Fault output
Input contact (9EA)	Operating input		5a	Local, Auto, Water Level, Flow Switch Operation input (Flow Switch: IMC-IIIa exclusion)
	MC condition input		1a	Sequence status monitoring (LED lights up)
	External trip		2a	Utilize sequences such as emergency stop
ZCT	Ratings			200mA/0.1mA (ZCT)
	Specification			ø25, ø40, ø80
Service environment	Service temperature			-10°C ~ 55°C
	Storage temperature			-20°C ~ 70°C
	Relative humidity			within 80% RH, no condensation
Insulation Resistance				DC 500V 10MΩ more
Lightning impulse voltage				1.2×50μs 5kV Standard waveform application
Fast Transient				2kV/1Min
Power Consumption				6W or less

Model numbering System

IMC - III [a] [NO] [2M] [AC 110V] [50/60Hz]

Function	
-	Option
a	Standard

Communication	
NO	Normal (No communication)
M485	MODBUS/RS485
A420	Analog 4~20mA

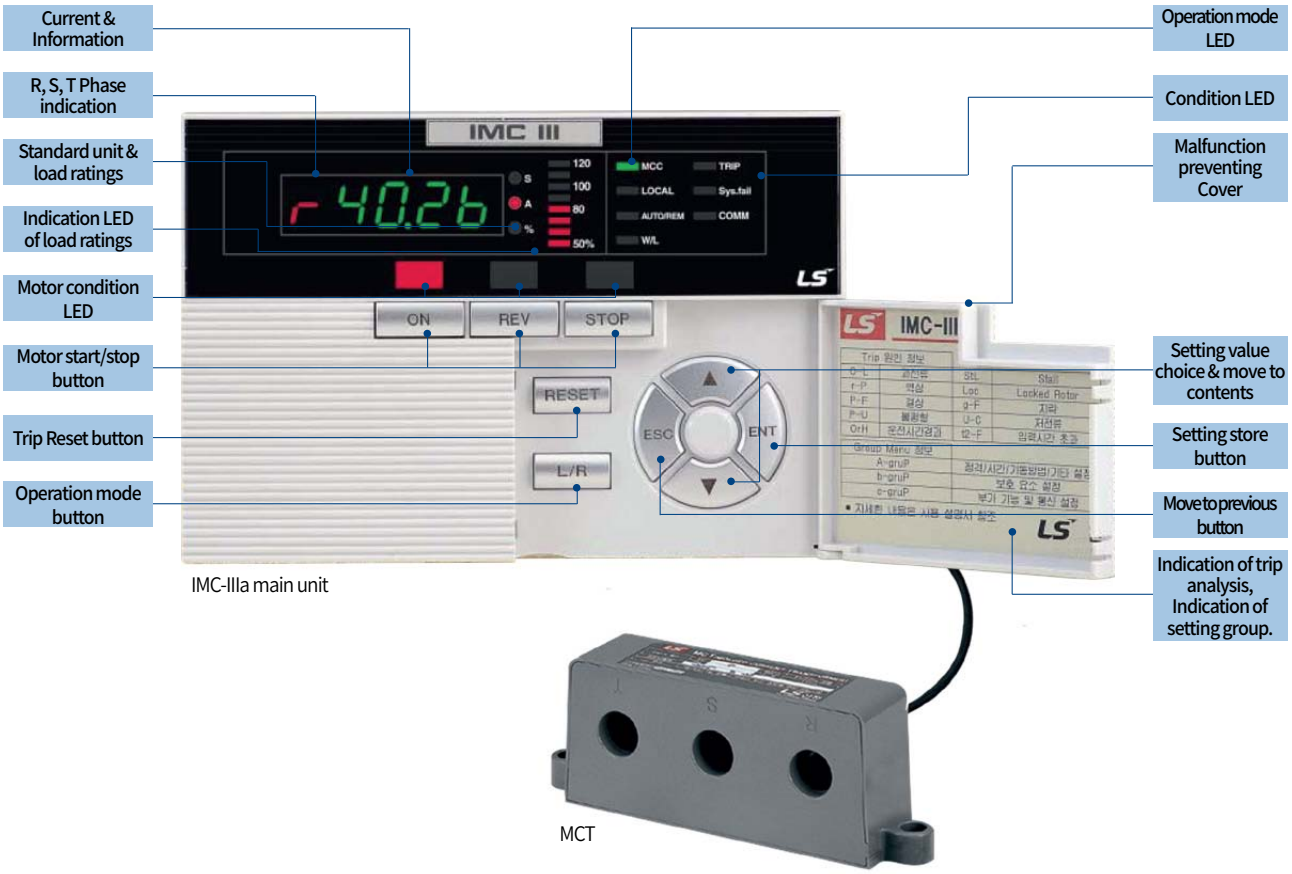
MCT Cable Length	
2M	2m
4M	4m

Control Power
AC 110V
AC 220V

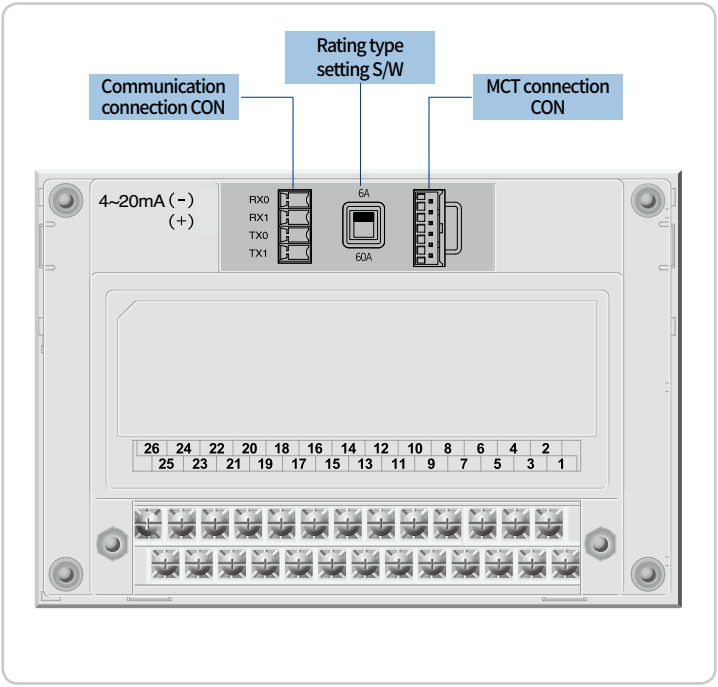
Frequency
50/60Hz

Operation & setting method

Display configuration



Rear view



Setting method

① The first stage will be indicated maximum current in znormal condition

② When the UP/DOWN(▲/▼) button is pushed, A, B, C group is indicated.

③ When user push the ENT button after selecting group, it move to the detail setting contents.

④ After selecting contents by pushing UP/DOWN(▲/▼) button, if user push the ENT button, the setting value will be stored.

⑤ When UP/DOWN(▲/▼) button is pushed, the setting value will change, so that after selecting contents, if you push the ENT button , setting value will be stored.

⑥ After setting, if user push the ESC button, IMC-IIIa will be returned normal operating condition.

⑦ Set the other setting items in the same way.

⑧ Press the RESET button during the setting to return to normal operation mode.

Note) 1. Pls note that setting value can be changed during motor operation.
2. If user did not operate for 10S , Setting value and group setting contents will returned to current indication mode automatically.

Group	No.	Setting	Indication	Setting value	Default value	Remark
A. grp Basic setting	1	Operating Characterist (Over current protection)	A. 1.CHA	Inu/dEF	Inu	Inverse/Definite time selection
	2	Operating time (Over current protection)	A. 2.0-t	1 ~ 60/1s	60	In case of definite time, motor operating time
	3	Operating delayed time (Over current protection)	A. 3.d-t	1 ~ 200/1s	200	
	4	Setting of rated current	A. 4.r-C	0.5 ~ 6/0.1(A), 5 ~ 60/1(A)	6/60	6/60A selection
	5	CT ratio	A. 5.Ctr	0.25, 0.5, 1 ~ 200/1	1	Impossible to set in case of selection 60A
	6	Start type selection	A. 6.dru	dir/y-d/F-r/Ind/Iut	dir	Direct, Y-Δ. Reactor, Inverter start
	7	Y operation time	A. 7.d-t	1 ~ 120/1	5 (Inverter start: 0)	Reactor start time Inverter start delayed time(0 ~ 1s)
	8	Y-D switching time	A. 8.ydt	0.05, 0.1, 0.2 (s)	0.2	
	9	Short time power off compensation time	A. 9.S-t	OFF, 1 ~ 20/1s	OFF	
	10	Re-start time	A. 10.Sd	0 ~ 300/1s	-	9. It can be indicated only in case of short time power stop compensation time
B. grp Protection function	1	Lock protection	b. 1.Loc	OFF, 200 ~ 700/100 (%)	OFF	
	2	Stall protection	b. 2.StL	OFF, 150, 200, 300 (%)	OFF	
	3	Phase-fault protection enabled	b. 3.P-F	OFF/On	On	
	4	Unbalance protection	b. 4.P-U	OFF, 30, 40, 50 (%)	OFF	
	5	Reverse phase protection	b. 5.r-P	OFF/On	OFF	Only during operation
	6	Under current protection	b. 6.U-C	OFF, 30 ~ 70/5 (%)	OFF	
	7	Ground fault protection	b. 7.9-F	OFF/On	OFF	OFF setting in case of inverter start
	8	Ground fault operation current	b. 8.9-C	0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5 (A)	0.1	7. Indication by ground fault protection seleection
	9	Ground fault operation time	b. 9.9-t	0.05, 0.1 ~ 1.0/0.1s	0.05	
	10	Ground fault delay	b. 10.9d	OFF/On	OFF	
C. grp Additional function	1	I/O state information	C. 1.I-O	4-segment		Notify the manual
	2	Total operation time	C. 2.trt	Total operation time checking	Time check, Setting disabled	Day → hour, min (Max.1year : 8760 hour)
	3	Operation time	C. 3.r-t	Operation time checking	Time check, Setting disabled	Operation time →Day → Hour, min (Max.1year : 8760 hour)
	4	Operation time setting	C. 4.Srt	OFF, 10 ~ 8760/10 (H)	OFF	After reached setting operation time, indicating "OrH"
	5	Contactor check	C. 5.CCh	OFF/On	On	MC condition input check (OFF→not indicated Err1,2)
	6	User contact mode	C. 6.n-F	nor/t-d/F-S	nor	Normal/Time delay/Flow switch
	7	ON Delay Timer	C. 7.tOn	0 ~ 300s/1s	0	Can be set when t-d or F-S mode is selected
	8	OFF Delay Timer	C. 8.tOF	0 ~ 300s/1s	0	
	9	comparison Timer	C. 9.t-C	0 ~ 300s/1s	0	Can be set when selecting F-S mode comparison Timer > ON Delay Timer
	10	Auto- returning	C. 10.Ar	OFF, 1 ~ 20min/1min	OFF	
	11	Communication address	C. 11.Ad	1 ~ 255	1	Only indication of communication model
	12	Communication Spped	C. 12.bS	96, 192, 384	96	bps (×100)
	13	SWAP	C. 13.SP	OFF/On	On	Floating data frame reverse (3, 4, 1, 2) selection

*Changing 6. Start Setting of A.grp basic settings, and 6. User Contact Mode of C.grp additional functions during motor operation can cause motor malfunctioning, so do not change their settings.
*If 10. Ground Fault Delay Function of B.grp protection function is set as ON, ground fault is detected after O-t in case of inverse time and d-t in case of definite time
*Menus 6-9 of C.grp additional functions are not displayed on IMC-IIIa.
*Some menus are not displayed according to their specific function settings (refer to remarks).

Operation & setting method

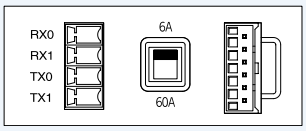
Rated current setting

1) IMC-IIIa rated current can be selected 6A(0.5 ~ 6A), 60A(5 ~ 60A)

① Protective operation is possible only above the minimum rated current.
(6A Tap is 0.5A or less, 60A Tap is 5A or less)

② Be sure to operate within the rated range because the current may be displayed incorrectly or the protection may be malfunctioning.

③ When changing the adjustment software, be sure to turn off the power.



Note) Don't change the switch during the operation.

2) To select the rated current.

① User has to switch the IMC-IIIa power OFF → ON

② User has to switch the IMC-IIIa ON → OFF

③ Turn on the IMC-III control

④ Move to [4.r-C] item in setting group A and set the detailed rated current.

- After finishing motor starting, set the 110~115% of real load current in the load operation condition.

• Load under 0.5A
- Set the CT ratio 0.5 or 0.25 in the [6.ctr]
- MCT cable penetration increase from 2 times to 4 times
- Rated current setting range : 0.25 ~ 3A(2 times), 0.125 ~ 1.5A (4 times)

• Over 60A load
- Usage of external CT
- CT ratio (1 ~ 200) : Maximum 1000A

Operating time setting

1) It can be set 1 ~ 60s in the A group in [2.O-t]

① In case of selecting inverse time in the [1.CHA]
- Setting operation time is 600% standard of rated current

② In case of selecting the definite time
- The standard is over 105% of rated current.
- User has to set the operation delayed time 1 ~ 200s In the [3.d-t] considering motor operating time.

Special function key

- **Turn the heating capacity into clear and return by force**

IMC-IIIa inverse time protects overload fault by sensing the applied current on the motor, trace heating condition of motor. Motor has heating capacity until completed cold status even if . motor stopped. IMC-IIIa accumulates heating capacity values similar with motor.

In case of continuous re-start, or generating the trip, it can be tripped by acknowledgement Hot curve through the cumulated heating capacity.

Information

If user want to re-start even if damaged to motor, push the STOP + RESET button. in conclusion, cumulative heating capacity remove and can be reset.

- **Fault Recording**

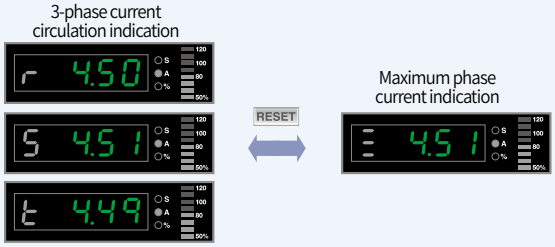
IMC-IIIa provides fault recording function even if power is OFF.

If user push the ESC + ENT button, user can check the Fault analysis and fault current value. If user push the RESET button, fault analysis and fault recording will be deleted.

If there is no string data, it will be indicated "non" And then if user push the ESC + ENT button, it will come back to normal mode.

- **Transfer to current indication mode.**

If user push the RESET button for 2 seconds, it will come back to current indication mode.



Note) If user push the RESET button for over 10s, IMC-IIIa will come back first manufacturing status. At this time, user has to know that setting and storing value is deleted and comes back first manufacturing status.

Total operation time

- Total operation time check: 2.tr t → ENT → day → ▼ → Hour minute

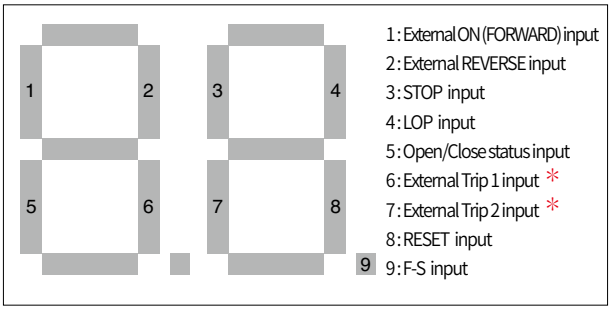
  ex) If total operation time is 50hours 50 minutes: 2.tr t → ENT → 2 days → ▼ → 2.50(2 hours 50 minutes)

- Operation time 3.r - t → ENT → Total operation time → ▼ → converse day → ▼ → Extra hour, minutes

  ex) If operation time is 50 hours 50minutes: 3.r - t → ENT → 5 0 hours → ▼ → 2days → ▼ → 2.50 (2 hours 50 minutes)

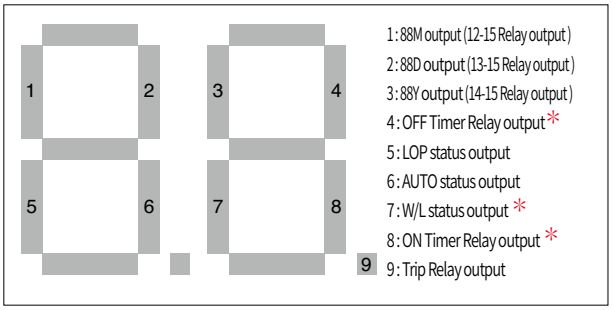
Refer to the following for I/O information:

- 1st and 2nd 7-segment are DI information which are as follows



- 3rd and 4th 7-segment are DO information which are as follows

  (#9 is trip relay output for which I/O information cannot be checked during trip status)



Note) Items with ✻ do not support IMC- II

Operation mode handling method

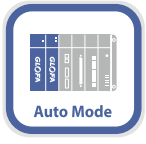
Operation priority: Local > MCC > Auto, W/L > Remote

Local Operation Panel mode

The local operation mode is the highest priority mode, When the emergency situation generates, it can control motor in the local site. Only in case of closing switch to the local site, motor can be controlled.
At that time, Local LED of IMC-IIIa is lighting on, can not be controlled in another modes.

Motor Control Center mode

This mode is possible to operate in the IMC-IIIa of MCC panel. If MCC LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa.
At this time, it can not be controlled by in AUTO.



Auto - PLC automatic operation mode

This mode can provides automatic operation and remote control by PLC, DDC, DCS.
If Auto/Rem LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa.
In such a case, controls from MCC, Auto and Remote are unavailable.

W/L- Water Level Auto Operation Mode

It is the mode that allows auto operation and remote control according to level change.
If W/L LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa. Like Auto mode, auto operations using PLC or DDC are also available.
In such a case, controls from MCC, Auto and Remote are unavailable.

*If LOP/Auto mode are used together, to differentiate inputs, the interlock circuit must be configured with status output contacts. (refer to Wiring Method)

*IMC-IIIa excluded

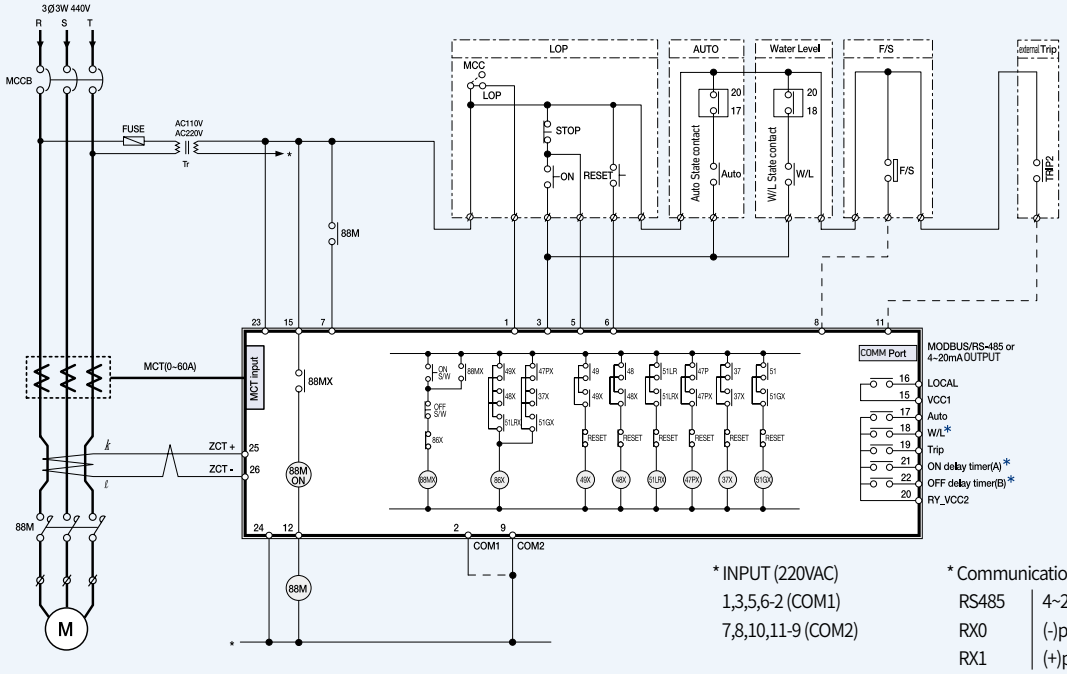
Remote - communication operation mode

This mode is for remote monitoring control by Modbus, RS-485.
If the Auto / Remote LED blinks by operating the L/R button of IMC-III, remote control by MODBUS / RS485 communication is possible, and data such as 3-phase current value, fault value, and various setting values can be checked.
In such a case, controls from MCC, Auto and Remote are unavailable.

• 4~20mA output model can check only current Value through the Analog communication(4~20mA)

Wiring & cable connection

Direct start sequence



* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

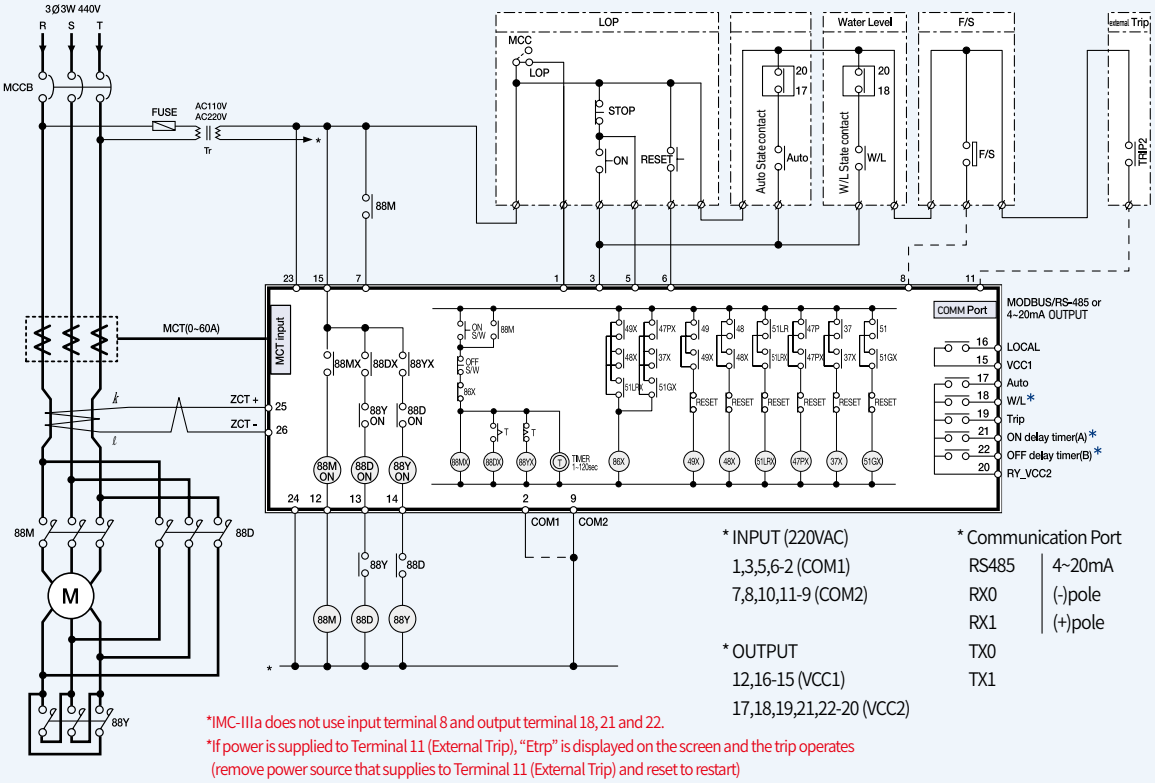
* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

*IMC-IIIa does not use input terminal 8 and output terminal 18, 21 and 22.
*If power is supplied to Terminal 11 (External Trip), "Etrp" is displayed on the screen and the trip operates (remove power source that supplies to Terminal 11 (External Trip) and reset to restart)

Y-△ start



* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

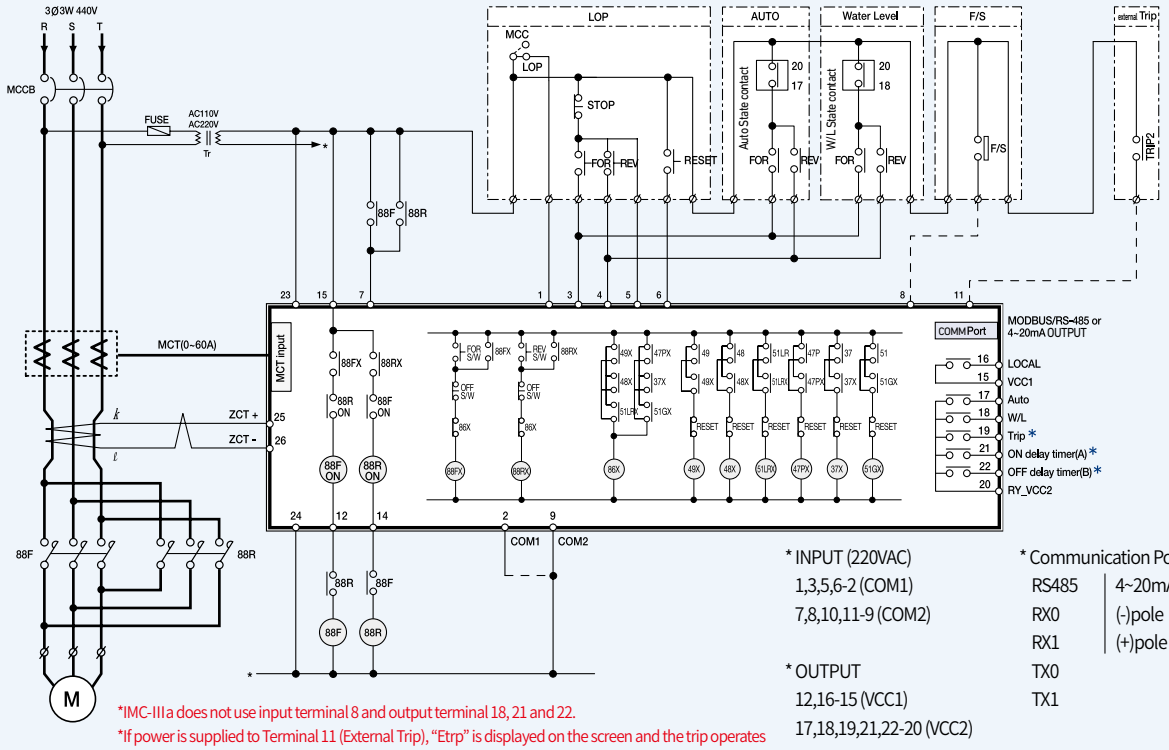
* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

*IMC-IIIa does not use input terminal 8 and output terminal 18, 21 and 22.
*If power is supplied to Terminal 11 (External Trip), "Etrp" is displayed on the screen and the trip operates (remove power source that supplies to Terminal 11 (External Trip) and reset to restart)

For/Rev start



* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

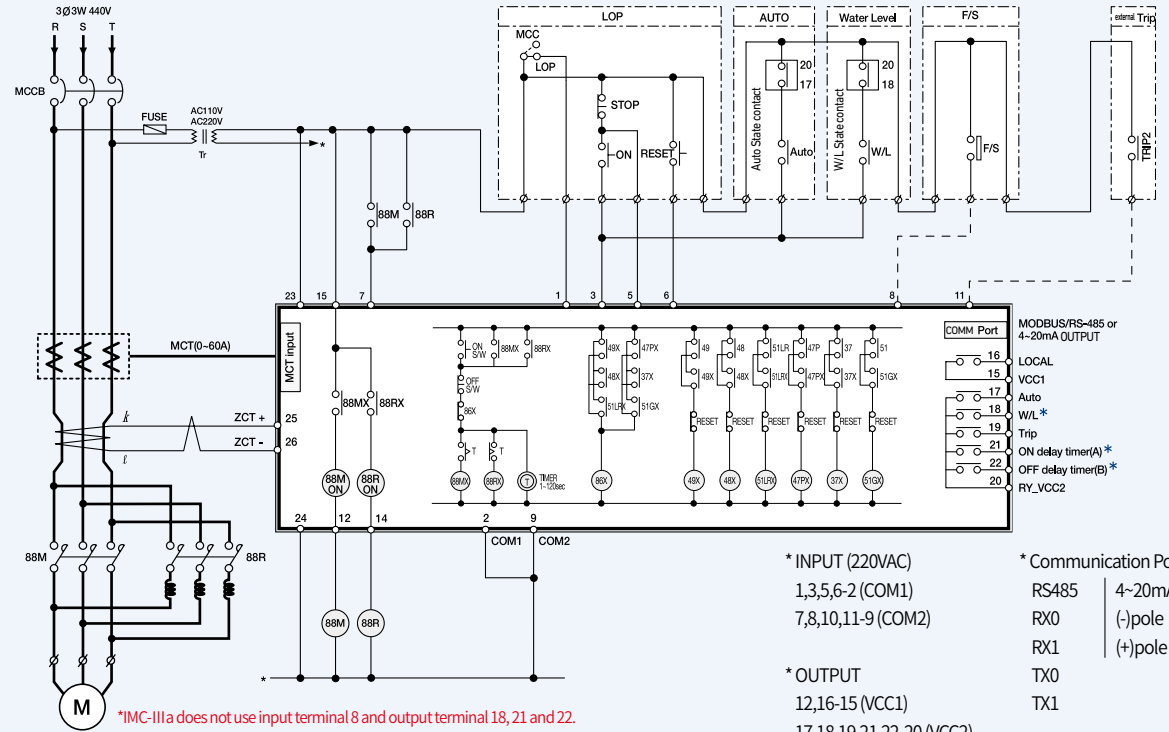
* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

*IMC-IIIa does not use input terminal 8 and output terminal 18, 21 and 22.
*If power is supplied to Terminal 11 (External Trip), "Etrp" is displayed on the screen and the trip operates (remove power source that supplies to Terminal 11 (External Trip) and reset to restart)

Reactor start



* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

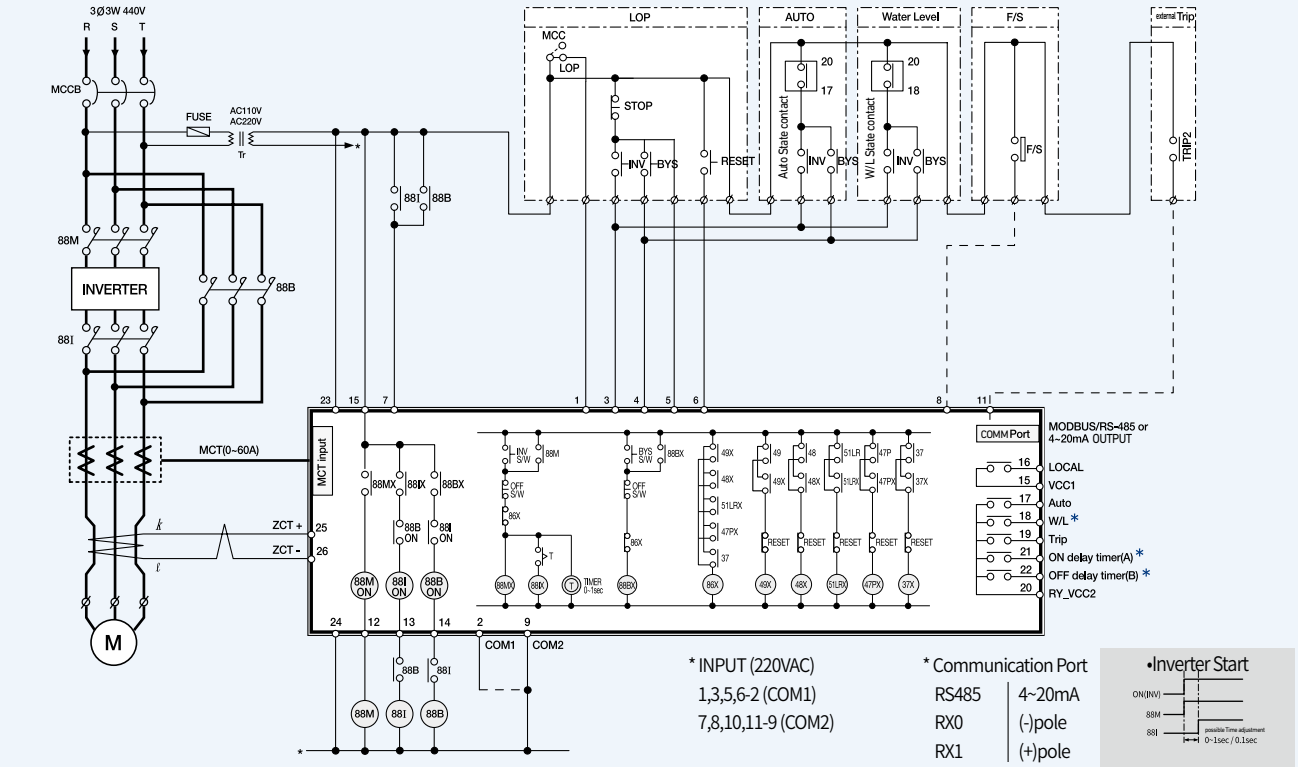
* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

*IMC-IIIa does not use input terminal 8 and output terminal 18, 21 and 22.
*If power is supplied to Terminal 11 (External Trip), "Etrp" is displayed on the screen and the trip operates (remove power source that supplies to Terminal 11 (External Trip) and reset to restart)

Wiring & cable connection

Inverter start



*IMC-IIIa does not use input terminal 8 and output terminal 18, 21 and 22.
*If power is supplied to Terminal 11 (External Trip), "Etrp" is displayed on the screen and the trip operates (remove power source that supplies to Terminal 11 (External Trip) and reset to restart)

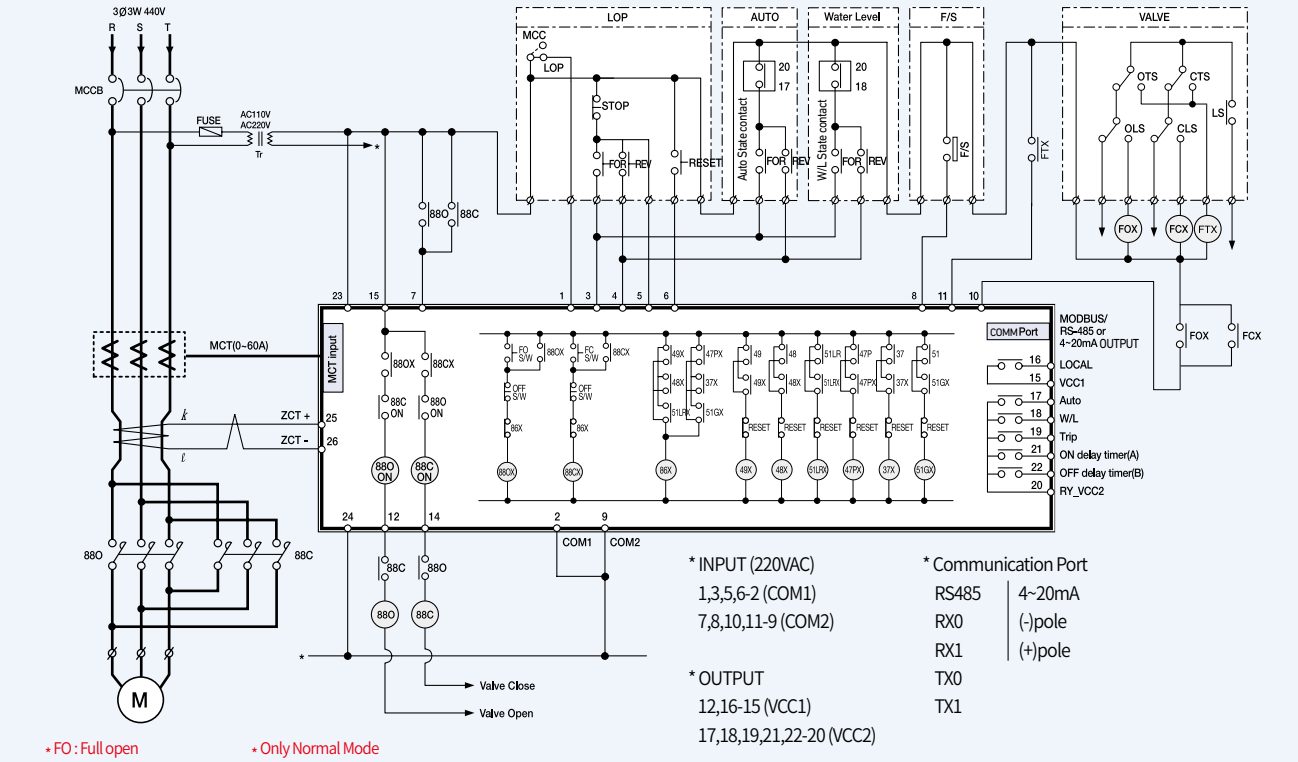
* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

FO/FC valve start (Forward/Reverse) (IMC-IIIa excluded)



* FO : Full open
FC : Full close

* Only Normal Mode

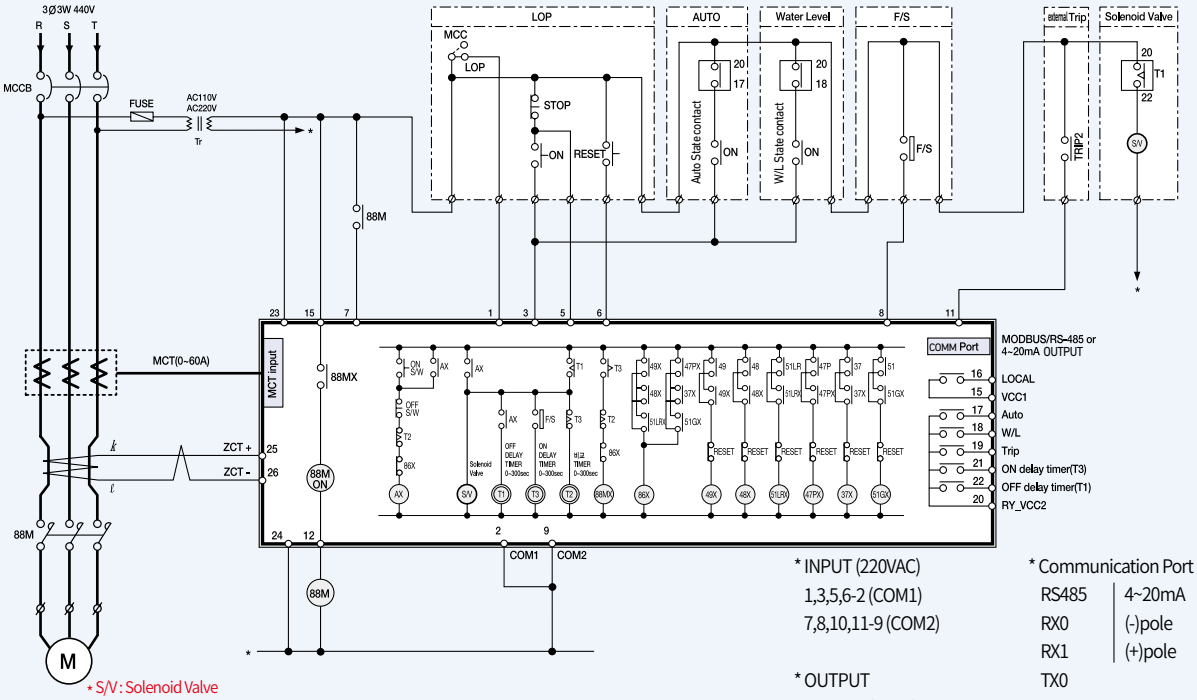
* INPUT (220VAC)
1,3,5,6-2 (COM1)
7,8,10,11-9 (COM2)

* OUTPUT
12,16-15 (VCC1)
17,18,19,21,22-20 (VCC2)

* Communication Port

RS485	4~20mA
RX0	(-)pole
RX1	(+)pole
TX0	
TX1	

S/V Start (Direct Input) (IMC-IIIa excluded)



① Once ON S/W input is made, S/V (Solenoid Valve) turns ON and OFF Delay Timer (T1) turns ON.
② If F/S (Flow Switch) input is made with set [T2-T3] time, ON Delay Timer (T3) turns ON.
③ After the set time since activation of ON (T3), the comparison timer (T2) turns OFF, 88MX turns ON and the motor starts.
④ If F/S input is not made within a set [T2-T3] time, ON execution is cancelled and "t2-F" is displayed.
⑤ Comparison timer (T2) must be larger than ON Delay Timer (T3), and it must consider the time needed for F/S inputs to be made.
⑥ If OFF S/W input is made to stop the motor, S/V and motor are OFF Delayed by the (T1) set time.
⑦ If F/S input is removed during motor operation

Terminal number

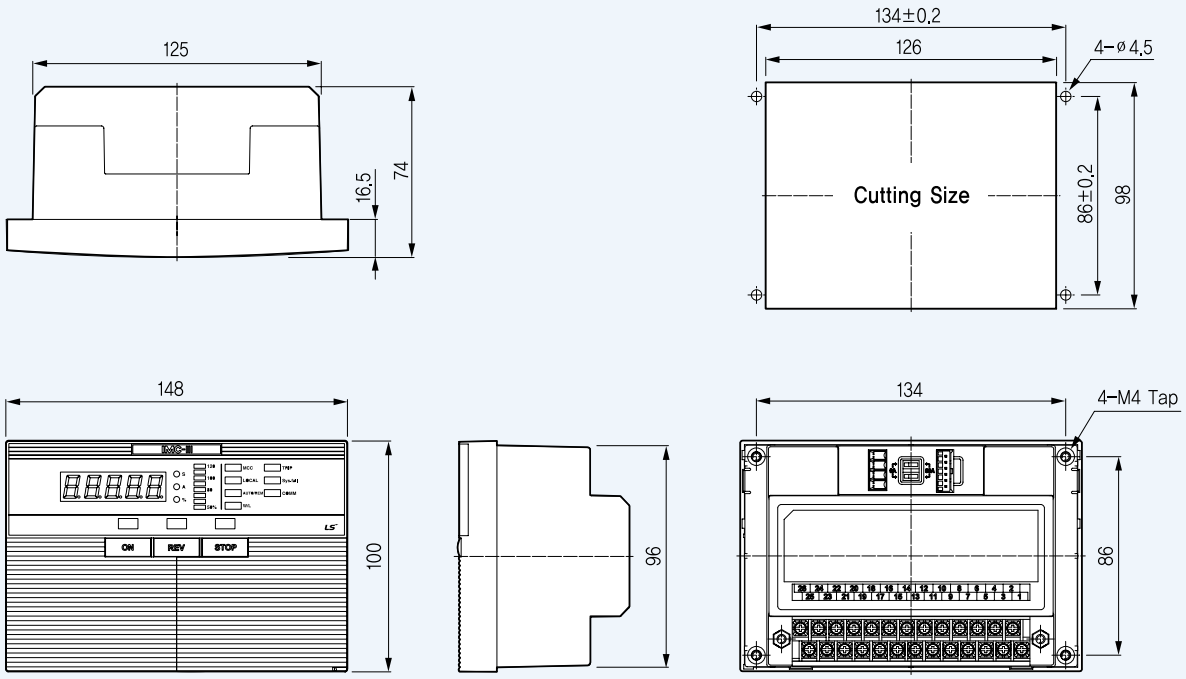
Terminal No	Explanation	Terminal No	
1	LOP selection input	14	Y Start/Reverse Rotation /Reactor/Bypass Contact Output
2	COM1 (1, 3, 4, 5, 6)	15	VCC1 (12, 13, 14, 16)
3	ON input	16	LOP condition output
4	Reverse Rotation ON Input (Bypass)	17	AUTO condition output
5	STOP input	18	Water Level condition output
6	RESET input	19	TRIP output (1a)
7	MC condition input	20	VCC2 (17, 18, 19, 21, 22)
8	F-S mode input	* 21	ON Delay Timer output (t-d, F-S mode)
9	COM2 (7, 8, 10, 11)	* 22	OFF Delay Timer output (t-d, F-S mode)
10	External trip1 input	23	Control Power (AC 110V or 220V)
11	External trip2 input	24	Control Power (AC 110V or 220V)
12	ON output	25	ZCT input (k)
13	△Start/Inverter Contact Output	26	ZCT input (ℓ)

* Normal Mode
20 - 21 : Operation Time Alarm("OrH") Output
20 - 22 : Not Used

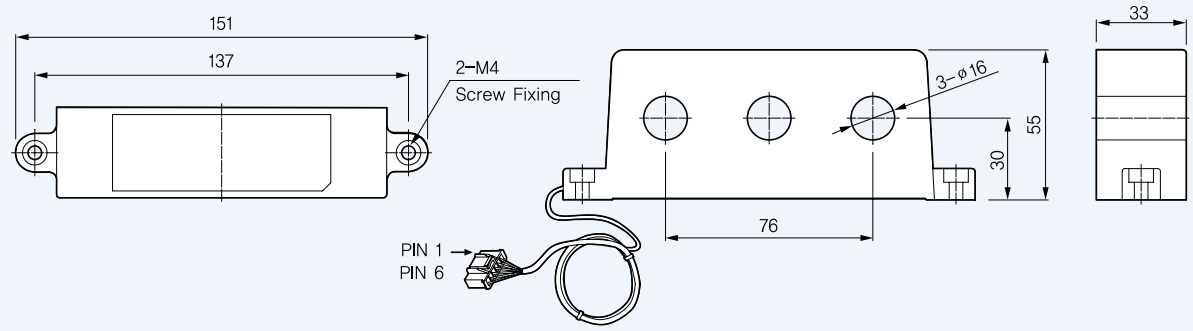
Dimensions

Dimensions

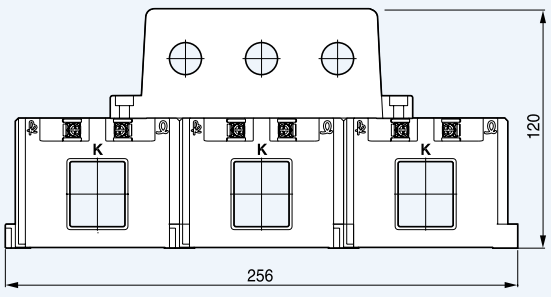
IMC-IIIa main unit



MCT



In case of MCT combination



Note) 1. This product is only for EMPR, IMC, user must not use for other service
2. Pls order each 3EA with IMC-IIIa, because this product is 1CT type.

Memo

FUTURING SMART ENERGY

We open up a brighter future through
efficient and convenient energy solutions.

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

- According to The WEEE Directive, please do not discard the device with your household waste.

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