

# EOCR Setting Guide

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This is a setting guide and advice for user's reference only .

### Conditions to be checked for the normal operation of EOCR .

1. Check the status of correct settings by pressing the UP/DN button in sequence.
2. When you enter the **tESt** menu and wait for 3 sec, it starts countdown during the O-time **ot: 5** setting. and display **End** with a trip to the output . This means EOCR is operating well.
3. Check all the sequence wiring if it is safe and correct .
4. After completion of the motor starting, check if the current display is fine, When the %LED in the bar graph doesn't show, it needs to check if the operation current is too lower than the Oc setting value by 65% and on the contrary, the %LED shows 100% (red LED lights on), It is advised to check the Oc setting if the re-adjustment is necessary.
5. If the motor starting isn't completed but EOCR operates, refer to the Troubleshooting guide first and contact customer care center if the trouble isn't cleared.

### Basic model (3DM / FDM)

**pd:000** Password input is necessary to change the setting value of EOCR, if a password is memorized except 000.  
If the password is set to 000, no password input is necessary in "000" to enter the setting change mode. Please take caution not to forget the password.No password function is provided in 3DM2/FDM2, 3MZZ/FMZZ.

**Ph:3Ph** The default setting is a 3phase motor. The setting change to **Ph:1Ph** is necessary for 1 phase motor.

**tcc:dE** Time current characteristic (TCC). the default setting is tcc : dE (definite TCC).

**ct:non** The default setting is "non", setting value is the primary current with an external CT combination in this mode. ( Ex: in case of 200; 5, the setting is 200 )

**FS: on** If the control power or EOCR itself has a problem, the motor stops with the output relay trip in the "FS: on" mode. The default setting is. **FS:off**

**rP: on** For the application which motor rotation direction is important , "rP: on" should be set .  
"rP:off" setting doesn't make a problem after completion of the installation for the permanent stable application.  
The default setting is "rP:off".

**oc: 3.5** It is recommended for "oc" to set at the rating current of motor. Default setting is oc:5.0A .

**dt: 5** It means a starting delay time setting for a motor start up duration from the start of motor to the normal running current. The start up duration depends on the inertia of load. Therefore, it is recommended to set the time after

measuring the time and current by EOCR with the initial set of D-time at 20 sec. For a Star-delta start, the longer time by 2sec than the setting of Star-delta timer is recommended. Default setting is 5 sec.

**ot: 5** It means the overcurrent trip time in definite TCC, when motor operating current (In) exceeds over current setting (Is) during the ot setting time, EOCR trips. Default setting is 5 sec. The advantage of definite TCC is that user is able to set accurate time and current and lead a mechanical protection of load together with motor protection.

**ct5: 5** This is a trip class(curve) setting in Inverse TCC or Thermal inverse TCC. The trip time changes according to the operating current inverse proportionally. Thermal inverse TCC reflects the Heat capacity of motor based on the current measurement.

**uc:off** It means under current (Dry Run) protection, If a level switch has a problem in a submersible pump, It backs up the level switch function from no water running of pump and protect the motor from overheating. For the machinery running with a belt (including conveyer), It candetect a broken belt. The current setting should be higher than rating no load current of motor for this function. The default setting is "oFF" .

**ut: 5** It is "uc" trip delay time setting . If you don't set the "uc" function (uc:oFF), "ut" setting doesn't appear at the menu.

**PL: on** This menu is to determine "enable/disable" of PL (Phase loss) function. If you set "Ph:1Ph" at the power phase selection menu for a single phase power supply line, this menu doesn't appear automatically.

**PLt: 3** It is trip delay time setting for PL. The default setting is 2 sec. For single phase power line setting, it doesn't appear at the menu.

**Ub: 15** EOCR calculates the unbalance rate among three phase currents. It trips after "Ubt" setting time under a unbalanced condition. The default setting is "oFF".

**Sc: 4** Locked Rotor protection during starting up a motor (Stall). If a rotor of motor is locked during starting and keep the current at higher than the "Sc" setting during D-time, EOCR trips in 0.5sec after D-time. The default setting is "Sc: 4".

The setting value is a multiple of "oc" setting value. This function operates under the Definite TCC condition.  
It is disabled under the Inverse TCC setting generally. But if you set D-time greater than zero in Inverse setting, Stall operates when d-time expires.

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**JR: 4** Locked rotor protection during normal running of motor (Jam). It is used to prevent a problem caused by rapid load increase. The setting value is a multiple of "oc" setting value. The trip delay time setting range is 0.2~10 sec.

**RL: 85** Alarm setting by % of the overcurrent threshold (oc). The output contact 07-08 makes a signal of A,F,H according to the ALo setting.

**rL:E-r** Reset type setting mode. Reset method shows below.

**rL:E-r** Electrical Reset . EOCR resets by power cycle of control power or ESC button. It can be used for a remote reset which enables EOCR to reset from a remote site.

**rL:H-r** Hand Reset (Manual Reset). EOCR can be reset by ESC button only.

**rL:R-r** Auto Reset . The time setting range is up to 20 minutes (20n). The auto reset number. of times is connected to the restart limitation setting menu. If the number of restart over the restart limitation number. in the "rn" setting menu during 30 minutes, EOCR doesn't reset anymore.

**rn: 3** Restart limitation number. It prevent a motor from a burning fail caused by many restarts during 30 minutes. In case an emergency restart is necessary, put the setting at "OFF" This function activates in Auto-Reset mode only.

**Rd: 1** Modbus slave (ID) address. It can be set at No. 1 ~ 247.

**bP: 192** Setting for communication speed. Select one among 1.2kbps, 2.4kbps, 4.8kbps, 9.6kbps, 19.2kbps, 38.4kbps.

**Pr:Eun** Parity setting. Select one among odd, even, non. even parity is displayed as "Eun".

**Lt: 10** Communication loss checking menu. If EOCR does not receive a data frame during "Lt" setting time, it displays an error message. The setting range is OFF, 1~999 sec.

**-t-r-h-** Total running hour. Time accumulation starts if there is a minimum sensing current in the line up to 99,999 hours. User can check it anytime but not allowed to erase it. Display unit is 1 hour.

**-r-h-** Running hour which user can set and erase the setting value. If you set the Alert output type at the "ALo: to", the output contact 07-08 repeats close and open to give a signal after the preset accumulated time elapsed.

**tESt** Self EOCR Check. If you push SET button in this menu, EOCR count time up 3sec and "ot" setting time and displays "End" with the output contact trip. This means EOCR is operating well. This function is blocked during motor running.

### Additional menu (i3MS/iFMS)

**SH: 10** Short Circuit protection. Setting value is a multiple of "oc" set value. Default setting is 10 times of "oc" setting.

**SHd: 7** Short Circuit trip delay time during motor starting to prevent a trip caused by starting current."OFF" setting is possible .

### Additional Menu (i3MZ/iFMZ, 3MZZ/FMZZ)

**Ec: 0.5** Earth leakage protection current setting. The default setting is 0.5A. Minimum setting value is recommended, if there is no leakage current in the motor by the current display. If the display shows a leakage current more than 50mA, user must check the insulation of motor and line. In the case of installing EOCR at the secondary side of Inverter, it's better to take care of EOCR operation error due to harmonics of Inverter.

**EL:0.05** Earth leakage trip time. The default setting is "0.05sec". It is recommended to set the faster time and lower current than the earth fault protection relay in the upper power system.

**Edt: 6** Earth leakage trip delay time during motor starting to prevent a trip caused by a stray current and harmonics of the starting current in motor.

### Additional menu (i3M420/iFM420)

**rS: 50** Current range setting menu of 4~20mA analog output signal. The setting value corresponds to the max analog output (20mA). The setting value can be made independently from "oc" setting . Analog output current formula :

$$\text{mA} = \frac{I}{rS} \times 16 + 4$$

Where, CTR is the parameter for CT, i.e. in case of CI : non, it is 1. I is the measured average load current.

If the load current is equal or greater than this value, analog output is fixed to 20mA . For the current lower than minimum sensing current of EOCR(0.4A), the analog output signal gives 4 mA .

# Troubleshooting Guide

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### 1. Reversed phase : `-r P -`

It trips instantly within 0.15sec from the motor starting. Check the phase sequence and cable direction of the power line going to the motor first. The sequence of EOCR internal CT is A(L1), B(L2), C(L3) from the left side. If the passing order of motor line to the EOCR doesn't coincide with the order of EOCR CT or not same all the direction of cables, It trips by RP. In this case, change the order of the two cables among three. When the sequence of cables to the motor changes in the downstream side of EOCR, EOCR isn't able to check the RP. The sequence of cables should be coincided from the power mains to the motor. If the RP is not an indispensable function or only necessary for the first installation and fixed in the site, The `rP:FFF` setting is recommended for normal operation.

### 2. Overcurrent : `oc: 3.5`

Overcurrent trip displays the biggest current among three phases and the small LED in the left side shows the phase. If the trip current is lower than the rating current of motor, check the "oc" setting if it is too low. The recommended "oc" setting is 110%~120% of actual running current in the definite TCC.

### 3. Stall : `Sc: 3.5.0`

When the starting current doesn't go down below the "Sc" setting during D-time. EOCR trips by Stall within 0.5se when D-time expires. Check the status of load and D-time, whether the D-time is too short or not. The recommended D-time is longer by 1sec than a time that the motor come to the normal running current.

### 4. Phase loss : `PL - r` `PL - S` `PL - t`

The small LED in the left side lights up and designates which phase is lost in the display like as PL - r, PL - S, PL - t, To check the PL status, put the PL trip time at the maximum and measure the lost phase current by a clamp meter after a test start, whether there is a current in the motor line or not. The minimum operating current (min setting current) of motor sensed by EOCR can make trip due to hunting current. Need to check load operation condition of the application in this case. If the clamp meter shows a normal current in the lost phase line, Check the EOCR status.

### 5. Unable to starting :

Even though the sequence wiring is O.K. If the motor is not able to be started with no magnetic contactor energized, Check the Fail Safe menu of `FS: 0.0` `FS:FFF` with the output contact status (NO, NC) of EOCR.

### 6. Undercurrent : `uc: 1.5`

Undercurrent trip displays the lowest current among three phases and the small LED in the left side shows the phase. The example shows the sensing current of 1.6A in L2(S) phase. For the heater line broken detection in a heater application. EOCR trips by undercurrent according to the setting in delta connection, and trips by phase loss in Star connection.

### 7. Current unbalance : `Ub: 4.2`

Ideally, the motor currents of three phases are balanced. If a current unbalance is high, the motor need to be checked.

The formula is as follows.

$$\text{Unbalance factor (\%)} = (\text{Imax\_phase} - \text{Imin\_phase}) / \text{Imax\_phase} \times 100\%$$

### 8. Jam : `JR: 15.8`

Rapid overload protection during motor running, Check the load which cause impacts it. If you find no problem in the load and motor, try to change the setting value higher of the time and current to be appropriate for the application.

### 9. Unable to reset : `rE:H-r`

If you cannot reset EOCR by control power interruption, Check the reset type setting first. In the setting of `rE:H-r` User can reset EOCR by ECS button only. If you want to reset EOCR by both control power cycle and ECS button, Put the setting at `rE:E-r`