บริษัท เอ็นเนอร์ทริค จำกัด
EnerTric Limited

EOCR-3EZ

Digital Over-current Relay with Ground Fault Protection and Ammeter

◆ Introduction

► MCU(Micro Controller Unit) based

► Function feature

Protected Item	Operation Delay
Over current	0.5 / 1~30 sec(Definite time)
	1~30 class(Inverse time)
Undercurrent	0.5 / 1~30 sec(Definite time)
Phase Loss	Within 3 sec
Phase Reversal	0.1 sec
Unbalance	Within 8 sec
Locked Rotor	Trip after preset 'dt'
Stall	0.5 / 1~10 sec(Definite time)
Ground Fault	0.05~10 sec(Definite time)

► Ampere meter function :
- Load current of 3 phases are displayed in sequence
- Display time of each phase current is 5 sec

► Over current protection range
- 0.5~60A(wide range type) : displays line current under 100A
- 11~960A with external CT

► Undercurrent protection range
: 0.5A ~ less than oc setting value / OFF(- -)

► Ground Fault
- Operated by zero sequence current.
- A Type : 0.02~3A(Definite time type)/OFF(--)
  B Type : 0.2~10A(Definite time type)/OFF(--)

► Time-Current characteristics
- 0.5~10A : Definite/Inverse, selectable
- Equal or more than 11A
: definite(if inverse required, use with external CT)

► Easy troubleshooting by 7 segment LED.

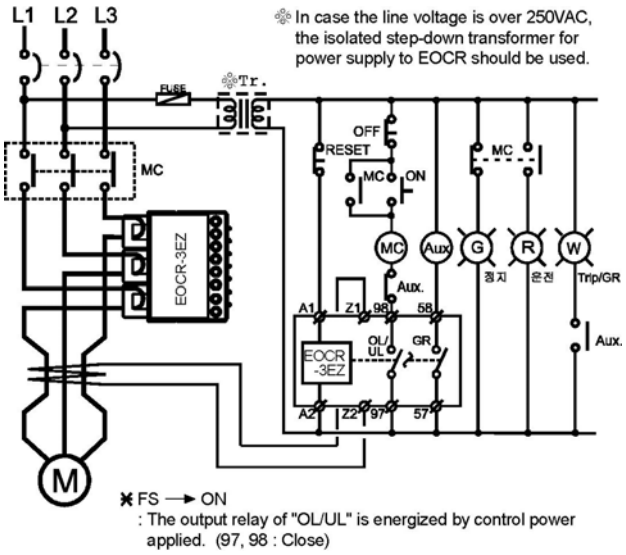
► Trip cause memory : Last 3 trip, stored regardless power failure.

► Reset : manual(instantaneous)/electrical(remote)

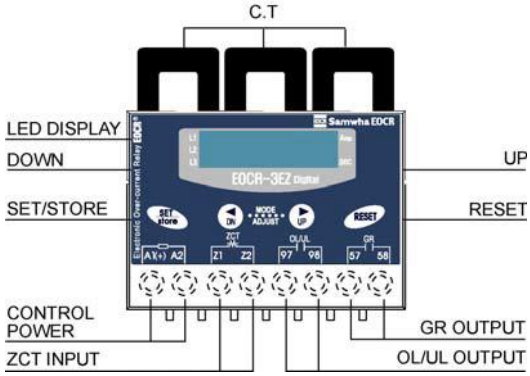
► Fail safe(self-diagnostics) : The output relay of "OL" is energized when control power applied.

► Appicable to Inverter(20~400Hz)

◆ Typical Application Diagram



◆ Relay Facia



◆ How to set

Mode	DN UP	Search a mode to be adjusted by depressing UP/DN mode switch.
Set	SET store	Selected mode and setting value start flickering which means to be ready to accept setting as depressing once a Set/store button
Adjust	DN UP	Select a required setting value and/or characters by depressing continuously UP/DN mode switch until reaching what want to do.
Store	SET store	Store a selected value and/or characters by depressing once Set/store button. Instantaneously the flickering is stopped.
Reset	RESET	After completing above procedure, make a reset to be ready to operate. If not made reset, it will be reset automatically after an elapse of 30 sec.
Current rotation by Manual		Instead of automatic rotation, manual display rotation is possible as depressing once SET/ Store button during an operation. If manual is selected, the information of phase current L1 is displayed firstly and next information is displayed continuously like a manner of L1→L2→L3→GF→L1→….
How to check trip cause		• Enter into "trip" mode by depressing once Set/store button, then last trip cause is showed. • Each phase current is displayed in order whenever depress UP/DN button in every once • The 2nd trip cause is showed after displaying 3 phase current of last trip • The 3rd trip can be checked by same manner.

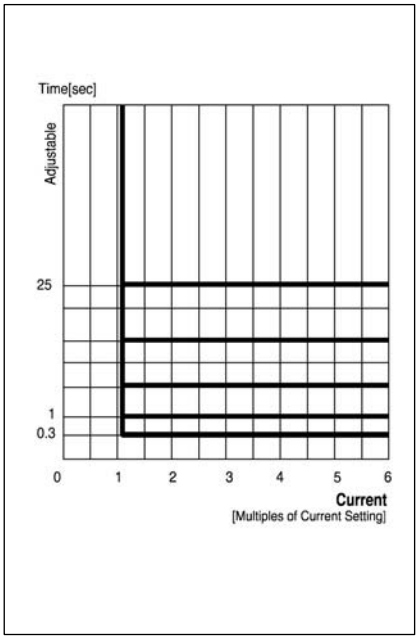
Table#1

Current Setting Range (Amps)	Number of Conductors thru CT windows	External CT Ratio	Setting of CT Ratio	Remark
0.5～60A	1	-	OFF (Mode:--)	Wide Range
0.25～3.0A	2	-	2t	
0.1～1.2A	5	-	5t	
1～12A	1	10:5	10	
1.5～18A	1	15:5	15	
2.0～24A	1	20:5	20	
2.5～30A	1	25:5	25	
3.0～36A	1	30:5	30	
4.0～48A	1	40:5	40	
5～60A	1	50:5	50	
6～72A	1	60:5	60	
7.5～90A	1	75:5	75	
10～120A	1	100:5	100	
12～144A	1	120:5	120	
15～180A	1	150:5	150	
20～240A	1	200:5	200	

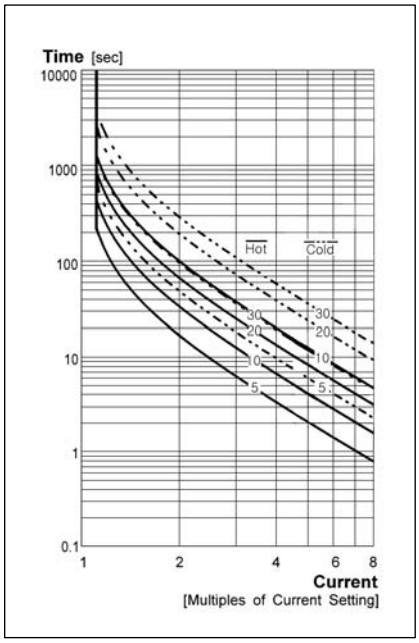
25～300A	1	250:5	250	
30～360A	1	300:5	300	
40～480A	1	400:5	400	
50～600A	1	500:5	500	
60～720A	1	600:5	600	
75～900A	1	750:5	750	
80～960A	1	800:5	800	

Model	EOCR-3EZ	
Current Setting Range	Over-current(oc)	0.5 ~ 60A
	Under-current(uc)	0.5A ~ Less than “oc” setting value./ OFF
	Ground Fault current(Ec)	A Type : 0.02 ~ 3A(Definite time type) / OFF
		B Type : 0.2 ~ 10A(Definite time type) / OFF
Time Setting	Starting Delay Time(dt)	1 ~ 200 sec(Definite time type) / OFF
	Over-current Trip Delay(ot)	0.5 / 1~30 sec(Definite time), 1~30 class(Inverse time)
	Under-current Trip Delay(ut)	0.5 / 1~30 sec(Definite time)
	Ground Fault Trip Delay(Et)	0.05 ~ 10 sec(Definite time)
	Ground Fault Starting Delay Time (Ed)	OFF / 1~10 sec(Definite time)
Reset	Manual	Depressing Reset button or control voltage interruption
Operation Characteristic	Definite/Inverse,selectable	• Overcurrent - 0.5~10A : definite / inverse, selectable - more than 11A : definite(If inverse time required, use with external CT) • Undercurrent : definite
Tolerance	Current	I < 1A : ±0.05A, I ≥ 1A : ±5%
	Time	t ≤ 3s : ±0.2s, t > 3s : ±5%
Ambient Temperature	Storage	-30~80°C
	Operation	-20~60°C
Ambient Humidity	30~85% RH without Condensation	
Control Voltage		• 220VAC : ±15%, 50/60Hz • 110VAC : ±15%, 50/60Hz • 24VAC/DC
Output Contacts	Contacts	• (OL/UL)1-SPST 3A/250VAC, Resistive • (GR) 1-SPST 3A/250VAC, Resistive
	Condition	Normally Energized in FS:ON, 97—┤ ├—98 Closed.
Insulation	Between Casing & Circuits	Over 10MΩ(DC 500V Megger)
Dielectric Strength	Between Casing & Circuits	2kV 60Hz 1min.
	Between Contacts	1kV 60Hz 1min.
	Between Circuits	2kV 60Hz 1min.
Mounting	35mm Din Rail or Panel	
Power Consumption	Less than 3W	
Electrostatic Discharge	IEC61000-4-2	Level 3: Air Discharge : ±8kV, Contact Discharge: ±6kV
Radiated Electromagnetic Field Disturbance	IEC61000-4-3	Level 3: 10V/m, 150MHz & 450MHz Portable transceiver
EFT / Burst	IEC61000-4-4	Level 3: ±2kV, 1min
Surge	IEC61000-4-5	Level 3: 1.2×50μs, ±2kV(0°, 90°, 180°, 270°)
1MHz Burst disturbance	IEC61000-4-12	Level 3: 2.5kV, 1MHz
Conducted Emission	EN55011	Class B

◆ Time-Current Characteristics



Table#2. <Definite time characteristics of OC>

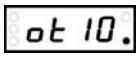
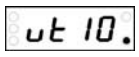
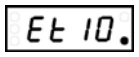
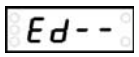
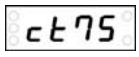
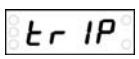
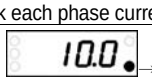
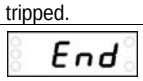


Table#3. <Inverse time characteristics of OC>
0.5~10A / combined with external CT

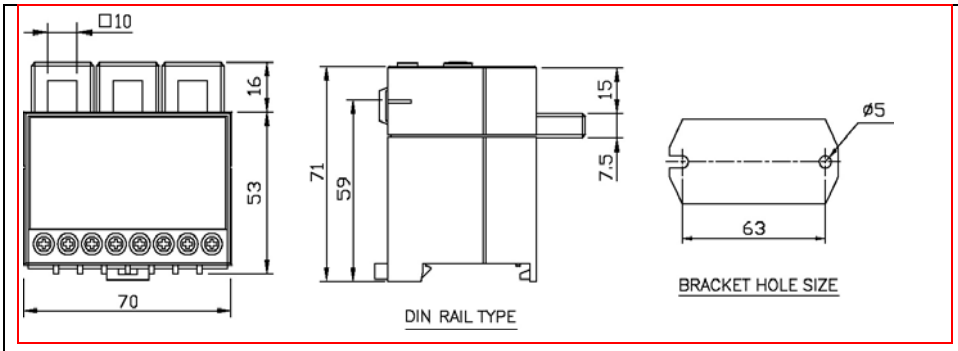
■ how to setup

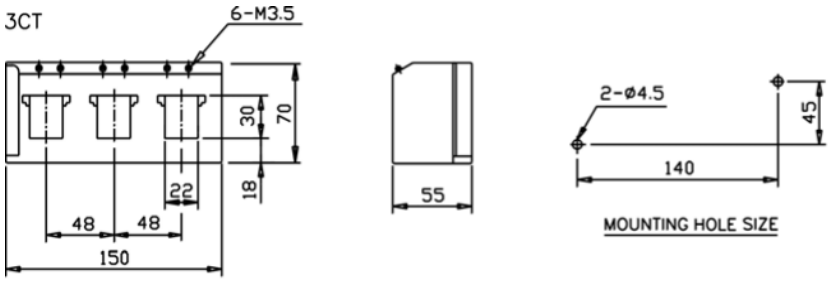
1) **Current :**
Definite Time – Set the rated motor current in “OC” mode. For protection of connected machinery with motor, it is recommended to set the 110~115% of running current after motor current is stabilized.
Inverse Time – 100% of rated motor current or 110~125% actual motor current is recommended.
2) **D-Time** : Set the expected run-up time of motor in “dt” mode.
3) **O-Time :**
Definite Time – Set the desired trip delay time in “ot” mode.
Inverse Time – Set the trip delay time according to Time-Current characteristics.
4) **Ground Fault :**
Set the ground fault current in “Ec”, set Its operating time “Et”, and then delay time in “Ed” .

■ Display Setting

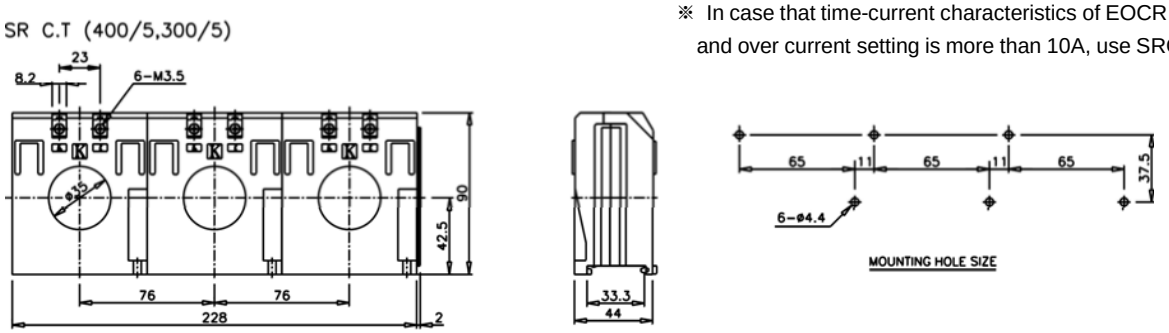
	Function	Setting Range	FND Display	Description
1	Over-current	0.5A~60A		▪ 0.5~10A : 0.1A steps. ▪ 10~60A : 1A steps. ▪ Not possible to set a current value over 10A if inverse characteristics is selected. ▪ Required to set a preset protected value(<6A) at first based on CT secondary output before setting a CT ratio if needed to adopt external CT instead of wide range["CT":OFF(--)].
2	Starting Delay Time	1~200sec / OFF(dt--)		▪ 1~100sec : 1 sec steps. ▪ 100~200sec : 10 sec steps.
3	Over-current Trip Delay Time	▪ Within 0.5sec / 1~30sec (definite time) ▪ 1~30 class(Inverse)		▪ 0.5sec / 1~30sec : 1sec steps. ▪ Operated after "Starting Delay Time"
4	Under-current	0.5A~less than "oc" setting value / OFF(uc--)		▪ Not possible to set over "over-current set-value("oc")". ▪ 0.5, 1~10A : 0.1A steps. ▪ 10A ~ : 1A steps.
5	Under-current Trip Delay Time	Within 0.5sec / 1~30sec		▪ 0.5sec / 1~30sec : 1sec steps. ▪ Operated after "Starting Delay Time"
6	Ground Fault	• A Type :0.02~3A /OFF(Ec--) • B Type :0.2~10 A /OFF(Ec--)		• Operated by zero sequence current.
7	Ground Fault Trip Delay Time	• 0.05~10 sec(Definite time)		• 0.05 / 0.1~1 sec : 0.1 sec steps. • 1~10sec : 1 sec steps.
8	Ground Fault Starting Delay Time	• 1~10 sec • OFF(Ed--)		• OFF : Disable
9	Locked Rotor	▪ 2~10 times of oc setting ▪ OFF(Lc--)		▪ Definite ▪ Tripped within 0.5 sec, After elapse of "dt". ▪ The decreased proportional % of "Lc" is determined by follow formular, [Max. value of "Lc"=100/"oc" setting value]
10	Stall	▪ 1.5~5times of oc setting ▪ OFF(Sc--)		▪ Definite ▪ Tripped after elapse of preset time("St") ▪ More than 11A: Set automatically by proper decreased %. ▪ The decreased proportional % of "Sc" is determined by follow formular, [Max. value of "Sc"=100/"oc" setting value]
11	Operating Time of Stall	Within 0.5sec / 1~10sec		▪ In case of "Sc:OFF", "St" mode becomes OFF automatically
12	Phase current Unbalance	5~50% / OFF(Ub--)		▪ [(Max curr. – Min curr.) / Max] x 100[%] > Ub setting %
13	Fail Safe	ON(FSon), OFF(FS--)		▪ Impossible to set during operation.
14	Phase Reversal	ON(RPon), OFF(RP--)		▪ Tripped 0.1sec.
15	Phase Loss	ON(PLon), OFF(PL--)		▪ Tripped within 3 sec.
16	Time characteristics for over-current	▪ Definite(tcdE) ▪ Inverse(tcIn)		▪ Definite: Followed by Table #2 ▪ Inverse: Followed by Table #3 ▪ In case of "oc" setting value is more than 11A, applied for definite characteristics automatically.
17	CT Ratio	OFF-5t,2t, 10-15-20-25-30-40-50-60-75-100-120-150-200-250-300-400-500-600-750-800		▪ OFF(ct--) : wide range(0.5~60A). ▪ 5t : Displayed the current more than 0.04A. ▪ 2t : Displayed the current more than 0.1A ▪ Required to set a current value under 6A based on CT secondary output if need to adopt external CT instead of wide range ["CT":OFF(--)] Refer detail in "oc" mode. ▪ Not possible to adjust during the operation
18	Trip Cause Memory	Memorized the last 3 trip causes		▪ Stored the trip causes, regardless power is off. ▪ The stored information is displayed from last trip causes and able to check each phase current when tripped.
19	Test	Not permitted to test this function during the operation to prevent the unnecessary trip.	 →(3sec)  →(o-time)  Not possible to test during the operation.	

■ Dimension





※ In case that time-current characteristics of EOCR is inverse and over current setting is more than 10A, use SRCT only.



◆ Ordering Information

Model name													1	2	3		4
E	O	C	R	3	E	Z	H	1	A	M	7	A					

Accessory1	Accessory2
3CT-H1-100	**ZCT-035**

	1		2		3				4	
	Current range		**Relay Output**		**Power supply**		**Frequency**		**Converter**	
EOCR3EZWRAM7A	Wide range	**WR**	a-a type	**A**	220VAC	**M**	50/60Hz	**7**	0.02 ~ 3.0A	**A**
EOCR3EZWRAF7A					110VAC	**F**			0.2 ~ 10 A	**B**
EOCR3EZH1AM7A	100:5	**H1**			220VAC	**M**				
EOCR3EZH1AF7A					110VAC	**F**				
EOCR3EZHHAM7A	150:5	**HH**			220VAC	**M**				
EOCR3EZHHAF7A					110VAC	**F**				
EOCR3EZH2AM7A	200:5	**H2**			220VAC	**M**				
EOCR3EZH2AF7A					110VAC	**F**				
EOCR3EZH3AM7A	300:5	**H3**			220VAC	**M**				
EOCR3EZH3AF7A					110VAC	**F**				
EOCR3EZH4AM7A	400:5	**H4**			220VAC	**M**				
EOCR3EZH4AF7A					110VAC	**F**				

※ 3CT - H1,HH,….H4
< SRCT - S1,SH,….S4

Accessory1

	3CT				Ratio
3CT- H1-100	3CT	-	H1	-	100:5
3CT- HH-150			HH		150:5
3CT- H2-200			H2		200:5
3CT- H3-300			H3		300:5
3CT- H4-400			H4		400:5

	SRCT				Ratio
SR-3CT-100	SR	-	3CT	-	100:5
SR-3CT-150					150:5
SR-3CT-200					200:5
SR-3CT-300					300:5
SR-3CT-400					400:5

Accessory2

	ZCT		Diameter
ZCT- 035	ZCT	-	35 Ø
ZCT- 080			80 Ø
ZCT- 120			120 Ø