

Enertronics Controls Inc.

NUMERICAL PROTECTION RELAY

MCRC SERIES



► MCRC

Over Current & Earth Fault Relay

► MCRC-U

Over Current & Sensitive Ground Fault Relay

► MCRV

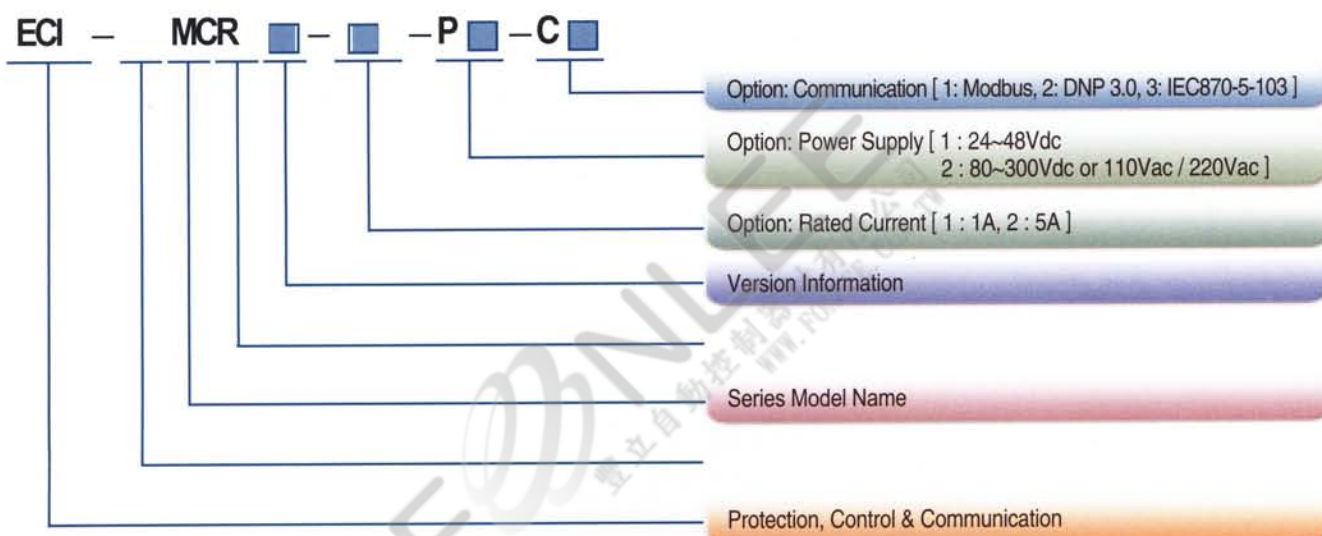
Over Voltage & Under Voltage Relay

MCR - Series

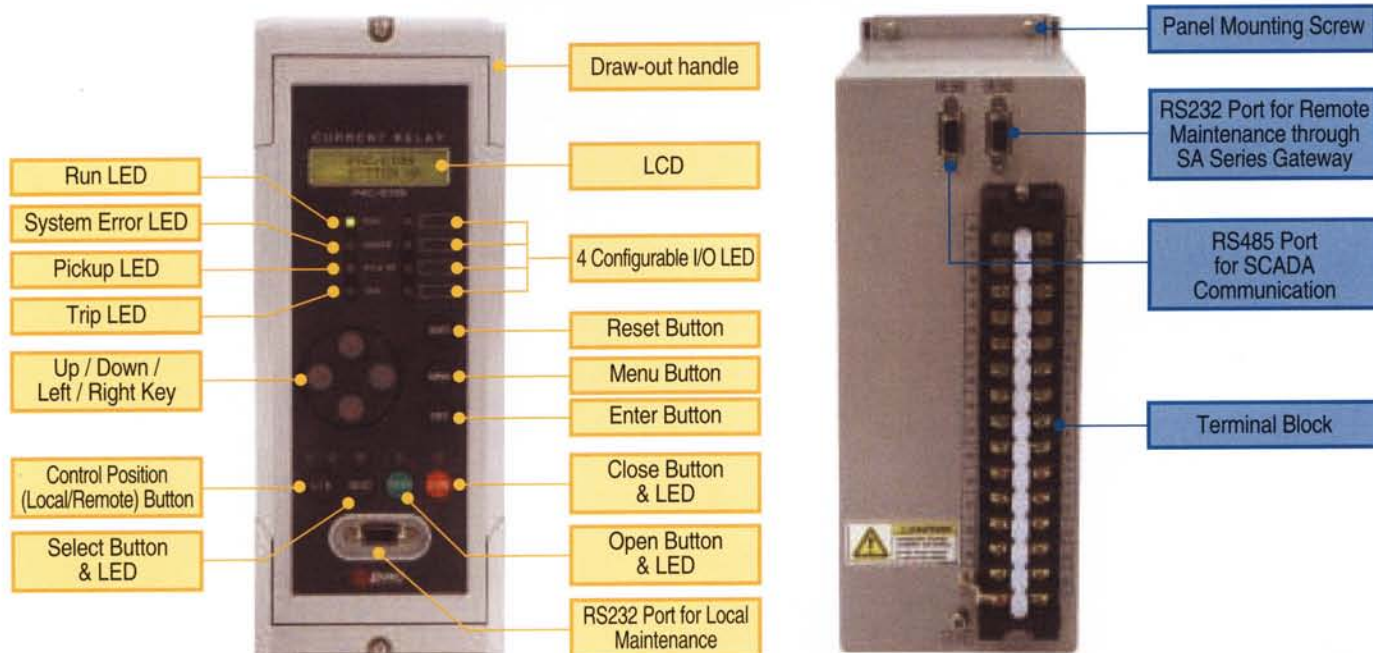
Model List

Type	Model Name
MCRC	Over Current & Earth Fault Relay
MCRC-U	Over Current & Sensitive Ground Fault Relay
MCRV	Over Voltage & Under Voltage Relay

Ordering Information



Front & Rear Panel Operator Interface





Configuration

MCR Series

H/W		MCRC	MCRC-U	MCRV
Front Panel	LCD(2 line,12 or 16 Character)			
	LEDs(Run,Error,Pickup,Trip)			
	Keys(Menu,Reset,4Arrow,Enter)			
	RS-232 (DB 9)			
Analog Inputs	Phase Current			1 Phase
	Ground Current			
	Phase Voltage			
	Ground Voltage			
	Sensitive Ground Current			
Contact Inputs	Min. 2 points, Configurable			
Contact Outputs	3 Form-A, 3 Form-C, Configurable			
Communications	RS-232C(Front and Rear), RS-485(Rear)			
Function		MCRC	MCRC-U	MCRV
Protection	Phase Overcurrent	50 /51		
	Neutral/Ground Overcurrent	50N /51N		
	Sensitive Ground Overcurrent	67N		
	Thermal Overload(True RMS)	49		
	Undercurrent	37		
	Negative Phase Sequence Overcurrent	46		
	Phase Overvoltage	59		
	Phase Undervoltage	27		
	Ground Overvoltage	59N		
	Breaker Failure Protection	BF		
	Negative Phase Sequence Overvoltage	47		
	Output Contact Latching	86		
	Underfrequency	81		
Control	Breaker Control(Remote Communication Only)			
Monitor	PT Fuse Failure			
	Self- Self-Diagnosis			
	- Memory			
	- Setting			
	- A/D Converter			
	- Auto-Calibration			
Measurement (True RMS)	Current			1 Phase
	Voltage			
	Sequence Current			
	Sequence Voltage			
	Current THD			
	Voltage THD			
Recording	Event (At least 100,with Time Tagged)			
	Waveform Recording			
Communications	RS-232C(Front and Rear, Modbus Only) RS-485(Rear)			



Power Supply	Input	110~220Vac \pm 20% (50/60Hz), 80~300Vdc
	Power Consumption	< 30VA
Phase Current Input MCR(C, CU)	Nominal Frequency	50/60Hz
	Phase CT Secondary	5A
	Ground CT Secondary	5A (E100)
	Input Range	0.1~250A
	Burden	< 0.5VA per phase
	Current Withstand	1 sec at 40 times rated, 2 sec at 20 times rated, continuous at 3 times rated
Sensitive Current Input MCR(CU)	Nominal Frequency	50/60Hz
	Input Range	1~1300mA
	Burden	< 0.5VA
Voltage Input MCR(CU,V)	Nominal Frequency	50/60Hz
	Input Range	1~220V
	Burden	< 0.5VA
	Voltage Withstand	Continuous at 220V
Contact Input	Number	4, configurable
	Voltage Range	250Vdc Maximum
	Recognition Time	10msec
Contact Output	Number	2NO, 2NC, configurable
	Make and Carry	6A, continuous
	Breaking Capacity	10A, 0.3sec, AC250, Resistive Load, 30A, 0.3sec, DC250, Resistive Load
Communication Interface	Front Panel	RS232, 19200bps (fixed), 8/N/1, Modbus protocol
	Rear Panel	RS232, physically identical port to front panel RS232
		Galvanic isolated RS485, 8/N/1, 300~38400bps, Modbus protocol
Environmental	Operating Temperatures	-20 $^{\circ}$ C ~ 70 $^{\circ}$ C
	Humidity (non-condensing)	up to 100%
	Altitude	up to 2000m
Type Test	Insulation	IEC 60255-5, ANSI/IEEE C37.90.0
	Oscillatory Transient	IEC 60255-22-1, ANSI/IEEE C37.90.1
	Surge Immunity	IEC 60255-22-5 class IV
	Fast Transient	IEC 60255-22-4 class IV, ANSI/IEEE C37.90.1
	Electrostatic Discharge	IEC 60255-22-2 class III
	RFI Susceptibility	IEC 60255-22-3 class III, ANSI/IEEE C37.90.2
	Vibration	IEC 60255-21-1 class II
	Shock	IEC 60255-21-2 class II

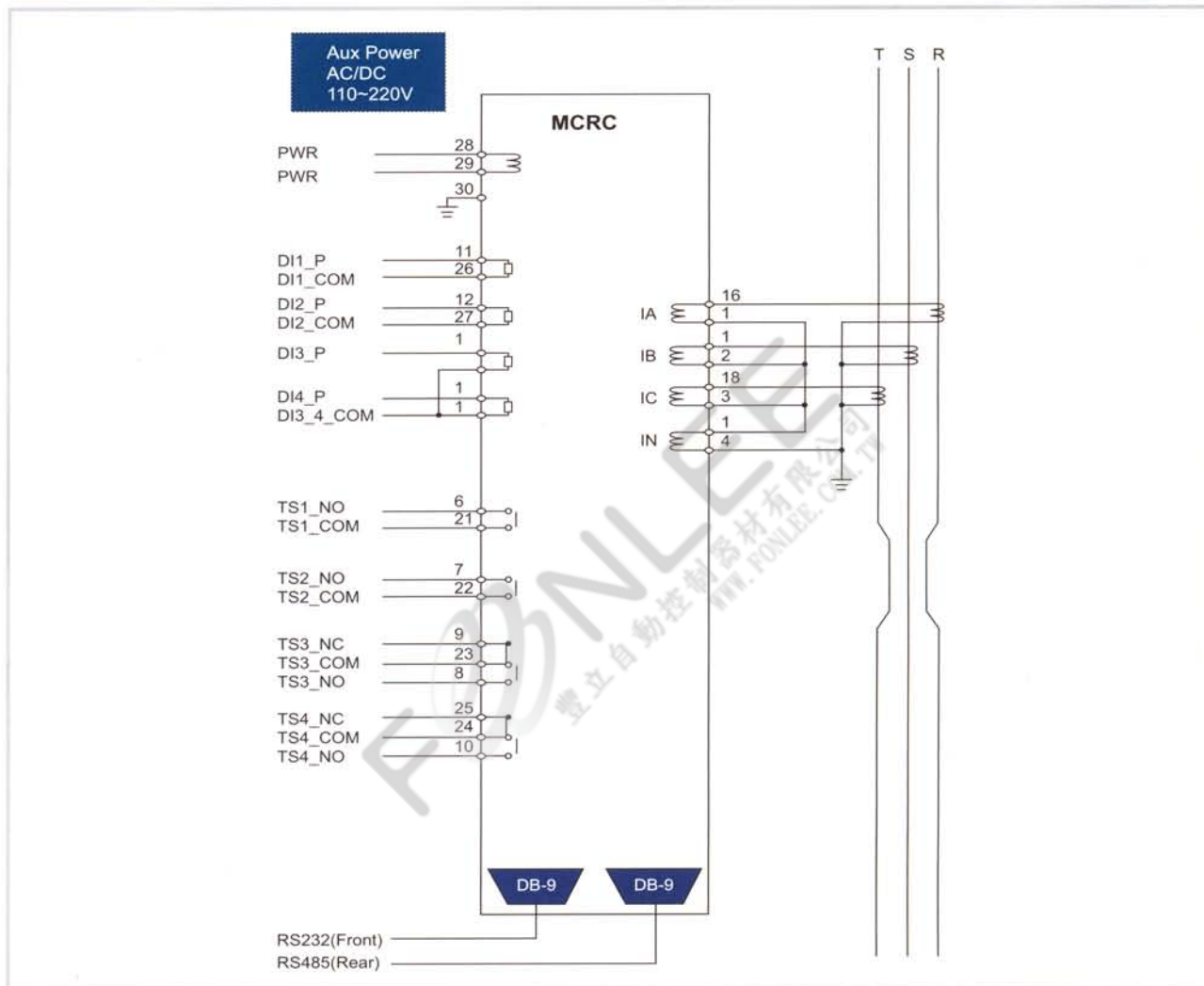
MERC (OCR/OCGR)

Technical Data

Definite/Inverse Time OCR, NSOCR, UCR, Thermal Overload			
Protection	Definite Time Over Current (50_1, 50_2, 50N_1, 50N_2)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Operating Delay : 0.00~60.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Inverse Time Over Current (51, 51N)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Time Multiplier : 0.00~10.00sec, 0.01 step Trip Characteristic Curve <ul style="list-style-type: none"> IEC 60255-3 • ANSI/IEEE KEPCO 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 35msec Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Negative Phase Sequence Over Current (46)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Operating Delay : 0.00~180.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Under Current (37)	Setting <ul style="list-style-type: none"> Pickup Current : 0.10~5.00A, 0.05 step Operating Delay : 0.00~180.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 0xPickup current, delay time 0.00~0.03 Dropout Level: 102~104% of pickup current Dropout Time: < 40msec
	Thermal Overload (49)	Setting <ul style="list-style-type: none"> K-Factor for IEC 60255-8 : 0.10~4.00, 0.01 step Time Constant(τ) : 1.0~999.9min, 0.01 step Thermal Alarm : 50~100%, 1 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time: 10% or ± 2sec of setting value Dropout Level: 98~100% of Thermal
Circuit Breaker Control	Setting <ul style="list-style-type: none"> Trip Pulse Time : 0.1~5.0sec, 0.1 step Close Pulse Time : 0.1~5.0sec, 0.1 step 		
Measurement	Current <ul style="list-style-type: none"> Phase, Ground Current RMS Input Range: 0.5~250A Accuracy (for In=5) : $\pm 2\%$(0.5~1A), $\pm 0.5\%$(1~6A) Sequence Current <ul style="list-style-type: none"> Positive/Negative/Zero Sequence Current RMS Frequency <ul style="list-style-type: none"> Range: 40Hz~70Hz, Phase A Current Accuracy <ul style="list-style-type: none"> ± 0.03Hz at Nominal current input 		
Programmable Logic	Contact Output, LED <ul style="list-style-type: none"> Logic : OR8 (8 input OR), HALF-OR8 (Non inverting 4 input & inverting 4 input OR), AND8 (8 input AND), HALF-AND8 (Non inverting 4 input & inverting 4 input AND) Reference : Logic Input Diagram Self (latched until delay timer is expired), Manual (latched until annunciator reset is issued) 0.00~60.00sec(0.01sec step) Contact Input <ul style="list-style-type: none"> Function : Not Connected, CB Open, CB Close, Remote Annunciator Reset, Protection Block, General Input 		

MCRC (OCR/OCGR)

External Connection Diagram



Description	No
IA+	16
IB+	17
IC+	18
IN+	19
--	20
TS1_COM	21
TS2_COM	22
TS3_COM	23
TS4_COM	24
TS4_NC	25
DI1_COM	26
DI2_COM	27
PWR+	28
PWR-	29
FG	30

No	Description
1	IA-
2	IB-
3	IC-
4	IN-
5	--
6	TS1_NO
7	TS2_NO
8	TS3_NO
9	TS3_NC
10	TS4_NO
11	DI1_P
12	DI2_P
13	DI3_P
14	DI4_P
15	DI3_4_COM

MCRC-U (OCR/SGR)

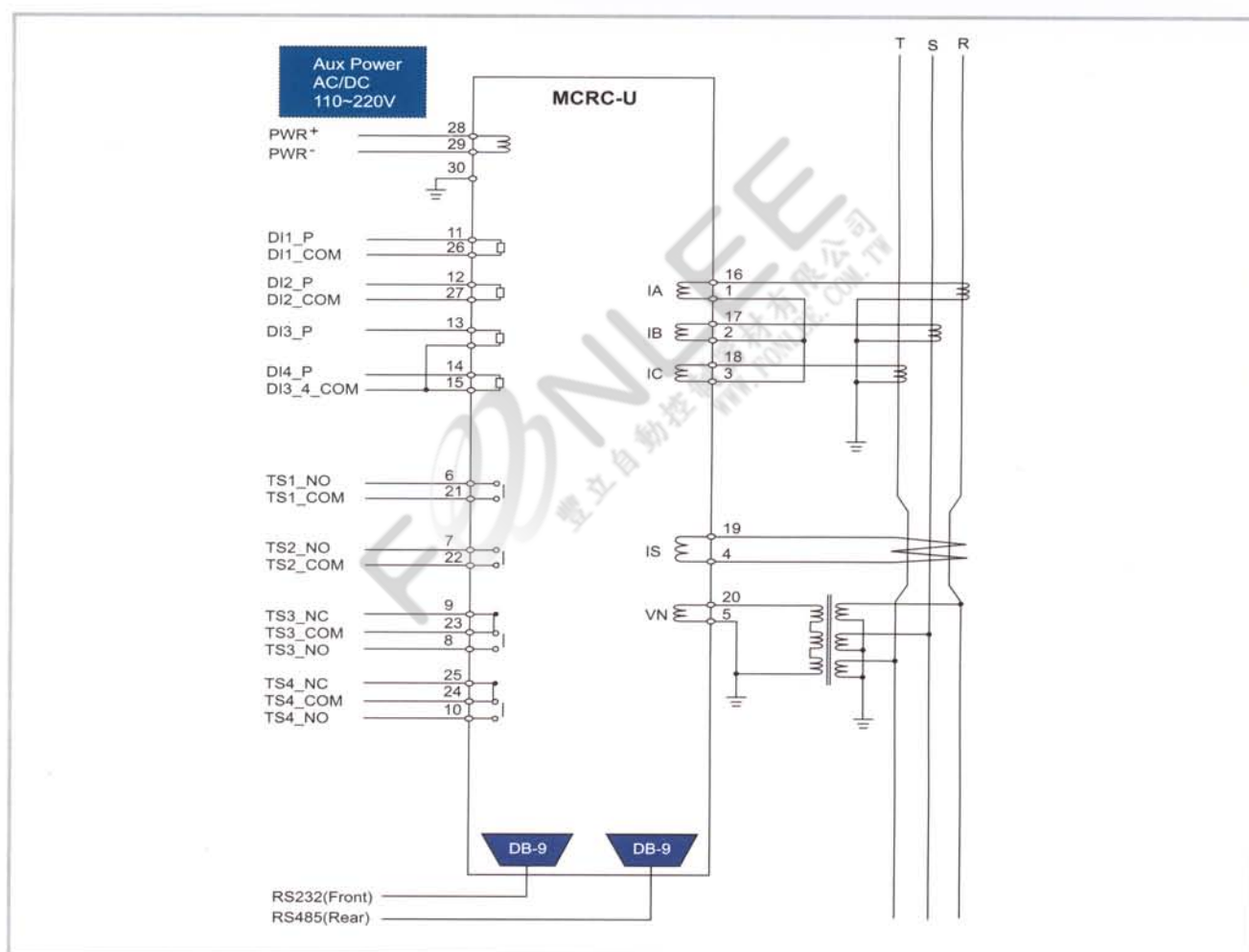
Technical Data

Definite/Inverse Time OCR, NSOCR, UCR, Thermal Overload, SGR, OVGR

Protection	Definite Time Over Current (50_1, 50_2)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Operating Delay : 0.00~60.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Inverse Time Over Current (51)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Time Multiplier : 0.01~10.00sec, 0.01 step Trip Characteristic Curve <ul style="list-style-type: none"> IEC 60255-3 ANSI/IEEE, KEPCO 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Negative Phase Sequence Over Current (46)	Setting <ul style="list-style-type: none"> Pickup Current : 0.50~100.00A, 0.05 step Operating Delay : 0.00~180.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec
	Under Current (37)	Setting <ul style="list-style-type: none"> Pickup Current : 0.10~5.00A, 0.05 step Operating Delay : 0.00~180.00sec, 0.01 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 3% or ± 35msec of setting value @ 0xPickup current, delay time 0.00~0.03 Dropout Level: 102~104% of pickup current Dropout Time: < 40msec
	Thermal Overload (49)	Setting <ul style="list-style-type: none"> K-Factor for IEC 60255-8 : 0.10~4.00, 0.01 step Time Constant(τ) : 1.0~999.9min, 0.1 step Thermal Alarm : 50~100%, 1 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 2% of setting value or 70mA Operating Time : 10% or ± 2sec of setting value Dropout Level: 98~100% of Thermal
	Sensitive Ground Over Current (67N)	Setting <ul style="list-style-type: none"> Pickup Current: 1~999mA, 1 step Pickup Voltage: 5~170V, 1 step Operating Delay : 0.00~60.00sec, 0.01 step Direction : Disable/Forward/Reverse Maximum Torque Angle : -90~90°, 1 step 	Accuracy <ul style="list-style-type: none"> Pickup Current: 3% of setting value or 0.2mA Operating Time : 3% or ± 35sec of setting value @ 2xPickup current, delay time 0.00~0.03 Dropout Level: 96~98% of pickup current Dropout Time: < 40msec Angle Accuracy: $\pm 3^\circ$
	Ground Over Voltage (59G_1, 59G_2, 59G_3)	Setting <ul style="list-style-type: none"> Pickup Voltage: 5~170V, 1 step Time Multiplier : 0.01~10.00, 0.01 step Operating Delay (DT) : 0.00~60.00sec, 0.01 step Trip Characteristic Curve <ul style="list-style-type: none"> Trip Inverse, Alarm Inverse 	Accuracy <ul style="list-style-type: none"> Pickup Voltage: 2% of setting value Operating Time : 3% or ± 35sec of setting value @ 2xPickup Voltage, delay time 0.00~0.03 Dropout Level: 96~98% of pickup Voltage Dropout Time: < 40msec

Circuit Breaker Control	Setting <ul style="list-style-type: none"> • Trip Pulse Time 0.1~5.0sec, 0.1 step • Close Pulse Time 0.1~5.0sec, 0.1 step 	
Measurement	Current <ul style="list-style-type: none"> • Phase, Ground Current RMS • Input Range: 0.5~250A • Accuracy (for In=5) : $\pm 2\%(0.5\sim 1A)$, $\pm 0.5\%(1\sim 6A)$ 	Sequence Current <ul style="list-style-type: none"> • Positive/Negative/Zero Sequence Current RMS Frequency <ul style="list-style-type: none"> • Range: 40Hz~70Hz, Phase A Current Accuracy <ul style="list-style-type: none"> • $\pm 0.03Hz$ at Nominal current input
Programmable Logic	Contact Output, LED <ul style="list-style-type: none"> • Logic OR 8 (8 input OR), HALF-OR8 (Non inverting 4 input & inverting 4 input OR), AND8 (8 input AND), HALF-AND8 (Non inverting 4 input & inverting 4 input AND) • Input Reference Logic Input Diagram • Reset Type Self (latched until delay timer is expired), Manual (latched until annunciator reset is issued) • Reset Delay 0.00~60.00sec(0.01sec step) Contact Input <ul style="list-style-type: none"> • Function Not Connected, CB Open, CB Close, Remote Annunciator Reset, Protection Block, General Input 	

External Connection Diagram



Description	No
IA+	16
IB+	17
IC+	18
Is+	19
VN+	20
TS1_COM	21
TS2_COM	22
TS3_COM	23
TS4_COM	24
TS4_NC	25
DI1_COM	26
DI2_COM	27
PWR+	28
PWR-	29
FG	30

No	Description
1	IA-
2	IB-
3	IC-
4	Is-
5	VN-
6	TS1_NO
7	TS2_NO
8	TS3_NO
9	TS3_NC
10	TS4_NO
11	DI1_P
12	DI2_P
13	DI3_P
14	DI4_P
15	DI3_4_COM

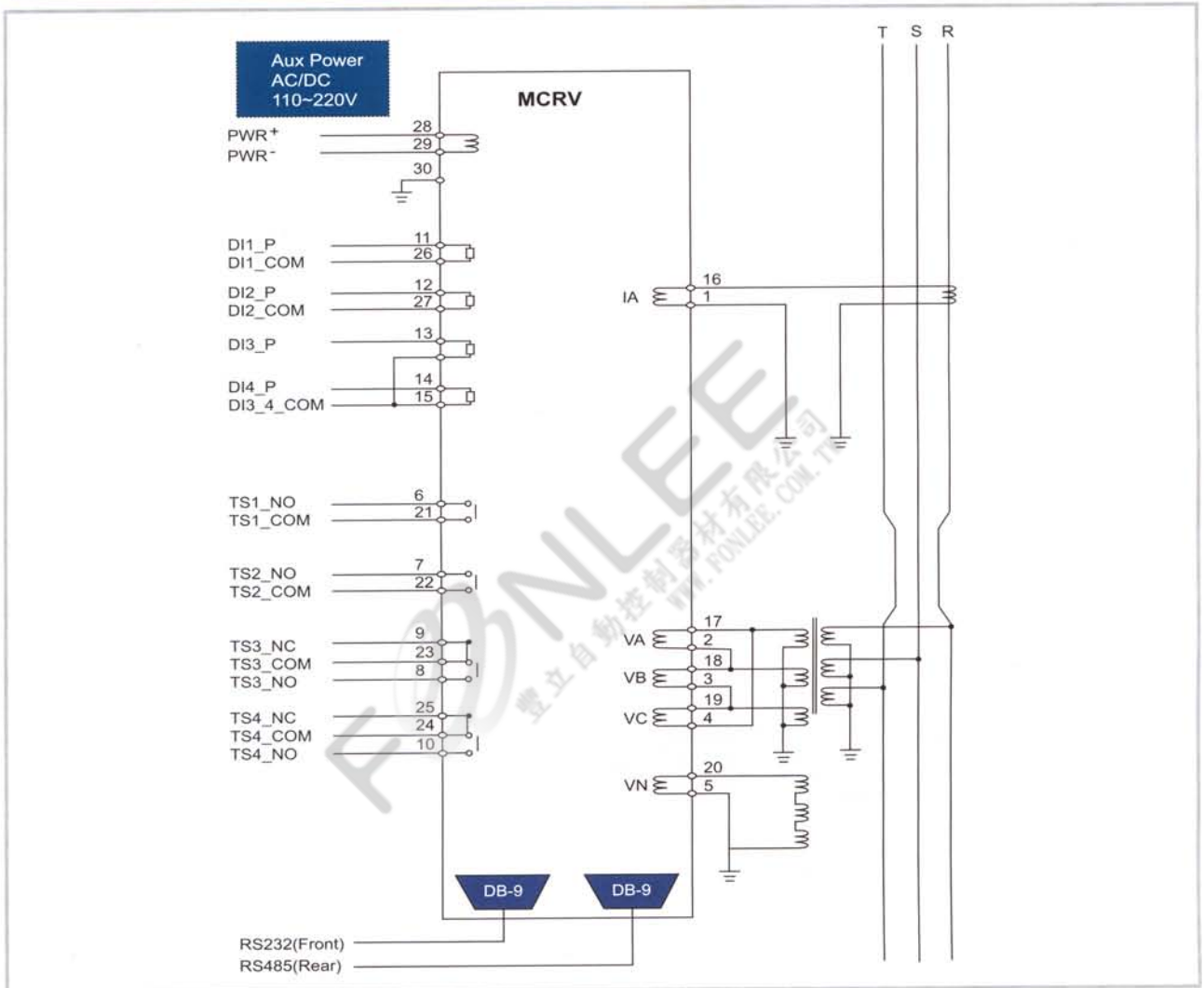
MCRV (OVR/UVR)

Technical Data

OVR, UVR, OVGR, NSOVR, Underfrequency			
Protection	Phase Over Voltage (59_1, 59_2)	Setting <ul style="list-style-type: none"> Pickup Voltage: 5~170V, 1 step Time Multiplier: 0,01~10,00, 0,01 step Operating Delay (DT): 0,00~60,00sec, 0,01 step 	Accuracy <ul style="list-style-type: none"> Pickup Voltage: 2% of setting value Operating Time: 3% or $\pm 35\text{msec}$ of setting value @ 2x Pickup voltage, delay time 0,00~0,03 Dropout Level: 96~98% of pickup voltage Dropout Time: < 40msec
	Phase Under Voltage (27_1, 27_2)	Setting <ul style="list-style-type: none"> Pickup Voltage: 5~170V, 1 step Time Multiplier: 0,01~10,00, 0,01 step Operating Delay (DT): 0,00~60,00sec, 0,01 step 	Accuracy <ul style="list-style-type: none"> Pickup Voltage: 2% of setting value Operating Time: 3% or $\pm 35\text{msec}$ of setting value @ 2x Pickup voltage, delay time 0,00~0,03 Dropout Level: 102~104% of pickup voltage Dropout Time: < 40msec
	Ground Over Voltage (59G_1, 59G_2, 59_3)	Setting <ul style="list-style-type: none"> Pickup Voltage: 5~170V, 1 step Time Multiplier: 0,01~10,00, 0,01 step Operating Delay (DT): 0,00~60,00sec, 0,01 step Trip Characteristic Curve <ul style="list-style-type: none"> Trip Inverse, Alarm Inverse 	Accuracy <ul style="list-style-type: none"> Pickup Voltage: 2% of setting value Operating Time: 3% or $\pm 35\text{msec}$ of setting value @ 2x Pickup voltage, delay time 0,00~0,03 Dropout Level: 96~98% of pickup voltage Dropout Time: < 40msec
	Negative Sequence Over Voltage (47)	Setting <ul style="list-style-type: none"> Pickup Voltage: 5~170V, 1 step Operating Delay (DT): 0,00~60,00sec, 0,01 step 	Accuracy <ul style="list-style-type: none"> Pickup Voltage: 2% of setting value Operating Time: 3% or $\pm 35\text{msec}$ of setting value @ 2x Pickup voltage, delay time 0,00~0,03 Dropout Level: 96~98% of pickup voltage Dropout Time: < 40msec
	Underfrequency (81)	Setting <ul style="list-style-type: none"> Pickup Under Voltage: 5~170V, 1 step Pickup Over Current: 0,5~100,00A, 0,05 step Pickup dF/dT: -10,00~-0,10Hz/s, 0,01 step Pickup Frequency: 45,00~65,00Hz, 0,01 step Operating Delay: 0,00~180,00sec, 0,01 step 	Accuracy <ul style="list-style-type: none"> Pickup Under Voltage: 2% of setting value Pickup Over Current: 2% of setting value Pickup dF/dT: 2% of setting value Pickup Frequency: 0,03Hz Operating Time: 3% or $\pm 35\text{msec}$ of setting value Dropout Level: +0,03Hz of pickup Frequency Dropout Time: < 40msec
Circuit Breaker Control	Setting <ul style="list-style-type: none"> Trip Pulse Time: 0,1~5,0sec, 0,1 step, Close Pulse Time: 0,1~5,0sec, 0,1 step 		
PT Fuse Failure Monitor	Setting <ul style="list-style-type: none"> Positive Seq. UVPickup: 5~170V, 1 step Negative Seq. OVPickup: 5~170V, 1 step Operate Time Delay: 0,00~60,00sec, 0,01 step 		Accuracy <ul style="list-style-type: none"> Operating Time Accuracy: 3% or $\pm 35\text{msec}$ of setting value
Measurement	Voltage <ul style="list-style-type: none"> Line to Line Voltage, Phase, Ground Voltage RMS Input Range: 0,5~220V Accuracy (for In=5): $\pm 2\%$(0,5~1V), $\pm 0,5\%$(1~220V) 		Sequence Voltage <ul style="list-style-type: none"> Positive/Negative/Zero Sequence Voltage RMS Frequency <ul style="list-style-type: none"> Range: 40Hz~70Hz, Phase A Voltage Accuracy <ul style="list-style-type: none"> $\pm 0,03\text{Hz}$ at Nominal Voltage input
Programmable Logic	Contact Output, LED <ul style="list-style-type: none"> Logic: OR8 (8 input OR), HALF-OR8 (Non inverting 4 input & inverting 4 input OR), AND8 (8 input AND), HALF-AND8 (Non inverting 4 input & inverting 4 input AND) Input: Reference Logic input Diagram Reset Type: Self (latched until delay timer is expired), Manual (latched until annunciator reset is issued) Reset Delay: 0,00~60,00sec(0,01sec step) Contact Input <ul style="list-style-type: none"> Function: Not Connected, CB Open, CB Close, Remote Annunciator Reset, Protection Block, General Input 		

MCRV (OVR/UVR)

External Connection Diagram



Description	No
IA+	16
VA+	17
VB+	18
VC+	19
VN+	20
TS1_COM	21
TS2_COM	22
TS3_COM	23
TS4_COM	24
TS4_NC	25
DI1_COM	26
DI2_COM	27
PWR+	28
PWR-	29
FG	30

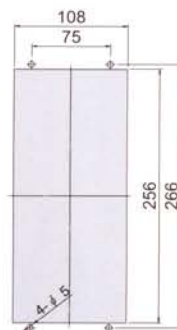
No	Description
1	IA-
2	VA-
3	VB-
4	VC-
5	VN-
6	TS1_NO
7	TS2_NO
8	TS3_NO
9	TS3_NC
10	TS4_NO
11	DI1_P
12	DI2_P
13	DI3_P
14	DI4_P
15	DI3_4_COM

MCR - Series

Dimensioned Drawings



TOP VIEW



PANEL CutOut



FRONT VIEW



SIDE VIEW



REAR VIEW

Logic Configuration

Logic Design (Contact Output & LED)

