

TOYO

Digital Type Multi-function Relay



F50 Digital Multi-function Relay

Feeder Protection Relay

(50/51, 50N/51N, 67N, 67G, 59, 27, 64, 47N, 46U, 49, 48/51LR)

TOYO-F50 is feeder protection relay that is designed and manufactured for use to the distribution line, transformer backup protection / control / monitoring, regardless of grounding(solid-grounding, nongrounding, resistance grounding) of power system. Also, it is designed and manufactured for fault, it can protect the device and electric line by line open or alarm.

■ Specification

Item \ Type		TOYO-F50		
Application		Feeder Protection		
Aux Power	Rated Volt	AC/DC 110 ~ 220V (88~264V)		
	Burden	Operation : 50W or less, Always: 30W or less		
Frequency		50Hz or 60Hz (Configurable)		
Display		Character LCD (4lines × 20characters)		
Input/Output	Digital Input	AC/DC 110 ~ 220V (Von ≥ 90V, Voff ≤ 70V)		
	Digital Output	Trip (1a×3)	Closing Capacity : 16A at AC 250V, 30A at DC 125V, Resistive load	
		Alarm (1a×6, 1b×1)	Closing Capacity : 5A at AC 250V, 10A at DC 125V, Resistive load	
	Analog Input	Current : 3Circuits, Ground Current : 1Circuit, Zero-seq Current : 1Circuit, Volt : 3Circuits, Ground Volt : 1Circuit		
		Current	Rated	AC 5A
			Burden	< 0.5VA / Phase
		Zero-seq current	Rated	AC 1.5mA
			Burden	< 0.5VA
		Voltage	Rated	AC 63.5 ~ 110V
			Burden	< 0.5VA / Phase
		Ground Voltage	Rated	AC 190V
	Burden		< 0.5VA	
Communication	Protocol	Modbus RTU		
	RS-485	1 Port (rear)		
	USB	1 Port (front)		
Self-Diagnosis		DC Power, CPU Watchdog, Memory, Setting, AD Converter, DO/I Circuit, Calibration		
Records	Event	Max. 1,024EA		
	Waveform	Max. 6EA (168cycle, 2.8sec)		
ZCT Type		ZS Type (200mA / 1.5mA)		
Standard		JEC1120, IEC60255		
Dimensions (W x H x D:mm)		164 × 218 × 223.5		
Weight		≒ 5kg		

Operation Characteristic

Relay Element		Operation Mode		Opreation Value		Opreation Time Characteristic		
				Value Setting Range	Value Unit	Time Setting Range	Time Unit	Time Characteristic
50/51	OCR	Instantaneous		1.0 ~ 100.0A	0.5A	—	—	INST (≤40ms)
						0.04 ~ 60.00sec	0.01sec	DT
		Time Delay		0.2 ~ 16.0A	0.1A	0.05 ~ 10.00 (Lever)	0.05	NI, VI, EI, LI
						0.04 ~ 60.00sec	0.01sec	DT
50N/51N	OCGR	Instantaneous		0.5 ~ 50.0A	0.1A	—	—	INST (≤40ms)
						0.04 ~ 60.00sec	0.01sec	DT
		Time Delay		0.1 ~ 10.0A		0.05 ~ 10.00 (Lever)	0.05	NI, VI, EI, LI
						0.04 ~ 60.00sec	0.01sec	DT
67N	DOCGR	Instantaneous	OP Current	0.5 ~ 50.0A	0.1A	—	—	INST (≤40ms)
			OP Voltage	5 ~ 170V	1V			
			REF Ang	−90 ~ +90°	1°			
			OP Ang	REF Ang ±90°	—			
		Time Delay	OP Current	0.1 ~ 10.0A	0.1A	0.05 ~ 10.00 (Lever)	0.05	NI, VI, EI, LI
			OP Voltage	5 ~ 170V	1V			
			REF Ang	−90 ~ +90°	1°			
			OP Ang	REF Ang ±90°	—			
67G	SGR	Time Delay	OP Current	0.9 ~ 250.0mA	0.1mA	0.05 ~ 10.00 (Lever)	0.05	NI
			OP Voltage	5 ~ 170V	1V			
			REF Ang	−90 ~ +90°	1°			
			OP Ang	REF Ang ±90°	—	0.04 ~ 60.00sec	0.01sec	DT
59	OVR	Time Delay		5 ~ 170V	1V	0.05 ~ 10.00 (Lever)	0.05	NI
						0.04 ~ 60.00sec	0.01sec	DT
27	UVR	Time Delay		5 ~ 170V	1V	0.05 ~ 10.00 (Lever)	0.05	NI
						0.04 ~ 60.00sec	0.01sec	DT
64	OVGR	Instantaneous		10 ~ 170V	1V	—	—	INST (≤40ms)
						0.04 ~ 60.00sec	0.01sec	DT
		Time Delay		5 ~ 170V		0.05 ~ 10.00 (Lever)	0.05	NI_TRIP, NI_ALARM
						0.04 ~ 60.00sec	0.01sec	DT
47N	NSOVR	Time Delay		5 ~ 170V	1V	0.04 ~ 60.00sec	0.01sec	DT
46U	UBOCR	Time Delay	Neg I2 / Pos I1	2 ~ 80%	1%	0.04 ~ 60.00sec	0.01sec	DT
			Min I1	0.50 ~ 5.00A	0.01A			
49	THERMAL	K-Factor		0.10 ~ 4.00	0.01	—	—	Thermal Hot Curve Thermal Cold Curve
		TH Time (τ)		1.0 ~ 999.9min	0.1min			
		TH Cool (τ)						
		Alarm Level		Trip Level 40 ~ 100%	1%			
48/51LR	STALL	Time Delay		1.0 ~ 100.0A	0.5A	0.04 ~ 300.00sec	0.01sec	DT
	LOCK ROTOR	Time Delay	0.05 ~ 10.00 (Lever)			0.05	VI, EI	
			0.04 ~ 300.00sec			0.01sec	DT	

Measurement

The measurement range is the range that can be measured on the secondary side, and if you enter the CT(NCT), ZCT, VT(EVT) ratios, it is displayed as the primary side size.

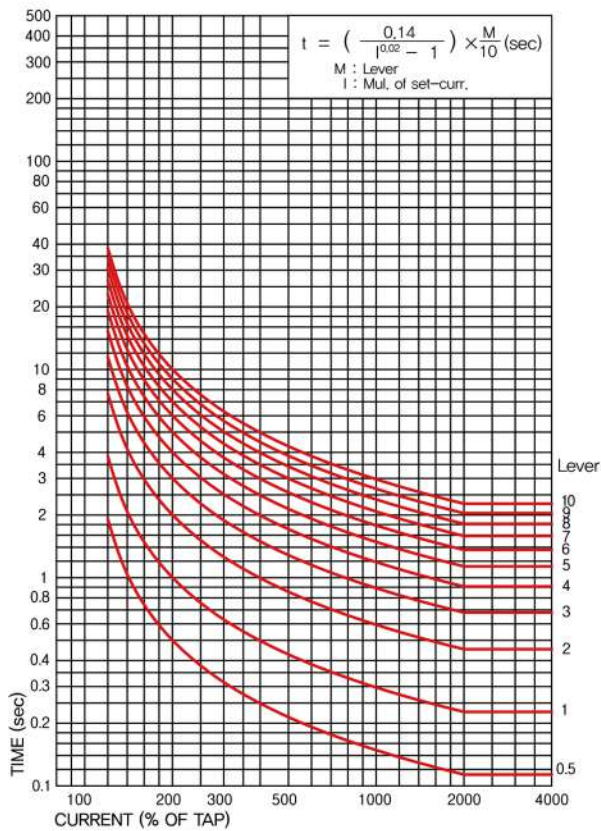
Measurement Item		Measurement Range
RMS current & phase	Ia, Ib, Ic, In	0 ~ 250.000A, 0.0 ~ 359.9°
Residual current (ZCT sec.) RMS & phase	Is	0 ~ 650.00mA, 0.0 ~ 359.9°
Phase / line voltage RMS & phase	Va, Vb, Vc, Vab, Vbc, Vca	0 ~ 300.00V, 0.0 ~ 359.9°
Ground voltage RMS & phase	Vn	0 ~ 300.00V, 0.0 ~ 359.9°
Frequency (phase-A voltage)	Freq	30.000 ~ 100.000Hz
Per phase / 3φ Power factor	PFa, PFb, PFc, PFt	Lead 0.000 ~ 1.000 ~ Lag 0.000
Per phase / 3φ active power Per phase / 3φ reactive power Per phase / 3φ apparent power	Watt_Pa, Watt_Pb, Watt_Pc, Watt_Pt, var_Qa, var_Qb, var_Qc, var_Qt, VA_Sa, VA_Sb, VA_Sc, VA_St	0 ~ 999.99MW / Mvar / MVA (Per Phase) 0 ~ 999.99MW / Mvar / MVA (3φ)
3φ active power energy 3φ reactive power energy 3φ apparent power energy	kWh kvarh kVAh	0 ~ 999.99MWh 0 ~ 999.99Mvarh 0 ~ 999.99MVAh
Sequence currents RMS & phase	I0, I1, I2	0 ~ 250.000A, 0.0 ~ 359.9°
Sequence voltages RMS & phase	V0, V1, V2	0 ~ 300.00V, 0.0 ~ 359.9°
Line thermal load indication (THERMAL)	%Q	0 ~ 250.00%

Terminal

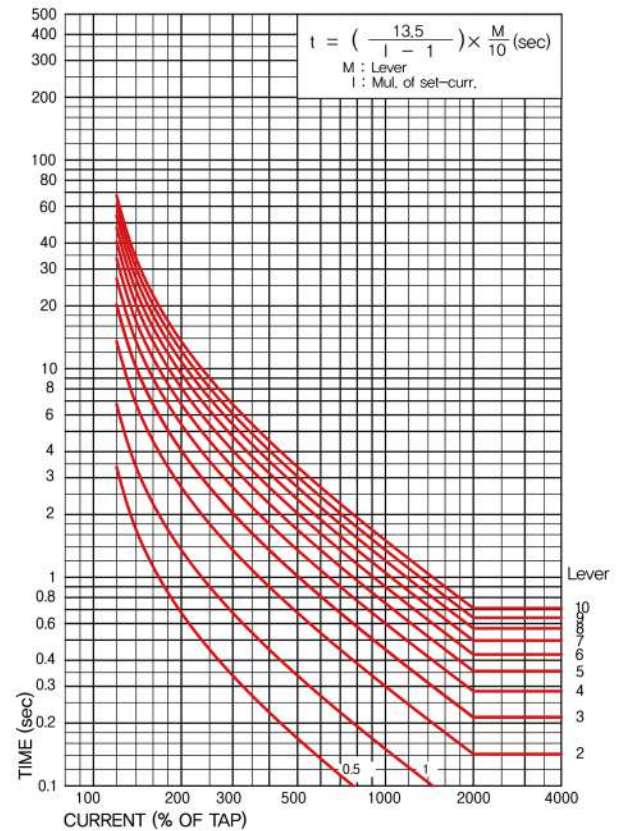
Terminal	T1 No.		Terminal	Terminal	T2 No.		Terminal
D/O1_NO	1	2	D/O1_COM	IA+	31	32	IA-
D/O2_NO	3	4	D/O2_COM	IB+	33	34	IB-
D/O3_NO	5	6	D/O3_COM	IC+	35	36	IC-
D/O4_NO	7	8	D/O5_NO	IN+	37	38	IN-
D/O6_NO	9	10	D/O4~6_COM	VA+	39	40	VA-
D/O7_NO	11	12	D/O8_NO	VB+	41	42	VB-
D/O9_NO	13	14	D/O7~9_COM	VC+	43	44	VC-
D/O10_NC	15	16	D/O10_COM	VN+	45	46	VN-
D/I1 (52a Input)	17	18	D/I2 (52b Input)	IS+	47	48	IS-
D/I3 (Remote Reset)	19	20	D/I1~3_COM	-	49	50	-
Aux. Power+	21	22	F.G	RS-485+	51	52	RS-485-
Aux. Power-	23	24	CHASSIS	RS-485_COM	53	54	F.G

■ Operation Characteristic Curves

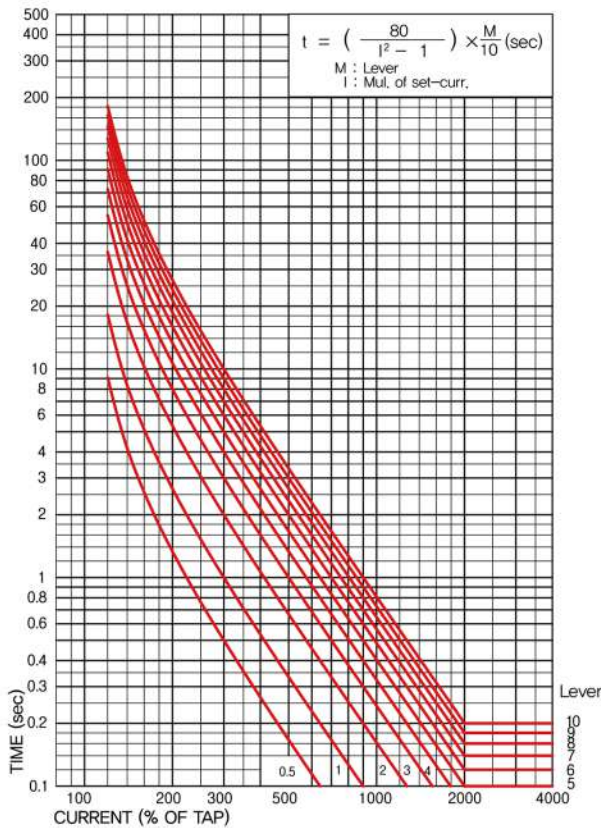
Normal Inverse



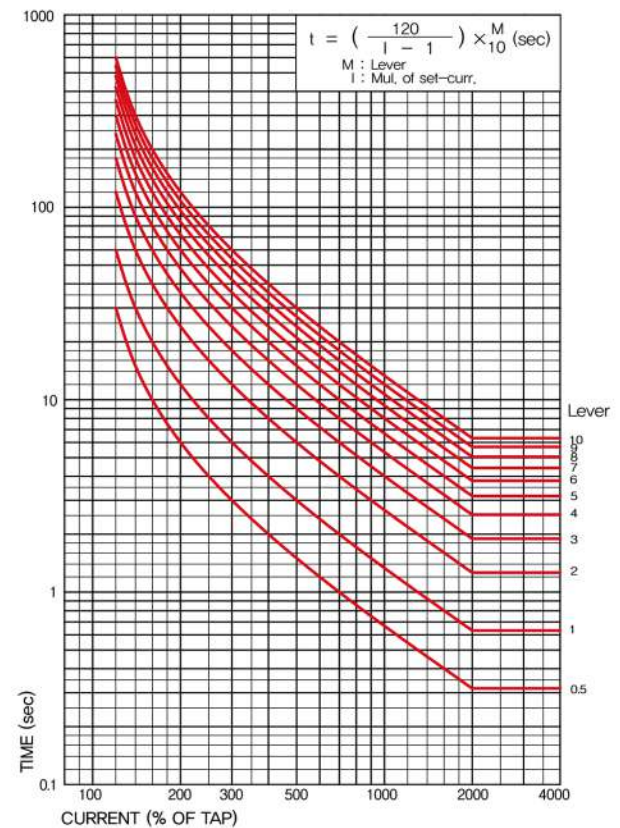
Very Inverse



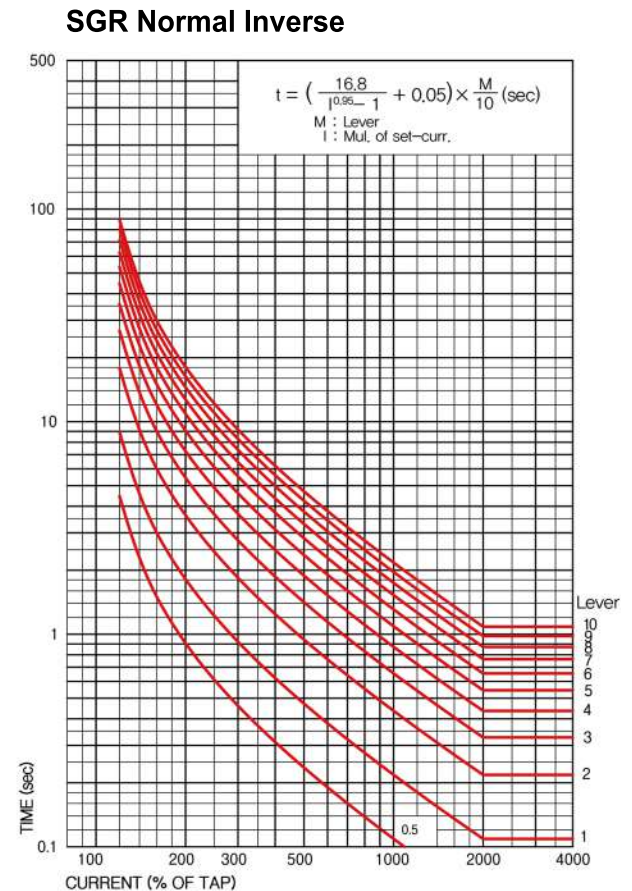
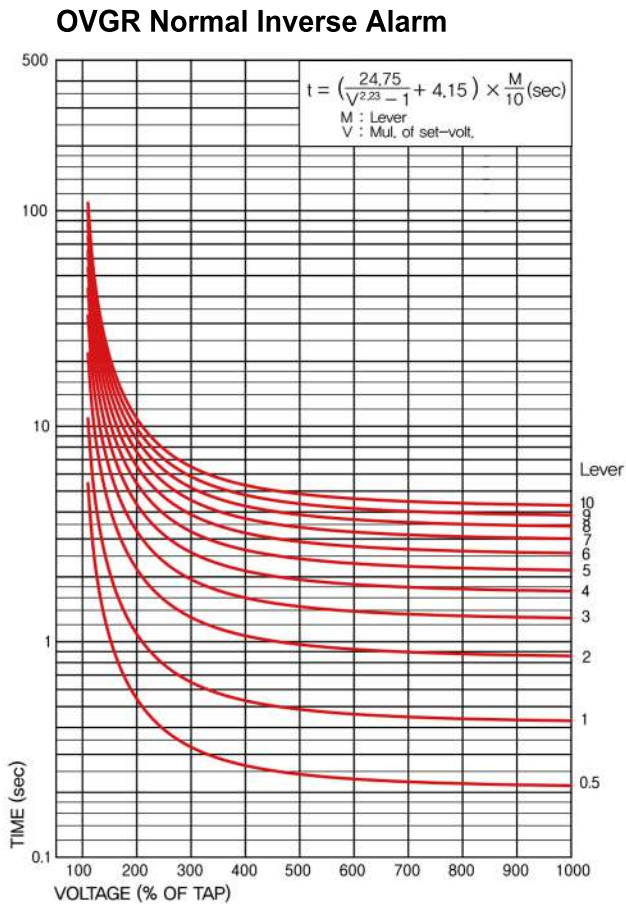
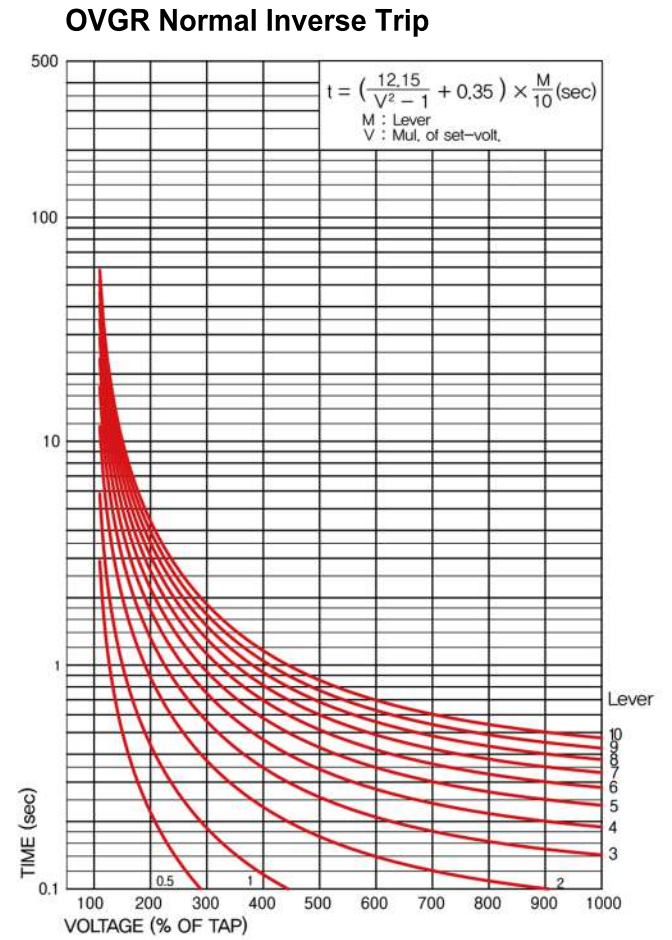
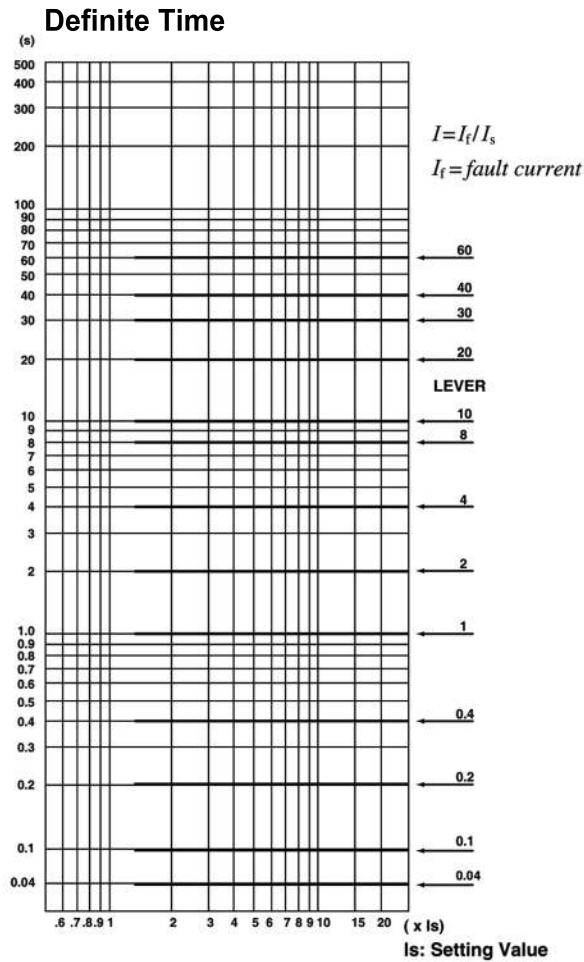
Extremely Inverse



Long Time Inverse

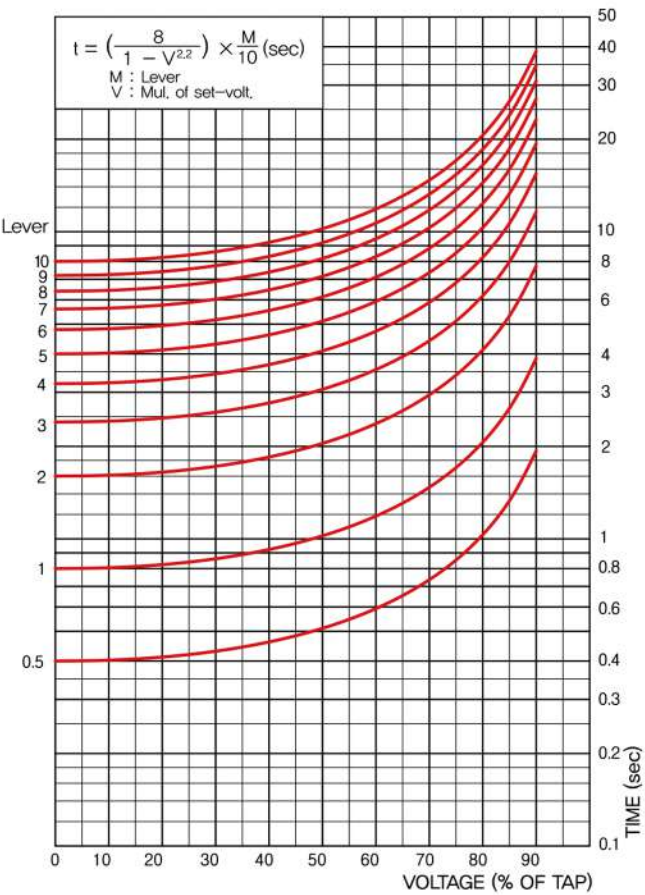


Operation Characteristic Curves

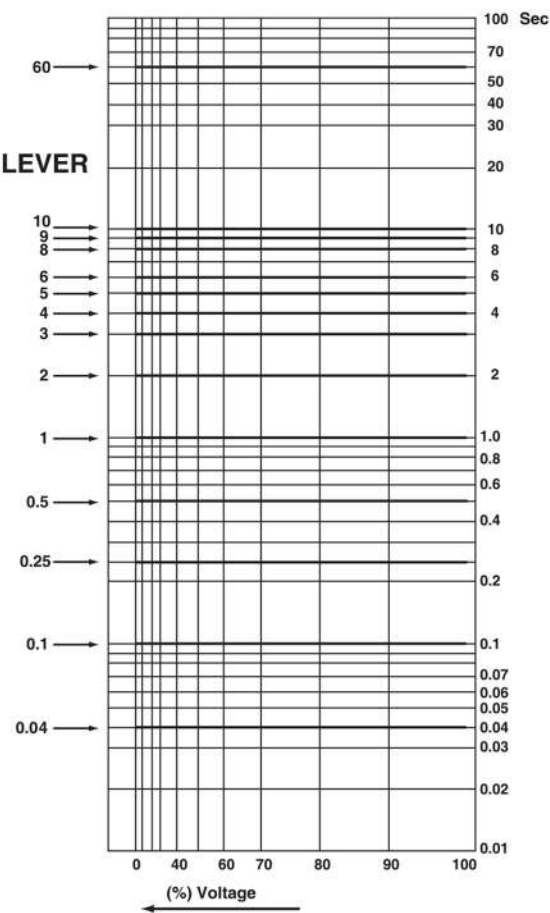


Operation Characteristic Curves

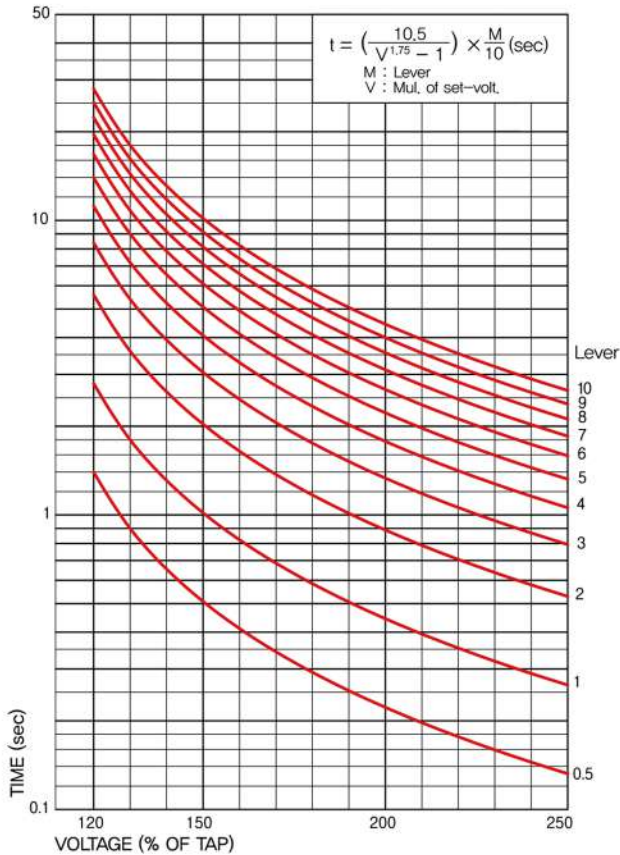
UVR Normal Inverse



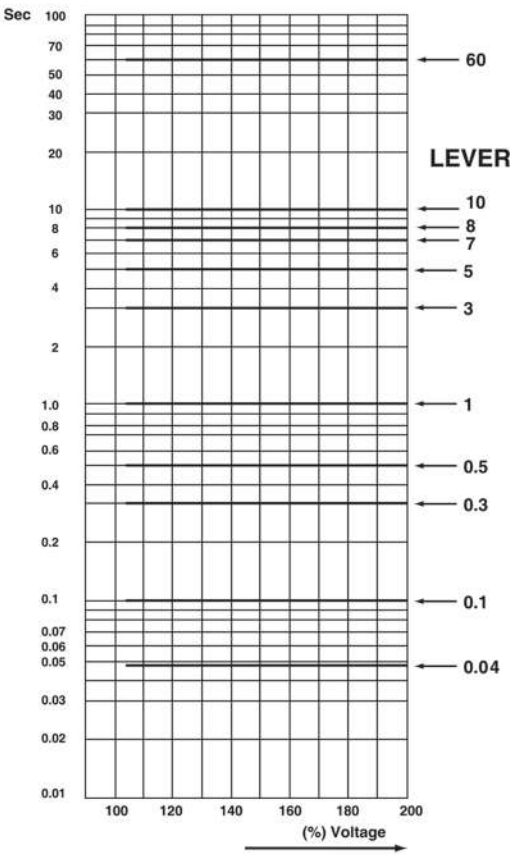
Under voltage relay (Definite time)



OVR Normal Inverse

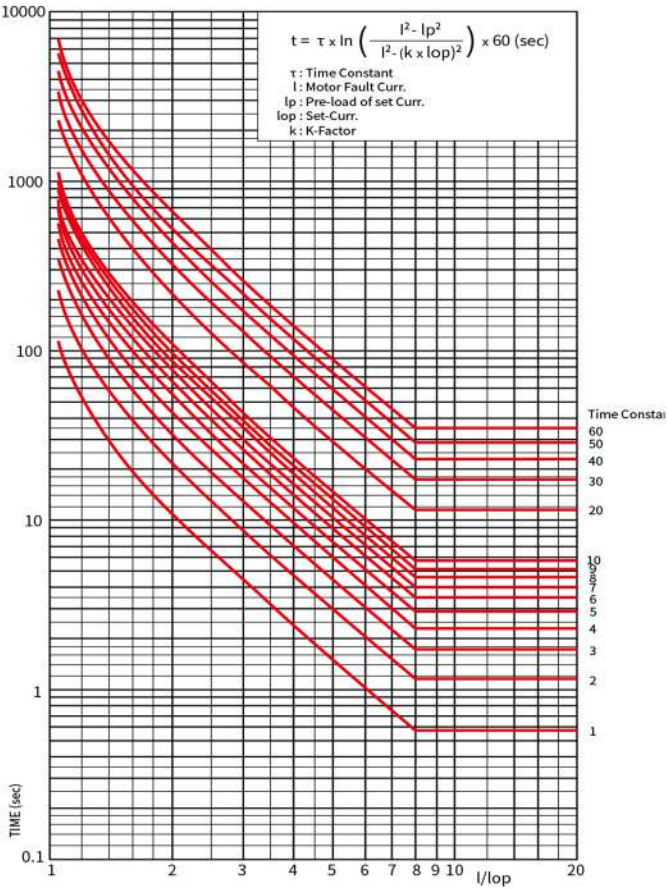


Over coltage relay (Definite time)

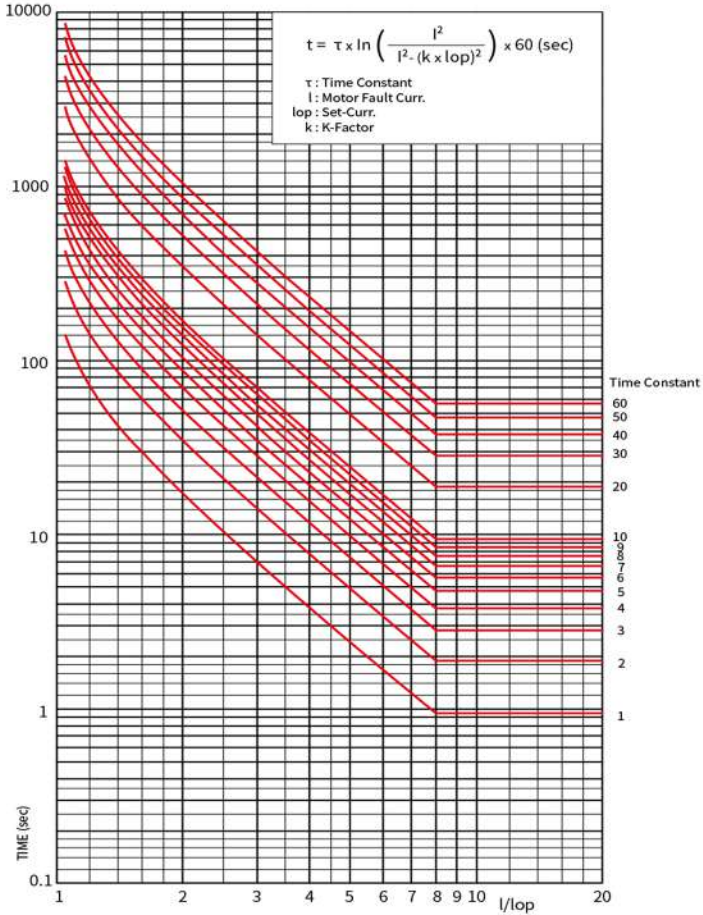


Operation Characteristic Curves

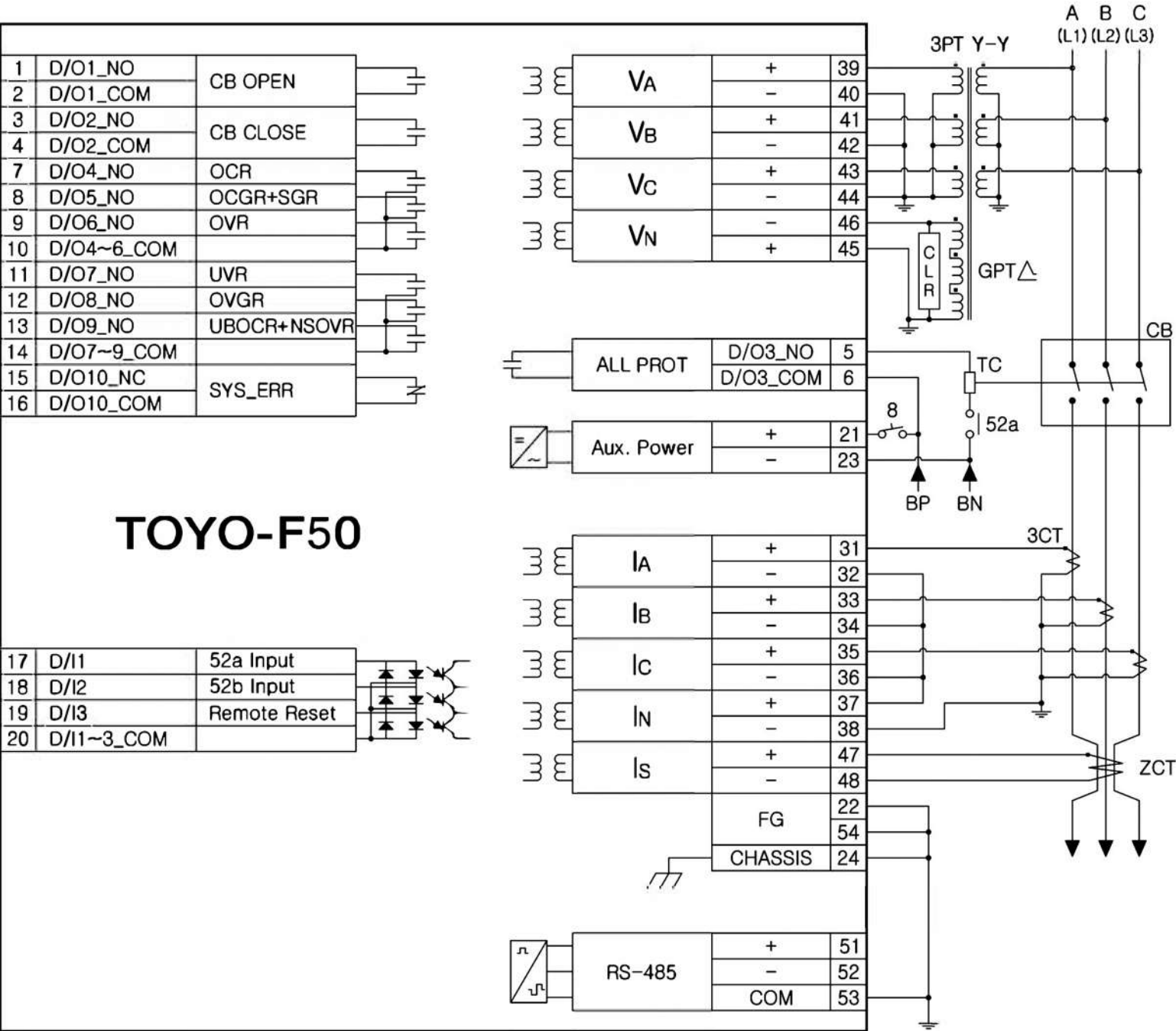
Thermal Hot Curve



Thermal Cold Curve



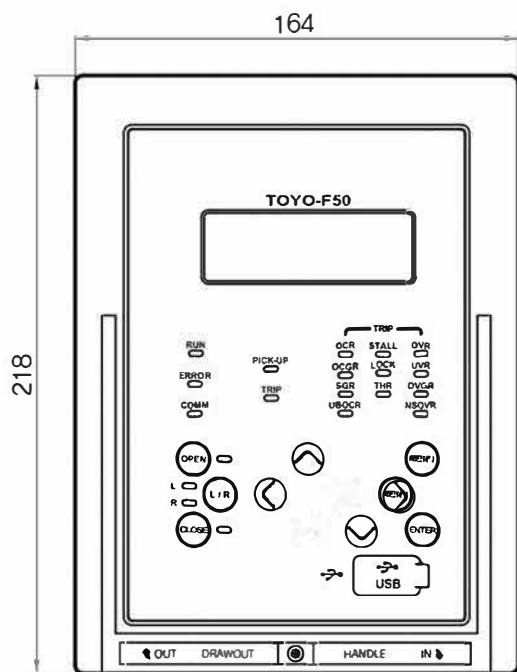
External Connection



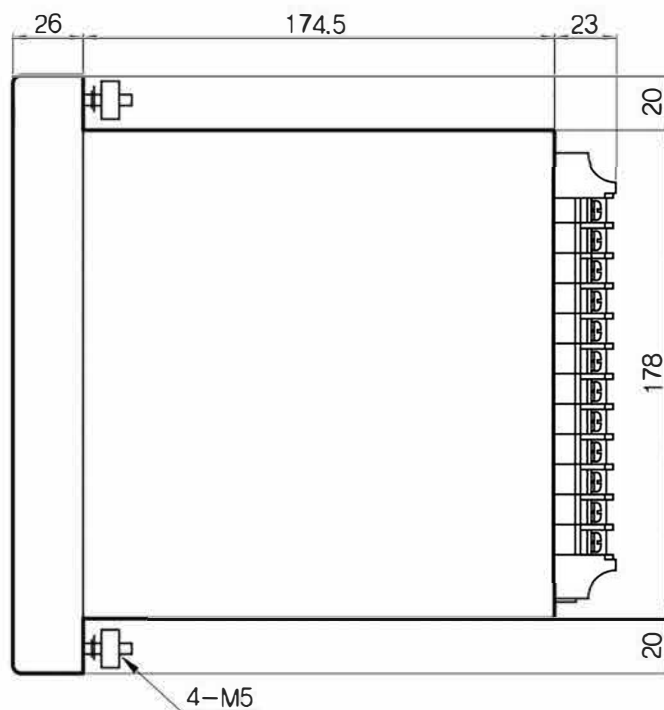
Dimension

(Unit : mm)

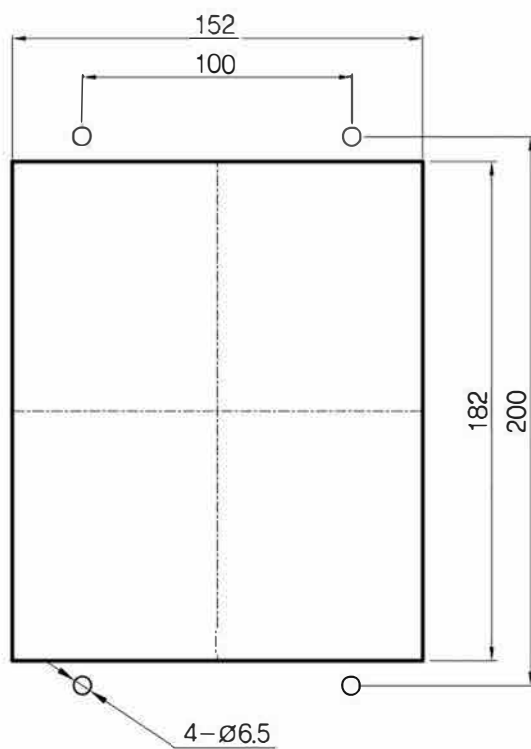
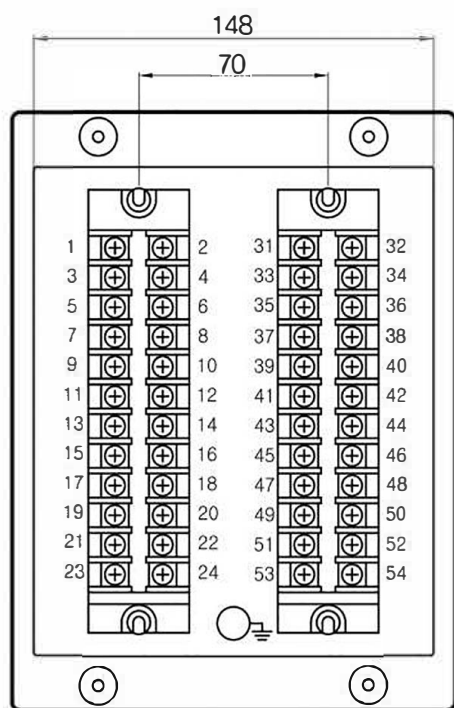
Front



Side



Panel cutout



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