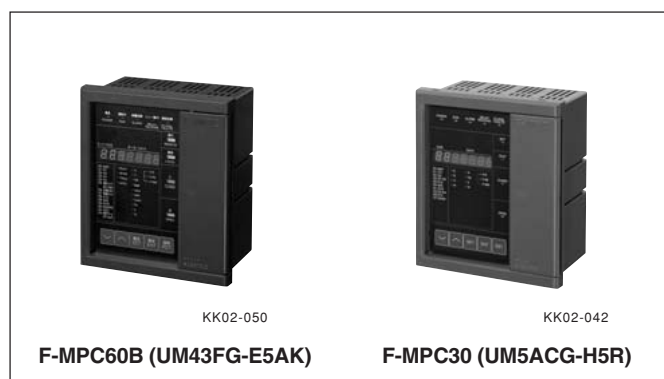


**Multiple function protectors and controllers
F-MPC60B, F-MPC30 series**

■ **Description**

- FUJI multiple function protector and controller (F-MPC) performs energy control to contribute to energy-saving. The F-MPC60B and F-MPC30 are a kind of multifunctional digital relays.
- Although these series are very compact, they integrate multiple functions in a compact body, such as protection, measurement, operation, and monitoring of high-voltage power distribution and switching facilities. They can also transmit data obtained from these functions to upper level controllers.



■ **Functions**

The functions of F-MPC60B and F-MPC30 series are listed below.

Series		F-MPC60B	F-MPC30
Type		UM43FG-E5AK	UM5ACG-H5R
Installation location		Receiving or feeder	Feeder
Application (phase: line)		3:3, 3:4	3:3, 3:4
VT voltage	Input	2VT/3VT star	—
	Voltage indication	Between phases, between lines	—
Ground fault system	System type	Direct/resistance	Direct/resistance
	IO detection	①Residual (3XCT) ②Tertiary winding (100/5A) ③ZCT (5 to 100/5A) ④ZCT (5 to 400/5A) ⑤ZCT (200/1.5mA) ⑥ZCT (100/1A) or (70/1A) or secondary I input (0.002 to 0.4A)	○ ○ ○ ○ — —
E0 detection * Feeder: Depending on MN signal.	EVT (3Ry= 110V)	—	—
	EVT (3Ry= 190V)	—	—
	ZPD-1 (FUJI-made)	—	—
	MN signal output	—	—
	MN signal input	—	—
Protective characteristic (current)	SI, VI, LT, EI, I ² t	○	○ (without I ² t)
	DT1 (short-time)	○	○
	DT2 (definite-time)	○	○
Control voltage	Rating	100V DC	100/200V DC
	Allowable range	80 to 143V DC	80 to 286V DC
Transducer output selection	No. of output pole	6	—
	(Function and terminal)	Select	—
No. of DI/DO		8 : 8	1 : 3
No. of CPU		2	1
External plug		—	○
CB close/open	CB making slow-down monitoring function	○	—
	Harmonic voltage (3, 5, 7, Total)	—	—
	Harmonic current (3, 5, 7, Total)	○	—
	Demand current	○	—
Display mode	All or part: changeable	○	— (All only)

○ Available — Not available

Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC60B, F-MPC30

■ Functions (continued)

Series			F-MPC60B	F-MPC30	
Type			UM43FG-E5AK	UM5ACG-H5R	
Installation location			Receiver or feeder	Feeder	
Protection	Overcurrent Instantaneous	50	○	○	
	Overcurrent Short-time	51DT1	○	○	
	Overcurrent Definite-time	51DT2	○	○	
	Overcurrent Inverse-time *1	51	○	○*2	
	Ground-fault Instantaneous	50G	○	○	
	Overcurrent Inverse-time *2	51G	○	○	
	Ground fault directional	67			
	Phase-loss	46	○*3		
	Inverse-phase	47	○*3		
	Voltage established	84			
	Undervoltage	27	○		
	Overvoltage	59	○		
	Ground-fault overvoltage	64			
	Current prealarm	OCA	○	○	
	Ground-fault current prealarm	OCGA	○	○	
	Measurement	Current (r, s, t)	A	○	○
		Voltage (line)	V	○	
Voltage (phase)			○		
Active power (±)		W	○		
Reactive power (±)		Var	○		
Power-factor (±)		PF	○		
Frequency		Hz	○		
Active electric energy (+)		WHM	○		
Active electric energy (-)		WHM	○		
Reactive electric energy (+)		VarH	○		
Reactive electric energy (-)		VarH	○		
Ground fault (zero-phase) voltage		V0			
Ground fault (zero-phase) current		A0	○	○	
Harmonic current (3, 5, 7, Total)		HA	○		
Harmonic voltage (3, 5, 7, Total)		HV			
Demand current (r, s, t)		DA	○		
Demand active power		DW	○		
Max. zero-phase current value			○	○	
Max. zero-phase voltage value					
Max. demand current value (r, s, t)			○		
Max. demand power			○		
Total electric energy (+)			○		
Total electric energy (-)			○		
Min. voltage value (between lines)		○			
Preventive maintenance	50(INST)	number of operation	○	○	
	51DT1	number of operation	○	○	
	51DT2	number of operation	○	○	
	51	number of operation	○	○	
	67DG	number of operation			
	50G	number of operation	○	○	
	51G	number of operation	○	○	
	OCA	number of operation	○	○	
	OCGA	number of operation	○	○	
	Phase loss	number of operation			
	Inverse phase	number of operation			
	27	number of operation	○		
	59	number of operation	○		
	64	number of operation			
	84 (VR)	number of operation			
	84 (VR)	operating time	○	○	
	84 (VR)	No. of making/breaking	○	○	

*1 with SI, VI, LT, EI, and I²t characteristics *3 Available for version 1 or later.

*2 with SI, VI, LT, and EI characteristics

○ Available — Not available

**Multiple function protectors and controllers
F-MPC60B series, UN43FG-E5AK**

■ Description

Although the F-MPC60B series is very compact, it integrates multiple functions in one body, such as protection, measurement, operation, and monitoring of high-voltage power distribution and switching facilities. It can also transmit the data obtained with these functions to upper level controllers.

■ Features

Flexibility

In accordance with changes in circuit conditions such as CT ratio, the setting of the F-MPC60B can be easily changed.

Improved maintainability

Preventive maintenance and fault analysis can be easily made with the functions that display operation history and fault data.

High reliability

To prevent operation errors such as circuit disconnection, the F-MPC60B series has dual CPUs that check with each other for confirmation and dual output circuits from which output signals are always checked.



RS-485 communication interface

Two protocol types are available: MPC-Net protocol and MODBUS protocol.*

Note: * MODBUS protocol is available for version 1 or later.

■ Specifications

• General specifications

Type		UM43FG-E5AK
Control power supply		100V DC (80 to 143V)/ 100V AC (85 to 132V) common use
Control power consumption		Max. 15W
Power consumption of CT, VT		Max. 1.0VA
Rated current (CT secondary current)		5A AC ("1A AC" model is also available (non-standard).)
Rated voltage	Line voltage	Select "110V AC" or "110×√3 AC" (VT secondary voltage)
	Phase voltage	Select "110V/√3 AC" or "110V AC" (VT secondary voltage)
Zero-phase current		5A AC
Insulation resistance		10MΩ (min.) between ground and electric circuits connected together
Vibration resistance		16.7Hz 1.96m/s ² , 0.4mm double amplitude, 10 minutes each in X, Y, and Z directions
Shock resistance		300m/s ² , three times each in X, Y, and Z directions
Dielectric strength		2kV AC 1 minute. between ground and electric circuits connected together, excluding, RS-485 signal, MN signal, and kWh-pulse output signal cables
Noise immunity		JEC2500 (conforming to ANSI), square wave, 1.5kV, 1ns/1μs, for 10 minutes.
Overload resistance		CT circuit: 40 × rated value, for 1s, 2 times VT circuit: 1.25 × rated value, for 10s
Lightning impulse noise resistance		5.0kV (between ground and electrical circuits connected together)
Dropout tolerance		20ms (Operation continues, however, display goes out.)
Electrostatic discharge		Contact discharge: ±8kV Aerial discharge: ±15kV
Ambient temperature		Operating: -10 to + 60°C (operation guaranteed) 0 to + 40°C (characteristics guaranteed) (no icing) *1 Storage: - 20 to + 70°C (no icing)
Humidity		20 to 90% RH (no condensation)
Atmosphere		Free from corrosive gases and excessive dusts or particles
Grounding		Class D grounding (100Ω or less)
Applicable standard		JEC2500 (Protective relays for electric power systems), JEC-2510 (Overcurrent relays), JEC-2511 (Voltage relays), JIS C4602 (Overcurrent relays for 6.6kV receiving), JIS C1102-1 to -9 (Direct acting analogue electrical instrument and their accessories), IEC255-3 (1989), -5, -6
Mass		1.4kg

*1: The operation guaranteed temperature is a temperature at which operation is guaranteed within two times of the guaranteed accuracy value at JEC characteristics guaranteed temperature, or within the accuracy of influence of JIS temperature.

Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC60B

■ Specifications

• Input/output specifications

Input circuit	Applicable to both 100V DC (max. 143V) and 100V AC (max. 132V) Pick up voltage: 40 to 70V DC/40 to 70V AC	
Output circuit	Circuit breaker ON/OFF/trip	Making current: 15A (110V DC), allowable continuous current: 4A
	Other than above	Making/breaking current: 0.2A (110V DC, inductive load L/R = 15ms or less), allowable continuous current: 1A

• Measurement and display specifications

	Effective measuring and display range	Accuracy *2
Current/Demand current/ Max. demand current	0, 0.8% to CT rating to $8 \times$ CT rating *1	$\pm 1.5\%$ (0, 0.8 to 100%), $\pm 5\%$ (100 to 800%)
Zero-phase current/Max. zero-phase current	CT: 0, 2% to CT rating to $8 \times$ CT rating	$\pm 1.5\%$: 0, 2% to CT rating, $\pm 5\%$: others
Active power Demand/active power/ Reactive power	± 0.015 to ± 1 kW at VT secondary circuit (The value is converted into the VT rated voltage)	$\pm 1.5\%$: 0, ± 0.015 to ± 1 kW See the figure below. 110V AC.)
Power factor	Lead 0% - 100% - Lag 0%	$\pm 5\%$ (Lagging: no sign, leading: - sign) See the figure below.
Active electric energy *3 Reactive electric energy	0 to 99999, multiplying factor: 1, 10, 100, 1000	Equivalent to ordinary instruments shown in Table 4 specified in JIS C 1216 (instrument with a transformer)
Line voltage Phase voltage	9.5 to 260V on VT secondary side 5.5 to 150V on VT secondary side	$\pm 1.5\%$ $\pm 1.5\%$
Frequency Max. demand value Harmonics current	45 to 55Hz (50Hz), 55 to 65Hz (60Hz) Same as the above range 3rd, 5th, 7th, overall harmonics	$\pm 0.5\%$ - -

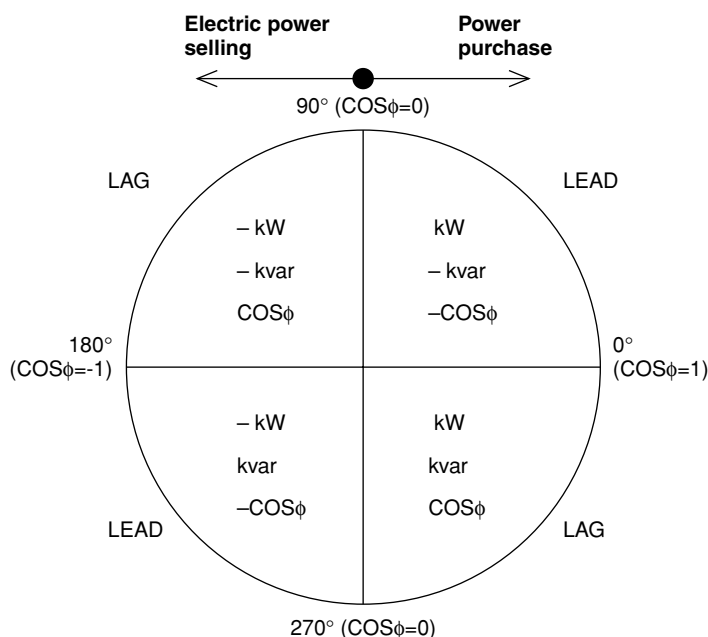
*1 The fault current up to 2000% (accuracy: $\pm 5\%$) can be displayed.

*2 "0, a to n%" means that "0" is indicated if a value is less than a%.

*3 There are two indications in the electric energy indication; total electric energy indication (zero clear disable) and periodic electric energy indication (zero clear is enable).

The sign "±" in electric measuring

The sign "±" is used to display "LEAD/LAG" in power-factor. measuring and "electric power selling/purchase" in electric power measuring. No signs are used if a value is "+". The sign "±" has the following meanings depending on the measured items.



- Active power: kW
 - +: Power purchase (Consumed electric power)
 - : Electric power selling (Inverse electric power flow)
- Reactive power: kvar
 - +: Lagging current by reactive volt-ampere meter method
 - : Leading current by reactive volt-ampere meter method
 - * "LEAD/LAG" reverses with electric power selling/purchase.
- Power factor: $\text{COS}\phi$
 - +: LEAD
 - : LAG

■ Specifications

● History data

Item	Display range	Display code
50 (INST) detection count	0 to 9999	H0
51DT1 detection count	0 to 9999	H1
51 (OC) detection count	0 to 9999	H2
51G detection count	0 to 9999	H3
50G detection count	0 to 9999	H4
59 (OV) detection count	0 to 9999	H6
27 (UV) detection count	0 to 9999	H7

* Other history display: Fault value display (on occurrence of a fault), history maximum values of zero-phase current/voltage, maximum demand value (A, W), and minimum instantaneous voltage

Item	Display range	Display code
46 detection count	0 to 9999	H9
47 detection count	0 to 9999	HA
OCA detection count	0 to 9999	Hb
Running time	0 to 9999 × 100 (h)	Hc
ON/OFF operation	0 to 9999 × 10 (times)	Hd
OCGA operation count	0 to 9999	Hn
51DT2 operation count	0 to 9999	HP

* The display codes are the codes to be displayed on this F-MPC60B (UM43FG-E5AK).

● Specifications of protective relays

Item	Setting range of current/voltage operate value	Setting range of operate time (timer)	Characteristics	
			Operate value	Operate time
50 (Instant trip)	(1 to 20) × CT rated current (in 0.2 times step), Lock	Fixed	±5%	40ms or less
51DT1 (Definite time)	(1 to 20) × CT rated current (in 0.2 times step), Lock	0 to 5s (in 0.05 step)	±5%	Less than 1s ±50ms More than 1s ±5%
51DT2 (Definite time)	(20 to 240%) × CT rated current (2% step), Lock	0 to 10s (0.1s step)	±5%	Less than 1s ±50ms More than 1s ±5%
51 (Inverse time) SI, EI, VI, LT, I ² t	(20 to 240%) × CT rated current (2% step), Lock	Time multiplication: 0.5 to 20 times, (in 0.1 times step) (Minimum operation time: 150ms)	±5%	Setting = 300%: ±12% 500, 1000%: ±7% (lower limit ± 100ms)
50G, 50N (Instant, definite time)	(0.2 to 8) × CT rated current (in 0.1 times step), Lock	0.0 to 10s to 180s *1	±5%	±5% (lower limit ±50ms)
51G, 51N SI, EI, VI, LT	(2 to 100%) × CT rated current (1% step), Lock	Time multiplication: 0.5 to 20 times (in 0.1 times step) (Minimum operation time: 150ms) *1	±5% (min. ± 100mA)	Setting = 300%: ±12% 500, 1000%: ±7% (lower limit ± 100ms)
59V (OV)	VT secondary voltage: 60 to 150V (1V step), lock	0.0 to 5.0s to 60s (in 0.5s step) (in 1s step)	±5%	±5% (min. ±50ms)
27V (UV)	VT secondary voltage: 10 to 100V (1V step), lock	0.0 to 5.0s to 60s (in 0.5s step) (in 1s step)	±5%	±5% (min. ±50ms)
46 (Open-phase)	—	—	Unbalanced rate 50 - 80%	2s (fixed)
47 (Phase sequence relay)	—	—	—	0.5s on less
OCA (Overcurrent pre-alarm)	(10 to 100%) × CT rated current (in 5% step), Lock	10 to 200s (in 10s step)	±10%	±5%
OCGA (Leakage current pre-alarm)	50, 60, 70, 80% of the setting value of "51G operating current", Lock	10 to 200s (in 10s step)	±10% (min±100mA)	±5%

*1 When a current exceeds 15% of the rated fundamental wave current, the malfunction preventive function against the exciting inrush current activates. (When the contents of the second higher harmonics are about 15% or higher, the feature will lock outputs.) Note that with the 50G relay, the malfunction preventive function against the exciting inrush current will not activate if you set the operate time at 0s.

● Communications specifications

Protocol	MODBUS protocol mode	MPC-Net mode
Standard	EIA RS-485	EIA RS-485
Data exchange method	polling/selecting system	1: N polling/selecting system
Transmission distance	1000m (total length)	1000m (total length)
No. of connectable units	Up to 32 units (including master unit)	Up to 32 units (including master unit)
Station number address	01 to 99	01 to 99
Transmission speed	4800/9600/19200 bps (selectable)	4800/9600/19200 bps (selectable)
Data format	Number of start bits: 1 (fixed) Data length: 8 bits (fixed) Parity bit: None/even/odd (selectable) Number of stop bits: 1/2 bit (depends on Parity bit)	Number of start bits: 1 (fixed) Data length: 7/8 bits (selectable) Parity bit: None/even/odd (selectable) Number of stop bits: 1 (fixed)

Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC60B

■ Specifications

• Specifications of transducer outputs

Transducer output signal		4 to 20mA DC (external load resistance: 270Ω or less)	
Signal type	Current (Ia, Ib, Ic)	4 to 20mA for 0 to CT rated Ω current	Accuracy ±1.5%
	Line voltage (Vab, Vbc, Vca)*1	For VT secondary 0 to 150V, 4 to 20mA *1 0 to 150V ×√3, 4 to 20mA *2	
		For VT secondary 0 to 150V/√3, 4 to 20mA *1 0 to 150V, 4 to 20mA *2	
	Active power (W)	For 0 to 1kW (CT5A, VT110V AC conversion), 4 to 20mA	
	Reactive power (var)	For -1 to 0 to 1kvar (CT5A, VT110V AC conversion), 4 to 12 to 20mA	
	Frequency (Hz)	For 45 to 55Hz or 55 to 65Hz, 4 to 20mA	
Power factor	For LEAD 0.5 to 1 to 0.5 LAG, 4 to 12 to 20mA		

Note: • Output signals are connected to a common terminal (minus side).

• An upper or lower limiter operates when the output signal is about to exceed the upper or lower limit.

The upper limit is fixed at 20mA, and the lower limit is fixed at 20mA.

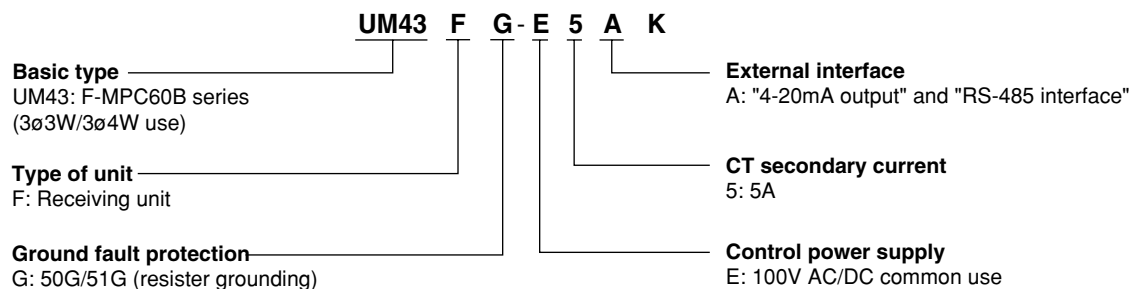
*1: Applied line voltage: 100V/110V/120V AC.

*2: Applied line voltage: 100V/110V/120V AC ×√3, AC.

• Specifications of kWh pulse output

Type of output	Transistor, open collector
Ratings	Max. 150V DC, 100mA
Pulse width	200 ± 20ms
Pulse rate	10 ⁿ kWh per pulse (n=-2 to 4) (integer), or 2000 pulses per kWh

■ Type number nomenclature



■ Ordering information

Specify the following:

1. Type number

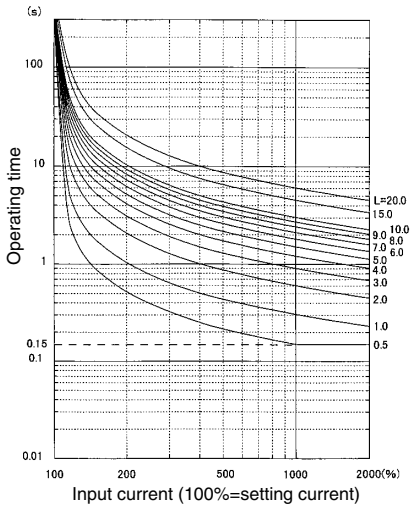
Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC60B

■ Time-current characteristic

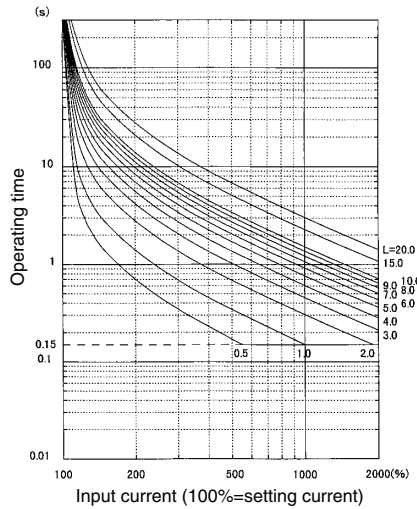
Standard inverse (SI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{0.14}{I - 1} \times \frac{L}{10} \quad (L: \text{time magnification})$$

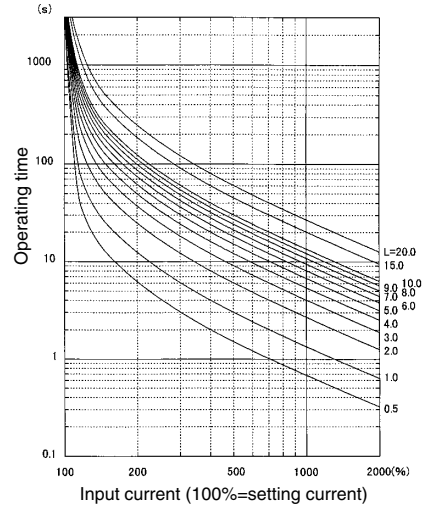
Very inverse (VI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{13.5}{I - 1} \times \frac{L}{10} \quad (L: \text{time magnification})$$

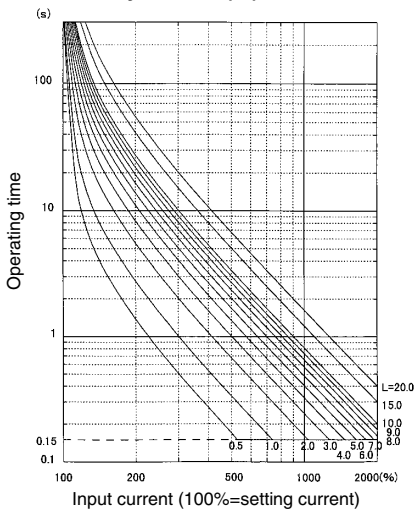
Very inverse (LT) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{120}{I - 1} \times \frac{L}{10} \quad (L: \text{time magnification})$$

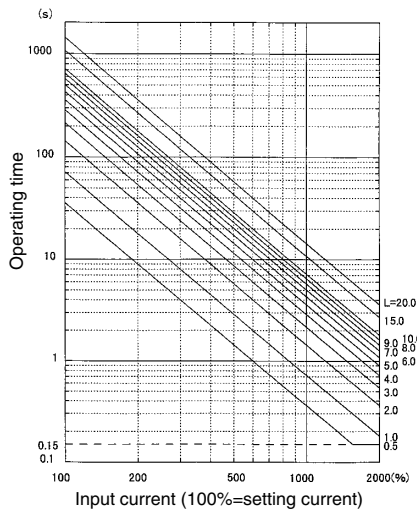
Extremely inverse (EI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{80}{I - 1} \times \frac{L}{10} \quad (L: \text{time magnification})$$

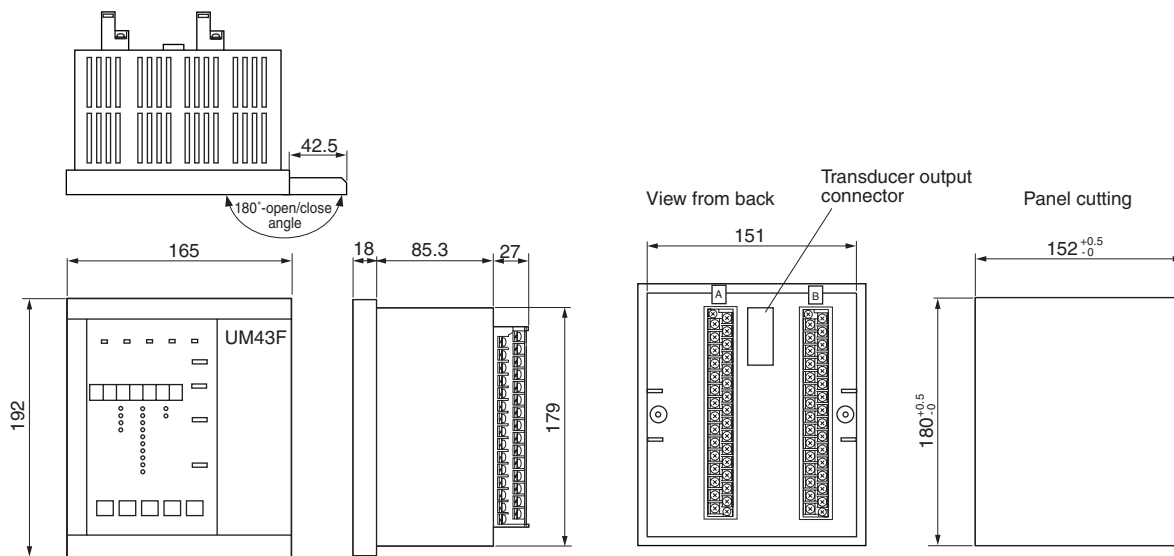
I²t characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{720}{I} \times \frac{L}{10} \quad (L: \text{time magnification})$$

■ Dimensions, mm



Minimum clearance from adjacent upper and lower devices or panel plate: 100mm

■ Characteristics of overcurrent relay (OCR)

The characteristics of overcurrent relays (OCR) are, in general, divided into the protective INST (50) (setting code 10, 11), the protective DT1 (setting code 12 to 14), protective DT2 (setting code 1c, 1d, 1E) and the protective OC 51 (setting code 15 to 18). The characteristics of protective OC 51 consist of 5 kinds

of inverse characteristic curves, such as standard inverse (SI) characteristics, very inverse (VI) characteristics, long time inverse (LT) characteristics, extremely inverse (EI) characteristics and I²t characteristics). Combination of the protective INST (50), protective DT1, protective DT2 and OC 51 carries out coordinative protection.

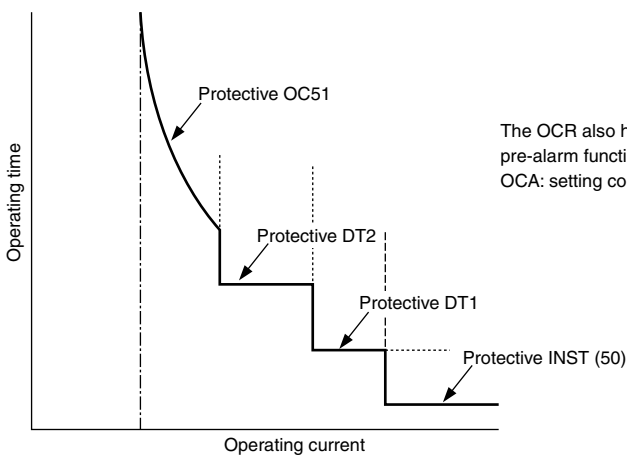
Outline of characteristic of overcurrent relay

Item	Operating current	Operating time
Protective INST (50)	1 to 16 times of CT rated current 5A (0.2 times step)	Fixed (40ms or less)
Protective DT1		0 to 5s (0.05s step)
Protective DT2	20 to 240% of CT rated current 5A (2% step) *1	0 to 10s (0.1s step)
Protective OC (51)		Select from 5 characteristic curves. Time magnification: 0.5 to 20 times (0.1 times step)

*1: The operating time of protective OC51 is saturated at about 150ms.

The operating time will be saturated at 20 times of CT rated current when the setting exceeds 200%.

For example, the operating time becomes 833% (= 2000%/(240%×100)) of the CT rated current in 240% setting.



The OCR also has the pre-alarm function (protective OCA: setting code 19-1b).

Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC30

Multiple function protectors and controllers

F-MPC30 series, UM5ACG-H5R

■ Description

The F-MPC30 series is a multiple function protectors and controllers in the power monitoring equipment, which integrates protective, measurement, and transfer functions for power feeder facilities. Versatile functions such as preventive maintenance and history data and abnormal value recording can be achieved with excellent economy and reliability. These works have been very complicated as you must have used individual power monitoring devices in combination.

■ Features

Economical system configuration

Includes measurement and protective functions limited to the current ranges most frequently used, thus allowing the construction of economical systems.

Improved operating reliability

Includes an automatic monitor function, an automatic diagnostic function supported by continuous monitoring and automatic inspection, and a fail-safe function, thus ensuring high operating reliability while minimizing daily and regular inspection tasks.



Easily designed coordination protection

Provided with 51DT1 and 51DT2 definite time trip characteristics that simplify the designing of coordination protection between overcurrent relays.

RS-485 communications interface

Two protocol types are available:
MPC-Net protocol and MODBUS protocol.

■ Specifications

• General specifications

Type	UM5ACG-H5R
Control power supply	100/200V DC (80 to 286V DC) common use
Control power consumption	Max. 15W
Power consumption of CT, VT	Max. 1.0VA
Rated current (CT secondary current)	5A AC ("1A model" is also available (non-standard))
Zero-phase current	5A AC
Insulation resistance	10MΩ min. between ground and electric circuits connected together
Vibration resistance	16.7Hz, 0.4mm double amplitude, 1.96m/s ² , 10 minutes each in X, Y, and Z directions
Shock resistance	300m/s ² , three times each in X, Y, and Z directions
Dielectric strength	2kV AC 1 minute between ground and electric circuits connected together, excluding RS-485 signal lines
Noise immunity	JEC 2500 (conforming to ANSI), square wave, 1.5kV, 1ns/1μs, for 10 minutes
Overload resistance	CT circuit: 40 × rated value, for 1s, 2 times
Lightning impulse noise resistance	5kV (between ground and electrical circuits connected together)
Dropout tolerance	20ms (Operation continues, however, display goes out.)
Electrostatic discharge	Contact discharge: ±8kV, Aerial discharge: ±15kV
Ambient temperature	Operating: -10 to +60°C (operation guaranteed), 0 to +40°C (characteristic guaranteed) (no icing) *1 Storage: -25 to +70°C (no icing)
Humidity	20 to 90%RH (no condensation)
Atmosphere	Free from corrosive gases and excessive dusts or particles
Grounding	Class D grounding (100Ω or less)
Applicable standard	JEC2500 (Protective relays for electric power systems), JEC-2510 (Overcurrent relays), JIS C4602 (Overcurrent relays for 6.6kV receiving), JIS C1102-1 to -9 (Direct acting analogue electrical instrument and their accessories), IEC255-3 (1989) -5, -6.
Mass	1.4kg

*1: The operation guaranteed temperature is a temperature at which operation is guaranteed within two times of the guaranteed accuracy value at JEC characteristics guaranteed temperature, or within the accuracy of influence of JIS temperature.

• **Input/output specifications**

Input circuit	100/200V DC (286V DC or less) common use Pick-up voltage: 40 to 70V DC (Input current; 1.2mA at 100V DC, 2.4mA at 200V DC)	
Output circuit	Circuit breaker trip	Making current: 15A (110V DC), 10A (220V DC), allowable continuous current: 4A
	Other than above	Making current: 0.2A (110V DC, inductive load L/R = 15ms or less) Allowable continuous current: 1A
		Making current: 0.1A (220V DC, inductive load L/R = 15ms or less) Allowable continuous current: 1A

• **Measurement and display specifications**

	Effective measuring and display range	Accuracy *2
Current	0, 0.8% to CT rating to 8 × CT rating *1	±1.5% (0, 0.8 to 100%), ±5% (100 to 800%)
Zero-phase current	CT: 0, 2% to CT rating to 8 × CT rating	±1.5% (0, 2% to CT rating), ±5% (more than CT rating)

*1 The fault current up to 2000% (accuracy: ±5%) can be displayed.

*2 "0, a to n%" means that "0" is indicated if a value is less than a%.

• **History data and display ranges**

Item	Display range	Display code
50 (INST) detection count	0 to 9999	H0
51DT1 detection count	0 to 9999	H1
51 (OC) detection count	0 to 9999	H2
51G detection count	0 to 9999	H3
50G detection count	0 to 9999	H4

* Other history display: Fault value display (on occurrence of a fault), history maximum values of zero-phase current/voltage, maximum demand value (A, W), and minimum instantaneous voltage

Item	Display range	Display code
OCA detection count	0 to 9999	Hb
Running time	0 to 9999 × 100 (h)	Hc
Close operation count	0 to 9999 × 10 (times)	Hd
OCGA operation count	0 to 9999	Hn
51DT2 operation count	0 to 9999	HP

* The display codes are the codes to be displayed on this F-MPC30 (UM5ACG-H5R).

• **Specifications of protective relays**

	Setting range of current/voltage operatel value	Setting range of operate time (timer)	Characteristics (accuracy)	
			Operate value	Operate time
50 (Instant trip)	(1 to 16) × CT rated current (in 0.2 times step), Lock	Fixed	±5%	40ms or less
51DT1 (Definite time trip)	(1 to 16) × CT rated current (in 0.2 times step), Lock	0 to 5s (in 0.05s step)	±5%	Less than 1s ±50ms More than 1s ±5%
51DT2 (Definite time trip)	(20 to 240%) × CT rated current (in 2% step), Lock	0 to 10s (in 0.1s step)	±5%	Less than 1s ±50ms More than 1s ±5%
51 (Inverse time trip) SI, EI, VI, LT	(20 to 240%) × CT rated current (in 2% step), Lock	Time multiplication: 0.5 to 20 times (in 0.1 times step) (Min. operation time: 150ms)	±5%	Setting value 300%: ±12% 500, 1000%: ±7% (lower limit ±100ms)
50G, 50N (Instant/definite time trip)	(0.1 to 8) × CT rated current (in 0.1 times step), Lock	0.0 to 10s to 180s (in 0.1s step) (in 1s step) *1 *2	±5%	±5% (lower limit ±50ms)
51G, 51N SI, EI, VI, LT	(2 to 100%) × CT rated current (in 1% step), Lock	Time multiplication: 0.5 to 20 times (in 0.1 times step) (Min. operation time: 150ms)*1	±5% (min. ±100mA)	Setting value 300%: ±12% 500, 1000%: ±7% (lower limit ±100ms)
OCA (Pre-alarm of overcurrent)	(10 to 100%) × CT rated current (in 5% step), Lock	10 to 200s (in 10s step)	±10%	±5%
OCGA (Pre-alarm of leakage current)	50, 60, 70, 80% of the setting value of "51G operating current", Lock	10 to 200s (in 10s step)	±10% (min. ± 100mA)	±5%

Notes: *1 When a current exceeds 15% of the rated fundamental wave current, the malfunction preventive function against the exciting inrush current activates. (When the contents of the second higher harmonics are about 15% or higher, the feature will lock outputs.) Note that with the 50G relay, the malfunction preventive function against the exciting inrush current will not activate if you set the operate time at 0s.

Power Monitoring Equipment

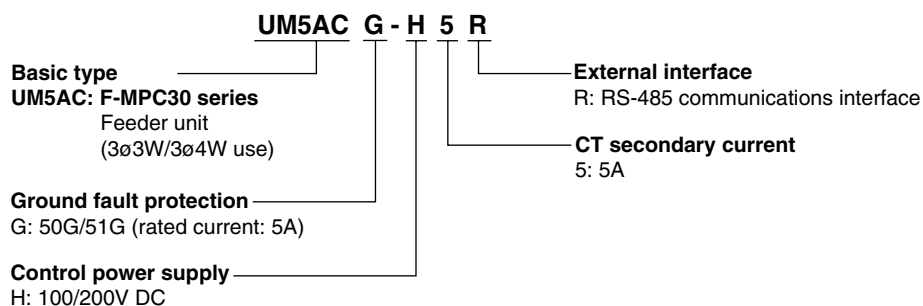
Multiple function protectors and controllers

F-MPC30

• Communications specifications

Protocol	MODBUS protocol mode	MPC-Net mode
Standard	EIA RS-485	EIA RS-485
Data exchange method	Polling/selecting system	1: N polling/selecting system
Transmission distance	1000m (total length)	1000m (total length)
No. of connectable units	Up to 32 units (including master unit)	Up to 32 units (including master unit)
Station number address	01 to 99	01 to 99
Transmission speed	4800/9600/19200 bps (selectable)	4800/9600/19200 bps (selectable)
Data format	Number of start bits: 1 (fixed) Data length: 8 bits (fixed) Parity bit: None/even/odd (selectable) Number of stop bits: 1/2 bit (depends on Parity bit)	Number of start bits: 1 (fixed) Data length: 7/8 bits (selectable) Parity bit: None/even/odd (selectable) Number of stop bits: 1 (fixed)

■ Type number nomenclature



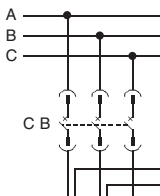
■ Ordering information

Specify the following:

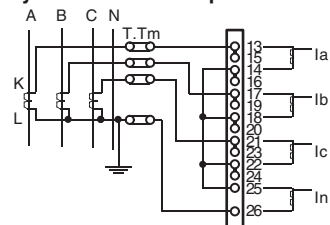
1. Type number

■ Example of external wiring diagram (External 3 CTs)

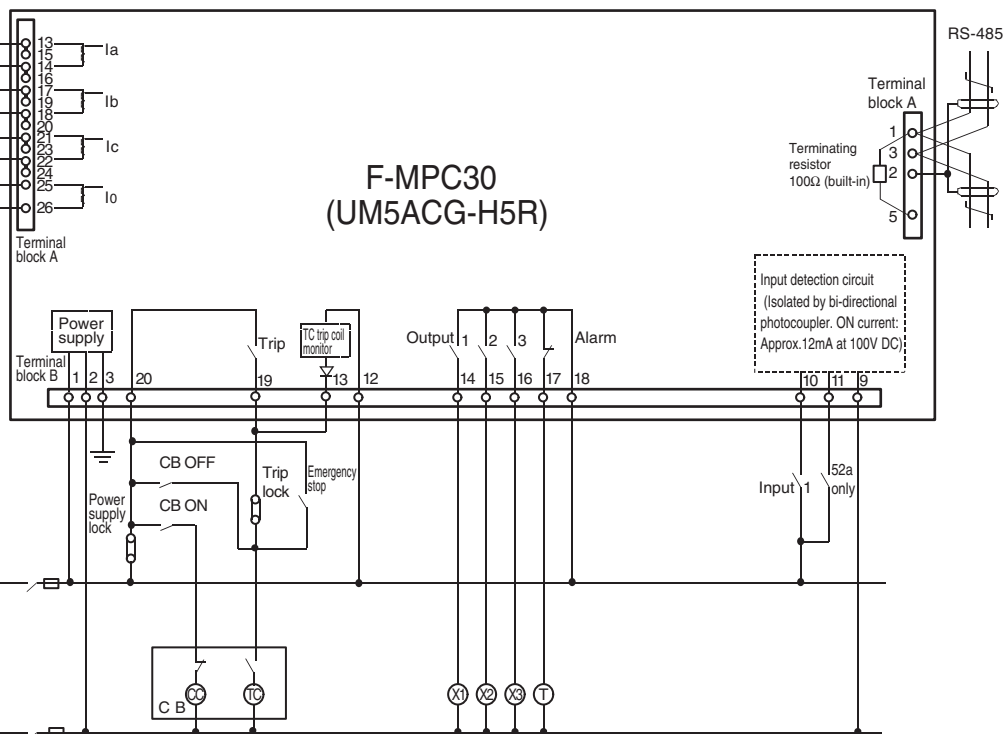
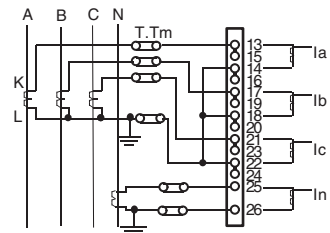
3-phase, 4-wire system / zero-phase current



3-phase, 4-wire system / currents of phase A, B, and C synthesized with N-phase current



3-phase, 4-wire system / N-phase dedicated CT connection



The output of X1, X2, and X3 are used for alarm display or trip display.

Note: When used with DC power supply, connect the input common terminals (terminal No.9 on terminal block B) to the N side.

- Note:
- Use selective input 1 and selective output 1 to 3 by selecting the function type by setup. See page 09/113 for details.
 - Outputs of "TRIP and equipment error" are used exclusively. Inputs of "52a: the answer back signal of CB ON" and "the monitoring of TC coil" are used exclusively.
 - Equipment error output is a normally closed contact (normally excited, and if an error occurs, excitation terminates and contact opens). Therefore, a time delay of about 100ms occurs before the contact opens, since the power has been on (in operation). Consider the use of a timer, if necessary, if you create an external sequence.
 - If you have to connect a heavy load exceeding relay's contact rating, be sure to use it in combination with FUJI's miniature power relay HH6□. See page 09/113 "Input/output specifications."
 - If this unit, being provided with RS-485 communication function, is located at the termination of a communication line, connect terminals No.3 and 5. With this, the 100Ω terminating resistor is connected across the RS-485 bus.

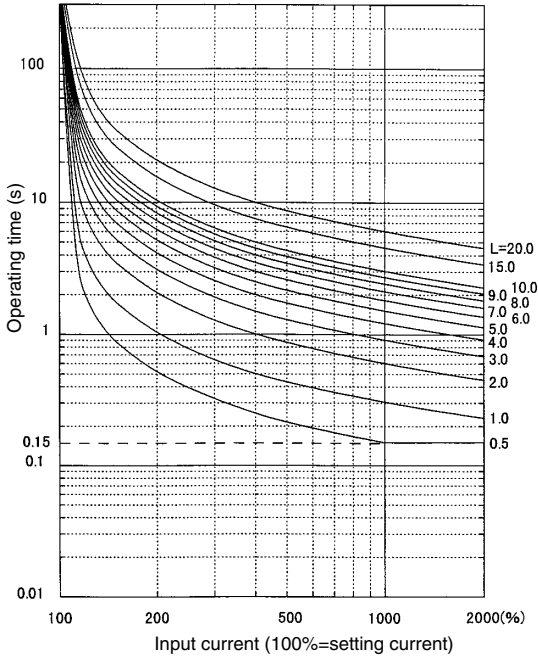
Power Monitoring Equipment

Multiple function protectors and controllers

F-MPC30

Time-current characteristics of an overcurrent relay

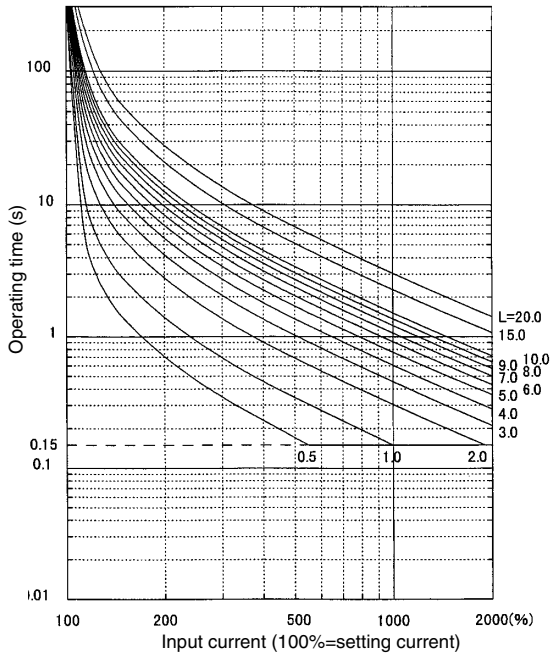
Standard inverse (SI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{0.14}{I^{0.02} - 1} \times \frac{L}{10} \quad (L: \text{Time magnification})$$

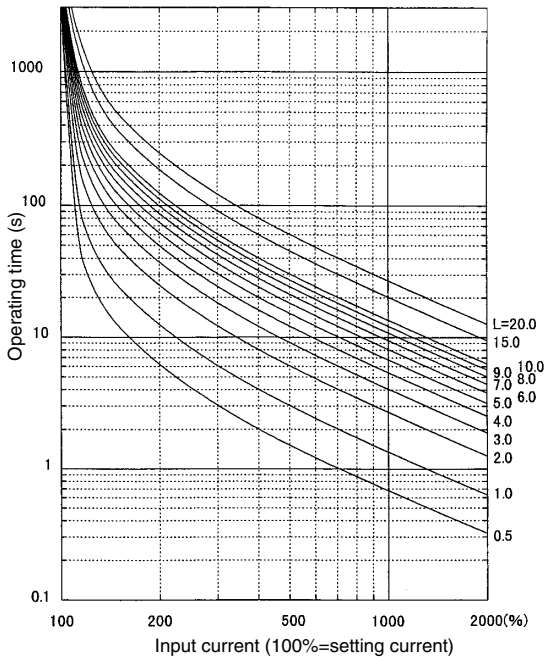
Very inverse (VI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{13.5}{I - 1} \times \frac{L}{10} \quad (L: \text{Time magnification})$$

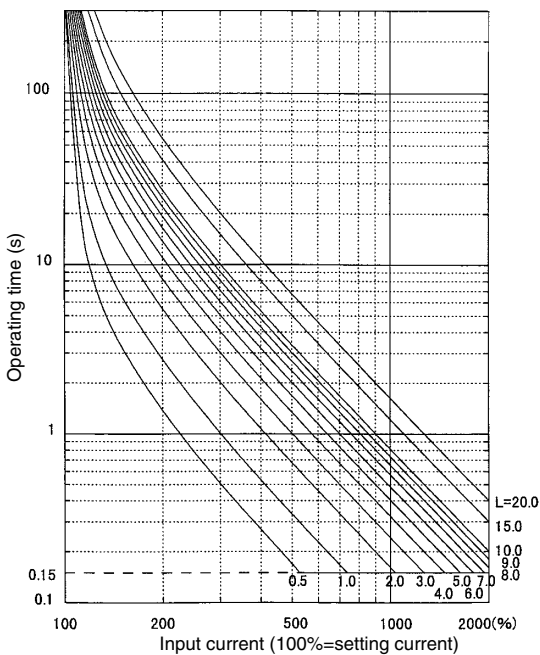
Long time inverse (LT) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{120}{I - 1} \times \frac{L}{10} \quad (L: \text{Time magnification})$$

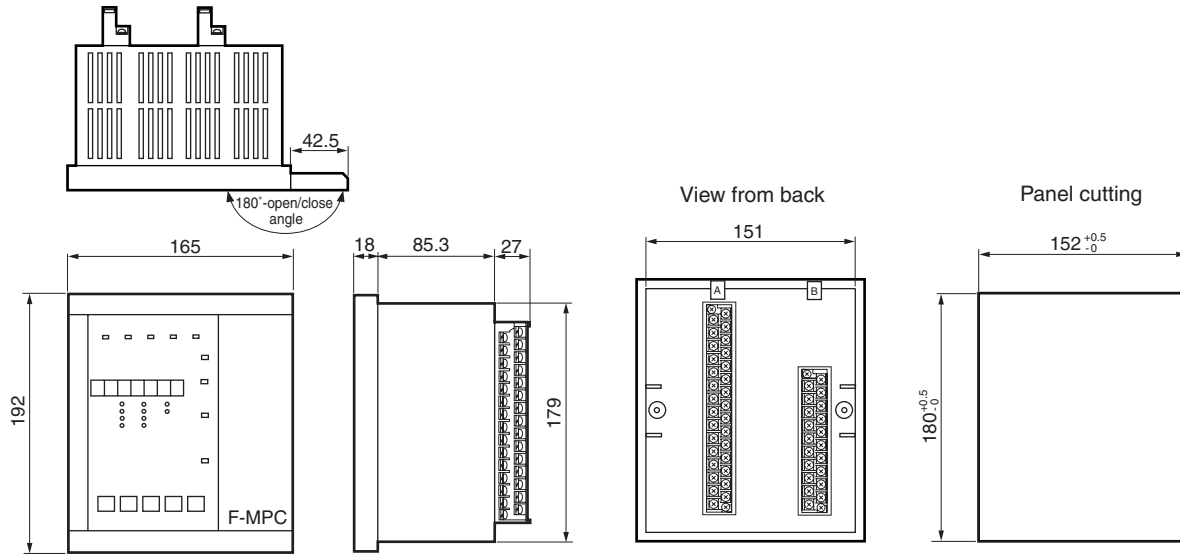
Extremely inverse (EI) characteristics



Note:
Time setting (lever) is of 0.1 times step (Lower limit: 0.5, upper limit: 20.0). Indication of a part of the lever is omitted in the characteristics indicated above.

$$t = \frac{80}{I - 1} \times \frac{L}{10} \quad (L: \text{Time magnification})$$

■ Dimensions, mm



Minimum clearance from adjacent upper and lower devices or panel plate: 100mm

■ Characteristics of overcurrent relay (OCR)

The characteristics of overcurrent relays (OCR) are, in general, divided into the protective INST (50) (setting code 10, 11), the protective DT1 (setting code 12 to 14), protective DT2 (setting code 1c, 1d, 1E) and the protective OC 51 (setting code 15 to 18). The characteristics of protective OC 51 consist of 4 kinds of inverse characteristic curves, such as standard inverse (SI)

characteristics, very inverse (VI) characteristics, long time inverse (LT) characteristics, extremely inverse (EI) characteristics. Combination of the protective INST (50), protective DT1, protective DT2 and OC 51 carries out coordinative protection.

Outline of characteristic of overcurrent relay.

Item	Operating current	Operating time
Protective INST (50)	1 to 16 times of CT rated current 5A (0.2 times step)	Fixed (40ms or less)
Protective DT1		0 to 5s (0.05s step)
Protective DT2	20 to 240% of CT rated current 5A (2% step) *1	0 to 10s (0.1s step)
Protective OC (51)		Select from 4 characteristic curves. Time magnification: 0.5 to 20 times (0.1 times step)

*1: The operating time of protective OC 51 is saturated at about 150ms.

The operating time will be saturated at 20 times of CT rated current when the setting exceeds 200%.

For example, the operating time becomes 833% (= 2000%/(240%×100)) of the CT rated current in 240% setting.

