

MicroSmart FC6A PLC

CPU Module Specifications



KEY FEATURES

- Embedded Ethernet port
- Embedded SD memory port
- Modbus TCP and RTU
- Embedded RS232C/RS485 user selectable
- Maximum 520 digital I/O
- Maximum 126 analog I/O
- Data Logging
- Web Server Functions
- Large programming and data memory
- CAN J1939 CPU
- Built-in Web Page Editor for user webpage

Standard Base Module

Part Number	Total I/O	Power Voltage	Input Voltage	Output Type	Maximum Digital I/O	Maximum Analog I/O
FC6A-C16R1AE	16 (9 inputs, 7 outputs)	100-240V AC	24V DC Sink/Source	Relay	400	100
FC6A-C16R1CE		24V DC		Relay		
FC6A-C16P1CE				Transistor Source		
FC6A-C16K1CE		Transistor Sink				
FC6A-C24R1AE	24 (14 inputs, 10 outputs)	100-240V AC	24V DC Sink/Source	Relay	504	124
FC6A-C24R1CE		24V DC		Relay		
FC6A-C24P1CE				Transistor Source		
FC6A-C24K1CE		Transistor Sink				
FC6A-C40R1AE	40 (24 inputs, 16 outputs)	100-240V AC	24V DC	Relay	520	126
FC6A-C40R1CE		24V DC		Relay		
FC6A-C40P1CE				Transistor Source		
FC6A-C40K1CE		Transistor Sink				
FC6A-C40R1DE		12V DC	12V DC Sink/Source	Relay	40	6
FC6A-C40P1DE				Transistor Source		
FC6A-C40K1DE	Transistor Sink					

CAN J1939 Base Module

Part Number	Total I/O	Power Voltage	Input Voltage	Output Type	Maximum Digital I/O	Maximum Analog I/O
FC6A-C40R1AEJ	40 (24 inputs, 16 outputs)	100-240V AC	24V DC Sink/Source	Relay	520	126
FC6A-C40R1CEJ		24V DC		Relay		
FC6A-C40P1CEJ				Transistor Source		
FC6A-C40K1CEJ		Transistor Sink				
FC6A-C40R1DEJ	12V DC	12V DC Sink/Source	Relay	40	6	
FC6A-C40P1DEJ			Transistor Source			
FC6A-C40K1DEJ			Transistor Sink			

SPECIFICATIONS

Part Number	FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Rated Power Voltage	AC: 100 to 240V AC, DC: 24V DC, 12V DC			
Allowable Voltage Range	AC: 85 to 264V AC 24V DC: 20.4 to 28.8V DC (including ripple), 12V DC: 10.2 to 18.0V			
Rated Frequency	AC: 50/60Hz (47 to 63 Hz)			
Maximum Power Consumption (CPU module)	AC	FC6A-C16R1AE: 100-240V AC, 33VA FC6A-C24R1AE: 100-240V AC, 35VA FC6A-C40R1AE: 100-240V AC, 41VA FC6A-C40R1AEJ: 100-240V AC, 37VA		
	DC	FC6A-C16R1CE: 24V DC 140mA, 3.36W FC6A-C24R1CE: 24V DC 155mA, 3.72W FC6A-C40R1CE: 24V DC 195mA, 4.68W FC6A-C16P1CE: 24V DC 190mA, 4.6W FC6A-C24P1CE: 24V DC 200mA, 4.8W FC6A-C40P1CE: 24V DC 205mA, 5.0W	FC6A-C16K1CE: 24V DC 190mA, 4.6W FC6A-C24K1CE: 24V DC 200mA, 4.8W FC6A-C40K1CE: 24V DC 205mA, 5.0W FC6A-C40R1DE: 12V DC 345mA, 4.14W FC6A-C40P1DE: 12V DC 260mA, 3.12W FC6A-C40K1DE: 12V DC 260mA, 3.12W	FC6A-C40R1CEJ: 24V DC 205mA, 5.0W FC6A-C40P1CEJ: 24V DC 175mA, 4.2W FC6A-C40K1CEJ: 24V DC 175mA, 4.2W FC6A-C40R1DEJ: 12V DC 340mA, 4.08W FC6A-C40P1DEJ: 12V DC 320mA, 3.9W FC6A-C40K1DEJ: 12V DC 320mA, 3.9W
Allowable Momentary Power Interruption	10 ms (at rated voltage)			
Dielectric Strength	Between power and ground terminals: 1,500V AC, 1 minute Between I/O and ground terminals: 1,500V AC, 1 minute			
Insulation Resistance	Between power and ground terminals: 100 MΩ minimum (500V DC megger) Between I/O and ground terminals: 100 MΩ minimum (500V DC megger)			
Noise Resistance	AC or DC power terminal: 1.5kV (DC type: 1kV), 50 ns to 1 μs I/O terminals (coupling clamp): 1.5kV, 50ns to 1μs coupling adapter			
Inrush Current	AC: 40A maximum 24V DC: 35A maximum 12V DC: 35A maximum			
Power Supply Wire	AWG22, AWG18			
Operating Temperature	-10 to +55°C (no freezing)			
Storage Temperature	-25 to +70°C (no freezing)			
Relative Humidity	Level RH1 (IEC 61131-2-10 to 95% (no condensation)			
Altitude	Operation: 0 to 2,000m, 795 to 1,013hPa, Transport: 0 to 3,000m, 701 to 1,013hPa			
Pollution Degree	2 (IEC 60664-1)			
Corrosion Immunity	Free from corrosive gases			
Degree of Protection	IP20 (IEC 60529)			
Ground	D-type ground (Class 3 ground)			
Grounding Wire	AWG16			
Vibration Resistance	5 to 8.4 Hz amplitude 3.5 mm, 8.4 to 150 Hz acceleration 9.8 m/s ² (1G), 2 hours per axis on each of three mutually perpendicular axes (IEC 61131-2)			
Shock Resistance	147 m/s ² (15G), 11 ms duration, 3 shocks per axis on three mutually perpendicular axes			
Mounting	DIN rail or panel mounting			
Weight	AC: 350g DC: 340g	AC: 420g DC: 400g	AC: 560g DC (relay): 530g DC (transistor): 480g	AC: 560g DC (relay/24V DC): 530g DC (relay/12V DC): 560g DC (transistor/24V DC): 480g DC (transistor/12V DC): 530g

SPECIFICATIONS CONT.

Part Number		FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Control System		Stored program system			
Instruction Words	Basic	42			
	Advanced	124			
Program Capacity ¹		384KB (48,000 steps)/72KB (9,000 steps) ²		640KB (80,000) 72KB (9,000 steps) ²	
User Program Storage		Serial Flash Memory (100,000 times rewritable)			
Processing Time	Basic Instruction	42us/1,000 steps			
	END Processing ³	1ms maximum			
I/O Points	Input	9 points	14 points	24 points	
	Output	7 points	10 points	16 points	
Expandable Modules		4 modules	7 modules		
Expandable I/O Points with Expansion Modules		128 points	224 points		
Expandable Modules with Expansion Interface Modules		8 modules			
Expandable I/O Points with Expansion Interface Modules		256 points			
Internal Relay		12,400 points			
Special Internal Relay		256 points			
Shift Register		256 points			
Data Register		54,000 points			
Special Data Register		500 points			
Counter		512 points			
Timer (1ms, 10ms, 100ms, 1s)		1,024 points			
Clock		Clock accuracy: ±30 sec/month (typical) at 25°C			
RAM Backup	Backup Data	Internal relay, shift register, counter, data register, timer, special data register, special internal relay			
	Battery	Lithium primary battery (BR2032)			
	Battery Life	Approx. 4 years			
	Replaceability	Possible			
Self-diagnostic Function		Keep data, user program sum check (EEPROM), user program sum check (RAM), timer/counter preset value sum check, user program syntax check, user program execution check, WDT check, user program write check, power failure, clock error, data link connection check, I/O bus initialization check			
Input Filter		0 ms (without filter), 3 to 15ms (selectable in increments of 1ms)			
Catch Input/Interrupt Input		Six inputs I0, I1, I6, I7 Minimum turn on pulse width: 5µs max. Minimum turn off pulse width: 5µs max.		I3, I4 Minimum turn on pulse width: 35µs max. Minimum turn off pulse width: 35µs max.	
High-speed Counter	Maximum Counting Frequency and High-speed Counter Points	Total 6 points Single/two-phase selectable: 100 kHz (single-phase: 4 points, two-phase: 2 points) Single-phase: 5 kHz (2 points)			
	Counting Range	0 to 4,294,967,295 (32 bits)			
	Operation Mode	Rotary encoder mode, adding counter mode, frequency measurement mode			
Analog Potentiometer	Quantity	1 point		-	
	Data Range	0 to 1,000		-	
Analog Voltage Input	Quantity	1 point		-	
	Input Voltage Range	0 to 10V		-	
	Input Impedance	Approx. 100KΩ		-	
	Digital Resolution	Approx. 1,000 steps (10 bits)		-	
Pulse Output	Quantity	4 points		-	
	Maximum Frequency	High speed output port: 100 kHz (2 points) maximum Middle speed output port: 5 kHz (2 points maximum)		High speed output port: 100 kHz maximum	
External Power Supply for Sensor (AC only)	Output Voltage/Current	24V (+10%, -15%) / 250mA			
	Overload Detection	Impossible			
	Isolation from the internal circuit	Transformer-isolated			
USB Port		USB mini-B (maintenance communication)			
Serial Port 1, CAN Port		RS232C or RS485 ⁴		CAN J1939	
Ethernet Port 1		Ethernet (maintenance communication, user communication, user communication, Modbus TCP server/client)			
SD Card Slot		Embedded			
Cartridge (option)		One cartridge can be added		Two cartridges can be added	
HMI Module (option)		Yes	Yes	Yes	Yes

Note: The maximum number of relay outputs that can be turned on simultaneously is limited.

Note 1: 1 step equals 8 bytes.

Note 2: When 72KB is selected, download function can be used during RUN.

Note 3: Not including expansion I/O service time, counter timer processing time, data link processing time, and interrupt processing time.

Note 4: Maintenance communication, user communication, data link, Modbus RTU master/slave communication.

USB Port Specifications

Part Number	FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
USB Type	USB mini-B			
USB Standard	USB 2.0 full speed			
Isolation	Not isolated from the internal circuit			
Communication Function	Maintenance communication to PC			

Ethernet Port 1 Specifications

Part Number	FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Communication Type	IEEE802.3 compliant			
Data Transfer	10BASE-T, 100BASE-TX			
Connector	RJ45			
Cable	CAT.5STP			
Maximum Cable Length	100m			
Isolation	Pulse trans isolation			
Communication Function	Maintenance communication server, user communication server, Modbus TCP (server/client), PING, SNTP			

Serial Port 1, CAN Port Specifications

Part Number	FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Port Type	Serial port 1			CAN port
Communication Type	RS232C or RS485 selectable			CAN
Connector	RJ45			Terminal Block (5-pole)
Cable	CAT. 5STP			SAE J1939-11/SAE J1939-15
Maximum Baud Rate Maximum Cable Length	115,200bps RS232C: 5m, RS485: 200m			SAE J1939-11: 250bps: 40m, stubs, 1m maximum SAE J1939-15: 250bps: 40m, stubs, 3m maximum
Isolation	Not isolated from the internal circuit			Isolated from the internal circuit
Communication Function	Maintenance communication, user communication, Modbus RTU (master/slave)			J1939

CAN J1939 Specifications

Part Number	FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40P1DEJ FC6A-C40K1DEJ	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40R1DEJ	
Supported SAE J1939	SAE J1939-11: Physical Layer, 250K bits/s, Twisted Shielded Pair SAE J1939-15: Reduced Physical Layer, 250K bits/s, Unshielded Twisted Pair SAE J1939-21: Data Link Layer SAE J1939-71: Vehicle Application Layer SAE J1939-73: Application Layer - Diagnostics SAE J1939-75: Application Layer - Generator Sets and Industrial SAE J1939-81: Network Management		
Transmit/Receive Message	Maximum No. of Send Message	100	
	Maximum No. of Receive Message	200	
	Transmittable PGN	Optional	
	Maximum Length of Transmit/Receive Message	1 to 252 bytes/message	
Transmission Function	Transmission Type	Event transmission/periodical transmission	
	Event Transmission	Transmission Method	Internal relay
	Cycle Transmission	Transmission Method Transmission Cycle ¹	Internal relay 10 to 655,350 ms (in increments of 10ms)
Receive Function	Receive Method	Polling reception ²	
	Receive Cycle Monitor	0, 10 to 655,350 ms (disabled at 0)	
Request Function	Yes		
Network Management Function	Static address/dynamic address management		
	NAME	Optional (automatic switching of static address/dynamic address management at highest-order bit)	
	Number of Nodes Manageable	128 nodes	
PGNs used Internally	00EA00h: Request PGN		
	00E800h: Acknowledgement		
	00EB00h: TP.DT		
	00EC00h: TP.CM		
	00EE00h: Address claim		

Note 1: Message is transmitted in END processing. Actual transmission cycle is affected by the ladder execution cycle.

Note 2: Receive message is transferred from internal buffer to data register in END processing.

Input Specifications

Part Number	FC6A-C16R1AE FC6A-C16R1CE FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24R1AE FC6A-C24R1CE FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40P1CE FC6A-C40K1CE FC6A-C40R1DE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40R1DEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Input Points	9 (9/1 common)	14 (14/1 common)	24 (24/1 common)	
Rated Input Voltage	AC, 24V DC: 24V DC sink/source input signal 12V DC: 12V DC sink/source input signal			
Input Voltage Range	AC, 24V DC: 0 to 28.8V DC 12V DC: 0 to 18.0V DC			
Rated Input Current	AC, 24V DC: high speed input port: 5mA/pt, middle/normal speed input port 7mA/pt 12V DC: high speed input port: 5mA/pt, middle/normal speed input port 6mA/pt			
Input Impedance	AC, 24V DC: high speed input port: 4.9kΩ, middle/normal speed input port: 3.4kΩ 12V DC: high speed input port: 1.8kΩ, middle/normal speed input port: 2.0kΩ			
Turn ON Time	High-speed input port: 5μs + filter value Middle-speed input port: 35μs + filter value Normal-speed input port: 35μs + filter value			
Turn OFF Time	High-speed input port: 5us + filter value Middle-speed input port: 35us + filter value Normal-speed input port: 100us + filter value			
Isolation	Between input terminals: Not isolated Internal circuit: Photocoupler-isolated			
Input Type	Type1 (IEC 61131-2)			
External Load for I/O Interconnection	Not needed			
Signal Determination Method	Static			
Effect of Improper Input Connection	Both sinking and sourcing input signals can be connected, therefore reverse connection does not cause damage. If any input exceeding the rated value is applied, permanent damage may be caused.			
Cable Length	3m in compliance with electromagnetic immunity			
Connector	Insertion Durability	100 times minimum		
	Applicable Ferrule	1-wire: AI 0.5-8 WH (Phoenix Contact) 2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact)		

Transistor Output Specifications

Part Number	FC6A-C16P1CE FC6A-C16K1CE	FC6A-C24P1CE FC6A-C24K1CE	FC6A-C40P1CE FC6A-C40K1CE FC6A-C40P1DE FC6A-C40K1DE	FC6A-C40P1CEJ FC6A-C40K1CEJ FC6A-C40P1DEJ FC6A-C40K1DEJ
Transistor Output Points	7 (7/1 common)	10 (10/1 common)	16 (8/1 common)	
Output Type	Transistor Sink	FC6A-C16K1CE/FC6A-C24K1CE/FC6A-C40K1CE/FC6A-C40K1DE/FC6A-C40K1CEJ/FC6A-C40K1DEJ		
	Transistor Source	FC6A-C16P1CE/FC6A-C24P1CE/FC6A-C40P1CE/FC6A-C40P1DE/FC6A-C40P1CEJ/FC6A-C40P1DEJ		
Rated Load Voltage	24V DC: 24V DC 12V DC: 12V DC			
Voltage Tolerance	24V DC: 19.2 to 28.8V DC 12V DC: 10.2 to 18.0V DC		24V DC: 19.2 to 28.8V DC 12V DC: 10.2 to 16.0V DC	
Rated Load Current	Per Point	0.5A		
	Per Common	3.5A	5A	4A
Voltage Drop (ON Voltage)	1V max (voltage between COM and output terminal when output is on.)			
Inrush Current	1A			
Leakage Current	0.1mA maximum			
Clamping Voltage	24V DC: 39V ±1V 12V DC: 27V ±1V			
Maximum Lamp Load	12W			
Inductive Load	24V DC: L/R=10ms (28.8V DC, 1Hz) 12V DC: FC6A-C40P1DE/FC6A-C40K1DE, L/R=10ms (18.0V DC 1Hz), FC6A-C40P1DEJ/FC6A-C40K1DEJ, L/R=10ms (16.0V DC, 1Hz)			
Overcurrent Protection	Transistor Sink Output: No Transistor Source Output: Overcurrent is detected by current limit resistance. ¹			
External Current Draw	24V DC: 100mA maximum, 24V DC (power voltage at the +V terminal, -V terminal at source) 12V DC: 100mA maximum, 12V DC (power voltage at the +V terminal, -V terminal at source)			
Isolation	Between output terminal and Internal circuit: Photocoupler-isolated Between output terminals: Not isolated			
Connector	Insertion Durability	100 times minimum		
	Applicable Ferrule	1-wire: AI 0.5-8 WH (Phoenix Contact) 2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact)		
Output Delay	Turn ON Time	High speed input port: 5μs Middle speed input port: 30μs Normal speed input port: 300μs		High speed input port: 5μs Middle speed input port: 300μs
	Turn OFF Time	High speed input port: 5μs Middle speed input port: 30μs Normal speed input port: 300μs		High speed input port: 5μs Middle speed input port: 300μs

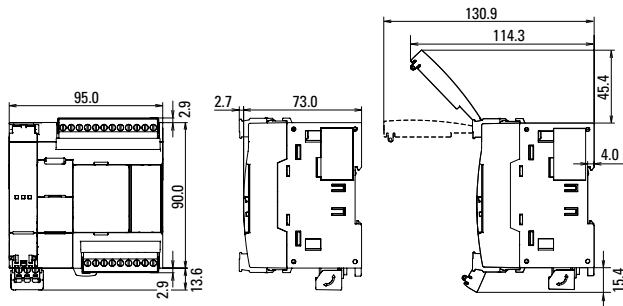
Note 1: This overcurrent signals consist of one signal per 4 point outputs. When microprocessor gets this overcurrent signal by interrupt input, microprocessor turns off 4pt outputs of this category at fixed time (approx. 1 second).

Relay Output Specifications

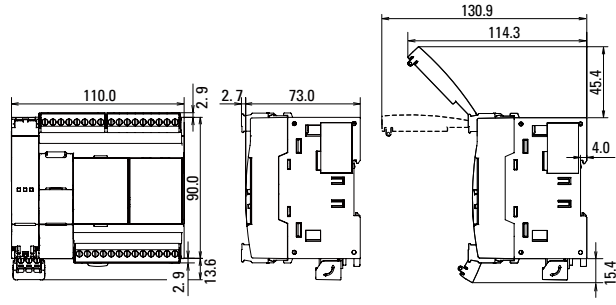
Part Number		FC6A-C16R1AE FC6A-C16R1CE	FC6A-C24R1AE FC6A-C24R1CE	FC6A-C40R1AE FC6A-C40R1CE FC6A-C40R1DE	FC6A-C40R1AEJ FC6A-C40R1CEJ FC6A-C40R1DEJ
Relay Output Points		7	10		16
Output Points per Common Line	COM1	4	4		4
	COM2	3	4		4
	COM3	—	2		4
	COM4	—	—		4
Output Type		1NO 2A			
Maximum Load Current	Per Point	COM1: 7A COM2: 6A			
	Per Common	COM1: 7A COM2: 6A	COM1: 7A COM2: 7A	COM3: 4A	COM1: 7A COM2: 7A COM3: 7A COM4: 7A
Minimum Switching Load		1mA/5V DC (reference value)			
Initial Contact Resistance		30 mΩ maximum			
Electrical Life		100,000 operations minimum (rated load 1,800 operations/hour)			
Mechanical Life		20,000,000 operations minimum (no load 18,000 operations/hour)			
Rated Load		Resistive load: 240V AC 2A, 30V DC 2A Inductive load: 240V AC 2A (cos $\theta = 0.4$), 30V DC 2A (L/R = 7 ms)			
Dielectric Strength		Between output and ground terminals: 1,500V AC, 1 minute Between output terminal and internal circuit: 1,500V AC, 1 minute Between output terminals (COMs): 1,500V AC, 1 minute			
Connector	Insertion/ Removal Durability	100 times minimum			
	Applicable Ferrule	1-wire: AI 0.5-8 WH (Phoenix Contact) 2-wire: AI-TWIN 2×0.5-8 WH (Phoenix Contact)			

DIMENSIONS (all dimensions are in mm)

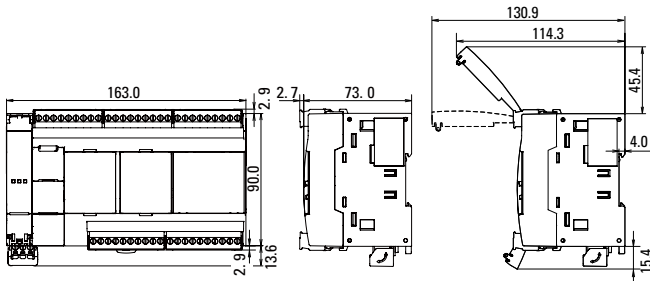
FC6A-C16R1AE/FC6A-C16R1CE
FC6A-C16P1CE/FC6A-C16K1CE



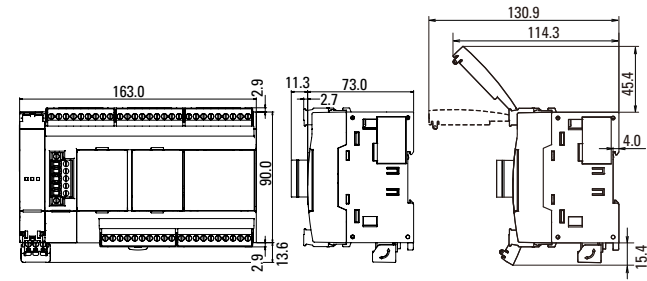
FC6A-C24R1AE/FC6A-C24R1CE
FC6A-C24P1CE/FC6A-C24K1CE



FC6A-C40R1AE/FC6A-C40R1CE
FC6A-C40P1CE/FC6A-C40K1CE
FC6A-C40R1DE/FC6A-C40P1DE
FC6A-C40K1DE



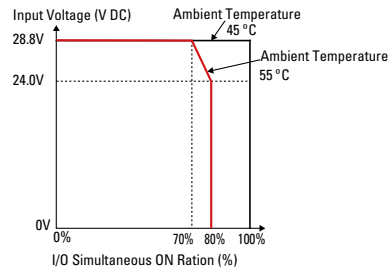
FC6A-C40R1AEJ/FC6A-C40R1CEJ
FC6A-C40P1CEJ/FC6A-C40K1CEJ
FC6A-C40R1DEJ/FC6A-C40P1DEJ
FC6A-C40K1DEJ



Temperature derating curves: Input voltage vs. I/O Simultaneous ON Ratio (%)

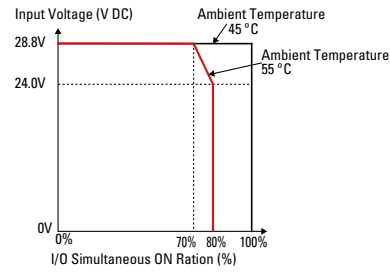
Input (with cartridge)

FC6A-C16K1CE FC6A-C40K1DE
 FC6A-C24K1CE FC6A-C40K1CEJ
 FC6A-C40K1CE FC6A-C40K1DEJ



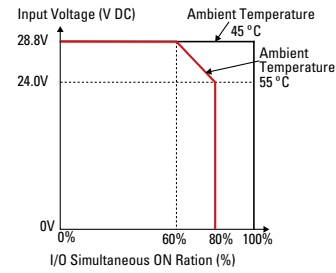
Output (with cartridge)

FC6A-C16K1CE FC6A-C40K1DE
 FC6A-C24K1CE FC6A-C40K1CEJ
 FC6A-C40K1CE FC6A-C40K1DEJ



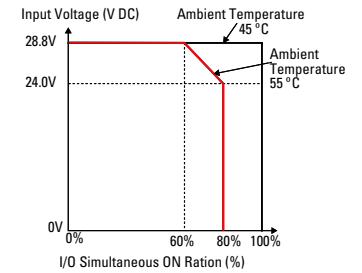
Input (w/o cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
 FC6A-C40P1CE FC6A-C40P1DEJ
 FC6A-C40P1DE



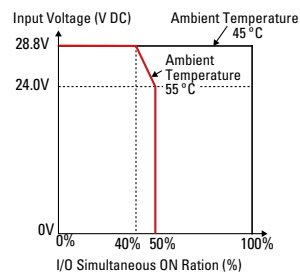
Output (w/o cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
 FC6A-C40P1CE FC6A-C40P1DEJ
 FC6A-C40P1DE



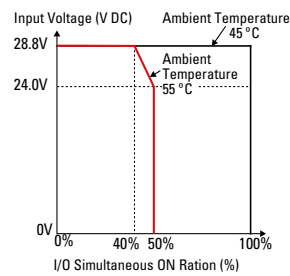
Input (with cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
 FC6A-C40P1CE FC6A-C40P1DEJ
 FC6A-C40P1DE



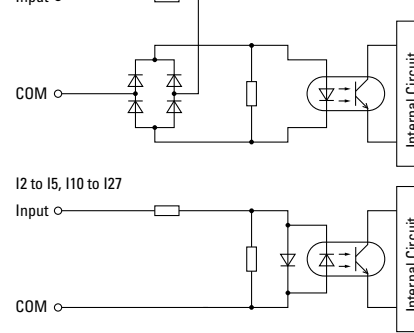
Output (with cartridge)

FC6A-C24P1CE FC6A-C40P1CEJ
 FC6A-C40P1CE FC6A-C40P1DEJ
 FC6A-C40P1DE

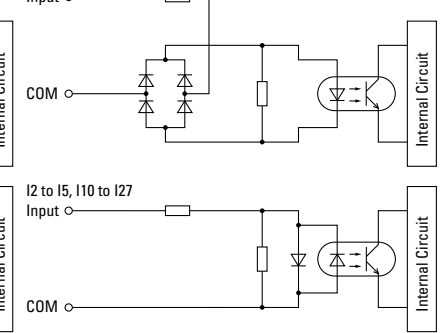


Input Internal Circuit

100V to 240V AC, 24V DC
 Transistor Sink Output
 I0, I1, I6, I7

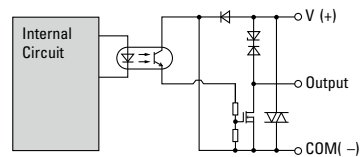


12V DC
 Transistor Sink Output
 I0, I1, I6, I7

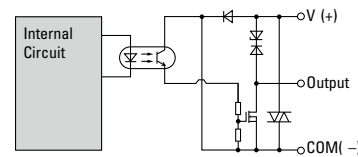


Output Internal Circuit

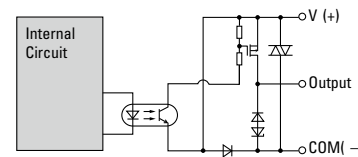
100V to 240V AC, 24V DC
 Transistor Sink Output



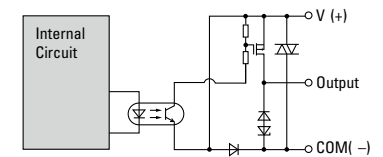
12V DC
 Transistor Sink Output



100V to 240V AC, 24V DC
 Transistor Source Output



12V DC
 Transistor Source Output





All-in-one touchscreen interface and logic controller

FT1A Touch



The FT1A SmartAXIS Touch combines operator interface and control in a single compact package, all programmable with IDEC's PC-based software. The FT1A Touch is available in 12 I/O and 14 I/O configurations with analog I/O expansion capability suitable for advanced analog monitoring and control.

KEY FEATURES

- 3.8" HMI+PLC
- Models with 12 or 14 I/O
- Embedded RJ45 Ethernet Port
- Modbus TCP or RTU
- Built-in 2 analog inputs
- Built-in 2 analog outputs
- Optional Analog Cartridges
- PID Controls
- USB Maintenance Port
- Seamless interface with other PLCs
- Class 1 Div. 2 Hazardous Locations
- -20 to 55 degree C operating temp.
- IP66f, Nema 4X (indoor), 13



General Specifications

Part No.	FT1A-*12RA-*	FT1A-*14KA-* / FT1A-*14SA-*
Output	Relay output	Transistor output
Rated Power Voltage/ Power Supply Isolation	24V DC/Not isolated	
Allowable Voltage Range	20.4 to 28.8V DC (including ripple)	
Power Consumption	9.2 W maximum	11W maximum
Allowable Momentary Power Interruption	10 ms maximum	
Dielectric Strength	Between power terminal and FE terminal: 500V AC, 5 mA, 1 minute Between power terminal and output terminal: 2,300V AC, 5 mA, 1 minute	Between power terminal and FE terminal: 500V AC, 5 mA, 1 minute Between power terminal and output terminal: 500V AC, 5 mA, 1 minute
EMC Immunity	IEC/EN 61131-2:2007 compliant	
Inrush Current	50A maximum (5ms maximum)	
Operating Temperature	Color display: -20 to +55°C, Monochrome display: 0 to +55°C (Note 1) (Note 2)	
Storage Temperature	-20 to +60°C (no freezing)	
Relative Humidity	10 to 95% RH (no condensation)	
Pollution Degree	2 (IEC 60664-1)	
Corrosion Immunity	Atmosphere free from corrosive gases	
Degree of Protection	IP66F TYPE 4X TYPE 13 (Panel front) (Note 3), IP20 (Rear)	
Ground	Functional grounding	
Protective grounding conductor	UL1007 AWG16	
Vibration Resistance	5 to 8.4 Hz half amplitude 3.5 mm, 8.4 to 150 Hz, acceleration 9.8 m/s ² (1G), 2 hours per axis on each of three mutually perpendicular axis (IEC 61131-2)	
Shock Resistance	147 m/s ² , 11 ms, X, Y, Z directions 3 times (IEC 61131-2)	
Mounting Structure	Panel mount	
Weight (approx.)	300g	250g

Note 1: FT1A-*12RA-* hardware version V130 (indicated on hardware) and earlier is UL, c-UL listed at 50°C (maximum operating temperature).

Note 2: See SmartAXIS Touch User's Manual FT9Y-B1390(2) for I/O derating.

Note 3: Operation not guaranteed when used with certain types of oils.

Function Specifications

Part Number		FT1A-*12RA-*	FT1A-*14KA-*	FT1A-*14SA-*	
Control System		Stored program system			
Ladder Program	Instruction Words	Basic Instructions	42 types		
		Advanced Instructions	98 types	99 types	
	Program Capacity		Program size: 47.4 kB, Configuration memory capacity: 5 MB		
	Processing Time	Basic Instruction	1850μs/1,000 steps		
END Processing		5 msec minimum			
FBD	FB		37 types		
	Program Capacity		Program size: 38kB, Configuration memory capacity: 5MB		
	No. of FB	FB (Note 1)	1,000		
		Timer (T)	200		
		Counter (C)	200		
Processing Time	Basic Instruction	4ms/100			
	END Processing	5ms minimum			
User Program Storage		Flash ROM (100,000 times)			
I/O Points	Inputs		8 (V3.90 or above: 90 max. can be added with remote I/O master function)	8 (90 max. can be added with remote I/O master function)	
	Outputs		4 (V3.90 or above: 54 max. can be added with remote I/O master function)	4 (54 max. can be added with remote I/O master function)	
Analog Input		2 (V3.90 or above: 24 max. can be added with remote I/O master function)	2 (4 max. can be added with analog cartridge, and 24 max. can be added with remote master function)		
Analog Output		—	2 (4 max. can be added with analog cartridge)		
Internal Relays		1,024			
Shift Registers		128			
Data Registers		2000			
Special Data Registers		200			
Counters		200			
Timer (1ms, 10 ms, 100 ms, 1s)		200			
Clock		Precision: ±30 seconds/month (25°C, typical)			
RAM Backup	Backup Data		Internal relays, shift registers, counters, data registers, clock data		
	Backup Duration		Approximately 30 days (typical) at 25°C after backup battery is fully charged		
	Battery		Lithium secondary battery		
	Charging Time		Approximately 15 hours required to charge from 0 to 90%		
	Replaceability		Not possible		
Self-Diagnostic Functions		Keep data check, power failure check, watchdog timer check, timer/counter preset value change error check, user program syntax check, user program execution check			
Input Filter		No filter, 3 to 15 ms (selectable in increments of 1 ms)			
Catch Input/Interrupt Input		4/4			
High-speed Counter	Maximum Counting Frequency and Points	Single/two-phase selectable	1 (5 kHz, multiple 2/4, single-phase cannot be used)		
		Single-phase	4 (x 10 kHz)		
	Counting Range		0 to 4,294,967,295 (32 bits)		
	Operation Mode		Rotary encoder mode and adding counter mode		
Analog Voltage Inputs	Built-in Points		2		
	Input Range		0 to 10V DC	0 to 10V DC (voltage input) / 4 to 20 mA (current input)	
	Input Impedance		78 kΩ	78 kΩ (voltage input) / 250 Ω (current input)	
	Digital Resolution		0 to 1,000 (10 bits)		
Number of Relay Outputs		10A relay: 4		—	
Number of Transistor Outputs		—	4 (sink)	4 (source)	
Analog Output	Built-in Points		—		
	Output Range		—		
	Digital Resolution		—		
			0 to 10V DC (voltage output) / 4 to 20 mA (current output)		
USB-mini B (Note 2)		×			
USB-A (Note 2)		×			
RS232C (Note 2)		×			
RS485/422 (Note 2)		×			
Ethernet		×			
Expansion Communication Ports	Port 2		—		
	Port 3		—		
Memory Cartridge		—			
SD Memory Card		—			
Analog Cartridge Interface	Number of Ports		—	2	
	Connectable Cards		—	4 (FC6A-PJ2A, FC6A-PK2AV, FC6A-PK2AW, FC6A-PJ2CP)	

Note 1: Except for timer, counter, input FB, and output FB.

Note 2: Not isolated from internal circuits.

Display Specifications

Part No.	Touch	
Display Element	TFT color LCD	STN monochrome LCD
Colors/Shades	65,536 colors	Monochrome 8 shades
Effective Display Area	88.92 W x 37.05 H mm	87.59 W x 35.49 H mm
Display Resolution	240 W x 100 H pixels	
View Angle	Left/right 40°, top 20°, bottom 60°	Left/right/top/bottom: 45°
Contrast Adjustment	Not possible	32 levels
Backlight	LED	LED (white, red, pink)
Backlight Life	50,000 hours (Note 1)	
Brightness	400 cd/m ² (Note 2)	740 cd/m ² (Note 2)
Brightness Adjustment	32 levels	
Backlight Control	Auto off function	
Backlight Replacement	Not possible	
Display Character Size	1/4 Size	8 x 8 pixels [JIS 8-bit code, ISO 8859-1 (Western European languages), ANSI 1250 (central Europe)], ANSI 1257 (Baltic), ANSI 1251 (Cyrillic)
	1/2 Size	8 x 16 pixels [JIS 8-bit code, ISO 8859-1 (Western European languages), ANSI 1250 (central Europe)], ANSI 1257 (Baltic), ANSI 1251 (Cyrillic)
		16 x 32 pixels, 24 x 48 pixels, 32 x 64 pixels (Western European languages: ISO 8859-1)
	Full Size	16 x 16 pixels (Japanese JIS first and second level characters, simplified Chinese, traditional Chinese, Korean)
	Double Size	32 x 32 pixels (Japanese JIS first level characters, Mincho font)
No. of Characters	1/4 Size	30 characters x 12 lines/screen
	1/2 Size	30 characters x 6 lines/screen
	Full Size	15 characters x 6 lines/screen
	Double Size	7 characters x 3 lines/screen
Character Magnification	0.5x, 1x, 2x, 3x, 4x, 5x, 6x, 7x, 8x vertically and horizontally	
Character Attributes	Blink, reverse, bold, shadowed (blink is 1 sec or 0.5 sec)	
Graphics	Line, polyline, polygon, rectangle, circle, ellipse, arc, pie, equilateral polygons (3, 4, 5, 6, 8), fill, picture	
Window Display	3 popup screens + 1 system screen	

Note 1: The backlight life refers to the time until the brightness reduces by half after use at 25°C.

Note 2: Brightness of LCD only (monochrome LCD: when lit white).

Operation Specifications

Part No.	Touch
Switching Element	Analog resistive membrane (touch panel)
Operating Force	0.2 to 2.5N
Mechanical Life	1 million operations
Acknowledgment Sound	Electric Buzzer
Multiple Press	Not possible

HMI Function Specifications

Functions	Drawings, bit button, word button, goto screen button, key button, multi-button, keypad, selector switch, potentiometer, numerical input, character input, pilot lamp, picture display, message display, message switching display, alarm list display, alarm log display, numerical display, bar chart, line chart, pie chart, meter, calendar, bit write command, word write command, goto screen command, timer, script command, multi-command, system area, start time, Auto Backlight OFF, O/I Link, user communication, maintenance communication, DM Link Communication, PLC Link Communication (Note 1), alarm log, data log, operation log, data storage area, preventive maintenance, recipe, text group, global script, user account, project data transfer using external memory, downloading logged data in external memory, USB auto-run function
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Note 1: The up-to-date information on the connectable PLC can be obtained from <http://www.idec.com/language>.

Input Specifications

Part Number		*12RA-*	*14KA-*	*14SA-*	
Digital Input	Input Points	6			
	Input Type	Sink	Source	Sink	
	Input Voltage Range	0 to 28.8V DC			
	Rated Input Current	4.4 mA	5.2 mA	4.4 mA	
	Input Impedance	5.5 k Ω	4.7 k Ω	5.5 k Ω	
	Input Delay Time	OFF \rightarrow ON	2.5 μ s + soft filter setting		
		ON \rightarrow OFF	5 μ s + soft filter setting		
	Isolation	Between input terminals	Not isolated		
		Internal circuit	Not isolated		
	Input Type	Type 1 (IEC 61131-2)			
	External Load for I/O Interconnection		Not needed		
	Operating Level	OFF voltage	Sink type: 5V DC max. Source type: 15V DC min.		
		ON voltage	Sink type: 15V DC min. Source type: 5V DC max.		
OFF current		Sink type: 0.9 mA max. Source type: -1.0 mA min.			
ON current		Sink type: 2.7 mA min. Source type: -3.0 mA max.			
Analog Input	Input Points	2			
	Input Type	Voltage input	Voltage/Current input		
	Input Range	0 to 10.0 VDC	0 to 10.0 VDC / 4 to 20 mA		
	Sampling Duration Time		2 ms maximum		
	Total Input System Transfer Time		3 ms + sampling time + scan time	3 ms + sampling time + scan time (voltage input) 12 ms + sampling time + scan time (current input)	
	Digital Resolution		0 to 1,000 (10 bits)		
	Input Error	25°C	\pm 3% of full scale		
		Total	\pm 5% of full scale		
	Isolation	Between input terminals	Not isolated		
		Internal circuit	Not isolated		
	When used as digital input	Digital I/O	Type 1 (not conforming to IEC 61131-2 digital I/O type)		
		Operation Level	OFF voltage: 5V maximum		
			ON voltage: 15V minimum		
OFF current: 0.06 mA maximum					
ON current: 0.20 mA minimum					
External Power for Input	Input Voltage Range	—			
	Output Current Capacity	—			

Output Specifications

Part Number			*12RA-*	*14KA-*	*14SA-*
Transistor Output	Output Points	Transistor Sink Output	—	4	—
		Transistor Source Output		—	4
	Rated Load Voltage			24V DC	
	Input Voltage Range			20.4 to 28.8V DC	
	Maximum Load Current	1 point		0.3A maximum	
		1 common		1A maximum	
	Voltage Drop (ON Voltage)			1V maximum (voltage between COM and output terminals when output is ON)	
	Inrush Current			1A	
	Leakage Current			0.1 mA maximum	
	Clamping Voltage			39V ± 1V	
	Maximum Lamp Load			8 W maximum	
	Inductive Load			L/R = 10 ms (28.8V DC, 1 Hz)	
	External Current Draw			100 mA maximum, 24V DC	
	Isolation	Between output terminal and internal circuit		Photocoupler isolated	
Between output terminals		Not isolated			
Output Delay	OFF ON	100µS max.			
	ON OFF	200µS max.			
Relay Output Common	Electrical Life		100,000 operations minimum (resistive load 1,800 operations/h)	—	—
	Mechanical Life		20 million operations minimum (no load 18,000 operations/h)	—	—
	Dielectric Strength	Between output terminal and internal circuit	2,300V AC, 1 minute	—	—
		Between output terminals (between COMs)	2,300V AC, 1 minute	—	—
Analog Output	Output Points		2		
	Analog Output Signal Type		Voltage/Current output (Selectable)		
	Analog Output Range		0 to 10V DC / 4 to 20mA		
	Load Impedance		2kΩ min (voltage input) / 500 Ω max (current input)		
	Applicable Load Type		Resistive Load		
	Maximum Deviation at 25°C		±0.3% of full scale		
	Temperature Coefficient		±0.02%/°C of full scale		
	Repeatability After Stabilization Time		±0.4% of full scale		
	Non-linearity		±0.01% of full scale		
	Output Ripple		30mV max. (spike noise not included)		
	Overshoot		0% (Note 2)		
	Total Error		±1.0% of full scale including ripple		
	Effect of Improper Output Connection		No damage		
	Digital Resolution		0 to 1,000 (10 bits)		
	Output Value of LSB		10mV (0-10V) / 16µA (4-20mA)		
Monotonicity		Yes			
Current loop open		Not detectable			

Note 1: High-speed output terminal (100 kHz pulse output terminal): 5 µs max. Normal output terminal (including 5kHz pulse output terminal): 100 µs max.

Note 2: Overshoot may occur under light load conditions. Overshoot can be suppressed by inserting a damping resistor. Damping resistor value: approx. 150Ω including the input impedance.

Analog Expansion Cartridge Specifications (FC6A-P)

Specifications

Part No.	FC6A-PJ2A	FC6A-PJ2CP	FC6A-PK2AV	FC6A-PK2AW
Type	Voltage/Current Input	Temperature Input	Voltage Output	Current Output
Number of Input/Output	2	2	2	2
Rated Voltage	5.0V, 3.3V (supplied from the Touch)			
Consumption Current	5.0V: – 3.3V: 30mA		5.0V: 70mA 3.3V: 30mA	5.0V: 185mA 3.3V: 30mA
Weight	15g			

Output Specifications

Part Number	FC6A-PK2AV	FC6A-PK2AW
Type	Voltage Output	Current Output
Output Type	Voltage Output	0 to 10V DC
	Current Output	—
Load	Impedance	2kΩ min.
	Load Type	Resistance Load
D/A Conversion	Cycle Time	20ms
	Settling Time	40ms max.
	Total Output System Transfer Type	60ms+1 scan
Output error	Maximum Error at 25°C	±0.3% of full scale
	Temperature Coefficient	±0.02%/°C of full scale
	Reproducibility after Stabilization Time	±0.4% of full scale
	Non-linearity	±0.01% of full scale
	Output Ripple	30mV max.
	Overshoot	0%
	Maximum Error	±1.0% of full scale
	Effect of Improper Output Terminal Connection	No damage
Data	Digital Resolution	4096 (12 bits)
	LSB Output Value	2.44mV (0 to 10V)
	Data Format in Application	0 to 4095 (0 to 10V)
	Monotonicity	Yes
	Open Current Loop	—
Noise Resistance	Maximum Temporary Deviation during Electrical Noise Tests	±4.0 of full scale
	Recommended Cable	Shielded twisted pair
	Crosstalk	1 LSB max.
Isolation	None	
Calibration to Maintain Rated Accuracy	Impossible	
Selection of Output Signal Type	Voltage output only	Current output only

Applicable Wire

Cartridge Part No.	FC6A-PJ2A	FC6A-PJ2CP	FC6A-PK2AV	FC6A-PK2AW
Applicable Wire	0.3mm2 (AWG22) shielded twisted pair	0.3mm2 (AWG22) twisted pair	0.3mm2 (AWG22) shielded twisted pair	

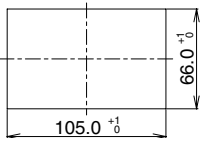
Input Specifications

Part No.	FC6A-PJ2A		FC6A-PJ2CP	
Input Type	Voltage Input	Current Input	Resistance Thermometer	Thermocouple
Input Range	0 to 10V DC	4 to 20mA DC 0 to 20mA DC	Pt100: -200 to +850°C Pt1000: -200 to +600°C Ni100: -60 to +180°C Ni1000: -60 to +180°C 3-wire RTD	K: -200 to 1300°C J: -200 to 1000°C R: 0 to 1760°C S: 0 to 1760°C B: 0 to 1820°C E: -200 to 800°C T: -200 to 400°C N: -200 to 1300°C C: 0 to 2315°C
Input Impedance	1MΩ min.	250Ω max.	1MΩ min.	
Allowable Conductor Resistance	—		10Ω max.	—
Input Detection Current	—		Typ: 0.2mA, 1.0mA max.	—
AD Conversion	Sample Duration Time	10ms		250ms
	Sample Interval	20ms		500ms
	Total Input System Transfer Time	20ms + 1 scan		500ms + 1 scan
	Type of Input	Single-ended input		
	Operating Mode	Self-scan		
Conversion Method	SAR			
Input Error	Maximum Error at 25°C	±0.1% of full scale	±0.1% of full scale	±0.1% of full scale Cold junction compensation accuracy ±4.0°C or less Exceptions R, S thermocouple error: ±6.0°C (0 to 200 °C range only) B thermocouple error: Not guaranteed (0 to 300 °C range only) K, J, E, T, N thermocouple error: ±0.4% of full scale (0°C or lower range only)
	Temperature Coefficient	±0.02%/°C of full scale		
	Reproducibility After Stabilization Time	±0.5% of full scale		
	Non-linearity	±0.01% of full scale		
	Maximum Error	±1.0% of full scale		
Data	Digital Resolution	4096 (12 bits)	Pt100: 10,500 (14 bits) Pt1000: 8000 (13 bits) Ni100: 2400 (12 bits) Ni1000: 2400 (12 bits)	K: 15,000 (14 bits) J: 12,000 (14 bits) R: 17,600 (15 bits) S: 17,600 (15 bits) B: 18,200 (15 bits) E: 10,000 (14 bits) T: 6,000 (13 bits) N: 15,000 (14 bits) C: 23,150 (15 bits)
	LSB Input Value	2.44mV (0 to 10V DC)	4.88μA (DC0 to 20mA) 3.91μA (DC4 to 20mA)	0.1°C 0.18°F
	Data Format in Application	Can be arbitrarily set for each channel in the range of -32,768 to 32,773		
	Monotonicity	Yes		
Noise Resistance	Maximum Temporary Deviation during Electrical Noise Tests	±4.0% of full scale		
	Recommended Cable	Shielded twisted pair	Twisted pair	
	Crosstalk	1LSB max.		
Isolation	None			
Effect When Input is Incorrectly Wired	No damage			
Maximum Allowable Constant Load (non-destructive)	13V DC	40mA	13V DC	
Input Type Modification	Software programming			
Calibration to Maintain Rated Accuracy	Impossible			

Mounting Hole Layout

FT1A-*12RA-*

FT1A-*14*A-*



Note: Waterproof characteristic may not be obtained depending on the panel material and size.

LCD Active Area

LCD Type	X	Y
TFT	88.92	37.05
STN	87.59	35.49

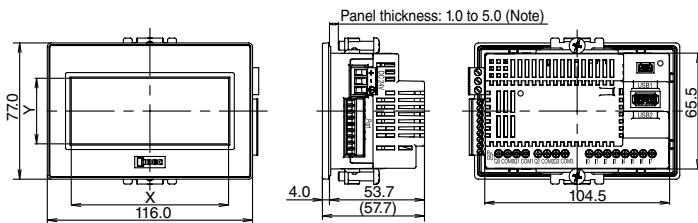
All dimensions in mm.

Dimensions

Relay Output Model (FT1A-12RA-*)

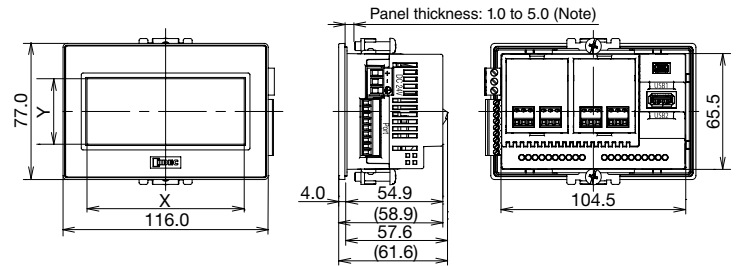
When using mounting bracket (HG9Z-4K2PN04)

All dimensions in mm.

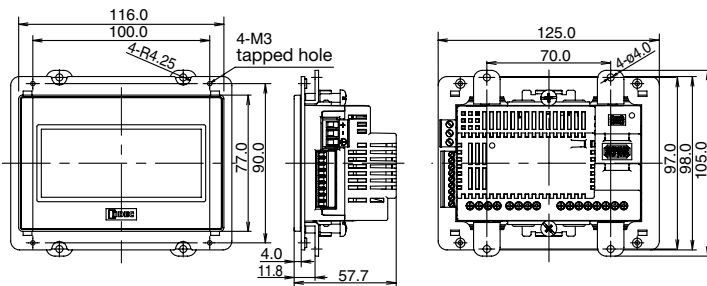


Transistor Output Model (FT1A-14KA-* / FT1A-14SA-*)

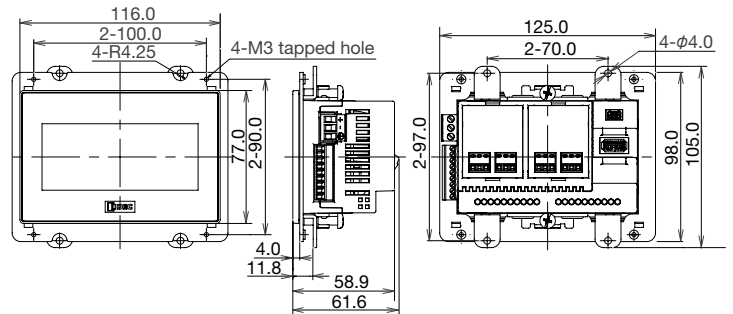
When using mounting bracket (HG9Z-4K2PN04)



When using rear mount adapter (FT9Z-1A01)



When using rear mount adapter (FT9Z-1A01)

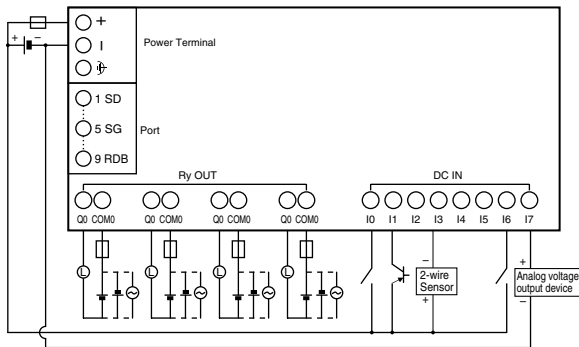


Terminal Arrangement and I/O Wiring Diagram Examples

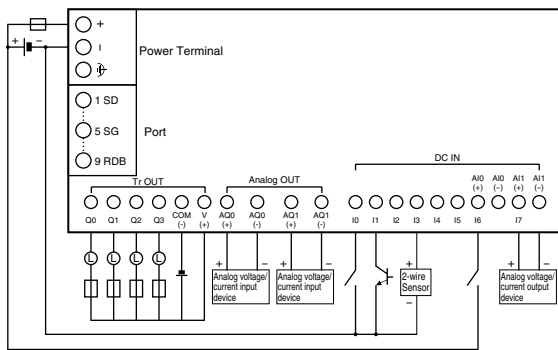
Touch (Display Model)

FT1A-*12RA-*

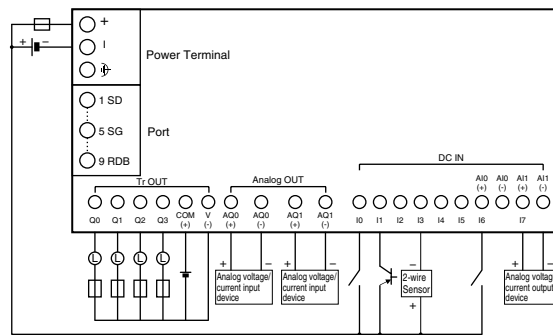
For terminal arrangement and I/O wiring diagram, see User's Manual.



FT1A-*14KA-*



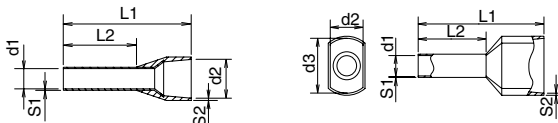
FT1A-*14SA-*



Recommended Ferrules for Touch/Pro/Lite Terminals

For 1-wire connection

For 2-wire connection



	Cross Section (mm ²)	AWG	Phoenix Contact Part No.	Touch				Pro/Lite		L1	L2	d1	S1	d2	d3	S2
				Power Supply	Serial Interface	I/O Relay Output Model	I/O Transistor Output Model	Power Supply	I/O							
1-wire connection	0.25	24	AI0.25-8YE			—		×	12.5	8.0	0.8	0.15	1.8		0.25	
	0.34	22	AI0.34-8TQ	×	×	×	×		12.5	8.0	0.8	0.15	2.0		0.25	
	0.5	20	AI0.5-8WH	×	×	×	×	—	14.0	8.0	1.1	0.15	2.5		0.25	
	0.75	18	AI0.75-8GY	×		×			14.0	8.0	1.3	0.15	2.8		0.25	
	1.0		AI1-8RD	×		—		×	14.0	8.0	1.5	0.15	3.0		0.3	
			AI1-10RD	—	—	×	—	—	16.0	10.0	1.5	0.15	3.0		0.3	
		1.5	16	AI1.5-8BK	×		—		×	14.0	8.0	1.8	0.15	3.4		0.3
			AI1.5-10BK	—		×		—	18.0	10.0	1.8	0.15	3.4		0.3	
2-wire connection	0.5	20	AI-TWIN2×0.5-8WH	×	×	—	×	—	15.0	8.0	1.5	0.15	2.5	4.6	0.25	
	0.75	18	AI-TWIN2×0.75-8GY	×	—	—	—	×	15.0	8.0	1.8	0.15	2.8	5.2	0.25	
			AI-TWIN2×0.75-10GY	—	—	×	—	—	17.0	10.0	1.8	0.15	2.8	5.2	0.25	
Screwdriver			SZS 0.6×3.5	×	—	×	—	×								
			SZS 0.4×2.5	—	×	—	×	—								

Note: Crimping pliers - Phoenix Contact part number CRIMPFOX ZA3 (12101882)



4.3-inch Operator Interface HG1G Series



OPERATOR INTERFACE PART NUMBERS

Display screen	Operation Style	Communication	Bezel color	Part Number
4.3-inch TFT color LCD 65,536 colors	Touchscreen (analog resistive)	COM LAN USB 1 USB 2	Black	HG1G-4VT22TF-B
			Silver	HG1G-4VT22TF-S

SPECIFICATIONS

General Specifications

Electrical Specifications	Rated Power Voltage	12-24V DC
	Power Voltage Range	10.2 to 28.8V DC
	Power Consumption	8W maximum 4W maximum when not using USB interface (USB2)
	Allowable Momentary Power Interruption	10ms maximum (voltage 20.4 to 28.8V DC) 1ms maximum (voltage 10.2 to 20.4V DC)
	Inrush Current	40A maximum
Environmental Specifications	Dielectric Strength	1,000V AC, 10mA, 1 minute between power and FG terminals
	Operating Temperature	-20 to +55°C (no freezing)
	Operating Humidity	10 to 90% RH (no condensation)
	Storage Temperature	-20 to +70°C (no freezing)
	Storage Humidity	10 to 90% RH (no condensation)
	Pollution Degree	2
	Vibration Resistance	5 to 8.4Hz amplitude 3.5 mm, 8.4 to 150Hz, acceleration 9.8m/s ² 10 cycles (100 minutes) on each of three mutually perpendicular axes
	Shock Resistance	147m/s ² , 11ms 5 shocks on each of three mutually perpendicular axes
	Noise Immunity	Fast transient/burst test, Power terminals: ±2kV, Communication line: ±1kV (IEC/EN 61131-2, IEC/EN 61000-4-4)
	Electrostatic Discharge	Contact ±6kV, air ±8kV (IEC/EN 61131-2, IEC/EN 61000-4-2)
Structure	Corrosion Immunity	Free from corrosive gases
	Mounting	Panel mounting (panel thickness: 1.0 to 5.0mm)
	Degree of Protection	IP66F/IP67F (IEC 60529, JIS C0920) (see JIS C 0920 Annex 1 for "F") (front part when mounted) *1 IP65F/IP67F when panel thickness is below 1.5mm TYPE 4X TYPE 13 *2, Class I Div 2
Dimensions	128 W × 102 H × 31.8 D mm	
Weight (approx.)	300g	

• Do not use the HG1G in an environment subject to strong ultraviolet rays, otherwise the LCD quality will deteriorate.

*1: Protection degree of the front surface after mounting. Operation not guaranteed.

*2: Operation not guaranteed under environments using certain types of oils.

PRODUCT DESCRIPTION

The super-bright, compact 4.3-inch HG1G has most of the features and functionalities found in a larger screen, including monitoring and control via PC, tablet or smartphone. It supports multiple protocols simultaneously, FTP Server function and best-in-class LED backlight life of 70,000 hours. HG1G can be mounted in portrait or landscape to fit your needs. It also supports a wide range of operating temperatures from -20 to 55 degrees C, and is rated IP66F/67F, Type 4X & Type 13, and Class 1 Div 2. It's flexible and small enough to fit in a tight space, and priced to fit a tight budget.

KEY FEATURES

- Supports up to four protocols simultaneously
- Remote monitor and control
- FTP Server Function
- Operating temperatures: -20°C to 55°C
- 65,536 colors with 800cd/m²
- 480 x 272 Pixel Resolution
- LED backlight lifespan: >70,000 hours
- Portrait or landscape mounting
- Rated power voltage: 12-24V DC
- Two Serial ports, 2 USB ports and an Ethernet port
- IP66F/IP67F, Type 4X, Type 13, Class 1 Div 2



SPECIFICATIONS (CON'T)

Display Specifications

Display	TFT color LCD
Color/Shade	65,536
Effective Display Area	95.04 W × 53.836 H mm
Display Resolution	480 W × 272 H pixels
View Angle	Right and left 70°, up 60°, down 65°
Backlight	White LED
Backlight Life	70,000 hours *1
Brightness	800cd/m ² *2
Brightness Adjustment	32 levels
Backlight Replacement	N/A

*1 Backlight life refers to time until the brightness reduces by half. It is an expected value after use at 25°C and not guaranteed. Actual backlight life depends on the operating environment and conditions.

*2 Brightness of LCD when operating condition is 25°C.

Operation Specifications

Switching Element	Analog resistive membrane
Operating Force	3N maximum
Mechanical Life	1,000,000 operations
Acknowledgement Sound	Electronic buzzer

Function Specifications

Screen Types	Base screen, popup screen, system screen
No. of Screens	Base screen: 3,000 max. Popup screen: 3,015 max.
User Memory	12MB (including expansion fonts)
Parts	Bit Button, Word Button, Goto Screen, Print Button Key Button, Multi Button, Keypad, Selector Switch, Potentiometer, Numerical Input, Character Input, Pilot Lamp, Multi-State Lamp, Picture Display, Message Display, Message Switching Display, Alarm List Display, Alarm Log Display, Numerical Display, Bar Graph, Trend Chart, Pie Chart, Meter, Calendar, Bit Write Command, Word Write Command, Goto Screen Command, Print Command Screen Script Command, Multi Command, Timer
Calendar	Year, Month, Day, Hour, Min., Sec., Day of Week ±90 sec per month (at +25°C)
Power Failure Backup Data	Calendar, log data, keep internal relay, keep internal register
Battery	Recommended replacement time: every 5 years (at +25°C)

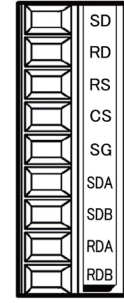
Interface Specifications

Serial Interface 1 (COM1) *1	RS232C	Electrical Characteristics	EIA RS232C compliant
		Transmission Speed	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500 bps
		Synchronization	Asynchronous
		Communication Method	Half or full duplex
		Control System	Hardware control or none
	RS422/485	Electrical Characteristics	EIA RS422/485 compliant
		Transmission Speed	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 187500bps *2
		Synchronization	Asynchronous
		Communication Method	Half or full duplex
		Control System	None
Connector		Detachable 9-pin terminal block	
Ethernet Interface (LAN)	Interface	IEEE802.3u (10BASE-T/100BASE-TX compliant)	
	Connector	Modular connector (RJ45)	
USB Interface (USB1)	Interface	USB 2.0 high speed (480Mbps)	
	Connector	USB Type Mini-B connector	
USB Interface (USB2)	Interface	USB 2.0 Full speed (12Mbps)	
	Connector	USB Type Mini-A connector	

*1: RS232C and RS 422/485 can be used simultaneously. *2: 187,500bps available only with SIEMENS SIMATIC S7-300/400 series (MPI port direct connection).

Serial Interface Terminal Arrangement

Name	I/O	Function	Communication Type
SD	OUT	Send Data	RS232C
RD	IN	Receive Data	
RS	OUT	Request to Send	
CS	IN	Clear to Send	
SG	—	Signal Ground	RS232C, RS422/485
SDA	OUT	Send Data (+)	RS422/485
SDB	OUT	Send Data (-)	
RDA	IN	Receive Data (+)	
RDB	IN	Receive Data (-)	



ACCESSORIES

Software and Cable Part Numbers

Name	Part No. (Ordering No.)	Package Quantity	Description
Application Software	SW1A-W1C	1	Automation Organizer Software Suite (includes WindO/I-NV4)
USB Maintenance Cable	HG9Z-XCM2A	1	USB Programming Cable USB-miniB
PLC Connection Cable *1	FC6A-KC1C	1	Communication cable between IDEC HMIs and FC6A (RS232/RS485)

*1: For the applicable connection cable to connect with the PLC of other than IDEC, refer to WindO/I -NV4 External Device Setup Manual included in the system configuration software Automation Organizer. The manual is also available on IDEC's website.

Maintenance Part Numbers

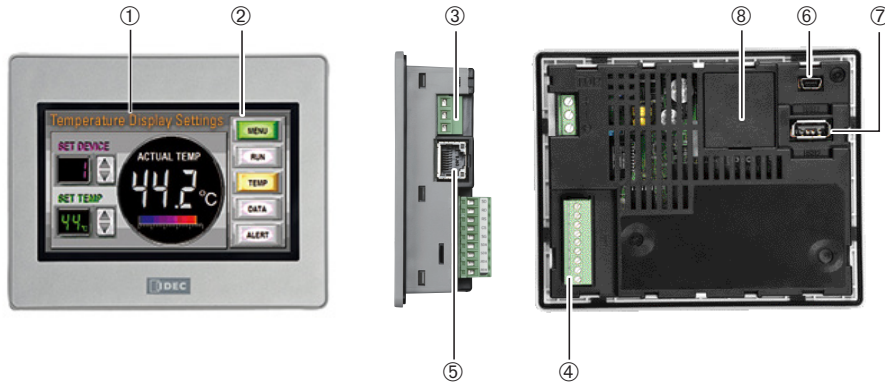
Name	Part No. (Ordering No.)	Package Quantity	Description
Mounting Clip	HG9Z-4K2PN04	4	Two clips are supplied with HG1G.
Serial Interface Connector (detachable 9-pin terminal block)	HG9Z-XT09V	1	One plug (terminal block type) is supplied.
Replacement Battery	HG9Z-XR1	1	Lithium battery CR2032 (one battery is supplied)
USB Cable Lock Pin	HG9Z-XU1PN05	5	Used to lock USB cable (for USB1, USB2). Two pins are supplied with HG1G.
Protective Sheet *2	HG9Z-1D4PN05	5	For 4.3 inch (5 pcs/pack) (used to protect the LCD)

*2: The protective sheet is UV resistant, however, resistance against direct sunlight in outdoor usage is not guaranteed. Used to protect the display screen.

STARTER KITS

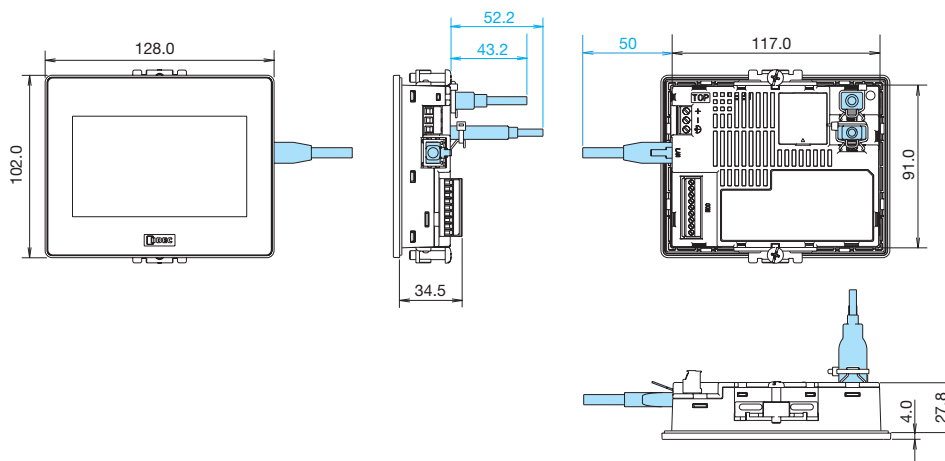
Part Numbers	Description
SMARTTOUCH-1G-B	HMI Kit - HG1G TFT 65K COLOR BLK Bezel, Power Supply, Software, and Programming Cable
KIT-FC6A-16-RA-HG1G	PLC/HMI Kit - FC6A 16IO 100–240V AC Relay Output, and HG1G TFT LCD black bezel, Power Supply, Software and cables
KIT-FC6A-16-RC-HG1G	PLC/HMI Kit - FC6A 16IO 24V DC Relay Output, and HG1G TFT LCD black bezel, Power Supply, Software and cables
KIT-FC6A-24-RA-HG1G	PLC/HMI Kit - FC6A 24IO 100–240V AC Relay Output, and HG1G TFT LCD black bezel, Power Supply, Software and cables
KIT-FC6A-24-RC-HG1G	PLC/HMI Kit - FC6A 24IO 24V DC Relay Output, and HG1G TFT LCD black bezel, Power Supply, Software and cables

HARDWARE

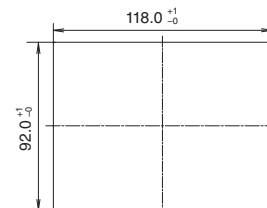


No.	Name	No.	Name
①	Display	⑤	Ethernet Interface (LAN)
②	Touchscreen	⑥	USB Interface (USB1)
③	Power Supply Terminal	⑦	USB Interface (USB2)
④	Serial Interface (COM)	⑧	Battery Cover

DIMENSIONS



Panel Cut-out



All dimensions in mm.

Panel thickness: 1.0 to 5.0mm

- Dimensions in blue show the mounting dimensions of the cable.
- Dimensions in the figure vary depending on the type of cable connected.
- Install the HG1G into a panel cut-out by tightening the two mounting clips (supplied) to a torque of 0.2 to 0.3 N-m.
- Do not use excessive force to tighten, otherwise the HG1G may be distorted. Also waterproof characteristics may be lost.

COMPATIBLE PLCS

Manufacturer	Series
IDEC	MICROSmart
	SmartAXIS Pro/Lite
	MICROSmart (Ethernet)
Mitsubishi	SmartAXIS Pro/Lite (Ethernet)
	MELSEC-A (link unit)
	MELSEC-QnA (link unit)
	MELSEC-Q (link unit)
	MELSEC-Q (Ethernet)
OMRON	MELSEC-FX
	MELSEC-FX (Ethernet)
	SYSMAC-C
	SYSMAC-CS
	SYSMAC-CJ1
	SYSMAC-CJ2
Allen-Bradley	SYSMAC-CP1
	SYSMAC (Ethernet)
	PLC-5 (Half Duplex)
	SLC-500 (Half Duplex)
	MicroLogix (Full Duplex)
	ControlLogix (Full Duplex)
	CompactLogix (Full Duplex)
	FlexLogix (Full Duplex)
	ControlLogix (Ethernet/IP, Ethernet/IP [Logix Native Tag])
	CompactLogix (Ethernet/IP, Ethernet/IP [Logix Native Tag])
	PLC-5 (Ethernet/IP)
	SLC 500 (Ethernet/IP)
	MicroLogix (Ethernet/IP)
SIEMENS	S7-200
	S7-300 (connects to CPU)
	S7-300 (link unit)
	S7-400
	S7-1200 (Ethernet)
Keyence	KV-700/1000/3000/5000
	KV Nano
	KZ
	KV
	KV (Ethernet)
Hitachi	S10mini
	S10V
JTEKT	TOYOPUC-PC2J
	TOYOPUC-PC3J
Toshiba Machine Works	TC200
	TCmini
GE Fanuc Automation	Series90-30
	VersaMax

Manufacturer	Series
Schneider Electric	Twido
Modicon	Modbus RTU Master
	Modbus RTU Slave
	Modbus ASCII Master
	Modbus TCP Client
	Modbus TCP Server
Panasonic	FP Series
Yaskawa Electric	MP
	MP (Ethernet)
Koyo	DirectLOGIC 05
	DirectLOGIC 06
	DirectLOGIC 205
	KOSTAC SZ
	KOSTAC SU
	KOSTAC SU (Ethernet)
Fanuc	Power Mate
	Series
Yokogawa Electric	FA-M3
	FA-M3 (Ethernet)
Fuji Electric	FREX-PC
	MICREX-F
	MICREX-SX
	MICREX-SX (Ethernet)
Toshiba	PROSEC T Series
LS Industrial Systems	V Series
VIGOR	MASTER-K
	VB
Emerson	VH
Equipment Systems	FloBoss
	EH (Ethernet)



6th-Generation IDEC SmartRelay



BASE MODULE GENERAL SPECIFICATIONS

Item	Specifications	Standard
Operating Temperature	Horizontal Mounting	0 to 55°C (no freezing)
	Vertical Mounting	0 to 55°C (no freezing)
Storage/Transportation Temp.	-40 to +70°C (no freezing)	—
Relative Humidity	10 to 95% (no condensation)	IEC60068-2-30
Atmospheric Pressure	795 to 1080hPa	—
Operating Condition	No corrosive gas	—
Degree of Protection	IP20	—
Vibration Resistance	5 to 8.4Hz, amplitude 3.5mm 8.4 to 150Hz, acceleration 9.8m/s ²	IEC60068-2-6
Shock Resistance	147m/s ²	IEC60068-2-27
Drop Test (packaged)	0.3m	IEC60068-2-32
Emissions	Limit class B Group 1	EN55011/A EN55022/B EN50081-1
Electrostatic Discharge Immunity	8kV air discharge 6kV contact discharge	IEC61000-4-2
Radiation Field Immunity	Field Strength: 1V/m and 10V/m	IEC61000-4-3
Fast Transient Burst	2kV (power line) 2kV (I/O signal line)	IEC61000-4-4
Surge Immunity ¹ (FL1F-H12RCC, FL1F-B12RCC only)	1kV (power line) normal 2kV (power line) common	IEC61000-4-5
Communication Cable	2.5mm ² (one wire) 1.5mm ² (two wires)	—
Terminal Style	Finger-safe type ²	—

1: For protection against surge noise on DC power supply types (FL1F-H12RCE/B12RCE, FL1F-H12SCD, FL1F-H12RCA/B12RCA), use surge absorbers, noise cut transformers or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.

2: Tightening torque 0.5 to 0.6N·m

PRODUCT DESCRIPTION

With an ever-changing market and tough competition, you need an edge to stay on top. This sixth-generation IDEC SmartRelay meets your demands from all small-scale applications by offering more powerful hardware, a new display and full communication options via Ethernet.

BASE MODULE HIGHLIGHTS

Embedded RJ45 Ethernet Port

- Remote program download, upload and monitor
- Integrated web server for remote monitoring and control

Micro SD Card

- Equipped with micro SD slot for program storage, transfer and data logging
- No need for a special memory cartridge

Data Logging

- Up to 20,000 lines in a file with a maximum of 50 files can be stored in the Micro SD Memory card

Integrated Web Server

- Easily monitor and control web pages with no HTML knowledge
- Instant monitoring and control using standard web browser like Chrome, IE and Firefox
- View and control I/O status, timer, counters, analog set point and more

There's an App for that!

- Download iOS and Android App for free
- Using the SmartRelay App, users can view and control any I/O status, timer, counters, and analog set point anywhere and at any time

1:N Communication

- FL1F SmartRelays now have the capability to communicate with each other over an Ethernet network
- Up to 16 FL1F SmartRelays can be configured on the network

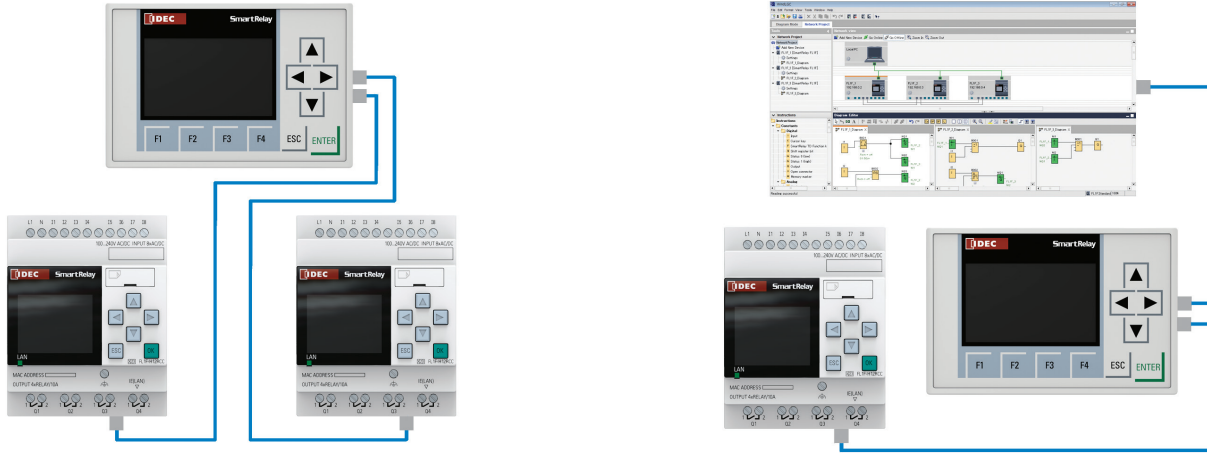
TEXT DISPLAY PANEL HIGHLIGHTS:

New and improved LCD display

- Improved display with 6 lines and 20 characters per line, more than twice as many characters as before
- Selectable white, amber or red backlighting for optical emphasis on alarms and events

Two RJ45 Ethernet ports

- Use a standard Ethernet cable to connect FL1F base module to the Text Display Panel. A special cable is not required.
- Provide different ways to connect



TEXT DISPLAY SPECIFICATIONS

Text Display General Specifications

Item	Specifications	Standard
Operating Temperature	Horizontal Mounting	Cold: IEC60068-2-1 Hot: IEC60068-2-2
	Vertical Mounting	
Storage/Transportation Temp.	-40 to +70°C (no freezing)	—
Relative Humidity	10 to 95% (no condensation)	IEC60068-2-30
Atmospheric Pressure	795 to 1080hPa	—
Operating Condition	No corrosive gas	—
Degree of Protection	IP20	—
Vibration Resistance	5 to 8.4Hz, amplitude 3.5mm	IEC60068-2-6
	8.4 to 150Hz, acceleration 9.8m/s ²	
Shock Resistance	147m/s ²	IEC60068-2-27
Drop Test (packaged)	0.3m	IEC60068-2-32
Emissions	Limit class B Group 1	EN55011/A EN55022/B EN50081-1
Electrostatic Discharge Immunity	8kV air discharge 6kV contact discharge	IEC61000-4-2
Radiation Field Immunity	Field Strength: 1V/m and 10V/m	IEC61000-4-3
Fast Transient Burst	2kV (power line) 2kV (I/O signal line)	IEC61000-4-4
Surge Immunity ¹ (FL1F-H12RCC, FL1F-B12RCC only)	1kV (power line) normal 2kV (power line) common	IEC61000-4-5
Communication Cable	2.5mm ² (one wire) 1.5mm ² (two wires)	—
Terminal Style	Finger-safe type ²	—

¹ For protection against surge noise on DC power supply types (FL1F-H12RCE/B12RCE, FL1F-H12SCD, FL1F-H12RCA/B12RCA), use surge absorbers, noise cut transformers, or noise filters. Use of a surge protection device (DEHN + SÖHNE GmbH + Co, BVT AD 24 Part No. 918 402) is recommended.

² Tightening torque 0.5 to 0.6N·m

Text Display General Specifications Cont.

Dimensions (W × H × D)	128.2 × 86 × 38.7 mm
Weight (approx.)	220g
Installation	Panel cut-out using mounting clips
Keyboard	Membrane keypad
Display	FSTN graphic display (W × H: 160 × 96 dots) LED backlight (White, Amber, Red)
Font type	English, Spanish, Russian, Chinese, Italian, Turkish, German, Dutch, French, Japanese
Displayable string	1 screen 6 lines × 20 columns

Power Supply Specifications

Power Voltage	24V AC/DC 12V DC
Allowable Voltage Range	20.4 to 26.4V AC 10.2 to 28.8V DC
Allowable Voltage Frequency	47 to 63Hz
Power Consumption	12V DC: 145mA (Typ.) 24V DC: 70mA (Typ.) 24V AC: 75mA (Typ.)
Data Transmission Rate	10/100M full/half duplex data transmission rate

LCD Display / Backlight Specifications

LCD Display Durability ³	50,000 hours
Backlight Durability ⁴	20,000 hours

³ Display durability is calculated under ordinary operating and storage conditions: room temperature, normal humidity below 65% RH, and not subjected to direct sunlight.

⁴ Backlight durability is the number of hours taken for the light to become 50% of the original brightness.

PART NUMBERS

Base Module

Rated Power Voltage	Input Signal	Output Signal	Display	Clock	I/O Points	Weight (approx.)	Part No.
24V DC	DC I1, I2, I7 and I8 are used for digital/ analog inputs	Transistor	Yes	Yes	8/4 points	195g	FL1F-H12SCD
12/24V DC		Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCE
			—			200g	FL1F-B12RCE
24V AC/DC	AC/DC ¹	Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCA
			—			200g	FL1F-B12RCA
100 to 240V AC/DC	AC/DC	Relay	Yes	Yes	8/4 points	240g	FL1F-H12RCC
			—			200g	FL1F-B12RCC

¹ With NPN/PNP sensor input. For details, see Input Internal Circuits in the Specifications table.

Expansion I/O Module

Type	Rated Power Voltage	Input Signal	Output Signal	I/O Points	Weight (approx.)	Part No.
Input/Output	24V DC	DC	Transistor	4/4 points	95g	FL1F-M08B1S2
	12/24VDC	DC	Relay	4/4 points	130g	FL1F-M08B2R2
	24V AC/DC ²	AC/DC ²	Relay	4/4 points	130g	FL1F-M08D2R2
	100 to 240V AC/DC	AC/DC	Relay	4/4 points	130g	FL1F-M08C2R2
Analog Input	12/24V DC	Analog	—	2/0 points	95g	FL1F-J2B2
Analog Output	24V DC	—	Analog	0/2 points	95g	FL1F-K2BM2

² With NPN/PNP sensor input. For details, see Input Internal Circuits in the Specifications table.

I/O points within the maximum number of expandable I/O points can be used.

When using modules of the same power voltage, supply power to the base module and expansion I/O modules using one power supply.

When power is supplied to the modules from different power supplies, the fast transient burst is 1 kV (IEC61000-4-4).

Text Display

Rated Power Voltage	Weight (approx.)	Part Number	Remarks
24V AC/DC 12V DC	220g	FL1F-RD1	Supplied with mounting clip and gasket

Options

Description	Part Number	Package Quantity	Remarks
Application Software: WindLGC	FL9Y-LP1CDW	1	DVD-ROM (incl. online help manual)
Mounting Clip for Base Module	FL1F-PSP1PN05	5	Supplied with a module ³
Mounting Clip and Waterproof Gasket for Text Display	FL1F-KW1	1	Supplied with text display ⁴
IDEC SmartRelay User's Manual (English)	FL9Y-B1789	1	Downloadable from: http://www.idec.com/download

³ Supplied with a base module and an expansion module.

⁴ Supplied with a text display, it includes a gasket, four mounting clips, and a power supply connector.

NEW FUNCTION BLOCKS

NEW

Analog filter

NEW

Astronomical clock

NEW

Max/Min

NEW

Stopwatch

NEW

Average value

BASE MODULE SPECIFICATIONS

Base Module Type No.		FL1F-H12SCD	FL1F-H12RCE FL1F-B12RCE	FL1F-H12RCA FL1F-B12RCA	FL1F-H12RCC FL1F-B12RCC	
Power Supply	Rated Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC	
	Allowable Voltage Range	20.4 to 28.8V DC	10.8 to 28.8V DC	20.4 to 26.4V AC 20.4 to 28.8V DC	85 to 265V AC 100 to 253V DC	
	Rated Frequency	—	—	47 to 63Hz	47 to 63Hz	
	Current Draw	15 to 50 mA (24V DC) 1.2A (with max. load on digital output)	30 to 140 mA (12V DC) 15 to 90 mA (24V DC)	15 to 150mA (12V DC) 15 to 130mA (24V DC)	15 to 40mA (100V AC) 5 to 10mA (100V DC) 15 to 25mA (240V AC) 2 to 8mA (240V DC)	
	Allowable Momentary Power Interruption	—	2ms Typ. (12V DC) 5ms Typ. (24V DC)	5ms Typ. (24V AC/DC)	10ms Typ. (100V AC/DC) 20ms Typ. (240V AC/DC)	
	Power Consumption	1.2 W (24V DC)	1.7W (12V DC) 2.2W (24V DC)	3.6 W (24V AC) 3.2 W (24V DC)	4.6W (100V AC) 1.2W (100V DC) 6.0W (240V AC) 2.0W (240V DC)	
	Reverse Polarity Protection	Yes	Yes	—	—	
Clock	Backup Duration	20 days	20 days	20 days	20 days	
	Clock Accuracy	±2 sec/day (Typ.)	±2 sec/day (Typ.)	±2 sec/day (Typ.)	±2 sec/day (Typ.)	
Input	Input Signal	DC	DC	AC/DC	AC/DC	
	Input Points	8 (I1 to I8)	8 (I1 to I8)	8 (I1 to I8)	8 (I1 to I8)	
	High-speed Input ¹	4 (I3, I4, I5, I6), 5kHz maximum	4 (I3, I4, I5, I6), 5kHz maximum	—	—	
	Analog Input Points	4 (I1, I2, I7, I8)	4 (I1, I2, I7, I8)	—	—	
	Analog Input Range	0 to 10V DC (max. rated input: 28.8V DC)	0 to 10V DC (max. rated input: 28.8V DC)	—	—	
	Analog Input Error	±1.5 (of full scale)	±1.5 (of full scale)	—	—	
	Analog Input Resolution	10 bits (0 to 1000)	10 bits (0 to 1000)	—	—	
	Cycle time	300ms	300ms	300ms	300ms	
	Allowable Voltage Range	0 to 28.8V DC	0 to 28.8V DC	0 to 26.4V AC 0 to 28.8V DC	0 to 265V AC 0 to 253V DC	
	Input Impedance	Digital Input	5.8kΩ	5.8kΩ	4.8kΩ	610kΩ
		Analog Input	72kΩ	72kΩ	—	—
	Isolation	—	—	—	—	
	Operating Range	OFF Voltage	< 5V DC	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC
		ON Voltage	≥ 12V DC	≥ 8.5 V DC	≥ 12V AC/DC	≥ 79V AC ≥ 79V DC
		OFF Current	< 0.9mA (I3 to I6) < 0.07mA (I1, I2, I7, I8)	< 0.88mA (I3 to I6) < 0.07mA (I1, I2, I7, I8)	< 1.2mA	< 0.05mA (AC) < 0.06mA (DC)
		ON Current	≥ 2.1mA (I3 to I6) ≥ 0.18mA (I1, I2, I7, I8)	≥ 1.5mA (I3 to I6) ≥ 0.12mA (I1, I2, I7, I8)	≥ 2.6mA	≥ 0.08mA (AC) ≥ 0.13mA (DC)
	Turn ON Time	1.5ms (Typ.) ≤ 1.0ms (I3 to I6)	1.5ms (Typ.) ≤ 1.0ms (I3 to I6)	1.5ms (Typ.)	100V AC: 40ms (Typ.) 240V AC: 30ms (Typ.) 100V DC: 25ms (Typ.) 240V DC: 20ms (Typ.)	
Turn OFF Time	1.5ms (Typ.) ≤ 1.0ms (I3 to I6)	1.5ms (Typ.) ≤ 1.0ms (I3 to I6)	15ms (Typ.)	100V AC: 45ms (Typ.) 240V AC: 70ms (Typ.) 100V DC: 60ms (Typ.) 240V DC: 75ms (Typ.)		
Wire Length ²	100m	100m	100m	100m		
Output	Output Signal	Transistor source output	Relay output	Relay output	Relay output	
	Output Points/ Contact Configuration	4 points (separate)	4NO contacts	4NO contacts	4NO contacts	
	Isolation	—	Isolated	Isolated	Isolated	
	Dielectric Strength (between power/input terminals and output terminals)	—	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	
	Output Voltage	External power voltage	—	—	—	
	Maximum Load Current	0.3A maximum	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	Resistive load 10A at 12/24V AC/DC 10A at 100/120V AC 10A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	
	Surge Current	—	30A maximum	30A maximum	30A maximum	
	Short-circuit Protection	Built-in current limiting resistor: Approx. 1A	External fuse required: 16A maximum	External fuse required: 16A maximum	External fuse required: 16A maximum	
	Minimum Switching Load	—	10mA, 12V DC (reference value)	10mA, 12V DC (reference value)	10mA, 12V DC (reference value)	
	Initial Contact Resistance	—	100mΩ maximum (at 1A, 24V DC)	100mΩ maximum (at 1A, 24V DC)	100mΩ maximum (at 1A, 24V DC)	
	Mechanical Life	—	10 million operations (no load, 10Hz)	10 million operations (no load, 10Hz)	10 million operations (no load, 10Hz)	
Electrical Life	—	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour		

1 When selecting frequency trigger function and up/down counter function.

2 10m when connected to analog input (twisted pair cable)

Initialization Time: After power-up, the FL1F takes a maximum of 9 seconds (when using a micro SD card) for initialization. When initialization is complete, the FL1F is automatically set to RUN mode.

EXPANSION I/O MODULE SPECIFICATIONS

Expansion I/O Module Type No.		FL1F-M08B1S2	FL1F-M08B2R2	FL1F-M08D2R2	FL1F-M08C2R2	FL1F-J2B2	FL1F-K2BM2	
Power Supply	Rated Power Voltage	24V DC	12/24V DC	24V AC/DC	100 to 240V AC/DC	12/24V DC	24V DC	
	Allowable Voltage Range	20.4 to 28.8V DC	10.8 to 28.8V DC	20.4 to 26.4V AC 20.4 to 28.8V DC	85 to 265V AC 100 to 253V DC	10.8 to 28.8V DC	20.4 to 28.8V DC	
	Rated Frequency	—	—	50/60Hz (47 to 63Hz)	50/60Hz (47 to 63Hz)	—	—	
	Current Draw	15 to 40mA	10 to 80mA (12V DC) 10 to 40mA (24V DC)	20 to 100mA (24V AC) 8 to 50mA (24V DC)	10 to 30mA (100V AC) 10 to 20mA (240V AC) 5 to 15mA (100V DC) 5 to 10mA (240V DC)	15 to 30mA	15 to 82mA	
	Allowable Momentary Power Interruption	—	2 ms (typ.) (12V DC) 5 ms (typ.) (24V DC)	5 ms (typ.) (24V AC/DC)	10ms (typ.) (100V AC/DC) 20ms (typ.) (240V AC/DC)	10ms (typ.) (12/24V DC)	10ms (typ.)	
	Power Consumption	1.0W	1.0W (12V DC) 1.0W (24V DC)	2.4W (24V AC) 1.2W (24V DC)	3.5W (100V AC) 1.8W (100V DC) 4.8W (240V AC) 2.4W (240V DC)	0.4W (12V DC) 0.8W (24V DC)	2.0W	
	Reverse Polarity Protection	Yes	Yes	—	—	Yes	Yes	
Input	Input Signal	DC input	DC input	AC/DC input	AC/DC input	Analog input	—	
	Input Points	4	4	4	4	—	—	
	Isolation	—	—	—	—	—	—	
	Allowable Voltage Range	20.4 to 28.8V DC	10.8 to 28.8V DC	20.4 to 26.4V AC 20.4 to 28.8V DC	85 to 265V AC 100 to 253V DC	—	—	
	Operating Range	OFF Voltage	< 5V DC	< 5V DC	< 5V AC/DC	< 40V AC < 30V DC	—	—
		ON Voltage	≥ 12V DC	≥ 8.5V DC	≥ 12V AC/DC	≥ 79V AC ≥ 79V DC	—	—
		OFF Current	< 0.88mA	< 0.88mA	< 1.1mA	< 0.05mA (AC) < 0.06mA (DC)	—	—
		ON Current	≥ 2.1mA	≥ 1.5mA	≥ 2.63mA	≥ 0.08mA (AC) ≥ 0.13mA (DC)	—	—
	Turn ON Time	1.5ms (Typ.)	1.5ms (typ.)	1.5ms (typ.)	100V AC: 40 ms (typ.) 240V AC: 30 ms (typ.) 100V DC: 25 ms (typ.) 240V DC: 20 ms (typ.)	—	—	
	Turn OFF Time	1.5ms (Typ.)	1.5ms (typ.)	15ms (typ.)	100V AC: 45 ms (typ.) 240V AC: 70 ms (typ.) 100V DC: 60 ms (typ.) 240V DC: 75 ms (typ.)	—	—	
	Analog Input Points	—	—	—	—	2	—	
	Analog Input Range	—	—	—	—	0 to 10V (max. rated input: 28.8V) 0 to 20mA (max. rated input: 40mA)	—	
	Digital Resolution	—	—	—	—	10 bits (0 to 1000)	—	
	Input Error	—	—	—	—	±1.5% (of full scale)	—	
Input Impedance	—	—	—	—	76kΩ (0 to 10V) 250Ω (0 to 20mA)	—		
Sampling Cycle	—	—	—	—	50ms	—		
Output	Wire Length	100m	100m	100m	100m	10m (twisted-pair shielded cable)	—	
	Output Signal	Transistor source output	Relay output	Relay output	Relay output	—	—	
	Output Points/ Contact Configuration	4 points (separate)	4NO contacts	4NO contacts	4NO contacts	—	—	
	Isolation	—	Isolated	Isolated	Isolated	—	—	
	Dielectric Strength (between power/input terminals and output terminals)	—	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	2500V AC, 1 minute 500V DC, 1 minute	—	—	
	Output Voltage	External power voltage (20.4 to 28.8V DC)	—	—	—	—	—	
	Maximum Load Current	0.3A maximum	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	Resistive load 5A at 12/24V AC/DC 5A at 100/120V AC 5A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC Inductive load 2A at 12/24V AC/DC 3A at 100/120V AC 3A at 230/240V AC 0.2A at 120V DC 0.1A at 240V DC	—	—	
	Short-circuit Protection	Built-in current limiting resistor: Approx. 1A	External fuse required: 16A maximum	External fuse required: 16A maximum	External fuse required: 16A maximum	—	Yes	
	Minimum Switching Load	—	10mA, 12V DC (reference value)	10mA, 12V DC (reference value)	10mA, 12V DC (reference value)	—	—	
	Initial Contact Resistance	—	100mΩ maximum (at 1A, 24V DC)	100mΩ maximum (at 1A, 24V DC)	100 mΩ maximum (at 1A, 24V DC)	—	—	
	Mechanical Life	—	10 million operations (no load, 10Hz)	10 million operations (no load, 10Hz)	10 million operations (no load, 10Hz)	—	—	
	Electrical Life	—	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	100,000 operations (rated resistive load) 1800 operations/hour	—	—	
	Analog Output Points	—	—	—	—	—	2	
	Analog Output Range	—	—	—	—	—	Voltage: 0-10V DC Current: 0-20, 4-20 mA	
	Digital Resolution	—	—	—	—	—	10 bits (0 to 1000)	
	Output Error (of full scale)	—	—	—	—	—	Voltage output: ±2.5% Current output: ±3%	
	Output Impedance	—	—	—	—	—	Voltage: 5kΩ min Current: 250Ω max	
Analog Value Conversion Interval	—	—	—	—	—	50ms (typ.)		
Wire Length	—	—	—	—	—	10m (twisted-pair shielded cable)		

DIMENSIONS (All dimensions in mm)



Base Module (with Display)

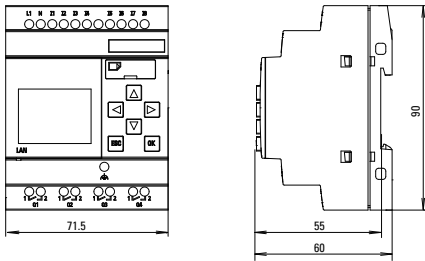


Base Module (without Display)

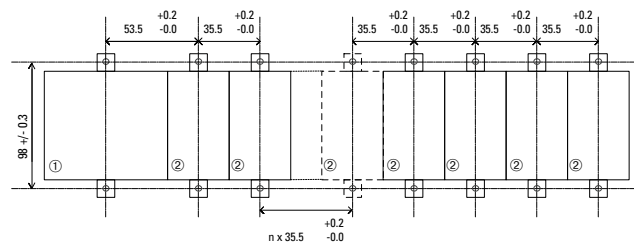


Expansion I/O Module

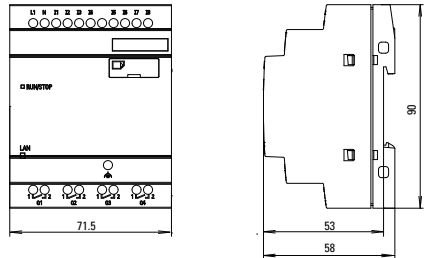
Base Module (with Display)



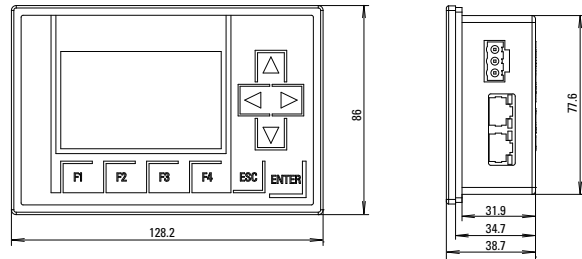
Mounting Hole Layout (Using Mounting Slides)



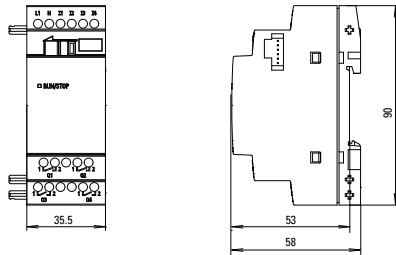
Base Module (without Display)



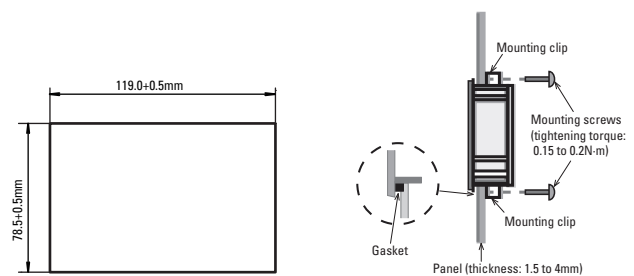
Text Display



Expansion I/O Module



(Panel Cutout)



Note: Drawings are not to scale

