Fuji Electric

SC Series Multi-Function PID Controller

SC Series
Multi-Function PID Controller

Highly visible color graphic LCD
Intuitive touch panel operation

SC Series Controllers

Model SC100 Basic version
Model SC200 Modbus/NestBus extension

Controllers with Manual Loader

Model SC110 Basic version
Model SC210 Modbus/NestBus extension

SC Series Multi-Function PID Controller

Fuji Electric

FULLY PROGRAMMABLE

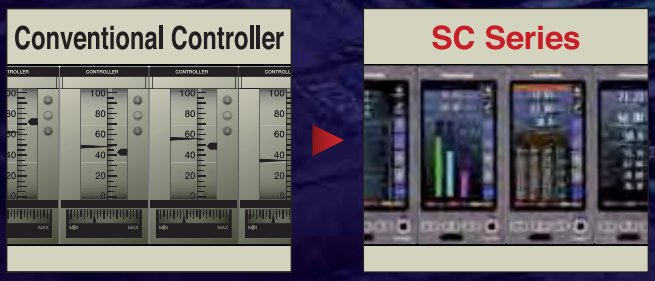
Multi-Function

New Generation of Programmable PID Controllers

- Large fine color graphic LCD
  (4.3-inch TFT, 256 colors, 480 x 272 pixels)
- Intuitive touch panel operation
- DCS in instrument format
  – Advanced computation and sequential control functions
- Ample I/O numbers with a wide selection of signal types
- Easy setting of various engineering functions

Ideal for Replacing Existing Instruments

- IEC/DIN format *1 panel cutout size
  (W72 x H144 mm)
- Fully compatible in functions with existing PID controllers



High Reliability for Demanding Process Use

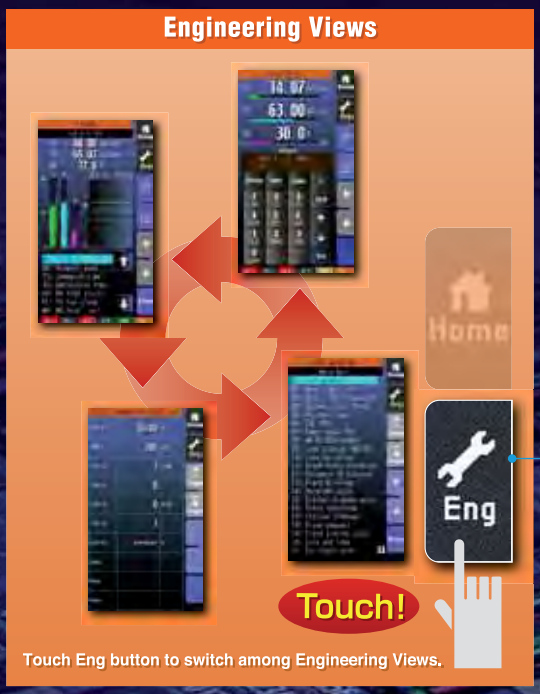
- Control, display and I/O functions are managed by independent CPUs for enhanced security and reliability.
- Built-in manual loader is available with models SC110 and SC210.

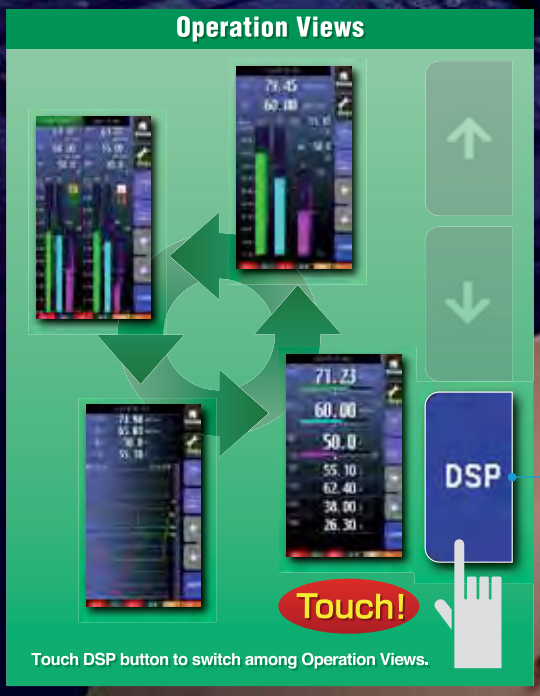
Excellent Expandability (SC200/210)

- Host communication via Modbus
  (Ethernet TCP/IP or RS-485 RTU)
- Peer-to-peer communication via NestBus to expand number of I/Os
- Stored trend data exportable to a PC via the built-in infrared communication port *2

*1. IEC 61354 (DIN 43700)
*2. PC Configurator SCCFG is used to convert and export data into CSV format.

- Highly visible color graphic LCD
- IP 55 front panel
- Intuitive touch panel operation





PID Controller

Standard I/O Signals

INPUT	
Universal input · DC (including 2-wire transmitter) · Thermocouple · RTD · Potentiometer	2 points
DC input (1-5 V)	4 points
Discrete/Pulse input	5 points
High speed pulse input (with sensor excitation)	1 point

OUTPUT	
DC current (4-20 mA)	2 points
DC voltage (1-5 V)	2 points
Relay or photo MOS contact	5 points
RUN relay contact	1 point

- Manual loader optional
- Independent hardware buttons for manual control operations
- Infrared communication port

Auxiliary Panel Instruments

Bargraph Indicating Alarm SD10

Independent bargraphs for three analog inputs. Four alarm trip indication and outputs.

Manual Loader SM10

Backup and manual loading function used in combination with a controller.

Powerful Engineering Tools to Help You Explore the Full Capability of the Controllers

PC Configuration Software SCCFG

Used to configure display setting, PV and network parameters.

SCCFG

Loop Configuration Builder Software SFEW3E

Used to program advanced computation and sequential control function block setting.

SFEW3E

Infrared Communication Adaptor COP-IRDA *3

*3. Separately purchased.

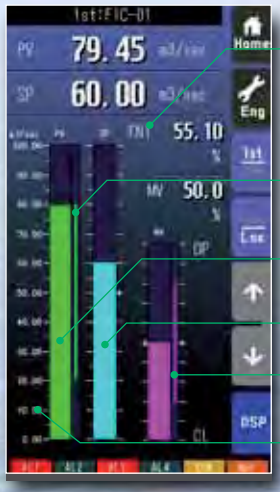
OPERATION VIEWS Ease and Continuity

Four types of operation views, Short Trend, Digital Display, Bargraph and Dual Bargraph, are available to suit various process applications, designed for the sense of ease and continuity for the operators who have been familiar with existing controllers.

Short Trend

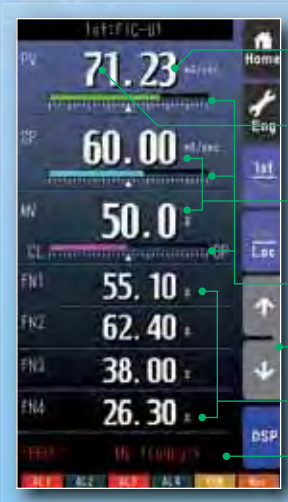
200 samples for four variables per loop are plotted on the chart (total 8 variables). Sampling interval is selectable between 1 second and 60 minutes.
Max. 400 samples of stored trend data can be exported to a PC in CSV format (SC200/210).

Bargraph



Loop control parameters (PV, SP and MV) are indicated with bargraphs and on the digital displays. Specific internal computation values can be assigned to FN1...FN4 and indicated on the digital display.

Digital Display



Loop control parameters (PV, SP and MV) are indicated on the digital displays. Specific internal computation values can be assigned to FN1...FN4 and indicated also on the digital displays. An error message appears in case of an error.

Dual Bargraph

Loop control parameters (PV, SP and MV) for two loops are indicated with bargraphs and on the digital displays. Touching 1st/2nd button switches the loop to be manually controlled.

ENGINEERING VIEWS Versatility and Flexibility

PID parameter setting, display and operation setting and function block setting are accessible respectively at Tuning, Configuration and Programming views.

Tuning

Short Trend Graph:
PID parameters can be adjusted while monitoring actual response.

Parameter Display:
The parameter and its current setting value are displayed in turn when the item is selected.

PID parameters, PB (proportional band), Ti (integral time) and Td (derivative time), are set on the Tuning View.
Auto-tuning is also available in this view. Bargraph and digital displays for the loop parameters and the short trend graph are displayed at once.

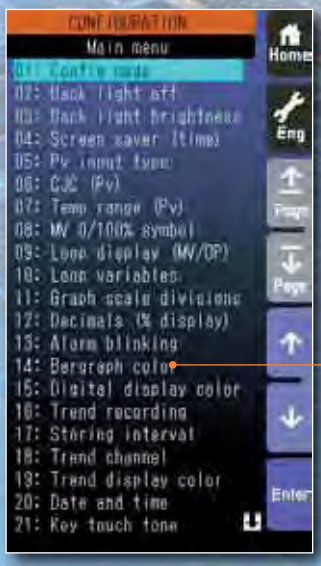
Programming

Digital displays are identical to those in Digital Display view. The selected loop status can be monitored in real time during parameter modifications.

The display and the key pad simulates the PU-2A hand-held programmer.

Function block parameters are set on the Programming View by simulating operations of the PU-2A Programming Unit. The SFEW3E Loop Configuration Builder software for Windows PC is also available for ease of setting all advanced function block configurations.

Configuration



Graph Color Setting

Color Chart

Display and operation of the Controller are thoroughly adjustable to enhance the user's comfort.

User's Parameter Table

User's selected parameters are listed, monitored and changed.

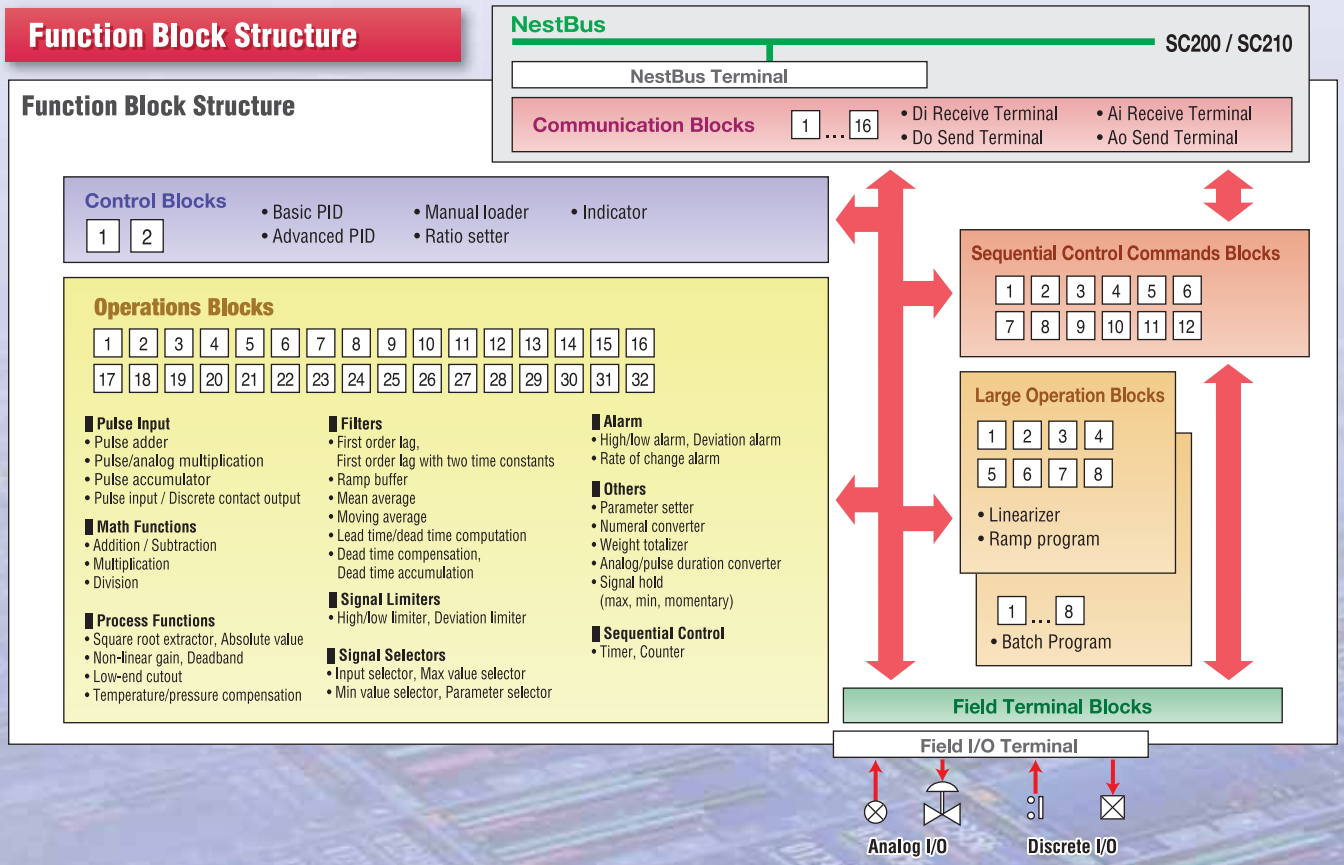
Realtime I/O Monitoring

I/O values and error status of all field terminal blocks are displayed.

DCS IN INSTRUMENT FORMAT Advanced Computation and Sequential Control Functions

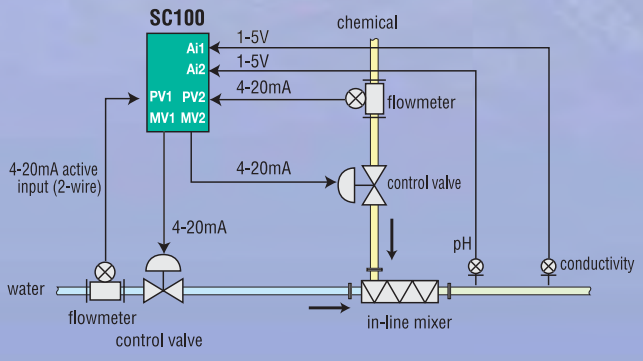
The control and computation functions are achieved by combining a wide variety of basic to advanced function blocks, which are normally found only in DCS systems. 2 PID blocks, 48 computation blocks and 12 sequential control blocks (1068 commands) are available for all versions of the SC Series, applicable to a wide range of application fields.

Function Block Structure



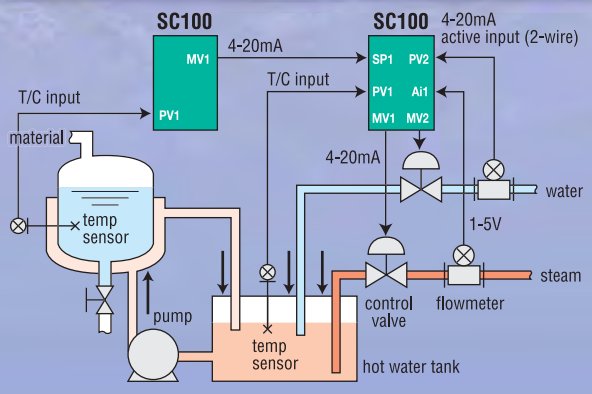
APPLICATION EXAMPLES

Chemical Injection Control



The SC100 controls two flow loops for water and injected chemical. The chemical flow is controlled in a constant ratio against the water flow. Other signals from pH and conductivity analyzers can be monitored at once.

Reactor Temperature Control



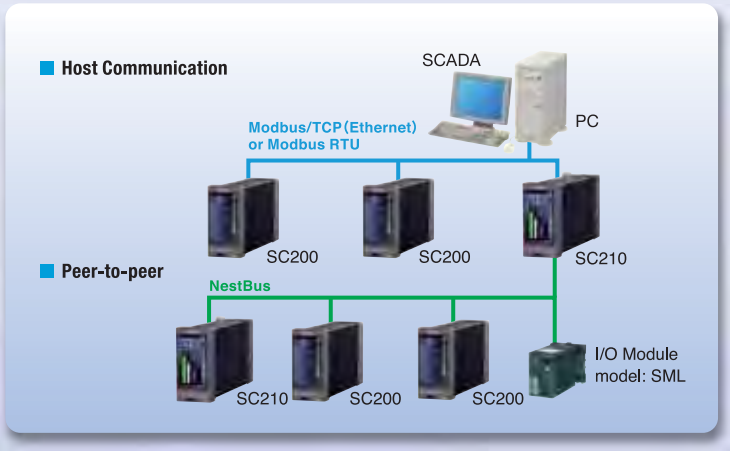
An example of temperature control in a batch control reactor. The reactor temperature control loop is connected in cascade to the hot water control loop in the hot water tank. The secondary loop controller controls the valves for hot water and steam.

EXCELLENT EXPANDABILITY Peer-to-peer and Host Communication

The SC200/SC210 has Modbus (Ethernet TCP/IP or RS-485 RTU) which enables easy connection to logging or SCADA systems on a host PC for supervising and controlling the local I/O data.

In addition, the RS-485 'NestBus' enables peer-to-peer communication with other controllers and I/O devices for flexibility of I/O points.

Expanded System Configuration Example



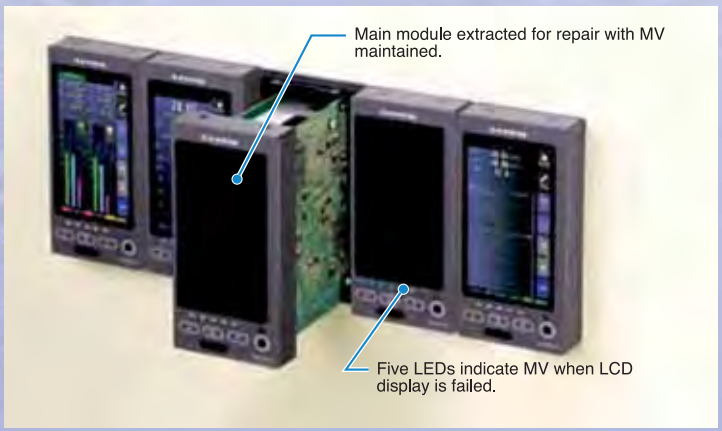
HIGH RELIABILITY For Demanding Process Use

Control, display and I/O functions are managed by independent CPUs for enhanced security and reliability.

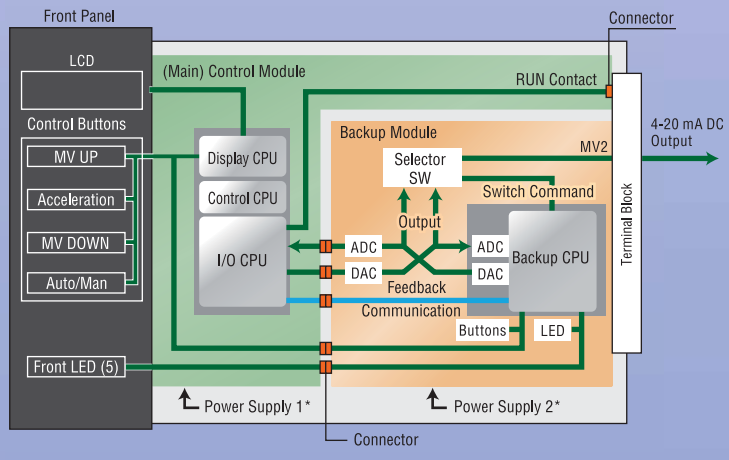
The built-in manual loader (SC110/210 option) can be controlled independently even in case of a failure of the main controller module, which can be replaced easily while the backup control is maintained.

- The main module can be disconnected from the backup module and extracted with the front display.
- The front blue LEDs are connected to the backup module, while the front UP/DOWN control buttons are connected to both main and backup in parallel.
- The backup module can be powered independently from that of the main module for further reliability.

- When the control is switched to the backup module either manually or automatically, the MV 2 selector SW is set from Main to Backup.
- Transition of output level is smooth as the backup module has been continuously tracking the control module output in normal status.
- A preset value can be provided also as output in the backup mode.
- The control module output can be tracked either manually or automatically to that of the backup before switching back to the normal mode.



Backup Function Diagram



*Independent power supply is optional.

SC SERIES SPECIFICATIONS

GENERAL SPECIFICATIONS — SC Series

Construction: Panel flush mounting
Degree of protection: IP55 (front)
Connection: M3.5 screw terminals
Backup module power supply terminal: Euro terminal block SC110/210
Isolation: Pv1 to Pv2 to supply output to Ai1 or Ai2 or Ai3 or Ai4 to Di1 or Di2 or Di3 or Di4 or Di5 or Pi1 or Pi2 or Pi3 or Pi4 or Pi5 to Pi6 to Mv1 to Mv2 (or Mv2B)*1 to Ao1 or Ao2 to Do1 to Do2 to Do3 to Do4 to Do5 to Do6 (to NestBus to Modbus RTU to Modbus TCP)*2 to power (to backup module power)*1 to FG
*1. SC110/210 *2. SC200/210
PID control: Single loop, cascade, advanced
Proportional band (P): 1 to 1000 %
Integral time (I): 0.01 to 100 minutes
Derivative time (D): 0.01 to 10 minutes
Auto-tuning: Limit cycle method
Alarm: PV high & low, deviation, rate of change
Computation: 48 functions blocks available for arithmetic operations, time functions, signal selection, limit, alarm and other functions
Sequence operation: Logic sequence and step sequence (max. 1068 commands)
Computation cycle: 50 msec. to 3 sec. (control cycle selectable among 1, 2, 4, 8, 16, 32 and 64 times of the computation cycle)
MV output range: -15 to +115 %
Parameter setting: With touch panel or PC (Loop Configuration Builder Software model: SFEW3E)
Self diagnostics: CPU monitoring with a watchdog timer
RUN contact: OFF in error detected by diagnostic (including NestBus for SC200/210)
Infrared communication: Transmission distance max. 0.2 meter (for use with the COP-IRDA)
Short trend SC200/210
Storing interval: 1, 2, 5, 10, 20, 30 sec., 1, 2, 5, 10, 30, 60 min.
Capacity: 400 points (display 200 points)

DISPLAY — SC Series

Display device: 4.3-inch TFT LCD
Display colors: 256
Resolution: 480 × 272 pixels
Pixel pitch: 0.198 × 0.18 mm (128 × 141 DPI)
Backlight: LED
AUTO/MAN indicator: Green/Amber LED
MV output setting indicator: Blue LED

EXTERNAL INTERFACE SC200/210 — SC Series

Host communication: Modbus RTU (RS-485) or Modbus TCP/IP (Ethernet)
Peer-to-peer communication: NestBus (RS-485)

INPUT — SC Series

- **Pv 1, Pv 2 (universal input)**
  DC current: 4-20 mA DC (250 Ω)
  Excitation supply to 2-wire transmitter: 24 V DC, 22 mA max.
  DC voltage: -10 to +10 V DC, -1 to +1 V DC, 0-10 V DC, 1-5 V DC, 0-1 V DC
  Thermocouple: K, E, J, T, B, R, S, C, N, U, L, P, PR
  RTD: Pt 100, JPt 100, Pt 50Ω, Ni 100
  Potentiometer: Total resistance 100 Ω to 10 kΩ
- **Ai 1...4:** 1-5V DC
- **Di 1...5 or Pi 1...5:** Dry contact
  Max. frequency: 20 Hz
  Min. pulse width: 0.33 msec.
- **Pi 6:** Dry contact
  Max. frequency: 10 kHz
  Min. pulse width: 0.05 msec.
  Excitation: 12 V DC ±10 %, 15 mA

OUTPUT — SC Series

- **Mv 1, Mv 2:** 4-20 mA DC
  Load resistance: ≤ 600 Ω
- **Ao 1, Ao 2:** 1-5 V DC
  Load resistance: ≥ 10 kΩ
- **Do 1...5**
  Relay contact: 250 V AC @1 A (cos ϕ = 1)
  30 V DC @1 A (resistive load)
  Photo MOSFET relay: 200 V AC/DC @0.5 A (resistive load)
- **RUN Output**
  Relay contact: 250 V AC @1 A (cos ϕ = 1)
  30 V DC @1 A (resistive load)

INSTALLATION — SC Series

Power input
AC power: 100-240 V AC; 50/60 Hz
Control module: Approx. 25 VA at 100 V AC
Approx. 40 VA at 240 V AC
SC110/210 Backup module: Approx. 10 VA at 100 V AC
Approx. 15 VA at 240 V AC
DC power: 24 V DC, ripple 10 %p-p max.
Control module: Approx. 500 mA
SC110/210 Backup module: Approx. 300 mA
Operational temperature: -5 to +55°C (23 to 131°F)
Operating humidity: 5 to 90 %RH (non-condensing)
Mounting: Panel flush mounting (high-density mounting available)
Panel cutout: 68 x 138 mm (2.68" x 5.44")
Panel thickness: 2.3 to 20 mm (0.1 to 0.78")
Dimensions: W72 x H164 x D274...624 mm (2.83" x 6.46" x 10.79"...24.57")
Weight: Approx. 1.8 kg (3.97 lbs) to 3.0 kg (6.61 lbs) depending on the housing depth

Fuji Electric
Fuji Electric France S.A.S.
46 rue Georges Besse - ZI du brézet - 63039 Clermont ferrand
Tél : 04 73 98 26 98 - Fax : 04 73 98 26 99
Mail : sales.dpt@fujielectric.fr - web : www.fujielectric.fr