

PID Control Components



**Touch
panel**

Perfect replacement!
Controllers redesigned with
the latest technologies.



This symbol identifies those products which contain less than the maximum levels of the 10 restricted substances specified by the RoHS Directive.

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ABL

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Multi-function PID Controller

SC Series

Controllers redesigned with the latest technologies.

A new-generation of programmable PID controller with a full spectrum of functions.

- Large fine color graphic LCD (4.3-inch TFT, 256 colors, 480 x 272 pixels)
- Equipped with advanced control and computation functions that support a wide range of user applications.
- Provides many inputs and outputs for a variety of interface options.
- Easy maintenance thanks to various engineering functions.

Touch-panel Programmable PID controller

SC Series Controllers

Basic version

SC100

CE

Modbus/NestBus extension

SC200

CE

Expansion module function

SC200W

Controllers with Manual Loader

Basic version

SC110

CE

Modbus/NestBus extension

SC210

CE

Expansion module function

SC210W

144 mm
[5.67"]

WIDTH 72 mm [2.83"]

Introducing the SC family



SC Series Controllers
Basic version: SC100
Modbus/NestBus extension:
SC200
Expansion module function:
SC200W

PAGE 2



Controllers with Manual Loader
Basic version: SC110
Modbus/NestBus extension:
SC210
Expansion module function:
SC210W

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Pulse Width Output
SC200D

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Multi-function PID Controller External Dimensions ► PAGE 16

Depth varies depending on the model and code.
See external dimensions for details.



Detachable terminal blocks
Detachable terminal blocks improve convenience, especially during inspections and specification changes.

Intuitive touch panel operation

- Intuitive touch panel operation: Simply touch the items that you want to operate or change.

High reliability for demanding process use

- Control, display, and input and output processing are functionally distributed into dedicated CPUs.
- Models with a built-in manual backup module are also available (SC110, SC210, SC210W).

Excellent expandability (SC200/SC210/210W)

- Host communication via Modbus/TCP or Modbus.
- Remote I/O modules can be added by using peer-to-peer communication for I/O expansion (NestBus).
- Collected trend data can be read from a PC. (via stereo jack connection) *1

*1. Dedicated PC Configurator Software (Model: SCCFG) allows you to convert data to CSV format for saving files.

Outstanding cost-effectiveness



SC Series Controllers SC100 SC200 SC200W
SC Series with Manual Loader SC110 SC210 SC210W
Pulse Width Output SC200D
Application Examples
1/4 DIN Size Controllers ABL
Bargraph Indicating Alarm SD10
Manual Loader SM10

SC Series functionality selection guide

Expansion models with network communication functionality						
Basic version	Backup function	Basic version	Backup function / Expansion module function		Pulse Width Output	
SC100	SC110 Backup	SC200	SC210 Backup	SC200W Expansion module	SC210W Backup Expansion module	SC200D

TOUCHPANEL PROGRAMMABLE PID CONTROLLER

PRODUCT	MODEL	CE	
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel)	SC100	✓	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, MV output backup)	SC110	✓	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, Modbus/NestBus communication)	SC200	✓	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, Modbus/NestBus communication, expansion module function)	SC200W	--	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, MV output backup, Modbus/NestBus communication)	SC210	✓	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, MV output backup, Modbus/NestBus communication, expansion module function)	SC210W	--	✓
MULTI-FUNCTION PID CONTROLLER (color LCD with touch-panel, Modbus/NestBus communication, pulse width output)	SC200D	✓	✓

BOARD OPERATION SYSTEM EQUIPMENT

PRODUCT	MODEL	CE	
BARGRAPH INDICATING ALARM (with 4-digit digital meter, LED bar indicator)	SD10	--	--
MANUAL LOADER (with 4-digit digital meter, LED bar indicator)	SM10	--	✓

Part names and functions

SC Series Controllers
SC100
SC200
SC200W

SC Series with Manual Loader
SC110
SC210
SC210W

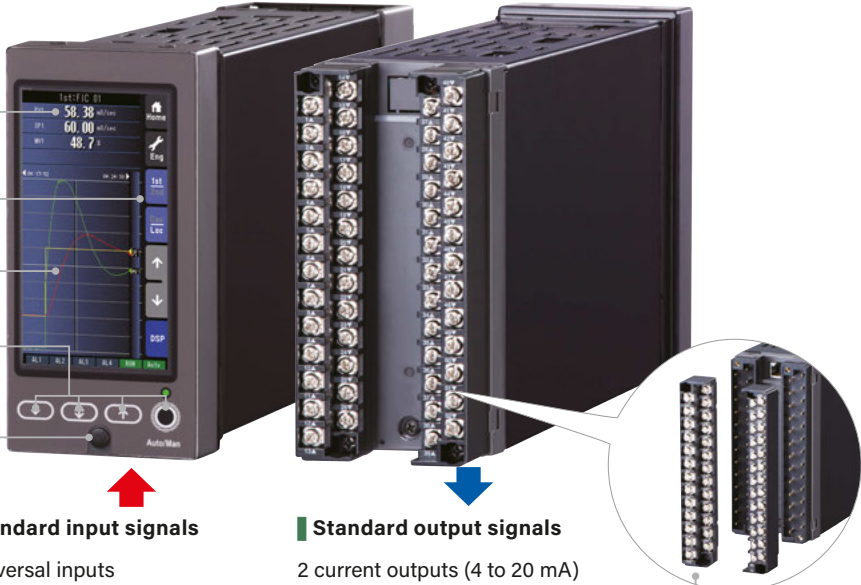
Pulse Width Output
SC200D

Application Examples

1/4 DIN Size Controllers
ABL

Bargraph Indicating Alarm
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SM10



Fine color graphic LCD display

Front panel:
Degree of protection IP55

Easy operation with a touch panel

Independent hardware switches for output operation

Stereo jack

Standard input signals

2 universal inputs

- DC current (two-wire transmitter input is possible)
- Thermocouple
- RTD
- Potentiometer

4 DC inputs (1 to 5 V)

6 contact inputs/pulse inputs (one is a pulse input with sensor excitation)

Standard output signals

2 current outputs (4 to 20 mA)

2 voltage outputs (1 to 5 V)

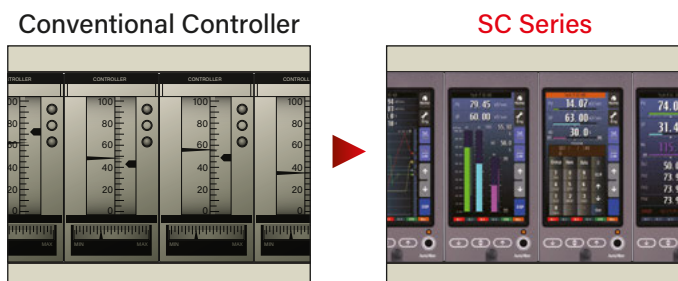
5 relay or photo MOS contact outputs

1 RUN (relay) contact output

Detachable terminal blocks

Perfect for replacement work

The Multi-function PID Controller SC Series adopts the international standard size for controllers (W72×H144 mm)^{*1}, which makes the models compatible with panel cutouts for old controllers. The series also fully covers the functions of conventional PID controllers (fixed functionality type and programmable type) to ensure use as replacement.



^{*1}. IEC 61354 (DIN 43700) compliant

Easy operation with a touch panel

Optimal operation with a variety of views



Screen transitions when you touch [DSP]

Versatile configuration and easy maintenance



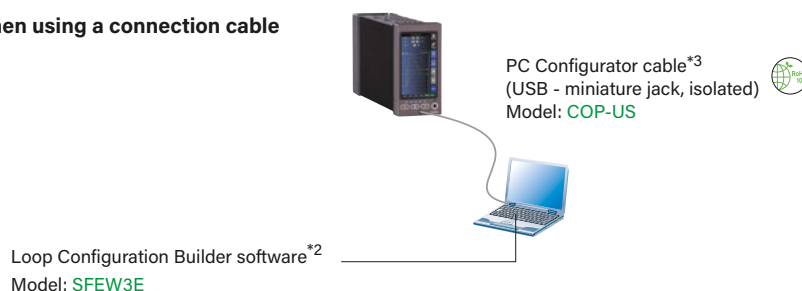
Screen transitions when you touch [Eng]

Multi-function PID Controller SC Series has a touch panel for intuitive touch-based operation. Touch the display button to switch screens or touch the PV display area to switch between PV and SP values or percentage indication for your convenience. The large display screen facilitates setup such as selection of functions and value entry.

Loop configuration builder software (Model: SFEW3E)

Use a connection cable for communication with the Loop Configuration Builder software^{*2}.

When using a connection cable



^{*2}. The Loop Configuration Builder software (Model: SFEW3E) can be downloaded for free from our website.

^{*3}. PC Configurator cable (Model: COP-US) is sold separately.

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Operation views

Enhanced Visibility and Easy Operation

The SC Series offers various operation views to provide optimal operation for any process and worksite.

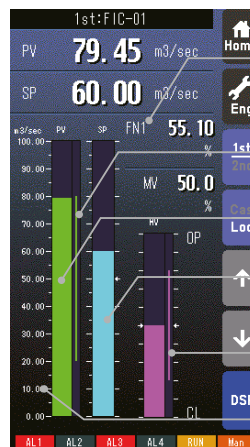
Operators who are used to conventional types of controllers can also perform monitoring and operation with confidence.

Short trend



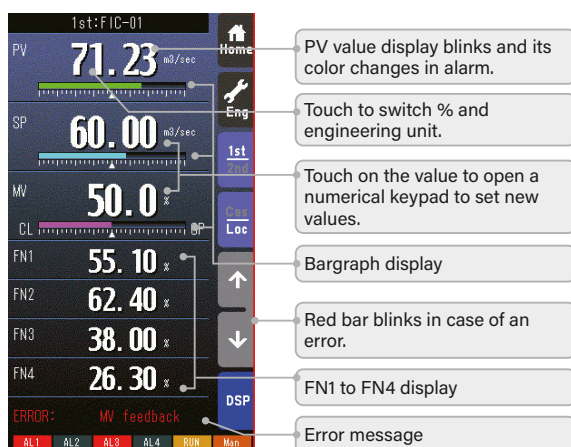
200 samples for four variables per loop are plotted on the chart (total 8 variables). Sampling interval is selectable between 1 second and 60 minutes. Max. 400 samples of stored trend data can be exported to a PC in CSV format (SC200/SC210).

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



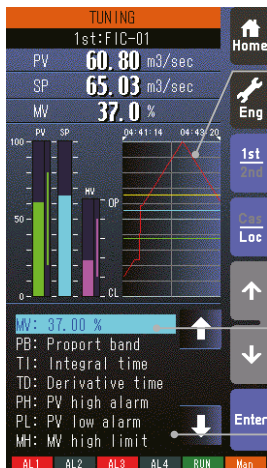
Loop control parameters (PV, SP and MV) for two loops are indicated with bargraphs and on the digital displays. Touching 1st/2nd button switches the loop to be manually controlled.

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.

Programming



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

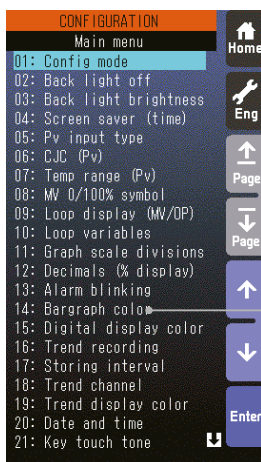
The display and the key pad simulate the PU-2A handheld programmer.

PID parameters, PB (proportional band), Ti (integral time) and Td (derivative time), are set on the Tuning View.

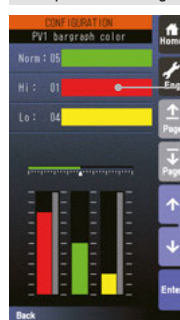
Auto-tuning is also available in this view. Bargraph and digital displays for the loop parameters and the short trend graph are displayed at once.

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

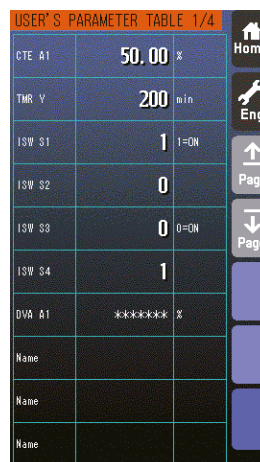


Color Chart



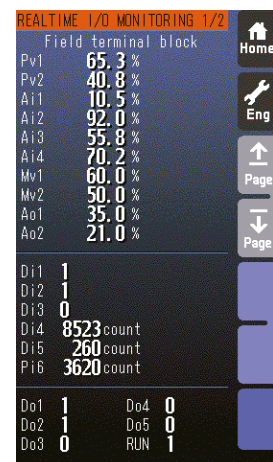
Display and operation of the Controller are thoroughly adjustable to enhance the user's comfort.

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.

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SC100
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Pulse Width
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1/4 DIN Size
Controllers
ABL

Bargraph
Indicating
Alarm
SD10

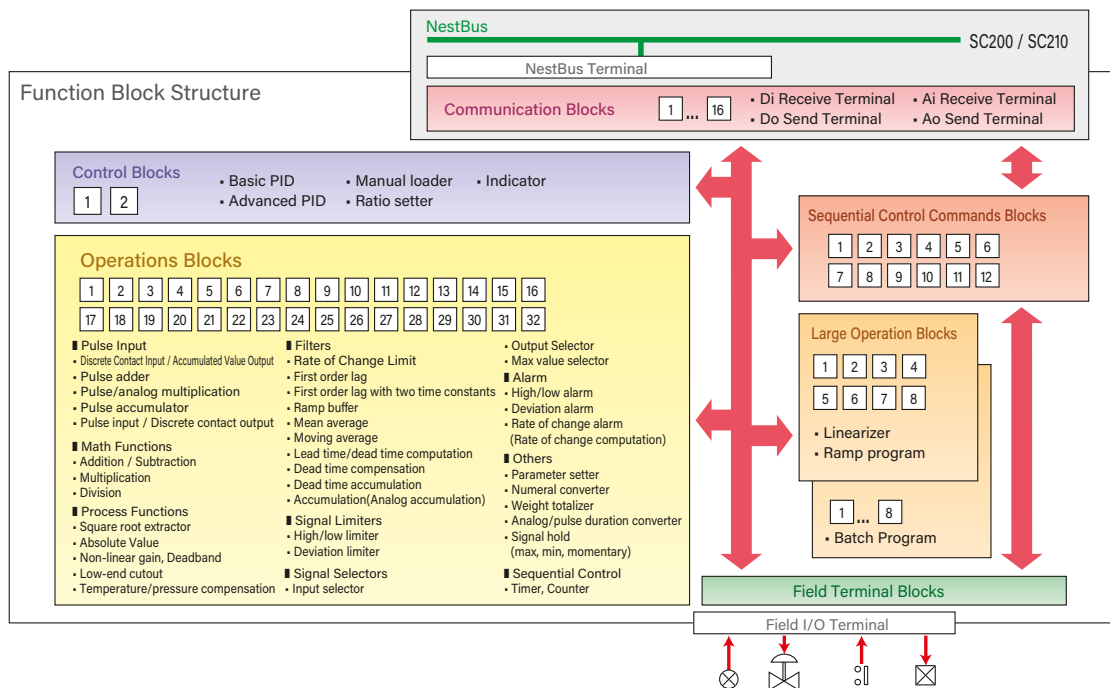
Manual
Loader
SM10

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.

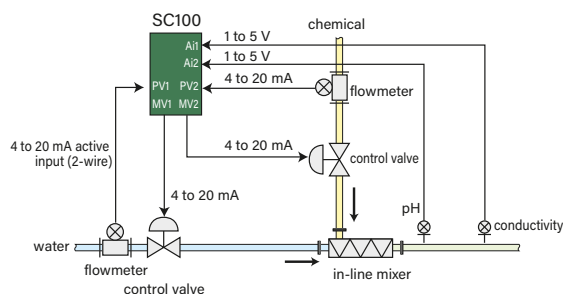
Function block structure



For more details, please refer to MULTI-FUNCTION PID CONTROLLER FUNCTION BLOCK LIST (EM-6461-B).

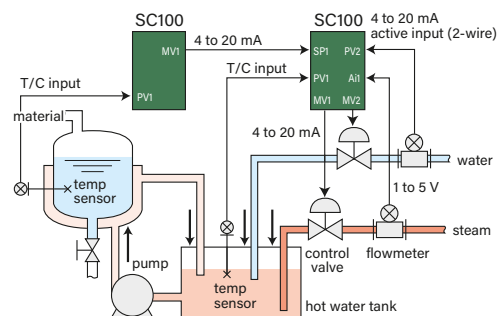
Application examples

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.

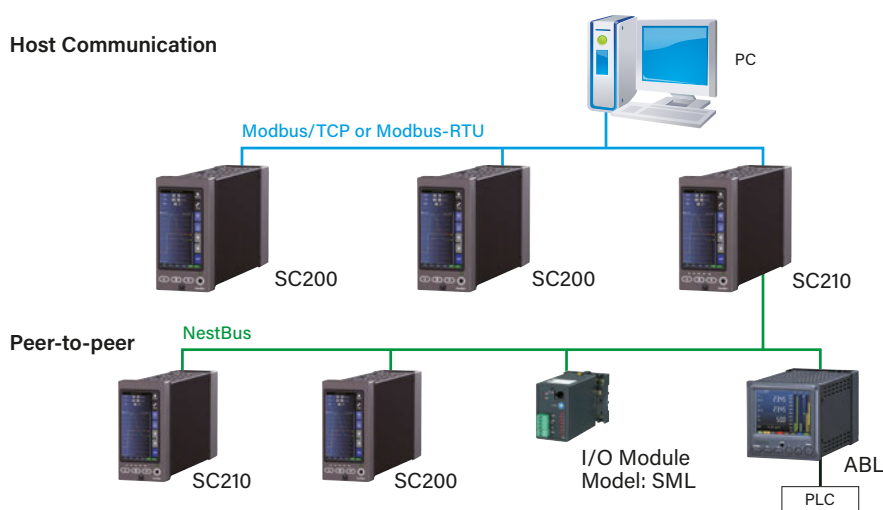
Excellent expandability

Peer-to-peer and Host Communication

The SC200/SC210 has Modbus (Modbus/TCP or Modbus-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



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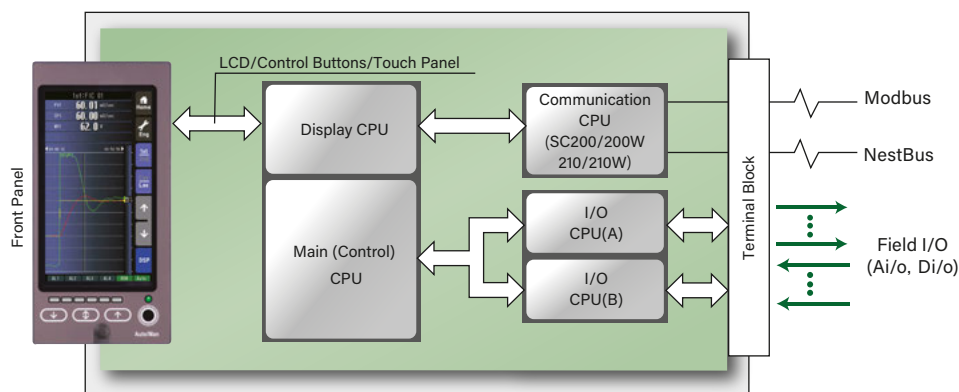
Manual
Loader
SM10

High reliability

For Demanding Process Use

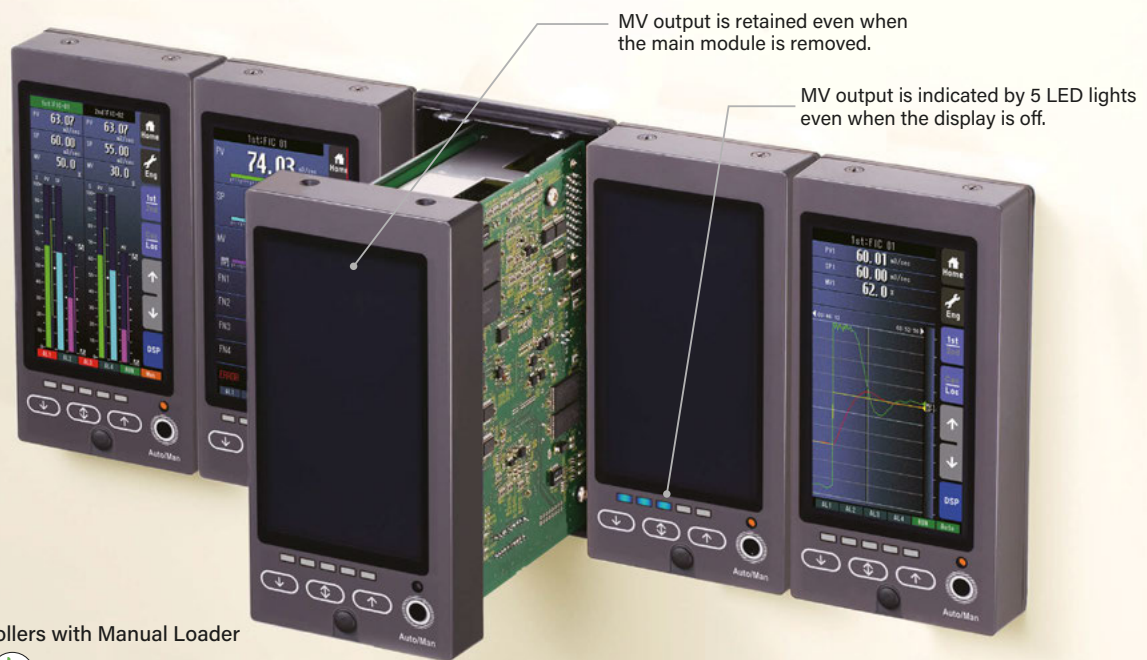
Control, display and I/O functions are managed by independent CPUs for enhanced security and reliability. The built-in manual loader (SC110/SC210 option) can be controlled independently even in case of a failure of the main controller module, which can be replaced easily while the backup control is maintained.

CPU configuration of multi-function PID controller SC Series



Highly reliable with a built-in backup module Multi-function PID Controllers SC110, SC210, and SC210W

- Multi-function PID Controllers SC110, SC210, and SC210W are models with a built-in backup module*¹.
- The backup module retains control output (MV)*² even in the event of a malfunction or failure in the controller (main module) and reliably supports manual backup.
- SC110, SC210, and SC210W are suitable for controlling plants with high operating rates and loops where ensuring operability is key.
- The main module can be taken out from the front panel while maintaining control output (MV2) with a backup module. Insert a replacement main module (spare module) or the repaired main module from the front side for recovery.



Controllers with Manual Loader



Basic version

SC110



Modbus/NestBus extension

SC210



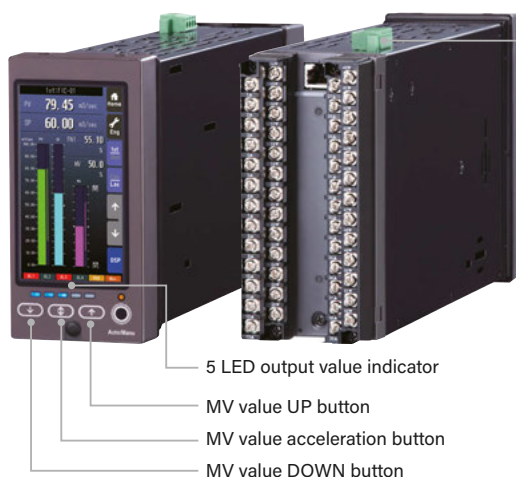
Expansion module function

SC210W

*1. Except for the backup function, the SC110 is equivalent to the SC100, the SC210 to the SC200, and the SC210W to the SC200W.

*2. The backup module provides a backup of MV2 (4 to 20 mA) output.

Explanation of front panel LED lights and keys



Backup module
power source terminal*³

Output Indicator (Front Panel LED)

LED lights up when the output is switched to the backup module side.

Output value is indicated in 9 levels by the 5 LED lights turning on and/or blinking.

Front buttons

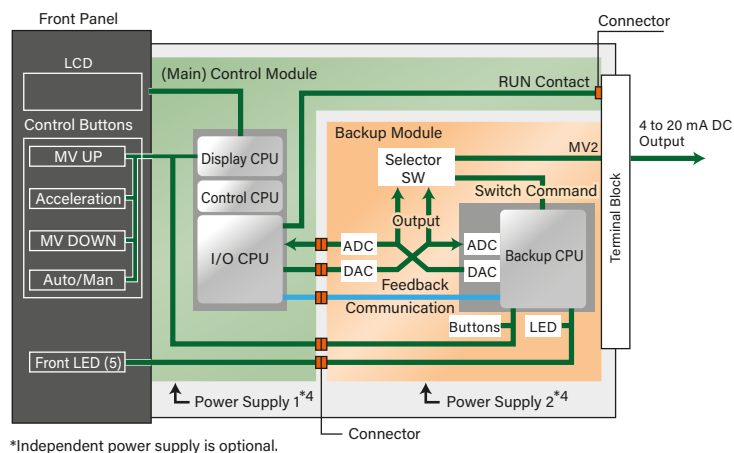
- Pressing and holding the [Auto/Man] button and the acceleration button at the same time prepares the system to switch over to the backup module (front panel LED displays the current value with blinking lights). Performing the same operation again manually switches the control to the backup module.
- You can cancel the switching-ready state by pressing and holding the [Auto/Man] button.
- While the backup module has control, manual operation can be performed by using the [MV value (UP)], [MV value (DOWN)], and Acceleration buttons.

*3. For two-system power supply model

Hardware construction

Main module can be removed with the front panel, and backup module can operate independently.

- Independent backup module is held in place on the housing (terminal block) side. It is connected to the main module via a connector. The main module can be taken out from the front panel while leaving the backup module on the housing.
- The output (MV2) indicator (front panel LED) is connected to the backup module. The front panel button contact signals for output manipulation are connected in parallel to both the main module and the backup module.
- The backup module has a separate power unit independent from the main module. The power supply system can be separated from the main module^{*4}.
- The backup module has a simple configuration consisting of a smaller number of parts compared to the main module and achieves a high operating rate.



^{*4}. A common power supply is used for models that do not support two-system power supply.

Switching operation

Smooth replacement and bumpless system recovery in the event of main module failure

Normal operation

- Main module and backup module communicate to monitor each other's state.
- The backup module side imports the main module's output feedback value (analog value) to track its own outputs.
- The main module side is selected by the control output (MV2) switch.

Switching to backup module

Manual switching can be performed at any time. Automatic switching can be enabled and disabled^{*5}.

1. Manual switching

- Operating the front panel buttons switches the control output (MV2) switch to output from the backup module^{*6}.
- Output from the backup module does not bump the process since it tracks the output from the main module in advance.
- In that state, you can perform manual operation using the front panel buttons.

2. Automatic switching

- When the backup CPU of the backup module detects an error on the main module side (I/O CPU or control CPU error), the control output switch switches to the backup module side^{*6}.

You can select the mode of output from the backup module from the following options^{*5}.

- (1) Value from the main module before switching
Bumpless transfer is achieved by advance tracking.
- (2) Preset value
Fixed value preset from the Configuration screen.
Pre-transfer output value can apply restriction to the rate of change^{*5} to suppress any rapid changes.

^{*5}. The SFEW3E Loop Configuration Builder software is also available for setting modes and parameters.

^{*6}. RUN contact opens when the control transfers to the backup module side.

Recovery

- To recover the removed main module, use the front panel button to switch the control output to the main module side. The main module side imports the output from the backup module side to track its own output for a bumpless transfer.
- The control loop is initially in manual mode immediately after transfer.

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Multi-function PID Controller

Pulse Width Output

Dual pulse width signal output. Multi-function PID controllers for control with control outputs driven by electric actuators.

No need for an electric positioner

Electric actuators can be directly controlled by the controller with pulse width output.

Automatic pulse width adjustment

Simply set the complete travel time of the electric actuator for automatic pulse width adjustment.

A range of function blocks shared with the SC200 Series are available.

Network communication, number of inputs and outputs, and their types are common (Do1 and Do2 are exclusively for control output).

Pulse Width Output

SC200D   

• Detachable terminal block



SC200D External Dimensions ► PAGE 16

SC200D multi-function PID controller with pulse width output was developed as a controller for control loops with control outputs driven by electric actuators such as control valves and dampers.

Normally, electric actuators have a built-in electric motor and open and close by rotating the motor forward and backward based on dual pulse width signals.

SC200D multi-function PID controller is a controller with dual pulse width signal output. The pulse width is computed according to the speed-based PID control algorithm. Combined with electric actuators, the controller offers the same level of control performance as PID control loops with a standard controller with position-based output (example: 4 to 20 mA output).

When using electric actuators with a standard controller, a position control loop must be in place using an electric positioner as a secondary loop. SC200D multi-function PID controller with pulse width output can operate without an electric positioner.

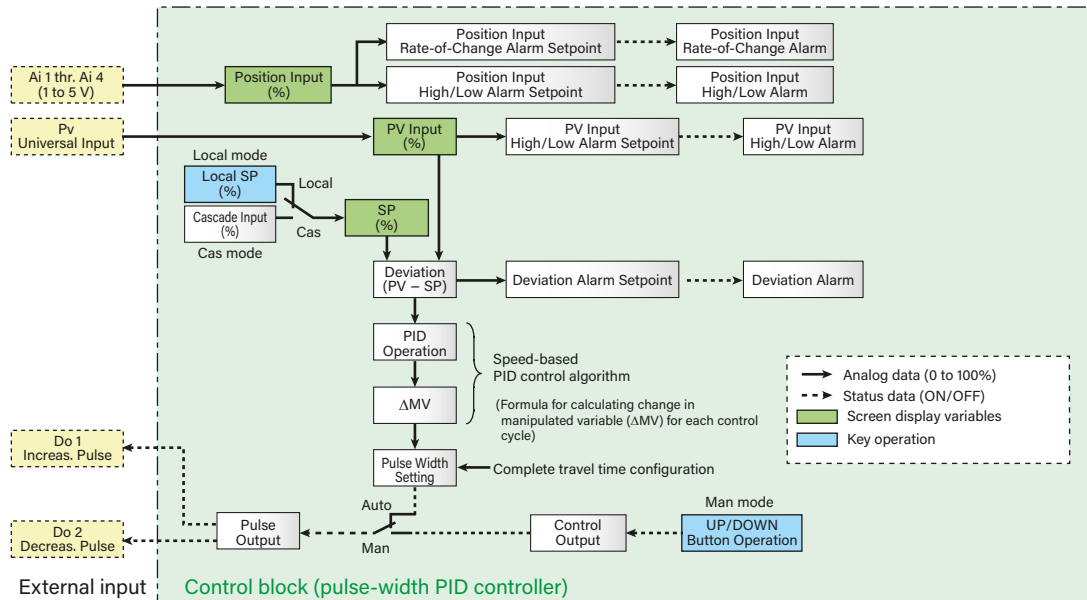


Function overview

Pulse-width PID controller for SC200 Series function blocks

Two control blocks can be used with SC200D controller.

The unique functionality of SC200D multi-function PID controller with pulse width output is assigned to the second control block as a dedicated control block (pulse-width PID controller).



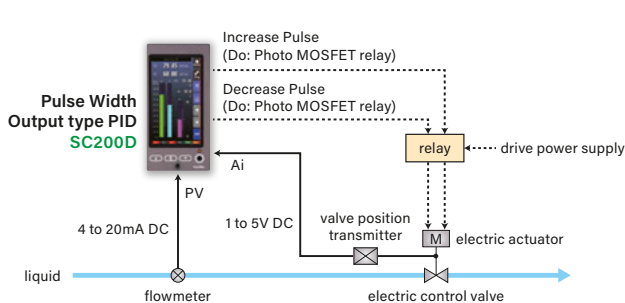
Functional configuration diagram of pulse-width PID controller

Applications

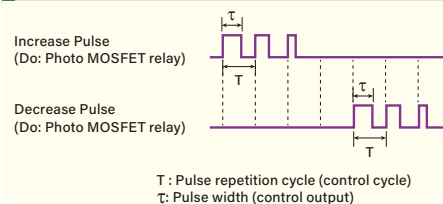
Configuration example of flow control loop using an electric control valve

In Auto mode, dual contact signals (photo MOSFET relay) with pulse widths that vary according to deviation are output.

In Man mode, the contact signal is made while the front manual operation button is pressed.



Pulse width output (increase/decrease, dual signals)



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■ GENERAL SPECIFICATIONS

Model	SC100	SC110	SC200	SC200W	SC210	SC210W	SC200D Pulse Width Output type
Construction	Panel mount type						
Degree of protection	IP55 (ensured for the front panel of the unit independently mounted to a panel)						
Connection	M3.5 screw terminals						
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						
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						Limit cycle method (Primary loop only)
Alarm	PV high & low, deviation, rate of change						
Sequence operation	Logic sequence and step sequence (Max. 1068 commands; 1068 commands × 2 for SC200W and SC210W)						
Computation	48 functions blocks available for arithmetic operations, time functions, signal selection, limit, alarm and other functions						
Computation cycle	50 msec. to 3 sec. (100 msec. to 3 sec. for SC200W and SC210W); Control cycle selectable from among 1, 2, 4, 8, 16, 32, and 64 times of the computation cycle						100 msec. to 3 sec.; Control cycle selectable from among 1, 2, 4, 8, 16, 32, and 64 times of the computation cycle
MV output range	-15 to +115%						-15 to +115% (Primary loop only)
RUN contact	OFF in error detected by diagnostic (including NestBus*2)						
Display	Display device: 4.3-inch TFT LCD, Display colors: 256, Resolution: 480 × 272 pixels, Backlight: LED						
Expansion specifications	Host communication	-	Modbus-RTU or Modbus/TCP				
	Bus communication for I/O expansion	-	NestBus (RS-485)				
	Trend data transfer	-	Collected trend data is transferred to PC via connection cable and saved in CSV format file.				

■ INPUT SPECIFICATIONS

Two-wire transmitter power supply specifications		Output voltage: 24 V DC ±10% with no load, 18 V DC min. at 20 mA; Current rating: ≤ 22 mA DC					
2 universal inputs	Current input	4 to 20 mA DC					
	Voltage input	-10 to +10 V DC, -1 to +1 V DC, 0 to 10V DC, 1 to 5 V DC, 0 to 1 V DC					
	Thermocouple input	K, E, J, T, B, R, S, C, N, U, L, P, PR					
	RTD input	Pt100 (JIS '97, IEC), Pt100 (JIS '89), JPt100 (JIS '89), Pt50 Ω (JIS '81), Ni100					
	Potentiometer input	Total resistance 100 Ω to 10 kΩ					
DC input		4 inputs: 1 to 5 V DC					4 inputs: 1 to 5 V DC (one can be used for position input)
Contact input		6 inputs: Dry contact with input terminal shared with pulse input					
Pulse input		5 inputs: Dry contact with input terminal shared with contact input (20 Hz max.)					
Pulse input with sensor excitation		Dry contact (Sensor excitation: 12 V DC, 1 point) (10 kHz max.)					

■ OUTPUT SPECIFICATIONS

Current output (MV output)	2 outputs: 4 to 20 mA DC					2 outputs: 4 to 20 mA DC, excluding MV output of secondary loop
Voltage output	2 outputs: 1 to 5 V DC					
Discrete output	5 outputs: Relay contact or photo MOSFET relay					5 outputs: Relay contact or photo MOSFET relay (two are secondary loop control outputs)

■ BACKUP SPECIFICATIONS

Backup specifications	-	One manually operated MV output (4 to 20 mA DC)	-	One manually operated MV output (4 to 20 mA DC)	-
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*1. SC110, SC210, SC210W *2. SC200, SC200W, SC210, SC210W, SC200D

■ INSTALLATION

Model		SC100	SC110	SC200	SC200W	SC210	SC210W	SC200D
								
Power input	AC power	100 to 240 V AC						
	DC power	24 V DC						
Two-wire transmitter power supply specifications		Output voltage: 24 V DC $\pm 10\%$ with no load, 18 V DC min. at 20 mA, Current rating: ≤ 22 mA DC						
Operating temperature		-5 to +55°C (23 to 131°F)						
Operating humidity		5 to 90% RH (with no condensation)						
Mounting		Panel mount type (serial mounting possible)						
Dimensions mm [inch] Varies by additional code	blank	W 72 [2.83]× H 144 [5.67]× D 274 [10.78]	-	W 72 [2.83]× H 144 [5.67]× D 274 [10.78]	-	-	-	-
	Code: /3	W 72 [2.83]×H 144 [5.67]×D 324 [12.75]						
	Code: /4	W 72 [2.83]×H 144 [5.67]×D 424 [16.69]						
	Code: /6	W 72 [2.83]×H 144 [5.67]×D 624 [24.56]	-	-	-	-	-	-
Panel cut out		68×138 mm						
Panel thickness		2.3 to 20 mm						
Weight		Approx. 2.4 kg (5.29 lb)- 3.6 kg (7.94 lb)	Approx. 2.6 kg (5.73 lb)- 3.6 kg (7.94 lb)	Approx. 2.4 kg (5.29 lb)- 3.1 kg (6.84 lb)	Approx. 2.4 kg (5.29 lb)- 3.1 kg (6.84 lb)	Approx. 2.6 kg (5.73 lb)- 3.1 kg (6.84 lb)	Approx. 2.6 kg (5.73 lb)- 3.1 kg (6.84 lb)	Approx. 2.6 kg (5.73 lb)- 3.1 kg (6.84 lb)

SC Series
Controllers
SC100
SC200
SC200W

SC Series
with Manual
Loader
SC110
SC210
SC210W

■ ACCESSORIES/RELATED DEVICES

Product name	Model	Main functions and features
REMOTE I/O MODULE (for NestBus use)	SML-x -A4 -C7 -C8 -E5 -G3 -G4 -M4 -P4 -R2 -R3 -S5 -S6	Remote I/O unit for NestBus connections. Di 8 points Do 8 points (photo MOSFET relay) Do 8 points (relay) Di 4 + Do 4 points (relay) Ai 8 points Ai 4 points Ao 4 points Pi 4 points Ai 2 points (isolated between chs)+ Ao 2 points (isolated between chs, current output) (power input code K, L not selectable) Ai 4 + Ao 4 points Ai 4 + Di 4 points Ao 4 + Do 4 points (relay)
PC CONFIGURATOR CABLE (USB - miniature jack, isolated)	 COP-US	Cable for connecting a device with stereo jack to a PC (IBM PC/AT or compatible computer) with USB socket (used for SC Series). · Use with SFEW3 or SCCFG to set parameters or for monitoring.
PC CONFIGURATOR CABLE (USB - modular jack, isolated)	 COP-UM	Cable for connecting the SML to a PC (IBM PC/AT or compatible computer) with USB socket. · Use with SFEW3E to set parameters or for monitoring.
LOOP CONFIGURATION BUILDER SOFTWARE	SFEW3E	SFEW3E is software that runs on Windows, for configuring control loops for Multi-function PID Controller SC Series and the SML.
SC CONFIGURATOR SOFTWARE	SCCFG	SCCFG is software for loading or saving SC Series configuration data and short trend data using a PC. This software is available as a free download from our website.
PROGRAMMING UNIT	 PU-2A	Portable unit for changing settings on site (used for SML).

Pulse Width
Output
SC200D

Application
Examples

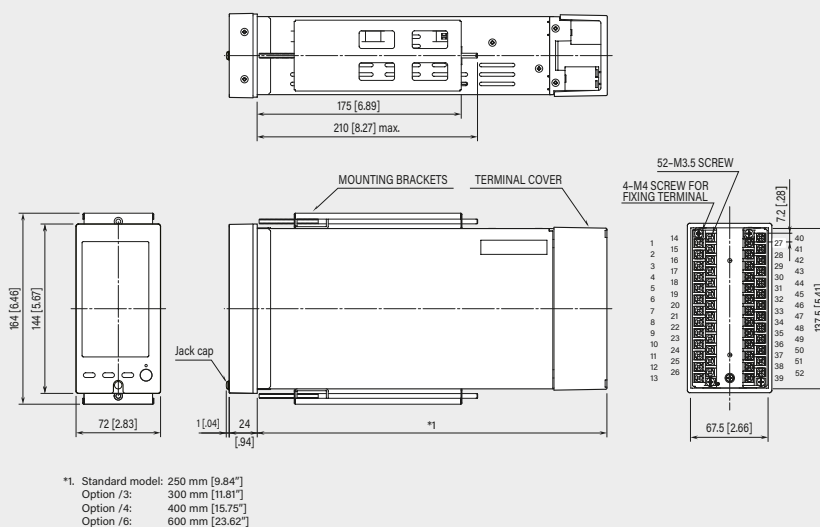
1/4 DIN Size
Controller
ABL

Bargraph
Indicating
Alarm
SD10

Manual
Loader
SM10

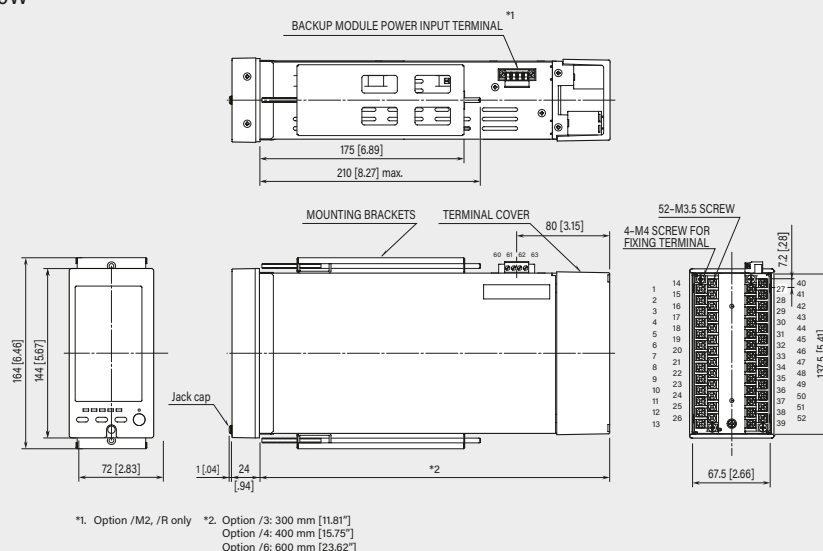
EXTERNAL DIMENSIONS unit: mm [inch]

SC100, SC200, SC200W



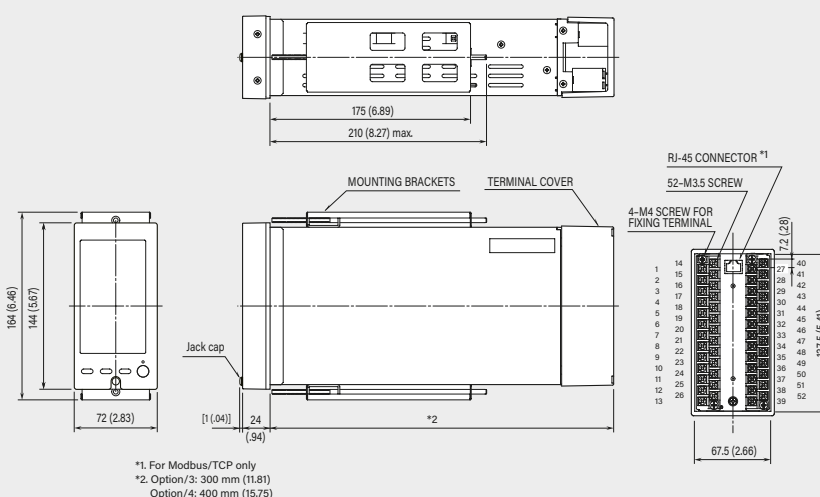
unit: mm [inch]

SC110, SC210, SC210W



unit: mm [inch]

SC200D



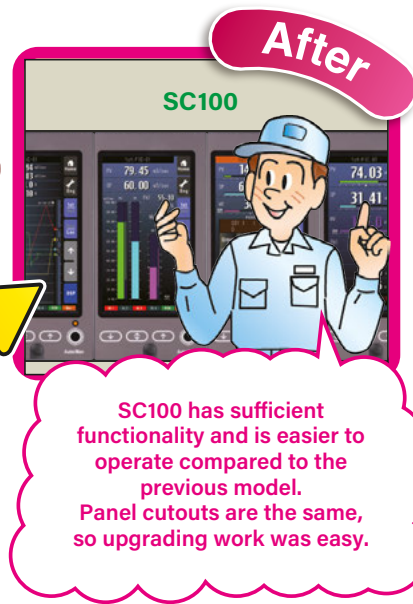
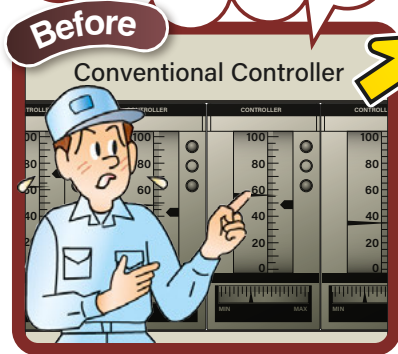
unit: mm [inch]

SC Series Controllers SC100 SC200 SC200W
Controllers with Manual Loader SC110 SC210 SC210W
Pulse Width Output SC200D
Application Examples
1/4 DIN Size Controller ABL
Bargraph Indicating Alarm SD10
Controllers with Manual Loader SM10

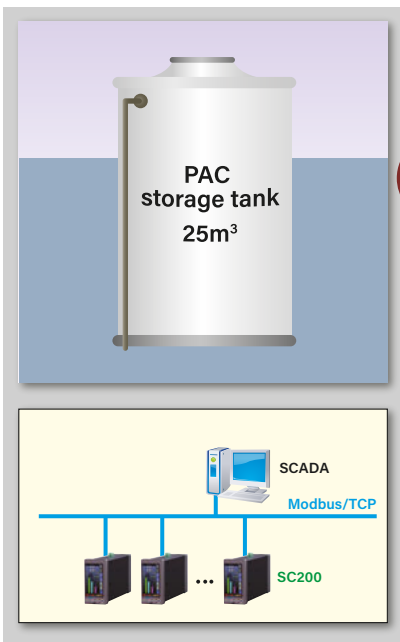
1 Upgrading on-site controllers for papermaking machines



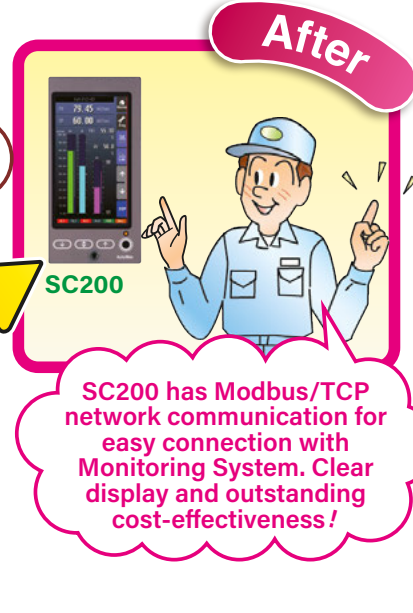
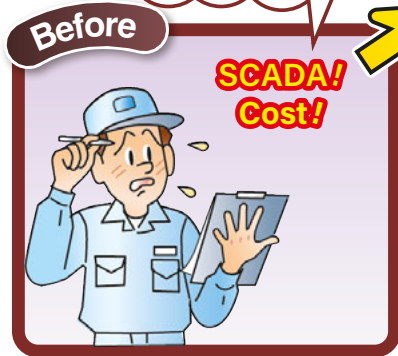
Controllers on site need to be replaced soon, but the current models are discontinued.
Are there any alternatives in the same size, with similar usability?



2 Upgrading a chemical dispensing system at a water treatment facility



The controller upgrading project involves using SCADA as host. Is there any cost-efficient controller that can handle data communication?



3 Upgrading controllers for a power generation system



Before

We have a plan to upgrade controllers, and replacement models must have an output backup function and redundant power supplies. Since our budget is limited, we can't afford an expensive model.

**Backup!
Redundant power supply!**

After

SC110

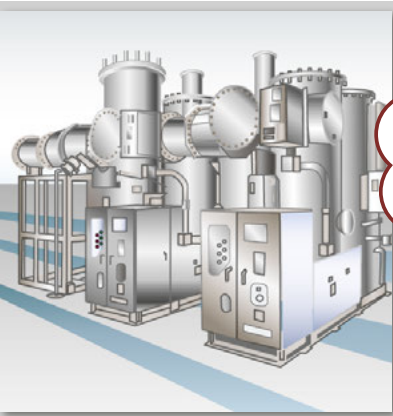
SC110 comes with a backup module and supports redundant power supplies, so our setup can stay the same. We managed to reduce costs with SC110 compared to other brands.

SC Series
Controllers
SC100
SC200
SC200W

SC Series
with Manual
Loader
SC110
SC210
SC210W

Pulse Width
Output
SC200D

4 Upgrading a DHC (District Heating / Cooling) System



Before

We need to upgrade the DHC system, but the conventional controllers are discontinued. The replacements must have an output backup function and be able to communicate with the host SCADA.

Discontinued model

After

SC210

SC210 comes with a backup module, so there's no need to worry. Modbus/TCP communication also makes it easy to connect to the host monitoring system.

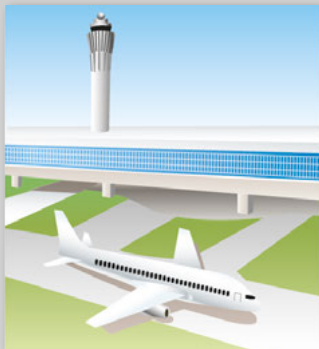
Application
Examples

1/4 DIN Size
Controller
ABL

Bargraph
Indicating
Alarm
SD10

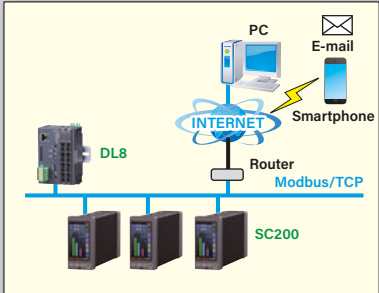
Manual
Loader
SM10

5 Controllers with remote monitoring function for airport building air-conditioning system



The existing controllers for combustion control are discontinued, so we are looking for an alternative.
In the IoT era, we want to remotely monitor the control status over the Internet.

Before



PC
E-mail
Smartphone
Internet
Router
Modbus/TCP
DL8
SC200
Discontinued model

After



SC200

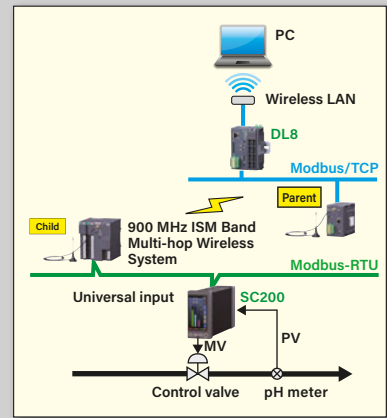
SC200 is the perfect controller for combustion control.
The Modbus/TCP network communication function combined with Web Data Logger DL8 easily achieves IoT remote monitoring, rationalizing maintenance.

6 Automation and remote monitoring of wastewater treatment system



We want to automate pH control, but the equipment is in a different location. Remote monitoring would help. But what about the budget?

Before



PC
Wireless LAN
DL8
Modbus/TCP
Parent
Child
900 MHz ISM Band Multi-hop Wireless System
Modbus-RTU
Universal input
SC200
MV
Control valve
pH meter
PV

After

900 MHz Band Wireless I/O

SC200 stabilized the sensitive pH control. Remote monitoring was easily achieved, combined with the 900 MHz Band Wireless I/O R3 Series^{*1}. Budget was no problem because wiring work wasn't needed.

* This device is approved for use only in the US.

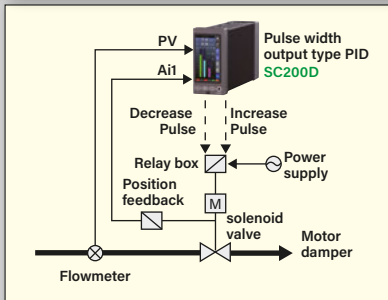
7 Upgrading controllers for driving solenoid valves in waterworks



We are looking for controllers that can drive solenoid valves for next year's construction. Creating a solenoid valve operation circuit using an ordinary controller app is not only a hassle, but quite complicated.

Before

Solenoid valve!



After



Pulse width output type PID
SC200D

SC200D with pulse width output comes with a solenoid valve-driving algorithm, which makes app creation unnecessary. Future upgrade works are no problem!

SC Series
Controllers
SC100
SC200
SC200W

SC Series
with Manual
Loader
SC110
SC210
SC210W

Pulse Width
Output
SC200D

8 Replacing a controller for motor damper control at a cement plant

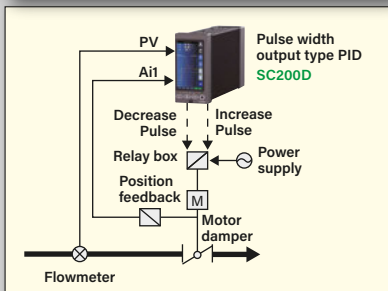


The controller for a motor damper has broken down. The model was discontinued a long time ago and we can't repair it, so we are adjusting positions manually.

Before



Failure



After



Pulse width output type PID
SC200D

SC200D with pulse width output can control the motor damper. We'll be replacing the rest of the controllers!

Application
Examples

1/4 DIN Size
Controller
ABL

Bargraph
Indicating
Alarm
SD10

Manual
Loader
SM10

Multi-function PID Controller

ABL

Equipped with approximately 50 computation formulas and sequential control functions with approximately 1000 commands. Developed to replace existing temperature controllers and other controllers.

Perfect for replacing controllers

This single loop controller offers advanced control functions and is perfect for replacing controllers used in a variety of applications.

96 mm square programmable controller

A general-purpose 96 mm square programmable controller for automatic control of flow, temperature, water level, pressure, and other variables. One unit provides PID control for up to two loops, various computation functions, and ladder sequence functions for advanced control.

Vivid 3.5-inch TFT LCD with 256 colors

Digital display views with excellent visibility and monitoring views with bargraphs are available.



MULTI-FUNCTION PID CONTROLLER

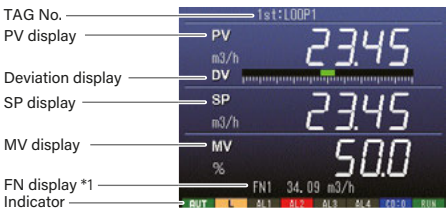
PRODUCT	MODEL	CE	
MULTI-FUNCTION PID CONTROLLER (color LCD display)	ABL	--	✓

Operation view

The vivid LCD provides flexible display options.

Digital 1 loop view

Loop control parameters (PV, SP and MV) are indicated on the digital displays. Deviation (DV) is indicated with a bargraph. Four function values (FN1 to FN4) can also be displayed.



Digital 2 loop view

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



DIGITAL + BARGRAPH 1 LOOP VIEW

Loop control parameters (PV, SP and MV) are indicated with bargraphs and on the digital displays. Four function values (FN1 to FN4) can also be displayed.



*1. FN (function) display is assigned to internal analog signals that can be selected by the user. (Skipped if no display is registered.)

Engineering view

Detailed display enables accurate and quick setting.

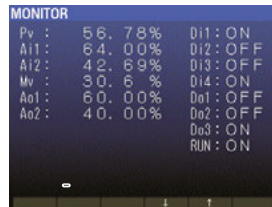
Tuning view

Operation status display TAG No.



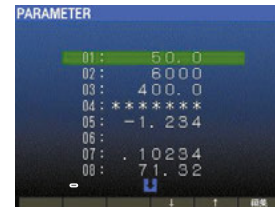
This view is used to set various PID control loop parameters, including PB (proportional band), TI (integral time), and TD (derivative time). Auto-tuning is also available in this view.

Monitor view



This view lists the values of input and output terminals. Because current values can be checked at a glance, it is useful for checking control results during debugging and for loop checks during wiring work.

Parameter list view



This is a setting (parameter) view for function blocks. Up to 20 items can be registered. Setting values can be checked and changed without using Builder Software.

Part names

Many input and output signals.



*2. Uses a resistor module (Model: REM5).

Standard input signals

Analog input

Universal input (Pv)	1 point
DC voltage signal	
DC current signal *2	
Thermocouple	
RTD	
DC input (Ai1 to Ai2) *2	2 points
1 to 5 V DC or 4 to 20 mA DC	

Contact input

Dry contact (Di1 to Di4)	4 points
--------------------------	----------

Standard output signals

Analog output

Control output (Mv): 4 to 20 mA DC, 1 point	
Current output (Ao1 to Ao2): 4 to 20 mA DC, 2 points	

Contact output

Do1 to Do3: Relay contact, 3 points	
RUN contact: Relay contact, 1 point	

SC Series
Controllers
SC100
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SC200W

SC Series
with Manual
Loader
SC110
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SC210W

Pulse Width
Output
SC200D

Application
Examples

1/4 DIN Size
Controller
ABL

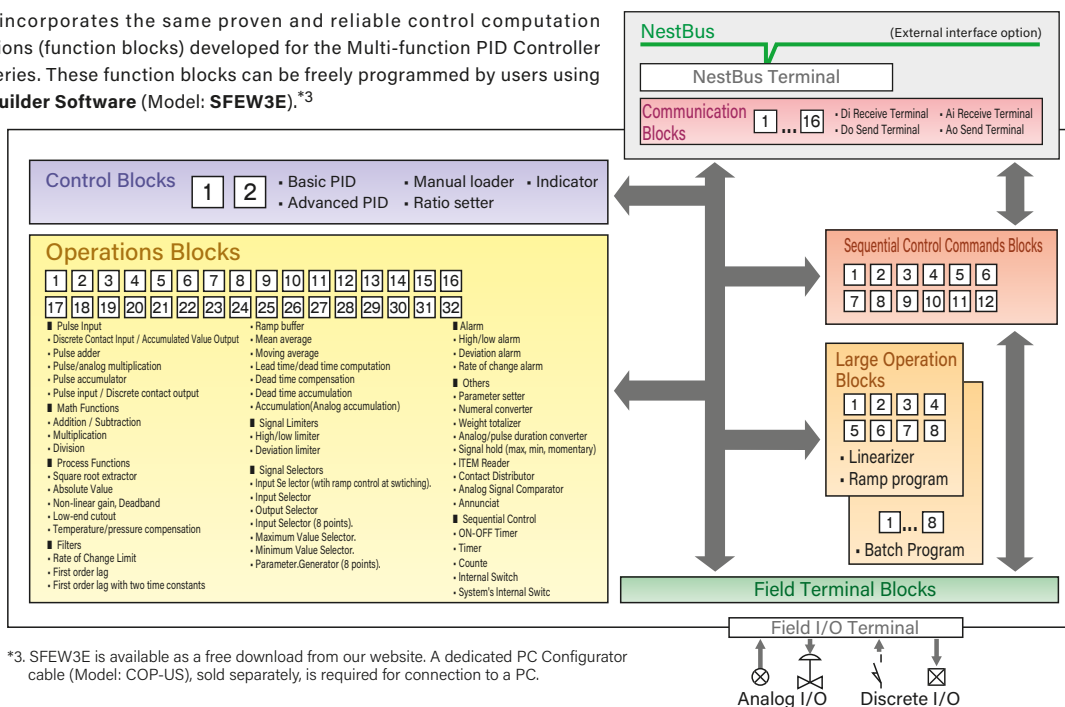
Bargraph
Indicating
Alarm
SD10

Manual
Loader
SM10

Function block diagram

Equipped with approximately 50 computation formulas and sequential control blocks.

ABL incorporates the same proven and reliable control computation functions (function blocks) developed for the Multi-function PID Controller SC Series. These function blocks can be freely programmed by users using the Builder Software (Model: SFEW3E).^{*3}



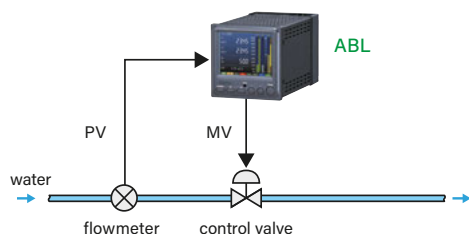
*3. SFEW3E is available as a free download from our website. A dedicated PC Configurator cable (Model: COP-US), sold separately, is required for connection to a PC.

System configuration examples

The ABL supports applications from standalone use to small- and medium-scale systems.

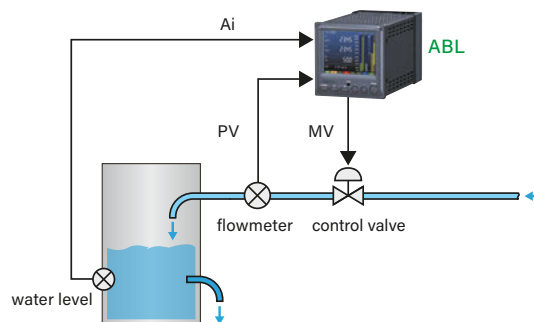
Standalone use (single loop control)

Single loop control using one PID control block.



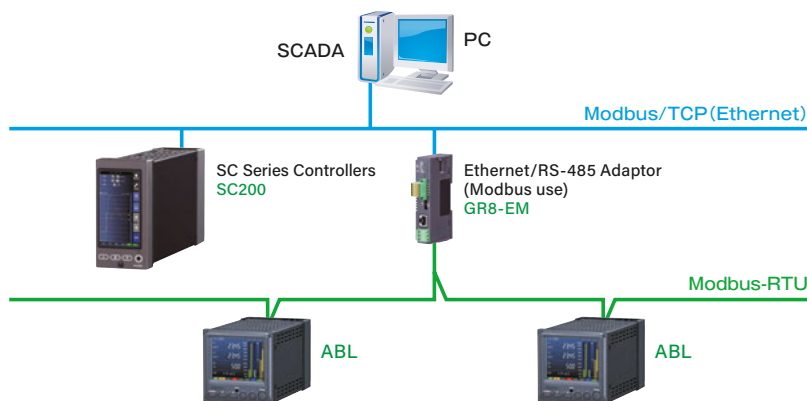
Standalone use (cascade control)

This control method uses two PID control blocks, connecting the primary loop manipulated output (MV) to the secondary loop setpoint signal (CAS). By setpoint two PID blocks in series, cascade control can be achieved with a single ABL controller.



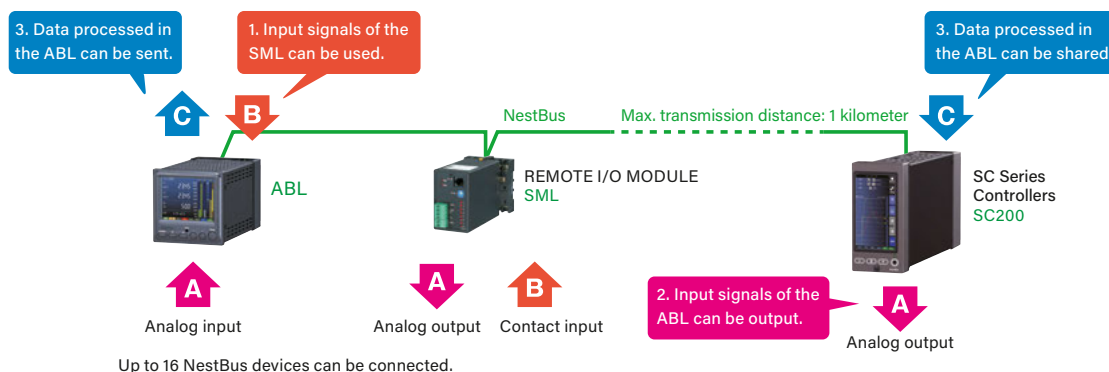
Centralized monitoring system via Modbus*4

Using the open Modbus network, SCADA software or PLCs on a host PC can perform centralized monitoring and operation, including reading PID parameters and computation results from and writing data to the ABL single loop controller.



I/O expansion system via NestBus*4

NestBus is our proprietary, highly reliable communication protocol based on a decentralized architecture without a master, allowing extremely easy inter-device communication. By connecting remote I/O units (Model: SML) and other devices to the ABL controller via NestBus, the following can be achieved: (1) expansion of analog and digital I/O points, (2) multiplex transmission, and (3) data sharing.



*4. Additional cost applies when an external interface (Modbus-RTU/NestBus communication) is included.

Main specifications

GENERAL SPECIFICATIONS

Construction: Panel flush mounting
Screw terminal: Nickel-plated steel
Housing material: Flame-resistant resin (black)
Isolation: Pv1 to Ai1 to Ai2 to Di1 or Di2 or Di3 or Di4 to Mv1 to Ao1 to Ao2 to Do1 to Do2 to Do3 to RUN contact to NestBus to Modbus-RTU to power to FE
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
Sequence operation: Logic sequence, step sequence (max. 1068 commands)
Control cycle: 100 msec. to 3 sec.
MV output range: -15 to +115%
Parameters: Stored in E² PROM (non-volatile memory)
Parameter setting: With front buttons or Builder Software (Model: SFEW3E)
Self diagnostics: CPU monitoring with a watchdog timer
RUN contact: OFF in error detected by diagnostic

■ DISPLAY

Display device: 3.5-inch TFT LCD
Display colors: 256
Resolution: 320×240 pixels

EXTERNAL INTERFACE

■ NestBus

Configuration: Bus type multi-drop
Standard: Conforms to TIA/EIA-485-A
Transfer rate: 19.2 kbps
Protocol: NestBus (our own protocol)
Max. transmission distance: 1 kilometer
Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)
Terminating resistor: incorporated
Address setting: 0 to F (16 nodes)

■ Modbus-RTU

Configuration: Half-duplex, asynchronous, no procedure
Standard: Conforms to TIA/EIA-485-A
Max. transmission distance: 500 meters
Transfer rate: 4800, 9600, 19.2 k, 38.4 k bps
Data bit: 8
Parity bit: Odd, even, none
Max. node number: 15 (except the master)
Transmission media: Shielded twisted-pair cable (CPEV-S 0.9 dia.)
Terminating resistor: incorporated
Node address setting: 1 to 247

INPUT SPECIFICATIONS

■ Pv

•DC input:

Input range

Wide span voltage: 0 to 10 V DC, 0 to 5 V DC, 1 to 5 V DC

Narrow span voltage: -1 to +1 V DC, 0 to 1 V DC

Current: 0 to 20 mA DC, 4 to 20 mA DC

Input resistance

Wide span voltage: $\geq 1 \text{ M}\Omega$ ($\geq 500 \text{ k}\Omega$ for 0 to 10 V)

Narrow span voltage: $\geq 100 \text{ k}\Omega$

Current: 250 Ω (Using resistor)

•Thermocouple input: K, E, J, T, B, R, S, C, N, U, L, P, PR

Input resistance: $\geq 30 \text{ k}\Omega$

Burnout sensing: $\leq 0.3 \mu\text{A}$

•RTD input: Pt 100 (JIS '97, IEC), Pt 100 (JIS '89), JPt 100 (JIS '89)

Maximum leadwire resistance: $\leq 100 \Omega$ per wire

Sensing current: $\leq 1 \text{ mA}$

■ DC input

Voltage input: 1 to 5 V DC, $\geq 1 \text{ M}\Omega$

Current input: 4 to 20 mA DC with input resistance 250 Ω (Using resistor module)

■Discrete input (Di1, Di2, Di3, Di4): Dry contact, 4 points

Input resistance: Approx. 1.8 k Ω

Common: Negative common per 4 points

Sensing: 12 V DC

OUTPUT SPECIFICATIONS

■DC output (Mv, Ao1, Ao2): 4 to 20 mA DC

Load resistance: $\leq 500 \Omega$

■Do1, Do2, Do3, RUN contact

Relay rating: 250 V AC @ 1 A ($\cos \phi = 1$)

30 V DC @ 1 A (resistive load)

INSTALLATION

Power input: 100 to 240 V AC

Power consumption: Approx. 9.2 VA at 100 V
 Approx. 12.6 VA at 240 V

Operating temperature: -5 to +55°C (23 to 131°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Mounting: Panel flush mounting (high-density mounting in horizontal direction)

Weight: 800 g (1.76 lb)

SC Series
Controllers
SC100
SC200
SC200W

SC Series
with Manual
Loader
SC110
SC210
SC210W

Pulse Width
Output
SC200D

Application
Examples

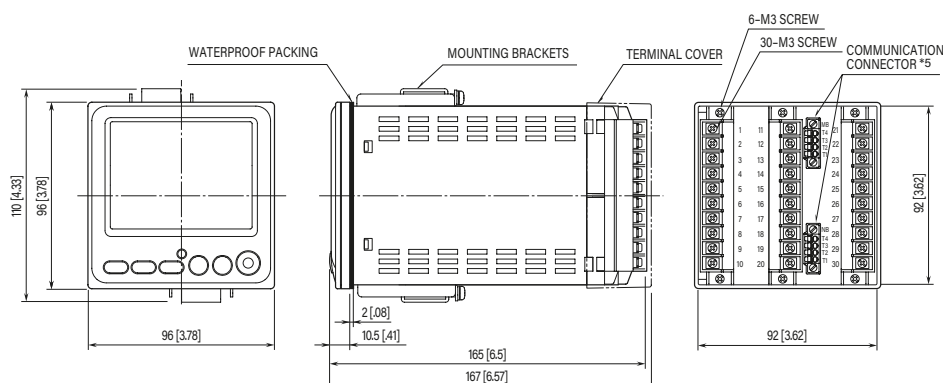
1/4 DIN Size
Controller
ABL

Bargraph
Indicating
Alarm
SD10

Manual
Loader
SM10

EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS

unit: mm [inch]



*5. Included only when the external interface code is "I": Modbus-RTU/NestBus communication.

Bargraph Indicating Alarm

SD10

Displays three analog inputs on bargraphs and outputs four alarm contact signals per input.

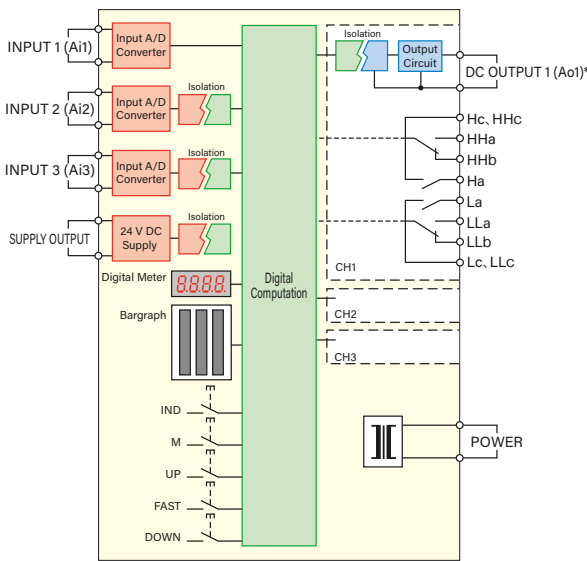
The Bargraph Indicating Alarm SD10 displays three analog inputs (Inputs 1 to 3) on independent bargraph LEDs and allows alarm settings at four thresholds (high-high, high, low, low-low) for each input. Each alarm status is indicated by LEDs on the front panel and output as alarm contacts.

Bargraph Indicating Alarm

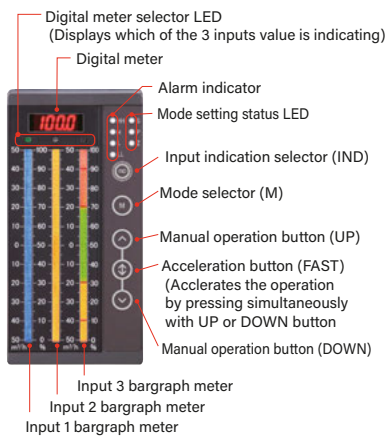
SD10 IP55



BLOCK DIAGRAM

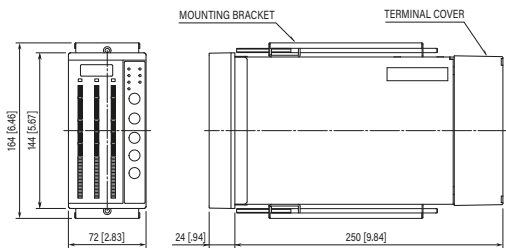


FRONT PANEL VIEW



EXTERNAL DIMENSIONS

unit: mm [inch]



INTERNET-BASED SCALE PLATE CREATION

Scale plates can be designed using the Scale Plate Designer on our website.

Manual Loader SM10

Manual loader with backup function

The SM10 is a manual loader that also functions as a backup instrument for controllers.

It has one analog (MV) output (4 to 20 mA DC, or various other current/voltage signals), which can be made to track the cascade (CAS) input, such as the MV output from an external controller, or manually operated to any desired value. It also includes a bargraph indicator for one analog (PV) input for reference, and MV feedback output to DCS.



**Manual Loader
SM10** IP55

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SC100
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SC200W

Controllers with Manual
Loader
SC110
SC210
SC210W

Pulse Width
Output PID
SC200D

Application
Examples

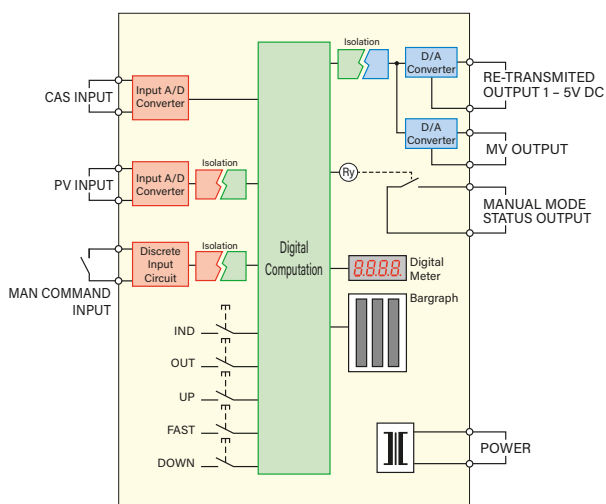
1/4 DIN Size
Controller
ABL

Bargraph
Indicating
Alarm
SD10

Controllers
with Manual
Loader
SM10

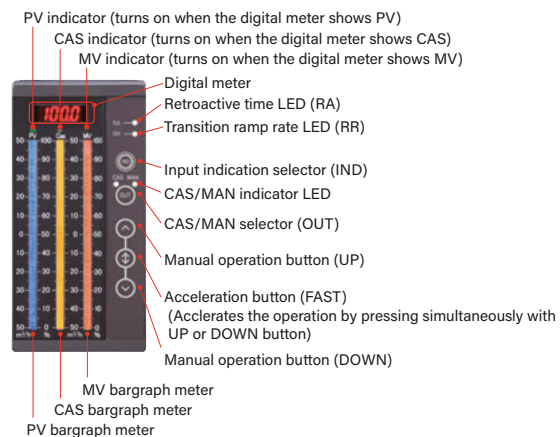
BLOCK DIAGRAM

'MV Output off at Power Down' option without 'CAS input'



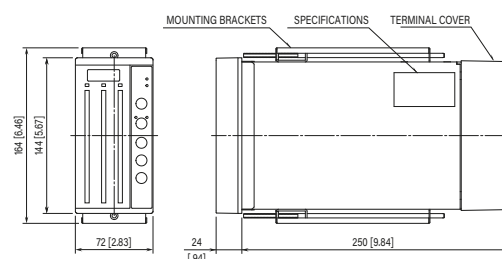
*1. MV and Re-transmitted output circuits are not included in this schematic circuit diagram.

FRONT PANEL VIEW



EXTERNAL DIMENSIONS

unit: mm [inch]



INTERNET-BASED SCALE PLATE CREATION

Scale plates can be designed using the Scale Plate Designer on our website.



Website



Request Info

Your local representative: