Single Loop Controller Model C2A/C2B/C3A/C3B: Enhanced functionality and improved versatility

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1. Introduction

Following the 2023 release of the compact single loop controller model C1A with high accuracy and high speed control, we have developed models C2A/C2B/C3A/C3B, which deliver enhanced functionality and improved versatility (collectively called "this device" from here on). This device is a successor to the SDC models C25/26/35/36 (collectively called "conventional devices" from here on).

2. Product overview

In models C2A/C2B, basic performance, such as accuracy and sampling cycle, has been improved compared to the conventional devices to satisfy the ever-evolving needs of customer equipment. They come equipped with a removable structure that enables you to detach the body from the case without disconnecting the rear terminal wiring, and are designed to reduce the influence of ambient temperature. They also offer high functionality, such as pattern operation with time-variable set points (SPs) and PLC link communication that allows data exchange with the programmable logic controller (PLC) without programming.

Models C3A/C3B are upgrades of models C2A/C2B with further enhanced basic performance and functionality. The broad product lineup includes the motor-drive relay model and remote set-point (RSP) input model, making them suitable for a wide range of applications.

The front panel dimensions of models C2A/C3A are 48 mm wide × 96 mm high, and those of C2B/C3B are 96 mm wide × 96 mm high (Fig. 1).

3. Product features

3.1 External form

The display fields have been designed to have segmented characters that are as large as possible within the limited display area. This improves their visibility from a distance and reduces the chance of being misread.

The operation keys are clearly separated from the displays, and are designed to be as large as possible to improve operability.

The improved visibility and operability embody the performance and reliability of this device, which also works as an information interface for transmitting control status.

In addition, adopting a removable structure prevents wiring errors during maintenance work and enables quick replacement.

①: Display field 1, ②: Display field 2, ③: Display field 3, ④: Display field 4, ⑤: Multi-status indicator, ⑥: Operation keys, ⑦: Loader connector

Fig. 1. Console of this device (top: model C3A, bottom: model C3B)

3.2 Performance

Thanks to its improved process value (PV) input circuit design and measurement method, this device offers high stability, high accuracy, and high-speed sampling of indicated values (Table 1).

In addition, by reducing the temperature drift of analog inputs and outputs, including PVs, the standard condition temperature range has been expanded from 23±2℃ to 25±3℃ and the operating temperature range from 0 to 50℃ to -10 to +55℃, which were points for improvement in the conventional devices.

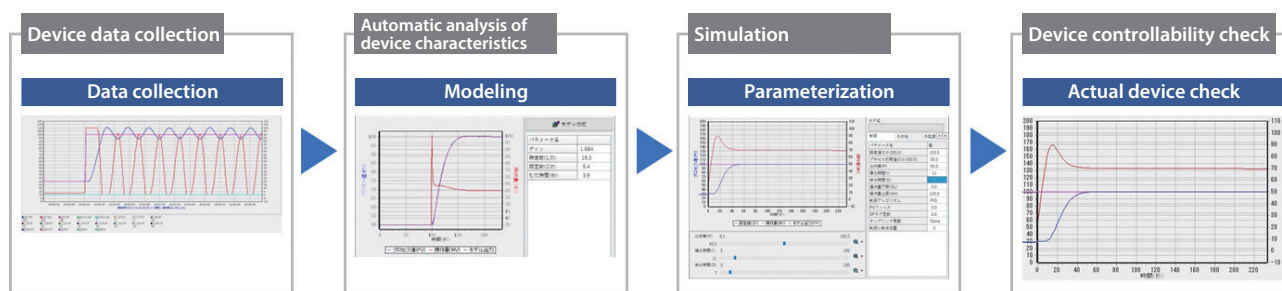| Device data collection	Automatic analysis of device characteristics	Simulation	Device controllability check
Data collection	Modeling	Parameterization	Actual device check

Fig. 2. Examples of PID simulator operation

Table 1. PV indication accuracy and sampling cycle

Model No.	Thermocouple (*1, *2, *3)	Resistance temperature detector (*1, *2)	DC voltage/ current (*1, *2)	Sampling cycle
C2A/C2B	±0.2%FS	±0.2%FS	±0.2%FS	50 ms min.
C3A/C3B	±0.1%RD	±0.1%RD	±0.1%FS	25 ms min.
C25/C26	±0.3%FS	±0.3%FS	±0.3%FS	300 ms fixed
C35/C36	±0.1%FS	±0.1%FS	±0.1%FS	100 ms fixed

*1: With exception range, *2: ±1 digit is omitted,
*3: Excluding terminal temperature compensation accuracy
RD: Readout error, FS: Full–scale error

3.3 Functions

The main features of this device are listed below.
- The motor-drive relay output models of models C3A/C3B are equipped with "position proportional control functions." These include motor feedback (MFB) input for the control motor drive, estimated position control, and automatic position proportional adjustment.
- The RSP input models of models C3A/C3B are equipped with an "RSP function" that takes in analog control signals as SPs, as well as a "virtual RSP function" that acquires RSPs via communication. You can select the PV derivative-type PID calculation (PID-B) to reduce sudden changes in the manipulated variable (MV) due to changes in the RSP.
- In the auxiliary output models, an analog current or continuous voltage output can be added, in addition to a maximum of two control outputs.
- A 16-segment "pattern operation function" is included. In the extended data memory models of models C3A/C3B, the number of patterns can be increased up to 16. Resumption of operation after a power outage is possible based on the pattern number, segment number, remaining cycle count, and segment elapsed time that were in effect before the outage. The pattern number, segment number, SP, and remaining segment time can be recognized on a single operation screen.
- Models C3A/C3B come equipped with a "user operation screen function," enabling you to create up to eight operation screens on which any monitor values are displayed on display fields 1 to 3.
- Models C3A/C3B come equipped with a "fixed value output function" that generates up to eight sets of MVs by automatic switching using an internal contact function, or by direct switching via communication or from the console. Lamp operation is available to give a gradient to the change in the MV when the set is switched.

3.4 Smart loader package

The engineering software model SLP-C1F, available free of charge on our website, incorporates a PID simulator (Fig. 2) for evaluating energy-saving effects through desktop simulation of control responses and reducing the labor-hours needed for PID adjustments. It also features previously added functions such as parameter settings and numeric/trend monitors.

A dedicated loader cable (sold separately) is required to connect to this device. The setting parameters can be read and written also through the USB cable supplying power from the PC running model SLP-C1F.

Moreover, you can read out the SLP-C35 configuration project file from a conventional device, convert the file format, and write the setting parameters to this device. These factors make replacing a conventional device easy.

4. Conclusion

We have provided an overview of this device and its features. With its extensive range of models, high performance, excellent visibility and operability, and ease of replacing conventional devices, this device can serve as an effective solution for instrumentation.

We will continue to develop controllers that solve your problems.

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