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ADD FURNACE CO.,LTD.
44 ซอยบรมราชชนนี 70 ถนนบรมราชชนนี แขวงศาลาธรรมสพน์ เขตทวีวัฒนา กรุงเทพฯ 10170
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No. CP-SS-1852E

azbil Specification

DCP551B Mark II

DIGITRONIK™
Programmable Controller

Overview

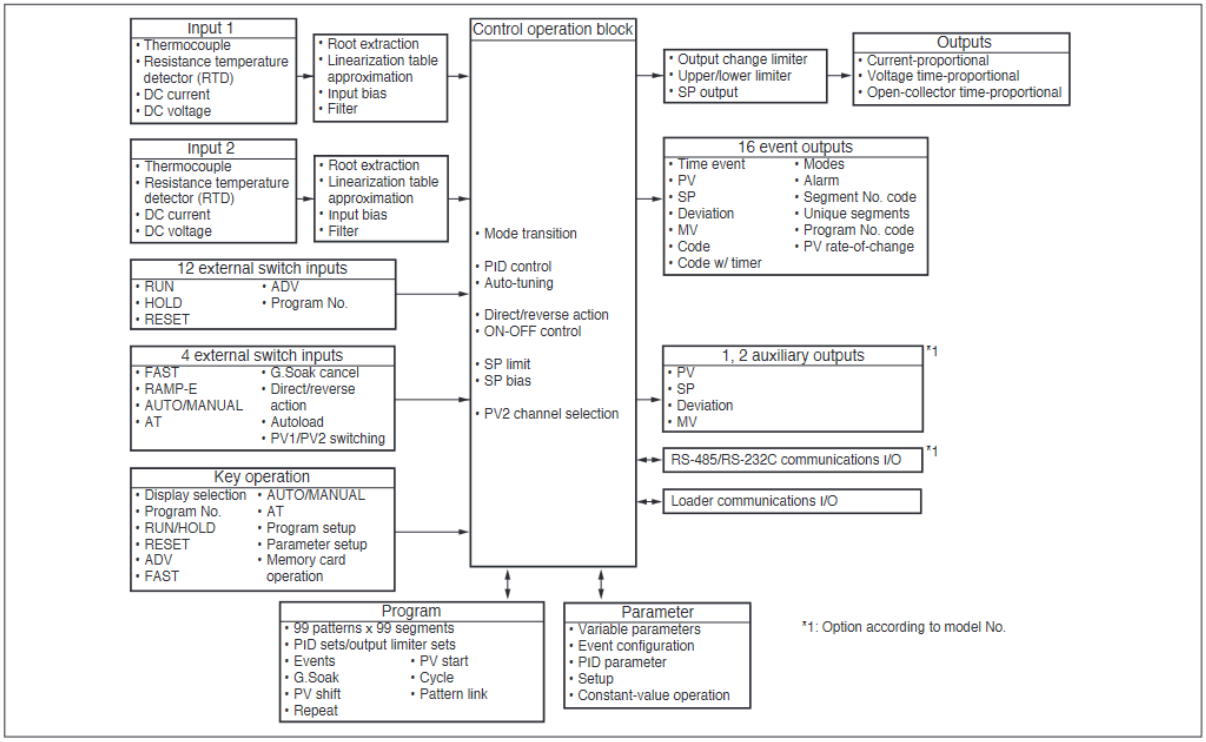
The DIGITRONIK™ DCP551B Mark II is a high-function programmable controller supporting up to 99 program patterns to which thermocouple, resistance temperature detector (RTD), DC voltage, DC current and other signals can be input.

The DCP551B Mark II supports, 16 event outputs, 16 external switch inputs and a wide range of other functions as part of the standard specification;and communications and auxiliary output as option functions.

Features

- Accuracy of ±0.1%FS. Easy-to-view large display characters. Compact design.
- 2 PV input type also available.
- Any input type can be selected by console key operation.
- Easy operation aided by guidance messages
- Up to 99 program patterns can be stored and up to 99
- segments can be programmed to each pattern.
- Various events can be selected and set for the 16 event outputs, and code events comprising a combination of two or more points can be set.
- 16 external switch inputs allow the control of remote selection of program Nos. or operation.
- CE marking-compatible
  Applicable standards: EN61010-1, EN61326

Basic function blocks of DCP551B Mark II



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Specifications

Program	Number of programs	99
	Number of segments	99 per program, 2000 per controller
	Segment setting system	RAMP-X: Set by set points (SP) and time. RAMP-T: Set by set points (SP) and ramp (θ) RAMP-E: Set by set points (SP) and ΔSP per external switch input 1 pulse
	Segment time	0 to 500 hours 0 minute, 0 to 500 minutes 0 second, 0.0 to 3000.0 seconds (time unit selectable)
	Segment ramp	1 to 10000 U/hour, 1 to 10000 U/minute, 1 to 10000 U/second (time unit selectable)
	Segment ΔSP	1 to 10000 U/1 pulse
	Number of sub-functions	4000 settings per controller
	Sub-function action	Events, PID set, output limiter set, G.Soak, PV shift, repeat
	Events (16)	Set operating point corresponding to event type
	PID set No.	Set 0 (continuation of previous segment), 1 to 9, A set (automatically switched) and ON-OFF control
	Output limiter set	Set 0 (continuation of previous segment), 1 to 9
	G.Soak	Set type (start/end points and overall) and G.Soak width 0 to 1000 U.
	PV shift	-10000 to +10000 U
	Repeat	Set return destination segment No. and repeat count.
	PV start	Set type (rising/falling or both) for each program.
	Cycle	Set cycle count for each program.
	Pattern link	Set program No.0 to 99 (0: no link) for each program.
	Tag	Set 8 alphanumerics or symbols for each program.
	Basic time accuracy	±0.01% (segment time setting = 0, with 0.1 second delay for each repeat and cycle)
Inputs	Input type	Thermocouple, resistance temperature detector (RTD), DC voltage, DC current multi-range (See pages 7, 8.)
	Sampling cycle	0.1 seconds
	Input bias current	Thermocouple, DC voltage input: Max. ±1.3 μA (at peak value and reference conditions) 1 V or higher range: Max. -3 μA
	Input impedance	DC current input: approx. 50 Ω (under operating conditions)
	Measuring current	RTD input: Approx. 1 mA current flow from terminal A (under operating conditions)
	Influence of wiring resistance	Thermocouple, DC voltage input: Thermocouple: 0.5 μV/Ω DC voltage (max. 1 V range): 0.5 μV/Ω DC voltage (5 V range): 3 μV/Ω DC voltage (10 V range): 6 μV/Ω RTD input: Max. ±0.01%FS/Ω in wiring resistance range 0 to 10 Ω Range of F01, F33, P01 and P33: ±0.02%FS/Ω max.
	RTD input allowable wiring resistance	• Ranges other than F01, F33, P01 and P33: 85 Ω max. • Ranges of F01, F33, P01 and P33: 10 Ω max.
	Allowable parallel resistance	Thermocouple disconnection detection allowable parallel resistance: 1 MΩ min.
	Max. allowable input	Thermocouple, DC voltage input: -5 to +15V DC DC current input: 50 mA DC, 2.5V DC
	Burnout	Detection selectable
	Over-range detection threshold	110%FS min.: Upscaled -10%FS max.: Downscaled (Note that F50 range is not downscaled.)
	Cold-junction compensation accuracy	±0.5°C (under standard conditions)
	Cold- junction compensation system	Internal/external (0°C only) compensation selectable
	Scaling	-19999 to +20000 U (possible in case of linear input only. Inverse scaling possible. Decimal point position settable at any point)
	Square root extraction	Possible. Dropout: 0.2 to 10.0% in case of DC current or DC voltage range
	PV equalizer (linearization table approximation)	PV1: 9 segments (10 points set) PV2: 19 segments (20 points set)
	Input bias	-1000 to +1000 U variable
	Digital filter	0.0 to 120.0 seconds variable (0.0: filter OFF)

External switch inputs	Number of inputs	16	
	Types of connectable outputs	Dry contacts (relay contact) and open-collector (current sink to ground)	
	Terminal voltage (open)	8.5 V±0.5 V between common terminals (terminals ⑫) and each input terminal (under operating conditions)	
	Terminal current (short-circuit)	Approx. 6 mA between each terminal (under operating conditions)	
	Allowable contact resistance (dry contact)	ON: 250 Ω max. (under operating conditions) OFF: 100 kΩ min. (under operating conditions)	
	Voltage drop (at open-collector ON)	2 V max. (under operating conditions)	
	Leakage current (at open-collector OFF)	0.1 mA max. (under operating conditions)	
	Parallel connection with other instruments	Can be connected to Azbil Corporation SDC40 and SDC10 series	
	Assignments (fixed)	RUN, HOLD, RESET, ADV, program No.	
	Assignments (variable)	RAMP-E, FAST, AT, AUTO/MANUAL, G.Soak cancel, direct/reverse action, auto-load, PV1/2 switching	
	Input sampling cycle	0.1 seconds	
	ON detection min. hold time	0.2 seconds (0.4 seconds for program No.)	
Indication/ programmer	Upper display	Green 5-digit, 7-segment LED This displays PV values in the basic display state. Item codes are displayed in the parameter setup.	
	Lower display	Orange 5-digit, 7-segment LED This displays SP and output % in the basic display state. Setting values are displayed in the parameter setup.	
	Program No. display	Green 2-digit, 7-segment LED This displays program No. in the basic display state.	
	Segment No. display	Green 2-digit, 7-segment LED This displays segment No. in the basic display state. Item Nos. are displayed in parameter setup, and alarm No. is displayed when alarm occurs.	
	Message display	This displays output graph, deviation graph, event state and tags in the basic display state. This displays reference messages in the parameter setup and program setup. This displays operation details and operation results of memory card operation.	
	Profile display	7 orange LEDs Displays program pattern rise, soak and fall trends.	
	Status displays	22 round LEDs Modes: RUN, HLD, MAN, PRG (green) Display details: PV, SP, OUT, TM, CYC, SYN, DEV (green) Battery voltage: BAT (red) (blinks at low voltage) Status: AT (green) Events: EG1, EG2 (red)	
	Operation keys	18 rubber keys	
	Loader connector port	1 (dedicated cable with stereo miniplugs)	
Modes	Program operation modes	READY: Ready to run program (control stop/program No. selectable) RUN: Program run HOLD: Program hold FAST: Program fast-forward END: Program end READY FAST: Ready to run and fast-forward program	
		AUTO: Automatic operation MANUAL: Manual operation (output can be controlled on console)	
	Constant-value operation modes	READY: Ready to run program (control stop) RUN: Program run	
		AUTO: Automatic operation MANUAL: Manual operation (output can be controlled on console)	
Controller	PID controls	Proportional band (P)	0.0 to 1000.0% (0.0: ON-OFF control)
		Reset time (I)	0 to 3600 seconds. 0 seconds: PD control
		Rate time (D)	0 to 1200 seconds. 0 seconds: PI control
		MV limit	Lower limit: -5.0 to upper limit % Upper limit: Lower limit to +105.0%
		Manual reset	0.0 to 100.0%

Controller	PID controls	Number of PID sets	16 sets for program operation (9 segment unique sets + 7 sets for automatic zone selection)
		PID set selection	Segment designation/automatic zone selection can be switched by program operation.
		MV change	0.1 to 110.0%/0.1 seconds
		Auto-tuning	Automatic setting of PID value by limit cycle system
		ON-OFF control differential	0 to 1000 U
	Direct/reverse action switching	Possible	
	Programmer function	Switching	MV output switchable to SP output
		Scaling	Possible
		Output resolution	1/10000
Outputs	Auxiliary output	Output types	PV, SP, deviation, MV, PV1, PV2
		Scaling	Possible
	Current output (5G) auxiliary outputs CH1, CH2	Output current: 4 to 20 mA DC Allowable load resistance: 600 Ω max. (under operating conditions) Output accuracy: ±0.1%FS max. (under standard conditions) Output resolution: 1/10000 Max. output current: 21.6 mA DC Min. output current: 2.4 mA DC Output updating cycle: 0.1 seconds Open terminal voltage: 25 V max.	
	Voltage output (6D)	Allowable load resistance: 600 Ω max. (under operating conditions) Load current adjustment: 2 to 22 mA variable Variable open terminal voltage: 25 V max. OFF leakage current: 100 μA max. Output response time: At ON-OFF 600 Ω load: 0.5 ms max. At OFF-ON 600 Ω load: 0.5 ms max. Output resolution: 1/1000 Time-proportional cycle: 1 to 240 seconds variable	
	Open-collector output (8D)	External supply voltage: 12 to 24V DC Max. load current: 100 mA/load OFF leakage current: 0.1 mA max. ON residual voltage: 2 V max. Output resolution: 1/1000 Time-proportional cycle: 1 to 240 seconds variable	
Event outputs	Open-collector output	External supply voltage: 12 to 24V DC Max. load current: 70 mA/load Max. common current: 500 mA OFF leakage current: 0.1 mA max. ON residual voltage: 2 V max.	
	Event types	PV type	PV, deviation, w/ deviation standby, absolute value deviation, w/ absolute value deviation standby, PV rate-of-change, SP, MV, G.Soak absolute value deviation, w/ G.Soak absolute value deviation standby, PV1 constant operation, PV2 constant operation, difference between PV1-PV2 at channel switching, difference between PV1-PV2
		Time type	Time events, RAMP-E time monitor, segment time, program time
		Code type	Code event, code event w/ timer, program No. binary code, segment No. binary code, program No. BCD code, segment No. BCD code
		Mode type	Unique segment, RUN+HOLD+END+FAST, HOLD, READY+READY FAST, END, G.Soak standby, MANUAL, AT executing, FAST+READY FAST, console operation in progress, RUN, advance, all alarms, PV range alarm, controller alarm, PV1 currently selected, PV2 currently selected, low battery voltage
	Event hysteresis	In case of PV type set, 0 to 1000 U	
	Event ON delay	0.0 to 3000.0 can be set to four events	
Communications	RS-485	Network	Multidrop This controller is provided with only slave instrument functionality except when connected to ST221 (dedicated display device). 1 to 16 units max. (DIM) 1 to 31 units max. (CMA, SCM)
		Data flow	Half duplex
		Synchronization	Start-stop synchronization
		Transmission system	Balanced (differential)
		Data line	Bit serial

Communications	RS-485	Signal line	5 transmit/receive lines (3-wire connection also possible)
		Transmission speed	1200, 2400, 4800, 9600 bps
		Transmission distance	500 m max. (total) (300 m max. for MA500 DIM connection)
		Other	Conforming to RS-485 interface specifications
		Char. bit count	11 bits/character
		Format	1 start bit, even parity, 1 stop bit; or 1 start bit, no parity, and 2 stop bits
		Data length	8 bits
		Isolation	All inputs and outputs are completely isolated except external switch inputs.
	RS-485 communications can be performed by connecting to a computer equipped with an RS-485 interface or to Azbil Corporation MX200, MA500 (DK link II DIM) or CMA50 controllers.		
	RS-232C	Network	1: 1 Connected, This controller is provided with only slave instrument functionality.
		Data flow	Half duplex
		Synchronization	Start-stop synchronization
		Transmission system	Unbalanced type
		Data line	Bit serial
		Signal line	3 transmit/receive lines
		Transmission speed	1200, 2400, 4800, 9600 bps
		Transmission distance	15 m max.
		Other	Conforming to RS-232C interface specifications
		Char. bit count	11 bits/character
		Format	1 start bit, even parity, 1 stop bit; or 1 start bit, no parity, and 2 stop bits
		Data length	8 bits
		Isolation	All inputs and outputs are completely isolated except external switch inputs.
General specifications	Memory backup	Memory: Battery backed up RAM Battery life: Controller power OFF: Approx. 5 years under standard conditions Controller power ON: Approx. 10 years under standard conditions	
	Rated power voltage	100 to 240V AC, 50/60 Hz	
	Power consumption	40 VA max.	
	Power ON rush current	50 A max.	
	Power ON operation	Reset time: 10 seconds max. (time until normal operation is possible under normal operating conditions)	
	Allowable transient power loss	20 ms max. (under operating conditions)	
	Insulation resistance	Min. 50 MΩ across power terminal ⓐ or ⓑ and FG terminal or ⓒ ⓓ by 500V DC megger)	
	Dielectric strength	1500V AC 50/60 Hz for 1 minute between power terminal and FG terminal Note) The primary side and secondary side capacities are joined inside the product. For this reason, when carrying out a withstand voltage test, disconnect the wiring of the grounded secondary side terminals (e.g. when grounding type thermocouple is used) from that terminal. If the test is carried out with the wiring as it is, this might result in malfunction.	
	Standard conditions	Ambient temperature	23±2°C
		Ambient humidity	60±5%RH
		Rated power voltage	105V AC±1%
		Power frequency	50±1 Hz, or 60±1 Hz
		Vibration resistance	0 m/s^2
		Shock resistance	0 m/s^2
		Mounting angle	Reference plane (vertical) ±3°
	Operating conditions	Ambient temperature range	0 to 50°C (ambient temperature at the bottom side of case when gang-mounted)
		Ambient humidity range	10 to 90%RH (condensation not allowed)
		Rated power voltage	100 to 240V AC
		Allowable power voltage	90 to 264V AC
		Power frequency	50±2 Hz, or 60±2 Hz
		Vibration resistance	0 to 1.96 m/s^2
		Shock resistance	0 to 9.80 m/s^2
		Mounting angle	Reference plane (vertical) ±10°

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General specifications	Transport/storage conditions	Ambient temperature range	-20 to +70°C
		Ambient humidity range	10 to 95%RH (condensation not allowed)
		Vibration resistance	0 to 4.90 m/s^2 (10 to 60 Hz for 2 hours each in X, Y and Z directions)
		Shock resistance	0 to 490 m/s^2 (3 times vertically)
		Package drop test	Drop height: 60 cm (1 angle, 3 edges and 6 planes; free fall)
	Terminal screw	M3.5 self-tapping screws	
	Terminal screw tightening torque	0.78 to 0.98 N·m	
	Mask/case materials	Mask: Multilon Case: Multilon	
	Mask/case color	Mask: Dark gray (Munsell 5Y3.5/1) Case: Light gray (Munsell 2.5Y7.5/1)	
	Installation	Specially designed mounting bracket	
	Weight	1.5 kg	

Standard accessories	**Item**	**Model No.**	**Q'ty**
	Unit indicating label	—	1
	Mounting bracket	**81446044-001**	1 set (2 p'ces)
	User's manual	**CP-UM-5005E**	1
	Terminal cover	**81446176-001**	1

Auxiliary parts (sold separately)	**Item**	**Model No.**	**Q'ty**
	Lithium battery set	**81446140-001**	Approx. 200 g

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Table 1 Input types and ranges (selectable in setup)

• Thermocouple

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.	°C	°F		
K (CA)	K46	16	-200.0 to +200.0	-300.0 to +400.0	±0.1%FS	
K (CA)	K09	0	0.0 to 1200.0	0 to 2400	±0.1%FS	
K (CA)	K08	1	0.0 to 800.0	0 to 1600	±0.1%FS	
K (CA)	K04	2	0.0 to 400.0	0 to 750	±0.1%FS	
E (CRC)	E08	3	0.0 to 800.0	0 to 1800	±0.1%FS	
J (IC)	J08	4	0.0 to 800.0	0.0 to 1600	±0.1%FS	
T (CC)	T44	5	-200.0 to +300.0	-300 to +700	±0.1%FS	±0.3%FS between -200°C to -45°C
B (PR30-6)	B18	6	0.0 to 1800.0	0 to 3300	±0.1%FS	±4.0%FS between 0 to 260°C, ±0.15%FS between 260 to 800°C
R (PR13)	R16	7	0.0 to 1600.0	0 to 3100	±0.1%FS	
S (PR10)	S16	8	0.0 to 1600.0	0 to 3100	±0.1%FS	
W (WRe5-26)	W23	9	0.0 to 2300.0	0 to 4200	±0.1%FS	
W (WRe5-26)	W14	10	0.0 to 1400.0	0 to 2552	±0.1%FS	
PR40-20	D19	11	0.0 to 1900.0	0 to 3400	±0.2%FS	±0.9%FS between 0 to 300°C, ±0.5%FS between 300 to 800°C
N	U13	12	0.0 to 1300.0	32 to 2372	±0.1%FS	
PLII	Y13	13	0.0 to 1300.0	32 to 2372	±0.1%FS	
Ni-Ni·Mo	Z13	14	0.0 to 1300.0	32 to 2372	±0.1%FS	
Golden iron chromel	Z06	15	0.0 to 300.0 K (K: Kelvin)		±0.4%FS	

• Resistance temperature detector (RTD)

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.	°C	°F		
JIS'89Pt100 (IEC Pt100 Ω)	F50	64	-200.0 to +500.0	-300.0 to +900.0	±0.1%FS	
	F46	65	-200.0 to +200.0	-300.0 to +400.0	±0.1%FS	
	F32	66	-100.0 to +150.0	-150.0 to +300.0	±0.1%FS	
	F36	67	-50.0 to +200.0	-50.0 to +400.0	±0.1%FS	
	F33	68	-40.0 to +60.0	-40.0 to +140.0	±0.15%FS	
	F01	69	0.0 to 100.0	0.0 to 200.0	±0.15%FS	
	F03	70	0.0 to 300.0	0.0 to 500.0	±0.1%FS	
	F05	71	0.0 to 500.0	0.0 to 900.0	±0.1%FS	
JIS'89JPt100	P50	96	-200.0 to +500.0	-300.0 to +900.0	±0.1%FS	
	P46	97	-200.0 to +200.0	-300.0 to +400.0	±0.1%FS	
	P32	98	-100.0 to +150.0	-150.0 to +300.0	±0.1%FS	
	P36	99	-50.0 to +200.0	-50.0 to +400.0	±0.1%FS	
	P33	100	-40.0 to +60.0	-40.0 to +140.0	±0.15%FS	
	P01	101	0.0 to 100.0	0.0 to 200.0	±0.15%FS	
	P03	102	0.0 to 300.0	0.0 to 500.0	±0.1%FS	
	P05	103	0.0 to 500.0	0.0 to 900.0	±0.1%FS	

Thermocouple : K, E, J, T, B, R, S (JIS C 1602-1981)
WRe5-26 (Hoskins Data)
PR40-20 (Johnson Matthey Data)
N (N.B.S. Monograph 161)
PLII (Engelhard Industries Data (IPTS68))
Ni-NiMo (General Electric Data)
Gold iron chromel (Hayashidenko Data)
Resistance temperature detector (RTD):
Pt100, JPt100 (JIS C 1604-1989)

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• DC current, DC voltage

Input type			Input range (FS)		Accuracy (under standard conditions)	
Symbol	Code	Range No.				
mA (linear)	C01	48	4 to 20 mA	Programmable range -19999 to +20000 (decimal point position can be changed)	±0.1%FS	
	Z51	52	2.4 to 20 mA		±0.1%FS	
mV	M01	49	0 to 10 mV		±0.1%FS	
	L02	50	-10 to +10 mV		±0.1%FS	
		51	0 to 100 mV		±0.15%FS	
mA (linear)	C01	128	4 to 20 mA	Programmable range -19999 to +20000 (decimal point position can be changed)	±0.15%FS	
	Z51	134	2.4 to 20 mA		±0.1%FS	
V (linear)		129	0 to 1 V		±0.1%FS	
		130	-1 to +1 V		±0.1%FS	
	V01	131	1 to 5 V		±0.1%FS	
		132	0 to 5 V		±0.1%FS	
		133	0 to 10 V		±0.1%FS	

Handling Precautions

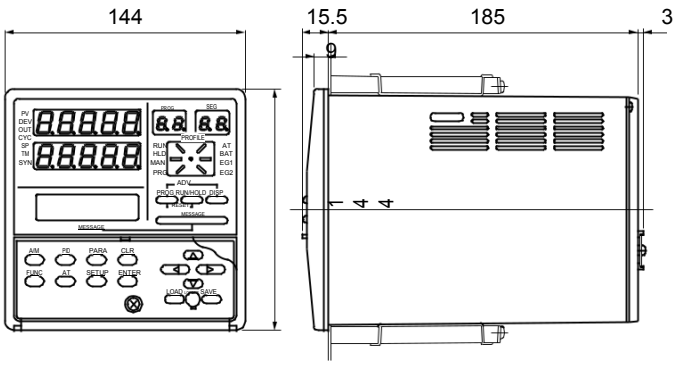
- The unit of code Z06 is Kelvin (K).
- The PV lower limit alarm does not occur with codes F50 and P50.
- The number of digits past the decimal point for DC current and DC voltage is programmable within the range 0 to 4.

Model selection guide

I II III IV V VI **Example: DCP551B10100**

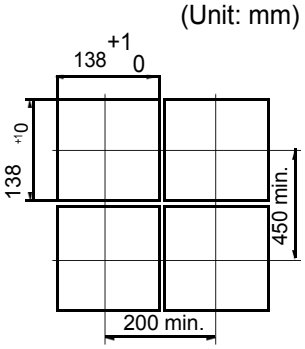
I	II	III	IV	V	VI	Specifications
Basic model No.	—	Number of PV inputs	Appended No.	Option	Additions	
DCP551						Digital Programmable Controller (single-loop model)
	B					Mark II
		1				PV input CH1
		2				PV input CH2
			0			0 (fixed)
				0		None
				1		Auxiliary output CH1
				2		Auxiliary output CH2, communications
					00	None
					D0	Inspection certificate
					Y0	Complying with the traceability certification

External dimensions



Panel cutout

(Unit: mm)



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Wiring

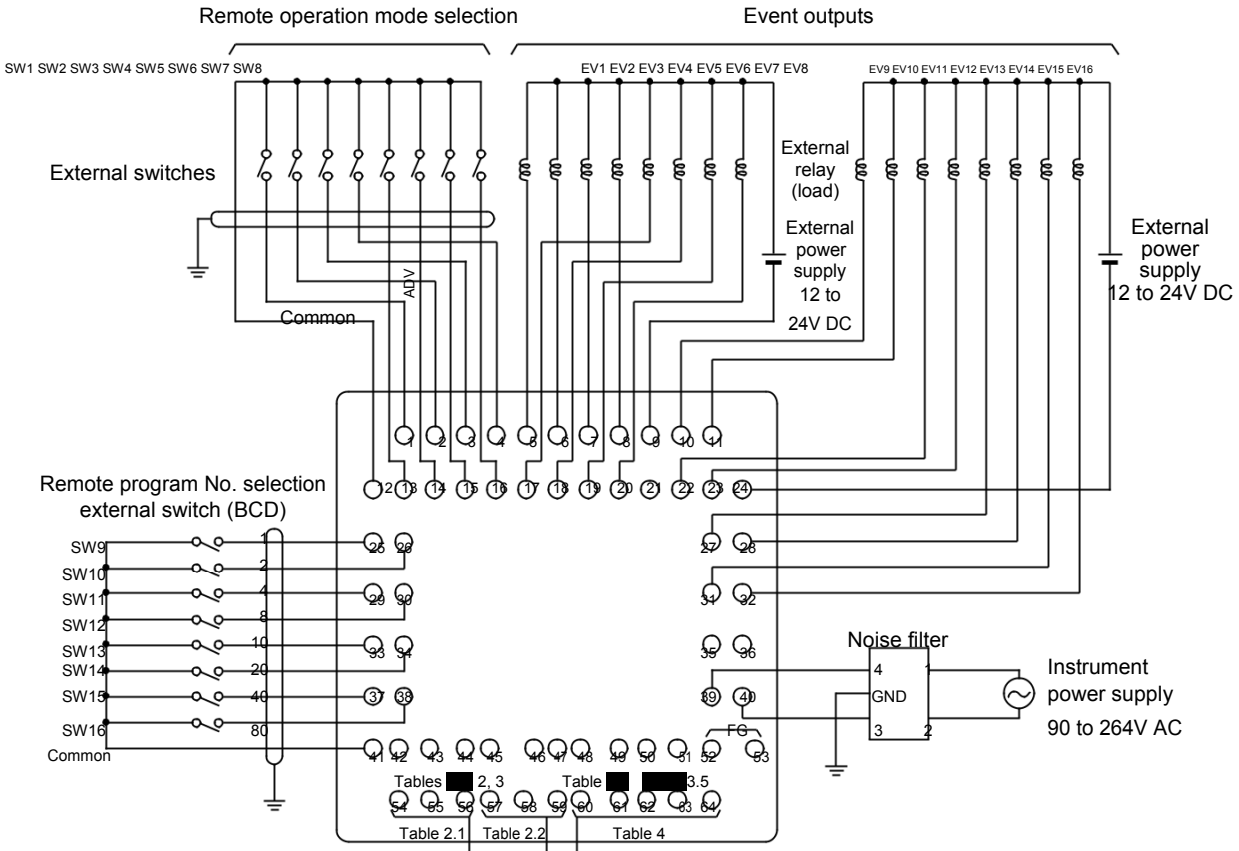

Table 2 PV input

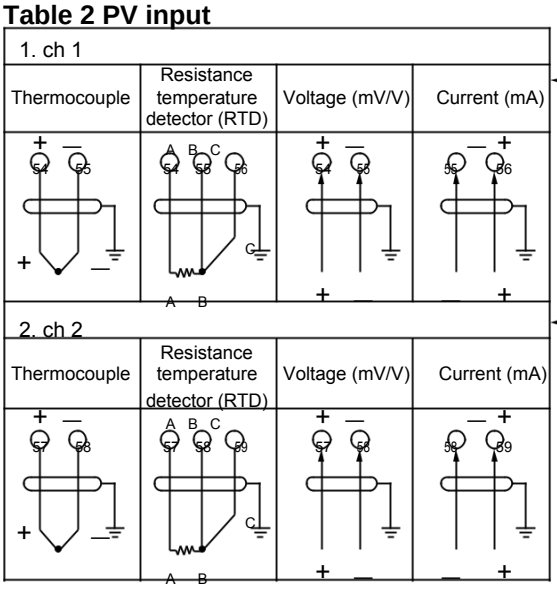

Table 3 Control, setup and auxiliary output

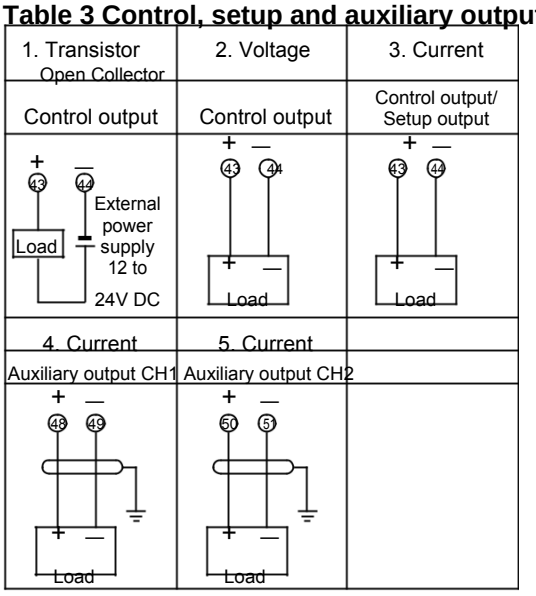

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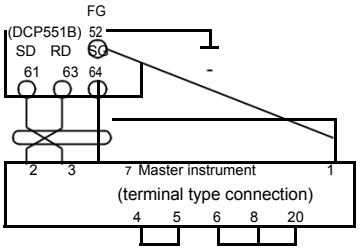
Table 4 Communications I/O

RS-232C

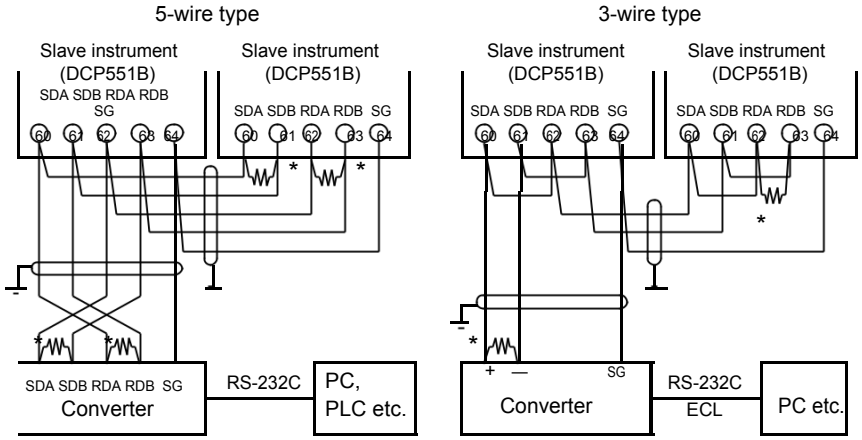


Note (1) In the case of a modem type connected master instrument, connect terminals 2 and 61, and 3 and 63 in reverse to the above figure.

(2) The RS-232C terminals 4-5 and 6-8-20 on the computer must be short-circuited as shown in the above figure.

(3) In the case of a computer whose RS-232C terminals 1 and 7 are for the same signal, do not connect the leads as shown in the above figure. Also, do not connect the sleeve marked "FG" to any terminal at all.

RS-485



* Attach a terminator (1/2 W or more, 150 Ω) to both ends of the communications path.

■Wiring precautions

1. Isolating inputs and outputs inside the controller

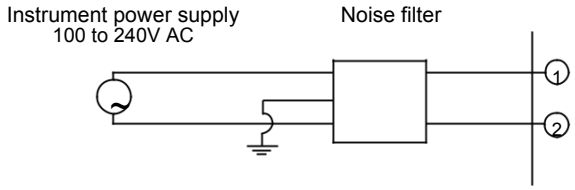
Solid lines ——— show isolated items.
Dotted lines ——— show non-isolated items.

PV input CH1	Digital circuit	Control output
PV input CH2		Auxiliary output CH1
Loader communications		Auxiliary output CH2
External switch input		Event output
Communications		

2. Noise countermeasures for instrument power supplies

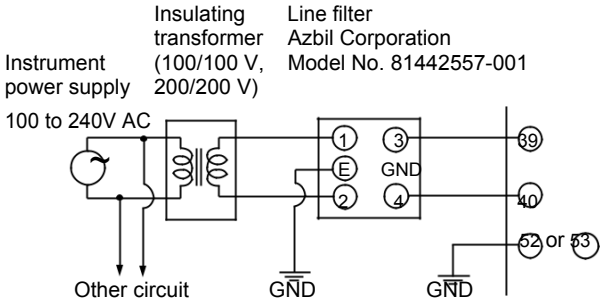
(1) Reducing noise

Connect the DCP551B to a single-phase power supply for instruments, and take measures to prevent the influence of electrical noise.



(2) When there is a lot of noise

If there is a lot of electrical noise, we recommend inserting an insulating transformer in the power circuit and using a line filter.



3. Noise generating sources and countermeasures

Generally, the following generate electrical noise: Relays and contacts, electromagnetic coils, solenoid valves, power lines (in particular, 90V AC min.), induction loads, inverters, motor commutators, phase angle control SCR, radio communications equipment, welding equipment, high-voltage ignition equipment

(1) Fast-rising noise

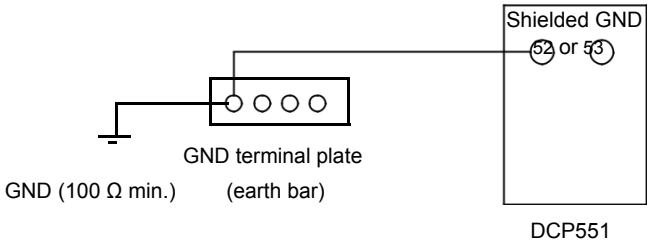
CR filters are effective in countering fast-rising noise.
Recommended CR filter:
Azbil Corporation Model No. 81446365-001

(2) Noise with a high wave height

Varisters are effective in countering noise with a high wave height. However, note that the varister may become short- circuited when trouble occurs. Pay attention to this when providing a varister on a controller.
Recommended varister:
Azbil Corporation Model No.
81446366-001 (for 100V AC)
81446367-001 (for 200V AC)

4. Ground

Use only the FG terminal or on the DCP551B for grounding. Do not ground [redacted] other terminals. When it is difficult to ground shielded cable, prepare a separate GND terminal plate (earth bar).
Ground type: 100 Ω max.
Ground cable: 2 mm 2 min. annealed-copper wire (AWG14)
Cable length: Max. 20 m



5. Precautions during wiring

(1) After providing anti -noise measures, do not bundle primary and secondary power leads together, or pass them through the same piping or wiring duct.
(2) Maintain a distance of at least 50 cm between I/O signal leads or communications leads and the power lead. Also, do not pass these leads through the same piping or wiring duct.

6. Inspection after wiring

After wiring is completed, be sure to inspect and check the wiring state. Wrong wiring may cause controller malfunction or accidents.