Fuji Electric

*Innovating Energy Technology*

## Power Supply and Voltage Control

AC Power Regulators

# APR-D Series (Single-phase)

Single AC power regulators

# APR-D series

20A
standard

45A / 60A
control input connector supplied

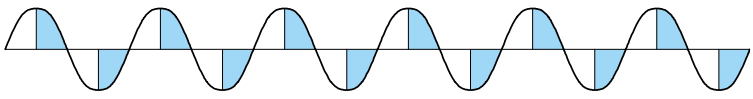
100A
communication board supplied

RPDE

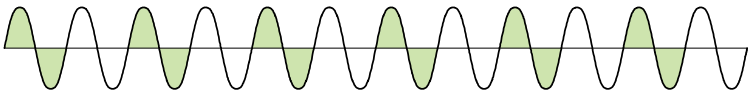
- *Also applicable to control of inductive load and primary control of transformers and rectifiers, through continuous comb tooth pulse control. Optimum for light modulation of LED illumination (for phase control).*
  *Note: When the rated voltage is applied, the load shall flow the minimum load current or more.*

- *Being able to switch the waveform control method among phase control, cycle control, and phase angle proportion control.*

**Phase control (0 to 100%)**
Output voltage 71%V, α = 90°



**Cycle control (Intermittent control)**
Output voltage 71%V, (1/2)



- *Space saving is possible due to a class-minimal dense array*
  *(minimum interval in width: 2 mm)*

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# AC Power Regulators
# APR-D Series (Single-phase)

## Single AC power regulators APR-D series

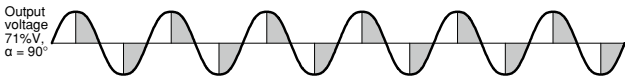
### ■ Description

The single-phase APR-D series of products are successors of αB and αC.
Whereas their functions and performance have been largely improved due to incorporation of a CPU, space saving, less wiring, and inexpensive cost have been achieved.

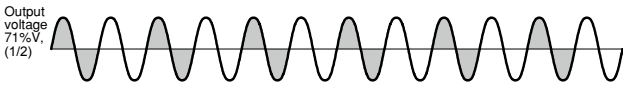
### ■ Features

- Also applicable to control of inductive load and primary control of transformers and rectifiers, through continuous comb tooth pulse control.
  Optimum for light modulation of LED illumination (for phase control).
  Note: When the rated voltage is applied, the load shall flow the minimum load current or more.
- Being able to switch the waveform control method among phase control, cycle control, and phase angle proportion control.

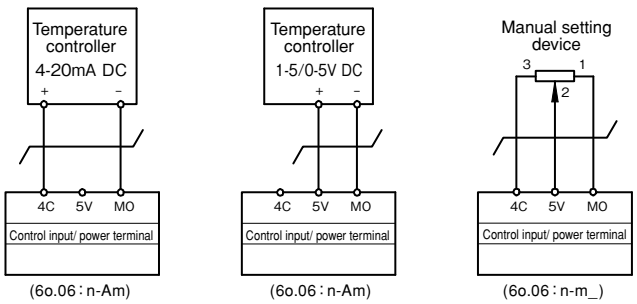
Phase control (0 to 100%)

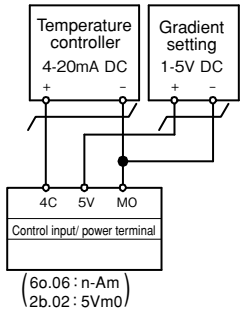



Cycle control (Intermittent control)

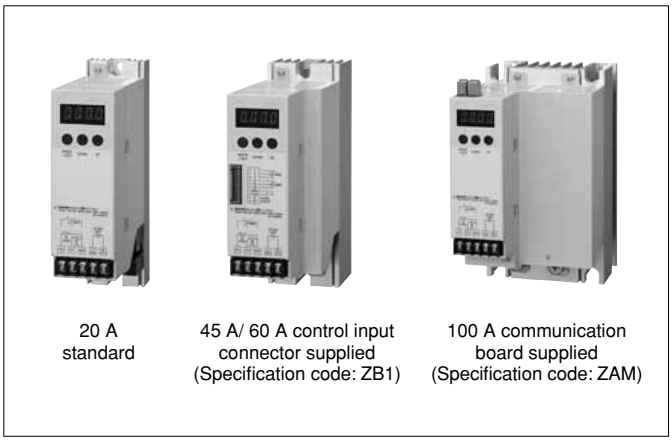



- The standard configuration does not include a control input connector. (Less wiring, low cost)
  For auto setting or manual setting only, it is possible to adjust the device by changing the function of the control input terminal block.




Note: The factory defaults are n-Am for 6o.06 and Aod for 2b.02.
The parentheses show function codes and terminal functions.

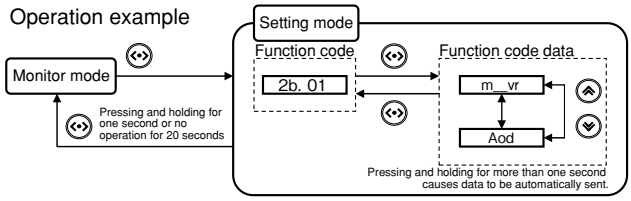


20 A standard

45 A/ 60 A control input connector supplied (Specification code: ZB1)

100 A communication board supplied (Specification code: ZAM)

- Space saving is possible due to a class-minimal dense array (minimum interval in width: 2 mm)
- Base load setting, digital settings including gradient setting, and monitor functions are available as part of the standard configuration.




- Allows soft start time, soft up time, and soft down time to be discretely set in the range of 0 seconds to100.0 seconds.
- Performs auto identification of 100 to 240 V AC and 50/60 Hz with respect to control power
- As a control method, current limit control and automatic current feedback control are available.
  You can also detect heater disconnection (cycle control: load opening).
  Note: It is possible to detect disconnection of one to three lines in an alloy heater where there are small changes in resistance depending on the temperature.
- Allows communication control as an optional function.
  Option type of the main unit:
  ZAP: Up to 50 units can be operated in parallel.
  For cycle control, a flicker prevention function is available.
  ZAM: Various settings and monitors are possible by means of RS485 (Modbus RTU).
- All models satisfy CE marking.

CE

## ■ Type number nomenclature

**RPD E 2 0 6 0 — T 1 — Z B 1** (Note 1)

Product category

| Product | Code |
|---|---|
| APR-D series | RPD |

Number of phases

| Number of phases | Code |
|---|---|
| Single phase | E |

Input voltage

| Input voltage | Code |
|---|---|
| 100-240V | 2 |

Rated current

| Rated current | Code |
|---|---|
| 20A | 020 |
| 45A | 045 |
| 60A | 060 |
| 100A | 100 |

Specifications

| Specifications | Code |
|---|---|
| Standard | Blank |
| Option of the main unit | Z** (Note 3) |

Setting device (Note 2)

| Setting device | Code |
|---|---|
| Non | Blank |
| Setting device: 1 set | 1 |
| Setting device: 2 sets | 2 |
| Setting device: 3 sets | 3 |

Control method

| Control method | Code |
|---|---|
| No feedback function | T |
| AC CLR | A |
| AC ACR plus AC CLR | B |

CLR: Current limit regulator
ACR: Automotic current regurator

Note 1: For the order codes which are blank, put no space, immediately followed by a hyphen.
Note 2: One set of setting devices is composed of a variable resistor, nameplate, control knob, and attachment sheet. The format of a separate order is "RPD001". This is not shown as the type of the main unit.
Note 3: For options of the main unit, it is possible to specify multiple specification items like RPDE2020-T1-ZAMB1.

| Option specification names | Description | Type |
|---|---|---|
| Communication board (For parallel run) | Mounting a communication board for parallel run, equipped with a flicker prevention function (Note 4) | RPDE2□□□-□■-ZAP |
| Communication board (For network connections) | Mounting a communication board for Modbus RTU | RPDE2□□□-□■-ZAM |
| Control input connector | A connector is supplied to support functions including manual, gradient setting input (external attachment) and alarm output. (Note 5) | RPDE2□□□-□■-ZB1 |
| Main-circuit power On soft start | Soft start through main-circuit power On is possible. (Pure metal load can be handled.) (Note 6) | RPDE2□□□-□■-Z45 |

Note 4: The parallel run function provided by this communication board is not compatible with models other than the APR-D series.
Note 5: A connector set (socket: built-in/ plug: supplied) for a European terminal block is supplied to support manual, gradient setting input (external variable resistor), auto/manual switching input, and alarm input. If the plug is not needed, specify ZB0.
Note 6: When the APR is to be connected with the secondary side of a transformer, this option type is not applicable.
Note 7: Note that options of the main unit are attached before shipment.

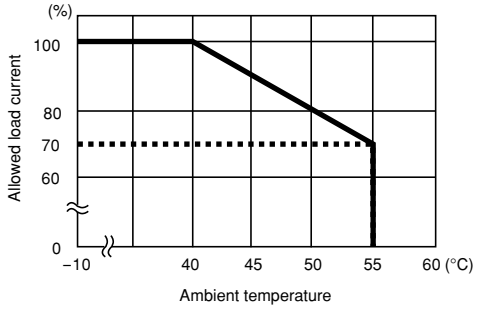
## ■ Types and ratings

| Number of phases | Input voltage | Output current (A) | Type |
|---|---|---|---|
| Single phase | Common for 100 to 240 V | 20 | **RPDE2020-T** |
| | | | **RPDE2020-A** |
| | | 45 | **RPDE2045-T** |
| | | | **RPDE2045-A** |
| | | 60 | **RPDE2060-T** |
| | | | **RPDE2060-A** |
| | | 100 | **RPDE2100-T** |
| | | | **RPDE2100-A** |

Note: The price does not include a setting device and the main unit's options.
The price of control method B type is the same as of control method A type.

## ■ Important notes in selecting product

- **Allowed load current/ ambient temperature characteristics**
  The standard rated current value is the one at an ambient temperature of 40°C. When it exceeds 40°C, reduce the load current as below:



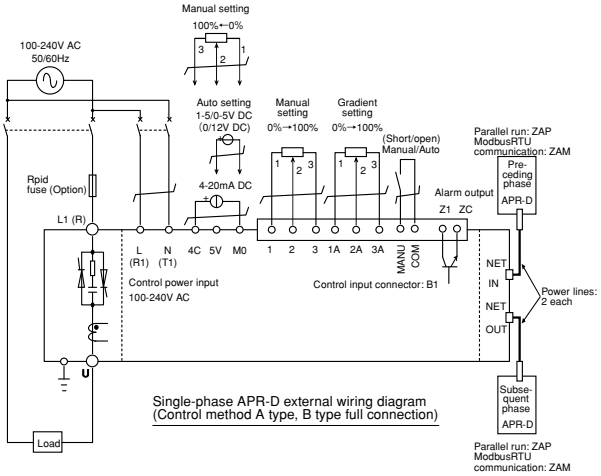

- **Options of the main unit**
  After delivery, addition and alternation are not allowed for the type (product code). Please remember this when making an order.
- **Rapid fuse**
  The main circuit does not contain a fuse. Use a rapid fuse depending on the capacity.
- **Selection of rated current**
  Considering that a large inrush current flows in an incandescent lamp or pure metal heater (a current that is several to ten times larger than a steady-state current for approx. 1/20 seconds to several seconds), choose the rated current very carefully.
- **Primary control of a transformer (primary control of a rectifier)**
  (1) If the transformer may be subject to no load, resistor attachment is needed to cause 0.5 A to flow in the primary wiring in parallel.
  (2) So that bias magnetism is well prevented, extra magnetic flux density shall be considered. (1.0 to 1.2 T)
  (3) Even if the line voltage becomes below -15%, output of APR-D is kept. Recovery of the line voltage may result in overcurrent caused by bias magnetism phenomenon.
- **Important notes for power cycle life expectancy**
  If run and stop are repeated at short-period cycles (for example, 30-minute run and 30-minute stop), a large difference in temperature occurs in the thyristor element, significantly shorting its life expectancy through thermal fatigue. If such operations need to be performed, try to minimize the temperature fluctuation. Specifically, reduce the use rate of rated current to less than 80%. Or, choose an APR whose rated current is one level higher, so that the use rate of rated current is less than 80%.

## ■ Specifications

| Item | | | Specifications | | | |
|---|---|---|---|---|---|---|
| Type | | | **RPDE2020-□** | **RPDE2045-□** | **RPDE2060-□** | **RPDE2100-□** |
| Input | Main circuit/ control circuit | Rated input voltage and frequency | Single phase 100/240 V AC<br>50 Hz/ 60 Hz (Auto identification) | | | |
| | | Input voltage range | Rated input voltage ±10% (Performance guarantee) (Note 1)<br>Rated input voltage ±15% (Operation guarantee) | | | |
| | | Input frequency range | 50Hz/60Hz±2.5Hz | | | |
| | Control circuit | Input capacity | 15 VA or less | | | |
| Output | Rated current (Ambient temperature: 40°C) [A] | | 20 | 45 | 60 | 100 |
| | Cooling system | | Self-cooled | | | |
| | Applied load | | Resistive load, inductive load, primary control of a transformer, primary control of a rectifier (For cycle control, resistive load (alloy) only) | | | |
| | Minimum load current | | 0.5 A (With 100% output of the rated input voltage) | | | |
| | Generation loss (with rated current) [W] | | 30 | 55 | 70 | 110 |
| Control | Waveform control method | | Single-phase thyristor normal/reverse parallel connection<br>Phase control/ cycle control (intermittent)/ phase angle proportion control | | | |
| | Output voltage adjustment range | | 0 to 100% (RMS value) of the main-circuit line voltage (thyristor voltage drop portion excluded) | | | |
| | Input/output characteristics | | Linear characteristic of RMS value/ linearity: ±3%FS or less (phase control)<br>Linearity: ±5%FS or less (cycle control) (With resistive load/ setting signal 10% to 90%) | | | |
| | Setting signal | Auto setting | Current signal: 4 to 20 mA DC (Zin = 100 Ω)<br>Voltage signal: 0 to 5 V DC, 1 to 5 V DC (Zin = 11 kΩ)<br>SSC signal: 0 V/ 12 V DC (Zin = 11 kΩ) | | | |
| | | Manual setting | External variable resistor: 1 kΩ (B characteristics 1/2 W or more) | | | |
| | | Digital setting | Front key input (Possible direct drive) | | | |
| | | High/low setting (2-position control) | Possible combinations by means of digital setting and an external variable resistor<br>External contact switching by means of digital setting or control input connector (option of the main unit), with respect to contact switching signals | | | |
| | Gradient setting | Setting range | 0 to 100% of output voltage | | | |
| | | Setting equipment | Voltage signal setting through digital setting (1 to 5 V DC only), external variable resistor (1 kΩ), or control circuit terminal (5 V, M0)<br>Possible countergradient characteristics through combinations with base load setting | | | |
| | Base load setting | Setting range | 0 to 100% of output voltage | | | |
| | | Setting equipment | Digital setting | | | |
| | Soft start time<br>Soft up time<br>Soft down time | Setting range | Control method T type, A type: 0 to 100 seconds<br>Control method B type: 0.5 to 100 seconds (Note 2) | | | |
| | | Setting equipment | Digital setting Discrete setting is possible for each time. | | | |
| | Feedback control method (Phase control only) | | AC CLR (Control method A type)<br>AC ACR plus AC CLR (Control method B type) (Prioritized run of AC CLR) | | | |
| | Manual/auto Switching signal | | Non-voltage contact | | | |
| Communi-cation (Note 4) | Parallel run Master/slave | | Maximum number of connectable units: 50 Main unit's option type "ZAP" (Not compatible with the APR-N series) | | | |
| | Network communication | | RS-485 conformed Two-wire system Half duplex start-stop synchronization Protocol: Modbus RTU conformed<br>Maximum number of connectable units: 31 Main unit's option type "ZAM" | | | |
| Fault detection/ protection | CPU memory error | | CPU memory error detection at the time of initiation | | | |
| | Power failure | | Detection of control power frequency outside the range from 45 to 65 Hz | | | |
| | Auto setting input, not connected | | Detection of non-connection of current signal (4 to 20 mA DC) and voltage signal (1 to 5 V DC) (Only with auto setting) | | | |
| | Manual setting input, not connected | | Detection of non-connection of a manual setting device (external variable resistor) (Only with manual setting) | | | |
| | Gradient setting input, not connected | | Detection of non-connection of an gradient setting device (external variable resistor or 1 to 5 V DC) | | | |
| | Reverse phase detection | | Detection when the main-circuit power phase and control power phase are reverse (Main unit's option type "Z45" only) | | | |
| | Data writing/reading error | | Detection of read/write errors from/to EEPROM | | | |
| | Thyristor failure | | Detection of thyristor shorting through built-in CT (Control method A type, B type) | | | |
| | Communication failure | | Detection of data transmission failure (main unit's option type "ZAP" or "ZAM") at the time of parallel run or network communications | | | |
| | Current limit detection | | Detection of load current exceeding the CLR setting value; decrease of the current to the CLR setting value (or lower) through phase angle change (Control method A type, B type) | | | |
| | Heater disconnection | | Detection of APR output current values lower than the disconnection judgment value (Control method A type, B type) (Note 3) | | | |
| | Alarm output | | Open collector 24 V DC/ 0.1 A 1 circuit | | | |
| Opera-tional environ-ment | Ambient temperature | | -10 to +55°C (If the temperature is over +40°C but within +55°C, the load current is to be reduced to the rated current value.) | | | |
| | Storage temperature | | -20 to +60°C | | | |
| | Ambient humidity | | +5 to +95%Rh (There must be no condensation.) | | | |
| | Others | | There must be no factor, action, and vibration which induce corrosive gas, fine particles, and insulation deterioration. Indoor, 1000 m or less altitude | | | |
| Insula-tion | Dielectric strength (Between the main circuit and the earth) | | 2000 V AC, 1 minute | | | |
| | Insulation resistance (with the earth) | | 10 MΩ or more with 500 V DC megger | | | |

Note 1: Performance guarantee designates satisfying specifications and assuring proper run of the product. Operation guarantee designates assurance of damage-free parts and proper run of the product.
Note 2: Soft start and soft up/down time regarding control method B type are invalid even if set to a time which is shorter than the response speed in terms of PI control. This is because PI control is prioritized over soft start and soft up/down time.
Note 3: For cycle control, load open detection is performed.
Note 4: Only any one type of communication board can be mounted before shipment.

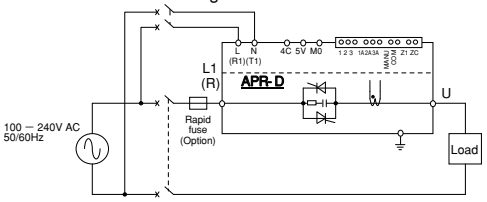
## ■ Wiring diagram



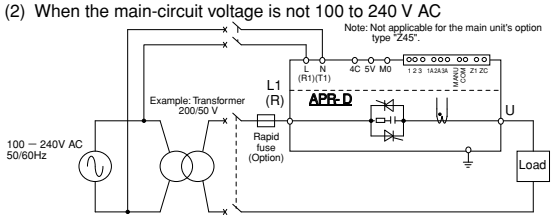

Single-phase APR-D external wiring diagram
(Control method A type, B type full connection)

## • Wiring of the main-circuit terminals and control power terminals

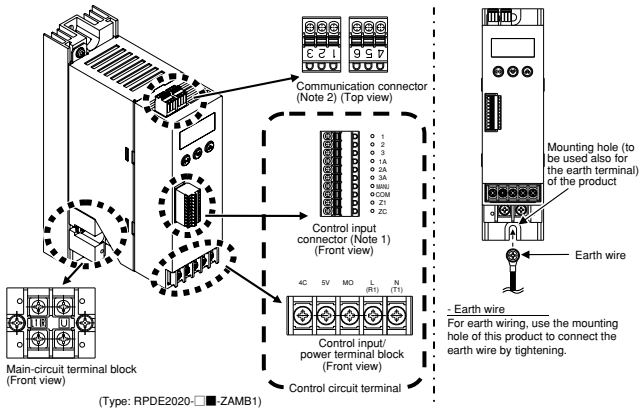
(1) When the main-circuit voltage is 100 to 240 V AC




(2) When the main-circuit voltage is not 100 to 240 V AC




## • Positions and functions of connection terminals




## • Screw size and tightening torque

| Terminal | | Screw size | Tightening torque [N·m]±10% |
|---|---|---|---|
| Main-circuit terminal block | L1 (R) , U | 20A M4 | 1.8 (18kgf·cm) |
| | | 45A M5 | 2.7 (27kgf·cm) |
| | | 60A M5 | |
| | | 100A M8 | 12.0 (120kgf·cm) |
| Control input / power terminal block | L (R1) , N (T1) , 4C, 5V, M0 | M3 | 0.5 (5kgf·cm) |
| Control input connector | 1 to ZC | – | – |
| Communication connector | NET IN, NET OUT | | |
| Main-unit mounting screw (To be used also for the earth terminal) | | 20-60A M5 | 3.5 (35kgf·cm) |
| | | 100A M6 | 5.8 (58kgf·cm) |

Note 1: To be supplied when the main unit's option "ZB1" is specified.
Note 2: To be supplied when the main unit's option "ZAM" is specified.

## • Terminal function

| Terminal type | | Pin | Symbol | Name | Function description |
|---|---|---|---|---|---|
| Terminal position | | | | | |
| Main-circuit terminal block | | – | L1 (R) | Main-circuit terminal | L1 (R): Main-circuit power input<br>U: APR output (Connection to load) |
| | | – | U | | |
| | | – | – | Earth terminal | Main unit's earth terminal (Shared mounting hole) |
| Control circuit terminal | Control input/ power terminal block | – | 4C (3) | Auto setting input (Function code 6o.06 = n-Am (factory default)) | 4C - M0: 4 to 20 mA DC input (Zin = 100 Ω)<br>5 V - M0: 1 to 5 V DC<br>0 to 5 V (SSC signal: 0/12 V) (Zin = 11 kΩ)<br>It is possible to allocate 5V - M0 to1 to 5 V DC gradient setting input. |
| | | – | 5V (2) | | |
| | | – | M0 (1) | Manual setting input (Function code 6o.06 = n-m_) | Connecting a variable resistor makes it possible to use as manual setting input.<br>* When using this terminal as manual setting input, detection of manual setting non-connection is not performed. |
| | | – | L (R1) | Control power terminal | Control power input. Input the same phase as that of the main circuit. |
| | | – | N (T1) | | |
| | Control input connector (option) | 1 | 1 | Manual setting input | Connecting a variable resistor makes it possible to use as manual setting input. |
| | | 2 | 2 | | |
| | | 3 | 3 | | |
| | | 4 | 1A | Gradient setting input | Connecting a variable resistor makes it possible to use as gradient setting input. |
| | | 5 | 2A | | |
| | | 6 | 3A | | |
| | | 7 | MANU | Auto/manual switching input | External contact Open: Auto setting<br>Close: Manual setting |
| | | 8 | COM | | |
| | | 9 | Z1 | Alarm output terminal | When an alarm is generated, the internal open collector is On. Operation selection is possible by changing the function code setting. |
| | | 10 | ZC | | |
| Communi-cation connector (Option) | Network | 1, 2 | NET IN | RS-485 input/output | When in network communications (option type: ZAM), various kinds of data are sent to and received from a host using the ModbusRTU protocol. |
| | | 4, 5 | NET OUT | | |
| | Parallel run | 1, 2 | NET IN | Parallel run input | When in parallel run (option type: ZAP), parallel run signals are received from the preceding APR. |
| | | 4, 5 | NET OUT | Parallel run output | When in parallel run (option type: ZAP), parallel run signals are sent to the subsequent-phase APR. |

## ■ Other options

• Replacement adapter for APR-αB and αC (RPD002-E □□ )

| Type | Description |
|---|---|
| RPD002-E02 | For RPDE2020-□ |
| RPD002-E06 | For RPDE2045-□, RPDE2060-□ |
| RPD002-E10 | For RPDE2100-□ |

Note: Attach the adapter to the mounting holes (for APR-αB and αC) on the board, and then attach the APR-D to the adapter. For RPCE2020-□, RPD002-E06 shall be applied.

• Control input connector (Plug side), DIN rail-mounting adapter

| Type | Description |
|---|---|
| RPD003 | Control input connector (plug for ZB0) |
| RPD004-E02 | DIN rail-mounting adapter for RPDE2020-□ |

• Rapid fuse

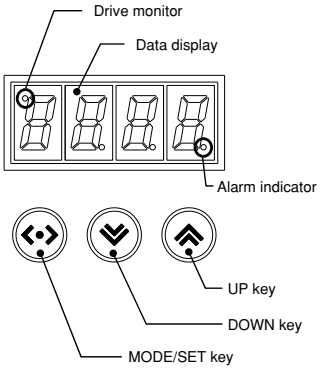
| Rated current (APR type) | Rapid fuse (Rated current) | Rapid fuse holder | Base and cap |
|---|---|---|---|
| 20A (RPDE2020) | CR2LS-30 (30 A) or BLC045-1 (45A) | CM-1A<br>CM-1A (For CR2LS; tripolar product) | AFa60+Pa60 (for BLC) |
| 45A (RPDE2045) | CR2LS-75 (75A) or BLC075-1 (75A) | | AFa100+Pa100 (for BLC) |
| 60A (RPDE2060) | CR2LS-100 (100A) or BLC090-1 (90A) | | |
| 100A (RPDE2100) | CR2L-150 (150A) | CM-2A (Tripolar product) | – |

## ■ The standard configuration of the APR-D series contains display/operation sections for various monitors and settings.

### • Names and functions of the individual parts

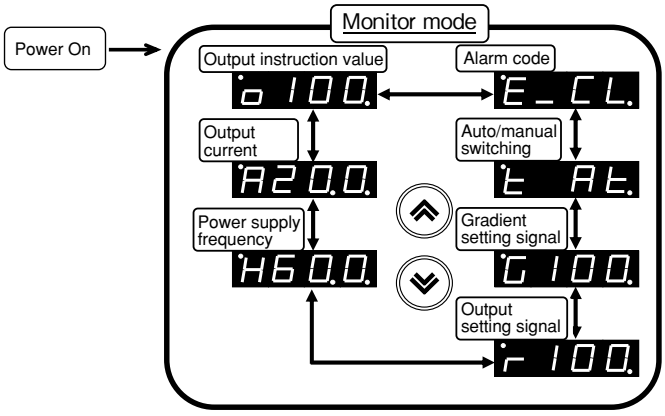
| Name | Function |
|---|---|
| Drive monitor | Data display section 4th digit DP<br>Run output Presence (lighting up)/ absence (going off) |
| Data display | 4-digit 7-segment LED monitor<br>The information below is shown depending on operation modes.<br>• When in monitor mode<br>Run information (Output instruction value, output current, input current, etc.)<br>When an alarm is generated, an alarm code is shown. The 4th digit shows items regarding various pieces of run information.<br>• When in setting mode<br>Information such as a function code and function code data is shown. |
| Alarm indicator | Data display section 1st digit DP<br>Alarm Presence (blinking)/ absence (going off) |

| Name | Function |
|---|---|
| UP key<br>DOWN key | Use, for example, to select run information shown on the data display section and to change the function code data.<br>* Press and hold for one second or longer to perform auto switch of the data display. |
| MODE/ SET key | Use to switch the operation mode.<br>• When in monitor mode<br>Press and release to switch to the setting mode.<br>• When selecting a function code in the setting mode<br>Press and release to switch to function code data display.<br>Press and hold for 1 second or longer to switch to the monitor mode.<br>• When setting function code data in the setting mode<br>Press and release to confirm data.<br>Press and hold for 1 second or longer to cancel the setting and return to the monitor mode. |




### • Monitor mode

Operating the UP and DOWN keys causes the monitor items below to be shown.
(The alarm code is shown only when a failure occurs.)




| | Monitor item | Function item display | Display | Unit | Display description | Monitor accuracy (Note) | |
|---|---|---|---|---|---|---|---|
| | | | | | | T | A/B |
| 1 | Output instruction value | o | 100 | % | Output instruction through APR internal calculation | ○ | |
| 2 | Output current | A | 20 | A | AC output current detection value | — | ○ |
| 3 | Power supply frequency | H | 60.0 | Hz | Power supply frequency detection value | ○ | |
| 4 | Output setting signal | r | 100 | % | Setting signal detection value | ○ | |
| 5 | Gradient setting signal | G | 100 | % | Gradient setting signal detection value | ○ | |
| 6 | Auto/manual switching | t | At/ mn | – | Auto/manual switching terminal status indication | — | |
| 7 | Alarm code | E | _SM | – | Indication at the time of alarm generation | — | |

Note: Monitor accuracy: ○=5%

### • Setting mode

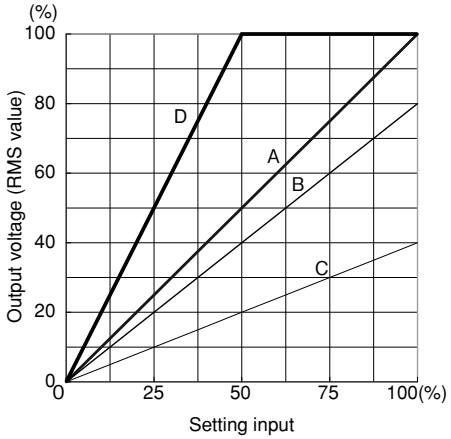
It is possible to set and confirm the data below, for each item:

| Category | Display | Setting item | Description of the main functions |
|---|---|---|---|
| Data setting | 1b._ _ | Basic function 1<br>b code (1b.01 to 1b.06) | Setting to be used for basic APR operations<br>Mainly substitute of external volume |
| | 2b._ _ | Basic function 2<br>b code (2b.01 to 2b.07) | Setting to be used for basic APR operations<br>Mainly function selection |
| | 3F._ _ | Feedback function<br>F code (3F.01 to 3F.08) | Setting relating to feedback<br>CLR setting, heater disconnection function |
| | 4n._ _ | Network function<br>n code (4n.01 to 4n.08) | Communication relating setting |
| | 5A._ _ | Alarm function<br>A code (5A.01 to 5A.09) | Alarm output (control input connector) setting |
| Setting option | 6o._ _ | Setting option function<br>o code (6o.01 to 6o.07) | Utility function setting<br>(For example, display of function codes changed from factory defaults and restriction of operations of the setting display section) |
| Initial setting | 0i._ _ | Initial setting function<br>i code (0i.01 to 0i.05) | Type setting, ROM version confirmation |

**• Example of setting groups**

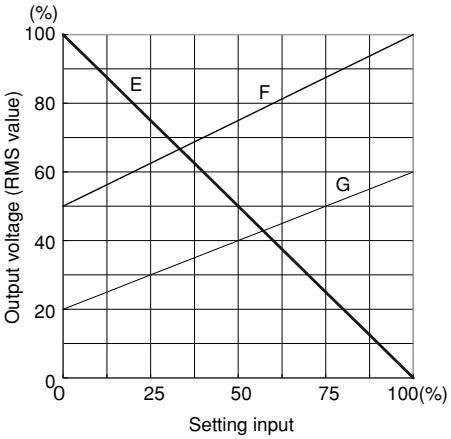
| Function code | Name | Function code data (Settable range) | Step size | Unit | Factory default |
|---|---|---|---|---|---|
| 1b.01 | Manual digital setting | 0 to 100.0(%) | 0.1 | % | 0 |
| 1b.02 | Gradient digital setting | 0 to 200.0(%) | 0.1 | % | 100.0 |
| 1b.03 | Base load setting | 0 to 100.0(%) | 0.1 | % | 0 |
| 1b.04 | Soft start time setting | T type, A type: 0 to 100.0 (seconds) B type: 0.5 to 100.0 (seconds) | 0.1 | seconds | 0.5 |
| 1b.05 | Soft up time setting | | 0.1 | seconds | 0.5 |
| 1b.06 | Soft down time setting | | 0.1 | seconds | 0.5 |

**• Gradient setting/ base load setting**




| Characteristics | Output adjustment range (%) | Base load setting (%) | Gradient setting (%) |
|---|---|---|---|
| A | 0 to 100 | 0 | 100 |
| B | 0 to 80 | 0 | 80 |
| C | 0 to 40 | 0 | 40 |
| D | 0 to 100 | 0 | 200 |

Gradient setting: Set an output value to be presented when setting input is 100%. (Setting range: 0 to 200%)
Note: The upper limit output value is 100% of input voltage.



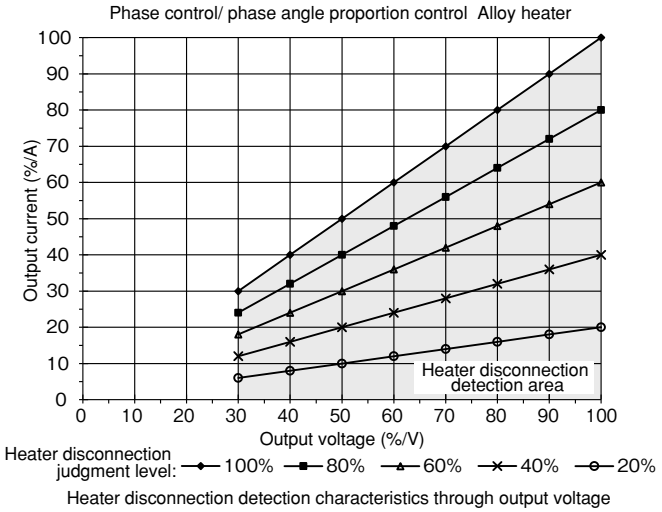

| Characteristics | Output adjustment range (%) | Base load setting (%) | Gradient setting (%) |
|---|---|---|---|
| E | 100 to 0 | 100 | 0 |
| F | 50 to 100 | 50 | 100 |
| G | 20 to 60 | 20 | 60 |

Base load: Set an output value to be presented when setting input is 0%. (Setting range: 0 to 100%)
Actual output represents characteristics resulted from the connection between a base load setting value and gradient setting value using a straight line.

**• Heater disconnection detection (Control method A type, B type)**

Heater disconnection is recognized when the load current becomes lower than the current value which has been set with the heater disconnection judgment level.

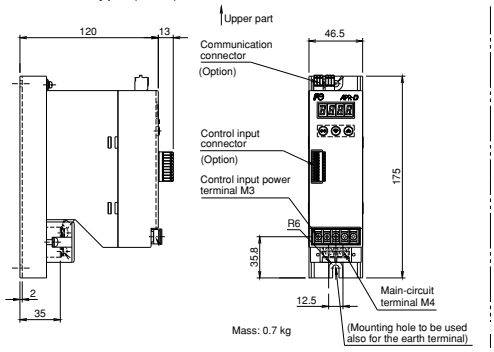
- Applied heater: Alloy heater (Load which flows 40 to 100% of the rated current when the output voltage is 100%)
- Number of parallel lines: 1 to 3 (The material and capacity must be identical.)
- For phase control/ phase angle proportion control
  When setting 5% or higher: Disconnection is detected when the output current is 5 (approx.) to 100% of the rated current.
- Cycle control
  When setting less than 5%: Invalid disconnection judgment
  When setting 5% or higher: Load open is detected when the output current is less than 5% (approx.) of the rated current.
- Judgment range: 30 to 100% of the output instruction value
- Judgment accuracy: ±5%FS or less



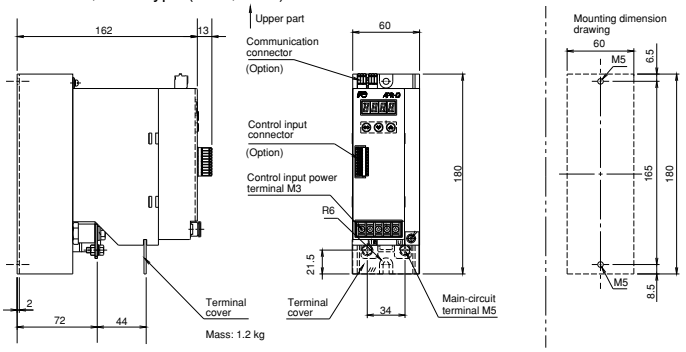

Heater disconnection detection characteristics through output voltage

## ■ Dimensions, mm

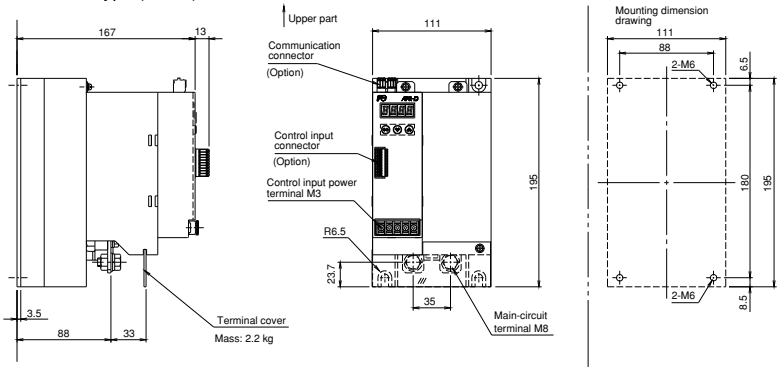
RPDE2020 type (20 A)




RPDE2045, 2060 type (45 A, 60 A)




RPDE2100 type (100 A)

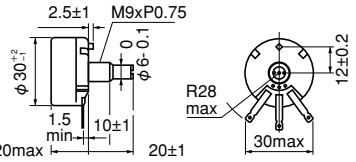



### • Supplied item (If specified in ordering information)

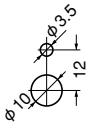
| | |
|---|---|
| Setting device Type: RPD001 | To be used for setting methods including variable resistor setting, 2-position control, and gradient setting. |

Rating: 1 kΩJ, 2.5 W Type: RA30Y20SB102J (Manufacturer: TOKYO COSMOS)

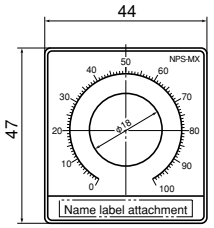
Variable resistor



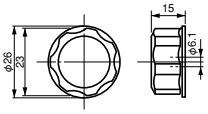

Mounting hole processing drawing




Nameplate




Knob




Name label sheet
(Japanese/English, 8 kinds)

| | |
|---|---|
| 手動設定 | MANUAL SET. |
| 勾配設定 | GRADE SET. |
| HIGH設定 | HIGH SET. |
| LOW設定 | LOW SET. |

## ■ Important notes for installation

(1) Install in a dust-free place with high cooling effect. So that heat radiation from APRs is possible, mount to a vertical metal object, confirm the vertical orientation shown in Figure 1, and ensure sufficient vertical and horizontal clearance among the units. If placing APRs closely one another, ensure sufficient clearance beyond the dimensions indicated in Figure 1 to reduce heat interference among the APRs.

(2) Heat generation of an APR raises the temperature inside the panel. Considering expected temperature rise, implement measures such as cooling and ventilation. (The upper limit of temperature inside the panel is 55°C.) The reference ambient temperature for the rated current is 40°C.
When it exceeds 40°C, reduce the load current.

(3) Ensure a clearance with nearby objects, considering the work space of wiring tools at the individual terminals.

(4) The top of an APR has a partial opening. Be careful not to drop any object into the opening.

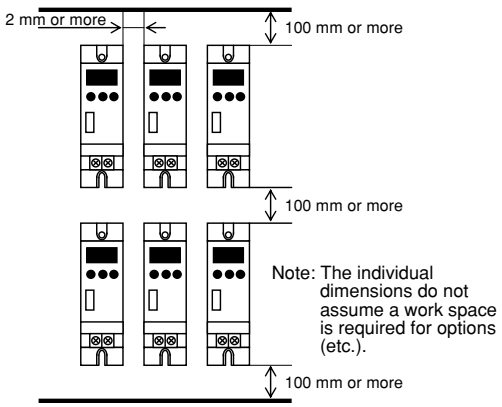



Figure 1 Installation interval

■ **MEMO**

## ⚠ Safety Considerations

- Operate (keep) in the environment specified in the operating instructions and manual. High temperature, high humidity, condensation, dust, corrosive gases, oil, organic solvents, excessive vibration or shock might cause electric shock, fire, erratic operation or failure.
- For safe operation, before using the product read the instruction manual or user manual that comes with the product carefully or consult the Fuji sales representative from which you purchased the product.
- Products introduced in this catalog have not been designed or manufactured for such applications in a system or equipment that will affect human bodies or lives.
- Customers, who want to use the products introduced in this catalog for special systems or devices such as for atomic-energy control, aerospace use, medical use, passenger vehicle, and traffic control, are requested to consult with Fuji Electric FA.
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- Follow the regulations of industrial wastes when the product is to be discarded.
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