

# BrainChild



## ***PR Series Paperless Recorders***



Ihr Systempartner

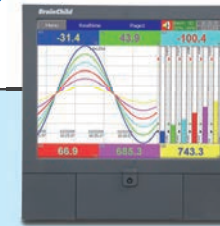
**g|b|m**




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# Outstanding Specifications & Features



|  |  PR10   |  PR20 |  PR30 |
|--|---|--|--|
| Product position                         | low-cost one, good for replacing 6-dotting chart recorders, and 1, 2, 3 pen recorders   | medium size and powerful up to the highest 24  | one, input numbers channels  |
| Input numbers                            | 3, 6 channels   | 3, 6, 12, 18, 24 channels  | 6, 12, 18, 24, 30, 36, 42, 48 channels   |
| Input Signals                            | Thermocouples: J, K, T, E, B, R, S, N, L, U, P, W5 or C, W3, LR, A1, A2, A3, M<br>RTD: Pt50, Pt100, Pt500, Pt1000 ( $\alpha=0.00385$ ), Pt50, Pt100 ( $\alpha=0.00391$ )<br>Ni100, Ni200, Ni500, Ni1000 ( $\alpha=0.00617$ ) mA, V, mV  |  |  |
| The fastest sampling rate                | to reach 100 msec / dot, default setting at 1 sec / dot   |  |  |
| Digital inputs / Relay outputs           | Maximum 24 channels   |  |  |
| Analog outputs                           | Maximum 6 channels  | Maximum 6 channels   | Maximum 12 channels  |
| Math channels (in standard firmware)     | 15  | 40   | 60   |
| External channels (in plus 1/3 firmware) | 24  | 48   | 96   |
| Batch & FDA 21 CFR part 11               | available in plus 1/3 firmware  |  |  |
| Custom display                           | available in plus 2/3 firmware  |  |  |
| Display                                  | 4.3" TFT wide touch screen  | 5.6" TFT touch screen  | 12.1" TFT touch screen   |
| Resolution                               | 480 x 272   | 640 x 480  | 1024 x 768   |
| MTFB backlight at 25°C                   | 30,000 hrs  | 30,000 hrs   | 60,000 hrs   |
| Backlight                                | LED   |  |  |
| Screen saver, Email                      | Yes   |  |  |
| CPU                                      | ARM Cortex-A8, 1Ghz with 256 MB RAM   |  |  |
| Internal Flash memory                    | 256 MB  |  |  |
| Ethernet                                 | Modbus TCP/IP   |  |  |
| RS-232/422/485                           | optional RS-232 or RS-422/485 Modbus RTU  |  |  |
| SD card Slot, USB host x 2               | standard, one USB in the front, another USB in the back   |  |  |
| Pulse input                              | optional DI card supports pulse input up to 100 Hz  |  |  |
| PID Process control                      | Maximum 4 cards   | Maximum 4 cards  | Maximum 8 cards  |
| START / STOP key                         | to turn on/off the system only, not the power so that a quick restart   |  |  |
| Calibration correction                   | on-site calibration possible, or using handy features of Offset and Gain for correction   |  |  |
| Multilingual                             | convenient for local users by offering languages in Brazil Portuguese, Chinese (simplified, traditional), Czech, Danish, Dutch, English, French, German, Greek, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Swedish, Thai, Turkish, other languages negotiable |  |  |
| PC software                              | standard: Historical Viewer+Configuration, optional Data Acquisition Studio for real-time monitoring & logging  |  |  |
| Power supply                             | 90-250VAC or 11-36VDC   |  |  |
| Outer dimensions (W x H x L mm)          | 144 x 144 x189  | 144 x 144 x189   | 288 x 288 x 189  |
| Shorter mounting depth (mm)              | 171   | 171  | 171  |
| DIN Panel cutout (W x H mm)              | 137 x 137   | 137 x 137  | 281 x 281  |
| Protection                               | IP65 front, IP20 rear   |  |  |
| Operating temperature                    | 0°C to 50°C   |  |  |
| Storage temperature                      | -30°C to 70°C   |  |  |
| Safety standards                         | CE, UL, cUL, RoHS, WEEE (UL & cUL available only for 90-250VAC on PR10 & PR20)  |  |  |

## Features

- \* 100 milliseconds data logging
- \* FDA 21 CFR part11 compliance
- \* Batch control, log data in batches
- \* Timer, Counter, Totalizer & Math channels
- \* Custom display pages
- \* PID control with profile function
- \* Alarms by email
- \* On field calibration
- \* Web server
- \* Clock synchronization via internet
- \* Handwriting function in historical data
- \* Multiple Languages
- \* Circular chart in PR30
- \* Direct printer connectivity or PDF printer
- \* USB barcode reader connectivity for data entry
- \* Dynamic data exchange (DDE) via PC software

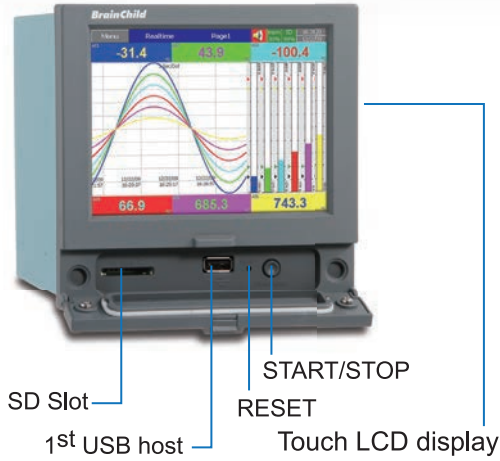
## IO modules easy for expansion



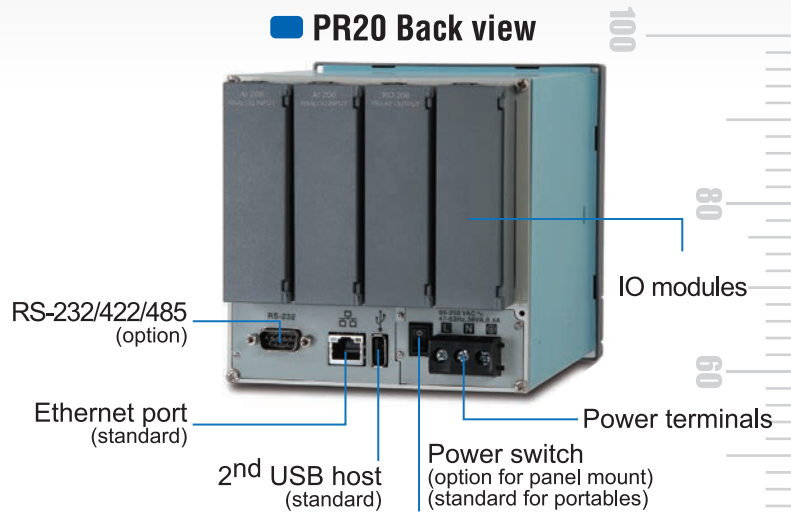
# Smart Mechanism

## Front view, Back view

### PR20 Front view



### PR20 Back view



## Expandable modules of inputs & outputs

**AI206**  
6 AI (6 analog inputs)



**AI203**  
3 AI (3 analog inputs)



**RO206**  
6 relay outputs



**DI206**  
6 DI (6 digital inputs)



**PC201**  
single loop process control



**AO206**  
6 AO (6 analog outputs)



**RD233**  
3 relays + 3DI



**PR10**  
(4 Slots, up to 6 AI)



**PR20**  
(4 Slots, up to 24 AI)



**PR30**  
(16 Slots, up to 48 AI)

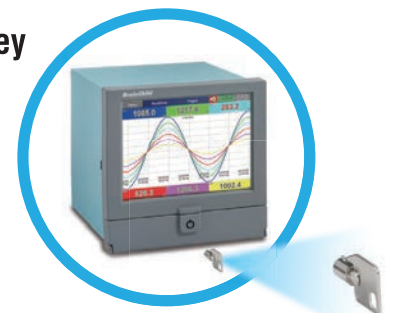


## Portable recorders, Security key

### Portable recorders



### Security key



## PC201: Single Loop PID Process Control Card

### Input 1

#### Characteristics :

| Type        | Range                              | Accuracy @25°C           | Input Impedance |
|-------------|------------------------------------|--------------------------|-----------------|
| J           | -120°C -1000°C<br>(-184°F -1832°F) | ±2°C                     | 2.2MΩ           |
| K           | -200°C -1370°C<br>(-328°F -2498°F) | ±2°C                     | 2.2MΩ           |
| T           | -250°C -400°C<br>(-418°F -752°F)   | ±2°C                     | 2.2MΩ           |
| E           | -100°C -900°C<br>(-148°F -1652°F)  | ±2°C                     | 2.2MΩ           |
| B           | 0°C -1820°C<br>(32°F -3308°F)      | ±2°C<br>(200°C - 1820°C) | 2.2MΩ           |
| R           | 0°C -1767.8°C<br>(32°F -3214°F)    | ±2°C                     | 2.2MΩ           |
| S           | 0°C -1767.8°C<br>(32°F -3214°F)    | ±2°C                     | 2.2MΩ           |
| N           | -250°C -1300°C<br>(-418°F -2372°F) | ±2°C                     | 2.2MΩ           |
| L           | -200°C -900°C<br>(-328°F -1652°F)  | ±2°C                     | 2.2MΩ           |
| PT100 (DIN) | -210°C -700°C<br>(-346°F -1292°F)  | ±0.4°C                   | 1.3KΩ           |
| PT100 (JIS) | -200°C -600°C<br>(-328°F -1112°F)  | ±0.4°C                   | 1.3KΩ           |
| mV          | -8mV -70mV                         | ±0.05%                   | 2.2MΩ           |
| mA          | -3mA -27mA                         | ±0.05%                   | 70.5Ω           |
| V           | -1.3V -11.5V                       | ±0.05%                   | 302KΩ           |

Resolution : 18 bits

Sampling Rate : 5 times / second

Maximum Rating : -2 VDC minimum, 12 VDC maximum  
( 1 minute for mA input )

Temperature Effect : ±1.5 uV/°C for all inputs except mA  
input ±3.0 uV/°C for mA input

#### Sensor Lead Resistance Effect :

T/C: 0.2uV/ohm

3-wire RTD: 2.6 °C/Ω of resistance difference of two leads

2-wire RTD: 2.6 °C/Ω of resistance sum of two leads 200nA

Common Mode Rejection Ratio ( CMRR ) : 120dB

Normal Mode Rejection Ratio ( NMRR ) : 55dB

#### Sensor Break Detection :

Sensor open for TC, RTD and mV inputs,  
below 1 mA for 4-20 mA input,  
below 0.25V for 1 - 5 V input, unavailable for other inputs

#### Sensor Break Responding Time :

Within 4 seconds for TC, RTD and mV inputs,  
0.1 second for 4-20 mA and 1 - 5 V inputs

### Input 2

Resolution : 18 bits

Sampling Rate : 1.66 times / second

Maximum Rating : -2 VDC minimum, 12 VDC maximum

Temperature Effect : ±1.5uV/°C for all inputs except mA

input ±3.0uV/°C for mA input

Common Mode Rejection Ratio ( CMRR ) : 120dB

Normal Mode Rejection Ratio ( NMRR ) : 55dB

Sensor Break Detection : Below 1 mA for 4-20 mA input,  
below 0.25V for 1 - 5V input,  
unavailable for other inputs

Sensor Break Responding Time : 0.5 second

#### Characteristics :

| Type   | Range       | Accuracy @25°C              | Input Impedance                             |
|--------|-------------|-----------------------------|---|
| CT94-1 | 0-50.0 A    | ±2%<br>of Reading<br>±0.2 A | 302 KΩ                                      |
| mA     | -3mA-27mA   | ±0.05%                      | 70.5Ω + $\frac{0.8V}{\text{input current}}$ |
| V      | -1.3V-11.5V | ±0.05%                      | 302 KΩ                                      |

### Input 3 (Event Input)

Logic Low : -10V minimum, 0.8V maximum.

Logic High : 2V minimum, 10V maximum

External pull-down Resistance : 400 KΩ maximum

External pull-up Resistance : 1.5 MΩ minimum

### Output 1 / Output 2

Relay Rating : 2A/240 VAC, life cycles 200,000 for resistive load

Pulsed Voltage : Source Voltage 5V, current limiting resistance 66Ω

#### Linear Output Characteristics

| Type    | Zero Tolerance | Span Tolerance | Load Capacity |
|---------|----------------|----------------|---------------|
| 4-20 mA | 3.6-4 mA       | 20-21 mA       | 500 Ω max.    |
| 0-20 mA | 0 mA           | 20-21 mA       | 500 Ω max.    |
| 0-5 V   | 0 V            | 5-5.25 V       | 10 KΩ min.    |
| 1-5 V   | 0.9-1 V        | 5-5.25 V       | 10 KΩ min.    |
| 0-10 V  | 0 V            | 10-10.5 V      | 10 KΩ min.    |

#### Linear Output

Resolution : 15 bits

Output Regulation : 0.01 % for full load change

Output Settling Time : 0.1 sec. ( stable to 99.9 % )

Isolation Breakdown Voltage : 1000 VAC

Temperature Effect : ±0.0025 % of SPAN / °C

#### Triac ( SSR ) Output

Rating : 1A / 240 VAC

Inrush Current : 20A for 1 cycle

Min. Load Current : 50 mA rms

Max. Off-state Leakage : 3 mA rms

Max. On-state Voltage : 1.5 V rms

Insulation Resistance : 1000 MΩ min. at 500 VDC

Dielectric Strength : 2500 VAC for 1 minute

#### DC Voltage Supply Characteristics (Installed at Output 2)

| Type | Tolerance | Max. Output Current | Ripple Voltage | Isolation Barrier |
|------|-----------|---------------------|----------------|-------------------|
| 20 V | ±0.1 V    | 25 mA               | 0.2 Vp-p       | 500 VAC           |
| 12 V | ±0.6 V    | 40 mA               | 0.1 Vp-p       | 500 VAC           |
| 5 V  | ±0.25 V   | 80 mA               | 0.05 Vp-p      | 500 VAC           |

### Alarm 1/ Alarm 2 ( Output 2 )

#### Alarm 1 Relay :

Form C, life cycles 200,000 for resistive load

#### Alarm 2 Relay :

Form A, Max. rating 2A / 240VAC, life cycles 200,000 for resistive load

Dwell Timer : 0 - 6553.5 minutes

#### Control Mode

Output 1 : Reverse ( heating ) or direct ( cooling ) action

Output 2 : PID cooling control, cooling P band 1 ~ 255% of PB

ON-OFF : 0.1-100.0°C (0.1-100.0°F) hysteresis control ( P band = 0)

P or PD : 0 - 100.0 % offset adjustment

PID : Fuzzy logic modified , Proportional band 0 ~ 500.0 °C ,

Integral time 0 - 1000 seconds , Derivative time 0 - 360.0 seconds

Cycle Time : 0.1 - 100.0 seconds

Manual Control : Heat (MV1) and Cool (MV2)

Auto-tuning : Cold start and warm start

Self-tuning : Select None and YES

Failure Mode : Auto-transfer to manual mode while sensor break  
or A-D converter damage

Ramping Control : 0-500.0°C (0 - 900.0°F) / minute or  
0-500.0°C (0 - 900.0°F) / hour ramp rate

Sleep Mode : Enable or Disable

Power Limit : 0 - 100 % output 1 and output 2

Pump / Pressure Control : Sophisticated functions provided

Remote Set Point : Programmable range for voltage or current input

Differential Control : Control PV1 - PV2 at set point

#### Digital Filter

Function : First order

Time Constant : 0, 0.2, 0.5, 1, 2, 5, 10, 20, 30, 60  
seconds programmable

#### Profiler

Number of Profiles : 50 per recorder

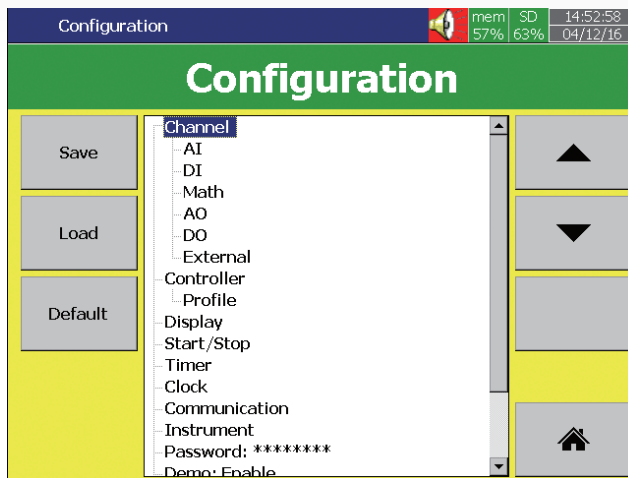
Number of Segments per Profile : 32

Note : Total Segments are limited to 1000 Segments

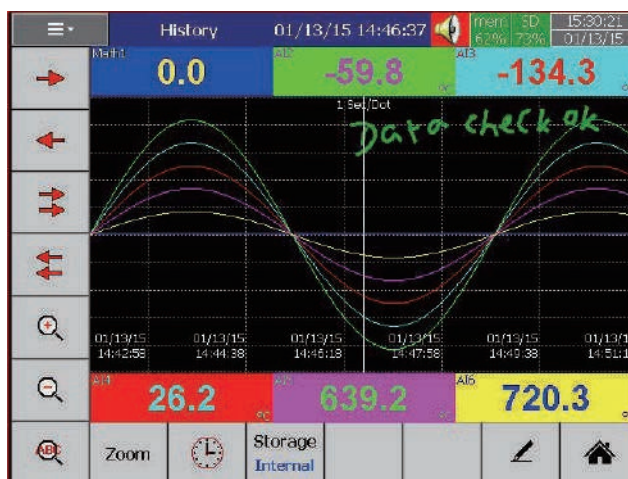


# User friendly functions in recorders

## Configuration in Tree Layout is easy for operation

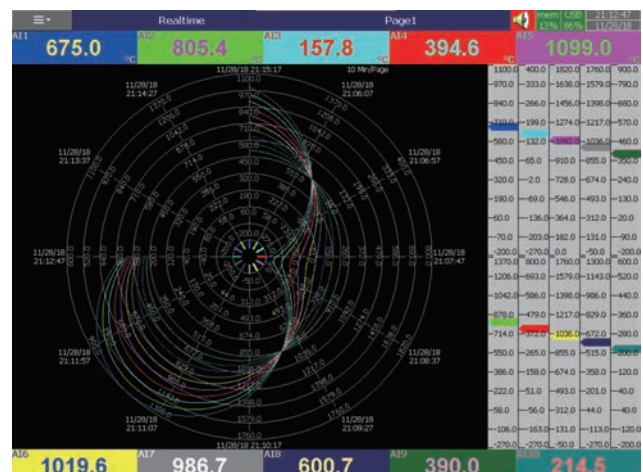


## Handwriting messages are handy for users



## Circular display (PR30 only)

For some industries preferred circular display, PR30 can offer this unique feature and set the display speed for each page/circle in 30 minutes, 1, 2, 4, 8, 12 hours, 1, 2 days, or 1, 2, 4 weeks.





## Standard version of Firmware

**AI:** Analog input is offered various log speed in 100ms, 1, 2, 5, 10, 20, 30 Sec, 1, 2 Min/Dot.

**DI:** Digital input is offered either normal Logic or high frequency Pulse.

**AO:** In analog output, mA or V and its Expression can be defined.

**DO:** Digital output/relay output can be enabled. Each DO card has 6 relays.

**Display:** Various display speeds are available in 100ms, 1, 2, 5, 10, 20, 30 Sec/Dot, or 1, 2, 10, 30 Min/Page, 1, 2, 4, 8, 12 Hour/Page, or 1 Day/Page.

**Timer:** Timer in Countdown, Repeat Countdown, Daily, Weekly or Monthly base, and various jobs can be defined.

**Clock:** Date Style of MM/dd/yy or dd/MM/yy, Time Synchronize via Internet, and Summer Saving Time can be defined.

**Communication:** Web Server and Email functions are available in Communication in Standard firmware.

**Instrument:** Brightness adjustment and Screen Saver are available in Instrument.

**Password:** If Normal Security is chosen, then only one password is offered. If high Security of CFR-21 is chosen, then 9 levels of password can be defined.

**Demo:** Enable or disable the demonstration.

**Auto-output:** Automatic output can be set to specify the printer, to print Historical data & Report data in specified period of time.

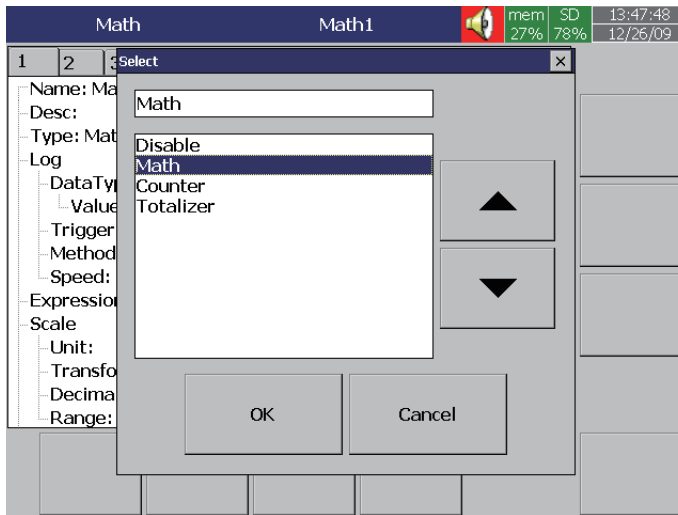
**System information:** It gives Firmware version number, Internal & External memory status, IP address, and IO card status of each Slot.

**Calibrate:** Sometimes the field calibration is required for high accuracy. In this case, a qualified engineer can do the necessary calibration.

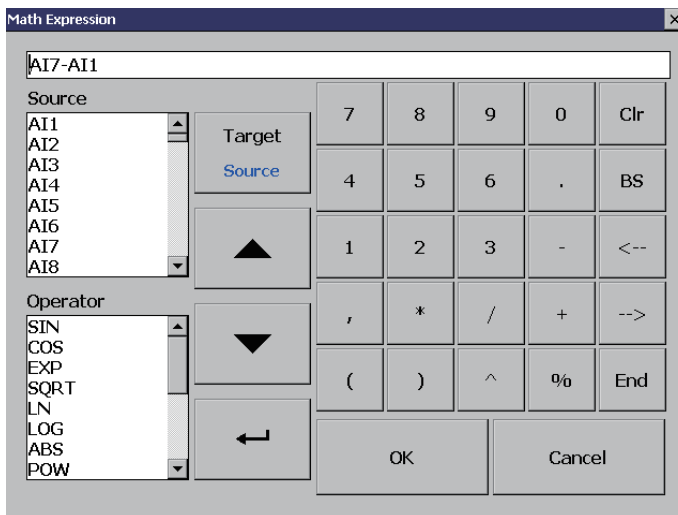
# User friendly functions in recorders

**Math:** Standard version includes mathematics

**Math:** It includes Math, Counter & Totalizer.



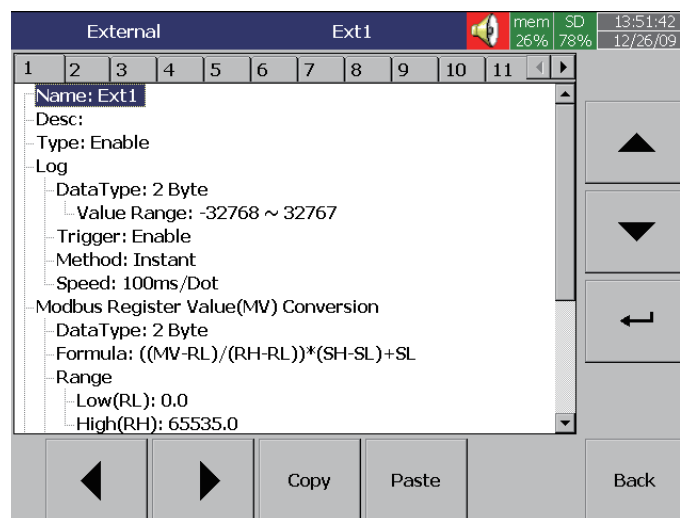
Math Expression is keyed in an easy way.



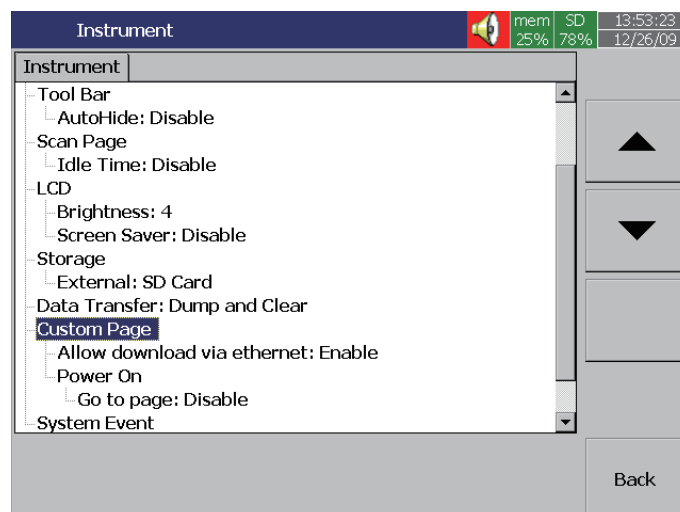
## Plus version of Firmware

Plus versions offer more features of External Channels, Custom Display, Batch, FDA 21 CFR part 11.

**External Channels:** Besides AI & DI inputs, PR recorders accept inputs through communication called External Channels. PR10, PR20 & PR30 can work External Channels maximum up to 24, 48 & 96 respectively.



**Custom Edited Display:** In Plus versions, PC software Panel Studio allows users to edit the specific display instead of standard one, and then download it onto PR recorders.



**Batch:** Batch production record is constantly required for more strict production, for example food and drugs.

**FDA 21 CFR part 11:** This feature is complied with U.S. Food and Drug Administration with human health concern. All data should be avoided from manipulating after recording.



# Powerful functions in PC Software

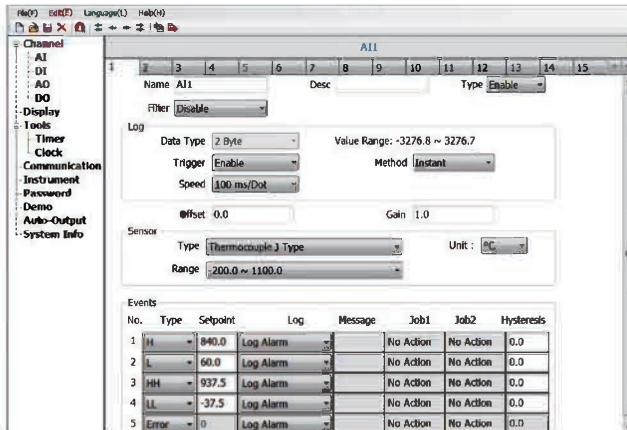
## Free basic software

It consists of two parts, which are Configuration and Historical Viewer.

### I. Configuration

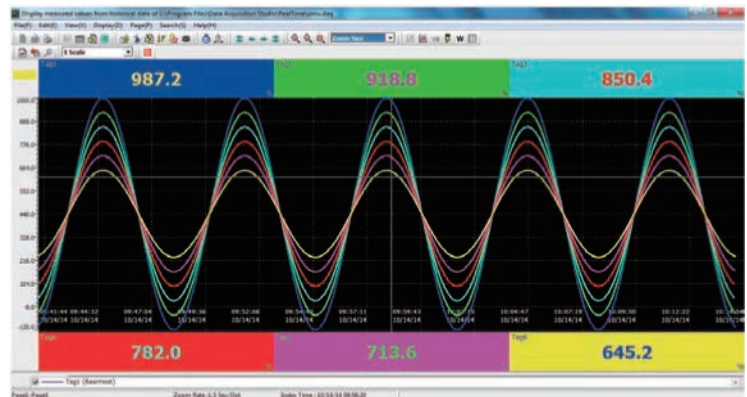
It is easy to do recorder configuration on PC.

Then, send the configuration files from PC to recorder.



### II. Historical Viewer

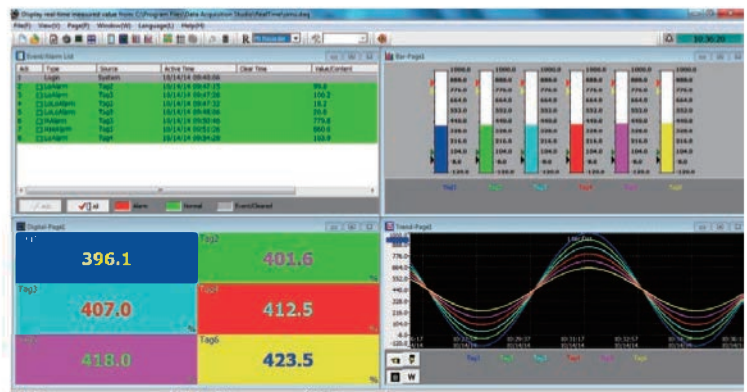
It can display historical trends, historical alarms, events, and then print it. It can search data by time, time period, tag, alarm, events and remarks. It also can export data in CSV format.



## Extensive software Data Acquisition Studio

### III. RealTime Viewer

Besides Configuration & Historical Viewer, it offers additional software RealTime Viewer for real-time monitoring.



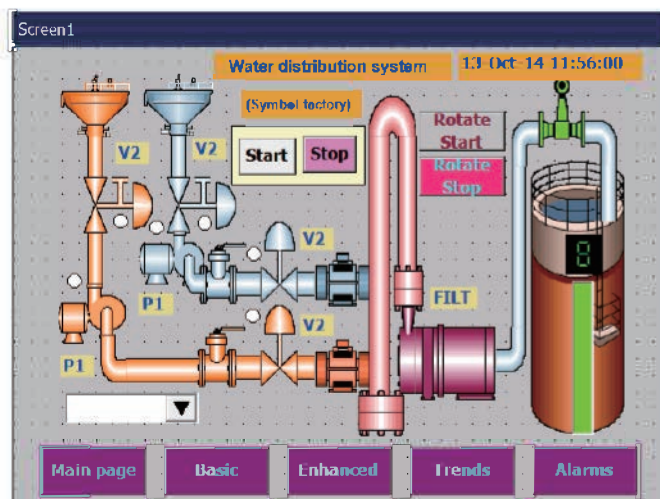
## IV. Panel Studio

If Plus version 2 or 3 of Firmware is purchased, additional software Panel Studio is offered for editing custom display. The users can use it to edit specific displays on PC first, and then download it onto recorders. The custom edited displays will be additional pages to standard ones.

Edit it on PC



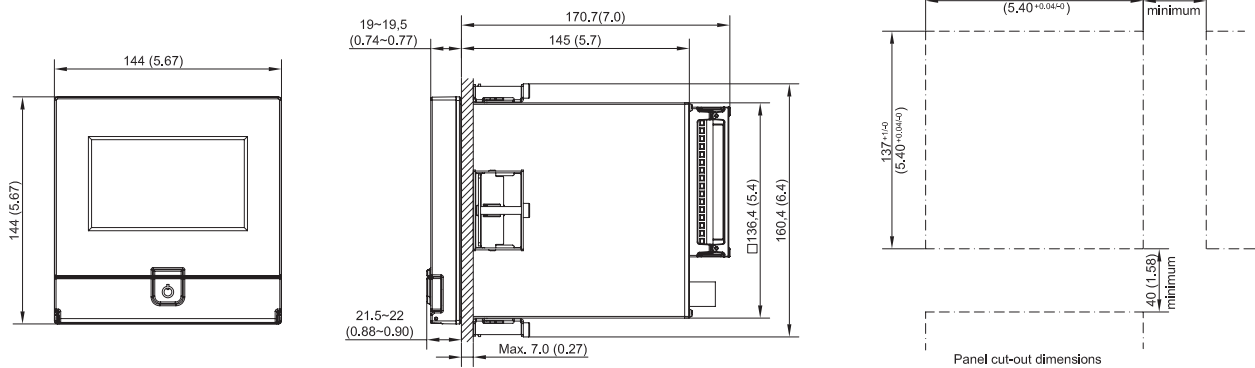
Download it onto recorders



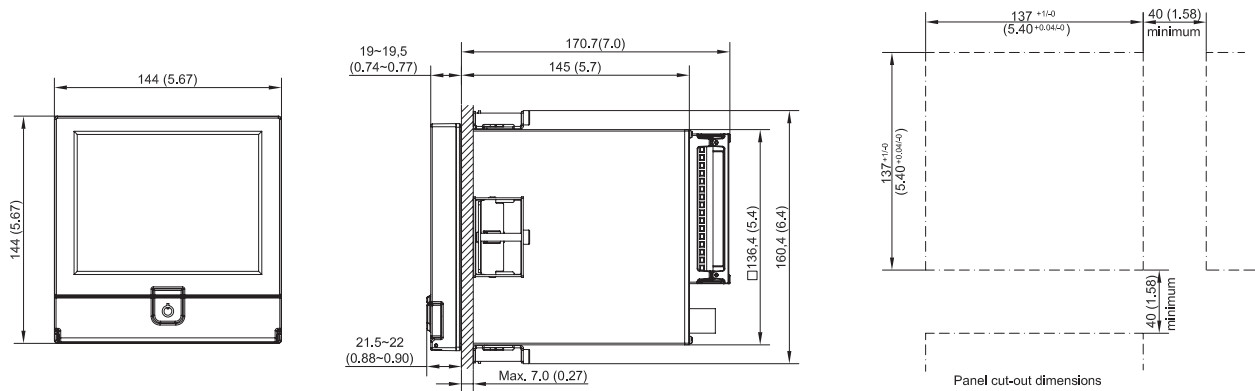
# Installation

## Dimensions in mm (in.)

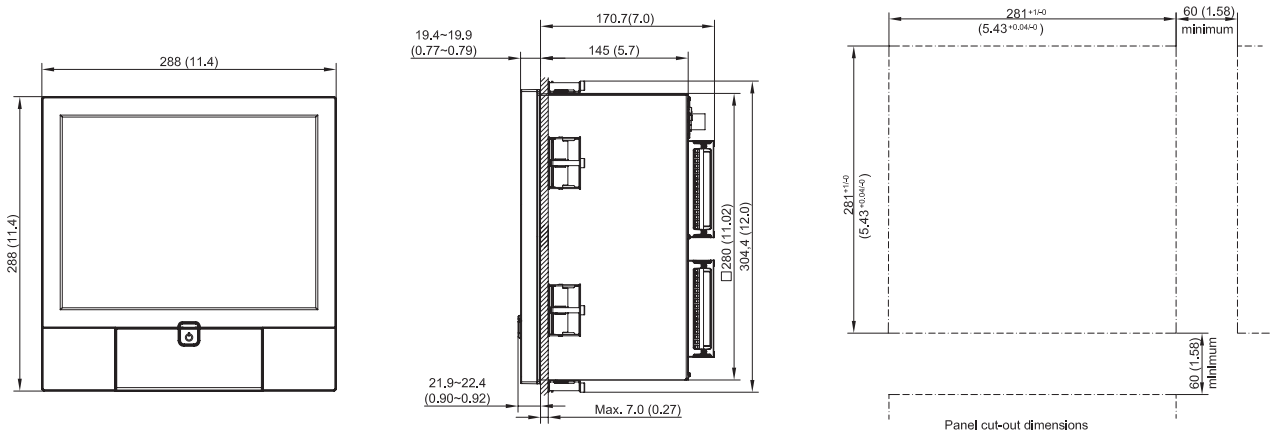
### PR10



### PR20



### PR30



# Ordering Code

## PR10 Ordering Code

### PR1003

(3 analog inputs)

#### Other inputs & outputs\*

- 0: none
- 6: 3 relays + 3 DI

### PR1006

(6 analog inputs)

#### Other inputs & outputs\*

- 0: none
- 1: 6 relays
- 3: 6 DI
- 6: 3 relays + 3 DI
- 7: 6 relays + 6 DI

### Power

- A: 90-250 VAC, 50/60 Hz
- D: 11-36 VDC

### Communication

- 0: standard Ethernet
- 1: Ethernet + RS232
- 2: Ethernet + RS-422/485

### Firmware

- 0: standard version with mathematics
- 1: Plus version 1 with external channels, batch & FDA 21 CFR part 11
- 2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied
- 3: Plus version 3 including Plus version 1+2 above

### PC software

- 1: free basic software of Historical Viewer & Configuration
- 2: extensive software Data Acquisition Studio (RealTime Viewer + Historical Viewer + Configuration)

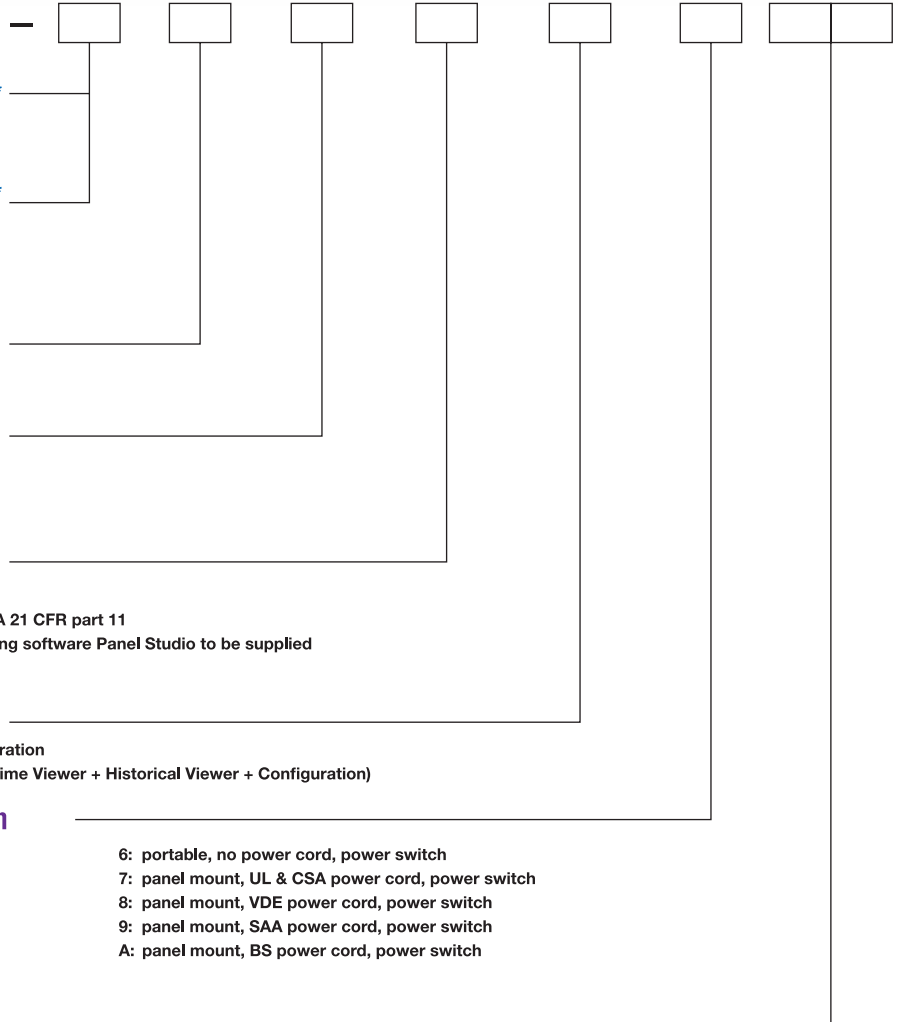
### Mounting types, power cord & switch

- 0: panel mount, no power cord, no power switch
- 1: panel mount, no power cord, power switch
- 2: portable, UL & CSA power cord, power switch
- 3: portable, VDE power cord, power switch
- 4: portable, SAA power cord, power switch
- 5: portable, BS power cord, power switch
- 6: portable, no power cord, power switch
- 7: panel mount, UL & CSA power cord, power switch
- 8: panel mount, VDE power cord, power switch
- 9: panel mount, SAA power cord, power switch
- A: panel mount, BS power cord, power switch

### Special options

- 00: none
- S1: 16G SD card
- S2: 32G SD card

\*Note: DI - digital inputs  
PID Process control card can be purchased separately



## Process Control card Ordering Code

### PC201

#### Output 1

- 0: None
- 1: Relay 2A/240VAC
- 2: Pulse voltage to drive SSR, 5V/30mA
- 3: Isolated 4-20mA/0-20mA (OM95-3)
- 4: Isolated 1-5V/0-5V (OM95-4)
- 5: Isolated 0-10V (OM95-5)
- 6: Triac output 1A/240VAC,SSR
- C: Pulse voltage to drive SSR, 14V/40mA (OM94-7)

#### Output 2

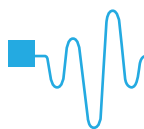
- 0: None
- 1: Relay 2A/240VAC
- 2: Pulse voltage to drive SSR, 5V/30mA
- 3: Isolated 4-20mA/0-20mA (OM95-3)
- 4: Isolated 1-5V/0-5V (OM95-4)
- 5: Isolated 0-10V (OM95-5)
- 6: Triac output 1A/240VAC,SSR
- 7: Isolated 20VDC/25mA power supply (DC94-1)
- 8: Isolated 12VDC/40mA power supply (DC94-2)
- 9: Isolated 5VDC/80mA power supply (DC94-3)
- C: Pulse voltage to drive SSR, 14V/40mA (OM94-7)

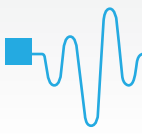
#### Alarm 1

- 0: None
- 1: Form C relay 2A/240VAC

#### Alarm 2

- 0: None
- 1: Form A relay 2A/240VAC





# PR20 Ordering Code

## PR2003 (3 analog inputs)

**Other inputs & outputs\***  
0: none  
6: 3 relays + 3 DI  
C: 3 relays + 3 DI + 6 AO

## PR2006 (6 analog inputs)

**Other inputs & outputs\***  
0: none  
1: 6 relays  
3: 6 DI  
5: 6 AO  
6: 3 relays + 3 DI  
7: 6 relays + 6 DI  
A: 6 relays + 6 AO  
B: 6 DI + 6 AO  
C: 3 relays + 3 DI + 6 AO  
D: 6 relays + 6 DI + 6 AO

## PR2009/12 (9/12 analog inputs)

**Other inputs & outputs\***  
0: none  
1: 6 relays  
2: 12 relays  
3: 6 DI  
4: 12 DI  
5: 6 AO  
6: 3 relays + 3 DI  
7: 6 relays + 6 DI  
8: 9 relays + 3 DI  
9: 3 relays + 9 DI  
A: 6 relays + 6 AO  
B: 6 DI + 6 AO  
C: 3 relays + 3 DI + 6 AO

## PR2015/18 (15/18 analog inputs)

**Other inputs & outputs\***  
0: none  
1: 6 relays  
3: 6 DI  
5: 6 AO  
6: 3 relays + 3 DI

## PR2021/24 (21/24 analog inputs)

**Other inputs & outputs\***  
0: none

### Power

A: 90-250 VAC, 50/60 Hz  
D: 11-36 VDC

### Communication

0: standard Ethernet  
1: Ethernet + RS232  
2: Ethernet + RS-422/485

### Firmware

0: standard version with mathematics  
1: Plus version 1 with external channels batch & FDA 21 CFR part 11  
2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied  
3: Plus version 3 including Plus version 1+2 above

### PC software

1: free basic software of Historical Viewer & Configuration  
2: extensive software Data Acquisition Studio (RealTime Viewer + Historical Viewer + Configuration)

### Mounting types, power cord & switch

0: panel mount, no power cord, no power switch  
1: panel mount, no power cord, power switch  
2: portable, UL & CSA power cord, power switch  
3: portable, VDE power cord, power switch  
4: portable, SAA power cord, power switch  
5: portable, BS power cord, power switch  
6: portable, no power cord, power switch  
7: panel mount, UL & CSA power cord, power switch  
8: panel mount, VDE power cord, power switch  
9: panel mount, SAA power cord, power switch  
A: panel mount, BS power cord, power switch

### Special options

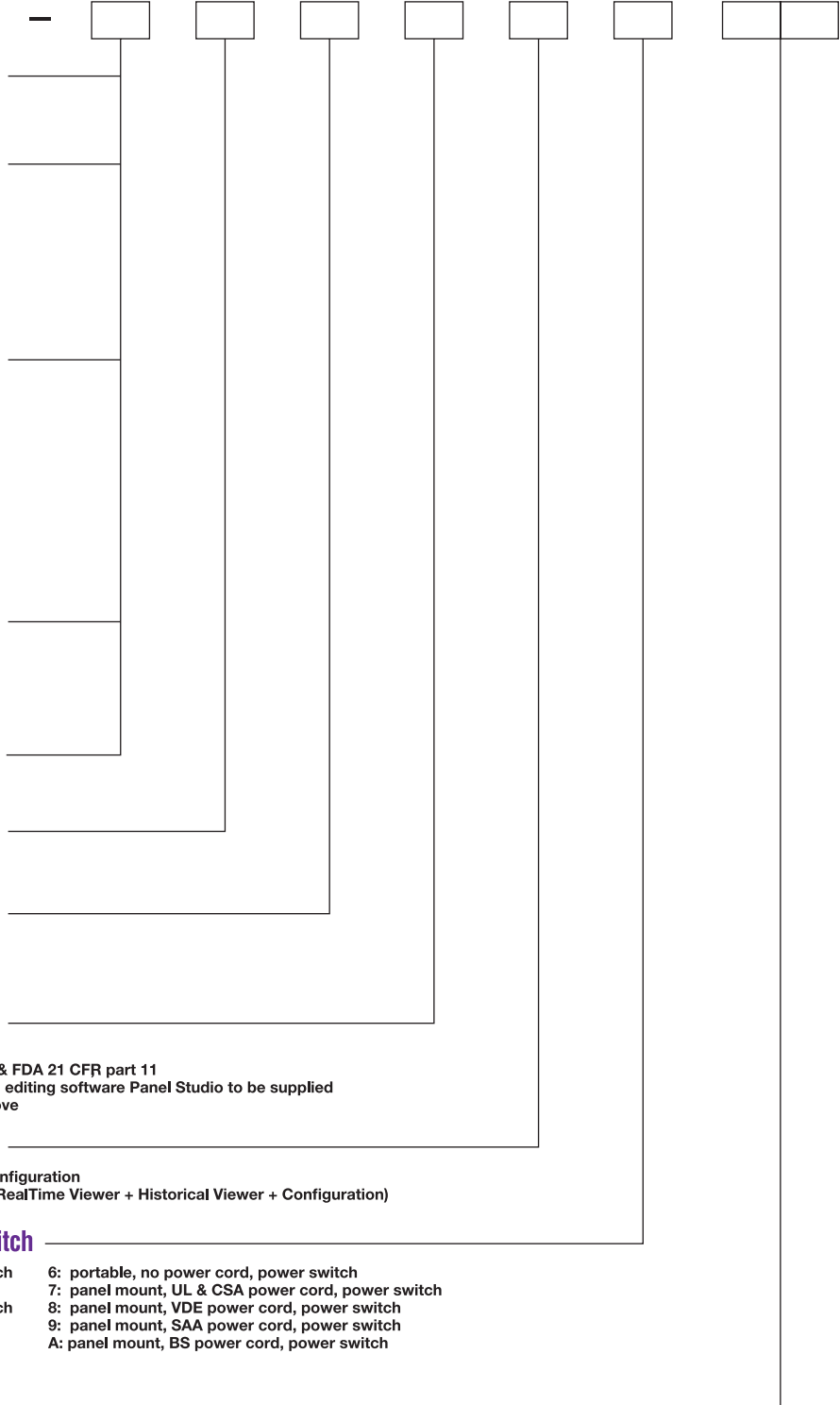
00: none  
S1: 16G SD card  
S2: 32G SD card

*\*Note: DI - digital inputs*

*AO - analog retransmission output*

*PID Process control card can be purchased separately*

*Process control card cannot be chosen together with PR2003, PR2006, PR2012, PR2018 order codes 5, A, B, C, D nor with PR2024 (24 analog inputs)*







# PR30 Ordering Code

- PR3006** (6 analog inputs)
- PR3012** (12 analog inputs)
- PR3018** (18 analog inputs)
- PR3024** (24 analog inputs)
- PR3030** (30 analog inputs)
- PR3036** (36 analog inputs)
- PR3042** (42 analog inputs)
- PR3048** (48 analog inputs)

## Relay outputs

- 0: none
- 1: 6 relays
- 2: 12 relays
- 3: 18 relays
- 4: 24 relays

## Digital inputs

- 0: none
- 1: 6 channels
- 2: 12 channels
- 3: 18 channels

## Analog outputs

- 0: none
- 1: 6 channels
- 2: 12 channels

## Power

- A: 90-250 VAC, 50/60 Hz
- D: 11-36 VDC

## Communication

- 0: standard Ethernet
- 1: Ethernet + RS232
- 2: Ethernet + RS-422/485

## Firmware

- 0: standard version with mathematics
- 1: Plus version 1 with external channels, batch & FDA 21 CFR part 11
- 2: Plus version 2 with custom edited display, an editing software Panel Studio to be supplied
- 3: Plus version 3 including Plus version 1+2 above

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## Mounting types, power cord & switch

- |   |  |
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|---|--|

## Special options

- 00: none
- S1: 16G SD card
- S2: 32G SD card

\*Note: PID Process control card can be purchased separately