

8270A/8370A

High-Pressure Modular Controller

Product Specifications

Specifications

General Specifications

Mains

Power Requirements	100 V ac to 240 V ac, 47 Hz to 63 Hz
Fuse	T3.15 A 250 V ac
Max Power Consumption.....	100 W

Environment

Operating Ambient Temperature Range.....	15 °C to 35 °C
Storage Temperature.....	-20 °C to 70 °C
Relative Humidity	
Operating	<80 % to 30 °C, <70 % to 40 °C
Storage	<95 %, non-condensing. A power stabilization period of four days may be required after extended storage at high temperature and humidity.
Vibration.....	MIL-T-28800E
Altitude (Operation).....	<3000 m
Warmup Time	15 minutes after power up or module installation, when items previously stored within Operating Ambient Temperature Range.

Compliance

Ingress Protection	IEC 60529: IP20
Safety.....	IEC 61010-1, Installation Category II, Pollution degree 2

Electromagnetic Compatibility (EMC)

IEC 61326-1 (Controlled EM environment).....	IEC 61326-2-1; CISPR 11: Group 1, Class A
	Group 1 equipment has intentionally generated and/or use conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.
	Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.
	Emissions which exceed the levels required by CISPR 11 can occur when the equipment is connected to a test object. The equipment may not meet the immunity requirements of 61326-1 when test leads and/or test probes are connected.
USA (FCC)	47 CFR 15 subpart B, this product is considered an exempt device per clause 15.103
Korea (KCC)	Class A Equipment (Industrial Broadcasting & Communication Equipment)
	This product meets requirements for industrial (Class A) electromagnetic wave equipment and the seller or user should take notice of it. This equipment is intended for use in business environments and not to be used in homes.

Dimensions and Weight

Dimensions

Height.....	147 mm (5.78 in)
Width.....	452 mm (17.79 in)
Depth	488 mm (19.2 in)
Rack Mount Dimensions.....	3U-19-inch rack

Weight

Chassis only (8270A/8370A)	13 kg (28.5 lbs) / 15kg (35.25 lbs)
----------------------------------	-------------------------------------

Communication Interfaces

Primary remote Interfaces	IEEE, Ethernet, RS232, USB
System Connection.....	Supports interconnection of 2 or 3 systems
Switch Test Connection	Standard BNC Jack:
	Nominal 24 V dc isolated drive
	Maximum 30 V dc w.r.t. chassis ground
Aux Drivers	4 external Solenoid Drivers
24 V dc Drive (Maximum drive 6 W continuous per channel)	

Performance Specifications

The performance specifications describe the complete instrumental uncertainty of the Product. The specifications include all relevant error components (linearity, hysteresis, repeatability, resolution, reference standard measurement uncertainty, 1-year drift, and temperature effects). The specifications are provided at a level of confidence of 95 %, k=2.

Measurement Specifications

PM200 and PM230 Modules

Specifications are valid from 15 °C to 35 °C ².

Table 1. PM200 and PM230 Module Measurement Specifications

Model	Range (SI Units) ¹	Range (Imperial Units)	Measurement Mode ²	1-Year Instrumental Uncertainty % FS Unless Otherwise Stated	Precision Uncertainty % FS
PM200-BG100K ³	-100 kPa to 100 kPa	-15 psi to 15 psi	bi-directional gauge	0.02	0.01
PM200-A200K ³	2 kPa to 200 kPa	0.3 psi to 30 psi	absolute	0.1	0.02
PM200-BG200K ³	-100 kPa to 200 kPa	-15 psi to 30 psi	bi-directional gauge	0.02	0.01
PM200-BG250K ³	-100 kPa to 250 kPa	-15 psi to 36 psi	bi-directional gauge	0.02	0.01
PM200-G400K ³	0 kPa to 400 kPa	0 psi to 60 psi	gauge	0.02	0.01
PM200-G700K	0 kPa to 700 kPa	0 psi to 100 psi	gauge	0.02	0.01
PM200-G1M	0 MPa to 1 MPa	0 psi to 150 psi	gauge	0.02	0.01
PM200-G1.4M	0 MPa to 1.4 MPa	0 psi to 200 psi	gauge	0.02	0.01
PM200-G2M	0 MPa to 2 MPa	0 psi to 300 psi	gauge	0.02	0.01
PM200-G2.5M	0 MPa to 2.5 MPa	0 psi to 360 psi	gauge	0.02	0.01
PM200-G3.5M	0 MPa to 3.5 MPa	0 psi to 500 psi	gauge	0.02	0.01
PM200-G4M	0 MPa to 4 MPa	0 psi to 580 psi	gauge	0.02	0.01
PM200-G7M	0 MPa to 7 MPa	0 psi to 1000 psi	gauge	0.02	0.01
PM200-G10M	0 MPa to 10 MPa	0 psi to 1500 psi	gauge	0.02	0.01
PM200-G14M	0 MPa to 14 MPa	0 psi to 2000 psi	gauge	0.02	0.01
PM200-G20M	0 MPa to 20 MPa	0 psi to 3000 psi	gauge	0.02	0.01
PM200-G28M	0 MPa to 28 MPa	0 psi to 4000 psi	gauge	0.02	0.01
PM200-G35M	0 MPa to 35 MPa	0 psi to 5000 psi	gauge	0.02	0.01
PM200-G40M	0 MPa to 40 MPa	0 psi to 6000 psi	gauge	0.02	0.01
PM230-G70M ⁴	0 MPa to 70 MPa	0 psi to 10000 psi	gauge	0.02	0.01
PM230-G100M ⁴	0 MPa to 104 MPa	0 psi to 15000 psi	gauge	0.015 % FS + 0.02 % of reading	0.015

Notes

- PM200 and PM230 gauge mode modules support absolute mode measurement when used with a barometric reference module. Instrumental uncertainty for gauge mode modules used in absolute mode by addition of a barometric reference module is calculated as the uncertainty of the gauge mode module root sum squared with the uncertainty of the barometric reference module. Uncertainty for gauge mode assumes routine zeroing which is the default operating mode when used in a chassis. Uncertainty for absolute mode modules includes 1-year zero stability. This specification can be reduced to 0.05 % FS if the PM200 module is zeroed on a continuing basis to remove the 1-year zero stability component.
- For modules with full scales <28 MPa (4000 psi) temperatures from 15 °C to 18 °C and 28 °C to 35 °C, add 0.003 % FS/°C.
- Can be used with 8270A only.
- Can be used with 8370A only.

PM500 Modules

Specifications are valid from 15 °C to 35 °C.

Table 2. PM500 Module Measurement Specifications

Model	Range (SI Units)	Range (Imperial Units)	Measurement Mode ²	1-Year Instrumental Uncertainty (% of reading or % FS, whichever is greater) unless otherwise stated	1-Year Zero Instrumental Drift % FS, RSS with 1-Year Instrumental Uncertainty ¹	Precision Uncertainty (% of reading or % FS, whichever is greater)
PM500-G100K ³	0 to 100 kPa	0 to 15 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G200K ³	0 to 200 kPa	0 to 30 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G250K ³	0 to 250 kPa	0 to 36 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G350K ³	0 to 350 kPa	0 to 50 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G400K ³	0 to 400 kPa	0 to 60 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G600K ³	0 to 600 kPa	0 to 90 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-G700K	0 to 700 kPa	0 to 100 psi	gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG1M	-100 to 1000 kPa	-15 to 150 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG1.4M	-100 to 1400 kPa	-15 to 200 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG2M	-100 to 2000 kPa	-15 to 300 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG2.5M	-100 to 2500 kPa	-15 to 400 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG3.5M	-100 to 3500 kPa	-15 to 500 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG4M	-100 to 4000 kPa	-15 to 600 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG7M	-100 to 7000 kPa	-15 to 1000 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG10M	-100 to 10000 kPa	-15 to 1500 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG14M	-100 to 14000 kPa	-15 to 2000 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BG20M	-100 to 20000 kPa	-15 to 3000 psi	bi-directional gauge	0.01 or 0.005	-	0.007 or 0.0035
PM500-BA120K ⁴	60 to 120kPa	8 to 17 psi	absolute	0.01 % of reading	0.05	0.005 % of reading
PM500-A120K ⁴	0.08 to 120kPa	0.01 to 16 psi	absolute	0.01 or 0.005	0.05	0.007 or 0.0035
PM500-A200K ³	0.08 to 200 kPa	0.01 to 30 psi	absolute	0.01 or 0.005	0.05	0.007 or 0.0035
PM500-A350K ³	0.08 to 350 kPa	0.01 to 50 psi	absolute	0.01 or 0.005	0.03	0.007 or 0.0035
PM500-A700K	0.08 to 700 kPa	0.01 to 100 psi	absolute	0.01 or 0.005	0.025	0.007 or 0.0035
PM500-A1.4M	0.035 to 1.4 MPa	5 to 200 psi	absolute	0.01 or 0.005	0.015	0.007 or 0.0035
PM500-A2M	0.07 to 2 MPa	10 to 300 psi	absolute	0.01 or 0.005	0.015	0.007 or 0.0035
				(% FS + % of reading)		(% FS + % of reading)
PM500-NG100K ³	-100 to 0 kPa	-15 psi to 0 psi	negative gauge	0.01 + 0.01	-	0.005 + 0.005
				% FS		% FS
PM500-BG100K ³	-100 kPa to 100 kPa	-15 psi to 15 psi	bi-directional gauge	0.01	-	0.005
PM500-BG200K ³	-100 kPa to 200 kPa	-15 psi to 30 psi	bi-directional gauge	0.01	-	0.005
PM500-BG250K ³	-100 kPa to 250 kPa	-15 psi to 36 psi	bi-directional gauge	0.01	-	0.005
PM500-BG350K	-100 kPa to 350 kPa	-15 psi to 50 psi	bi-directional gauge	0.01	-	0.005
PM500-BG400K	-100 kPa to 400 kPa	-15 psi to 60 psi	bi-directional gauge	0.01	-	0.005
PM500-BG700K	-100 kPa to 700 kPa	-15 psi to 100 psi	bi-directional gauge	0.01	-	0.005

Notes

1. For absolute PM500s, the 1-Year Stability can be eliminated with a zeroing technique described in the Operators Manual. If not adhered to, the 1-Year Specification is:

$$\sqrt{\left(\frac{1 \text{ year instrumental uncertainty}}{2}\right)^2 + \left(\frac{1 \text{ year zero stability}}{1.73}\right)^2} \times 2$$

2. PM500 gauge mode modules support absolute mode measurement when used with a barometric reference module. Instrumental uncertainty for gauge mode modules used in absolute mode by addition of a barometric reference module is calculated as the uncertainty of the gauge mode module root sum squared with the uncertainty of the barometric reference module. Uncertainty for gauge mode assumes routine zeroing which is default operating mode when used in a chassis.
3. Can be used with 8270A only.
4. For 8x70A chassis, the PM500-A120K can only be used as a barometer to enable gauge mode PMMs to measure absolute pressure and as an AutoZero reference for A1.4 and A2 M ranges.

PM600 and PM630 Modules

Specifications are valid from 15 °C to 35 °C.

Table 3. PM600 and PM630 Module Measurement Specifications

Model	Absolute Mode Range (SI Units)	Absolute Mode Range (Imperial Units)	Gauge Mode Range (SI Units)	Gauge Mode Range (Imperial Units)	1-Year Instrumental Uncertainty (% of Reading or % FS, whichever is Greater, Unless Otherwise Stated)	Precision Uncertainty (% of Reading or % FS, whichever is Greater, Unless Otherwise Stated)
BRM600-BA100K	70 to 110 kPa	10 to 16 psi	N/A	N/A	0.01 % of reading	0.008 or 0.0024
PM600-A200K ^{3,6}	10 to 200 kPa	1.5 to 30 psi	-90 to 100 kPa	-13.2 to 15 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A350K ^{3,6}	10 to 350 kPa	1.5 to 50 psi	-90 to 250 kPa	-13.2 to 35 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A700K	18 to 700 kPa	2.6 to 100 psi	-82 to 700 kPa	-12.1 to 100 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A1.4M	0.035 to 1.4 MPa	5 to 200 psi	-0.065 to 1.4 MPa	-10 to 200 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A2M	0.07 to 2 MPa	10 to 300 psi	-0.03 to 2 MPa	-5 to 300 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A3.5M	0.07 to 3.5 MPa	10 to 500 psi	-0.03 to 3.5 MPa	-5 to 500 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A7M	ATM ⁵ to 7 MPa	ATM ⁵ to 1000 psi	0 to 7 MPa	0 to 1000 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A10M	ATM ⁵ to 10MPa	ATM ⁵ to 1500 psi	0 to 10 MPa	0 to 1500 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A14M	ATM ⁵ to 14 MPa	ATM ⁵ to 2000 psi	0 to 14 MPa	0 to 2000 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A20M	ATM ⁵ to 20 MPa	ATM ⁵ to 3000 psi	0 to 20 MPa	0 to 3000 psi	0.01 or 0.003 ¹	0.008 or 0.0024
PM600-A28M	ATM ⁵ to 28 MPa	ATM ⁵ to 4000 psi	0 MPa to 28 MPa	0 psi to 4000 psi	0.01 or 0.003 ²	0.008 or 0.0024
PM600-A35M	ATM ⁵ to 35 MPa	ATM ⁵ to 5000 psi	0 MPa to 35 MPa	0 psi to 5000 psi	0.01 or 0.003 ²	0.008 or 0.0024
PM600-A40M	ATM ⁵ to 40 MPa	ATM ⁵ to 6000 psi	0 MPa to 40 MPa	0 psi to 6000 psi	0.01 or 0.003 ²	0.008 or 0.0024
PM630-A70M ⁴	ATM ⁵ to 70 MPa	ATM ⁵ to 10000 psi	0 MPa to 70 MPa	0 psi to 10000 psi	0.01 or 0.003 ²	0.008 or 0.0024
PM630-A100M ⁴	ATM ⁵ to 104 MPa	ATM ⁵ to 15000 psi	0 MPa to 104 MPa	0 psi to 15000 psi	0.012 or 0.004 ²	0.01 or 0.003

Notes

- For PM600s modules with full scale less than 28 MPa, when used in absolute mode, root sum square (RSS) with 0.007 % of FS (reduced to k=1 by square root of 3).
$$\sqrt{\left(\frac{1 \text{ year instrumental uncertainty}}{2}\right)^2 + \left(\frac{0.007 \% FS}{1.73}\right)^2} \times 2$$

This specification may be reduced or eliminated with the use of a separate more stable module as an AutoZero reference.
- PM600 and PM630 modules, with full scales of 28 MPa and higher, use an internal barometer in the PMM to correct for changes in barometric pressure when they are used in gauge mode and as a zeroing reference when used in absolute mode, hence there is no need to RSS 0.007 % FS.
- Can be used with 8270A only.
- Can be used with 8370A only.
- ATM is any atmospheric pressure from 70 kPa to 110 kPa (10 psi to 16 psi absolute).
- For absolute ranges used in gauge mode there is an additional uncertainty of ±14 Pa for dynamic barometric compensation. When combined with other uncertainties, the uncertainty of the PM600-A200K is ±0.016 kPa. The threshold uncertainty for the PM600-A350K is ±0.005 % Span.

Operating Characteristics

95 % of set points are within specification limits for stated conditions as calculated by mean plus 1.67 standard deviations of test data.

Control Precision (Dynamic Mode)..... 0.002 % Range Span or 0.01 kPa (whichever is greater)

Control Turndown 100:1 (typical)

To meet the control specifications, supply pressure should not be greater than 100 times the range of the measurement module. Control turndown is defined as the relationship between the provided supply pressure and the appropriate supply pressure for the range.

Low Control Point 1 kPa (0.15 psi) absolute (8270A only)

7 kPa (1.0 psi) gauge (8370A, 8270A without vacuum pump)

Settling Time

Settling time is the time required to be within 0.005 % of setpoint for 10 % steps into volumes up to 50 cm³ for all pressures >7 kPa absolute (8270A) or 7 kPa gauge (8370A). Settling time may be affected by multiple variables, including temperature effects, component flow rates, leaks, and overall volume configurations.

Pressure Measurement Module (PMM)	Dynamic A Mode ^[1]		Dynamic B Mode	
	Range ≤ 44 MPa	Range > 44 MPa	Range ≤ 44 MPa	Range > 44 MPa
PM200/PM230	30 seconds	45 seconds	60 seconds	75 seconds
PM500	35 seconds	--	60 seconds	--
PM600/PM630	45 seconds	60 seconds	60 seconds	75 seconds
[1] 8270A: Settling time for setpoints ≤200 kPa absolute may require an additional 15 seconds. 8370A: Settling time for setpoints ≤700 kPa gauge may require an additional 15 seconds.				

Overshoot (Dynamic A)..... 0.08 % Full Scale or 2 kPa (whichever is greater)

Overshoot (Dynamic B) 0.008 % Full Scale or 2 kPa (whichever is greater)

Pressure Limits

Supply Port (8270A/8370A) Maximum 48 MPa (7 000 psi) gauge / 110 MPa (16 000 psi) gauge
 Minimum 2 MPa (300 psi) gauge for 8270A and 8370A

Test Port (8270A/8370A) 44 MPa (6 400 psi) gauge / 107 MPa (15 500 psi) gauge

Reference Port 150 kPa (22 psi) absolute

Vent Port 150 kPa (22 psi) absolute

Relief Valves/Rupture Disk

8270A Chassis Supply port relief valve is set to 52 MPa (7500 psi)

8370A Chassis Supply has a rupture disk installed which is designed to burst at 152 MPa (22 000 psi). Low pressure manifold relief valve is set to 52 MPa (7500 psi).

Modules with full scales ≤44 MPa include pressure relief valves.

Supply Gas Type

Clean Dry Nitrogen, Helium, Argon, or Air – Industrial Grade Nitrogen, 99.5 %+

Vacuum Supply

>50 liters per minute capacity with Auto Vent feature

System will exhaust gas through the vacuum system when controlling down in pressure. Appropriate protections are necessary.