RPM4™

Reference Pressure Monitor

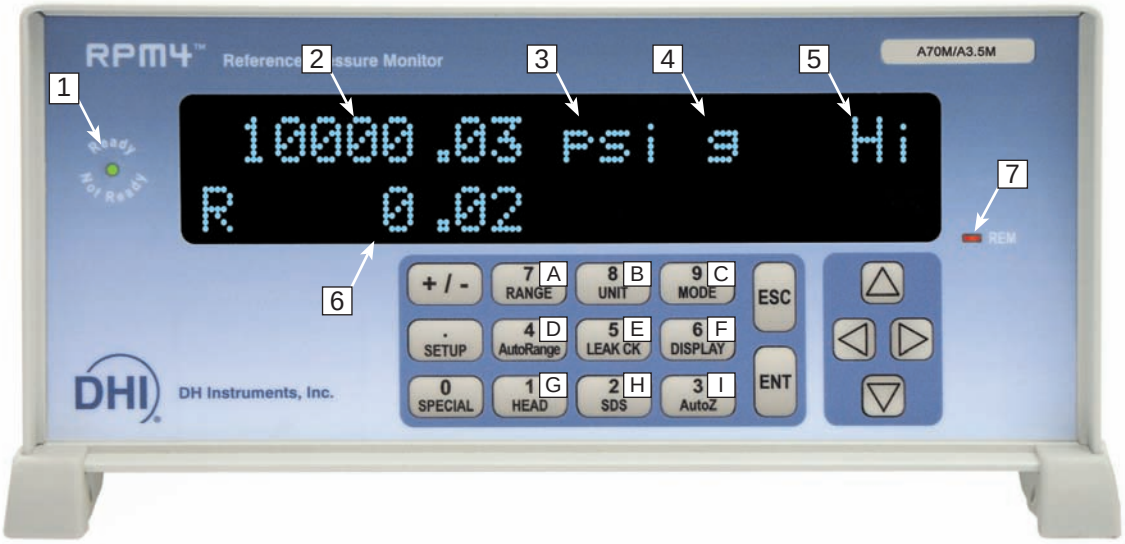
Premium Performance... Unmatched Features...
Compact and Rugged...

DHI® DH Instruments
A Fluke Company

RPM4™ Reference Pressure Monitor

RPM4 is much more than a traditional pressure indicator.

State of the art performance from very low pressure to 280 MPa (40 000 psi)… advanced on-board features… compact and rugged… full local and remote communications… RPM4 is the perfect solution in a wide variety of high end pressure calibration, testing and measurement applications.



1. Pressure "Ready" (green) "Not Ready" (red) based on real time measurement of pressure stability
2. Measured pressure
3. Pressure unit of measure
4. Measurement mode
5. Active Q-RPT module (Hi or Lo)
6. Special functions display
7. Remote activity indicator

A. **RANGE** - Select between Q-RPTs and saved AutoRange ranges.

B. **UNIT** - Select pressure unit of measure.

C. **MODE** - Select pressure measurement mode (absolute, gauge, compound gauge, Hi-Lo differential).

D. **AutoRange** - Automatically optimize all measurement characteristics for the exact range of operation.

E. **LEAK CK** - Run and view automated leak check functions.

F. **DISPLAY** - Select special display functions including rate, average, freeze, high/low, deviation.

G. **HEAD** - Make automatic fluid head corrections for differences in height between RPM4 and DUT.

H. **SDS** - User control of Q-RPT Self Defense System.

I. **AutoZ** - Automated zeroing of reference pressure transducers in absolute and gauge measurement modes.

INFINITE RANGING™ AND AUTORANGE™

Infinite Ranging gives RPM4 unprecedented versatility in adapting to the specific range of operation. With the easy to use **AutoRange** function, a few simple key strokes or a single remote command string at the start of a test adapt every feature of the pressure monitor to optimize it for the range to be covered. Just enter the maximum pressure and the measurement mode. AutoRange then:

- Selects and activates the most appropriate Q-RPT to cover the specified range and measurement mode.
- Sets the pressure unit of measure.
- Activates absolute, gauge or compound gauge measurement.
- Adjusts display resolution to the appropriate level for the range.
- Adjusts overpressure alarms to the actual range of operation.
- Reduces measurement uncertainty proportionally to the selected range (premium class Q-RPTs only).

Note: The use of RPM4's Infinite Ranging and AutoRange feature is recommended to optimize operation for a specific range but is not required to obtain "% of reading" measurement specifications.

SDS™ Q-RPT SELF DEFENSE SYSTEM

All Q-RPT modules up to 7 MPa (1 000 psi) include **DHI**'s unique Self Defense System™ (SDS). SDS valves automatically isolate and vent the module's Q-RPT when it is not in use or an overpressure is about to occur. With SDS, any Q-RPT module can be left connected to pressure up to 10 MPa (1 500 psi) without needing to isolate or disconnect it.

ADVANCED ON-BOARD FUNCTIONS

RPM4 provides a variety of advanced on-board pressure data functions including:

- **Special data** such as pressure average over time, rate of change, hi/lo, freeze, deviation from set point.
- **Differential mode** directly measures the difference between two Q-RPTs including taring at the line pressure.
- **Parallel measurement** uses two Q-RPTs redundantly as one.
- **Leak check** measures average pressure rate of change over a user set time period.
- **AutoTest** automates calibration routines with tolerance testing and data logging.

QUARTZ REFERENCE PRESSURE TRANSDUCER (Q-RPT) MODULES

RPM4's outstanding pressure measurement specifications are made possible by **DHI**'s exclusive quartz reference pressure transducer (Q-RPT) modules.

Q-RPTs measure pressure by measuring the change in the natural oscillating frequency of a quartz crystal with pressure induced stress. To be qualified for use in a Q-RPT module, each transducer is individually evaluated and characterized using primary pressure standards. Only transducers exhibiting required levels of linearity, repeatability and stability are selected. A proprietary compensation model, derived from more than 15 years experience with thousands of quartz pressure transducers, is applied to optimize the metrological characteristics needed in a transfer standard. **Standard** and **premium** class Q-RPT modules are available to best fit your performance and budgetary requirements.

Q-RPT Module

A unique **dynamic compensation for atmospheric pressure system** uses an independent on-board barometer to provide seamless switching between absolute, gauge and compound gauge modes at any time. The barometer is used only to measure the small variations in atmospheric pressure that occur during gauge mode operation so its absolute error and drift over time do not contribute to measurement uncertainty.

Q-RPT modules offer the advantages of:

- % of reading measurement uncertainty with AutoRange span turndown available
- Negligible warm up time
- No gas species dependence
- Quartz element isolated from test medium
- Low sensitivity to orientation

Q-RPTs AND RANGES

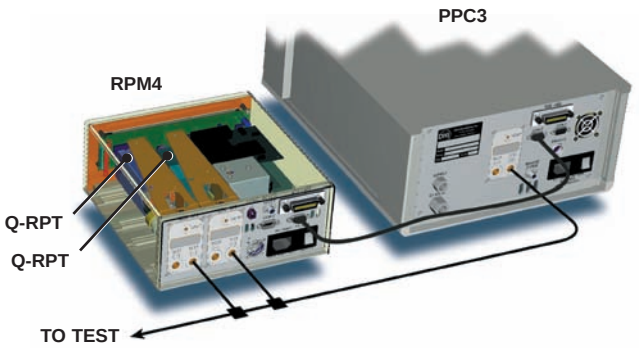
Q-RPT DESIGNATION	SI VERSION MAXIMUM RANGE [kPa] Absolute	SI VERSION MAXIMUM RANGE [kPa] Gauge	US VERSION MAXIMUM RANGE [psi] Absolute	US VERSION MAXIMUM RANGE [psi] Gauge	MEASUREMENT MODE(S) SUPPORTED	OPERATING MEDIA	SDS™ Self Defense System
A280M-L	280 000	280 000	40 000	40 000	Absolute, Gauge and Compound Gauge	Oil standard Gas available	Not available
A200M-L	200 000	200 000	30 000	30 000			
A140M-L	140 000	140 000	20 000	20 000			
A100M-L	100 000	100 000	15 000	15 000			
A70M	70 000	70 000	10 000	10 000		Gas standard Oil available	
A40M	40 000	40 000	6 000	6 000			
A20M	20 000	20 000	3 000	3 000			
A14M	14 000	14 000	2 000	2 000			
A10M	10 000	10 000	1 500	1 500			
A7M	7 000	7 000	1 000	1 000			Included
A3.5M	3 500	3 500	500	500		Gas only	
A2M	2 000	2 000	300	300			
A1.4M	1 400	1 400	200	200			
A700K	700	700	100	100			
A350K	350	250	50	35			
A200K	200	100	30	15			
A160K	160	60	23	8			
A100K	110	10	16	1.5			
BA100K[1]	110	---	16	---			
G200K	---	200	---	30	Gauge only		
G100K	---	100	---	15			
BG15K[2]	---	15	---	2.2			
G15K	---	15	---	2.2			

1 BA100K is a barometer with a low point of 70 kPa (10 psia).
2 BG15K is bidirectional gauge from - 15 to + 15 kPa (- 2.2 to + 2.2 psi).

COMPATIBLE WITH PPC3 AUTOMATED PRESSURE CONTROLLER

RPM4 can be used as an external reference pressure measurement device for a **DHI** PPC3, fully automated, pressure controller/calibrator. One or two RPM4s can be "daisy chained" to PPC3 by 9 pin RS232 cable(s). The RPM4's Q-RPTs become part of the PPC3 system and are managed by PPC3 transparently to the user. There is only one test connection for the PPC3 system's full range of operation.

See the PPC3 product brochure for additional information.



FEATURES, FEATURES, FEATURES

RPM4 includes all the features you expect in today's modern pressure instruments and more… stability based Ready/Not Ready indication… built-in fluid head corrections… user defined pressure units… intelligent AutoZero™ function… remote [ENTER] switch… large character, easy to read display… 12VDC power and battery pack option… RS232 and IEEE-488 communications… FLASH memory and free embedded software upgrades on **dhinstruments.com**… PC based recalibration utility software included… free LabVIEW® drivers.

ORDERING INFORMATION

CONFIGURING AN RPM4 MODEL NUMBER...

RPM4 mhhhac/mlllac

Where: **mhhhac** Indicates the Hi Q-RPT designation.
c indicates Q-RPT class (**s** for Standard, **p** for Premium).

mlllac Indicates the Lo Q-RPT designation and class.
Leave blank if there is no Lo Q-RPT.

See **Q-RPTs AND RANGES** table for available Q-RPTs.

OPTIONS

DESIGNATOR	DESCRIPTION
RPM4 04	**-1** US units version, **-2** SI units version
RPM4 05	CE mark
RPM4 06	Special calibration
RPM4 07	Special test fluid, Hi Q-RPT (specify fluid)
RPM4 08	Special test fluid, Lo Q-RPT (specify fluid)
RPM4 09	**-1** Special configuration, air data (A160K/A160K, A350K/A160K only)

ACCESSORIES

DESIGNATOR	PART NO.	DESCRIPTION
Battery Pack/Charger	**401904**	12VDC battery with charger
Rack Mount Kit	**401929**	Rack mount kit for standard 19 in. rack
Footswitch	**401886**	Remote [ENTER] footswitch
MPC1-1000	**401067**	Manual gas pressure controller, for vacuum to 7 000 kPa (1 000 psi)
MPC1-3000	**401210**	Manual gas pressure controller, for vacuum to 20 MPa (3 000 psi)
MPC1-D-1000	**401646**	Manual pressure controller, for differential pressure at line pressure up to 7 000 kPa (1 000 psi)
MPC1-D-3000	**401647**	Manual pressure controller, for differential pressure at line pressure up to 20 MPa (3 000 psi)
GPC1-16000	**401800**	Assisted gas pressure controller, 110 MPa (16 000 psi)
MPG1-100M	**402121**	Manual hydraulic pressure generator/ controller, 100 MPa (15 000 psi)
MPG1-200M	**402122**	Manual hydraulic pressure generator/ controller, 200 MPa (30 000 psi)
OPG1-30000	**401497**	Assisted hydraulic pressure generator/ controller, 200 MPa (30 000 psi)
PK-7000-PPC/MPC	**400985**	Interconnections kit for RPM4 and MPC1 with quick-connector test connection

SPECIFICATIONS

GENERAL

Power Requirements	85 to 264 VAC, 50/60 Hz, 25 VA max and 12 VDC @ 9 Ahr
Battery/Charger	100 to 240 VAC, 50/60 Hz
Normal Operating Temperature Range	15 to 35 °C
Vibration	Meets MIL-T-28800D
Weight (Typical)	5 kg (11 lb)
Dimensions	10 cm H x 22.7 cm W x 24 cm D (3.9 in. x 8.9 in. x 9.5 in.)
Battery/Charger	8 cm H x 22.5 cm W x 20 cm D (3.1 in. x 8.9 in. x 7.9 in.)
Communications Ports	RS232 (COM1, COM2), IEEE-488.2
Operating Modes	Absolute, gauge, compound gauge, differential
Pressure Ranges	Vacuum to 280 MPa (40 000 psi)
Operating Media	
Q-RPTs lower than A7M	Gas only
All others	Either gas or oil
Calibration	A2LA accredited calibration report included
Pressure Connections	Up to A70M: 1/8 in. NPT F Above A70M: DH500 (equivalent to AE250C)
CE Mark	Available, must be specified

MEASURED PRESSURE (Q-RPT)

Warm Up Time	30 minute temperature stabilization recommended from cold power up
Resolution	To 1 ppm, user adjustable
Predicted One Year Stability[1]	± 0.005 % of reading all ranges and classes

	Standard Class	Premium Class
	Q-RPTs UP TO A10M (1 500 psi)	
Precision[2]	± 0.008 % of reading or 0.0024% of Q-RPT span, whichever is greater[4]	± 0.005 % of reading, 0.0015% of AutoRanged span or 0.0005% of Q-RPT span, whichever is greater[5]
Measurement Uncertainty[3]	± 0.010 % of reading or 0.0030% of Q-RPT span, whichever is greater[4]	± 0.008 % of reading, 0.0024% of AutoRanged span or 0.0007% of Q-RPT span, whichever is greater[5]
	Q-RPTs A14M TO A140M (2 000 to 20 000 psi)	
Precision[2]	± 0.012 % of reading or 0.0036% of Q-RPT span, whichever is greater[4]	
Measurement Uncertainty[3]	± 0.013 % of reading or 0.0039% of Q-RPT span, whichever is greater[4]	
	Q-RPTs A200M to A280M (30 000 to 40 000 psi)	
Precision[2]	± 0.015 % of reading or 0.0045% of Q-RPT span, whichever is greater[4]	
Measurement Uncertainty[3]	± 0.018 % of reading or 0.0054% of Q-RPT span, whichever is greater[4]	

1. Predicted one year stability limit (k=2) assuming regular use of AutoZero function. Absolute mode predicted one year stability without use of AutoZ is ± (0.005 % Q-RPT span + 0.005 % of reading).
2. Combined linearity, hysteresis and repeatability. Add ± 1 Pa (0.00015 psi) in gauge mode with an Axxx Q-RPT for the resolution and short term stability of the on-board barometer.
3. Maximum deviation of the Q-RPT indication from the true value of applied pressure including precision, predicted one year stability, temperature effect and calibration uncertainty, combined and expanded (k=2) following the ISO "Guide to the Expression of Uncertainty in Measurement."
4. % of reading value times measured pressure from 100 to 30 % of Q-RPT span. Under 30 % of Q-RPT span, % of reading value times 30 % of Q-RPT span. For example, if the Q-RPT is a Standard A160K, the Measurement Uncertainty in pressure is 0.010% times the measured pressure to 48 kPa (160 kPa span x 30%) and 0.0048 kPa (160 kPa span x 30% x 0.01%) under 48 kPa.
5. % of reading value times measured pressure from 100 to 30 % of AutoRanged span. Under 30% of AutoRanged span, % of reading value times 30% of AutoRanged span. If AutoRanged span is less then 30% of maximum Q-RPT span, % of reading values times measured pressure, or % of reading times 9% of Q-RPT span, whichever is greater. For example, if the Q-RPT is a Premium A160K and AutoRanged span is 160 kPa, the Measurement Uncertainty in pressure is measured pressure x 0.008% to 48 kPa (160 kPa AutoRanged span x 30%) and 0.0038 kPa (160 kPa span x 30% x 0.008%) under 48 kPa. If the AutoRanged span is 100 kPa (greater than 30% of 160 kPa maximum Q-RPT span), the Measurement Uncertainty in pressure is measured pressure x 0.008% to 30 kPa (100 kPa AutoRanged span x 30%) and 0.0025 kPa (100 kPa span x 30% x 0.008%) under 30 kPa. If the AutoRanged span is 30 kPa (less than 30% of the 160 kPa maximum Q-RPT span), the Measurement Uncertainty in pressure is measured pressure x 0.008% to 14.4 kPa (160 kPa maximum Q-RPT span x 9%) and 0.0012 kPa (160 kPa maximum Q-RPT span x 9% x 0.008%) under 14.4 kPa.

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