

# RPM4™

## Reference Pressure Monitor



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

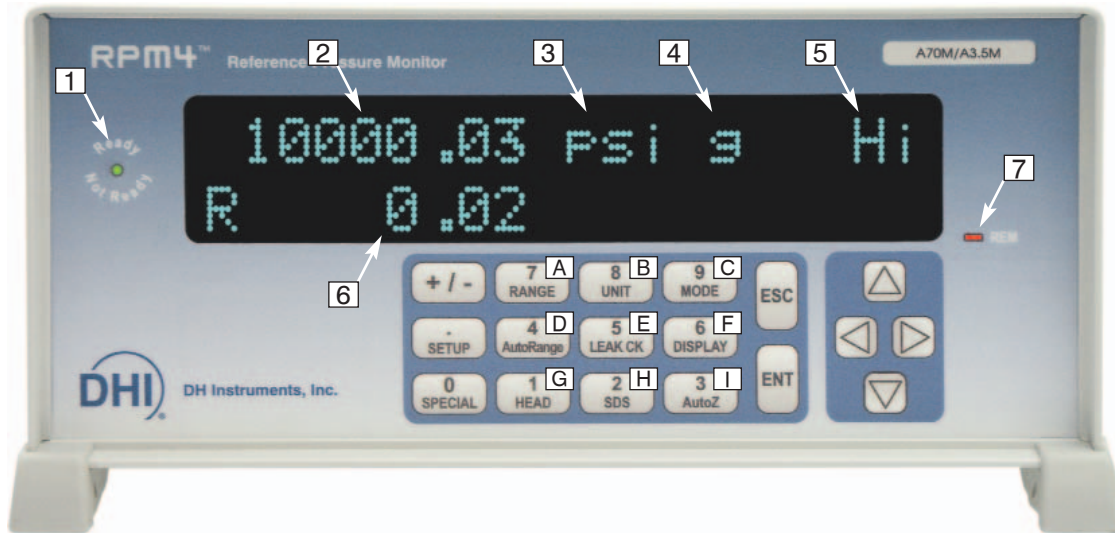


Calibration Solutions  
for Pressure  
and Flow™

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.



Q-RPT Module

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.

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		US VERSION		MEASUREMENT MODE(S) SUPPORTED	OPERATING MEDIA	SDS** Self Defense System	
	MAXIMUM RANGE [kPa] Absolute	MAXIMUM RANGE [kPa] Gauge	MAXIMUM RANGE [psi] Absolute	MAXIMUM RANGE [psi] Gauge				
A280M-L	280 000	280 000	40 000	40 000	Absolute, Gauge and Compound	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		Gas only		Included
A7M	7 000	7 000	1 000	1 000				
A3.5M	3 500	3 500	500	500				
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 <sup>1</sup>	110	---	16	---	Gauge only			
G200K	---	200	---	30				
G100K	---	100	---	15				
BG15K <sup>2</sup>	---	15	---	2.2				

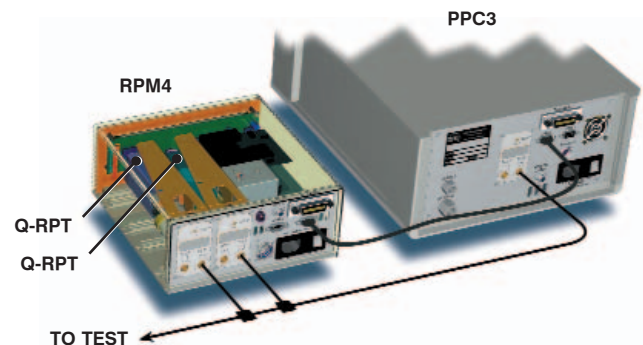
1 BA100K is a barometer with a low point of 70 kPa (10 psia).

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... External valve drivers... RS232 and IEEE-488 communications... FLASH memory and free embedded software upgrades on [www.dhainstruments.com](http://www.dhainstruments.com)... PC based recalibration utility software included... free LabVIEW® drivers.

# ORDERING INFORMATION

## CONFIGURING AN RPM4 MODEL NUMBER...

### RPM4 mhhac/mlllac

Where: **mhhac** 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)

## ACCESSORIES

DESIGNATOR	PART NO.	DESCRIPTION
Drivers Connector	401382	Connector for external electrical drivers
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	Manual gas pressure controller, 110 MPa (16 000 psi)
OPG1-30000	401497	Manual hydraulic pressure generator/controller, 200 MPa (30 000 psi)
PPC3		Automated pressure controller - See PPC3 brochure
VA-MPC-REF, 110V	400922	Vacuum pump (110V) and connections for MPC1
VA-MPC-REF, 220V	401160	Vacuum pump (220V) and connections for MPC1
PK-7000-PPC/MPC	400985	Interconnections kit for RPM4 and MPC1 with quick-connector test connection

# SPECIFICATIONS

## GENERAL

<b>Power Requirements</b>	85 to 264 VAC, 50/60 Hz, 25 VA max and 12 VDC @ 9 Ahr
Battery/Charger	100 to 240 VAC, 50/60 Hz
<b>Normal Operating Temperature Range</b>	15 to 35 °C
<b>Vibration</b>	Meets MIL-T-28800D
<b>Weight (Typical)</b>	5 kg (11 lb)
<b>Dimensions</b>	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.)

<b>Communications Ports</b>	RS232 (COM1, COM2), IEEE-488.2
<b>Operating Modes</b>	Absolute, gauge, compound gauge, differential
<b>Pressure Ranges</b>	Vacuum to 280 MPa (40 000 psi)
<b>Operating Media</b>	Gas only All others Either gas or oil
<b>Pressure Connections</b>	TEST (+), VENT (-) Up to A70M: 1/8 in. NPT F Above A70M: DH500 (equivalent to AE250C) 10-32 UNF ATM
<b>Drivers</b>	(8) 12V, 1 A max total output
<b>CE Mark</b>	Available, must be specified

## MEASURED PRESSURE (Q-RPT)

<b>Warm Up Time</b>	30 minute temperature stabilization recommended from cold power up
<b>Resolution</b>	To 1 ppm, user adjustable
<b>Acceleration Affect</b>	± 0.008 % /g maximum Allows operation at ± 20° from reference plane without significant effect
<b>Predicted One Year Stability<sup>1</sup> All Ranges and Classes</b>	± 0.005 % of reading <sup>4</sup>
<b>Calibration</b>	A2LA accredited calibration report included
<b>Q-RPTs Classes Available</b>	
STANDARD	% of reading uncertainty, from 30 to 100 % of Q-RPT span
PREMIUM	Enhanced % of reading uncertainty and up to 3:1 AutoRange turndown

	STANDARD CLASS	PREMIUM CLASS
	<b>Q-RPTs UP TO A10M (1 500 psi)</b>	
<b>Precision<sup>2</sup></b>	± 0.008 % of reading <sup>4</sup>	± 0.005 % of reading, and AutoRange turndown <sup>5</sup>
<b>Measurement Uncertainty<sup>3</sup></b>	± 0.010 % of reading <sup>4</sup>	± 0.008 % of reading, and AutoRange turndown <sup>5</sup>
	<b>Q-RPTs A14M TO A140M (2 000 to 20 000 psi)</b>	
<b>Precision<sup>2</sup></b>	± 0.012 % of reading <sup>4</sup>	
<b>Measurement Uncertainty<sup>3</sup></b>	± 0.013 % of reading <sup>4</sup>	
	<b>Q-RPTs A200M TO A280M (30 000 to 40 000 psi)</b>	
<b>Precision<sup>2</sup></b>	± 0.015 % of reading <sup>4</sup>	
<b>Measurement Uncertainty<sup>3</sup></b>	± 0.018 % of reading, and AutoRange turndown <sup>5</sup>	

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 applies to 30 to 100 % of Q-RPT span. Under 30 % of Q-RPT span, uncertainty is a constant value obtained by multiplying the % of reading value by 30 % of Q-RPT span.
5. % of reading applies from 30 to 100 % of any AutoRanged span equal to or greater than 30 % of the Q-RPT span. Under 30 % of AutoRanged span, uncertainty is a constant value obtained by multiplying the % of reading value by 30 % of AutoRanged span. If the AutoRanged span is less than 30 % of the Q-RPT span, uncertainty is % of reading or % of reading value times 9 % of Q-RPT span, whichever is larger.

Due to a policy of continuous improvement, all specifications contained in this document are subject to change without notice.

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