PG7000-AMH

Automated Mass Handling for PG 7000 Piston Gauges

Introduction

PG7000™, already the world's most advanced piston gauge, takes another step ahead with the introduction of AMH™ automated mass handling technology. Finally, tedious, error prone and wear inducing manual mass manipulation can be eliminated from high end piston gauge operation… over the full pressure range, in bench top systems, at a reasonable cost. The AMH system is an optional accessory to PG7000 platforms. It can be added to existing platforms or ordered with new installations. Two models are available to cover the complete PG7000 line of gas and oil operated piston gauges… including absolute mode with a vacuum reference.

Thanks to the PG7000's unique system architecture, the exact level of automation appropriate for the application can be configured with standard components. Automate mass handling while maintaining direct operator control over pressure generation and adjustment… or use standard pressure controllers to automate pressure control and make fully automated piston gauge operation a reality. In all cases, PG7000's unified approach assures a simple, integrated system with a single local and remote interface.

PG7000-AMH… a new level in piston gauge applications… an ultra-high performance alternative in pressure controller applications…

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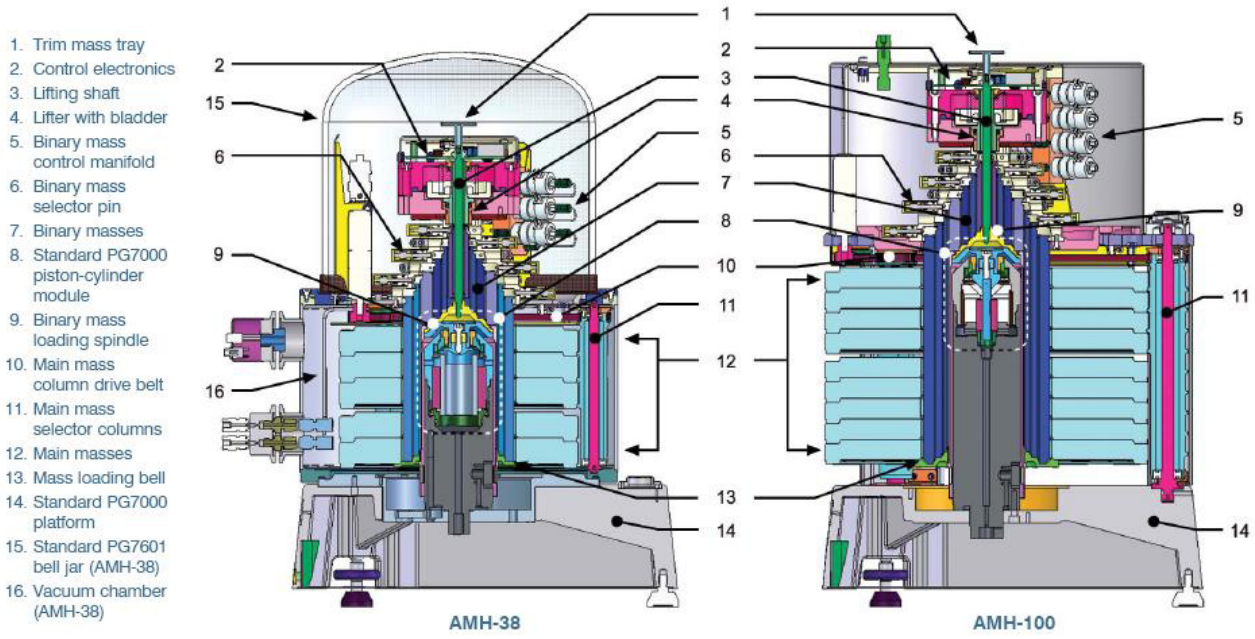

AMH Technologie

To install the AMH masses, a binary mass spindle is placed on the piston cap and a mass bell is installed over the spindle. The mass set's main mass discs are hung from the mass bell. Tubular binary masses are placed in descending sequence on the mass bell hanger and on the spindle. The mass handling system is placed over the installed mass set and controlled by the PG7000 platform, using RS232 communications from the platform's COM3 port. To load a specific mass value, the mass handling system raises the entire mass load above the piston upper end of stroke to the mass selection position. The mass is raised by a pneumatically actuated lifter acting on a lifter shaft connected to the binary mass spindle. Each tubular binary mass that is not to be loaded is held in place by engaging three selector pins. The three main mass columns are rotated synchronously so that the main masses not to be loaded are held in place by the columns' retention ledges and masses to be loaded face release flats. When the mass selection is complete, the lifter moves down, placing the lifter shaft, binary spindle, bell and all the released masses onto the piston. The AMH mass handling system is designed and tested to provide years of reliable, maintenance free mass manipulation.

AMH Operating

Mass Loading System

Control of the mass handling system is integrated into PG7000's intelligent operation. In pressure entry mode, when a target pressure command is entered from the front panel or remotely, PG7000 calculates the mass required to achieve the target pressure. It then stops piston rotation and loads the mass value by sending a command to the AMH. The true value of mass loaded and exact pressure value achieved are reported and updated real time. In mass entry mode, the requested value is loaded directly. The mass actually loaded by the AMH is as close as possible to the target value within AMH's 100 g loading resolution. If more precise mass loading is specified, the operator is instructed to load trim masses on the trim mass tray (not available in absolute mode with vacuum reference).

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AMH-38, 38 kg under vacuum for PG7601

The AMH-38 provides automated mass handling of a 38 kg mass set for the PG7601 piston gauge platform. The mass handling system is integrated into a vacuum chamber which provides KF40 vacuum fittings for connection of a turbo molecular vacuum pump and external vacuum gauge if desired. Automated mass handling eliminates the need to break the vacuum between pressure points and reference vacuum as low as 0.01 Pa (< 0.1 mTorr) can be maintained indefinitely.

AMH-38 Piston-Cylinder Ranges and Automated Increment

PISTON-CYLINDER MODULE	MINIMUM PRESSURE		MAXIMUM PRESURE		MINIMUM AUTOMATED INCREMENT	
	kPa	psi	kPa	psi	kPa	psi
PC - 7100 / 7600 - 10	7	1.0	380	55	1	0.15
PC - 7100 / 7600 - 10, TC	10	1.5	380	55	1	0.15
PC - 7100 / 7600 - 50	35	5.0	1900	275	5	0.70
PC - 7100 / 7600 - 200	140	20.0	7600	1100	20	3.00

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Access To Piston-Cylinder Module

The same piston-cylinder modules used in PG7000 with manual mass handling are used with AMH. The piston-cylinder module can be removed and reinstalled in less than 5 minutes, and requires about the same amount of effort as a single, manual mass handling calibration sequence.

The piston-cylinder module is accessed by removing the AMH mass handling system and masses. The procedure is to load all of the mass on the piston so that no masses are in contact with the mass handler. The mass handler is lifted off of the PG7000 platform vertically, leaving behind the complete loaded mass set. The masses are then removed manually to access the piston-cylinder module.

AMH-100 - 100 kg for PG7102, 7202, 7302

The AMH-100 provides automated mass handling of a 100 kg mass set for the PG7102, PG7202 and PG7302 piston gauge platforms.

The 100 kg mass set results in a very wide range on a single piston-cylinder module, minimizing the need for piston-cylinder changes.

AMH-100 Piston-Cylinder Ranges and Automated Increment

PISTON-CYLINDER-MODULE	MINIMUM PRESSURE		MAXIMUM PRESSURE		MINIMUM AUTOMATED INCREMENT	
	kPa	psi	MPa	psi	kPa	psi
PC - 7100 / 7600 - 10	10	1.50	1	150	1	0.15
PC - 7100 / 7600 - 10, TC	13	1.90	1	150	1	0.15
PC - 7100 / 7600 - 50	50	7.00	5	750	5	0.70
PC - 7100 / 7600 - 200	200	29.00	11*	1600*	20	3.00
PC - 7200 oder 7300 - 100	100	14.50	10	1500	100	14.50
PC - 7200 oder 7300 - 200	200	29.00	20	3000	20	3.00
PC - 7200 oder 7300 - 500	500	72.50	50	7500	5	7.30
PC - 7300 - 1	1000	145.00	100	15000	100	14.50
PC - 7300 - 2	2000	290.00	200	30000	200	29.00
PC - 7300 - 5	5000	725.00	500	72500	500	75.00

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Specifications

Automated Mass Handler

Electrical Power:	100 to 240 VAC, 50 to 60 Hz 30 W max consumption
Normal Operating Temperature Range:	15 to 35 oC
Weight (Mass Handler Only):	
AMH-38	18 kg (40 lb)
AMH-100	12 kg (26 lb)
Dimensions:	
AMH-38	41 cm H x 37 cm W x 38 cm D (16.3 in. x 14.6 in. x 15 in.)
AMH-100	41 cm H x 41 cm W x 36 cm D (16.3 in. x 16.1 in. x 14.1 in.)
Communications Port:	RS232 (COM1), controlled by PG7000 platform
Drive Air Supply:	550 kPa (80 psi) "shop air"
Drive Air Connection:	Quick connect equivalent to Swagelok® QM Series (QM2-B200)

AMH-38 Vacuum Chamber

Fittings	(2) KF40 for pump and vacuum gauge upgrade
Typical Residual Vacuum	< 10 mPa (0.08 mTorr) with 70 l/s turbo pump Higher pressure with other pumps
Mass Changing Time	< 15 sec
CE Conformance	Available, must be specified

MASS SET

	MS-AMH-38	MS-AMH-100
Fits PG7000 Platforms	7601	7102, 7202, 7302
Minimum Mass	**(Piston and Bell)** 0.7 kg (1 kg w/ tungsten carbide 10 kPa/kg)	**(Piston and bell)** 1kg
Maximum Mass Load	38 kg	103,7 kg
Minimum Automated Increment	100 g (373 increments), trim masses to 0.01 g may be loaded manually	100g (1 027 increments) trim masses to 0.01 g may be loaded manually
Mass Set Composition	Piston 0.2 kg (10 kPa/kg t-c 0.5 kg) Bell, spindle, lifter assembly 0.5 kg (6) cylindrical binary masses of 0.1, 0.2, 0.4,0.8, 1.6, 3.2kg (5) main mass disks of 6.2 kg	Piston 0.2 kg (10 kPa/kg t-c 0.5 kg) Bell, spindle, lifter assembly 0.8 kg (7) cylindrical binary masses of 0.1, 0.2, 0.4,0.8, 1.6, 3.2, 6.4kg of 10 kg each (1) trim mass set of 50 g to 0.01 g*
Mass Uncertainty	± 5 ppm	

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Ordering Information

The AMH automated mass handling system is ordered as an accessory to a PG7000 piston gauge platform. AMH automated mass handling requires an AMH mass handler and mass set.

For new installations, the mass handler is ordered with the piston gauge platform as a separate line item.

The AMH mass set is ordered in place of a manual mass set. AMH mass handling systems may be used with existing PG7000 platforms. Most PG7601s can use AMH-38 without modification. PG7102, PG7202 and PG7302 must be modified for AMH-100 (order AMH-100-RETRO). This procedure requires return of the PG7000 platform. Please contact **DHI** for assistance.

DESIGNATOR	PART NO.	DESCRIPTION
AMH-38-VAC	402061	Automated mass handler
AMH-100	402062	Automated mass handler
MS-AMH-38	402063	38 kg mass set, AMH
MS-AMH-100	402064	100 kg mass set, AMH
AMH-100-RETRO-AR	402065	Modify platform with AutoRotate
AMH-100-RETRO-NAR	402066	Modify platform without AutoRotate

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