



OPERATING MANUAL

CONBEL™ Pneumatic Consolidation Test System HM-354, HM-355 and HM-356

INTRODUCTION:

Karol-Warner CONBEL™ Pneumatic Consolidation Test Systems are accurate and reliable loading mechanisms for soils consolidation testing at low or high loads. The unique design features greater testing sensitivity and ease of operation. A low-bleed pressure regulator is used to set and maintain specimen loads. Adjustable centering pads quickly align the Consolidometer. The rugged, powder coated steel cabinet protects the unit in harsh lab environments.

A Fixed-Ring or Floating-Ring Consolidometer and a Mechanical or Digital Dial Indicator are required to perform testing and are sold separately. Each Consolidometer includes loading pad, cutting sample ring, top and bottom porous stones, acrylic inundation ring and load-bearing ball. Calibration Discs to verify system performance are optional and are sold separately. A source of compressed air is required for operation.

FEATURES:

- Meets ASTM D2435, ASTM D4546 and AASHTO T 216 standards
- Stainless-steel vertical support rods
- 1in (25.4mm) thick aluminum platforms with adjustable centering pads
- Sturdy powder coated steel cabinets
- Compact size allows for tabletop operation
- Digital readout
- Precision pressure regulators and pressure transducers
- Loading ball included
- 16tsf (1,532kPa), 32tsf (3,064.3kPa) and 64tsf (4,596.5kPa) load capacities available

SPECIFICATIONS:

Height: 20.5in (521mm)
Width: 12in (305mm)
Depth: 14.5in (368mm)
Vertical Clearance: 8.25in (210mm)
Horizontal Clearance: 7.75in (197mm)
Weight: 48lbs (21.8kg)
Maximum Piston Travel: 0.5in (12.2mm)



HM-354



HM-354 closeup

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ACCESSORIES (Purchased Separately):

- Consolidometer – Fixed Ring or Floating Ring (refer to Consolidometer chart below).
- Dial Indicator Options
 - MA-333 Mechanical Dial Indicator, 0.5 x 0.0001in
 - MA-363 Digital Dial Indicator, 0.6 x 0.0001in
 - HM-738 Linear Digital Displacement Transducer and HM-418 Two-Channel Digital Display Readout Box
- Calibration Discs, stainless steel discs replace a soil sample for verification of loading system.

Consolidometer		
Description	Model	Calibration Disc
50mm (1.969in) Fixed Ring Consolidometer	HMA-83A	HMA-88A
2in (50.8mm) Fixed Ring Consolidometer	HMA-83B	HMA-88B
60mm (2.36in) Fixed Ring Consolidometer	HMA-83C	HMA-88C
2.42in (61.5mm) Fixed Ring Consolidometer	HMA-83D	HMA-88D
2.5in (63.5mm) Fixed Ring Consolidometer	HMA-83E	HMA-88E
70mm (2.756in) Fixed Ring Consolidometer	HMA-83F	HMA-88F
75mm (2.95in) Fixed Ring Consolidometer	HMA-83G	HMA-88G
3in (76.2mm) Fixed Ring Consolidometer	HMA-83H	HMA-88H
50mm (1.97in) Floating Ring Consolidometer	HMA-84A	HMA-88A
2in (50.8mm) Floating Ring Consolidometer	HMA-84B	HMA-88B
2.42in (61.47mm) Floating Ring Consolidometer	HMA-84D	HMA-88D
2.5in (63.5mm) Floating Ring Consolidometer	HMA-84E	HMA-88E
70mm (2.76in) Floating Ring Consolidometer	HMA-84F	HMA-88F

COMPONENT ASSEMBLY:

- Dial Indicator rod: Screws into the center rear of the load platform between the two eccentric stops.
- Dial Indicator clamping arm: Attaches to the Dial Indicator rod.
- Air line: The 15ft (4,572mm) x 0.25in (6.3mm) ID air line connects to the push-on fitting at the rear of the cabinet.
 - Air pressure should not exceed 200psi
 - Air pressure should not be less than 20psi higher than the highest pressure setting

PANEL CONTROLS:

- PRESSURE readout: Built-in digital display with $\pm 0.5\%$ accuracy.
- LOAD REGULATOR: Sets and maintains air pressure to the pistons to load the sample; sensitive to 0.125in (3.18mm) variations in water column.
- HIGH/LOW LOAD selector valve:
 - LOW LOAD – loads to 1tsf (95.76kPa)
 - HIGH LOAD – loads to 16tsf (1,532kPa), 32tsf (3,064.3kPa) or 64tsf (4,596.5kPa)
 - OFF – used when changing from 1 to 2tsf loads
- LOAD valve: When open, allows air flow from the regulator to the pistons.

UNPACKING & SETUP:

1. Carefully inspect your CONBEL™ Pneumatic Consolida-

tion Test System for damage, and report immediately to the shipper if any is found.

2. Ensure the following items are included:
 - Dial Indicator rod
 - Dial Indicator clamping arm
 - Air line tubing, 15ft (4,572mm) x 0.25in (6.3mm) ID
 - Loading ball
3. Unpack the required accessories (ordered separately):
 - Consolidometer(s)
 - Dial Indicator
4. Attach the Dial Indicator rod, Dial Indicator clamping arm and air line as noted in “COMPONENT ASSEMBLY”.
5. If using a Consolidometer that is not Karol-Warner, adjust the centering pads on the loading platform, as these stops have been set for Karol-Warner Consolidometers.
 - When using a Karol-Warner Fixed Ring or Floating Ring Consolidometer, alignment is automatic when placed against the eccentric stops.
6. Adjust the lower nuts on the crossarm supports until there is an approximate 1/16in (1.59mm) gap between the crossarm and the ball on the Consolidometer load pad or piston when using a back pressure Consolidometer.
7. Adjust the Dial Indicator (or Linear Digital Displacement Transducer) to the top of the displacement indicator pin on the upper crossarm to allow for sufficient travel when the sample compresses.

OPERATING INSTRUCTIONS:

1. Read all operating instructions before operating the unit.
2. Consult ASTM D2435, ASTM D4546 or AASHTO T 216 for specific instructions on testing procedures.
3. Set the HIGH/LOW LOAD selector valve to LOW LOAD.
4. Set the LOAD valve to OFF.
5. Select a seating load per the CONBEL™ Load Setting Table.
 - The combined weight of the load pad, porous stone and steel ball has not been factored into the calibration sheets.
 - When using a back pressure Consolidometer, factor in the weight of the piston along with the cross-sectional area of the piston and the pressure during the test.
 - The cross-sectional area of a 0.75in (19.1mm) diameter piston is 0.44 in² (2856.03mm²).
6. With the vertical dial indicator seated on the crossarm pin, note the reading on the data sheet.

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7. Turn the LOAD valve from OFF to LOAD and start a separate timer to record the appropriate time deformation characteristics.
8. To apply the next load, turn the LOAD valve to OFF, adjust the LOAD REGULATOR to the required pressure and repeat the previous step.
9. When changing from 1tsf (95.76kPa) to 2tsf (191.5kPa), turn both valves (LOAD and HIGH/LOW LOAD) to OFF and adjust the pressure to the desired setting.
10. Simultaneously turn the HIGH/LOW LOAD valve to HIGH LOAD and the LOAD valve to LOAD.
11. Record the appropriate time deformation characteristics.
12. When unloading the sample, turn the LOAD valve to OFF and adjust the LOAD REGULATOR to zero psi.
13. Turn the LOAD valve to LOAD to exhaust the air through the regulator vent.