







# HM685 QUICK START GUIDE

---

## Key Pad

Each key and its function are described below.

	The ▲ and ▼ keys are used to navigate through menus or to select an item to change.
	The ◀ and ▶ keys are used to change the selected item.
<b>ESC</b>	The <b>ESC</b> key returns to the previous screen or cancels an operation without saving changes.
	Pressing the <b>ENTER</b> key accesses the Main Menu, select a menu item or accept changes.
<b>READ</b>	Pressing the <b>READ</b> key initiates taking a time-averaged reading based on Log Mode and Log Settings. After taking the reading, the values are stored to memory (current Test ID) and displayed on screen for a period of four (4) seconds or until the <b>READ</b> key has been pressed again. The <b>READ</b> key also updates the calculations with current readings in the <b>CALCULATIONS</b> Menu.
	Press the <b>BACKLIGHT</b> key to turn the display's backlighting on or off.
<b>DATA</b>	Press the <b>DATA</b> key from a measurement screen to access the Data Logging Menu.
<b>PRESS</b>	Accesses the Pressure measurement screen from the Flow measurement screen.
	Press the  key to turn the HM685 Hydronic Manometer on or off.
<b>CALC</b>	Accesses the Calculations menu from the Flow or Pressure measurement screen.
<b>FLOW</b>	Accesses the Flow measurement screen from the Pressure measurement screen.

---

## Instrument Power

The HM685 Hydronic Manometer can be powered by four (4) AA-size batteries (alkaline or rechargeable NiMH) or the AC adapter.

---

## Battery Installation

Locate the battery cover on the back of the unit and loosen the screw to remove. Take out the battery holder and replace with fresh batteries (alkaline or rechargeable NiMH). Ensure that the batteries are correctly oriented within the battery holder and Set the battery-type selection switch to indicate the type of batteries to be used (alkaline or rechargeable NiMH). Reinstall the battery holder and battery cover.

---

## Using the AC Adapter

The AC adapter allows the HM685 Hydronic Manometer to be powered from a standard AC wall outlet. When using the AC adapter, alkaline batteries (if installed) will be bypassed. The AC adapter also charges the NiMH type batteries (if installed) in the unit.

---

## Zeroing the Gauge Pressure Sensor

Upon instrument start-up, the user will be prompted to zero the gauge pressure sensor and includes on-screen instructions. Gauge pressure sensor zeroing can also be initiated by selecting **Zero Gauge Pressure** when in the Main Menu by pressing the **ENTER (↵)** key. The (+) and (-) pressure ports must be open to atmosphere and the valve handle on the manometer set to the **MEASURE** position.



---

## Zeroing the Differential Pressure Sensor

Turn the valve handle on the manometer to the **BYPASS** position while in the main **Measurement Screen** to automatically zero the differential pressure sensor. Zeroing of the differential pressure sensor occurs any time the valve handle is turned to the **BYPASS** position. Any pressures applied to the hoses will not affect the **dP** zeroing function and allows for zeroing of the differential pressure sensor while maintaining connections to the system under test.

---

## Attaching the Hoses to the Manometer

Connect the straight female flare fitting on the High pressure (red) hose to the male fitting on the top of the manometer marked with a plus (+) sign. Connect the straight female flare fitting on the Low pressure (blue) hose to the male fitting on the top of the manometer marked with a minus (-) sign.

---

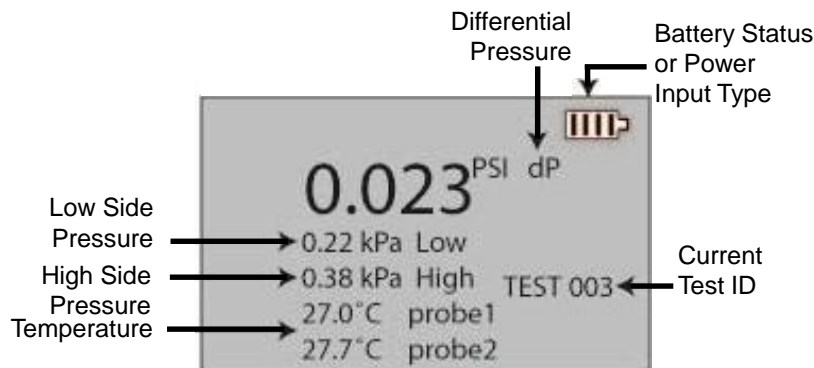
## Bleeding Entrained Air from the Hoses

1. Turn the shut-off ball valve on both the High and Low pressure hoses to the closed position.
2. Turn the valve handle on the manometer to the **MEASURE** position.
3. Using an appropriate fitting, connect the open end of the High pressure (red) hose to the test point with the higher line pressure.
4. Attach the appropriate fitting to the open end of the Low pressure (blue) hose.
5. To ensure all the air is bled from the hoses, hold the open end of the Low pressure (blue) hose in an upright position over a suitable receptacle or near a drain.
6. Turn the shut-off ball valve on both the High and Low pressure hoses to the open position.
7. Turn the valve handle on the manometer to the **BYPASS** position to allow the liquid flow to displace the entrained air.
8. Once the liquid is flowing steadily from the Low pressure (blue) hose, turn the valve handle on the manometer to the **MEASURE** position.

---

## Performing Pressure Measurements

The HM685 Hydronic Manometer allows for simultaneous and continuous measurement and display of the High-side gauge and Differential pressure. The calculated Low-side gauge pressure is also displayed.



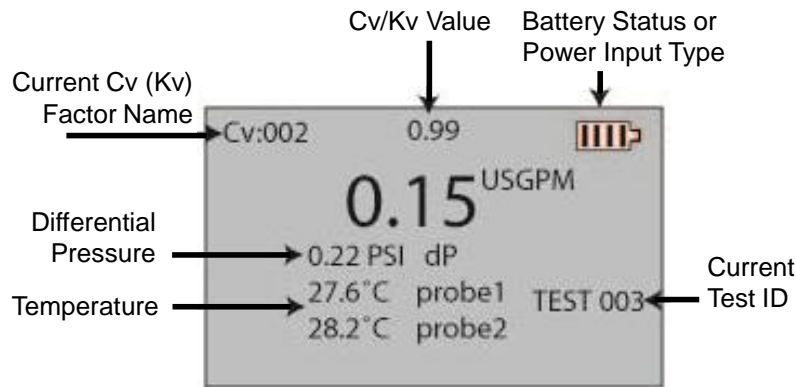
---

## Discrete Pressure Measurements

Taking a discrete pressure measurement allows for measurement and display of a single time-averaged reading taken over the sampling period as defined by the Log Mode and Log Settings. Discrete measurement values are stored to the memory (current Test ID) and displayed on-screen for a period of four (4) seconds and then returns to continuous measurement mode. Press the **READ** key to initiate.

## Performing Flow Measurements

The manometer makes and displays continuous differential pressure measurements, calculates and displays continuous flow readings, and allows for discrete data storage to the memory when in the Flow measurement screen.



<b>Flow</b>	A calculated value determined from the differential pressure and user entered values for the valve flow coefficient (Cv or Kv) and fluid specific gravity.
<b>Cv/Kv</b>	The valve flow coefficient is indicated as Cv (Kv) on the manometer display. The <b>Cv (Kv)</b> value of the measured valve must be known in order to obtain meaningful flow readings. The Cv (Kv) value can be temporarily edited within the Flow Measurement screen by pressing the ▲ or ▼ key to enter an edit mode. Use the ▲ or ▼ keys to change the value. Press <b>ESC</b> to leave the edit mode.

## Discrete Flow Measurements

Taking a discrete flow measurement allows for measurement and display of a single time-averaged reading taken over the sampling period as defined by the Log Mode and Log Settings. Discrete pressure or flow measurement values are stored to the memory (current Test ID) and displayed on-screen for a period of 4 seconds and then returns to continuous measurement mode. Press the **READ** key to initiate.

## Performing Temperature Measurements

The accessory temperature probes are optional for the HM685 Hydronic Manometer and can be connected to the 3-pin mating connector located on the right-hand side of the manometer. The unit of measurement for temperature (°F or °C) is driven by the differential pressure measurement:

Differential pressure in psi, inH<sub>2</sub>O, ftH<sub>2</sub>O, or inHg → temperature in °F  
 Differential pressure in kPa, mH<sub>2</sub>O, mmHg, or bar → temperature in °C

## Menu Items

Pressing the ← key from either the Pressure or Flow Measurement screens accesses the Main Menu, select a menu item or accept changes. Use the arrow ▲ ▼ ◀ ▶ keys to navigate through menu items and change selected items.

<u>MENU</u>
Zero Gauge Press
Flow Setup
Data Logging
Calculations
Settings
Calibration

## Flow Setup

Use Flow Setup to set values for key factors that impact measured flow values.

## Data Logging

Access the Data Logging Menu by pressing the DATA key from either the Pressure or Flow Measurement screens or from the Main Menu.

**Log Mode:** HM685 programmable logging formats:

Auto-Save Logging	Samples are automatically logged to memory at the end of the sampling period. To start logging, press the <b>Read</b> key.
Cont-key Logging	Logging starts by press the <b>Read</b> key. The instrument continues logging until the <b>Esc</b> key is pressed.
Cont-time Logging	Readings start by pressing the <b>Read</b> key. The instrument continues taking samples until the time set in "Sample Time" elapses or the <b>Esc</b> key is pressed.

**Log Settings:** defines the period the manometer will log sample readings. When the Log Mode is set to Cont-Time, this setting is also used to define the length of the test in hh:mm:ss.

**Choose Test:** choose the Test where the samples (readings) will be stored.

**Name Test:** customize the Test ID name of the selected test using 10 characters maximum.

**View Data:** choose the data to review.

**Delete Data:** delete discrete samples, an entire Test ID, or all data stored.

**Memory:** displays the total memory available

## Calculations

The Calculations Menu is accessed by pressing the **CALC** key from either the Pressure or Flow Measurement screens.

**Brake Power:** determines pump brake power using flow, delta P and pump efficiency

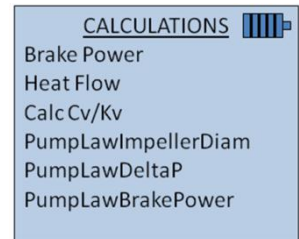
**Heat Flow:** determines heat flow using temperature, flow, specific heat and gravity

**Calc Cv/Kv:** calculates **Cv** or **Kv** based on flow and differential pressure

**Pump Law Impeller Diameter:** allows for determination of required pump impeller size

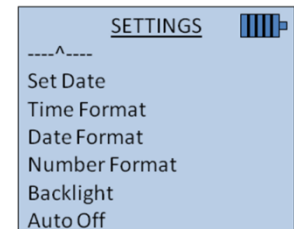
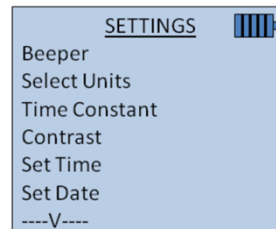
**Pump Law Delta P:** determines required pump pressure drop using flow and delta P inputs

**Pump Law Brake Power:** determines pump brake power based upon the following affinity law: Pump brake power varies as the cube of flow



## Settings

The Settings menu allows customization of the instrument display.



UNDERSTANDING, ACCELERATED

TSI Incorporated – Visit our website [www.tsi.com](http://www.tsi.com) for more information.

USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
UK	Tel: +44 149 4 459200	China	Tel: +86 10 8219 7688
France	Tel: +33 1 41 19 21 99	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		