

FLUKE®

— Hart Scientific®

2019-DCB

Liquid-In-Glass Thermometer Calibration Kit User's Guide

Fluke Corporation, Hart Scientific Division

799 E. Utah Valley Drive • American Fork, UT 84003-9775 • USA

Phone: +1.801.763.1600 • Telefax: +1.801.763.1010

E-mail: support@hartscientific.com

www.hartscientific.com

Subject to change without notice. • Copyright © 2005 • Printed in USA

Table of Contents

1	Before You Start	1
1.1	Symbols Used	1
1.2	Safety Information	2
1.2.1	WARNINGS	2
1.2.2	CAUTIONS	3
1.3	Authorized Service Centers.	3
2	Introduction	7
2.1	Description	7
2.1.1	Carousel	7
2.1.2	Access Cover	7
2.1.3	Flow Tube	9
2.1.4	Flow Adjustment Gate	9
3	Installation	11
4	Operation	15
5	Maintenance	17
5.1	Removal of the 2019-DCB	17
6	Disclaimer.	19

Figures

Figure 1 2019 Assembly 8

Figure 2 Flow Adjustment Gate. 9

Figure 3 Slide the flow tube over the stirring assembly outlet. 11

Figure 4 Inside Bath Tank 12

Figure 5 2019 Assembly in Place with Optional Magnifying Scope 13

Figure 6 Thermometer Holding Carousel 13

1 Before You Start

1.1 Symbols Used

Table 1 lists the International Electrical Symbols. Some or all of these symbols may be used on the instrument or in this manual.

Table 1 International Electrical Symbols

Symbol	Description
	AC (Alternating Current)
	AC-DC
	Battery
	CE Complies with European Union Directives
	DC
	Double Insulated
	Electric Shock
	Fuse
	PE Ground
	Hot Surface (Burn Hazard)
	Read the User's Manual (Important Information)
	Off
	On

Symbol	Description
	Canadian Standards Association
CAT II	OVERVOLTAGE (Installation) CATEGORY II, Pollution Degree 2 per IEC1010-1 refers to the level of Impulse Withstand Voltage protection provided. Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation. Examples include household, office, and laboratory appliances.
	C-TIC Australian EMC Mark
	The European Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) mark.

1.2 Safety Information

Use this instrument only as specified in this manual. Otherwise, the protection provided by the instrument may be impaired.

The following definitions apply to the terms “Warning” and “Caution”.

- “WARNING” identifies conditions and actions that may pose hazards to the user.
- “CAUTION” identifies conditions and actions that may damage the instrument being used.

1.2.1 WARNINGS

To avoid possible personal injury, follow these guidelines.

GENERAL

- It is not recommended that this accessory be left unattended during operation.
- The user should be familiar with the operation and the User's Guide for the bath this accessory is being use with.
- **DO NOT** use the instrument for any application other than calibration work. The instrument was designed for temperature calibration. Any other use of the unit may cause unknown hazards to the user.
- This accessory is to be used with Hart's Deep Well Compact Bath models only.
- **DO NOT** overfill the bath. Overflowing extremely cold or hot fluid may be harmful to the operator. Refer to the specific Bath Preparation and Filling instructions in the bath User's Guide.
- Follow all safety guidelines listed in the user's manual.
- Calibration Equipment should only be used by trained personnel.

- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Overhead clearance is required to use this accessory with the bath. Do not place the instrument under a cabinet or other structure. Always leave enough clearance to allow for safe and easy insertion and removal of probes.
- The instrument is intended for indoor use only.

BURN HAZARD

- Metal parts of this accessory will be the same temperature as the bath fluid. **DO NOT** touch the metal parts of the accessory. Only touch the black plastic handles provided.
- Hot fluids may be present. The technician must be careful to avoid any hot fluid that might be accessible when rotating the carousel.
- Extremely cold temperatures may be present in this equipment. Freezer burns and frostbite may result if personnel fail to observe safety precautions.
- High temperatures may be present in this equipment. Fires and severe burns may result if personnel fail to observe safety precautions.

BATH FLUIDS

- Fluids used with this accessory may produce noxious or toxic fumes under certain circumstances. Consult the fluid manufacturer's MSDS (Material Safety Data Sheet). Proper ventilation and safety precautions must be observed.
- Utilization of a vent hood or other ventilation system is required for silicon oil at high temperatures.

1.2.2

CAUTIONS

- **DO NOT** turn on the bath used with this accessory without fluid in the tank and the heating coils fully immersed.
- The gate must always be set to its lowest position while making temperature changes to prevent overflowing the access cover.
- When taking the adapter away from the bath, do not allow it to drip onto the control panel or scope.

1.3

Authorized Service Centers

Please contact one of the following authorized Service Centers to coordinate service on your Hart product:

Fluke Corporation, Hart Scientific Division

799 E. Utah Valley Drive

American Fork, UT 84003-9775
USA

Phone: +1.801.763.1600
Telefax: +1.801.763.1010
E-mail: support@hartscientific.com

Fluke Nederland B.V.

Customer Support Services
Science Park Eindhoven 5108
5692 EC Son
NETHERLANDS

Phone: +31-402-675300
Telefax: +31-402-675321
E-mail: ServiceDesk@fluke.nl

Fluke Int'l Corporation

Service Center - Instrimpex
Room 2301 Sciteck Tower
22 Jianguomenwai Dajie
Chao Yang District
Beijing 100004, PRC
CHINA

Phone: +86-10-6-512-3436
Telefax: +86-10-6-512-3437
E-mail: xingye.han@fluke.com.cn

Fluke South East Asia Pte Ltd.

Fluke ASEAN Regional Office
Service Center
60 Alexandra Terrace #03-16
The Comtech (Lobby D)
118502
SINGAPORE

Phone: +65 6799-5588

Telefax: +65 6799-5588

E-mail: antng@singa.fluke.com

When contacting these Service Centers for support, please have the following information available:

- Model Number
- Serial Number
- Voltage
- Complete description of the problem

2 Introduction

Hart Scientific Deep-Well Compact Baths may be readily adapted for calibration of liquid-in-glass thermometers. The 2019-DCB Liquid-In-Glass Thermometer Calibration Kit provides features specific for the needs of liquid-in-glass thermometer calibration. Additionally, the model 2069 8X magnifying scope is recommended for use with this kit. These accessory products easily mount to the Hart 6331, 7321, 7341 and 7381 baths providing an excellent solution for liquid-in-glass thermometer calibration.

2.1 Description

The 2019-DCB Calibration Kit allows easy calibration of liquid-in-glass thermometers by allowing the bath fluid to rise up near the top of the bath to a point adequately below the thermometer meniscus to permit non-compensated reading of a total immersion thermometer. Multiple thermometers can be accommodated in the carousel and then easily rotated into position for reading.

The kit consists of the following major components: 1) the carousel, 2) access cover, 3) flow tube, and 4) flow adjustment gate. See Figure 1 on page 8.

2.1.1 Carousel

The carousel is a device with individual wells that holds up to 10 thermometers. This provides one reference thermometer and up to 9 units under test. The carousel rests on top of the access cover and is easily installed or removed as required. Each thermometer well in the carousel is provided with a spring that holds the thermometer in place and keeps it steady in the well. All thermometers will be in direct contact with the fluid. The carousel can rotate easily in its locating hole permitting each thermometer to be viewed through the magnifying telescope directly in front of the bath. There are two handles each located directly across from one another on the perimeter of the carousel to facilitate rotation. Each handle has an insulating knob on the top.



BURN HAZARD WARNING: *Hot fluids may be present. The technician must be careful when rotating the carousel to avoid any hot fluid that might be accessible.*

2.1.2 Access Cover

The access cover rests on the edges of the bath access hole and serves several purposes. The first is to prevent drafts over the surface of the fluid from disturbing the stability of the bath. It supports the carousel, locating it centrally over the flow tube. It provides a guide and clamp for positioning and holding the flow adjustment gate in the desired location. Finally, there are several added holes in the cover to permit draining of spilled or overflowed fluid back into the bath tank.

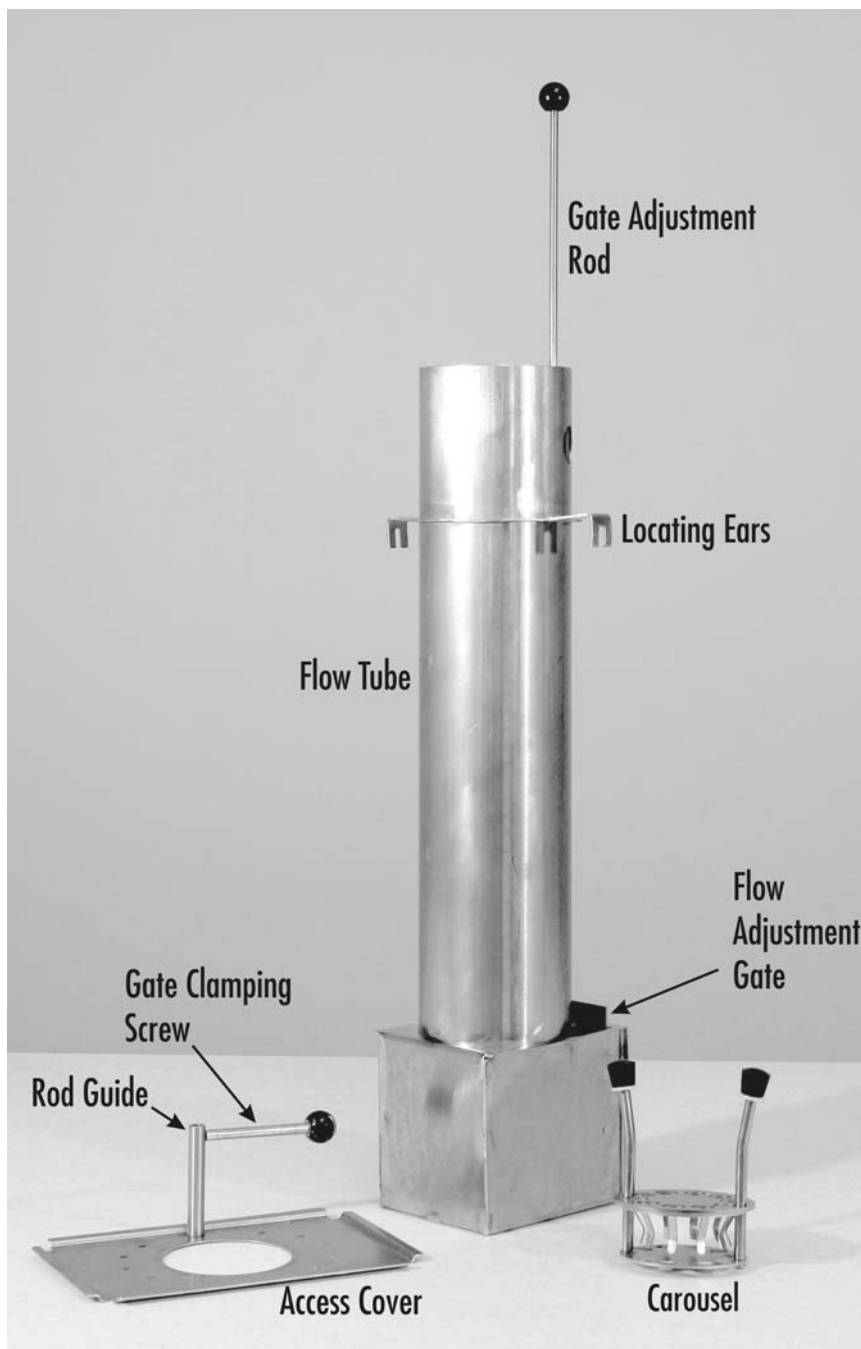


Figure 1 2019 Assembly

2.1.3 Flow Tube

The flow tube is a stainless steel tube that attaches to the bath's stirring assembly. Bath fluid is pushed up through the tube to a level near the top of the bath. The tube is about 3.5 inches (88.9 mm) in diameter. It attaches to the inside of the tank at specific locations that keep it properly situated and supported while forcing the bath's fluid into and up through it. The fluid exits through holes near the top without needing to flow over the top.

2.1.4 Flow Adjustment Gate

The flow adjustment gate fits inside the entrance to the flow tube. It consists of a flat piece of stainless steel that slides up and down, increasing and decreasing the flow, to control the level of the fluid in the tube. A tab at the bottom of the plate prevents the gate from coming out. A stainless steel rod is attached to the gate that then slips up through the access cover with a round knob on top for easy adjustment. A clamping screw (see Figure 1) on the access cover will hold the gate at the desired vertical location.

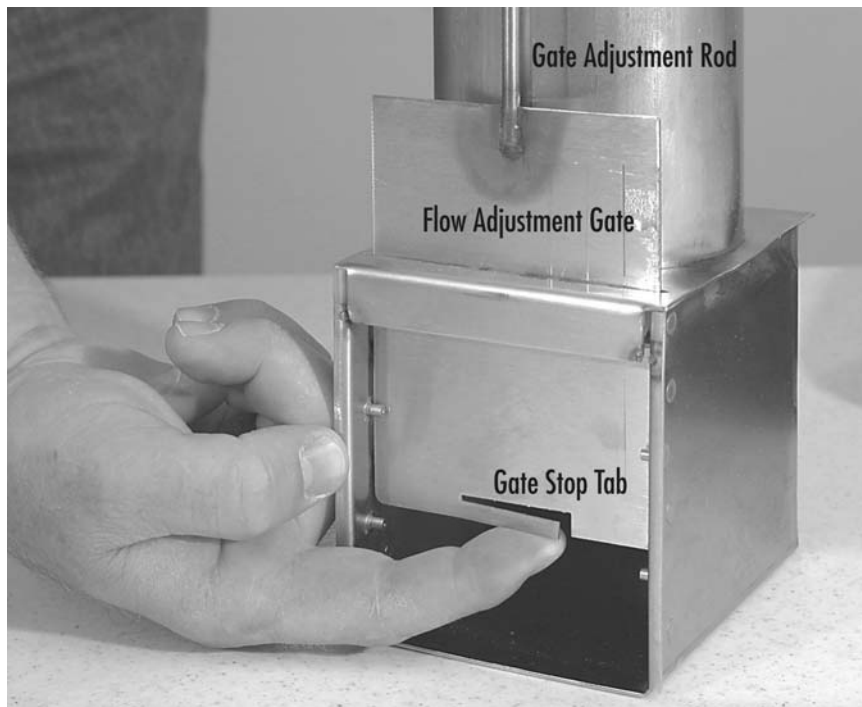


Figure 2 Flow Adjustment Gate

3 Installation

The flow tube is easiest to install if the bath is empty of fluid. No attaching hardware is necessary. It may be installed with fluid in place if the fluid is clear enough to see to the bottom. **The bath power must be off for the installation and the fluid must be at a safe temperature.**

The inlet opening at the bottom of the flow tube has narrow flanges on each side. These flanges must slide into the mating grooves at the bottom of the bath where the fluid exits from the stirring assembly (see Figures 3 and 4). On each side of the flow tube, about 3.5 inches (88.9mm) from the top, there are some locating ears (see Figure 1 on page 8). The vertical slot in each of these ears must slide onto the mating studs (see Figure 4) on each side of the bath tank as the flow tube is slid into position. No attaching hardware is necessary. The gate comes assembled as part of the flow tube and does not require any further assembly by the user. With the flow tube in place, you are ready for the next step.

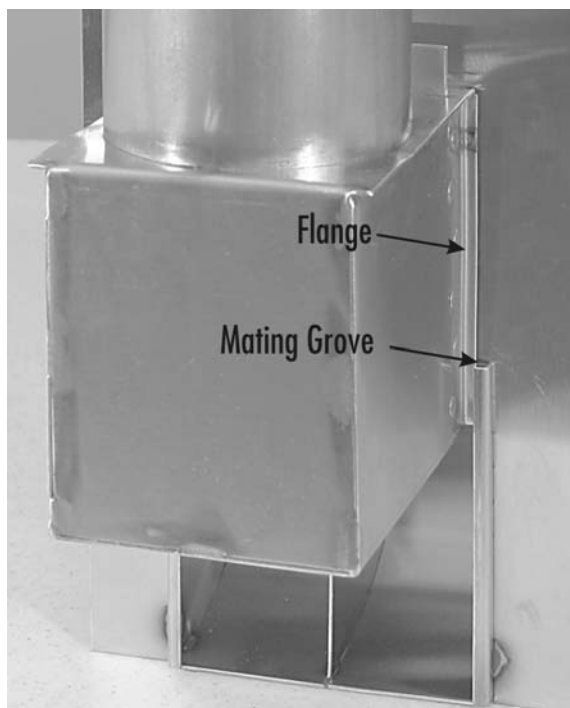


Figure 3 Slide the flow tube over the stirring assembly outlet.

The access cover sits on top of the bath access hole and is located just inside the rubber seal around the access hole. Remove the knob from the top of the gate adjusting rod and loosen the gate clamping screw in the rod guide of the

access cover. Slip the gate adjusting rod through the guide on the access cover. Replace the knob on top of the adjusting rod.

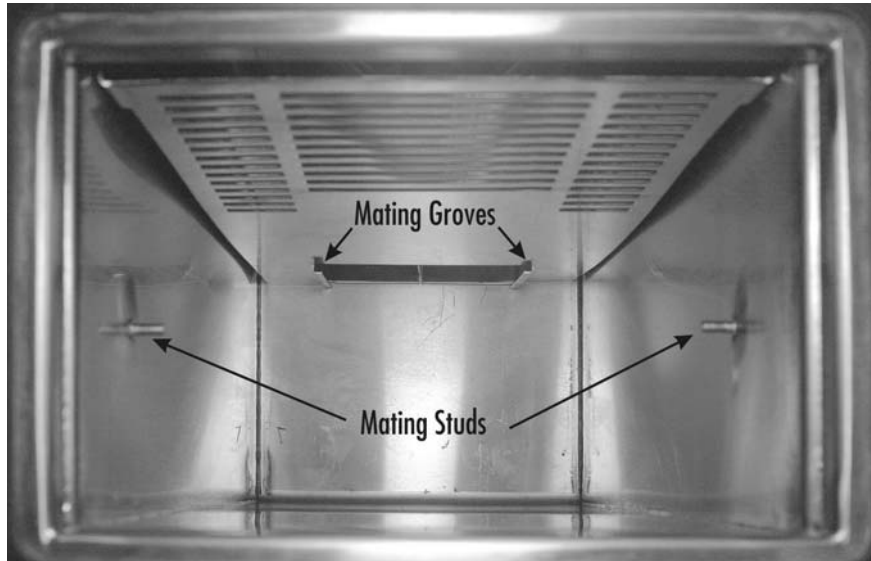


Figure 4 *Inside Bath Tank*

Finally, examine the thermometer holding springs (see Figure 6) in the carousel and adjust them as needed for your thermometers. To adjust the springs, grip the spring firmly near the top bend with a pair of needle nose pliers. Bend it in the appropriate direction until there is enough spring tension on the thermometer to hold it in place while permitting it to slide up and down with just enough ease to properly position the meniscus. **Do not** permit the thermometer to slide

to the bottom of the bath unrestrained or it may be broken. Place the carousel into the locating hole in the access cover.



Figure 6 Thermometer Holding Carousel



Figure 5 2019 Assembly in Place with Optional Magnifying Scope

4 Operation

2019-DCB: With the adapter properly installed and the gate all the way down, the bath may be turned on. The gate **must** be down to prevent flooding over the top of the access cover by an improper setting for the conditions. The ideal setting will be different with different fluids at different temperatures and at different bath fluid levels. Be sure the fluid is at the maximum level and that the fluid expansion reservoir is empty or sufficiently low to contain any excess fluid created over the calibration range. Temperature measurements are generally made with the bath temperature going in the rising direction. Therefore, the lowest calibration temperature should be the starting point.



CAUTION: *The gate must always be set to its lowest position while making temperature changes to prevent overflowing the access cover.*

The gate is designed to permit some fluid to flow through it when closed during temperature changes but it will need to be adjusted to optimum flow before measurements are made. When the desired temperature is reached, unclamp the gate and slowly raise it up while monitoring the fluid level in the flow tube. When the level reaches a point near the top of the tube, clamp the gate clamping screw snugly. Performance is best if the fluid does not contact the access cover. Do not permit the fluid to overflow the access cover.

When the bath is stable, adjust the vertical position of the thermometers in the carousel so the meniscus and markings are just high enough to read through the scope. Thermometers may now be measured by rotating each one into position as desired.

As the fluid increases in temperature it will expand and the excess will flow into the fluid expansion reservoir keeping the bath at the maximum level. The changing properties of the fluid will also permit it to rise higher in the tube and perhaps overflow the access cover if the gate is left unattended.



CAUTION: *The gate must always be set to its lowest position while making temperature changes to prevent overflowing the access cover.*



CAUTION: *if the power is lost to the bath, the gate must be lowered to prevent fluid from surging and spilling over the top of the access cover when the power is reinstated.*

5 Maintenance

5.1 Removal of the 2019-DCB

Always reduce the temperature of the bath to one safe for handling of the adapter components before removing the 2019-DCB. Reverse the procedure for installation. Always allow as much fluid as possible to drain off the flow tube and into the bath before setting it aside.



CAUTION: *When taking the adapter away from the bath, do not allow it to drip onto the control panel or scope.*

Place the adapter on paper towels or some other absorbent material to collect the remaining fluid clinging to its surfaces. Wipe the excess fluid from the surfaces when necessary. Any surfaces coated with oil will collect dirt during storage and may contaminate the bath when used again. Always be sure the adapter parts are clean when reinserting into the bath. If the adapter is used with different fluids, be sure to remove all of the old fluid from the surfaces so that it does not contaminate the new bath fluid.

6 Disclaimer

This manual is not intended to provide a procedure for the proper calibration of liquid-in-glass thermometers but to provide guidance for the proper use of the indicated Hart Scientific bath accessories.