

Frontispiece

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Figure 1-1. Thermo Unit, Model 3605, Part No. 3605-1-1 and 3605-1-101

SECTION I

INTRODUCTION AND DESCRIPTION

1-1. SCOPE.

1-2. This publication contains operation and service instructions, with an illustrated parts breakdown, for Thermo Unit, Part No. 3605-1-1 and 3605-1-101.

1-3. PURPOSE OF EQUIPMENT.

1-4. The Thermo Unit (see figure 1-1) is a completely self-contained portable temperature test system designed for on-site testing and calibration of temperature sensitive devices such as thermocouples, thermal switches, thermistors, temperature control systems, and temperature indicators within a range of -40°F to $+250^{\circ}\text{F}$. Table 1-3 lists the general specifications of the Thermo Unit.

1-5. DIFFERENCES BETWEEN MODELS.

1-6. The two Thermo Unit models covered in this publication differ only in the quantities and bore configurations of the adapter chucks furnished as standard equipment. Adapter chucks furnished with Thermo Unit, Part No. 3605-1-1, are primarily designed to suit requirements of industrial users, whereas chucks furnished with Thermo Unit, Part No. 3605-1-101, are specifically designed to satisfy requirements of U.S. Navy applications. (Refer to paragraph 1-10 through 1-12 for detailed chuck descriptions.)

1-7. DESCRIPTION.

1-8. The Thermo Unit consists of a chassis assembly installed in an aluminum carrying case. Mounted on the front panel of the chassis assembly is a temperature well, a digital LED readout, indicator lamps, control switches and electrical fuses. A circuit board, a cooling fan, transformers, and all necessary electronic components are mounted internally on the chassis assembly. The complete chassis assembly can be removed from the case as a unit for ease of calibration and maintenance. A rack is included in the case for storage of as many as 12 adapter chucks.

1-9. TEMPERATURE WELL. The temperature well is designed to permit direct plug-in of a test item probe without disconnection of associated capillary tubes or electrical wiring. The temperature well assembly consists of a housing containing an aluminum-alloy well, two stages of thermoelectric modules, a commutator plate, and a finned heatsink. The area between the well assembly and the housing is filled with polyurethane foam for insulating purposes. The outer stage of

thermoelectric modules is mounted directly on the heatsink; the inner stage is mounted on the well. The ID of the well is precision machined to accept a series of removable adapter chucks. A stainless-steel sheathed resistance temperature sensor is installed in a hole in the well. The sensor controls the readout and control electronics. The well is covered during operation by doors equipped with removable insulators drilled to accommodate standard capillary tubes. Spare insulators which can be drilled, or hand shaped, to accommodate other diameters are available from the manufacturer.

1-10. ADAPTER CHUCKS. The adapter chucks are designed to accept probes from $1/16$ - to 1- inch in diameter and up to 6- inches in length. Outside diameters are precision machined for proper clearance with the temperature well bore. Due to special clearance and plating requirements, adapter chucks must be purchased from the manufacturer.

1-11. Four adapter chucks are furnished with Thermo Unit, Part No. 3605-1-1, in standard bore diameters of $1/4$, $3/8$, $7/16$, and $9/16$ inch. Other standard bore diameters in increments of $1/16$ inch are available from the manufacturer. (Refer to table 1-1.) Blank adapter chucks may be bored by the customer to suit specific applications.

1-12. Twelve adapter chucks are furnished with Thermo Unit, Part No. 3605-1-101, with special bore configurations. (Refer to table 1-2.) The chucks and their corresponding locations in the case storage rack are identified by code letters. A decal in the case lid defines the bore size and part number corresponding to the code letter of each chuck.

1-13. ALIGNMENT FIXTURE. An Alignment Fixture, Part No. 3605-38-1, is available from the manufacturer. The unit is designed to facilitate alignment of the Thermo Unit by eliminating the time required to heat or cool the temperature well when calibrating between two set points. The alignment fixture plugs into the circuit board during calibration, replacing the temperature sensor in the well by two precision resistors and 10-turn potentiometers in the fixture. By using a precision thermometer to measure the exact well temperature at the nominal -10°F and $+220^{\circ}\text{F}$ calibration test points, the respective 10-turn potentiometer can be adjusted until the panel meter indication agrees with the precision thermometer indication. The number appearing in the potentiometer digital readout can be logged for future reference and the potentiometer can be latched to prevent accidental disturbance of the potentiometer setting. Once both potentiometers are set, it is only necessary to switch back and forth to duplicate the sensor resistance at the high and low calibration test points.

Table 1-1. Standard Available Adapter Chucks (Part No. 3605-1-1)

PART NO.	BORE DIAMETER (IN.) (NOMINAL)	PART NO.	BORE DIAMETER (IN.) (NOMINAL)
3605-28-000	Blank	*3605-28-562	9/16
3605-28-063	1/16	3605-28-625	5/8
3605-28-125	1/8	3605-28-687	11/16
3605-28-187	3/16	3605-28-750	3/4
*3605-28-250	1/4	3605-28-812	13/16
**3605-28-312	5/16	3605-28-875	7/8
*3605-28-375	3/8	3605-28-937	15/16
*3605-28-437	7/16	**3605-41-19	5/16
3605-28-500	1/2		(two bores)

*Standard chucks for Thermo Unit, Part No. 3605-1-1.
**Suitable for use with ASTM glass thermometers.

Table 1-2. Chucks Furnished with Thermo Unit, Part No. 3605-1-101

CODE	BORE SIZE	PART NO.
1	0.145	3605-41-9
2	0.250	3605-28-250
3	0.280	3605-41-15
4	0.353	3605-41-7
5	0.380A	3605-41-1
6	0.380B	3605-41-3
7	0.380C	3605-41-11
8	0.470	3605-41-13
9	0.500	3605-28-500
10	0.625	3605-28-625
11	0.682	3605-41-17
12	0.937	3605-28-937

1-14. *ACCESSORY KIT (OPTIONAL). An Accessory Kit, Part No. 3605-46-1, is available with the Thermo Unit as an additional-cost option. When ordered, the kit is affixed by Velcro tape to the lid of the carrying case. The kit contains a vernier dial caliper, a continuity tester, and a variety of commonly spared items such as chuck handling tools, lenses and lamps for the heat and cool mode indicators, fuses, and spare inserts for the temperature well

doors. The vernier dial caliper provides a convenient tool for precision measurement of chuck inside diameters, probe outside diameters, and counterbore depths. The continuity tester is used to check operation of actuated devices such as thermal switches. An alligator clip is provided to adapt the probe lead of the tester to a clamp-on lead. All parts are contained in a sturdy, compact case. (Refer to Section VIII for a complete list of kit contents.)

*Not illustrated

Table 1-3. Specifications

General:	
Equipment Type	Portable dry-well temperature calibrator
Range	40°F to +250°F (-40°C to +121°C)
Well Size	1 in. diameter by 6 inches deep
Performance:	
Accuracy	Well temperature within $\pm 0.5^{\circ}\text{F}$ ($\pm 0.28^{\circ}\text{C}$) of indicated temperature
Set-Point Stability	$\pm 0.3^{\circ}\text{F}$ ($\pm 0.2^{\circ}\text{C}$)
Stabilization Time (maximum)	30 minutes for 60°F change in set point from ambient
Well Uniformity	$\pm 0.5^{\circ}\text{F}$ ($\pm 0.25^{\circ}\text{C}$) excluding top 1 in. of well
Cooling Capacity	100°F (55°C) below ambient temperature
Control and Readout:	
Type	LED digital display in degrees and tenths
Scale	Switchable between °F and °C
Sensor	Resistance thermometer
Electronics	Solid-state throughout
Adapter Chucks:	
Type	Insert type
Material	Flash hard anodized aluminum
Standard (Part No. 3605-1-1)	1/4, 3/8, 7/16, 9/16 in. bore diameter
Optional	Available 1/16-increments within a range of 1/16- to 5/16-in. bore
Fuses:	
Thermo-Electronics	10 amperes
Control Circuits	1 ampere
Input Power:	
Voltage	115 volts AC, 50/60 Hz
Current Drain (maximum)	5 amperes
Operating Ambient Temperature	-5°F to +125°F (-20°C to +52°C)
Dimensions:	
Length	16 in.
Height	11-9/16 in.
Width	10 in.
Weight:	
Part No. 3650-1-1	40 pounds (including four standard chucks)
Part No. 3605-1-101	44 pounds (including twelve standard chucks)