



Fischer-Robertson, Inc.
 3890 Symmes Road
 Hamilton, Ohio 45015
 p: 513-860-3445
 f: 513-860-4744
 sales@fischer-robertson.com
 www.fischer-robertson.com

HYDROMETERS
 THERMOMETERS
 and ACCESSORIES

BULLETIN 61
 (9-04)

HYDROMETERS AND THERMOMETERS TO ASTM STANDARDS

The hydrometers and thermometers listed in this bulletin are specially selected to cover a wide range of fuels, including all aviation fuels. The hydrometers having ASTM numbers conform totally to ASTM E-100. For gravity or density ranges above or below those listed here, please contact our office or your local distributor.

API GRAVITY RANGE	With Thermometer	Length, mm	ASTM No.	GTP NO.
29-41	NO	335	4H	GTP-1675
† 37-49	NO	335	11H	GTP-9136
39-51	NO	335	5H	GTP-1676
49-61	NO	335	6H	GTP-1677
59-71	NO	335	7H	GTP-1678
† 64-76	NO	335	12H	GTP-9285
69-81	NO	335	8H	GTP-1679
29-41	0-150°F	380	54HL	GTP-1680
†*37-49	0-102°F	380	255H	GTP-9155
39-51	0-150°F	380	55HL	GTP-915
49-61	0-150°F	380	56HL	GTP-1681
59-71	0-150°F	380	57HL	GTP-1682
†*64-76	0-102°F	405	258H	GTP-9185
69-81	0-150°F	380	58HL	GTP-1683
METRIC DENSITY RANGE				
650/700 KG/M ³	NO	335	312H	GTP-1855
700/750 KG/M ³	NO	335	313H	GTP-1856
750/800 KG/M ³	NO	335	314H	GTP-1857
‡ 760/825 KG/M ³	NO	335	314HL/315H	GTP-5904-1
† 775/825 KG/M ³	NO	335	321H	GTP-5904
800/850 KG/M ³	NO	335	315H	GTP-1858
850/900 KG/M ³	NO	335	316H	GTP-1859
650/700 KG/M ³	-20 to +65°C	380	301HL	GTP-1875
700/750 KG/M ³	-20 to +65°C	380	302HL	GTP-1876
750/800 KG/M ³	-20 to +65°C	380	303HL	GTP-1877
‡ 760/825 KG/M ³	-20 to +65°C	380	303HL/304HL	GTP-5909-1
† 775/825 KG/M ³	-10 to +40°C	380	345H	GTP-5909-2
775/825 KG/M ³	-20 to +65°C	380	303HL/304HL	GTP-5909
800/850 KG/M ³	-20 to +65°C	380	304HL	GTP-1878
850/900 KG/M ³	-20 to +65°C	380	305HL	GTP-1879
RELATIVE DENSITY RANGE				
0.700/0.750	NO	335	83H	GTP-1684
0.750/0.800	NO	335	84H	GTP-1685
0.800/0.850	NO	335	85H	GTP-1686
0.850/0.900	NO	335	86H	GTP-1687
0.700/0.750	0-150°F	380	-	GTP-1689
0.750/0.800	0-150°F	380	-	GTP-1690
0.800/0.850	0-150°F	380	-	GTP-1691

NOTICE:

For customers who prefer non-mercury thermohydrometers, add a suffix "B" to the part number. ASTM has not yet published specifications for these instruments so we are unable to certify them to any ASTM standard. However, we can provide a document stating that, to the best of our knowledge, these instruments conform to the expected ASTM requirements.

*Lengthened thermometer scale for greater accuracy

† New Hydrometers Specially Designed for Aviation Fuels

GTP-9155 for jet fuel API gravity range and GTP-9185 for avgas API range, both have ½°F thermometers. GTP-5904 and GTP-5909-2 have metric density range for jet fuel. Each has an ASTM assigned number.

‡ For Hot Climates

GTP5904-1 and GTP-5909-1 have extended metric density range, 760/825KG/M³. Graduation spacing - same as std. hydrometers. Thermometer in GTP-5909-1 has range -20 to +65°C.

SPECIAL HYDROMETERS AND THERMOMETERS FOR USE IN ALJAC CLOSED CIRCUIT SAMPLERS - Standard length ASTM hydrometers and thermometers are too long to fit the holders if it is desired to leave these instruments in place with the lid closed. For customers who want to leave them in place, we offer special short models as follows.

These hydrometers have shorter scales than are required for standard ASTM models. For example, in the metric models, the graduations are 2.14 mm apart for 1 KG instead of 2.59 mm for standard hydrometers. These thermometers have the same graduation spacings as for standard ASTM thermometers such as 12C and 12F but the range has been shortened so they will fit in the Aljac Sampler.

GTP-5904-2 Hydrometer, metric, 760 to 825 KG/M³
 GTP-3312-1 Thermometer -20 to +60°C , ASTM 136C

GTP-8708 Hydrometer, API, 37 to 49
 GTP-8709 Thermometer, -5 to +140°F, ASTM 136F

POUNDS PER U.S. GALLON HYDROMETERS

Graduated to 0.01, 320 mm length;
 No thermometer included.

Range, lbs./gal.
 5.4 - 6.3
 6.0 - 7.1
 6.0 - 6.6
 6.5 - 7.1

Model No.
 GTP-1694
 GTP-1695
 GTP-1696
 GTP-1697-2

SYRINGE HYDROMETER combined with 0-130°F thermometer graduated to 2°F.
 The gravity scales are color coded as follows:

MODEL NO.	GTP-1431	
GREEN	65 to 75° API	Avgas
YELLOW	48 to 65°	JP4/JetB
WHITE	37 to 48°	JetA/JetA1

NOTE: The above model number includes a syringe and a hydrometer.

Replacement Hydrometers for above:

API type	GTP-1431-1
Replacement syringe only	GTP-1431-2



SHORT FORM HYDROMETERS that will also fit in the syringe GTP-1431-2 are available. API° range is graduated

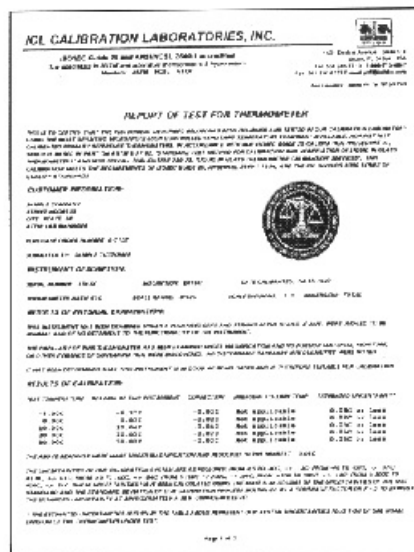
API° Range	Model No. Without Thermometer	Model No. With Thermometer 0-130°F
29-41°	GTP-1701	GTP-1706
39-51	GTP-1702	GTP-1707
49-61	GTP-1703	GTP-1708

CERTIFIED HYDROMETERS AND THERMOMETERS

Any of the hydrometers or thermometers in this brochure may be furnished with a NIST Traceable Certificate of Calibration at extra cost, upon request. This certificate shows actual data at three test points as required by ASTM E-100 (for hydrometers) or the test points required by ASTM E-1 (for thermometers); actual readings are resolved to 1/10 of the smallest scale division. The test methods and NIST standards that are used, as well as uncertainties of measurement and all other necessary data to maintain full traceability are provided.

This calibration is performed by an independent calibration laboratory which is accredited to the international standard ISO/IEC Guide 25. Copies of the laboratory's ISO Guide 25 Accreditation are available upon request for your qualified vendor files.

To order this Certificate, add the suffix "C" to our GTP number. There is an additional charge for this service.



Selection of Hydrometers

To select the correct hydrometer for your fuel, use the following chart.

	API Gravity	Relative Density	Metric Density	Pounds per U.S. Gal
Diesel/No. 2 Fuel Oil	25-40	0.82-0.90	820-900	6.8-7.5
Jet A - Jet A1	37-50	0.78-0.84	780-840	6.5-7.0
JP-4 - Jet B	43-64	0.72-0.81	720-810	6.0-6.7
Avgas - Motor Gasoline	64-76	0.68-0.72	681-723	5.6-6.1

CALCULATORS API Gravity and Metric Density

These circular calculators eliminate the need for books of tables for making gravity or density corrections to standard temperature. Easy to use and very fast - about half a minute. See Bulletin 100.

CORRECTION TABLES (Formerly called reduction tables)

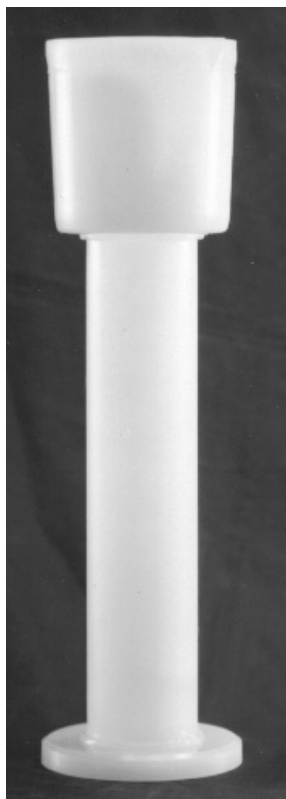
Tables for correcting measured gravity readings to a standard temperature have been changed as of 1980 to provide greater accuracy. The project took about 7 years and was based on US National Bureau of Standards data. The preparation was jointly done by ASTM, API and the IP. Unfortunately, these new tables are available only in rather expensive books that include volume correction tables. There are 3 tables for correcting gravity, as follows:

1. Table 5B Corrects measured API gravity to the standard temperature of 60° F. (Table 5 is now obsolete.) Table 5B is in a book 7/8 inch thick and includes Table 6B which is used to correct volume to 60°F against API gravity 60°F.
2. Table 23B Corrects measured Relative Density to the standard temperature of 60° F. The term "Relative Density" replaces the obsolete term "Specific Gravity" but means the same thing. (Table 23 is now obsolete.) Table 23B is in a book 1 1/8 inch thick and includes Table 24B which is used to correct volume to 60°F against Relative Density at 60°F.
3. Table 53 B Corrects measured Density to the standard temperature of 15° C. The new units of "Density" are kg/m³. (Table 53 is now obsolete.) Table 53B is in a book 1 3/16 inch thick and includes Table 54B which is used to correct volume to 15°C against Density at 15°C.

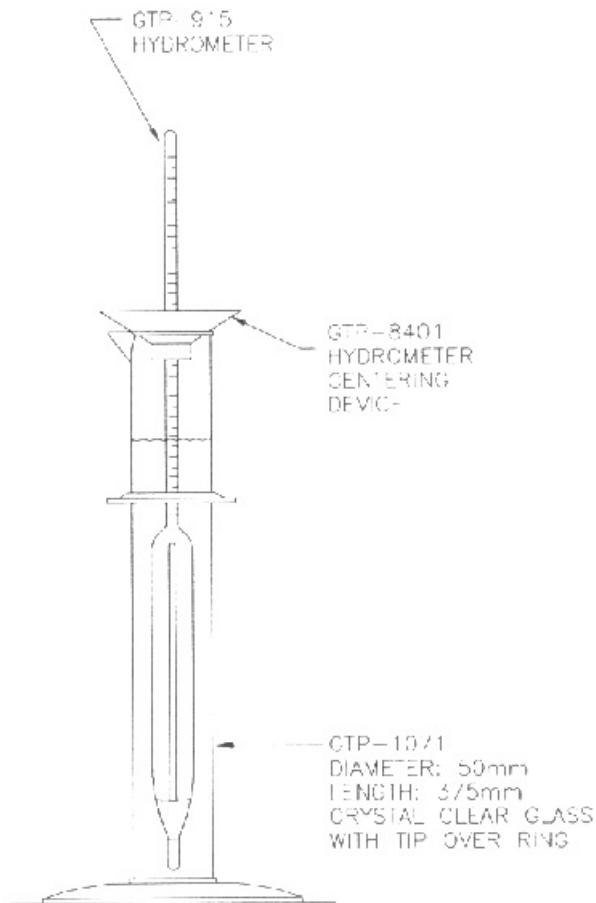
These books are available from ASTM headquarters but we maintain a small stock and can supply them at a nominally higher price to cover our handling costs. Use the following catalog numbers when ordering.

Table 5B	Book No. 1	TL-2457
Table 23B	Book No. 2	TL-2458
Table 53B	Book No. 3	TL-2459

HYDROMETER JARS

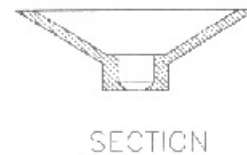


Model GTP-1073 Non-Breakable Plastic. Take reading at top of jar - no need to see through the plastic. Overflow collector at top prevents spilling as hydrometer settles.



COLRUD HYDROMETER CENTERING DEVICE

Eliminates errors caused by the hydrometer adhering to the side of the hydrometer jar. Self-centering, this device dramatically reduces the time needed to obtain accurate readings, especially in outdoor conditions and for inexperienced personnel. Developed with Dave Colrud, an Alaskan fuel Q.C. expert for use in all conditions. Tested by a top laboratory to confirm that it causes no error. Precision machined, fuel resistant high density plastic. Model GTP-8401.



THERMOMETERS PER ASTM E-1

Gravity Thermometers, for use in density and gravity measurements

GTP-2600 ASTM# 12F Range -5 - 215°F

GTP-3312 ASTM# 12C Range -20 - 102°C

For short versions to fit Closed Circuit Samplers, such as Aljac, see Page 2.

Tank Gauging Thermometers

GTP-1670 ASTM# 58F Range -30 - 120°F

GTP-1671 ASTM# 58C Range -35 - 50°C

Thermometer Holder with cup and lid, equipped with metal backing to dissipate static charges through wire cable. Cable not supplied. Lid of cup is hinged to open as it is lowered into fuel.

GTP-2126 Assembly: holder with ASTM thermometer # 58F

GTP-2127 Assembly: holder with ASTM thermometer # 58C

Non-Mercury Thermometers (ASTM 12C, 12F, 58C and 58F) are available on special order. Non-mercury thermohydrometers are not yet available.

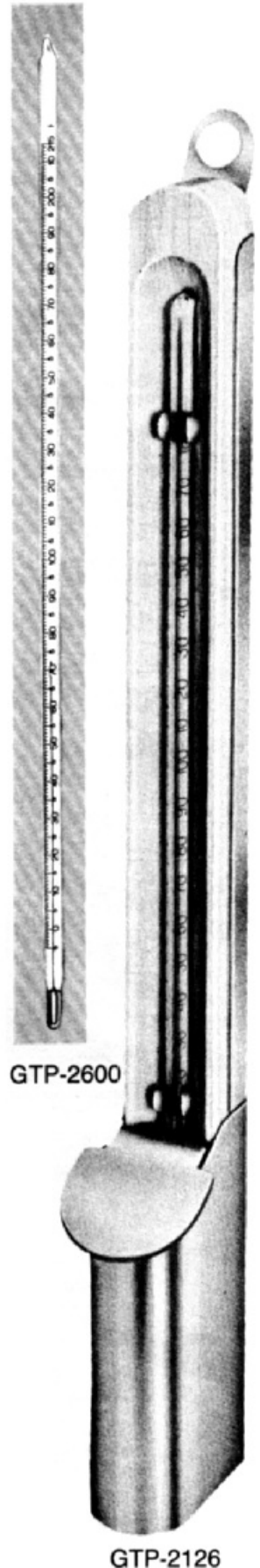
Rejoining Mercury Separations in Thermometers



PLEASE UNDERSTAND - A separation of mercury in your thermometer is not a defect! It is a condition, normally caused by shock in transit, which of course must be rectified before using the thermometer, or you will experience significant errors in your readings.

There are two methods that you can use. The best way is by cooling. The more difficult way is by using heat. The object of both methods is to get the broken pieces of mercury into a chamber where they can rejoin. The bulb at the bottom is a large chamber so cooling only the bulb in dry ice will draw all of mercury in capillary back into the bulb. Wait a few seconds more, and then withdraw the thermometer from the dry ice and gently and carefully tap it onto a padded surface. The tapping will permit the separated pieces of mercury to fall and rejoin the main mass of mercury now within the bulb. Allow the thermometer to warm naturally (do not heat it) in a vertical position, and observe the mercury column as it ascends into the capillary to be certain it is intact.

If dry ice is not available, you must use heat. Thermometers and thermohydrometers that are offered by Gammon Technical are made with an "expansion chamber" at the top of the capillary tube. The purpose of this chamber is to provide overrange protection in case the thermometer is heated beyond its scale range. This chamber may be used to rejoin separations provided the amount of separated mercury is very small (not more than a few scale divisions in length). The thermometer may be heated (in hot water, hot oil, or other suitable medium compatible with the temperatures to be attained. DO NOT USE FLAME!) so that the separation(s) enter the expansion chamber followed by a small portion of the main (intact) column. GREAT CARE MUST BE TAKEN TO NOT FILL THE EXPANSION CHAMBER MORE THAN HALFWAY, OR BREAKAGE OF THE BULB AND SPILLAGE OF THE MERCURY MAY OCCUR. Remove the thermometer from the heat, maintain it in a vertical position, and observe the mercury column as it retreats to be sure it is intact.



GTP-2600

GTP-2126