

FLUKE®

71X Series

Process Calibrators

Calibration Manual

PN 686540

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Introduction

⚠ Warning

The information provided in this document is for the use of qualified personnel only. Do not perform the verification tests or calibration procedures described in this manual unless you are qualified to do so.

The information in this manual deals with the 71X Series Process Calibrators (hereafter referred to as “the calibrator” or the “71X Calibrator”). The 71X Series includes the 712, 713 30G, 713 100G, 714, 715, 716, 717 30G, 718 30G and 718 100G models.

This manual provides the following information:

- Precautions and safety information
- Specifications
- Basic maintenance (cleaning, replacing the battery and fuses)
- Verification test procedures
- Calibration and calibration adjustment procedures
- Accessories and replaceable parts

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Precautions and Safety Information

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

A Warning statement identifies conditions and actions that pose hazard(s) to the user; a Caution statement identifies conditions and actions that may damage the calibrator. The following Warning statement applies to all of the 71X Calibrators unless noted:

⚠ Warning

To avoid possible electric shock or personal injury:

- **Never apply more than 30 V between any two terminals or between any terminal and earth ground.**
- **Make sure the battery door is closed and latched before you operate the calibrator.**
- **Remove test leads or attached thermocouple miniplug (714 only) from the calibrator before you open the battery door.**
- **Do not operate the calibrator if it is damaged.**
- **Do not operate the calibrator around explosive gas, vapor or dust.**
- **When servicing the calibrator, use only specified replacement parts.**
- **When using probes, keep fingers behind the finger guards on the probes.**
- **Do not allow water inside the case.**
- **Follow all equipment safety procedures.**
- **713, 716, 717 30G, 718 30G and 718 100G only: To avoid a violent release of pressure in a pressurized system, shut off the valve and slowly bleed off the pressure before you attach or detach the calibrator pressure fitting to the pressure line.**
- **718 30G and 718 100G only: Use only two 9 V batteries, properly installed in the calibrator case, to power the calibrator.**
- **718 30G and 718 100G only: Turn off circuit power before connecting the calibrator mA and COM terminals in the circuit. Place calibrator in series with the circuit.**
- **To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator (⊕) appears.**
- **Use only type 9 V batteries, properly installed in the meter case, to power the meter.**

Caution

The 71X Series Calibrators contain parts that can be damaged by static discharge. If you open the case, follow the standard practices for handling static sensitive devices.

Use the proper jacks, function, and range for your measurement or output application.

Models 713, 717 30G, 718 30G and 718 100G only:

- To avoid mechanically damaging the calibrator, do not apply torque between the pressure fitting and the calibrator case. See Figure 1 for the proper use of tools.
- To avoid overpressure damage, do not apply pressure that exceeds the following:

Models 713 30G, 717 30G and 718 30G:

- 3X top of range (90 psi, 620 kPa, 6.2 bar)

Models 713 100G and 718 100G:

- 2X top of range (200 psi, 1380 kPa, 13.8 bar)

713, 717 30G, 718 30G and 718 100G only:

- To avoid corrosion in the pressure sensor, use the calibrator only with media compatible with glass, ceramic, silicon, RTV, nitrile, (Buna -N) type 303 stainless steel, and nickel.

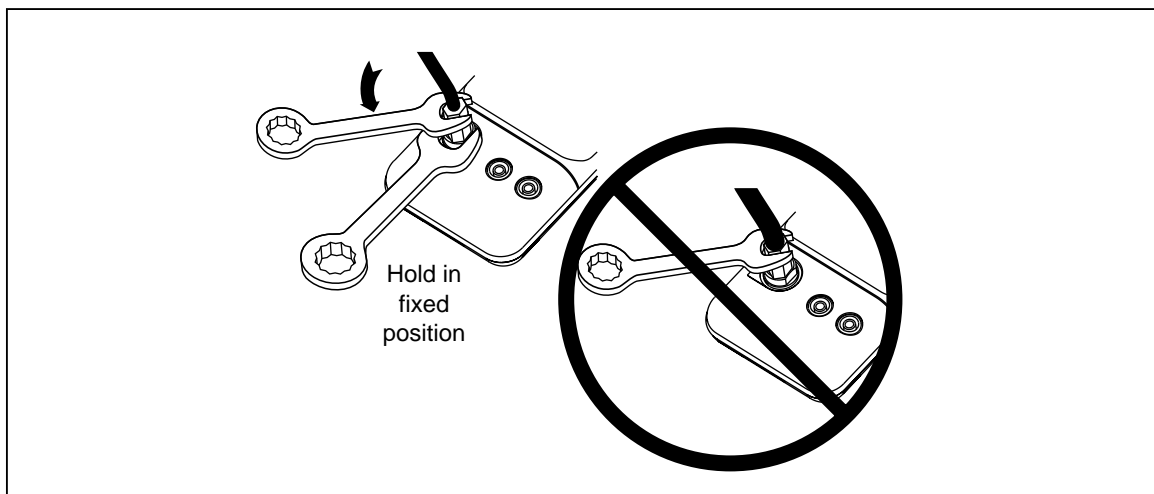










Figure 1. Proper Use of Tools (713, 717 and 718 Models)

kf01f.eps

Explanation of International Symbols

The following symbols are used on the calibrator or in this calibration manual. Table 1 explains their meaning.

Table 1. International Symbols

Symbol	Meaning
	Earth ground
	Fuse
	Battery
	Refer to the instrument instruction sheet for information about this feature
	Double insulated
	Conforms to relevant Canadian Standards Association directives
	Pressure
	Conforms to European Union directives

Specifications

Specifications for the 71X Calibrators are based on a one-year calibration cycle and apply for ambient temperatures from + 18 °C to + 28 °C unless stated otherwise. “Counts” are the number of increments or decrements of the least significant digit. General specifications for all models are in Table 2.

Table 2. General Specifications

Maximum voltage applied between any terminal and earth ground or between any two terminals:	30 V
Storage temperature:	-40 °C to 60 °C
Operating temperature:	-10 °C to 55 °C
Operating altitude:	3000 meters maximum
Relative humidity:	95 % up to 30 °C 75 % up to 40 °C 45 % up to 50 °C 35 % up to 55 °C
Vibration:	Random 2 g, 5 Hz to 500 Hz
Shock:	1 meter drop test
Safety: 712, 713, 714, 715, 716, 717	Certified as compliant to CAN/CSA C22.2 No. 1010.1:1992 Complies with ANSI/ISA S82.01-1994
Safety: 718	Certified as compliant to CAN/CSA C22.2 No. 1010.2:1995 Complies with ANSI/ISA S82.01-1995
Power requirements: 712, 713, 714, 715, 716, 717	Single 9 V battery (ANSI/NEDA 1604A or IEC 6LR61)
Power requirements: 718	Two 9 V batteries (ANSI/NEDA 1604A or IEC 6LR61)
Size:	32 mm H x 87 mm W x 187 mm L; With holster and Flex-Stand: 52 mm H x 98 mm W x 201 mm L
Weight:	
712	337 g; With holster and Flex-Stand: 587 g
713	369 g; With holster and Flex-Stand: 624 g
714	332 g; With holster and Flex-Stand: 584 g
715	349 g; With holster and Flex-Stand: 601 g
716, 717 30G	369 g; With holster and Flex-Stand: 624 g
718 30G and 718 100G	737 g; With holster: 992G

712 RTD Specifications

Table 3. 712 Supported RTD Types

RTD Type	Temperature Range and Resolution	Allowable Excitation ¹
	°C	mA
Ni 120	-80.0 to 260.0	0.15 to 2.00
Pt 100 385	-200.0 to 800.0	0.15 to 2.00
Pt 200 385	-200.0 to 630.0	0.15 to 2.00
Pt 500 385	-200.0 to 630.0	0.05 to 0.80
Pt 1000 385	-200.0 to 630.0	0.05 to 0.40
Pt 100 392	-200.0 to 630.0	0.15 to 2.00
Pt 100 JIS	-200.0 to 630.0	0.15 to 2.00
	Range and Resolution for Ohms Simulate and Measure	
R ²	15.0 Ω to 400.0 Ω	0.15 to 2.00
R	400.0 Ω to 1500.0 Ω	0.05 to 0.80
R	1500.0 Ω to 3200.0 Ω	0.05 to 0.40

1: This column is for simulate mode only. It shows the allowable excitation current from an ohmmeter or RTD measurement device connected to the calibrator.
2: The R annunciator signifies "resistance," not an RTD type. Select it the same way as an RTD type.

Resolution

RTD: 0.1 °C

Ohms: 0.1 Ω

Temperature Coefficient

0.005 % of ohms range per °C for temperature ranges -10 °C to 18 °C and 28 °C to 55 °C. Ohms ranges are 400 Ω, 1.5 kΩ, and 3.2 kΩ.

Table 4. 712 RTD and Ohms Simulation

Ohms Range	Excitation Current from Measurement Device	Accuracy, ± Ω
15 Ω to 400 Ω	0.15 mA to 0.5 mA	0.15
15 Ω to 400 Ω	0.5 mA to 2 mA	0.1
400 Ω to 1.5 kΩ	0.05 mA to 0.8 mA	0.5
1.5 kΩ to 3.2 kΩ	0.05 mA to 0.4 mA	1

Maximum input voltage: 30 V

Table 5. 712 RTD and Ohms Measurement

Ohms Range	Accuracy, Four-Wire ± Ω
15 Ω to 400 Ω	0.1
400 Ω to 1.5 kΩ	0.5
1.5 kΩ to 3.2 kΩ	1

Maximum input voltage: 30 V
Excitation current from 712: 0.3 mA

713 Specifications

Table 6. 713 30G Pressure Input

Range	Accuracy
0 to 30 psi (206.85 kPa)	± 0.05 % of range
Maximum nondestructive pressure: 3X top of range (90 psi, 620 kPa, 6.2 bar) Temperature coefficient: 0.01 % of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C	

Table 7. 713 100G Pressure Input

Range	Accuracy
0 to 100 psi (689.5 kPa)	± 0.05 % of range
Maximum nondestructive pressure: 2X top of range (200 psi, 1380 kPa, 13.8 bar) Temperature coefficient: 0.01% of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C	

Table 8. 713 Pressure Range and Resolution

Displayed Pressure Units	Model 713 30G Range and Resolution	Model 713 100G Range and Resolution
psi	30.000 psi	100.00 psi
inH ₂ O at 4 °C	830.4 inH ₂ O	2768.0 inH ₂ O
inH ₂ O at 20 °C	831.9 inH ₂ O	2772.9 inH ₂ O
cmH ₂ O at 4 °C,	2109.0 cmH ₂ O	7030 cmH ₂ O
cmH ₂ O at 20 °C	2113.0 cmH ₂ O	7043 cmH ₂ O
bar	2.0685 bar	6.895 bar
mbar	2068.5 mbar	6895 mbar
kPa	206.85 kPa	689.5 kPa
inHg	61.080 inHg	203.6 inHg
mmHg	1551.3 mmHg	5171 mmHg
kg/cm ²	2.1090 kg/cm ²	7.030 kg/cm ²

Table 9. 713 30G and 713 100G DC mA Input

Range	Resolution	Accuracy, ±(% of Reading + Counts)
24 mA	0.001 mA	0.025 + 1
Overload protection: 125 mA, 250 V fast acting fuse Temperature coefficient: 0.005 % of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C		

714 Specifications

Table 10. 714 Temperature Measure and Thermocouple Simulate

TC Type	Resolution	Error	Reference Junction Error
J, K, T, E, L, U	0.1 °C	± (0.3 °C + 10 µV)	± 0.2 °C
B, R, S	1 °C	± (0.3 °C + 10 µV)	± 0.2 °C

Maximum input voltage: 30 V
Temperature Coefficient: 0.05 x specified accuracy per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C

Table 11. 714 Millivolt Measure and Source

Range	Resolution	Accuracy
-10 mV to 75 mV	0.01 mV	± (0.025 % of range (75 mV) + 1 count)

Maximum input voltage: 30 V

715 Specifications

Table 12. 715 DC V Input and Output

Range	Resolution	Accuracy, ± (% of Reading + Counts)
100 mV	0.01 mV	0.02 % + 2
10 V	0.001 V	0.02 % + 2

Input impedance: 2 MΩ (nominal), < 100 pF
Overvoltage protection: 30 V
Voltage drive capability: 1 mA

Table 13. 715 DC mA Input and Output

Range	Resolution	Accuracy, ± (% of Reading + Counts)
24 mA	0.001 mA	0.02 % + 2

Overload protection: 125 mA, 250 V fast acting fuse
mA Output: 0 % = 4 mA, 100 % = 20 mA

Temperature Coefficient

0.005 % of ohms range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C

Source mode

Compliance: 1000 Ω at 20 mA for battery voltage ≥ 6.8 V (700 Ω at 20 mA for battery voltage 5.8 to 6.8 V)

Simulate mode

External loop voltage requirement: 24 V nominal, 30 V maximum, 12 V minimum

Loop Power

24 V ± 10 %

716 Specifications

Table 14. 716 Pressure Display, Pressure Module Input

Range	Resolution	Accuracy
(determined by pressure module)		

Table 15. 716 DC mA Input

Range	Resolution	Accuracy, ± (% of Reading + Counts)
24 mA	0.001 mA	0.025 + 1
<i>Overload protection: 125 mA, 250 V fast acting fuse</i> <i>Temperature coefficient: 0.005 % of range per °C for temperature ranges -10 °C to 18 °C and 28 °C to 55 °C</i>		

Loop Supply

24 V ±10%

717 30G Specifications

Table 16. 717 30G Pressure Display, Pressure Sensor Input

Range	Accuracy
0 to 30 psi (206.85 kPa)	± 0.05 % of range
<i>Maximum nondestructive pressure: 3X top of range (90 psi, 620 kPa, 6.2 bar)</i> <i>Temperature coefficient: 0.01 % of range per °C for temperature ranges -10 °C to 18 °C and 28 °C to 55 °C</i>	

Table 17. 717 30G Pressure Display, Pressure Module Input

Range	Resolution	Accuracy
(determined by Pressure Module)		

Table 18. 717 30G DC mA Input

Range	Resolution	Accuracy, ± (% of Reading + Counts)
24 mA	0.001 mA	0.025 + 1
<i>Overload protection: 125 mA, 250 V fast acting fuse</i> <i>Temperature coefficient: 0.005 % of range per °C for temperature ranges -10 °C to 18 °C and 28 °C to 55 °C</i>		

Table 19. 717 30G Pressure Sensor Range and Resolution

Displayed Pressure Units	Model 717 30G Range and Resolution
psi	30.000 psi
inH ₂ O at 4 °C	830.4 inH ₂ O
inH ₂ O at 20 °C	831.9 inH ₂ O
cmH ₂ O at 4 °C,	2109.0 cmH ₂ O
cmH ₂ O at 20 °C	2113.0 cmH ₂ O
bar	2.0685 bar
mbar	2068.5 mbar
kPa	206.85 kPa
inHg	61.080 inHg
mmHg	1551.3 mmHg
kg/cm ²	2.1090 kg/cm ²

Loop Supply

24 V ± 10 %

718 Specifications

Table 20. 718 30G Pressure Input

Range	Accuracy
-12 psi (82.74 kPa) to 30 psi (206.85 kPa)	± 0.05 % of range
Maximum nondestructive pressure: 3X top of range (90 psi, 620 kPa, 6.2 bar) Temperature coefficient: 0.01 % of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C	

Table 21. 718 100G Pressure Input

Range	Accuracy
-12 psi (82.74 kPa) to 100 psi (689.5 kPa)	± 0.05 % of range
Maximum nondestructive pressure: 2X top of range (200 psi, 1380 kPa, 13.8 bar) Temperature coefficient: 0.01 % of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C	

Table 22. Pressure Module Input

Range	Resolution	Accuracy
(determined by Pressure Module)		

Table 23. 718 30G and 718 100G DC mA Input

Range	Resolution	Accuracy, ± (% of Reading + Counts)
24 mA	0.001 mA	0.025 + 1
Overload protection: 125 mA, 250V fast acting fuse Temperature coefficient: 0.005 % of range per °C for temperature ranges – 10 °C to 18 °C and 28 °C to 55 °C		

Table 24. 718 Pressure Range and Resolution

Displayed Pressure Units	Model 718 30G Range and Resolution	Model 718 100G Range and Resolution
psi	30.000 psi	100.00 psi
inH ₂ O at 4 °C	830.4 inH ₂ O	2768.0 inH ₂ O
inH ₂ O at 20 °C	831.9 inH ₂ O	2772.9 inH ₂ O
cmH ₂ O at 4 °C,	2109.0 cmH ₂ O	7030 cmH ₂ O
cmH ₂ O at 20 °C	2113.0 cmH ₂ O	7043 cmH ₂ O
bar	2.0685 bar	6.895 bar
mbar	2068.5 mbar	6895 mbar
kPa	206.85 kPa	689.5 kPa
inHg	61.080 inHg	203.6 inHg
mmHg	1551.3 mmHg	5171 mmHg
kg/cm ²	2.1090 kg/cm ²	7.030 kg/cm ²

Table 25. Leak Rate for 718 30G and 718 100G

Model	Leak Rate*
Fluke 718 30G	0.050 PSI/minute maximum
Fluke 718 100G	0.10 PSI/minute maximum

*Leak rate is to be measured after rated pressure is applied for one minute.

Loop Supply

24 V ± 10 %

Basic Maintenance

For maintenance procedures not described in this manual, contact an authorized service center.

Cleaning

Periodically wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents.

Replacing the Battery

⚠ Warning

To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator (⚡) appears.

To replace the battery in models 712,713,714,715,716 and 717, refer to Figure 2.

To replace batteries in model 718 30G and 718 100G, refer to Figure 3.

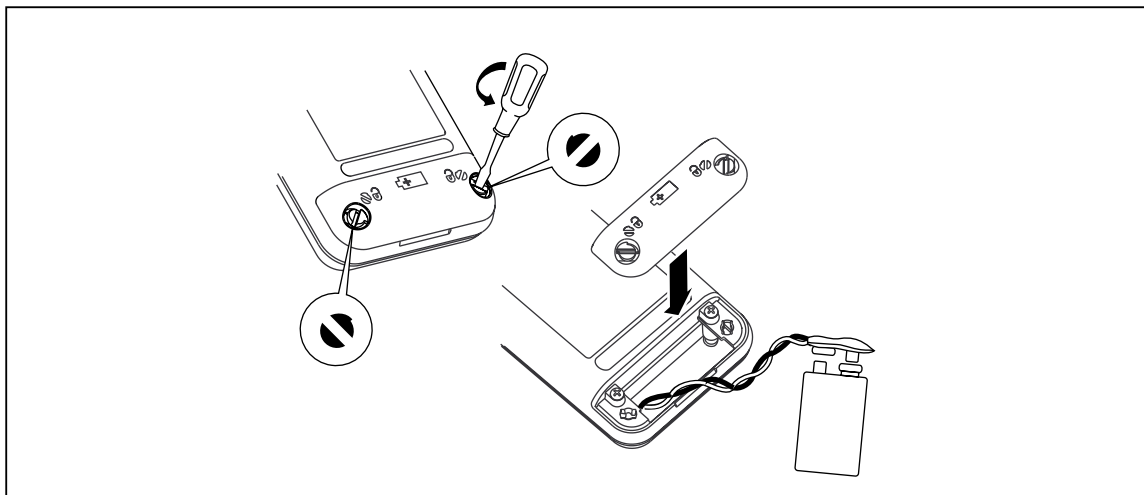
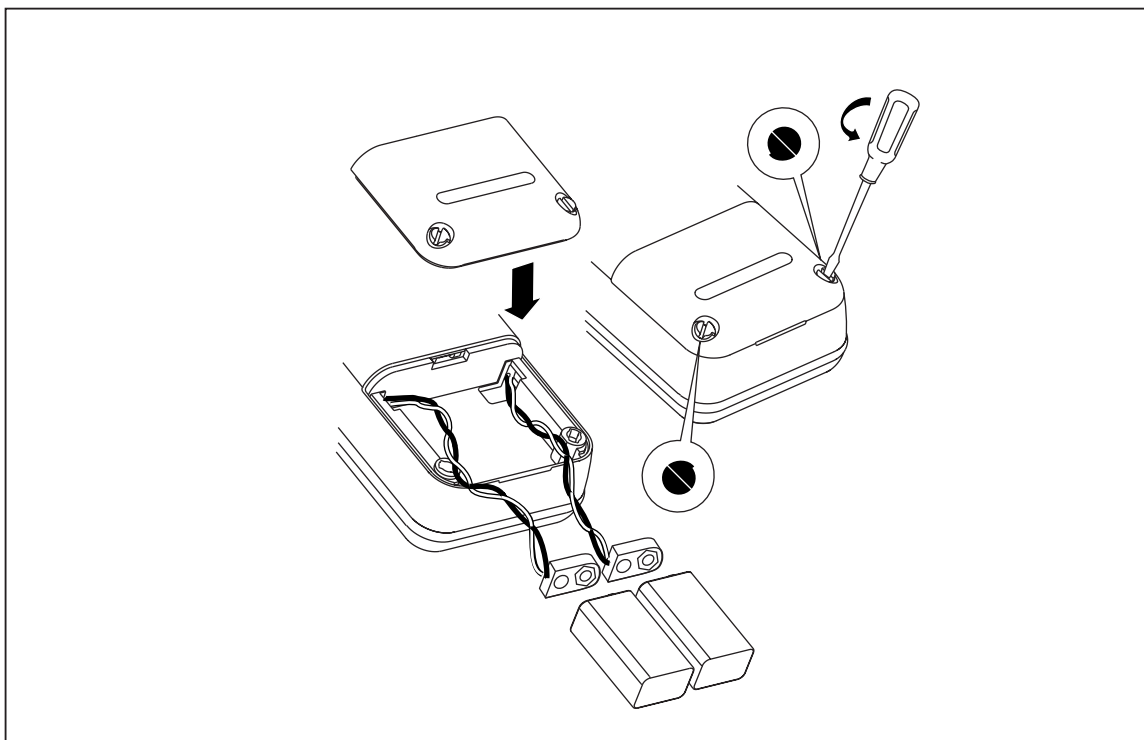


Figure 2. Replacing the Battery

it07i.eps



Wh008f.eps

Figure 3. Replacing the Battery (718 only)

Replacing the Fuse

⚠ Warning

To avoid personal injury or damage to the calibrator, use only a 0.125A 250V fast fuse, Littelfuse® 2AG.

To check if the fuse(s) are blown, refer to Table 26.

Table 26. Verifying a Blown Fuse

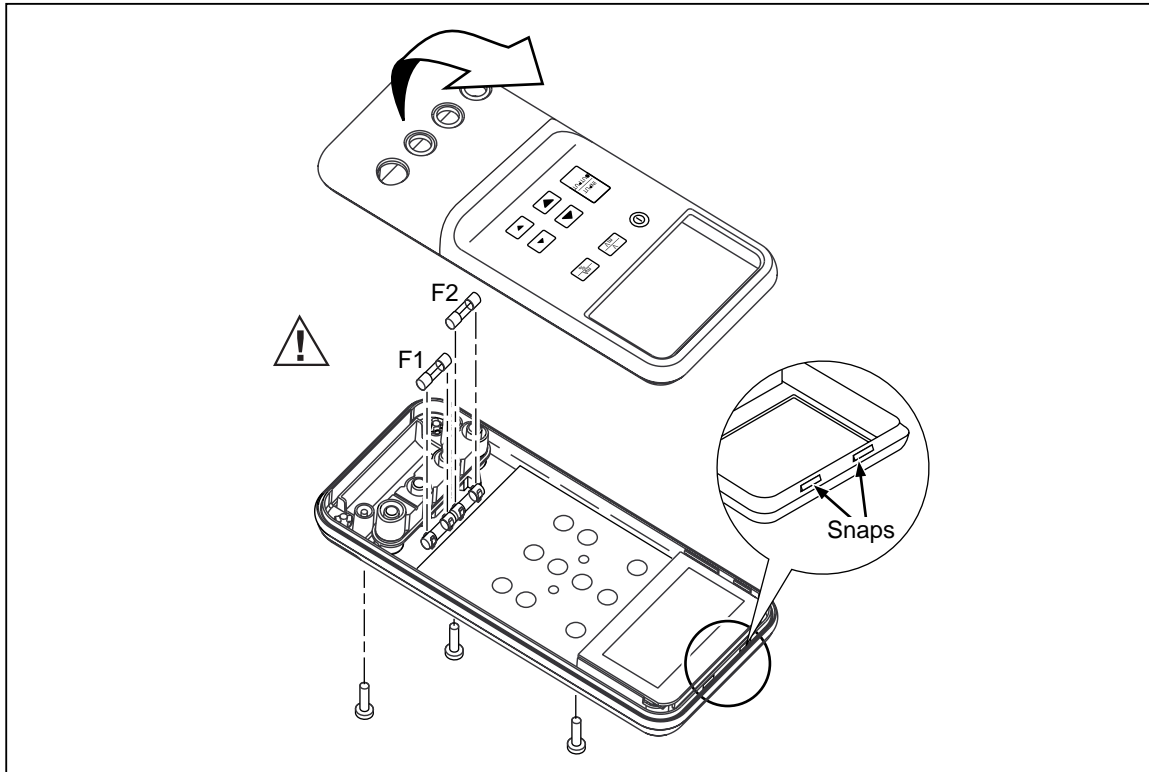
Calibrator Model	Determining a Blown Fuse
712	Put the calibrator in simulate mode (OUTPUT on the display), and check for proper resistance at the calibrator's OUTPUT terminals. An open or very high impedance suggests fuse F1 is blown.
713 Series 716 717 30G 718 Series	Fuse F1 is probably blown if the mA measurement display reading does not respond to current applied to the current (mA) inputs.
714	Fuse F1 is probably blown if, in the input mode, the calibrator always reads OL, even with a thermocouple connected.

Table 26. Verifying a Blown Fuse (cont.)

Calibrator Model	Determining a Blown Fuse
715	<p>Fuse F1 is probably blown if:</p> <ul style="list-style-type: none"> • in the mA input mode, the calibrator always reads 0.000, even with a signal applied. • in the mA output mode, with a short across the mA OUTPUT jacks, OL is flashing on the display. <p>Fuse F2 is probably blown if:</p> <ul style="list-style-type: none"> • in the V output mode, with the test leads removed from the calibrator, the display flashes OL. • in the V input mode, the calibrator always displays OL, even with a signal applied that is within the measurement range.

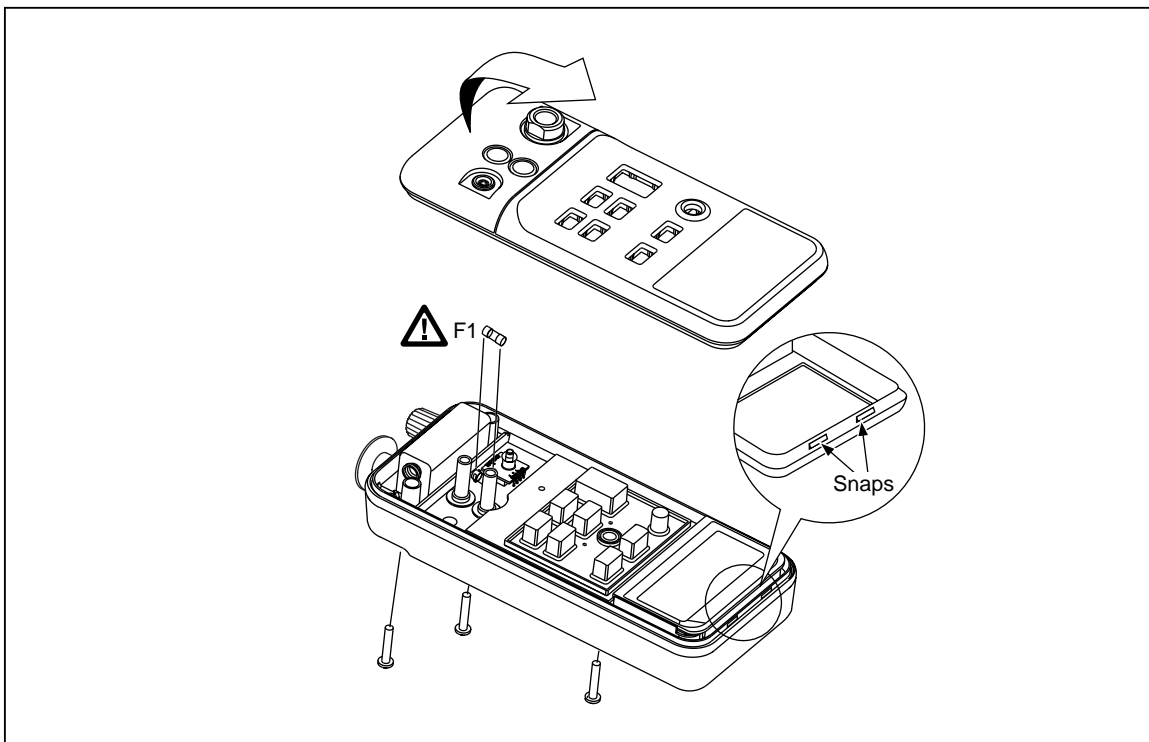
Replace the fuse(s) as follows, refer to Figures 4 and 5:

1. Remove the test leads and turn the calibrator off.
2. Remove the battery door.
3. Remove the three Phillips-head screws from the case bottom and turn the case over.
4. Gently lift the top cover from the end nearest the input jacks until it unsnaps from the bottom cover.
5. Replace the fuse(s) with a 0.125 A 250 V fast fuse, Littelfuse® type 2AG.
 F1 and F2 are the same type on the 715
6. (712, 714, and 715 only)
 Fit the top and bottom covers together, engaging the two snaps. Make sure that the gasket is properly seated. Reinstall the three screws.
 (713, 716, 717 30G, and 718 only)
 Carefully fit the case top and circuit board assembly together, making sure that the O-ring is properly seated between the pressure sensor and the pressure fitting on the case top. Fit the case bottom onto the case top, engaging the two snaps near the display end of the case. Reinstall the three screws.
7. Replace the battery door.



it08f.eps

Figure 4. Replacing the Fuses (715 shown)



Wh003f.eps

Figure 5. Replacing the Fuse (718 shown)

Required Equipment

The equipment required to perform the verification and calibration procedures in this manual is identified in Table 27.

Table 27. Required Calibration Equipment

Calibrator Model	Required Calibration Equipment
712	Fluke 5500A HP 3458A Four test leads
713	Fluke 5500A Deadweight Tester Two-wire test lead Teflon tape
714	Fluke 5500A Fluke 8842A or Equivalent Two-wire copper test lead (banana to mini-connector) Two-wire Type J Thermocouple Test Lead (with Type J to Type J Mini-Connectors)
715	Fluke 5500A Fluke 8842A or equivalent HP 3458A (for mA measurements) Two-wire test lead
716	Fluke 5500A 1 k Ω 10% 1 W and 2 k Ω 10% 0.5 W resistors Fluke 700 Series Pressure Module
717 30G	Fluke 5500A Deadweight Tester Teflon Tape 1 k Ω 10% 1 W and 2 k Ω 10% 0.5 W resistors Fluke 700 Series Pressure Module
718	Fluke 5500A Deadweight Tester or pressure calibrator (.01% accuracy or better) Teflon tape 0-2 k Ω decade resistor box or other resistor source Fluke 700 Series Pressure Module

Verification

The following verification tests check the accuracy of each calibrator function against the calibrator's specifications. If the calibrator fails any of these tests, calibration adjustment or repair is required. Calibrate your 71X Calibrator once a year to ensure that it performs according to its specifications.

To perform the verification tests, it is not necessary to open the case or adjust the calibrator. Simply make the required connections, apply the designated source stimulus and determine if the measurements fall within the acceptable range indicated.

Note

Throughout this section, the 71X Calibrator may be referred to as the "UUT" (unit under test).

Preparing for Verification

To prepare for verification, do the following:

1. Make sure fuse(s) in the UUT are intact. By referring to Table 26, you should not have to open the unit.
2. Make sure you have the required test equipment available. (Refer to Table 27.)
3. Turn on and warm up the test equipment for the time required.
4. Allow UUT to come to ambient temperature. Turn it on and allow 5 minutes for warm-up of the UUT.

712 Verification

Resistance Measure Verification


1. Press the green $\text{\textcircled{C}}$ key to turn on the 712. Press the $\text{\textcircled{I/O}}$ key, the $\text{\textcircled{RTD}}$ key, so that the display indicates:
 INPUT TYPE R 4W
2. Configure the 712 Calibrator into a 4-wire ohms measurement:
 - Connect two test leads from the NORMAL jacks of the 5500A to the INPUT jacks (two middle jacks) on the 712 Calibrator (black to black, red to red).
 - Connect two additional test leads, also from the NORMAL jacks of the 5500A, to the 712 Calibrator (black wire to the 712 red jack labeled [3W NC] and red wire to the red jack labeled [4W NC]). All four input jacks of the 712 should now be configured in a 4-wire ohms measurement.
3. Set the Fluke 5500A to the settings in Table 28, and verify the reading as displayed on the 712 Calibrator:

Table 28. 712 Resistance Measure Verification

Fluke 5500A	Fluke 712
207.5 Ω	207.4 to 207.6 Ω
950.0 Ω	949.5 to 950.5 Ω
2350.0 Ω	2349.0 to 2351.0 Ω

4. Disconnect the test leads.

Resistance Source Verification

1. Using four test leads, connect the four jacks of HP3458A (Ω Sense 'Hi & Lo' and Input 'Hi & Lo') to the two middle jacks of the 712 Calibrator (black to black; red to red). This puts the HP3458A in a 4-wire configuration.
2. On the 3458A, select four-wire ohms measurement and up-range to the 1 k Ω range. Use the 1 k Ω range for the first test point, and use the 10 k Ω range for the last two test points. Correct ranging is important in supplying the correct excitation current back into the 712 Calibrator. Otherwise the specifications may change, or the measurements may be incorrect.
3. Press the  key on the 712 Calibrator so that the display indicates:





OUTPUT

Using the large and small scroll keys ([or]), source the resistance settings in Table 29, verifying the readings on the 3458A display:




Table 29. 712 Resistance Source Verification

Fluke 712	HP 3458A
207.5 Ω	.2074 to .2076 k Ω
950.0 Ω	.9495 to .9505 k Ω
2350.0 Ω	2.349 to 2.351 k Ω

Keypad Test

1. Press and hold the large  to source 950.0 ohms.
2. Press and hold the small  scroll key. Verify the numbers scrolling on the display changes in 0.1 increments, then changes in 1.0 increments, then in 10.0 increments.
3. Press and hold the small  scroll key. Verify the numbers scrolling on the display changes in 0.1 decrements, then changes in 1.0 decrements, then in 10.0 decrements.
4. Disconnect all test leads from the 712 Calibrator and press the  key to turn the calibrator off.

Display Verification

1. Press and hold the  key and then turn the 712 back on by pressing and releasing the green  key. This locks the 712 in a mode where all display segments are on. All segments will stay on until the  key is released.
2. Check to see that all segments of the LCD are displayed.
3. Turn the 712 off.

The 712 verification test is complete.

713 Verification

Pressure Verification

1. Carefully attach the pressure fitting of the deadweight tester to the pressure port of the 713 Calibrator.

Note

The use of TEFLON tape at the pressure fitting strengthens the seal.

2. Press the green \odot key to turn the 713 on.
3. The display should read 0.00 PSI with the deadweight tester opened up to ambient air. If not, press the **ZERO** key until display does read 0.00 PSI.
4. Depending if the instrument being tested is a 713-30G or a 713-100G, set up the deadweight tester for the sequence of PSI inputs from Table 30 to be injected into the pressure port of the 713 Calibrator.
5. Ensure the pressure has stabilized at each input before verifying the display reading.
6. Carefully vent all pressure and disconnect the 713 from the deadweight tester.

Note

When verifying vacuum pressure make sure the pressure/vacuum switch is in the vacuum position. Forward (clockwise) is for pressure and backward (counter-clockwise) is for vacuum.

Table 30. 713 Pressure Verification

713-30G		713-100G	
Input pressure	Display Reading	Input pressure	Display Reading
0 psi	-0.015 to 0.015	0 psi	-0.05 to 0.05
6 psi	5.985 to 6.015	20 psi	19.95 to 20.05
12 psi	11.985 to 12.015	40 psi	39.95 to 40.05
18 psi	17.985 to 18.015	60 psi	59.95 to 60.05
24 psi	23.985 to 24.015	80 psi	79.95 to 80.05
30 psi	14.985 to 15.015	100 psi	99.95 to 100.05
24 psi	23.985 to 24.015	80 psi	79.95 to 80.05
18 psi	17.985 to 18.015	60 psi	59.95 to 60.05
12 psi	11.985 to 12.015	40 psi	39.95 to 40.05
6 psi	5.985 to 6.015	20 psi	19.95 to 20.05

mA Measure Verification

The display should indicate:

0.000mA 0.00 PSI

1. Connect two test leads from the AUX jacks on the Fluke 5500A to the mA jacks on the 713 Calibrator (black to black and red to red). Set the Fluke 5500A to the settings in Table 31, and verify the display readings on the 713 Calibrator.

Table 31. 713 mA Measure Verification

Fluke 5500A	Fluke 713
4.0000 mA	3.998 mA to 4.002 mA
12.0000 mA	11.996 mA to 12.004 mA
24.0000 mA	23.993 mA to 24.007 mA

2. Disconnect the test leads and turn off the 713 Calibrator.

Display Verification

1. Press and hold the key and then press and release the green key. This locks the 713 in a mode where all display segments are on. All segments will stay on until the key is released.
2. Check to see that all segments of the display are showing.
3. Turn the 713 off.

The 713 verification test is now complete.

714 Verification

Thermocouple Measure Verification

1. Press the key to turn on the 714 Calibrator. Press the key and the key so that the display indicates:

INPUT xx.x °C

where xx.x is some variable number; or OL (overload) may be indicated.

2. Press the key to measure Type J thermocouple and connect the Type J thermocouple test lead from the TC jack of the Fluke 5500A to the TC jack on the 714 Calibrator, observing correct polarity.
3. Set the Fluke 5500A to output in Type J thermocouple, press the key, and set the 5500A to the settings in Table 32, verifying the display readings on the 714:

Table 32. 714 Thermocouple Measure Verification

Fluke 5500A	Fluke 714
-200.00 °C	-200.9 °C to -199.1 °C
0.00 °C	-0.7 °C to +0.7 °C
1200.00 °C	1199.3 °C to 1200.7 °C


4. Disconnect the Type J thermocouple test lead and install the two-wire copper test lead from the Fluke 5500A NORMAL jacks to the 714 Calibrator TC jack, observing correct polarity.
5. On the 714 press the  key until "mV" is shown on the display.
6. Set the Fluke 5500A to the settings in Table 33, and verify the display readings on the 714 Calibrator.

Table 33. 714 Thermocouple Measure Verification (mA)

Fluke 5500A	Fluke 714
-10.0000 mV	-10.03 to -9.97 mV
30.0000 mV	29.97 to 30.03 mV
75.0000 mV	74.97 to 75.03 mV

7. Disconnect the copper test lead from the Fluke 5500A.

Thermocouple Source Verification



1. Set the 8842A to VDC and 200 mV range. Connect the two-wire copper test lead from the TC jack on the 714 Calibrator to the INPUT jacks of the Fluke 8842A.
2. Press the  key on the 714 Calibrator to indicate:
OUPUT 0.00 mV
3. On the 714, press the large [and  scroll keys to source the voltages in Table 34 while verifying the readings on the 8842A.

Table 34. 714 Thermocouple Source Verification (mA)

Fluke 714	Fluke 8842A
-10.00 mV	-10.028 to -9.972 mV
30.00 mV	29.972 to 30.028 mV
75.00 mV	74.972 to 75.028 mV










4. Press the  key on the 714 Calibrator to TYPE J and disconnect the copper wire test lead.
5. Connect the Type J thermocouple test lead from the Fluke 5500A TC jack to the TC jack on the 714 Calibrator, observing correct polarity.
6. Set the Fluke 5500A to  with 'Type J' input. On the 714, press the large  and  scroll keys to source the temperatures in Table 35 while verifying the readings on the 5500A:

Table 35. 714 Thermocouple Source Verification (Temperature)




Fluke 714	Fluke 5500A
0.0 °C	-0.70 °C to +0.70 °C
-200.0 °C	-200.94 °C to -199.06 °C
1200 °C	1199.33 °C to 1200.67 °C

Keypad Test

1. On the 714 Calibrator, press the large  scroll key to 800.0 °C.
2. Press and hold the small  scroll key, verifying that the numbers scrolling on the display change in 0.1 increments, then change in 1.0 increments, then change in 10.0 increments.
3. Press and hold the  scroll key, verifying that the numbers scrolling on the display change in 0.1 decrements, then change in 1.0 decrements, then change in 10.0 decrements.
4. Scroll to 800.0°C.
5. Press the  key on the 714 Calibrator. The display should change to:




OUTPUT 1472.0 °F
6. Disconnect the Type J test lead from the 714 Calibrator and press the  key to turn the calibrator off.

Display Verification

1. Press and hold the  key and then press and release the green  key. This locks the 714 in a mode where all display segments are on. All segments will stay on until the  key is released.
 2. Check to see that all segments of the display are showing.
 3. Turn the 714 off.
- The 714 verification test is now complete.

715 Verification

DC Voltage Source Verification

1. On the 715 Calibrator turn the green  key on.
2. Press the  and the  key so that the display indicates:



OUTPUT 0.000 V
3. Connect test leads from the Fluke 8842A input V jacks to the voltage jacks on the 715 Calibrator (black to COM and red to V).
4. Using the large  scroll button of the 715 Calibrator, press to step to the voltages in Table 36, verifying the output on the 8842A:

Table 36. 715 DC Voltage Source Verification (0.000 to 10.000 V)

Fluke 715	Fluke 8842A
0.000 V	-0.002 V to +0.002 V
5.000 V	4.997 V to 5.003 V
10.000 V	9.996 V to 10.004 V

5. Press the  key on the 715 Calibrator. Display should change to:

OUTPUT 0.00 mV



- Using the large  key scroll button of the 715 Calibrator, press to step to the voltages in Table 37, verifying the output on the 8842A.

Table 37. 715 DC Voltage Source Verification (0.00 to 100.00 V)

Fluke-715	Fluke 8842A
0.00 mV	-0.02 mV to + 0.02 mV
50.00 mV	49.97 mV to 50.03 mV
100.00 mV	99.96 mV to 100.04 mV

DC Current Source Verification

- Disconnect the Fluke 8842A. Press the  key on the 715 Calibrator. The display should change to:
 OUTPUT 0.000 mA
- Connect test leads from the 715 Calibrator's mA output jacks (black to V jack and red to +LOOP jack) to the HP3458A input mA jacks (black to LO and red to I).

Note

The HP3458A is used because of its dc-current measurement accuracy.






- Set the HP3458A [NPLC] to 30, and the function to [DC CURRENT]. Using the large  scroll button of the 715 Calibrator, press to step to the current outputs in Table 38, verifying the readings on the HP3458A.

Table 38. 715 DC Current Source Verification

Fluke 715	HP3458A
4.000 mA	3.9972 mA to 4.0028 mA
12.000 mA	11.9956 mA to 12.0044 mA
24.000 mA	23.9932 mA to 24.0068 mA

Keypad Test

- Using the large  scroll key, press to step down to 12.000 mA.
- Using the small  scroll key, press to verify that the numbers scrolling on the display change in .001 increments; then change in .01 increments; then change in 0.1 increments.
- Using the small  scroll key, press to verify that the numbers scrolling on the display change in .001 decrements; then change in .01 decrements; then change in 0.1 decrements.
- Scroll to 12.000 mA.
- Press the  key on the 715 Calibrator. Display should change to:
 OUTPUT 50.00 mA %

DC Current Measure Verification



- Press the  key on the 715 Calibrator. Display should indicate closely to:
INPUT -25.00 mA %
- Connect the test leads from the AUX jacks of the Fluke 5500A to the mA input jacks on the 715 Calibrator (black to COM and red to mA). Press the  key and the display should change to:
INPUT 0.000 mA
- Set the Fluke 5500A to the dc-current settings in Table 39, and verify the display readings on the 715 Calibrator:

Table 39. 715 DC Current Measure Verification

Fluke 5500A	Fluke-715
24.0000 mA	23.993 mA to 24.007 mA
12.0000 mA	11.996 mA to 12.004 mA
4.0000 mA	3.998 mA to 4.002 mA

DC Voltage Measure Verification


- Press the  key on the 715 Calibrator. Display should change to:
INPUT 0.000 V
- Connect test leads from the output *NORMAL* jacks of the Fluke 5500A to the voltage jacks on the 715 Calibrator (black to *COM* jack and red to the *V* jack).
- Set the Fluke 5500A for the voltage settings in Table 40, and verify the display readings on the 715 Calibrator.

Table 40. 715 DC Voltage Measure Verification (10.0000 to 0.0000 V)

Fluke 5500A	Fluke 715
10.00000 V	9.996 V to 10.004 V
5.00000 V	4.997 V to 5.003 V
0.0000 V	-0.002 V to +0.002 V


- Press the  key on the 715 Calibrator. Display should indicate closely to:
INPUT 0.00 mV
- Set the Fluke 5500A for the mV settings in Table 41, and verify display readings on the 715 Calibrator.

Table 41. 715 DC Voltage Measure Verification (0.0000 mV to 100.0000 mV)

Fluke 5500A	Fluke-715
0.0000 mV	-0.02 mV to + 0.02 mV
50.0000 mV	49.97 mV to 50.03 mV
100.0000 mV	99.96 mV to 100.04 mV

- Disconnect the test leads from 715 Calibrator and turn the green  key off.

Display Verification

1. Press and hold the key and then turn the 715 back on by pressing and releasing the green key. This locks the 715 in a mode where all display segments are on. All segments will stay on until the key is released.
2. Check to see that all segments of the LCD are displayed.
3. Turn the 715 off.

The 715 verification test is complete.

716 Verification

mA Measure Verification

1. Press the green button to turn the calibrator on. The display should read:

----- mA

then change to:

0.000 mA

2. Connect the test leads from the AUX jacks on the Fluke 5500A to the mA jacks on the 716 Calibrator (Black to Black and Red to Red). Set the Fluke 5500A to the settings in Table 42, and verify the display readings on the 716 Calibrator. Remember to push the key on the Fluke 5500A.

Table 42. 716 mA Measure Verification

FLUKE 5500A	FLUKE 716
4.0000 mA	3.998 mA to 4.002 mA
12.0000 mA	11.996 mA to 12.004 mA
24.0000 mA	23.993 mA to 24.007 mA

3. Disconnect the test leads and press to turn the power off.

mA Loop Power Verification

1. Hold down both *LOOP POWER* keys (and) at the same time until the screen reads:

----- LOOP mA

then release the keys.

2. Apply 1 k Ω to the mA jacks from the decade box or other resistor source. The display should read over 21 mA but less than OL.
3. Apply 2 k Ω to the mA jacks from the decade box or other resistor source. The display should read between 11 mA and 13 mA.
4. Press to turn the calibrator off.

Sensor Jack Verification

1. Make sure nothing is connected to the sensor port of the Fluke 716. Push Ⓢ to turn the calibrator on. The display should read:

----- mA

then change to:

OL 0.000 mA

2. Plug the Fluke Pressure Module into the sensor port of the Fluke 716. The display should change to:

----- mA

A pressure value should appear on the screen after all of the calibration constants have been downloaded.

3. Disconnect the Fluke Pressure Module and push Ⓢ to turn the Fluke 716 off.

717 30G Verification

Pressure Verification

1. Carefully attach the pressure fitting of the deadweight tester to the pressure port of the 717 30G Calibrator.

Note

Use Plenty of TEFLON tape when attaching pressure fitting.

The display should read 0.00 PSI with the deadweight tester opened up to ambient air. If not, press the ZERO key until display reads 0.00 PSI.

2. Set up the deadweight tester for the sequence of PSI inputs from Table 43 to be injected into the pressure port of the 717 Calibrator.
3. Ensure the pressure has stabilized at each input before verifying the display reading.

Note

When verifying vacuum pressure make sure the pressure/vacuum switch is in the vacuum position. Forward (clockwise) is for pressure and backward (counter-clockwise) is for vacuum.

Table 43. 717 Pressure Verification

30G	
Input pressure	Display Reading
0 psi	-0.015 to 0.015
6 psi	5.985 to 6.015
12 psi	11.985 to 12.015
18 psi	17.985 to 18.015
24 psi	23.985 to 24.015
30 psi	14.985 to 15.015
24 psi	23.985 to 24.015
18 psi	17.985 to 18.015
12 psi	11.985 to 12.015
6 psi	5.985 to 6.015

- Carefully vent all pressure and disconnect the 717 from the deadweight tester.

mA Measure Verification




- Press Ⓢ to turn power on. The display should read:
 ----- mA
 then change to:
 0.000 mA 0.00PSI
- Connect the test leads from the AUX jacks on the Fluke 5500A to the mA jacks on the 717 Calibrator (Black to Black and Red to Red). Set the Fluke 5500A to the settings in Table 44, and verify the display readings on the 717 Calibrator.

Table 44. 717 mA Measure Verification


Fluke 5500A	Fluke 717
4.0000 mA	3.998 mA to 4.002 mA
12.0000 mA	11.996 mA to 12.004 mA
24.0000 mA	23.993 mA to 24.007 mA

- Disconnect the test leads and press Ⓢ to turn the power off.

mA Loop Power Verification

1. Hold down both **LOOP POWER** keys ( and ) at the same until the screen reads:
----- LOOP mA
then release the keys.
2. Apply 1 k Ω to the mA jacks from the decade box or other resistor sources. The display should read over 21 mA but less than OL.
3. Apply 2 k Ω to the mA jacks from the decade box or other resistor source. The display should read between 11 mA and 13 mA.
4. Press  to turn the power off.

Sensor Jack Verification

1. Make sure nothing is connected to the sensor port of the Fluke 717.
2. Turn power on. The display should read:
----- mA
then change to:
0.000 PSI
3. Plug the Fluke Pressure Module into the sensor port on the Fluke 717. The display should change to:
----- mA
A pressure value should appear on the screen after all of the calibration constants have been down loaded.
4. Disconnect the Fluke Pressure Module and press  to turn the Fluke 717 off.

718 Verification

Pressure Verification



Warning

To avoid a violent release of pressure or vacuum, always depressurize the system slowly using the pressure/vacuum release control before detaching any pressure line.

1. Carefully attach the pressure fitting of the deadweight tester to the pressure port of the 718 Calibrator.

Note

The use of TEFLON tape at the pressure fitting strengthens the seal.

2. Press the green  key to turn the 718 on.
3. The display should read 0.00 PSI with the deadweight tester opened up to ambient air. If not, press the  key until display does read 0.00 PSI.
4. Depending if the instrument being tested is a 718-30G or a 718-100G, set up the deadweight tester for the sequence of PSI inputs from Table 45 to be injected into the pressure port of the 718 Calibrator.

5. Ensure the pressure has stabilized at each input before verifying the display reading.
6. Carefully vent all pressure and disconnect the 718 from the deadweight tester.

Note

When verifying vacuum pressure make sure the pressure/vacuum switch is in the vacuum position. Forward (clockwise) is for pressure and backward (counter-clockwise) is for vacuum.

Table 45. 718 Pressure Verification

718-30G		718-100G	
Input Pressure	Display Reading	Input Pressure	Display Reading
0 psi	-0.015 to 0.015	0 psi	-0.05 to 0.05
6 psi	5.985 to 6.015	20 psi	19.95 to 20.05
12 psi	11.985 to 12.015	40 psi	39.95 to 40.05
18 psi	17.985 to 18.015	60 psi	59.95 to 60.05
24 psi	23.985 to 24.015	80 psi	79.95 to 80.05
30 psi	14.985 to 15.015	100 psi	99.95 to 100.05
24 psi	23.985 to 24.015	80 psi	79.95 to 80.05
18 psi	17.985 to 18.015	60 psi	59.95 to 60.05
12 psi	11.985 to 12.015	40 psi	39.95 to 40.05
6 psi	5.985 to 6.015	20 psi	19.95 to 20.05
-12 psi	-12.015 to -11.985	-12 psi	-12.05 to -11.95

Leak Test Verification

1. Make sure the pressure-vacuum switch is in the clockwise position for pressure.
2. Seal off the pressure sensor input port.
3. Using the fine adjustment knob and internal pump, adjust the display for a reading of 3 PSI. Let the reading stabilize for a period of one minute, then record reading.

Note

If you are unable to adjust reading to 3 PSI exactly, record reading after one minute, wait an additional minute and verify leakage according to UUT's rated specification. Adjusted display value should be 3 PSI or less for initial reading.

4. After one additional minute, take another reading.
5. Depending if the instrument being tested is a 718 30G or a 718 100G, use the fine adjustment knob and internal pump to adjust the display for a reading of either 30 PSI or 100 PSI respectively. Let the reading stabilize and record the reading.

6. After one additional minute, take another reading.
7. The difference between the two numbers is the leak rate. Depending if the instrument being tested is a 718 30G or a 718 100G, the leak rate should be no more than 0.050 PSI or 0.1 PSI per minute respectively. Verify that the readings in Step 4 and Step 6 are within the ranges in Table 46.

Table 46. 718 Leak Test Verification

718 30G		718 100G	
Adjusted Pressure	Display Reading	Adjusted Pressure	Display Reading
3.000 PSI	2.950 to 3.000	3.00 PSI	2.90 to 3.00
30.000 PSI	29.950 to 30.000	100.00 PSI	99.90 to 100.00

mA Measure Verification

The display should indicate:

0.000mA 0.00 PSI

1. Connect two test leads from the AUX jacks on the Fluke 5500A to the mA jacks on the 718 Calibrator (black to black and red to red). Set the Fluke 5500A to the settings in Table 47, and verify the display readings on the 718 Calibrator.

Table 47. 718 mA Measure Verification

Fluke 5500A	Fluke 718
4.0000 mA	3.998 mA to 4.002 mA
12.0000 mA	11.996 mA to 12.004 mA
24.0000 mA	23.993 mA to 24.007 mA

2. Disconnect the test leads and turn off the 718 Calibrator.

Display Verification

1. Press and hold the **ZERO** key and then press and release the green **Ⓢ** key. This locks the 718 in a mode where all display segments are on. All segments will stay on until the **ZERO** key is released.
2. Check to see that all segments of the display are showing.
3. Turn the 718 off. The 718 verification test is now complete.

mA Loop Power Verification

1. Hold down both **LOOP POWER** keys (**UNITS** and **Ⓢ**) at the same time until the screen reads:

----- LOOP mA

then release the keys.

2. Apply 1 k Ω to the mA jacks from the decade box or other resistor source. The display should read over 21 mA but less than OL.
3. Apply 2 k Ω to the mA jacks from the decade box or other resistor source. The display should read between 11 mA and 13 mA.
4. Press **Ⓢ** to turn the calibrator off.

Sensor Jack Verification

1. Make sure nothing is connected to the sensor port of the Fluke 718. Push Ⓢ to turn the calibrator on. The display should read:

----- mA

then change to:

OL 0.000 mA

2. Plug the Fluke Pressure Module into the sensor port of the Fluke 718. The display should change to:

----- mA

A pressure value should appear on the screen after all of the calibration constants have been downloaded.

3. Disconnect the Fluke Pressure Module and push Ⓢ to turn the Fluke 718 off.

Calibration

Re-calibration (obtaining new cal-constants) is required only if a calibrator fails verification. Always re-verify after a re-calibration.

Note

Throughout this section, the 71X Calibrator may be referred to as the “UUT” (unit under test).

Preparing for Calibration

To prepare for calibration, do the following:

1. Make sure fuse(s) in the UUT are intact. By referring to Table 26, you should not have to open the unit.
2. Make sure you have the required test equipment available. (Refer to Table 27.)
3. Turn on and warm up the test equipment for the time required.
4. Allow UUT to come to ambient temperature. Turn it on and allow 5 minutes for warm-up of the UUT.

712 Calibration

Millivolts Measure

1. Hold down the $\boxed{\text{RTD TYPE}}$ and the $\boxed{^{\circ}\text{C}/^{\circ}\text{F}}$ key at the same time, then press and release the Ⓢ key.
2. When the display momentarily shows CAL , release both the $\boxed{\text{RTD TYPE}}$ and the $\boxed{^{\circ}\text{C}/^{\circ}\text{F}}$ keys. This puts the 712 into Cal Mode. The 712 should display:
INPUT 0.00 mV
3. Connect the test lead from the NORMAL jacks of the Fluke 5500A to the INPUT jacks (two middle jacks) on the 712 Calibrator (black to black, red to red).
4. Set the Fluke 5500A to 0.0000 mV and press $\boxed{\text{OPR}}$.
5. Press any key on the 712 Calibrator. The display should read:
INPUT ---- mV
then change to:
INPUT 0.00 mV
6. Press any key on the 712 Calibrator. The display should read:
INPUT ---- mV
then change to:
INPUT 160.00 mV
7. Set the Fluke 5500A to 160.0000 mV.
8. Press any key on the 712 Calibrator. The display should read:
INPUT ---- mV
then change to:
INPUT 320.00 mV
9. Set the Fluke 5500A to 320.0000 mV.

10. Press any key on the 712 Calibrator. The display should read:

INPUT ---- mV

then change to:

INPUT 640.00 mV

11. Set the Fluke 5500A to 640.000 mV.

12. Press any key on the 712 Calibrator. The display should read:

INPUT ---- mV

then change to:

INPUT 1280.00 mV

13. Set the Fluke 5500A to 1280.000 mV.

14. Press any key on the 712 Calibrator. The display should read:

INPUT ---- mV

then change to:

INPUT 400.00 R 4W

Resistance Measure

1. Connect two additional test leads from the NORMAL jacks of the 5500A to the 712 Calibrator (black wire to the 712 red jack labeled [3W NC] and red wire to the red jack labeled [4W NC]). All four input jacks of the 712 should now be in a 4-wire ohms measurement configuration.
2. Set the Fluke 5500A to 400.00 ohms and press **OPR**.
3. Press any key on the 712 Calibrator. The display should read:

INPUT ---- R 4W

then change to:

INPUT ----

mA Measure

1. Disconnect all four test leads from the Fluke 5500A and the 712 Calibrator.
2. Connect the two test leads from the AUX jacks on the Fluke 5500A to the middle jacks on the 712 Calibrator (black to black; red to red).
3. Press any key on the 712 Calibrator. The display will change to:

INPUT 0.00 mA

4. Set the Fluke 5500A to 0.00000 mA and press **OPR**.

5. Press any key on the 712 Calibrator. The display should read:

INPUT ---- mA

then change to:

INPUT 0.00 mA

6. Again, press any key on the 712 Calibrator, still with a 0.00000 mA input from the Fluke 5500A. The display should read:

INPUT ---- mA

then change to:

INPUT 2.000 mA

7. Set the Fluke 5500A to 2.00000 mA.
8. Press any key on the 712 Calibrator. The display should read:
INPUT ---- mA
then change to:
INPUT 0.500 mA
9. Set the Fluke 5500A to 0.50000 mA.
10. Press any key on the 712 Calibrator. The display should read:
INPUT ---- mA
11. Press any key on the 712 Calibrator and the unit will automatically reset itself, with all segments momentarily being displayed. Calibrator is now out of CAL mode. Press the \odot key to turn the calibrator off and disconnect all test leads.

713 Calibration

mA Measure Measure

1. On the 713 Pressure Calibrator hold down both the $\boxed{\text{UNITS}}$ and $\boxed{\text{DAMP}}$ keys. Press and release the \odot key.
2. When the display momentarily shows CAL, release the $\boxed{\text{UNITS}}$ and the $\boxed{\text{DAMP}}$ keys. This puts the 713 into Cal Mode. The 713 should display:
CAL 0.000 mA
3. Connect the test leads from the AUX jacks of the Fluke 5500A to the mA jacks on the 713 Calibrator (black to black and red to red).
4. Set the Fluke 5500A to 0.00000 mA and press $\boxed{\text{OPR}}$.
5. Press any key on the 713 Calibrator. The display should read:
---- 0.000 mA
then change to:
CAL 24.000 mA
6. Set the Fluke 5500A to 24.0000 mA.
7. Press any key on the 713 Calibrator. The display should read:
---- 24.00 mA
then change to:
rAnGE

Pressure Measure

The 713 Pressure Calibrators have built-in temperature compensation. Instruments being calibrated should be in a stable temperature environment for several minutes before calibration. Calibration facilities should be maintained near 23 °C nominal.

Re-calibration (re-characterization) is performed in terms of 'psi' pressure units. Inputs using other pressure units (ie. kPa and bar) must be mathematically converted.

1. Remove two-wire test lead from the 713 Calibrator and carefully attach the pressure fitting of the deadweight tester to the *pressure* jack on the 713 Calibrator.

Note

The use of TEFLON tape at the pressure fittings strengthens the seal.

At this point, the display should be indicating “rAnGE”. This is an indication to choose the correct model of the 713 Calibrator.

2. For 713-30G, press the MIN key. For 713-100G, press the MAX key. The display will flash for a short time:

----- rAnGE

then display:

CAL 0.00 PSI

3. Vent the system to ambient air to ensure 0.00 PSI.
4. Press any key on the 713 Calibrator. The display will change to read:

CAL ----- PSI

then change to:

CAL 30.000 PSI

or

CAL 100.00 PSI

depending on which model /range was selected in step 2.

5. Set up the deadweight tester for either 30 PSI or 100 PSI to be injected into the pressure port of the 713 Calibrator.
6. Once the pressure has stabilized, press any key on the 713 Calibrator. The display will read:

CAL ----- PSI

then change to:

CAL 15.000 PSI

or

CAL 50.00 PSI

depending on which model /range was previously selected.

7. Set the deadweight tester for either 15 PSI or 50 PSI.
8. Once the pressure has stabilized, press any key on the 713 Calibrator. The display will read:

CAL ----- PSI

then change to:

0.000mA 0.00 PSI

9. The 713 Calibrator is now out of the CAL mode and into the normal mode of operation. Carefully vent all pressure, press the Ⓢ key to turn the calibrator off, and disconnect all pressure fittings.

714 Calibration

Temperature Measure

1. On the 714 Calibrator press and hold the $\boxed{\text{TC TYPE}}$ and $\boxed{^{\circ}\text{C}/^{\circ}\text{F}}$ keys, then turn on the 714 by pressing and releasing the $\text{\textcircled{C}}$ key.
2. When the display momentarily shows CAL, release both the $\boxed{\text{TC TYPE}}$ and $\boxed{^{\circ}\text{C}/^{\circ}\text{F}}$ keys. This puts the 714 into the Cal Mode. The 714 should display:
INPUT 0.00 mV
3. Connect the two-wire copper test lead (banana jacks to mini-connector) from the NORMAL jacks of the Fluke 5500A to the TC jack on the 714 Calibrator, observing correct polarity.

Note

Copper wire must be used during this step.

4. Set the Fluke 5500A to 0.0000 mV and press $\boxed{\text{OPR}}$.
5. Press any key on the 714 Calibrator. The display should read:
INPUT ----- mV
then change to:
INPUT 77.00 mV
6. Set the Fluke 5500A to 77.0000 mV.
7. Press any key on the 714 Calibrator. The display should read:
INPUT ----- mV
then change to:
OUTPUT mV

Temperature Source

1. Remove the copper test lead from the 714 Calibrator.
2. Press any key on the 714 Calibrator. The display should read:
OUTPUT ----- mV
After a few seconds, the display should change to:
TYPE J 0.0 °C

Thermocouple Block Calibration

1. Connect the Type-J thermocouple test lead from the TC jack on the Fluke 5500A to the TC jack on the 714 Calibrator, observing correct polarity.

Note

Type-J thermocouple wire (not copper) must be used.

2. Set the Fluke 5500A to source Type-J thermocouple at 0.0 °C. Press **OPR**.
3. Press any key on the 714 Calibrator. The display will very quickly flash:
TYPE J ----- °C
then read:
TYPE J HOLD °C
4. Wait for three to five minutes. The longer the waiting period, the more accurate the Thermo-block calibration will be.
5. Press any key on the 714 Calibrator. The display should read:
TYPE J ----- °C
then change to:
TYPE J 0.xx °C
This number represents the absolute error of the "CJC" sensor and should be below 1°C.
6. Press any key on the 714 Calibrator. The 714 should reset itself, displaying all segments momentarily. The display should then change to:
INPUT xx.x °C
where xx.x is some variable number; or OL (overload) may be indicated.
7. Press the **⊙** key to turn the calibrator off and remove the Type J thermocouple test lead.

715 Calibration

mA/Volts Measure

1. On the 715 Calibrator, hold down the **$\frac{V}{mV}$** and the **$\frac{mA}{\%}$** keys at the same time, then press and release the **⊙** key.
2. When the display momentarily shows CAL , release the **$\frac{V}{mV}$** and the **$\frac{mA}{\%}$** keys. After CAL shows momentarily, the 715 will display:
INPUT 0.000 mA
3. Connect two test leads from the AUX jacks of the Fluke 5500A to the middle mA input jacks on the 715 Calibrator (black to COM jack and red to mA jack).
4. Set the Fluke 5500A to 0.00000 mA and press **OPR**.
5. Press any key on the 715 Calibrator. The display should read:
INPUT ----- mA
then change to:
INPUT 24.000 mA

6. Set the Fluke 5500A to 24.0000 mA.
7. Press any key on the 715 Calibrator. The display should read:
INPUT ---- mA
then change to:
INPUT 0.000 V
8. Connect test lead from the NORMAL output jacks of the Fluke 5500A to the voltage jacks on the 715 Calibrator (black to COM jack and red to the V jack).
9. Set the Fluke 5500A to 0.0000 mV and press **OPR**.
10. Press any key on the 715. A relay will click and the display should read:
INPUT ---- V
then change to:
INPUT 10.000 V
11. Set the Fluke 5500A to 10.00000 V.
12. Press any key on the 715 Calibrator. The display should read:
INPUT ---- V
then change to:
INPUT 0.00 mV
13. Set the Fluke 5500A to 0.0000 mV.
14. Press any key on the 715 Calibrator. The display should read:
INPUT ---- mV
then change to:
INPUT 100.00 mV
15. Set the Fluke 5500A to 100.0000 mV.
16. Press any key on the 715 Calibrator. The display should read:
INPUT ---- mV
then change to:
OUTPUT mV

mA/Volts Source Measure

1. Remove all test leads from the 715 Calibrator.
2. Press any key on the 715 Calibrator. Display should change to:
OUTPUT ---- mV
After a couple of seconds, display should change to:
OUTPUT ---- V
After a couple more seconds, display should change to:
OUTPUT mA
3. Take one single test lead and plug one end into the V jack and the other end into the +LOOP jack of the 715 Calibrator (places a short between the two jacks).
4. Press any key on the 715 Calibrator. Display should read:
OUTPUT ---- mA

- The 715 will then reset itself with all segments momentarily being displayed, then change to:

OUTPUT 0.0000 V

The 715 is now out of the CAL mode. Turn the green $\text{\textcircled{O}}$ key to turn the calibrator off.

716 Calibration

mA Measure

- Hold down the $\text{\textcircled{U}}$ and the $\text{\textcircled{D}}$ keys at the same time, then press the green $\text{\textcircled{O}}$ key. When the display shows CAL momentarily, release the $\text{\textcircled{U}}$ and the $\text{\textcircled{D}}$ keys immediately. After CAL shows, the display will automatically read:

CAL 0.000mA

- Connect the test leads from the AUX jacks of the Fluke 5500A to the mA jacks on the 716 Calibrator (Black to Black and Red to Red).
- Set the Fluke 5500A to 0.00000 mA and press the $\text{\textcircled{O}}$ key.
- Press any key on the 716 Calibrator. The display should change to:

----- 0.000mA

then to:

CAL 24.000mA

- Set the Fluke 5500A to 24.0000 mA.
- Press any key on the 716 Calibrator. Display should change to:

----- 24.000mA

The unit will reset itself. All segments will be displayed momentarily and change to:

----- mA

- Turn the green $\text{\textcircled{O}}$ power key OFF and push the $\text{\textcircled{S}}$ key on the Fluke 5500A.

717 30G Calibration

mA Measure

- Hold down the $\text{\textcircled{U}}$ and the $\text{\textcircled{D}}$ keys at the same time, then press the green $\text{\textcircled{O}}$ key. When the display shows CAL momentarily, release the $\text{\textcircled{U}}$ and the $\text{\textcircled{D}}$ keys immediately. After CAL shows, the display will automatically read:

CAL 0.000mA

- Connect the test leads from the AUX jacks of the Fluke 5500A to the mA jacks on the 717 30G Calibrator (Black to Black and Red to Red).
- Set the Fluke 5500A to 0.00000 mA and press the $\text{\textcircled{O}}$ key.
- Press any key on the 717 30G Calibrator. The display should change to:

----- 0.000mA

then to:

CAL 24.000mA

5. Set the Fluke 5500A to 24.0000 mA.
6. Press any key on the 717 30G Calibrator. Display should change from:
----- 24.000mA
to:
rAnGE

Pressure Measure

1. Remove test leads from the 717 30G Calibrator and carefully attach the pressure fitting to the *pressure* jack on the 717 30G Calibrator.

Note

The use of TEFLON tape at the pressure fittings strengthens the seal.

2. Press the MIN key. The display will flash for a short time:
----- rAnGE
then display:
CAL 0.00 PSI
3. Vent the system to ambient air to ensure 0.00 PSI.
4. Press any key on the 717 30G Calibrator. The display will change to read:
CAL ----- PSI
then change to:
CAL 30.000 PSI
5. Set up the deadweight tester for 30 PSI to be injected into the pressure port of the 717 30G Calibrator.
6. Once the pressure has stabilized, press any key on the 717 30G Calibrator. The display will read:
CAL ----- PSI
then change to:
CAL 15.000 PSI
7. Set the deadweight tester for 15 PSI to be injected into the pressure port of the 717 30G calibrator.
8. Once the pressure has stabilized, press any key on the 717 30G Calibrator. The display will read:
CAL ----- PSI
then the calibrator will be out of CAL mode and in OPERATE mode. The display will read:
0.000mA 0.00 PSI
9. The 717 Calibrator is now out of the CAL mode and into the normal mode of operation. Carefully vent all pressure, press the Ⓢ key to turn the calibrator off, and disconnect all pressure fittings.

718 Calibration

mA Measure

1. On the 718 Pressure Calibrator hold down both the **[UNITS]** and **[DAMP]** keys. Press and release the **[⊙]** key.
2. When the display momentarily shows CAL, release the **[UNITS]** and the **[DAMP]** keys. This puts the 718 into Cal Mode. The 718 should display:
CAL 0.000 mA
3. Connect the test leads from the AUX jacks of the Fluke 5500A to the mA jacks on the 718 Calibrator (black to black and red to red).
4. Set the Fluke 5500A to 0.00000 mA and press **[OPR]**.
5. Press any key on the 718 Calibrator. The display should read:
----- 0.000 mA
then change to:
CAL 24.000 mA
6. Set the Fluke 5500A to 24.0000 mA.
7. Press any key on the 718 Calibrator. The display should read:
----- 24.00 mA
then change to:
rAnGE

Pressure Measure

The 718 Pressure Calibrators have built-in temperature compensation. Instruments being calibrated should be in a stable temperature environment for several minutes before calibration. Calibration facilities should be maintained near 23 °C nominal.

Re-calibration (re-characterization) is performed in terms of ‘psi’ pressure units. Inputs using other pressure units (ie. kPa and bar) must be mathematically converted.

1. Remove two-wire test lead from the 718 Calibrator and carefully attach the pressure fitting of the deadweight tester to the *pressure* jack on the 718 Calibrator.

Note

The use of TEFLON tape at the pressure fittings strengthens the seal.

2. At this point, the display should be indicating “rAnGE”. This is an indication to choose the correct model of the 718 Calibrator.

For 718-30G, press the **[MIN]** key. For 718-100G, press the **[MAX]** key. The display will flash for a short time:

----- rAnGE
then display:

CAL 0.00 PSI

3. Vent the system to ambient air to ensure 0.00 PSI.

4. Press any key on the 718 Calibrator. The display will change to read:
CAL ----- PSI
then change to:
CAL 30.000 PSI
or
CAL 100.00 PSI
depending on which model /range was selected in step 2.
5. Set up the deadweight tester for either 30 PSI or 100 PSI to be injected into the pressure port of the 718 Calibrator.
Once the pressure has stabilized, press any key on the 718 Calibrator. The display will read:
CAL ----- PSI
then change to:
CAL 15.000 PSI
or
CAL 50.00 PSI
depending on which model /range was previously selected.
6. Set the deadweight tester for either 15 PSI or 50 PSI.
7. Once the pressure has stabilized, press any key on the 718 Calibrator. The display will read:
CAL ----- PSI
then change to:
CALU
8. Release pressure by venting the system.
9. Press the MIN key to go to vacuum calibration. Otherwise, press any key to finish calibration. If calibrating vacuum, the display should show:
CAL -12.000 PSI
10. Make sure the pressure/vacuum switch is in the vacuum position. Forward (clockwise) is for pressure and backward (counter-clockwise) is for vacuum.
11. Set up the deadweight tester to apply -12.000 PSI.
12. Wait for the pressure standard to stabilize, then press any key.
13. The display should show:

14. The unit will then reset power.
15. The 718 Calibrator is now out of the CAL mode and into the normal mode of operation. Carefully vent all pressure, press the Ⓢ key to turn the calibrator off, and disconnect all pressure fittings.

Replacement Parts and Accessories

Table 48. Replacement Parts

Item	Description	PN or Model no.	*71X Model	Qty.
A1	Assembly	690906	718 30G	1
A1	Assembly	691147	718 100G	1
Holster	Holster, yellow	664182	718	1
BT1	9V battery, ANSI/NEDA 1604A or IEC 6LR61	614487	712 713 714 715 716 717 718	1
BT2	9V battery, ANSI/NEDA 1604A or IEC 6LR61	614487	718	1
CG81Y	Holster, Yellow	CG81Y		1
△F1	Fuse, 125 mA, 250V fast	686527		1
△F2	Fuse, 125 mA, 250V fast	686527	715	1
MP1	LCD Bezel	664158 664169	718 30G 718 100G	1
MP3,4	Pump Retainer Bracket	664201	718	2
MP5	Gasket	664208	718	1
MP6	Pump Assembly	691383 691748	718 30G 718 100G	1
MP9	Vernier adjust knob	664190	718	1
MP7,8	Selector knob	664193	718	2
MP85	Case top	620192 620218 620226 620234 620200 663994 690997 690997 691147	712 713 30G 713 100G 714 715 716 717 30G 718 30G 718 100G	1
	Shield, LCD, Top Case	687092		1
	LCD	686490	712 714 715	1
	LCD	686482	713	1
	LCD Zebra Strip	643376		2
MP86	Case bottom	620168		1
H2, 3, 4	Case screw	832246		3
MP89, 90	Non-skid foot	824466		2
OR1	O-ring, for pressure input	146688	713 717 30G	1
MP8	O-ring for input/output receptacle	831933	712 715	1
MP92	Battery door	609930		1
H5, 6	Battery door fasteners	948609		2
H7,8	Bracket screw	641131	718	2
SP1	Spacer for pressure input	687449	713 717 30G	1
S1	Keypad	687084 687068 687076 687100	712 713/716 717 30G 714 715	1
TL 75	Test lead set	TL75	713	1

71X Series

Calibration Manual

			715 716 717 30G	
AC70A	Alligator Clips	AC70A	713 715 718	1
TL20	Industrial Test Lead Set	TL20	713 715 716 717 30G	Option
-	712 Instruction Sheet	650280	712	1
-	713 Instruction Sheet	650298	713	
-	714 Instruction Sheet	560306	714	
-	715 Instruction Sheet	650314	715	
-	716 Instruction Sheet	690008	716	
-	717 30G Instruction Sheet	690013	717 30G	
-	718 30G/100G users Manual	690388	718	
-	Test lead, red	688051	712	2
-	Test lead, black	688066	712	2
-	71X Series Calibration Manual	686540		Option
<p>*Parts are for all 71X Calibrators unless specified. ⚠ For safety, use exact replacement only.</p>				