CONZERV®
Smart Energy Management

ELF™ 3200 v02.05.01
Digital Energy, Power and V, A, F Meters

1 Measure
2 Detect
3 Control

3200:

QUICK START GUIDE

• Brilliant Single line 4 digit (digit height 14.2 mm) display
• Kilo, Mega and Negative (-) indicator
• Auto scaling capability for Kilo, Mega, and Giga.
• 3 smart keys for easy and intuitive navigation
• Password protection on setup parameters
• True RMS values are measured with update every 1 sec
• The energy values are not lost even after INTG is cleared and can be viewed with OLD parameter.

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1.1 Need Help? We are here

• Check our website www.conzerv.com for the latest Help, FAQs or our Help Desk phone number for support.
• Question persists? Then send us an email to support@conzerv.com
Remember to include
• Model
• Serial number
• Description of problem, settings, wiring diagram

1.2 Safety first

• Only qualified and trained personnel should carry out
• Installation & wiring
• Disconnection & removal of the meter
• De-energize the connected circuits before meter installation or disconnection.
• During normal operation of this meter, hazardous voltages might be present at the rear terminals, which can cause severe injury or death. High voltages are likely to be present inside even after the meter has been switched off.
• Do not open the cover of the meter – there are no user serviceable parts inside.
• Contact your nearest authorized Conzerv service center for all your servicing requirements.

1.3 Model wise features

Parameter		ELF 3259	ELF 3234 VA VAR PF		ELF 3234-3 VA VAR	
RMS AVG L1 L2 L3	V					
	A					
	% Load					
	% Unbal					
	F					
	RPM					
RMS Total L1 L2 L3	W					
	VA					
	VAR					
	PF					
INTG 3 Ph energy	Wh					
	VAh					
	VARh					
	-VARh					
OLD 3 Ph energy	Wh					
	VAh					
	VARh					
	-VARh					

v02.05.01

Display parameter factory-set to W for ELF 3234 Wh for ELF 3234-3. Display parameter selection can be edited through PROG Menu. Refer section 7.1, 7.2

1.4 Technical Specification

Sensing / Measurement	True RMS, 1sec update time
Input Voltage	4 voltage input terminals (V1, 2, V3, VN) 80 to 500 Vac Line - Line
Input Current	Current input terminals (A1, A2, A3) 50mA to 6A (Field configurable 1A or 5A) Overload: 10A max continuous, 50A max for 3 sec
Aux Supply (Control Power)	80 to 270 Vac
Burden	0.2 VA max per volts / amps input 3 VA max on Aux Supply
Frequency	45 to 65 Hz
Resolution	RMS 4 digit, INTG 8 digit
Environmental	Operating Temperature: -10°C to 60°C Storage Temperature: -25°C to 70°C Humidity 5% to 95% non-condensing
Weight	225 gms approx

2.1 Keypad Operation

Take a quick look at what the keys do

Navigation Concept

RUN — CODE y — PROG
SET
RMS — VLL — V12
VLN

Let us take an example to understand the actions of the front panel keys in the RUN menu. This example will explain how you can navigate from the 'RMS' page to the 'VLN' page and back to 'RMS' in ELF 3259

Step 1: • From the RMS page use the RIGHT key ▶. The display shows 'VLL '.
• The RIGHT key can be used to go forward into sub-parameter pages.
Step 2: • Now press the DOWN key ▼
• You can Scroll down through other display pages at the same level using the DOWN key. The display shows 'VLN'. Congrats you have successfully navigated from 'RMS' to 'VLN'
Step 3: • To return to 'RMS' press the LEFT key ◀. The display shows 'RMS'
• Using the left key you can go back towards the main parameter pages from the sub-parameter pages
• Going Left past "PROG" requires Code entry to enter PROG menu (Setup and Clear)

2.2 Auto Scroll

• Auto display of a group of Display Pages sequentially every 5 seconds, without constantly pressing the keys.
• Parameter Name (1 sec) followed by the value (4 sec) is displayed.
Enter Auto Scroll
• Go to the desired display page
• Press ▼ for 3 seconds (minimum) and then release key.
• The display flashes "AUTO" and then automatically scrolls through other pages at the same level.
• Press any key to revert to Manual Scrolling.

2.3 Indicators - Kilo, Mega, Giga and Negative

Kilo

32.00 K

When lit, indicates that the reading is in Kilo (10^3). 10,000 is displayed as 10.00K and 1.0K as 1000
E.g.: 32.00 with K LED glowing indicates the value reads 32,000

Mega

32.00 M

When lit, indicates that the reading is in Mega, (10^6).
10,000K is shown as 10.00M and 1.0M as 1000K
E.g.: 32.00 with M LED glowing indicates the value reads 32,000K

Giga

32.00 M

When Kilo and Mega are both glowing, the reading is in Giga (10^9). 10,000 M is shown as 10.00G. 1.0G is shown as 1000M.
E.g.: 32.00 with both K and M LED's glowing reads as 32,000M

Negative -

32.00

When lit, indicates that the reading is negative Per IEEE 100 and industry standard practice by meter-men:
• With Forward Flow of Watts & Capacitive (Leading) load: VAR & PF are negative.
• With Reverse Flow of Watts & Inductive (Lagging) load: VAR, PF and Watts are negative
E.g.: 32.00 with negative LED glowing indicates the value reads as -32.00.

2.4 RMS, INTG, OLD

rrMS

RMS:
The RMS block comprises of instantaneous readings.

Refer Section 1.3 for RMS parameters measured by each ELF model

IntG

INTG:
Energy Integrator, which provides several parameters for Energy Management.
Refer Section 5.1

OLd

OLD:
Stores the energy values from INTG when INTG is cleared (manually or overflow.
Refer Section 5.4

2.5 W, W.h, W.H, DIAG

W

W:
Indicates watts (both total and phasewise values can be viewed).

Refer Section 6.1, 6.2, 6.3

W.H

W.H:
The first four digits of energy value (W.h.) are labeled with "W.H" (both uppercase).

Refer Section 5.2, 5.3

W.h

W.h:
The last four digits of energy value (W.h.) are labeled with "W.h" (h lowercase).

Refer Section 5.2, 5.3

dI AG

DIAG:
Represents diagnostic pages. Scroll right to view the diagnostic values (these values are useful for factory testing only).
Refer Section 6.1, 6.2, 6.3

3.1 PROG Menu - Setup

PROG menu gives the complete list of user-programmable parameters.
• The meter must be set (programmed/configured) to match the application settings, before use. Otherwise, the readings will be wrong.
• All the Setup values can be re-programmed at any time, upon entering "SET". However, the settings: SYS (Star/wye or Delta), Vpri, Vsec, Apri, Asec critically determine the scaling of measured readings.
• While the scaling may be used to minimise the error in readings due to Instrument Transformer errors, wrong settings will upset the readings of running systems.
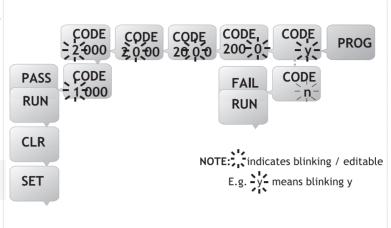
CAUTION: It is the user's responsibility to ensure that only qualified personnel correctly Setup the Meter.

You can enter PROG menu in
• Edit mode – to view or edit set parameters – Section 3.2
• View only mode – to view the set parameters - Section 3.3

3.2 Enter PROG Menu in edit mode

CODE 2000 — CODE 2000 — CODE 2000 — CODE 2000 — CODE y — PROG
PASS RUN — CODE 1000 — FAIL RUN — CODE n
CLR
SET

NOTE: ☼ indicates blinking / editable
E.g.: ☼ means blinking y

Step 1: • Go ◀. The display will show "CODE Y" with the "Y" blinking.
Step 2: • To continue with code entry scroll left using the LEFT key ◀
Step 3: • Press ◀ 3 times. The blinking zero will shift position one place leftwards with each key press
Step 4: • Now 2 starts blinking.
• Press ▼ to change the blinking 2 to 1.
• You have now entered the factory set code 1000
Step 5: • Press ◀ to confirm the code.
• The display shows "PASS" and then "RUN".
• "PASS" indicates that you have successfully entered the code and entered PROG Menu - Setup.

If the display shows "FAIL" - means that you have not successfully entered PROG Menu, don't despair. Try again from step1.
Restart the meter to easily return to the RMS page to re-enter the code.

3.3 Enter PROG Menu in View (read-only) mode

CODE ☼ — PROG
FAIL RUN — CODE ☼

Step 1: • Go ◀. The display will show "CODE Y" with the "Y" blinking.
Step 2: • Go ▼. The display will show "CODE N" with the "N" blinking
Step 3: • Go ◀, to continue with PROG menu entry in view mode.
Step 4: • The display shows "FAIL" and then "RUN".
• You have successfully entered the PROG Menu – Setup in view mode.
Step 5: • Press ▼, display shows CLR.
• Press ▼ again, display shows SET.
• You are at the PROG Menu now. Press to enter the menu and view the set parameters.

NOTE
• You cannot go left into the PROG menu ("RUN") unless you enter a code
• Once in the PROG menu ("RUN"), you can go down to "CLR" or "SET". Going right though the "CLR" page allows you to clear the integrator. Similarly, keep going right through "SET" to program the meter settings. When done:
• Go Left all the way back to the PROG menu
• Go Up to "RUN"
• Go Right into RMS to view the display pages again.
Complete PROG Menu listing all the set up parameters is shown overleaf in Section 7.1

3.4 Enter PROG Menu on Power ON

An easy way to enter PROG Menu
• During power ON, press ▶ the key for 2 sec continuously
• Meter displays SET.
• Press ▼ the key to enter the PROG menu.

Edit the setup parameters as explained in section 7.2
NOTE
1. To set the meter settings, you must first enter the PROG Menu.
2. Go Up to "PROG", then Left to enter the PROG Menu.
• You must now enter the Factory Set code of 1000, to proceed. "Code y", followed by the entry of the Code "1000" is required.
• To enter the code, edit the blinking digit value up or Down to get "1000".
• Keep going left.
• Without entering the code, you may view the settings, but you can't change them.

4.1 Electrical & Mechanical Installation

• Connecting cable requirements

	Insulation Rating	Current Rating
Voltage Circuit	> 500 V ac	> 0.1 A
Current Circuit	> 500 V ac	> 7.5 A Or 16 AWG minimum

• Tools & Equipments

Driver	Power Driver preferred or hand screw driver
Tip	Philips tip preferred or flat tip. DO NOT USE POZIDRIV TIP
Screw head diameter	3.5 mm
Shaft diameter	< 5mm. Diameter = 5mm or more will get stuck in the safety cover
Torque	Tightening Torque: (25 to 60) N-cm Loosening Torque: (55 to 60) N-cm Torque greater than 60 N-cm may strip the screw or break the Safety Cover.
Screw Travel	6mm less wire thickness

4.2 Wiring Diagrams

3 Phase 4 Wire Star (Wye)
3 CTs. Direct Voltage Connections if Voltages are less than 501V ac L-L. Otherwise 3 PTs

3 Phase 3 Wire Delta connection diagram
Direct Voltage Connections if Voltages are less than 501V ac L-L. Otherwise, 3 PTs for Closed Delta or 2 PTs for Open Delta

Note: Remember to make sure Delta is programmed in the meter Setup. Leave the Vn terminal un-connected

2 Phase 3 Wire, 110-0-110V connection diagram (U.S.)

Single phase connection

Direct Voltage Connections if Voltages are less than 501v ac L-L. Otherwise use one PT.
The unused current terminals must be shorted together.
1.) Program the meter in for STAR mode. However Voltage primary and secondary needs to be programmed as Line to Line.
2.) Connect the voltage and current inputs only to the V1 and A1 voltage and current terminals of the meter.
3.) The unused current terminals (A2 and A3) must be shorted together to reduce noise picked up in the meter
4.) However, the energy parameter readings will be accurate.

3.5 Mechanical Dimensions

90, 40, 43, 48, 3200:, 96

4.3 Recommended Panel Cut-out

43.5mm +0.5 -0
90.5mm +0.5 -0
Not to scale

5.1 Energy Integrator INTG

• ELF 3234 and ELF 3234-3 are equipped with Energy Integrator function which provides several energy parameters for Energy Management: VAh, Wh, VARh, -VARh.
• The Integrator parameters are always accumulated irrespective of the display parameter selected.
• All the recorded values are direct readings and have a high resolution. This enables accurate energy analysis over short intervals of time.
• The Integrator parameters can be viewed by changing the PAR in the PROG menu (setup).

E.g.: ELF 3234 is in operation in the "Wh" mode. Not only Wh, but also the other Integrator parameters (VAh, VARh) will also get accumulated. If you want to view the VAh accumulated, enter PROG menu and change "PAR" from W to VA.

5.2 Labelling of INTG parameters

Integrator values up to 4 digits both before and after decimal place are displayed. The labelling of Integrator parameters for display is as explained below.
Here is an example to explain the labelling on Integrator parameters.
If the display of ELF 3200 reads
W.H = 01.00
W.h = 0987
Then the Energy value = 1.000987 Wh.

In ELF 3200 series meters display, the first four digits are labelled with "W.H." (both capital) and the last four digits are labelled with "W.h.".

5.3 Viewing INTG parameters

The example below tells you how to view the Integrator parameters using your ELF 3200 series meter (ELF 3234 and ELF 3234-3). Energy value = 1.000987 Wh. Follow steps below.

Step 1: • From the RMS page press ▼. The display shows INTG

Step 2: • Press ▶. The display shows W.H for 2 seconds and then the Energy value (first four digits) is displayed.

Step 3: • Press ▼. The display shows W.h for 2 seconds and then the Energy value (last four digits) is displayed.

5.4 OLD data register

• When the Integrator is cleared (manually or due to overflow), the energy values stored in the integrator will be transferred to OLD register.
• Thus the old energy values are not lost even after the integrator is cleared and can be viewed with the OLD parameter.
• Available with 3234 and 3234-3 models.

NOTE: For energy studies clear the Integrator at the end of each observation. This will, transfer all the stored energy values to the OLD register and held frozen, while the Integrator begins accumulating data for the next observation. Remember that the next time the Integrator is cleared, the OLD values will be over-written.
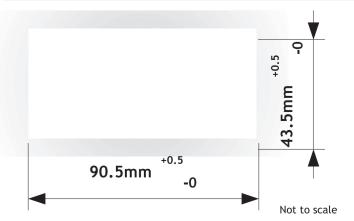
5.5 INTG Overflow

• The energy values stored in INTG will max out based on the PT ratio x CT ratio set for the application.
• Enable easy energy management calculations - all the INTG (VAH/VAh, WH/Wh, VARH/VARh, -VARH/-VARh) reset together whenever any one of them (usually VAH/VAh) overflows.
• The maximum number that the Meter handles is 9,999 Giga for RMS and Energy values.
• The values stored in INTG are transferred into OLD register during INTG overflow. Refer section 5.4 for details.

The INTG Overflow values are shown below

PT ratio x CT ratio	Max reading (Wh/VAh)	Time taken for Overflow (months)	
		Min	Max
1 to 1.999	9999K	1.92	3.85
2 to 1000.999	9999M	3.85	1928.81
Greater than 1001	9999G	3.85	3857.63

5.6 SET, CLR, PROG

SET:
The user programmable parameters are displayed when you scroll right from SET.
Refer Section **7.1, 7.2**

CLR:
Scroll right from the CLR page to reset the integrator to zero (i.e.erase the stored energy values)
Refer Section **5.4, 8.1**

PROG:
Display PROG indicates start of PROG Menu. Go left from this display page to enter PROG Menu.
Refer Sections **3.1, 3.2, 3.3, 3.4** enter PROG Menu
Sections **7.1, 7.2** to edit and save parameters

RUN:
Scroll right from the RUN page to enter the display mode and view the display parameters
Refer Section **6.1, 6.2, 6.3**

6.1 Display Map - ELF 3234

SET= This menu has the entire PROG menu. The user programmable parameters are listed here
RUN = This menu has all the display pages. You can scroll through the display pages using the front panel keys

RMS = RMS value display pages are in sub level
W = Total watts
W1 = Watts phase1
W2 = Watts phase 2
W3 = Watts phase 3
INTG = Integrated parameter display pages are in sub level
W.H = First 4 digits of energy value Wh
w.h = Last 4 digits of energy value Wh
OLD = Stores the energy values from INTG when INTG is cleared (manually or overflow)
W.H = First 4 digits of energy value Wh
w.h = Last 4 digits of energy value Wh
DIAG = represents diagnostic pages. The values contained in these pages are for factory testing only
MDL = Model number
Ver 1 & Ver 2 = Version no.
D1 = Display scanning
D2, D3, D4, D6, D7 = Data for Conzerv's internal analysis
D5 = Check Sum
D8 = 1 if INTG reset manual
2 if INTG reset by overflow
3 if INTG reset due to internal error
D9 = 1, overflow parameter is VAh forward
2, overflow parameter is Wh forward
CLR = This menu has all the display pages. You can scroll through the display pages using the front panel keys

6.2 Display Map - ELF 3234-3

SET= This menu has the entire PROG menu. The user programmable parameters are listed here
RUN = This menu has all the display pages. You can scroll through the display pages using the front panel keys

RMS = RMS value display pages are in sub level
W = Total watts
W1 = Watts phase1
W2 = Watts phase 2
W3 = Watts phase 3
PF = Total power factor
PF1 = Power factor phase1
PF2 = Power factor phase 2
PF3 = Power factor phase 3
INTG = Integrated parameter display pages are in sub level
W.H = First 4 digits of energy value Wh
w.h = Last 4 digits of energy value Wh
OLD = Stores the energy values from INTG when INTG is cleared (manually or overflow)
W.H = First 4 digits of energy value Wh
w.h = Last 4 digits of energy value Wh
DIAG = represents diagnostic pages. The values contained in these pages are for factory testing only
MDL = Model number
Ver 1 & Ver 2 = Version no.
D1 = Display scanning
D2, D3, D4, D6, D7 = Data for Conzerv's internal analysis
D5 = Check Sum
D8 = 1 if INTG reset manual
2 if INTG reset by overflow
3 if INTG reset due to internal error
D9 = 1, overflow parameter is VAh forward
2, overflow parameter is Wh forward
CLR = This menu has all the display pages. You can scroll through the display pages using the front panel keys

6.3 Display Map - ELF 3259

SET= This menu has the entire PROG menu. The user programmable parameters are listed here
RUN = This menu has all the display pages. You can scroll through the display pages using the front panel keys

RMS = RMS value display pages are in sub level
VLL = Phase - Phase voltage average
V12 = RMS voltage phase1-2
V23 = RMS voltage phase 2-3
V31 = RMS voltage phase 3-1
VLN = Phase - Neutral voltage average
V1 = RMS voltage phase1 - Neutral
V2 = RMS voltage phase 2- Neutral
V3 = RMS voltage phase 3- Neutral
A = Current average
A1 = RMS current phase 1
A2 = RMS current phase 2
A3 = RMS current phase 3
L1% = % of load phase 1
L2% = % of load phase 2
L3% = % of load phase 3
unb = % of unbalanced load
RPM = Source RPM. Poles programmed in the PROG Menu
F = Frequency in Hz
DIAG = represents diagnostic pages. The values contained in these pages are for factory testing only
MDL = Model number
Ver 1 & Ver 2 = Version no.
D1 = Display scanning
D2, D3, D4, D6, D7 = Data for Conzerv's internal analysis
D5 = Check Sum

7.1 PROG Menu - Setup parameters

The entire list of set up parameters in PROG Menu are listed:

SET=	This menu has the entire PROG menu. The user programmable parameters are listed
SYS=	Power system's configuration*: STAR, DELTA
V.PRI=	Voltage primary winding (PT), line-line*
V.SEC=	Voltage secondary winding (PT), line-line*
A.PRI=	Current primary winding (CT)* Input range: 1 A to 99 kA (100.0)
A.SEC=	Current secondary winding (CT)* Input range: 1 A to 7.5 A (5.000)
LABL=	Phase labeling Choose from: 123, RYB, RST, PQR, ABC
VA.FN=	VA function selection* Set the VA function to: 3D, ARTH
F.S%=	Full scale % Set the full scale between1 to 100: 100
POLE=	Number of poles for RPM Choose from: 2,4,6,8,10,12,14,16
PAR=	Selectable energy parameter*

*Changing these values while the device is in use, is not recommended. Default Setup values are give in BOLD
NOTE:
• The PROG menu of ELF 3259 will not have "PAR" (Energy parameter selectable) option.
• The "F.S%" and "POLE" options will not be available in the PROG menu of ELF 3234 and ELF 3234-3
• ELF3234 can be used as Wh or VAh or VARh or PF meter based on selection of parameter in set-up table.
• ELF3234-3 can be used as Wh and PF or VAh and PF or VARh and PF meter based on selection of the parameter in set-up table.

How to enter PROG Menu to edit the set up? Just refer section **3.2**

7.2 Edit set parameters in PROG Menu

This example explains how to edit the system type from "STAR" to "DELTA" in the PROG Menu of ELF 3200 Series.
For easy understanding we have explained edit PROG Menu in 2 parts.

7.2.1 Edit & accept setup

Step 1: • From "RUN", go ▼ untill "SET" is displayed. Refer Section **3.2** to enter PROG menu.

Step 2: • Go ▶, the display shows "SYS".

Step 3: • Go ▶, the display shows "STAR".

Step 4: • Press ▶, the display shows "STAR" blinking. This means that the parameter value can be edited now.

Step 5: • Press ▼, the display shows "DLTA" blinking. This means that value for SYS has been changed to delta.

Step 6: • To accept the new valure, press ▶.
• "DLTA" stops blinking. This means that the new value for SYS has been accepted.

7.2.2 To save the new value to setup

NOTE: ⁃⁃⁃ indicates blinking / editable
E.g. ⁃⁃⁃ means blinking y

Step 7: • After completing upto step 6 above, go ◀. The display shows "SYS".

Step 8: • Go ◀. The display shows "SAVE Y" with "Y" blinking

Step 9: • If you want to save the edited settings, go ◀. The display will flash "PASS" for sometime and then "SET".

NOTE:
• If you do not want to save the edited settings, after step 9 go ▼. The display shows "SAVE N" with "N" blinking.
Now go ◀, the display flashes "FAIL" for sometime and then "SET".

8.1 Clear INTG

ELF 3234 and ELF 3234-3 are equipped with Energy Integrator INTG, where the energy parameters are accumulated. Refer Section 5.1 for information on INTG

Step 1: • Enter the PROG Menu. Refer Section **3.2**
Step 2: • When the display shows "RUN", go ▼. The display shows "CLR".
Step 3: • Go ▶.You have entered the CLR menu and the display shows "INTG"
Step 4: • Go ▶ to proceed with INTG clear. The display shows "INTG Y" with blinking "Y".
• This is to prompt you that you are about to Clear the data stored in INTG.
• If you do not want to clear INTG, go ▼. The display shows "INTG N". Go ▶.
• The display shows "FAIL" which indicates failure in clearing INTG. Now go to step 6
Step 5: • Go ▶ once to clear INTG. "PASS" flashes on the display followed by INTG.
• INTG is cleared and the data is transferred to OLD register. Refer section **5.4**
• If ▶ is pressed more than once, the Integrator value will not be transferred to OLD register and will be lost.
Step 6: • To exit.
• Now, you're back in the PROG Menu and can go ▼ to "RUN"
• Now go ▶ to "RMS"

8.2 Warranty & Calibration

Product Warranty

CONZERV warrants all products to be free from defects in material, workmanship and title and will be of the kind and quality specified in CONZERV's written description in the manual. The foregoing shall apply only to failures to meet said warranties, which appear within one year from the date of shipping. During the warranty period, CONZERV will, at its option, either repair or replace any product that proves to be defective. Please see the LIMITED WARRANTY CERTIFICATE provided with the product for further details.

Limitation of Warranty

This warranty does not apply to defects resulting from unauthorized modification, misuse or use for any reason other than electrical power monitoring.
OUR PRODUCTS ARE NOT TO BE USED FOR PRIMARY OVER-CURRENT PROTECTION. ANY PROTECTION FEATURE IN OUR PRODUCTS IS TO BE USED FOR ALARM OR SECONDARY PROTECTION ONLY.
THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CONZERV SHALL NOT BE LIABLE FOR ANY PENAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING FROM ANY AUTHORIZED OR UNAUTHORIZED USE OF ANY CONZERV PRODUCT. LIABILITY SHALL BE LIMITED TO THE ORIGINAL COST OF THE PRODUCT SOLD.

Statement of Calibration

Our instruments are inspected and tested in accordance with specifications published by an independent testing facility. The accuracy and calibration of our instruments are traceable to the National Institute of Standards and Technology through equipment that is calibrated at planned intervals by comparison to certified standards.

Notes

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