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<b>Objective</b>	FAQs for ELF 3200 Series				

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**This document supersedes all earlier versions.**

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## 1.NOMENCLATURE

Parameter	Description
V12, V23, V31	Line to line Voltages
V1, V2, V3	Per phase voltages
A1, A2, A3	Per phase currents
V LL	Average of line to line voltages
PF1, PF2, PF3	Power factor for each phase
V LN	Average of line to neutral voltages
F	Frequency of the measurement circuit
L%1, L%2, L%3	Percentage of load per phase based on C.T. primary
UNB	Percentage of unbalanced load of all three phase
RPM	Revolution per Minute (for DG application)
W	3 phase total power
VA1, VA2, VA3	Apparent power per phase
W1, W2, W3	Active power per phase
VAR1, VAR2, VAR3	Reactive power per phase
VAh	Volt – Ampere hours
VARh	VAR hours Inductive (with IE – capacitive)
-VARh	VAR hours Capacitive (with IE – inductive)

### Display labels for integrator parameters

Parameter	Description
WH	Watt hours value before decimal position
Wh	Watt hours value after decimal position
VAH	Volt-Ampere hours value before decimal position
VAh	Volt-Ampere hours value after decimal position
VARH	VAR hours value before decimal position
VARh	VAR hours value after decimal position

## 2.INSTALLATION

### 2.1 What are default settings of the meter?

If there is no instruction from the customer while ordering, meter will be dispatched with the following default settings.

• Default Settings for ELF 3259		• Default Settings for ELF 3234 and ELF 3234-3	
SET parameter	Default value	SET parameter	Default value
SYS	STAR	SYS	STAR
V.PRI	415.0	V.PRI	415.0
V.SEC	415.0	V.SEC	415.0
A.PRI	100.0	A.PRI	100.0
A.SEC	5.000	A.SEC	5.000
LABL	123	LABL	123
VA.Fn	3D	VA.Fn	3D
F.S <sub>0</sub>	100.0	PAR	W
POLE	4.000		

## 2.2 How to change the meter setup?

Refer the QSG for ELF 3200 Series to enter and edit PROG menu - setup.

## 2.3 What are WH and Wh in ELF3234?

Energy reading has 8-digit resolution. But the display will show four digits at a time. Generally the higher digits (parameter will display capital "H". eg: VAH) are sufficient for monitoring. However if lower digits (parameter will display small "h". eg: VAh) are required to be monitored in some application, we can select the lower digit pages. Even in case of power failure, it automatically selects the last displayed parameter and hence the selected parameter will be displayed.  
For example: 12.345678 will be displayed as 12.34 in VAH ( KILO and MEGA LED OFF) and 5678 will display in VAh. Similarly 1234.5678 will be displayed as 1234. in VAH ( KILO and MEGA LED OFF) and 5678 in VAh and also 12345.678 displayed as 12.34K (KILO LED is ON and MEGA LED is OFF) in the VAH and 5678 in the VAh. (KILO and MEGA LED is OFF).

## 2.4. How do I use 96 x 48 mm compact size in already cut 96 x 96mm panel?

Adapter plate of 96 x 48 mm to 96 x 96 mm is available as optional accessory.

## 2.5 What are the wiring configurations possible with the ELF 3200 Series?

STAR 4V3A and DELTA 3V2A, which are selectable through the PROG menu.

## 2.6 What is the meaning of Star and DLTA in the PROG menu?

STAR means for STAR 3E, 4V3A (means for 3 phase 4 wire applications) and DLTA means for DELTA 3E, 3V2A (for 3phase 3 wire applications).  
Star is also called Wye in some countries.

## 2.7 Can I use ELF 3200 Series Meter for single-phase applications?

Yes. Please follow the steps below.

- 1.) Programme 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.

**NOTE:** Please refer V1 and A1 only for correct readings in ELF 3259.

## 2.8 How to check for wrong connections?

These steps are applicable for both Star and Delta systems.

**1.) If the current in any phase is reversed (instead of S1 to S2 the connection is S2 to S1),** Active power of W1, W2, W3 shows negative (for ELF 3234 and ELF 3234-3). However, in ELF 3259 it is not possible to identify reversed current connections.

Reverse the current inputs of the phase, which shows the W negative (ELF 3234 and ELF 3234-3).

**2.) For checking the System (Star or Delta) for the sequence of connection**

- Connect all the voltages and auxiliary supply.
- Connect the current from R and B phase. Switch ON the meter.
- For ELF 3234 and ELF 3234-3: If the System is STAR then Y phase current and power parameter is zero, else if the System is DLTA then Y phase current and power parameter will display some value.
- For ELF 3259: If the System is STAR then Y phase current is zero, else if the System is DLTA then Y phase current will display some value.

## 2.9 When do I need to connect an external CT/PT?

External CT is required when the current to be measured is greater than 6A.

An external PT is required when voltage greater than 500V (Phase – Phase).

## 2.10 Is it possible to use ELF 3200 Series Meter without CT application (i.e. load <5A in 415/440V applications 3 phase or single phase)?

Yes for input current upto 6 A maximum, the ELF 3200 Series meter can be used without connecting an external CT.

## 2.11 What is the range for input current and voltage range for ELF 3200 Series?

Voltage (phase to phase): 80 to 500 V ac

Current: 50 mA to 6 A

**2.12 What is the range for auxiliary supply for ELF 3200 Series Meter?**

Auxiliary supply voltage range: 80 to 270 V ac, 45 to 65 Hz.

**2.13 Meter does not show the calculated W (Watts) readings. Why?**

The Meter should be programmed before installation. Not programmed/ incorrectly programmed meters will show incorrect readings. See the Quick Start Guide (QSG) supplied along with the meter for programming. For the current phase reversal (instead of S1 to S2 the connection is S2 to S1) - check the Watts individual (W1, W2, W3). If any one of the phases is negative then the particular phase is reversed.

**2.14 Connections are proper, meter is showing proper voltage but Y phase current is not showing in the meter. What could be the problem?**

The meter would have programmed for STAR and connections to the Y phase are not given presuming the system as DELTA. For checking the system configuration (STAR or DELTA) in the meters

- a.) Connect the current from R and B phase.
- b.) Switch ON the meter.
- c.) If the System is STAR then Y phase current and power parameter is zero, else if the System is DELTA then Y phase current and power parameter will display some value.
- d.) Change the system configuration if required.

**2.15 What is the current input range for which accuracy remains within specified limit?**

The ELF 3200 Series Meters operate with the specified accuracy when the input current value lies between 50 mA to 6.0A.

### **3.DISPLAY INDICATIONS**

**3.1 How are KILO, MEGA and GIGA ranges shown?**

<b>RMS Reading</b>	<b>Indicator</b>
Less than 0.001	K, M OFF, displays "0.000"
Less then 9999	K, M OFF
Above 9999	K ON, M OFF
Above 9999 k	M ON, K OFF
Above 9999 M	Giga (K + M indicators ON)
Upto 9999G	Giga
Above 9999G	Display shows "Hi" for positive numbers and "Lo" for negative numbers

E.g.: Here is an example below:

<b>Actual W value (In watts)</b>	<b>W value displayed on the ELF 3200 meter</b>	<b>K LED</b>	<b>M LED</b>	<b>Remarks</b>
0.00067	0.000	OFF	OFF	Actual RMS value is less than 0.001
1000.00	1000.00	OFF	OFF	Actual RMS value lies between 0.001 and 9999
10111.27	1.011	ON	OFF	Actual RMS value lies between 9999 and 9999k
9867000.09	9867	ON	OFF	Actual RMS value lies between 9999 and 9999k
1000000.67	1.000	OFF	ON	Actual RMS value lies between 9999k and 9999M
10000011.56	1.000	ON	ON	Actual RMS value lies between 9999M and 9999G
1099000000000.45	<b>Hi</b>	OFF	OFF	Actual RMS value is positive and above 9999G
-1099000000000.21	<b>Lo</b>	OFF	OFF	Actual RMS value is negative and above 9999G

### 3.2 How is Lead and Lag shown for the PF parameter?

Check the Minus LED (“-” LED) to the left of the reading, between “K” LED and “M” LED.  
 Minus LED ON: PF is LEAD or  
 Minus LED OFF: PF is LAG

### 3.3 What are VARh and -VARh under the INTG page of ELF 3234 and ELF 3234-3?

VARh shows Reactive Energy- Inductive.  
 -VARh shows Reactive Energy-Capacitive.

### 3.4 How do I know which is parameter value currently displayed?

Press any one of the 3 keys once; meter will display the parameter name of the current page under display.

**Or**

If none of the keys are pressed and if the auto scroll is also not enabled, then the meter repeatedly displays the current page parameter name (2sec) and value (8sec).

**Or**

If the auto scroll is enabled, then the meter will display the current parameter name (1sec) and value (4sec) and moves to the next page. See the QSG for more details on auto scroll.

## 4.PROG MENU - SETUP

### 4.1 What are the display options available and how do I select them?

The display options are:

ELF 3259 (V, A, F, %Unbal, RPM, Load% - no selection required)

ELF 3234 (Can be used as “W, Wh” / “VA, VAh” / “VAR, VARh” / “PF” meter based on the “PAR” selection in the PROG menu.

ELF 3234-3 (Can be used as “W, Wh, PF ” / “VA, VAh, PF” / “VAR, VARh, PF” / “PF” meter based on the “PAR” selection in the PROG menu.

### 4.2 What is “PROG” page? How to edit the PROG menu - setup and clear the integrator?

The steps to edit the setup and clear integrator are listed below:

- 1.) Enter into the HOME page (RMS). Press “DOWN” key until you reach the “PROG” page.
- 2.) Press the “LEFT” key once, CODE “Y” will be displayed.
- 3.) Enter the password 1000 to enter in the PROG menu - setup.
- 4.) See the ELF 3200 QSG to edit the PROG menu - setup or to clear the Integrators.

### 4.3 Can I restore the old setup parameter, while editing the setup?

Yes, two steps are explained below.

Partially edited setup parameter: While editing the parameter if you want to restore the old setup data press the “LEFT” key continuously up to the blinking the first digit then press the “LEFT” key once again it will resume the old setup data.

**Or**

Save changes Y/N: After completing the setup edit, when you are exiting the PROG menu if “Y” is selected then changes are saved else if “N” is selected the values before entering the PROG menu are restored.

### 4.4 How to set CT and PT ratio?

Please refer the QSG for the ELF 3200 Series.

### 4.5 Can I set my own password instead of 1000?

No. The password is always 1000, which is not editable.

### 4.6 What is LABL in the PROG menu?

The user can set the label as “123”, “ABC”, “RST”, “PQR” and “RYB”, depending on the country and the requirement. These labeling options are to satisfy the international standards or requirements. In India normally people use RYB. These are used for identifying the per phase parameters.

**Example:** If “123” is selected as label, then the phase wise current will be displayed as A1, A2, A3.

**4.7 What does F.S<sup>0</sup> (in the PROG menu for ELF 3259) stand for?**

F.S<sup>0</sup> allows the user to set required full scale in % of CT Primary. While setting up a new factory or commercial complexes the current transformer is selected keeping the future expansion in mind, i.e. CT primary rating may be much higher than the sanctioned load. This may be as high as 10 times the present load. For E.g.: If the CT ratio is 500/5A, but the sanctioned load is only 100A, meter will indicate just 20% (bar graph and % load) even if the load is 100A. User may not notice even if he is exceeding the sanctioned limit, which result in penalty from Electricity Board. With the programmable FS for the above condition the user can select the FS as 20% of CT primary (sanctioned load), so that the meter will show 100% when the load is 100A.

**4.8 What does POLE (in the PROG menu for ELF 3259) mean?**

This is required for calculating the generator RPM, user has to enter correct no of poles based on which the generator RPM is calculated.

**4.9 What does Unbalance (Unb) (in ELF 3259) mean?**

This is a measure of unbalance between loads of 3 phases.

**4.10 What is 3d and Arithmetic in VA function and which is best under what conditions?**

VA function display in the PROG menu	Formula	Other names	Which one?
3d (default)	$kVA_{3D} = \sqrt{\sum W^2 + \sum VAR^2 + \sum D^2}$ Where D = Distortion Power per IEEE 100	U , Apparent , Vectors	Best all round
Arth	$\sqrt{\sum VI * AI}$	Arithmetic, scalar	Good under Low unbalance

**4.11 Is it possible to reset all the set parameters at once?**

No. The user can edit the set parameters one at a time by entering into the PROG menu.

**4.12 Is there any pre-set maximum time duration for storage of user set parameters?**

No. Only editing the values in the PROG menu can change set parameters.

**4.13 What happens in case of a power failure while editing the set up parameters?**

The last saved values before interruption will be present. The meter display goes to RMS on restoration of power.

**4.14 What happens if the set parameters are changed after the meter is connected to a load?**

Meter continues measurement as per the new setup values.

**4.15 How to select the setup parameter to be edited?**

Refer the QSG for ELF 3200 Series for the steps involved in selecting the setup parameter for editing the setup parameters.

**4.16 Is AUTO SCROLL possible among the set parameter display pages?**

No. AUTO SCROLL is not possible among set parameters.

## **5.SIM (simulation) MODE**

**5.1. What is SIM mode and why it is required?**

Simulation mode is provided for the purpose of demonstration of the features of the meter and in exhibition displays where no 3 phase load is available. In this mode user can see the functioning of the meter without any input signals, meter shows fixed Frequency, voltage and current and 0.5PF. Power and Energy parameters calculated based on this V (240VLN), A (5000A) and PF (-0.5) are displayed.

**5.2. How to enter into SIM mode for Demo?**

Power up the meter with left key pressed, it will go to “SIM” page.

Now press the right key to enter into RUN menu in the SIM mode, further navigation is same as the normal mode.

**5.3. How to exit SIM mode?**

Please follow the steps below:

- 1.) Move to the home page “RMS”.
- 2.) Press “DOWN” key until the display shows “PROG”.
- 3.) Press the “LEFT” key to enter the PROG menu. Meter displays code “Y”.
- 4.) Press the left key 4 times to enter the password (1000). Meter displays SIM.
- 5.) Press the down key until you reach the display page “RUN”.
- 6.) Press the right key to enter RUN menu.
- 7.) Then press the down key once to return to RMS. Meter is now in the normal (RUN menu) mode.

**NOTE:** The mode can be changed only through the PROG menu. Switching off will not change the mode, since switching off is often used to show the incrementing “Number of Interruptions” in the Integrator.

**5.4. How to confirm whether the meter is in SIM mode?**

In the SIM mode, meter does not display the actual value. It always displays fixed unchanging values.

**Example:** V= 415VLL, 240VLN, A=5000A, PF =-0.5, Frequency= 50Hz and the Power and Energy parameters are derived from this.

In the normal mode meter displays the actual measured values based on the input signals.

**5.5. Is it possible to edit set parameters in SIM mode? Will this affect the displayed values in SIM mode?**

Yes the PROG menu - setup can be edited in SIM mode and the values displayed in SIM mode are updated as per the edited setup.

## **6.AUTO SCROLL**

**6.1 How to enable the auto scrolling?**

Keep pressing the down key for at least 3 seconds, the parameter name will be scrolled within the level (Refer QSG) and when the key is released meter will display “AUTO” for a moment, which means the auto scrolling is enabled.

**6.2 How to disable the auto scroll?**

Auto scroll can be disabled by pressing any one of the 3 keys or by interrupting the control power (auxiliary power).

**6.3 What is the time duration between the display of two consecutive parameters in auto scroll?**

The time duration between parameter-to-parameter display in the auto scroll is 5 seconds (Parameter name is displayed for 1 second + the corresponding value for 4 seconds).

## **7.INTEGRATORS**

**7.1. Which parameter is responsible for Integrator reset?**

The Integrators are reset when the value of Wh/VAh reaches the maximum allowable reading (Refer FAQ 7.2 below).

**7.2. When does the integrator reset?**

Integrator reset (Overflow) is based on CT ratio\* PT ratio, which is generally called as Power ratio. The following table shows the Power ratio and the corresponding maximum reading for Wh/VAh. If VAh or Wh reaches the limit given below with respect to the corresponding power ratio, all the values stored in the integrator will reset to zero (clears to zero).

<b>PT Ratio x CT Ratio</b>	<b>Max Reading Wh/VAh</b>
1 to 1.999	9999K
2 to 1000.999	9999M
Greater than 1001	9999G

**7.3. Under what conditions integrator (kVARh, kWh, kVARh and -kVARh) does not update?**

ELF 3200 has in built reverse lock. In star mode two or all the phases of current is connected in the reverse direction the integrator may not accumulate. In the delta mode if any one of the phase current is in the reverse direction then the integrator may not accumulate. In short, if the total power is negative, then the integrator (INTG) parameters do not accumulate.

**Note:** If both the import and export energy are to be measured, then choose the model with IE option.

**7.4. Is any stored integrator value reset with power interruption?**

No the stored values are not lost due to power interruption.

**7.5. What happens when the Integrator is cleared?**

When Integrator is cleared, the INTG registers are cleared to zero. The data available in INTG registers is stored in OLD register.

## 8. FEATURES

**8.1 What are the various Models and Options available?**

Parameter	ELF 3250	ELF 3234				ELF 3234-3		
		User PAR Setup				User PAR Setup		
		W	VA	A	PF	W	VA	/AR
RMS L1 L2 L3 AVG	V	✓						
	A	✓						
	%Load	✓						
	%Unbal	✓						
	F	✓						
	RPM	✓						
RMS Total L1 L2 L3	W		✓			✓		
	VA			✓			✓	
	VAR				✓			✓
	PF					✓	✓	✓
INTEG 3PH energy	Wh		✓			✓		
	VAh			✓			✓	
	VARh				✓			✓
	-VARh				✓			✓
OLD 3PH energy	Wh		✓			✓		
	VAh			✓			✓	
	VARh				✓			✓
	-VARh				✓			✓

**8.2 Does ELF 3200 have IE option (Export Energy)?**

IE is not available with ELF 3200 Series Meter. For this feature we recommend CONZERV's EM 6000 DigitAN Series. For details visit [www.conzerv.com](http://www.conzerv.com)

**8.3 Do ELF 3200 Series Meters measure THD (Total Harmonic Distortion) for V and A?**

ELF 3200 Series Meters do not have an option for THD measurements for V (V%1, V%2, V%3) and A (A%1, A%2, A%3). For this feature we recommend CONZERV's EM 6000 DigitAN Series. For details visit [www.conzerv.com](http://www.conzerv.com)

**8.4 Are all the stored Integrator values reset at once?**

Yes. Clearing the integrator resets all the saved INTG parameters. The ELF 3200 meters do not allow energies to be reset individually. This ensures matched energy values. Prevents misleading situations like Wh greater than VAh.

**8.5 What readings are shown under OLD?**

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. The INTG values getting stored in Old are: Wh, VAh, VARh, -VARh.

**8.6 When are the OLD values saved?**

Values from INTG are saved in OLD register in case

- Integrator is cleared (INTG Clear)
- Overflow of Wh/VAh parameters

**8.7 List the parameters whose old values get saved when INTG is cleared?**

The INTG values getting stored in OLD are: Wh, VAh, VARh, -VARh.

**8.8 Can the meter be connected to the communication network?**

The ELF 3200 Series does not support communication with MODBUS RTU. For this feature we recommend CONZERV's EM 6000 DigitAN Series. For details visit [www.conzerv.com](http://www.conzerv.com).

## **9. GENERAL**

**9.1 How to get clarifications on the product/product features?**

You can contact the nearest CONZERV's contact point for assistance. Visit the Support Section on our website [www.conzerv.com](http://www.conzerv.com) for more details.

Call 1600 425 0555 (Toll Free Number all over India) for on-line assistance.

**9.2. What is a "Meter Constant"?**

Meter constant is a scaling factor for the reading of meters that do not have in-built scaling.

Since this term gained widespread use with energy meters with mechanical readouts, it has continued with simple electronic energy meters a scaling factor for the blink rate of the POP LED and energy consumption (display reading).

For **Example:** 1000 impulses/ kWh. Generally manufacturers provide POP LED which blink faster than the display / counter update and it is useful where the display is mechanical (impulse or stepper) counter. But in case of ELF 3200 meters displays instantaneous V, A and Power parameters along with energy parameters. Using this we can easily view the accuracy of any parameter. So there is no need of any POP LED and hence there is no meter constant.

An average of a minimum of 10 continuous display values needs to be taken for correct measurement of instantaneous parameters.

**9.3 How can we find the meter constant of ELF 3200 meters?**

This is not applicable for ELF 3200 series products.

The ELF 3200 series of meters are Direct Reading. This means that they can be programmed with the PT and CT ratios and the scaled value viewed directly on the display. There is no need for a separate "meter constant" which the user has to manually apply.

**9.4 What is the benefit of RMS Power readings in ELF 3234 Energy meters as compared to energy meters with mechanical readouts?**

Generally, POP is provided to check the Accuracy of the meters with mechanical display. In this method approximately 400 pulses are counted and compared with respect to the reference meter pulse. Large number of pulses is required in this method to reduce the measurement error, i.e. 1/4th of accuracy. Higher the impulse / kWh, faster is the test. Mostly the tariff meters are with mechanical displays and the test benches at electricity boards do not have a very stable source. So the Electricity Board insists on the POP LED on every meter for the purpose of testing.

In the case of ELF 3200 Series Meters, we can see the instantaneous parameter updating every second. This will directly show the accuracy of parameter and very useful for testing both at laboratory as well as in the field. Average of 10 display readings will give the correct accuracy. But using the POP is both time consuming and may not give the correct information under all the conditions.

**Example:** For meter constant 1600 (1600 pulses per kW):

At 100% load, measurement time for 400 pulse is 400/1600 hours = 15minutes as against 5 to 10 seconds in the case of ELF 3200 Series Meters.

At 25% load, measurement time for 400 pulse is = 60minutes as against 5 to 10 seconds in the case of ELF 3200 Series Meters.

At field it is not possible to check the accuracy of meter using the POP.

**9.5 What is the purpose of DIAG pages?**

S.No	DIAG	Available in ELF 3200
1	Model no.	Available MDI in DIAG
2	Display scanning	Available in DIAG1
3	Data for CONZERV's internal analysis purpose only	Available in DIAG2
4	Data for CONZERV's internal analysis purpose only	Available in DIAG3
5	Data for CONZERV's internal analysis purpose only	Available in DIAG4
6	Check Sum	Available in DIAG5
7	Data for CONZERV's internal analysis purpose only	Available in DIAG6
8	Data for CONZERV's internal analysis purpose only	Available in DIAG7
9	Integrator Reset: <ul style="list-style-type: none"> <li>• 1 for manual clear.</li> <li>• 2 for overflow according to the CT and PT ratio.</li> <li>• 3 for Due to the internal error.</li> </ul>	Available in DIAG8 for ELF 3234 and ELF 3234-3 only
10	If overflow due to which parameter: <ul style="list-style-type: none"> <li>• 1 for VAh forward.</li> <li>• 2 for Wh forward.</li> <li>• 3 for VARh inductive forward.</li> <li>• 4 for VARh capacitive forward.</li> <li>• 5 for VAh Reverse.</li> <li>• 6 for Wh Reverse.</li> <li>• 7 for VARh inductive Reverse.</li> <li>• 8 for VARh capacitive Reverse.</li> </ul>	Available in DAIG9 for ELF 3234 and ELF 3234-3 only
11	Value at which the overflow occurred.	Available in DAIG10 for ELF 3234 and ELF 3234-3 only
12	Element selected in the PROG menu.	Available in DAIG11
13	VA Arithmetic or 3D selected in the PROG menu	Available in DAIG7 – Row2.
14	Label selected in the PROG menu.	Available in DAIG7 – Row3.

**9.6 Does this meter function when connected with other meters?**

Yes ELF 3200 Series meters can be used along with other meters (Connect the input currents in series and input voltages in parallel with the other meters).

**NOTE:** Check CT /PT burden before connection.

**9.7 What does DIAG stand for?**

DIAG stands for diagnostic pages. Refer FAQ 9.4 above for details contents of DIAG pages.

**9.8 Can the user edit the values in the DIAG pages?**

The values in DIAG pages cannot be edited by the user.

## FAQs for ELF 3200 Series



### 9.9 What are the climatic conditions under which ELF 3200 Series Meters can function without any failure or error?

Temperature range for operation of ELF 3200	– 10 to 60 °C, (14 to 140 °F)
Temperature range for storage of ELF 3200	– 25 to 70 °C, (-13 to 158 °F)
Humidity	Below 5% to 95%, non-condensing

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