



A TESCO COMPANY

# **OPERATIONS MANUAL**

# **PRECISION TRANSFORMER COMPARATOR**

**PRODUCT:**

**KATC-C2**

# CURRENT COMPARATOR OPERATIONS MANUAL



THE EASTERN SPECIALTY COMPANY

© 2020 TESCO - The Eastern Specialty Company

All Rights Reserved.

Specifications are subject to change without prior notice.

Revision: 1.0

**TESCO – The Eastern Specialty Company**

925 Canal Street Bristol, PA, 19007

Phone: 215.785.2338

[info@tescometering.com](mailto:info@tescometering.com)

[www.tescometering.com](http://www.tescometering.com)

## LIMITED WARRANTY & LIMITATION OF LIABILITY

TESCO warrants to the original purchaser that it will correct all defects in material and/or workmanship in the Instrument, test equipment or software covered by this warranty (herein called "**PRODUCT**"), provided that TESCO is notified of such defect within the warranty period (set forth below) in accordance with paragraph four of this Warranty.

**WARRANTY PERIOD.** The warranty period shall begin on the date of shipment of the **PRODUCT** or the date of the issuance of this warranty certificate, whichever is later. If no warranty period is specified below and signed by an authorized **DISTRIBUTOR** of TESCO, the Warranty Period shall be one (1) year. In no event shall this Warranty remain in effect for more than the stated Warranty Period plus two (2) months after the date of shipment. TESCO's sole obligation and the purchaser's sole remedy under this Warranty is limited to repair or replacement, at TESCO's option, free of charge, F.O.B. TESCO's factory at Bristol, PA of any workmanship and/or part which in TESCO's sole judgment displays evidence of defect. On-site Warranty repairs will be made when in TESCO's judgment the **PRODUCT** cannot practically be shipped to TESCO's factory. Any modifications, additions or upgrades made to the **PRODUCT** or control software after this warranty becomes effective shall not extend the term of this warranty.

**COVERAGE.** The warranty set forth above shall be applicable only if the **PRODUCT**:

1. Is used for the specific purpose for which it was intended;
2. Is operated in accordance with instructions, if any, supplied by TESCO;
3. Has not been modified, neglected, altered, tampered with, vandalized, abused or misused, or subjected to accident, fire, flood or other casualties;
4. Has not been repaired by unauthorized persons;
5. Has not had its serial number altered, defaced or removed;
6. Has not been connected, installed or adjusted other than in accordance with the instructions, if any, furnished by TESCO.

The warranty set forth herein DOES NOT APPLY to defects resulting from ordinary wear, tear and usage, or any cause, similar or dissimilar, not resulting solely from defective material and/or workmanship.

The Warranty set forth herein shall NOT be effective unless:

1. Notice of defect is given to TESCO by phone, fax, email or mail as soon as the defect is discovered.
2. Notice of defect contains the following information: PRODUCT serial number, PRODUCT model number, date of original installation, and an accurate and complete description of the defect including the exact circumstances leading to the defect.
3. The defective PRODUCT or part is returned only upon authorization from TESCO as evidenced by the issuing of a Return Merchandise Authorization (RMA) number, and that the transportation charges are prepaid (except that TESCO may, at its option, appoint a qualified DISTRIBUTOR to make field inspections of the PRODUCT for which purpose the purchaser shall permit such DISTRIBUTOR to enter upon its premises and examine the PRODUCT).
4. The Return Merchandise Authorization (RMA) number is written on the shipping label and all paperwork defective PRODUCT or part.
5. The defective PRODUCT or part is returned in the original packing or packing approved by TESCO

TESCO is not responsible for drayage charges, damages or labor costs incurred in conjunction with failure, removal or reinstallation of any PRODUCT, all of which shall be at the purchaser's expense. TESCO is not responsible for special, incidental or consequential damages, whether resulting from breach of warranty, negligence or any other reason.

TESCO manufactured parts will be available for a minimum period of at least two years after the manufacture of a PRODUCT has been discontinued.

TESCO will provide original purchaser during the Warranty Period, unlimited telephone consulting time for the purpose of PRODUCT trouble shooting/servicing and for the first thirty (30) days of the Warranty Period, unlimited telephone consulting time for the purpose of PRODUCT/software application.

**THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES AND TESCO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OR CONDITION, DESIGN, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER.**

No other Warranty, express or implied, is authorized by TESCO, and no DISTRIBUTOR of TESCO or any other person has any authority to amend, extend, modify, enlarge or otherwise alter the foregoing warranty and disclaimers in any way whatsoever, except as provided for in an Extended Limited PRODUCT Warranty Agreement.

---

# TABLE OF CONTENTS

- 1.0 INTRODUCTION ..... 1**
- 1.1 Introduction ..... 2**
- 1.2 Contacting TESCO..... 2**
- 1.3 General Safety Summary..... 2**
- 1.4 Description of Safety-related Icons..... 3**
- 1.5 Protective Earth / Grounding ..... 3**
- 1.6 Product Features ..... 3**
  - 1.6.1 Key Features .....3
  - 1.6.2 Standard Features.....4
- 1.7 General Specifications..... 4**
  - 1.7.1 Input Characteristics .....4
  - 1.7.2 Dimensions .....4
  - 1.7.3 Measurements Resolution.....4
  - 1.7.4 Measurement Accuracy .....5
- 1.8 About this Operations Manual ..... 5**
- 2.0 INSTALLATION ..... 6**
- 2.1 Introduction ..... 7**
- 2.2 Unpacking and Inspection ..... 7**
- 2.3 Mounting..... 7**
- 2.4 Main Power Supply ..... 8**
- 2.5 Connection to KCTS..... 9**
- 3.0 KATC-C2 FUNCTIONS..... 10**
- 3.1 Introduction ..... 11**
- 3.2 Front Panel Features ..... 11**
  - 3.2.1 KATC-C2 Front Panel .....11
  - 3.2.2 KATC Navigation Keys .....12
- 3.3 The Graphical User Interface (GUI) ..... 12**
  - 3.3.1 Graphical User Interface (GUI) Screens .....12
  - 3.3.2 DEFAULT MENU .....13
  - 3.3.3 HOLD OPERATION .....13
  - 3.3.4 ERROR MESSAGES.....15

3.3.5	PREFERENCES.....	17
3.3.6	DEMAG.....	18
<b>4.0</b>	<b>MAINTENANCE .....</b>	<b>19</b>
<b>4.1</b>	<b>Introduction .....</b>	<b>20</b>
<b>4.2</b>	<b>Replacing the Fuse .....</b>	<b>20</b>
<b>4.3</b>	<b>Cleaning the Air Filters .....</b>	<b>21</b>
<b>4.4</b>	<b>Cleaning the Instrument External Surface.....</b>	<b>22</b>
<b>4.5</b>	<b>Recalibration .....</b>	<b>22</b>

---

# 1.0 INTRODUCTION

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>1.1 Introduction .....</b>	<b>2</b>
<b>1.2 Contacting TESCO.....</b>	<b>2</b>
<b>1.3 General Safety Summary.....</b>	<b>2</b>
<b>1.4 Description of Safety-related Icons.....</b>	<b>3</b>
<b>1.5 Protective Earth / Grounding .....</b>	<b>3</b>
<b>1.6 Product Features .....</b>	<b>3</b>
1.6.1 Key Features .....	3
1.6.2 Standard Features.....	4
<b>1.7 General Specifications.....</b>	<b>4</b>
1.7.1 Input Characteristics .....	4
1.7.2 Dimensions .....	4
1.7.3 Measurement Resolution .....	4
1.7.4 Measurement Accuracy .....	5
<b>1.8 About this Operations Manual .....</b>	<b>5</b>

## 1.1 Introduction

### *KATC-C2 FOR CT QUALIFICATION*

The Knopp Type KATC-C2 Precision Transformer Comparator is a next generation of the popular Type KATC-C Comparator. It incorporates NextGen™ metrology technology, processors and software environment for testing and qualifying CT's.

Knopp's KATC-C2 is a highly accurate state-of-the-art current comparator that is compatible with all older generation Knopp comparators, and is designed to be a direct, plug-in replacement requiring no modification of the existing Knopp Current Transformer Test Systems.

The KATC-C2 will be referred to as the "Instrument" throughout the operational manual.

## 1.2 Contacting TESCO

To contact TESCO, call one of the following telephone numbers:

- Technical Support: 215.785.2338
- Calibration/Repair: 215.785.2338

Visit our website at [www.tescometering.com](http://www.tescometering.com) or send an email to [support@tescometering.com](mailto:support@tescometering.com).

To view, print, or download the latest manual supplement, visit [www.tescometering.com](http://www.tescometering.com).

## 1.3 General Safety Summary

This manual contains information and warnings that must be observed to ensure safe operation and to keep the Instrument in a safe condition. Operation or service in conditions or in a manner other than specified could compromise safety. For the correct and safe use of this device, it is essential that both operating and service personnel follow accepted safety procedures in addition to the safety precautions specified.

In this manual, a **WARNING** identifies conditions and actions that pose hazard(s) to the user, while a **CAUTION** identifies conditions and actions that may damage the Instrument or the test equipment.

### **WARNING**



**To avoid electrical shock, personal injury, or fire hazard:**

- **The device must NOT be switched on if it is damaged or suspected to be faulty.**
- **Do not operate the device in wet, condensing, or dusty conditions, or if exposed to explosive gas.**



- If the equipment is used in a manner not specified in this manual, the protection provided by the Instrument may be impaired.
- Whenever it is likely that safety protection has been impaired, the device must be made inoperative and be secured against any unintended operation. Inform qualified maintenance or repair personnel.
- Safety protection is likely to be impaired if, for example, the Instrument displays visible damage or fails to operate normally.

## 1.4 Description of Safety-related Icons

ICONS	DESCRIPTION
	Risk of danger. Important information. See manual.
	Hazardous voltage. Risk of electrical shock.

## 1.5 Protective Earth / Grounding

### WARNING

To avoid electrical shock or personal injury, do not intentionally or unintentionally interrupt the protective ground conductor inside or outside the Instrument. Interrupting the protective ground conductor is likely to make the Instrument dangerous. Intentional interruption is prohibited.

## 1.6 Product Features

### 1.6.1 Key Features

- 178ppi Full Color LCD Screen
- Front Keypad for Data Entry
- Front USB and Ethernet Connectivity
- Powerful, multi-core, 32-bit processors
- 0.001 Accuracy Class Resolution, 0% to 400% of Accuracy Class Measurable
- Reduced Testing Time

## 1.6.2 Standard Features

- Auto-Rundown Capable
- Automatic Sensing of 50 or 60 Hertz
- Configurable Units  
(Degrees, MilliRads, Minutes),(Amps, %Ratio),( RCF, %Error)
- 5A Current, Optional 1A Current
- 3U Compatible Enclosure

## 1.7 General Specifications

### 1.7.1 Input Characteristics

PARAMETERS	Value
Power Supply	120 VAC, 2A
Supply Frequency	45-65Hz

### 1.7.2 Dimensions

PARAMETERS	KATC-C2
Height	5.25"
Width	19"
Depth	16"
Weight	Vary by product

### 1.7.3 Measurements Resolution

*Valid for 50Hz/60Hz and Current of 0.05A to 20A.*

PARAMETERS	RCF	Phase Angle	Acc. Class
0.0% ≤ Acc. Cl. < 0.2%	0.000 000 1	0.001'	0.000 1
0.2% ≤ Acc. Cl. < 0.7%	0.000 000 1	0.001'	0.000 1
0.7% ≤ Acc. Cl. < 1.4%	0.000 000 1	0.001'	0.000 1
1.4% ≤ Acc. Cl. < 10.0%	0.000 000 1	0.001'	0.000 1
10.0% ≤ Acc. Cl.	0.000 000 1	0.001'	0.000 1

## 1.7.4 Measurement Accuracy

*Valid for all current comparators, provided Calibration Certification will provide further detail.*

*Valid for 50Hz/60Hz and Current of 0.05A to 20A.*

PARAMETERS	RCF	Phase Angle	Acc. Class
1% to 4.99% Full Scale	400ppm	2.0'	0.04%
5% to 400% Full Scale	50ppm	0.5'	0.01%

## 1.8 About this Operations Manual

This manual provides complete information for installing and operating the Instrument. This document instructs the user on the following operations of the KATC-C2:

- Installation
- Front Panel Features
- Graphical User Interface (GUI)
- How to set up the machine for remote operation using PC Application
- Instrument Maintenance

# 2.0 INSTALLATION

2.1 Introduction .....	7
2.2 Unpacking and Inspection .....	7
2.3 Mounting.....	7
2.4 Main Power Supply.....	8
2.5 Connection to KCTS.....	9

## 2.1 Introduction

This chapter provides instructions for unpacking and installing the Instrument. Read this chapter before you operate the Instrument. Instructions for cable connections can be found here.

## 2.2 Unpacking and Inspection

The Instrument is shipped in a container designed to prevent damage during shipping.

Inspect the Instrument carefully for damage, and immediately report any damage to the shipper. A packing list is included in the packaging. When you unpack the Instrument, check for all the standard equipment listed and check the shipping order for any additional items ordered. Report any shortage to the place of purchase, to your distributor, or directly to TESCO.

## 2.3 Mounting



The instrument contains four mounting holes, ① as shown above, on the front panel and should be mounted to the KCTS where the previous comparator was placed. All four screws can then be mounted as they were prior through the four mounting holes. If not in a KCTS, mount as normal into a 3U enclosure.

## 2.4 Main Power Supply

The Instrument can be powered by plugging it to a 120V-Single Phase AC line. An AC line power cord is provided.



Figure 2.4. KATC-C2 Main Power Supply

NUMBER	DESCRIPTION
1	Power Switch
2	5A Fuse
3	Power Inlet Port
4	Chassis Ground

Table 2.4. KATC-C2 Main Power Supply sections

### WARNING

The Instrument should only be plugged to an AC outlet with a 90 – 120V voltage range to avoid damaging the Instrument.

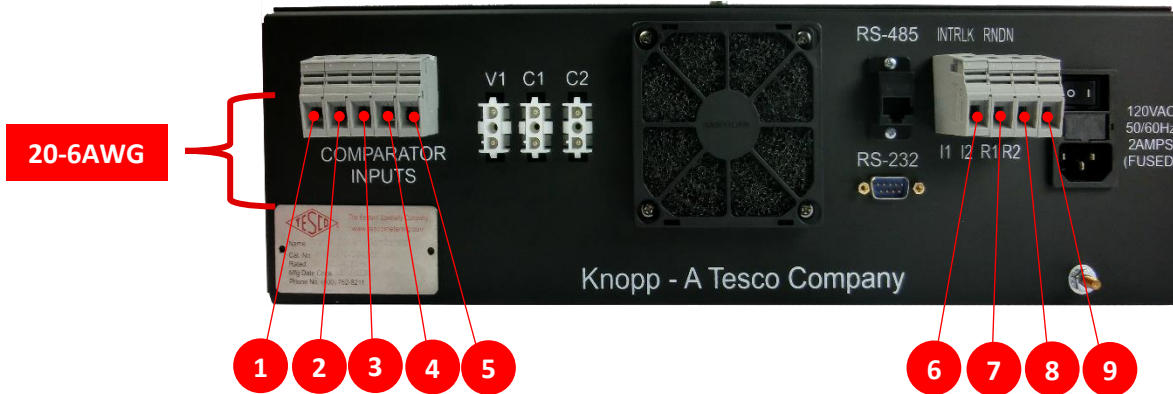
To avoid electrical shock, personal injury, or fire hazard, connect the factory-supplied three-conductor-line power cord to a properly grounded power outlet.

During test operation, a two-conductor adapter or extension cord **MUST NOT** be used. This will break the protective ground connection and will affect the measurement accuracy of the Instrument.

The power outlets supplying the Instrument system should be controlled by an emergency switch so that power can be switched off if a hazard arises.

## 2.5 Connection to KCTS

The Instrument is powered by plugging it into a 120V-Single Phase AC line. An AC line power cord is provided. KCTS has a cable within cabinet for this purpose.



Input #	Input Label	Signal	Value	Polarity	Transformer	Max Common Mode Voltage
1	S	Reference Input	0-20A	High	KCTS Reference Transformer	240VAC
2	E	Reference Output	0-20A	Low		240VAC
3	EB	TUT Input*	0-20A	High	Customer Supplied Test Transformer	240VAC
4	U	TUT Output*	0-20A	Low		240VAC
5	C	Cal (TESCO use only)	-	-	-	-
*TUT stands for Transformer Under Test						

Input #	Input Label	Usage	Value	Description
6	I1	Interlock Relay	120v	Interlock Shutdown System. Comparator must be on to apply power to KCTS
7	I2	Interlock Relay	120v	
8	R1	Rundown Relay	120v	Run Down System. System power will run down automatically post measurement. (If equipped)
9	R2	Rundown Relay	120v	
These are Normally open relay contacts rated for 120VAC. They do not supply voltage.				

# 3.0 KATC-C2 FUNCTIONS

<b>3.1 Introduction .....</b>	<b>11</b>
<b>3.2 Front Panel Features .....</b>	<b>11</b>
3.2.1 KATC-C2 Front Panel .....	11
3.2.2 KATC Navigation Keys .....	12
<b>3.3 The Graphical User Interface (GUI) .....</b>	<b>12</b>
3.3.1 Graphical User Interface (GUI) Screens .....	12
3.3.2 DEFAULT MENU .....	13
3.3.3 HOLD OPERATION .....	13
3.3.4 ERROR MESSAGES.....	15
3.3.5 PREFERENCES.....	17
3.3.6 DEMAG.....	18



## 3.1 Introduction

This chapter is a reference for the functions and locations of the Instrument's front panel features and provides brief descriptions of each feature for quick access. **Please read this information before operating the Instrument.** Front panel operating instructions for the Instrument are provided in this chapter and Remote Operating instructions are in Chapter 4.

## 3.2 Front Panel Features

Front panel features (including all controls, displays, indicators, and terminals) are shown in Figure 3.2.1. Each front panel feature is briefly described in Table 3.2.1.

### 3.2.1 KATC-C2 Front Panel

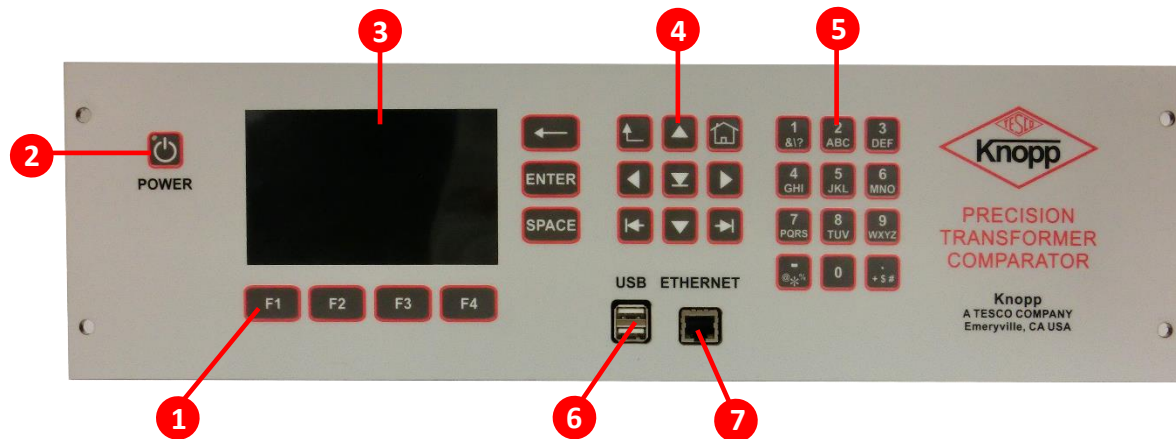
















Figure 3.2.1. KATC-C2 Front Panel

NUMBER	DESCRIPTION
1	Function keys
2	Power button
3	TFT LCD Screen. 5" 800x480, full color TFT LCD screen
4	Navigation Keys
5	Alphanumeric membrane keyboard
6	Dual USB Connection
7	RJ45 Ethernet Connection

Table 3.2.1. KATC-C2 Front Panel

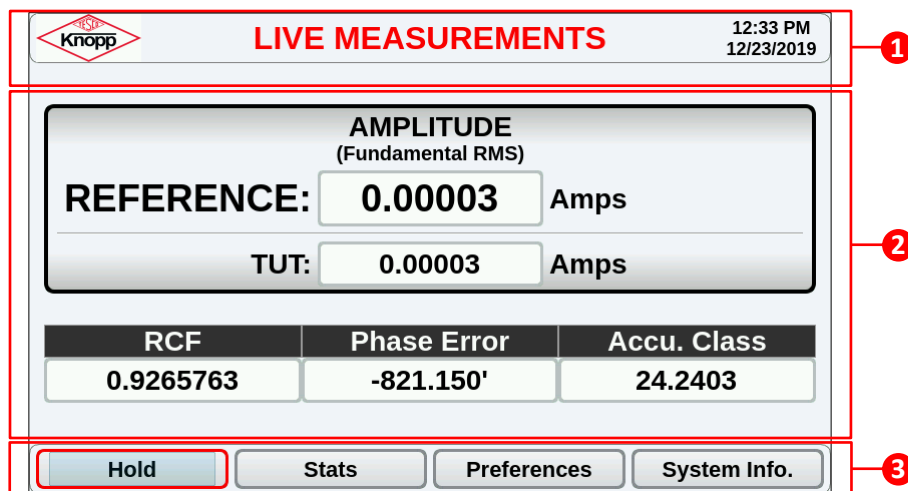
### 3.2.2 KATC Navigation Keys

Symbol	Description
 or 	Functions any of the following: <ul style="list-style-type: none"> <li>• Selects the NEXT or PREVIOUS <b>MENU</b> item.</li> <li>• Moves the <b>SELECTED LINE UP</b> or <b>DOWN</b></li> <li>• Select an Item from a dropdown menu</li> </ul>
 or 	Functions any of the following: <ul style="list-style-type: none"> <li>• Moves the cursor left/right of the current character in text boxes.</li> <li>• Moves the selection left/right of the current selected cell in tables.</li> </ul>
 or 	Selects the NEXT or PREVIOUS <b>TAB</b> item.
	Deletes the previous character
	Returns to the previous screen
   	Function Keys
	Power button
	Selects a response

## 3.3 The Graphical User Interface (GUI)

### 3.3.1 Graphical User Interface (GUI) Screens

The user interface is divided into three sections.



NUMBER	DESCRIPTION
1	Screen Title
2	Screen Data
3	Function Buttons

Table 3.3.1. KATC-C2 GUI Sections

### 3.3.2 DEFAULT MENU

SCREEN	DESCRIPTION												
<p><b>NOTE:</b> KATC-C2 is used in the example above.</p>	<p><b>DEFAULT MENU</b></p> <p>The MAIN MENU screen consists of the following function buttons: HOLD DATA, STATS, PREFERENCES &amp; DEMAG. Press arrow keys to navigate through the main menu or directly press the function keys below buttons.</p> <p><b>KEYPAD &amp; FUNCTION KEYS:</b></p> <table border="1"> <tr> <td>F1</td> <td>Hold Data</td> <td>Press to take a Measurement</td> </tr> <tr> <td>F2</td> <td>Stats</td> <td>Press to open the extended data screen</td> </tr> <tr> <td>F3</td> <td>Preferences</td> <td>Press to open data measurement settings</td> </tr> <tr> <td>F4</td> <td>DeMag</td> <td>Press to open the DeMag Operation screen</td> </tr> </table> <p>To return to the previous screen, press  at any time.</p>	F1	Hold Data	Press to take a Measurement	F2	Stats	Press to open the extended data screen	F3	Preferences	Press to open data measurement settings	F4	DeMag	Press to open the DeMag Operation screen
F1	Hold Data	Press to take a Measurement											
F2	Stats	Press to open the extended data screen											
F3	Preferences	Press to open data measurement settings											
F4	DeMag	Press to open the DeMag Operation screen											

### 3.3.3 HOLD OPERATION

SCREEN	DESCRIPTION																						
	<p><b>HOLD OPERATION</b></p> <p>HOLD is how single measurements are taken. It starts by allowing the input to settle, then averages over the preset time allotted. It will then Hold the Data until the user has recorded it and releases the instrument by pressing <b>F1</b> again. Step of hold operation is indicated by title at top of screen.</p> <p><b>NOTE:</b> The preset averaging time can be changed and will be shown later in the manual.</p> <p><b>KEYPAD &amp; FUNCTION KEYS</b></p> <table border="1"> <tr> <td>F1</td> <td>Release</td> <td>Press to Release the Holding/Averaging function to go back to Live Data</td> </tr> <tr> <td>F2</td> <td>Stats</td> <td>Press to open the extended data screen</td> </tr> <tr> <td>F3</td> <td>Preferences</td> <td>Press to open data measurement settings</td> </tr> <tr> <td>F4</td> <td>Print</td> <td>Save results to database. (Feature unavailable)</td> </tr> </table> <p><b>DATA</b></p> <table border="1"> <tr> <td>Reference</td> <td>Measured Amplitude of Reference Transformer (Amps)</td> </tr> <tr> <td>TUT</td> <td>Measured Amplitude of Transformer under Test (Amps)</td> </tr> <tr> <td>RCF</td> <td>Ratio Correction Factor</td> </tr> <tr> <td>Phase Error</td> <td>Phase Angle difference between Ref and TUT with relation to Ref (Minutes/Degrees/milliRads)</td> </tr> <tr> <td>Accu. Class</td> <td>Accuracy Class Rating based on Test</td> </tr> </table> <p><b>WARNING:</b> Never exceed 20 Amps!</p>	F1	Release	Press to Release the Holding/Averaging function to go back to Live Data	F2	Stats	Press to open the extended data screen	F3	Preferences	Press to open data measurement settings	F4	Print	Save results to database. (Feature unavailable)	Reference	Measured Amplitude of Reference Transformer (Amps)	TUT	Measured Amplitude of Transformer under Test (Amps)	RCF	Ratio Correction Factor	Phase Error	Phase Angle difference between Ref and TUT with relation to Ref (Minutes/Degrees/milliRads)	Accu. Class	Accuracy Class Rating based on Test
F1	Release	Press to Release the Holding/Averaging function to go back to Live Data																					
F2	Stats	Press to open the extended data screen																					
F3	Preferences	Press to open data measurement settings																					
F4	Print	Save results to database. (Feature unavailable)																					
Reference	Measured Amplitude of Reference Transformer (Amps)																						
TUT	Measured Amplitude of Transformer under Test (Amps)																						
RCF	Ratio Correction Factor																						
Phase Error	Phase Angle difference between Ref and TUT with relation to Ref (Minutes/Degrees/milliRads)																						
Accu. Class	Accuracy Class Rating based on Test																						

**Stats**

**STATISTICS** 3:55 PM 05/26/2020

Raw Data Std Deviation Direct vs Computed Harmonic Distortion

	AMPLITUDE (Fundamental RMS)	PHASE (Minutes)
Reference:	5.03067	0.000'
Error:	0.00175	-5363.883'
TUT Direct:	5.03067	-0.818'
TUT Computed:	5.03069	-1.193'

Sample Length: 1 Seconds

Raw Stdev Dir Vs Comp. Distortion

**STATISTICS** 3:54 PM 05/26/2020

Raw Data Std Deviation Direct vs Computed Harmonic Distortion

	AMPLITUDE (Fundamental RMS)	PHASE (Degrees)
Reference:	5.01684	0.00000°
Error:	0.00214	-90.11765°
TUT Direct:	5.01684	-0.01675°
TUT Computed:	5.01683	-0.02444°

Sample Length: 1 Seconds

Raw Stdev Dir Vs Comp. Distortion

**STATISTICS** 3:54 PM 05/26/2020

Raw Data Std Deviation Direct vs Computed Harmonic Distortion

	AMPLITUDE (Fundamental RMS)	PHASE (Degrees)
Reference:	0.00088	0.00000°
Error:	0.00002	0.11040°
TUT Direct:	0.00088	0.00033°

RCF	Phase Error	Accu. Class
0.0000008	0.00017°	0.0004

Sample Length: 1 Seconds

Raw Stdev Dir Vs Comp. Distortion

**STATISTICS** 3:54 PM 05/26/2020

Raw Data Std Deviation Direct vs Computed Harmonic Distortion

Measured directly:

RCF	Phase Error	Accu. Class
1.0000000	-0.01675°	0.0387

Computed using reference and error:

RCF	Phase Error	Accu. Class
1.0000008	-0.02444°	0.0565

Sample Length: 1 Seconds

Raw Stdev Dir Vs Comp. Distortion

**STATISTICS** 3:54 PM 05/26/2020

Raw Data Std Deviation Direct vs Computed Harmonic Distortion

THD (Total harmonic distortion): The square root of the sum of harmonics squared divided by the fundamental. (RMS of harmonics divide by Fundamental)

	THD
Reference:	0.010
Error:	0.094
TUT Direct:	0.010

Sample Length: 1 Seconds

Raw Stdev Dir Vs Comp. Distortion

**STATS**

After a Hold Operation, or Live Measurements, further data can be viewed by pressing **Stats**. From here further menus allow looking at extended Raw Data, Standard Deviation, Direct Measurement vs. Computed (computed is used for main screen), and Harmonic Distortion.

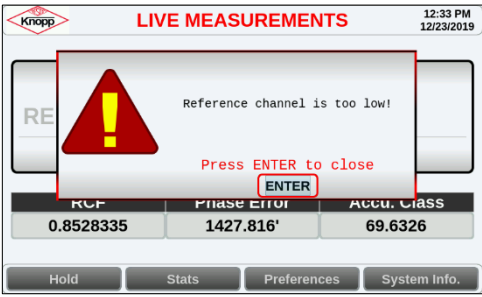
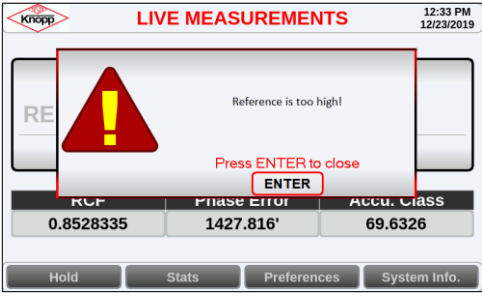
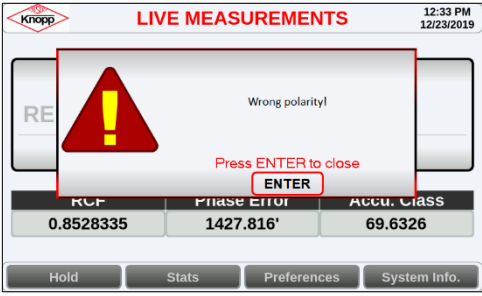
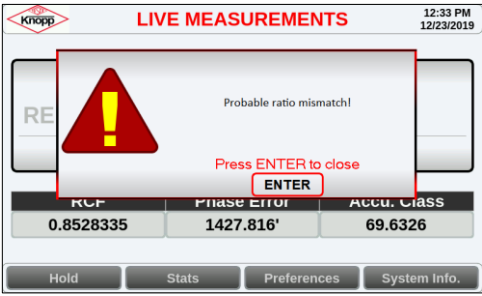
**KEYPAD & FUNCTION KEYS**

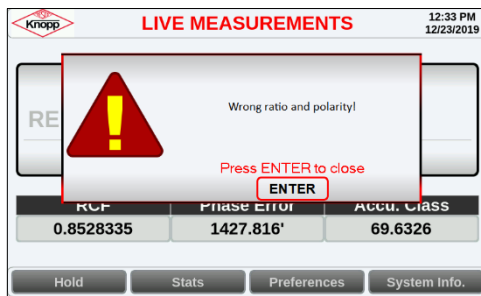
F1	Raw	View Raw Data (minutes/degrees/milliRads)
F2	Stdev	View Standard Deviation
F3	Dir Vs Comp.	Direct vs. Computed TUT measurements
F4	Distortion	Total Harmonic Distortion

**DATA**

Reference	Measured Amplitude of Reference Transformer (Amps)
Error	Measured Current difference between REF and TUT
TUT Direct	Measured Amplitude of Transformer under Test (Amps)
TUT Computed	Calculated Measurement of TUT from REF and Error values
RCF	Ratio Correction Factor
Phase Error	Phase Angle difference between Ref and TUT with relation to Ref (Minutes/Degrees/milliRads)
Accu. Class	Accuracy Class Rating based on Test

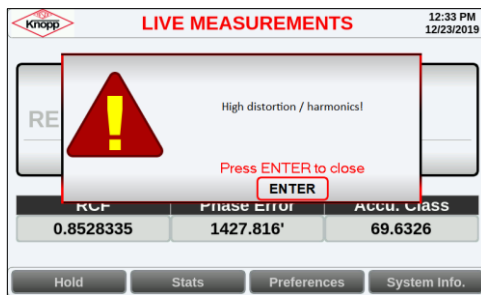
## 3.3.4 ERROR MESSAGES

SCREEN POPUP	DESCRIPTION
	<p><b>Reference Channel is too low:</b> Likely have not turned variac up. If TUT is measuring a normal Amplitude, <b>shut down system</b> and check connections.</p>
	<p><b>Reference is too high:</b> <b>Turn down Variac</b> and confirm ratio, also check TUT connections.</p>
	<p><b>Wrong Polarity:</b> <b>Shut down system</b> and check TUT polarity. (Primary or secondary could be reversed)</p>
	<p><b>Probable Ratio Mismatch:</b> <b>Shut down system</b> and verify TUT ratio.</p>



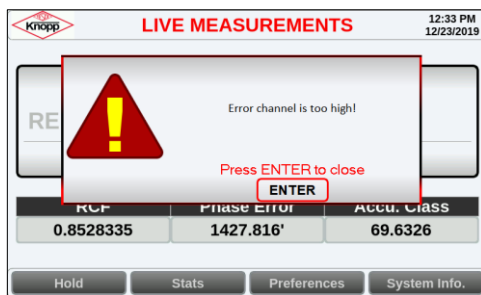
**Wrong Ratio and Polarity:**

**Shut down system.** Both wrong polarity and ratio are selected for TUT. Check and try again. If error persists, TUT may be damaged internally.



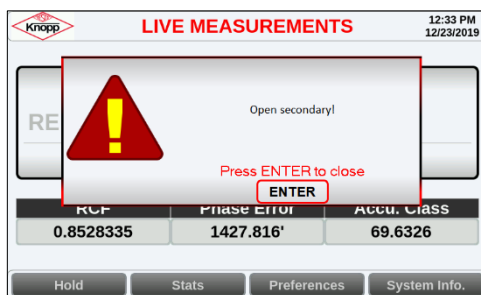
**High Distortion/Harmonics:**

**Shut down system** and make sure all connections are solid. If it persists, TUT may be damaged internally and should be checked by other methods.



**Error Channel is too High:**

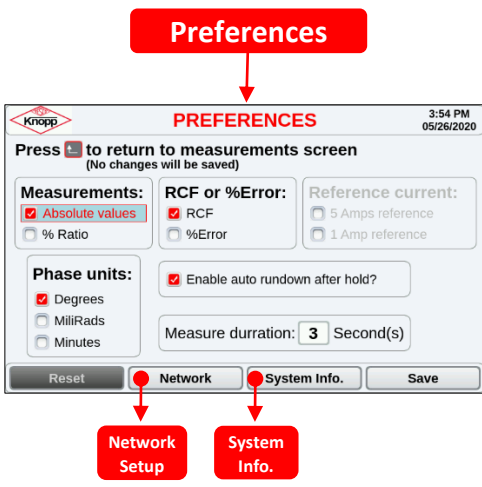
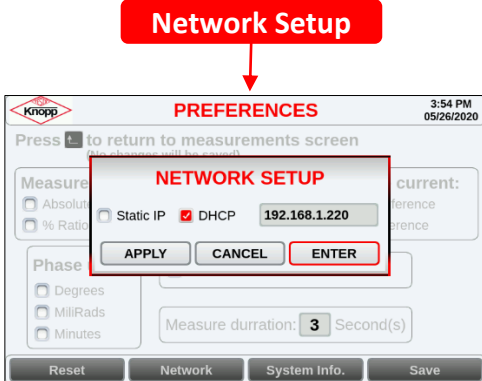
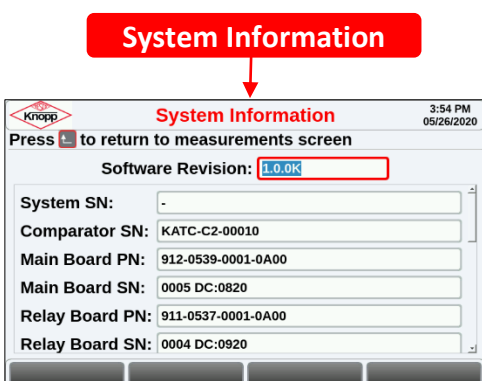

**Turn Variac down.** Error cannot exceed 5Amps or instrument may be damaged. Verify Ratio is correct.



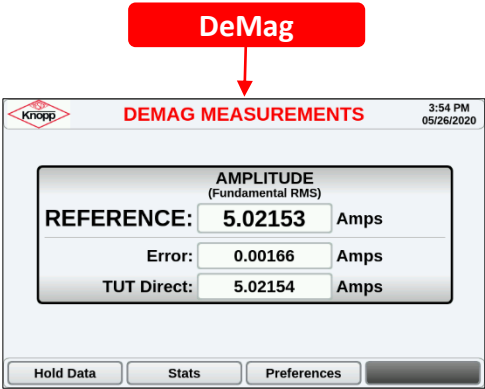
**Open Secondary:**

**Shut down system.** Check TUT connections.

### 3.3.5 PREFERENCES

SCREEN	DESCRIPTION												
	<p><b>PREFERENCES</b></p> <p>Edit Settings such as Units/Ratio, and measurement averaging duration.</p> <p><b>NOTE:</b> If 1A option is included, changing between a 5A and 1A reference current is changed here as well.</p> <p><b>KEYPAD &amp; FUNCTION KEYS</b></p> <table border="1"> <tr> <td>F1</td> <td>Reset</td> <td>Resets setting to default</td> </tr> <tr> <td>F2</td> <td>Network</td> <td>Access NETWORK screen</td> </tr> <tr> <td>F3</td> <td>System Info.</td> <td>Access Comparator System information</td> </tr> <tr> <td>F4</td> <td>Save</td> <td>Saves current settings</td> </tr> </table>	F1	Reset	Resets setting to default	F2	Network	Access NETWORK screen	F3	System Info.	Access Comparator System information	F4	Save	Saves current settings
F1	Reset	Resets setting to default											
F2	Network	Access NETWORK screen											
F3	System Info.	Access Comparator System information											
F4	Save	Saves current settings											
	<p><b>3.3.5.1 NETWORK SETUP</b></p> <p>Edit/View Network Configuration and IP. Use arrow keys for navigation, and keypad for IP entry.</p> <p><b>KEYS</b></p> <table border="1"> <tr> <td>Apply</td> <td>Applies Network Settings</td> </tr> <tr> <td>Cancel</td> <td>Cancel changes and return to PREFERENCES screen</td> </tr> <tr> <td>Enter</td> <td>Apply changes and return to PREFERENCES screen</td> </tr> </table>	Apply	Applies Network Settings	Cancel	Cancel changes and return to PREFERENCES screen	Enter	Apply changes and return to PREFERENCES screen						
Apply	Applies Network Settings												
Cancel	Cancel changes and return to PREFERENCES screen												
Enter	Apply changes and return to PREFERENCES screen												
	<p><b>3.3.5.2 SYSTEM INFORMATION</b></p> <p>View the Software and Hardware configuration, and Serial Numbers. Use the  Key to return to Preferences Screen.</p>												

### 3.3.6 DEMAG

SCREEN	DESCRIPTION									
 <p style="text-align: center;"><b>DeMag</b></p> <p><b>DEMAG MEASUREMENTS</b> 3:54 PM 05/26/2020</p> <p><b>AMPLITUDE (Fundamental RMS)</b></p> <p><b>REFERENCE: 5.02153 Amps</b></p> <p><b>Error: 0.00166 Amps</b></p> <p><b>TUT Direct: 5.02154 Amps</b></p> <p>Hold Data Stats Preferences</p>	<p><b>DeMag</b></p> <p>Demagnetization Operation is performed using this Display.</p> <p><b>KEYPAD &amp; FUNCTION KEYS</b></p> <table border="1"> <tr> <td>F1</td> <td>Hold Data</td> <td>Holds Data for making DeMag Measurement</td> </tr> <tr> <td>F2</td> <td>Stats</td> <td>Accesses further data during DeMag Operation</td> </tr> <tr> <td>F3</td> <td>Preferences</td> <td>Go to settings</td> </tr> </table>	F1	Hold Data	Holds Data for making DeMag Measurement	F2	Stats	Accesses further data during DeMag Operation	F3	Preferences	Go to settings
F1	Hold Data	Holds Data for making DeMag Measurement								
F2	Stats	Accesses further data during DeMag Operation								
F3	Preferences	Go to settings								



# 4.0 MAINTENANCE

4.1 Introduction ..... 20

4.2 Replacing the Fuse ..... 20

4.3 Cleaning the Air Filters ..... 21

4.4 Cleaning the Instrument External Surface ..... 22

4.5 Recalibration ..... 22

## 4.1 Introduction

This chapter explains how to perform the routine user maintenance required to keep your Instrument in optimal operating condition.

The topics covered in this chapter include:

- Replacing the Fuse
- Cleaning the Air Filter
- Cleaning the Instrument External Surface



Figure 5.2. KATC-C2 Fuse and Air Filter location

## 4.2 Replacing the Fuse

The fuse is accessible from the Instrument's rear panel. See Figure 5.2.

### WARNING

**To avoid electrical shock or personal injury, ensure that the Instrument is switched off and disconnected by removing the line power cord from the power input socket before attempting to access the power fuse.**

To access & replace the fuses, proceed as follows:

1. Disconnect line power.
2. Using a standard 5mm wide screwdriver, insert it to the slit and pull upwards for both ends until the cap and fuse are disengaged.
3. Pull the fuse holder and replace the defective fuses. Use the recommended fuse ratings and manufacturer in Table 5.2.
4. Return the fuse holder by pushing down the cap until it completely closes.

Description	Voltage	Amperage	Manufacturer	Part Number
(1x) AC DC Fuse Cartridge, Glass, Time Lag, 5mm x 20mm	250V	5.0A	Bel Fuse Inc.	5ST 5-R

Table 5.2. Recommended Fuse Replacement

### 4.3 Cleaning the Air Filters

The air filter is accessible from the Instrument’s rear panel. See Figure 5.2.

**CAUTION** 

Damage caused by overheating may occur if the area around the fan is restricted, the intake air is too warm, or the air filter is clogged. The air filter must be removed and cleaned at least every 30 days or more frequently if the Instrument is operated in a dusty environment.

To access and clean the air filters, proceed as follows:

1. Disconnect line power.
2. Remove the filter retainer by holding its two upper corners or two lower corners and pulling it outward until it disengages from the fan guard.
3. Remove the air filter that is in between the Filter Retainer and Fan Guard. See Figure 5.3.
4. Clean the filter by washing it in soapy water. Rinse and dry it thoroughly before reinstalling.
5. Place the filter at the back of the retainer.
6. Reinstall the retainer in the fan guard. The retainer is snapped on the four sides for the fan guard.

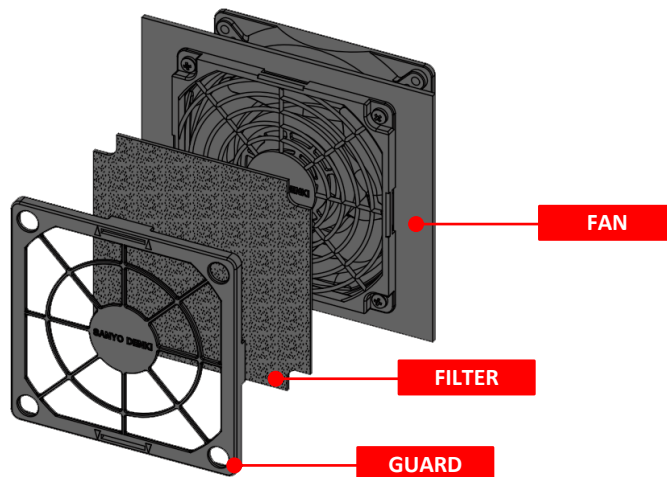


Figure 5.3: KATC-C2 Fan Filter Assembly

## 4.4 Cleaning the Instrument External Surface

Clean the exterior of the instrument using a soft cloth slightly dampened with either water or a non-abrasive mild cleaning solution that is not harmful to plastics.



**Do not use hydrocarbons or chlorinated solvents for cleaning. They can damage the plastic materials used in the Instrument.**

## 4.5 Recalibration

For the Instrument's recalibration, directly contact TESCO through phone or email. See section **1.2 Contacting TESCO** for contact details. TESCO recommends recalibration on an annual basis. Further details can be found on the Calibration Certificate provided with your instrument.