

Customer: ROMAN MELNYK TEST ACCOUNT
35 VANTAGE POINT DRIVE
ROCHESTER, NY 14624

PO Number: ABC123



ANAB AC-2489

Certificate/SO Number: 1-FY5AR-160-1 Revision 2

Manufacturer: Fluke Corporation
Model Number: 87 V
Description: Multimeter, Digital
Serial Number: ABC123
ID: 54321

As-Found: In Tolerance,
As-Left: In Tolerance,

Issue Date: Mar 10, 2021
Calibration Date: Mar 10, 2021
Due Date: Mar 10, 2022

Calibrated To: Manufacturer Specification
Calibration Procedure: 1-AC08977-28

Transcat Calibration Laboratories have been audited and found in compliance with ISO/IEC 17025:2017. Accredited calibrations performed within the Lab's Scope of Accreditation are indicated by the presence of the Accrediting Body's Logo and Certificate Number. Any measurements on an accredited calibration not covered by that Lab's Scope of Accreditation are listed in the notes section of the certificate. SCC, NRC, CLAS or ANAB do not guarantee the accuracy of an individual calibration by accredited laboratories.

Transcat calibrations, as applicable, are performed in compliance with the requirements of the Transcat Quality Manual QAC-P01-000, the customer's Purchase Order and/or Quality Agreement requirements, ISO 9001:2015, ANSI/NCCL Z540.1-1994 (R2002) or NQA-1, as applicable. Complete records of work performed are maintained by Transcat and are available for inspection. Laboratory standards used in the performance of this calibration are listed on this certificate.

Transcat documents the traceability of measurements to the SI units through the National Institute of Standards and Technology (NIST), or the National Research Council of Canada (NRC), or other national measurement institutes (NMI) that are signatories to the CIPM Mutual Recognition Arrangement, or accepted fundamental and/or natural physical constants, or by the use of specified methods, consensus standards or ratio type measurements. Documentation supporting traceability information is available for review upon written request at a Transcat facility. The measured quantity and the measurement uncertainty are required for further dissemination of traceability.

A binary decision rule, utilizing simple acceptance, and simple rejection criteria is used for the determination of compliance, unless otherwise superseded by the client's Decision Rule. When Calibration Tolerance compliance statements are present, they are reported without factoring in the effects of uncertainty and comply with the guidelines established by ASME B89.7.3.1-2001 (R2019) as follows:

-The acceptance zone is defined as: less than or equal to the high calibration tolerance limit, and/or greater than or equal to the low calibration tolerance limit. The rejection zones are defined as greater than the high calibration tolerance limit and/or less than the low calibration tolerance limit.

-Single measurement results in the acceptance zone are identified as in-tolerance. Single measurement results in the rejection zone are identified as out-of-tolerance (OOT).

-When all measurement results are in the acceptance zone for repeated measurements, for the same characteristic, the test is identified as in-tolerance. For repeated characteristic measurements, a single measurement result in the rejection zone, will cause the test to be identified as out-of-tolerance (OOT).

Uncertainties are reported with a coverage factor $k=2$, providing a level of confidence of approximately 95%. All calibrations have been performed using processes having a TUR of 4:1 or better (3:1 for mass calibrations), unless otherwise noted. The Test Uncertainty Ratio (TUR) is calculated in accordance with NCSL International RP-18. For mass calibrations: Conventional mass referenced to 8.0 g/cm³.

The results in this report relate only to the item calibrated or tested. Recorded calibration data is valid at the time of calibration within the stated uncertainties at the environmental conditions noted. The determination of compliance to the specification is specific to the model/serial no./ID no. referenced above based on the tolerances shown; these tolerances are either the original equipment manufacturers (OEM's) warranted specifications or the client's requested specifications. This certificate may not be reproduced except in full, without the written approval of Transcat. Additional information, if applicable may be included on separate report(s).

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ANAB AC-2489

PO Number: ABC123

Certificate/SO Number: 1-FY5AR-160-1 Revision 2

As Found/As Left Data

| Description | Setpoints | Accuracy | Low Limit | High Limit | As Found / As Left | O O T | Cal Process Uncertainty (k=2; ±) | Measurement Uncertainty (k=2; ±) | Units | TUR |
|-------------------------|------------|----------------------|-----------|------------|--------------------|-------------|--|--|-------|-----------|
| AC Volts Measure | | | | | | | | | | |
| 600 mV Range | 330.0mVrms | ±(0.7% Rdg + 4 LSD) | 327.3 | 332.7 | 329.5 mVrms | | 8.6e-002 | 1.7e-001 | mVrms | 31.5 : 1 |
| | 60Hz | | | | | | | | | |
| | 600.0mVrms | ±(2% Rdg + 20 LSD) | 586.0 | 614.0 | 602.4 mVrms | | 1.4e-001 | 2.0e-001 | mVrms | 100.0 : 1 |
| | 13kHz | | | | | | | | | |
| 6 V Range | 3.300Vrms | ±(0.7% Rdg + 2 LSD) | 3.275 | 3.325 | 3.295 Vrms | | 8.6e-004 | 1.7e-003 | Vrms | 29.2 : 1 |
| | 60Hz | | | | | | | | | |
| | 3.300Vrms | ±(2% Rdg + 20 LSD) | 3.214 | 3.386 | 3.287 Vrms | | 1.1e-003 | 1.8e-003 | Vrms | 79.3 : 1 |
| | 20kHz | | | | | | | | | |
| 60 V Range | 33.00Vrms | ±(0.7% Rdg + 2 LSD) | 32.75 | 33.25 | 32.96 Vrms | | 6.5e-003 | 1.5e-002 | Vrms | 38.5 : 1 |
| | 60Hz | | | | | | | | | |
| | 33.00Vrms | ±(2% Rdg + 20 LSD) | 32.14 | 33.86 | 32.87 Vrms | | 1.1e-002 | 1.8e-002 | Vrms | 77.3 : 1 |
| | 20kHz | | | | | | | | | |
| 600 V Range | 330.0Vrms | ±(0.7% Rdg + 2 LSD) | 327.5 | 332.5 | 329.6 Vrms | | 8.5e-002 | 1.5e-001 | Vrms | 29.4 : 1 |
| | 60Hz | | | | | | | | | |
| | 330.0Vrms | ±(2% Rdg + 4 LSD) | 323.0 | 337.0 | 329.8 Vrms | | 7.2e-002 | 1.4e-001 | Vrms | 96.8 : 1 |
| | 2.5kHz | | | | | | | | | |
| 1000 V Range | 500Vrms | ±(0.7% Rdg + 2 LSD) | 494 | 506 | 500 Vrms | | 1.2e-001 | 1.2e+000 | Vrms | 48.0 : 1 |
| | 60Hz | | | | | | | | | |
| | 1000Vrms | ±(1% Rdg + 4 LSD) | 986 | 1014 | 1002 Vrms | | 2.4e-001 | 1.2e+000 | Vrms | 57.8 : 1 |
| | 1kHz | | | | | | | | | |

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As Found/As Left Data

| Description | Setpoints | Accuracy | Low Limit | High Limit | As Found / As Left | O O T | Cal Process Uncertainty (k=2; ±) | Measurement Uncertainty (k=2; ±) | Units | TUR |
|---------------------------|-----------|------------------------|-----------|------------|--------------------|-------------|--|--|-------|-----------|
| Frequency Measure | | | | | | | | | | |
| 600 mV Range | 99.95kHz | ±(0.005% Rdg + 1 LSD) | 99.94 | 99.96 | 99.95 kHz | | 1.9e-004 | 1.2e-002 | kHz | 51.3 : 1 |
| | 150mVrms | | | | | | | | | |
| | 199.50kHz | ±(0.005% Rdg + 1 LSD) | 199.48 | 199.52 | 199.50 kHz | | 3.9e-004 | 1.2e-002 | kHz | 51.5 : 1 |
| | 150mVrms | | | | | | | | | |
| 6 V Range - Sensitivity | 99.95kHz | ±(0.005% Rdg + 1 LSD) | 99.94 | 99.96 | 99.95 kHz | | 1.9e-004 | 1.2e-002 | kHz | 51.3 : 1 |
| | 0.7Vrms | | | | | | | | | |
| 60 V Range - Sensitivity | 99.95kHz | ±(0.005% Rdg + 1 LSD) | 99.94 | 99.96 | 99.95 kHz | | 1.9e-004 | 1.2e-002 | kHz | 51.3 : 1 |
| | 7Vrms | | | | | | | | | |
| 6 V Range - Trigger Level | 1000.0Hz | ±(0.005% Rdg + 1 LSD) | 999.8 | 1000.2 | 1000.0 Hz | | 2.0e-003 | 1.2e-001 | Hz | 100.0 : 1 |
| | 3.4Vp-p | | | | | | | | | |
| Duty Cycle | | | | | | | | | | |
| Duty Cycle - 6 V DC Range | 1kHz | ±(0.3 %) | 49.7 | 50.3 | 50.0 % | | 9.8e-005 | 1.2e-001 | % | 100.0 : 1 |
| | 5Vp-p | | | | | | | | | |
| DC Volts Measure | | | | | | | | | | |
| 6 V Range | 3.300V | ±(0.05% Rdg + 1 LSD) | 3.297 | 3.303 | 3.300 V | | 5.0e-005 | 1.2e-003 | V | 59.5 : 1 |
| 60 V Range | 33.00V | ±(0.05% Rdg + 1 LSD) | 32.97 | 33.03 | 33.00 V | | 6.3e-004 | 1.2e-002 | V | 47.8 : 1 |
| 600 V Range | 330.0V | ±(0.05% Rdg + 1 LSD) | 329.7 | 330.3 | 330.0 V | | 6.0e-003 | 1.2e-001 | V | 50.1 : 1 |
| 1000 V Range | 1000V | ±(0.05% Rdg + 1 LSD) | 998 | 1002 | 1000 V | | 1.6e-002 | 1.2e+000 | V | 100.0 : 1 |
| 600 mV Range | 33.0mV | ±(0.1% Rdg + 1 LSD) | 32.9 | 33.1 | 33.0 mV | | 1.3e-003 | 1.2e-001 | mV | 76.7 : 1 |
| | 330.0mV | ±(0.1% Rdg + 1 LSD) | 329.6 | 330.4 | 330.0 mV | | 4.6e-003 | 1.2e-001 | mV | 86.8 : 1 |

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As Found/As Left Data

| Description | Setpoints | Accuracy | Low Limit | High Limit | As Found / As Left | O O T | Cal Process Uncertainty (k=2; ±) | Measurement Uncertainty (k=2; ±) | Units | TUR |
|---------------------------------------|-----------|----------------------|-----------|------------|--------------------|-------------|--|--|-------|-----------|
| Resistance 2 Wire Comp Measure | | | | | | | | | | |
| 600 Ohm Range | 330.0Ohm | ±(0.2% Rdg + 2 LSD) | 329.1 | 330.9 | 330.1 Ohm | | 2.4e-002 | 1.4e-001 | Ohm | 36.8 : 1 |
| 6 kOhm Range | 3.300kOhm | ±(0.2% Rdg + 1 LSD) | 3.292 | 3.308 | 3.300 kOhm | | 2.4e-004 | 1.4e-003 | kOhm | 32.7 : 1 |
| 60 kOhm Range | 33.00kOhm | ±(0.2% Rdg + 1 LSD) | 32.92 | 33.08 | 33.02 kOhm | | 2.4e-003 | 1.4e-002 | kOhm | 32.7 : 1 |
| 600 kOhm Range | 330.0kOhm | ±(0.6% Rdg + 1 LSD) | 327.9 | 332.1 | 330.3 kOhm | | 2.6e-002 | 1.4e-001 | kOhm | 81.9 : 1 |
| 6 MOhm Range | 3.300MOhm | ±(0.6% Rdg + 1 LSD) | 3.279 | 3.321 | 3.303 MOhm | | 5.4e-004 | 1.4e-003 | MOhm | 39.2 : 1 |
| 50 MOhm Range | 30.00MOhm | ±(1% Rdg + 3 LSD) | 29.67 | 30.33 | 30.09 MOhm | | 7.9e-003 | 1.5e-002 | MOhm | 41.6 : 1 |
| 60 nS Range (Open) | 0.00MOhm | ±(1% Rdg + 30 LSD) | -0.30 | 0.30 | -0.05 nS | | 0.0e+000 | 1.2e-002 | nS | 4 : 1 |
| 60 nS Range | 100MOhm | ±(1% Rdg + 30 LSD) | 9.60 | 10.40 | 9.93 nS | | 4.6e-003 | 1.3e-002 | nS | 87.2 : 1 |
| Diode Test | | | | | | | | | | |
| Diode Test | 3.000V | ±(2% Rdg + 1 LSD) | 2.939 | 3.061 | 3.000 V | | 2.9e-005 | 1.2e-003 | V | 100.0 : 1 |
| A AC Measure | | | | | | | | | | |
| 6 A Range | 3.000A | ±(1% Rdg + 2 LSD) | 2.968 | 3.032 | 2.999 A | | 3.0e-003 | 3.4e-003 | A | 10.7 : 1 |
| | 60Hz | | | | | | | | | |
| A DC Measure | | | | | | | | | | |
| 6 A Range | 3.000A | ±(0.2% Rdg + 4 LSD) | 2.990 | 3.010 | 3.001 A | | 1.9e-003 | 2.3e-003 | A | 5.2 : 1 |
| 10 A Range | 10.00A | ±(0.2% Rdg + 2 LSD) | 9.96 | 10.04 | 10.00 A | | 5.5e-003 | 1.3e-002 | A | 7.3 : 1 |
| mA AC Measure | | | | | | | | | | |
| 60 mA Range | 33.00mA | ±(1% Rdg + 2 LSD) | 32.65 | 33.35 | 32.97 mA | | 2.7e-002 | 3.2e-002 | mA | 13.0 : 1 |
| | 60Hz | | | | | | | | | |
| 400 mA Range | 330.0mA | ±(1% Rdg + 2 LSD) | 326.5 | 333.5 | 330.0 mA | | 2.1e-001 | 2.6e-001 | mA | 16.7 : 1 |
| | 60Hz | | | | | | | | | |

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| Description | Setpoints | Accuracy | Low Limit | High Limit | As Found / As Left | O O T | Cal Process Uncertainty (k=2; ±) | Measurement Uncertainty (k=2; ±) | Units | TUR |
|--|-----------|--|-----------|------------|--------------------|-------------|--|--|-------|-----------|
| mA DC Measure | | | | | | | | | | |
| 60 mA Range | 33.00mA | ±(0.2% Rdg + 4 LSD) | 32.89 | 33.11 | 33.00 mA | | 4.5e-003 | 1.4e-002 | mA | 24.6 : 1 |
| 400 mA Range | 330.0mA | ±(0.2% Rdg + 2 LSD) | 329.1 | 330.9 | 329.9 mA | | 8.2e-002 | 1.6e-001 | mA | 10.9 : 1 |
| µA AC Measure | | | | | | | | | | |
| 600 µA Range | 330.0µA | ±(1% Rdg + 2 LSD) | 326.5 | 333.5 | 329.9 µA | | 3.8e-001 | 4.0e-001 | µA | 9.3 : 1 |
| | 60Hz | | | | | | | | | |
| 6000 µA Range | 3300µA | ±(1% Rdg + 2 LSD) | 3265 | 3335 | 3299 µA | | 2.8e+000 | 3.3e+000 | µA | 12.7 : 1 |
| | 60Hz | | | | | | | | | |
| µA DC Measure | | | | | | | | | | |
| 600 µA Range | 330.0µA | ±(0.2% Rdg + 4 LSD) | 328.9 | 331.1 | 330.0 µA | | 6.7e-002 | 1.6e-001 | µA | 16.4 : 1 |
| 6000 µA Range | 3300µA | ±(0.2% Rdg + 2 LSD) | 3291 | 3309 | 3300 µA | | 5.1e-001 | 1.4e+000 | µA | 17.5 : 1 |
| Capacitance Measure | | | | | | | | | | |
| 10 nF Range | 0.26nF | ≥ (0.21 nF) ; ≤ (0.31 nF) | 0.21 | 0.31 | 0.26 nF | | 0.0e+000 | 1.2e-002 | nF | 4 : 1 |
| 100 nF Range | 5.0nF | ±(1% Rdg + 2 LSD) | 4.7 | 5.3 | 5.0 nF | | 1.6e-002 | 1.3e-001 | nF | 18.3 : 1 |
| 100 µF Range | 9.5µF | ±(1% Rdg + 2 LSD) | 9.2 | 9.8 | 9.5 µF | | 2.5e-002 | 1.3e-001 | µF | 11.8 : 1 |
| Low Pass Filter | | | | | | | | | | |
| Low Pass Filter - 1000 V Range | 400Vrms | -(6% Rdg + 4 LSD) ; +(1% Rdg + 4 LSD) | 372 | 408 | 381 Vrms | | 1.0e-001 | 1.2e+000 | Vrms | 100.0 : 1 |
| | 400Hz | | | | | | | | | |
| (Not spec'd - Approx 226 to 340Vrms) | 400Vrms | | | | 289 Vrms | | 7.2e-002 | 1.2e+000 | Vrms | 4 : 1 |
| | 800Hz | | | | | | | | | |
| Low Pass Filter @ 800Hz | | | | | | | | | | |
| Filter follows an expected roll-off curve. | | | P | P | P | | | | | |

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As Found/As Left Data

| Description | Setpoints | Accuracy | Low Limit | High Limit | As Found / As Left | O O T | Cal Process Uncertainty (k=2; ±) | Measurement Uncertainty (k=2; ±) | Units | TUR |
|----------------------------|---------------|---------------------|-----------|------------|--------------------|-------------|--|--|-------|-----------|
| Peak MIN/MAX | | | | | | | | | | |
| MAX - 6 VDC Range | 6Vp-p 2kHz | ±(0.103 V) | 3.897 | 4.103 | 4.025 V | | 5.6e-004 | 1.4e-003 | V | 100.0 : 1 |
| MIN | 6Vp-p 2kHz | ±(0.102 V) | -2.102 | -1.898 | -2.009 V | | 2.8e-004 | 1.3e-003 | V | 100.0 : 1 |
| Temperature Measure | | | | | | | | | | |
| Type K (ITS90) | 0.0°C | ±(1% Rdg + 10 LSD) | -1.0 | 1.0 | 0.1 °C | | 0.0e+000 | 1.2e-001 | °C | 4 : 1 |
| | 100.0°C | ±(1% Rdg + 10 LSD) | 98.0 | 102.0 | 100.1 °C | | 1.6e-001 | 2.0e-001 | °C | 12.5 : 1 |
| Function Check | | | | | | | | | | |
| Backlight Comes On | | | P | P | P | | | | | |
| Backlight Intensifies | | | P | P | P | | | | | |
| Backlight Off | | | P | P | P | | | | | |

Field not applicable.

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Traceable Standards

| Asset | Manufacturer | Model Number | Description | Cal Date | Due Date | Traceability Number | Use |
|-------|-------------------|--------------|--------------------------|-----------|-----------|---------------------|-------|
| 5312 | Fluke Corporation | 5520A | Multifunction Calibrator | 27-Aug-20 | 27-Aug-21 | 5-&5312-38-2 | AF/AL |

The use of the standard is defined as: AF - used for as-found readings, AL - used for as-left readings.

Environmental Data

| Temperature | Relative Humidity | Temp / RH Asset |
|-------------------|-------------------|-----------------|
| 71.40°F / 21.89°C | 53.00% | 3133A |

Decision Rule

When compliance statements are present, they are reported without factoring in the effects of uncertainty and comply with the guidelines as follows: The acceptance zone is defined as: less than or equal to the high limit, and/or greater than or equal to the low limit. The rejection zones are defined as greater than the high limit and/or less than the low limit. Single measurement results in the acceptance zone are identified as in-tolerance. Single measurement results in the rejection zone are identified as out-of-tolerance (OOT). When all measurement results are in the acceptance zone for repeated measurements, for the same characteristic, the test is identified as in-tolerance. For repeated characteristic measurements, a single measurement result in the rejection zone, will cause the test to be identified as out-of-tolerance (OOT). Data rejection for cause, (outliers) is permitted after the "Determining and Verifying Out Of Tolerance (OOT) and/or Op Fail Readings" procedure outlined in this document has been completed and the anomalous reading cannot be repeated, and the anomalous reading does not represent the system under test. Statements of conformity are binary.

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Legend

| Topic | Description |
|-------------------------------|--|
| Accuracy | UUT specification that establishes expected tolerances and a time limit (calibration interval) over which the instrument is expected to hold these tolerances |
| As Found | Initial measurement results |
| As Left | Measurement results after adjustment and/or repair |
| Blank Data Field | Test is not applicable for the UUT |
| Cal Process Uncertainty (CPU) | The uncertainty of calibration process for the reported measurement result |
| Calibration Date | Indicates the date that the calibration was completed |
| Cover Factor (k) | A measure of uncertainty that defines an interval about the measurement result |
| Due Date | Indicates the end of the calibration cycle as requested by the customer |
| Issue Date | Indicates the date that the calibration has passed the Data Review Process and was signed by an authorized signatory or the date that a revision to the original certificate has been issued |
| Low / High Limits | Establishes UUT acceptable performance limits for the test measurement |
| Measurement Uncertainty | The dispersion of the values attributed to a measured quantity |
| OOT | Out of Tolerance |
| Setpoints | Measurement target values |
| Traceability | Unbroken chain of comparisons relating an instrument's measurements to a known standard(s) |
| Traceability Number | Unique identifier(s) used to document traceability of calibration standards |
| TUR | Test Uncertainty Ratio, ratio of the tolerance or specification of the test measurement in relation to the uncertainty in measurement results |
| UUT | Unit Under test |

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Calibrated At:
35 Vantage Point Dr
Rochester, NY 14624

Facility Responsible:
35 Vantage Point Dr
Rochester, NY 14624
800-828-1470

Calibrated By:
 **Electronically Signed By:**
Kevin Kita

Reviewed By:
 **Electronically Signed By:**
Jared Payne for

Unit Barcode: 
273A0001034

Kevin Kita Mar 10, 2021
Calibration Technician 22:45:40 -05:00

Kevin OGrady Nov 12, 2020
Lab Manager 10:21:33 -05:00

Date Received: November 09, 2020
Service Level : R9
Revised On: Revised on March 10, 2021