



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017  
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: January 31, 2028

Certificate Number: 4828.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations<sup>1, 7</sup>:

I. Electrical – DC/Low Frequency

| Parameter/Equipment                                                                                                                                                                                                                   | Range                                                                                                                                            | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                   | Comments    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| DC Voltage <sup>3</sup> – Measure<br><br>Auto, 10 M $\Omega$ , 1 M $\Omega$<br>Auto, 10 M $\Omega$ , 1 M $\Omega$<br>Auto, 10 M $\Omega$ , 1 M $\Omega$<br>Auto, 10 M $\Omega$<br>1 M $\Omega$<br>Auto, 10 M $\Omega$<br>1 M $\Omega$ | Up to 200 mV<br>200 mV to 2 V<br>(2 to 20) V<br>(20 to 200) V<br>(20 to 200) V<br>200 V to 1.0 kV<br>200 V to 1.0 kV                             | 8.9 $\mu$ V/V + 0.40 $\mu$ V<br>9.8 $\mu$ V/V + 0.60 $\mu$ V<br>2.8 $\mu$ V/V + 1.0 $\mu$ V<br>4.1 $\mu$ V/V + 61 $\mu$ V<br>9.0 $\mu$ V/V + 61 $\mu$ V<br>4.3 $\mu$ V/V + 530 $\mu$ V<br>9.1 $\mu$ V/V + 26 mV | Fluke 8588A |
| DC Voltage <sup>3</sup> – Generate                                                                                                                                                                                                    | (0 to 220) mV<br>220 mV to 2.2 V<br>(2.2 to 11) V<br>(11 to 22) V<br>(22 to 220) V<br>(220 to 1100) V                                            | 6 $\mu$ V/V + 0.40 $\mu$ V<br>4 $\mu$ V/V + 0.7 $\mu$ V<br>3 $\mu$ V/V + 2.5 $\mu$ V<br>2.8 $\mu$ V/V + 4 $\mu$ V<br>4 $\mu$ V/V + 40 $\mu$ V<br>5.2 $\mu$ V/V + 400 $\mu$ V                                    | Fluke 5730A |
| DC Current <sup>3</sup> – Measure                                                                                                                                                                                                     | Up to 20 $\mu$ A<br>(20 to 200) $\mu$ A<br>200 $\mu$ A to 2 mA<br>(2 to 20) mA<br>(20 to 200) mA<br>200 mA to 2 A<br>(2 to 20) A<br>(20 to 30) A | 24 $\mu$ A/A + 0.4 nA<br>9 $\mu$ A/A + 0.4 nA<br>9 $\mu$ A/A + 10 nA<br>24 $\mu$ A/A + 0.1 $\mu$ A<br>33 $\mu$ A/A + 2 $\mu$ A<br>100 $\mu$ A/A + 0.2 mA<br>180 $\mu$ A/A + 0.8 mA<br>500 $\mu$ A/A + 4.4 mA    | Fluke 8588A |

| Parameter/Equipment                                                      | Range                                                                                                                                                                                                                                                                  | CMC <sup>2, 5</sup> (±)                                                                                                                                                                                                                                                                                                                                                                                                          | Comments                          |
|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| DC Current <sup>3</sup> – Generate                                       | (0 to 220) $\mu$ A<br>(0.22 to 2.2) mA<br>(2.2 to 22) mA<br>(22 to 220) mA<br>(0.22 to 2.2) A<br>(2.2 to 3.1) A<br>(3.1 to 12) A<br>(12 to 30.2) A                                                                                                                     | 31 $\mu$ A/A + 6 nA<br>27 $\mu$ A/A + 7 nA<br>27 $\mu$ A/A + 40 nA<br>35 $\mu$ A/A + 0.7 $\mu$ A<br>67 $\mu$ A/A + 12 $\mu$ A<br>230 $\mu$ A/A + 150 $\mu$ A<br>230 $\mu$ A/A + 250 $\mu$ A<br>780 $\mu$ A/A + 500 $\mu$ A                                                                                                                                                                                                       | Fluke 5730A<br><br>Fluke 5560A    |
| Clamp On Only<br>Non Toroidal                                            | (30.2 to 60) A<br>(60 to 1510) A                                                                                                                                                                                                                                       | 1.5 % + 0.5 A<br>0.55 % + 0.5 A                                                                                                                                                                                                                                                                                                                                                                                                  | Fluke 5500A coil<br>& Fluke 5560A |
| DC Resistance <sup>3</sup> – Measure                                     | Up to 2 $\Omega$<br>(2 to 20) $\Omega$<br>(20 to 200) $\Omega$<br>200 $\Omega$ to 2 k $\Omega$<br>(2 to 20) k $\Omega$<br>(20 to 200) k $\Omega$<br>200 k $\Omega$ to 2 M $\Omega$<br>(2 to 20) M $\Omega$<br>(20 to 200) M $\Omega$<br>200 M $\Omega$ to 2 G $\Omega$ | 15 $\mu\Omega/\Omega$ + 8.1 $\mu\Omega$<br>12 $\mu\Omega/\Omega$ + 28 $\mu\Omega$<br>9.0 $\mu\Omega/\Omega$ + 100 $\mu\Omega$<br>7.0 $\mu\Omega/\Omega$ + 1.0 m $\Omega$<br>7.0 $\mu\Omega/\Omega$ + 10 m $\Omega$<br>7.0 $\mu\Omega/\Omega$ + 100 m $\Omega$<br>11 $\mu\Omega/\Omega$ + 20 $\Omega$<br>23 $\mu\Omega/\Omega$ + 200 $\Omega$<br>43 $\mu\Omega/\Omega$ + 20 k $\Omega$<br>580 $\mu\Omega/\Omega$ + 2.0 M $\Omega$ | Fluke 8588A                       |
| Electrical Calibration of<br>RTDs <sup>3</sup> – Simulation &<br>Measure |                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                   |
| Pt 385, 100 $\Omega$                                                     | (-200 to 0) $^{\circ}$ C<br>(0 to 100) $^{\circ}$ C<br>(100 to 300) $^{\circ}$ C<br>(300 to 400) $^{\circ}$ C<br>(400 to 630) $^{\circ}$ C<br>(630 to 800) $^{\circ}$ C                                                                                                | 0.04 $^{\circ}$ C<br>0.05 $^{\circ}$ C<br>0.07 $^{\circ}$ C<br>0.08 $^{\circ}$ C<br>0.09 $^{\circ}$ C<br>0.18 $^{\circ}$ C                                                                                                                                                                                                                                                                                                       | Fluke 5560A                       |
| Pt 3926, 100 $\Omega$                                                    | (-200 to 0) $^{\circ}$ C<br>(0 to 100) $^{\circ}$ C<br>(100 to 300) $^{\circ}$ C<br>(300 to 400) $^{\circ}$ C<br>(400 to 630) $^{\circ}$ C                                                                                                                             | 0.04 $^{\circ}$ C<br>0.05 $^{\circ}$ C<br>0.07 $^{\circ}$ C<br>0.08 $^{\circ}$ C<br>0.09 $^{\circ}$ C                                                                                                                                                                                                                                                                                                                            |                                   |
| Pt 3916, 100 $\Omega$                                                    | (-200 to -190) $^{\circ}$ C<br>(-190 to -80) $^{\circ}$ C<br>(-80 to 0) $^{\circ}$ C<br>(0 to 100) $^{\circ}$ C<br>(100 to 260) $^{\circ}$ C<br>(260 to 300) $^{\circ}$ C<br>(300 to 400) $^{\circ}$ C<br>(400 to 600) $^{\circ}$ C<br>(600 to 630) $^{\circ}$ C       | 0.19 $^{\circ}$ C<br>0.03 $^{\circ}$ C<br>0.04 $^{\circ}$ C<br>0.05 $^{\circ}$ C<br>0.05 $^{\circ}$ C<br>0.06 $^{\circ}$ C<br>0.07 $^{\circ}$ C<br>0.08 $^{\circ}$ C<br>0.18 $^{\circ}$ C                                                                                                                                                                                                                                        |                                   |

| Parameter/Equipment                                                         | Range                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                                                                                                             | Comments    |
|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| DC Resistance <sup>3</sup> – Generate                                       | 0 $\Omega$<br>(0 to 1) $\Omega$<br>(1 to 1.9) $\Omega$<br>1.9 $\Omega$ to 10 $\Omega$<br>(10 to 19) $\Omega$<br>(19 to 100) $\Omega$<br>(100 to 190) $\Omega$<br>190 $\Omega$ to 1 k $\Omega$<br>(1 to 1.9) k $\Omega$<br>(1.9 to 10) k $\Omega$<br>(10 to 19) k $\Omega$<br>(19 to 100) k $\Omega$<br>(100 to 190) k $\Omega$<br>190 k $\Omega$ to 1.0 M $\Omega$<br>(1.0 to 1.9) M $\Omega$<br>(1.9 to 10) M $\Omega$<br>(10 to 19) M $\Omega$<br>(19 to 100) M $\Omega$ | 31 $\mu\Omega$<br>74 $\mu\Omega$<br>74 $\mu\Omega$<br>20 $\mu\Omega$<br>18 $\mu\Omega$<br>8 $\mu\Omega$<br>8 $\mu\Omega$<br>5 $\mu\Omega$<br>5 $\mu\Omega$<br>5 $\mu\Omega$<br>5 $\mu\Omega$<br>9 $\mu\Omega$<br>7 $\mu\Omega$<br>12 $\mu\Omega$<br>15 $\mu\Omega$<br>40 $\mu\Omega$<br>68 $\mu\Omega$<br>180 $\mu\Omega$ | Fluke 5730A |
| Electrical Calibration of Thermocouples <sup>3</sup> – Simulation & Measure |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                           |             |
| Type E                                                                      | (-250 to -100) $^{\circ}\text{C}$<br>(-100 to -25) $^{\circ}\text{C}$<br>(-25 to 350) $^{\circ}\text{C}$<br>(350 to 650) $^{\circ}\text{C}$<br>(650 to 1000) $^{\circ}\text{C}$                                                                                                                                                                                                                                                                                            | 0.31 $^{\circ}\text{C}$<br>0.11 $^{\circ}\text{C}$<br>0.09 $^{\circ}\text{C}$<br>0.12 $^{\circ}\text{C}$<br>0.16 $^{\circ}\text{C}$                                                                                                                                                                                       | Fluke 5560A |
| Type J                                                                      | (-210 to -100) $^{\circ}\text{C}$<br>(-100 to -30) $^{\circ}\text{C}$<br>(-30 to 150) $^{\circ}\text{C}$<br>(150 to 760) $^{\circ}\text{C}$<br>(760 to 1200) $^{\circ}\text{C}$                                                                                                                                                                                                                                                                                            | 0.19 $^{\circ}\text{C}$<br>0.10 $^{\circ}\text{C}$<br>0.09 $^{\circ}\text{C}$<br>0.11 $^{\circ}\text{C}$<br>0.16 $^{\circ}\text{C}$                                                                                                                                                                                       |             |
| Type K                                                                      | (-200 to -100) $^{\circ}\text{C}$<br>(-100 to -25) $^{\circ}\text{C}$<br>(-25 to 120) $^{\circ}\text{C}$<br>(120 to 1000) $^{\circ}\text{C}$<br>(1000 to 1372) $^{\circ}\text{C}$                                                                                                                                                                                                                                                                                          | 0.22 $^{\circ}\text{C}$<br>0.13 $^{\circ}\text{C}$<br>0.12 $^{\circ}\text{C}$<br>0.16 $^{\circ}\text{C}$<br>0.27 $^{\circ}\text{C}$                                                                                                                                                                                       |             |
| Type N                                                                      | (-200 to -100) $^{\circ}\text{C}$<br>(-100 to -25) $^{\circ}\text{C}$<br>(-25 to 120) $^{\circ}\text{C}$<br>(120 to 410) $^{\circ}\text{C}$<br>(410 to 1300) $^{\circ}\text{C}$                                                                                                                                                                                                                                                                                            | 0.26 $^{\circ}\text{C}$<br>0.12 $^{\circ}\text{C}$<br>0.09 $^{\circ}\text{C}$<br>0.09 $^{\circ}\text{C}$<br>0.16 $^{\circ}\text{C}$                                                                                                                                                                                       |             |
| Type R                                                                      | (0 to 250) $^{\circ}\text{C}$<br>(250 to 400) $^{\circ}\text{C}$<br>(400 to 1000) $^{\circ}\text{C}$<br>(1000 to 1767) $^{\circ}\text{C}$                                                                                                                                                                                                                                                                                                                                  | 0.40 $^{\circ}\text{C}$<br>0.23 $^{\circ}\text{C}$<br>0.21 $^{\circ}\text{C}$<br>0.26 $^{\circ}\text{C}$                                                                                                                                                                                                                  |             |

| Parameter/Equipment                                          | Range                                                                       | CMC <sup>2</sup> (±)                     | Comments    |
|--------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------|-------------|
| Electrical Simulation of Thermocouples <sup>3</sup> – (cont) |                                                                             |                                          |             |
| Type S                                                       | (0 to 250) °C<br>(250 to 1000) °C<br>(1000 to 1400) °C<br>(1400 to 1767) °C | 0.33 °C<br>0.24 °C<br>0.25 °C<br>0.32 °C | Fluke 5560A |
| Type T                                                       | (-250 to -150) °C<br>(-150 to 0) °C<br>(0 to 120) °C<br>(120 to 400) °C     | 0.47 °C<br>0.16 °C<br>0.10 °C<br>0.09 °C |             |

| Parameter/Range                           | Frequency                                                                                                                                                                   | CMC <sup>2, 5</sup> (±)                                                                                                                                                                        | Comments    |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Voltage <sup>3</sup> – Measure         |                                                                                                                                                                             |                                                                                                                                                                                                |             |
| Up to 12.12 mV,<br>Auto, 10 MΩ, 1 MΩ      | (1 to 2) kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz                                                                  | 2200 μV/V + 1.3 μV<br>1000 μV/V + 1.3 μV<br>350 μV/V + 1.3 μV<br>0.3 % + 1.3 μV<br>1.0 % + 4.8 μV<br>2.0 % + 4.8 μV                                                                            | Fluke 8588A |
| (12.12 to 121.2) mV,<br>Auto, 10 MΩ, 1 MΩ | (1 to 2) kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz<br>(1 to 2) MHz<br>(2 to 4) MHz<br>(4 to 8) MHz<br>(8 to 10) MHz | 3700 μV/V + 0.61 μV<br>3700 μV/V + 0.61 μV<br>220 μV/V + 1.2 μV<br>520 μV/V + 6.1 μV<br>0.2 % + 36 μV<br>1.0 % + 120 μV<br>1.5 % + 610 μV<br>4.0 % + 1.2 mV<br>8.0 % + 1.2 mV<br>15 % + 1.2 mV |             |
| (0.121 to 1.212) V,<br>Auto, 10 MΩ, 1 MΩ  | (1 to 2) kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz<br>(1 to 2) MHz<br>(2 to 4) MHz<br>(4 to 8) MHz<br>(8 to 10) MHz | 1900 μV/V + 6.1 μV<br>1900 μV/V + 6.1 μV<br>300 μV/V + 12 μV<br>600 μV/V + 61 μV<br>0.2 % + 370 μV<br>1.0 % + 1.3 mV<br>2.0 % + 6.0 mV<br>4.0 % + 12 mV<br>8.0 % + 12 mV<br>15 % + 12 mV       |             |

| Parameter/Range                                           | Frequency                                                                                                                                                                   | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                     | Comments    |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Voltage <sup>3</sup> – Measure (cont)                  |                                                                                                                                                                             |                                                                                                                                                                                                                                   |             |
| (1.212 to 12.12) V,<br>Auto, 10 M $\Omega$ , 1 M $\Omega$ | (1 to 2) kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz<br>(1 to 2) MHz<br>(2 to 4) MHz<br>(4 to 8) MHz<br>(8 to 10) MHz | 1900 $\mu$ V/V + 60 $\mu$ V<br>1900 $\mu$ V/V + 60 $\mu$ V<br>300 $\mu$ V/V + 120 $\mu$ V<br>600 $\mu$ V/V + 600 $\mu$ V<br>0.2 % + 3.6 mV<br>1.0 % + 12 mV<br>2.0 % + 60 mV<br>4.0 % + 120 mV<br>8.0 % + 120 mV<br>15 % + 120 mV | Fluke 8588A |
| (12.12 to 121.2) V,<br>10 M $\Omega$                      | 1 Hz to 1 kHz<br>(1 to 2) kHz<br>(2 to 10) kHz                                                                                                                              | 1400 $\mu$ V/V + 0.60 mV<br>1000 $\mu$ V/V + 0.60 mV<br>2 % + 1.2 mV                                                                                                                                                              |             |
| (12.12 to 121.2) V,<br>Auto, 1 M $\Omega$                 | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz<br>(100 to 300) kHz<br>300 kHz to 1 MHz                                                                 | 160 $\mu$ V/V + 0.6 mV<br>170 $\mu$ V/V + 0.6 mV<br>230 $\mu$ V/V + 1.2 mV<br>540 $\mu$ V/V + 6.1 mV<br>170 $\mu$ V/V + 61 mV<br>170 $\mu$ V/V + 600 mV                                                                           |             |
| (121.2 to 1050) V,<br>10 M $\Omega$                       | 1 Hz to 1 kHz<br>(1 to 2) kHz<br>(2 to 10) kHz                                                                                                                              | 830 $\mu$ V/V + 11 mV<br>1000 $\mu$ V/V + 11 mV<br>2 % + 11 mV                                                                                                                                                                    |             |
| (121.2 to 1050) V,<br>Auto, 1 M $\Omega$                  | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                                                         | 90 $\mu$ V/V + 2.6 mV<br>90 $\mu$ V/V + 2.6 mV<br>210 $\mu$ V/V + 2.6 mV<br>510 $\mu$ V/V + 110 mV                                                                                                                                |             |

| Parameter/Range                    | Frequency                                                                                                                                          | CMC <sup>2, 5</sup> ( $\pm$ )                                                                                                                                                                                                                      | Comments    |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| AC Voltage <sup>3</sup> – Generate |                                                                                                                                                    |                                                                                                                                                                                                                                                    |             |
| (1 to 2.2) mV                      | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 190 $\mu$ V/V + 7.0 $\mu$ V<br>84 $\mu$ V/V + 7.0 $\mu$ V<br>71 $\mu$ V/V + 6.0 $\mu$ V<br>160 $\mu$ V/V + 6.0 $\mu$ V<br>460 $\mu$ V/V + 15 $\mu$ V<br>850 $\mu$ V/V + 30 $\mu$ V<br>1100 $\mu$ V/V + 30 $\mu$ V<br>3800 $\mu$ V/V + 30 $\mu$ V   | Fluke 5730A |
| (2.2 to 22) mV                     | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 180 $\mu$ V/V + 4.0 $\mu$ V<br>70 $\mu$ V/V + 4.0 $\mu$ V<br>62 $\mu$ V/V + 4.0 $\mu$ V<br>160 $\mu$ V/V + 4.0 $\mu$ V<br>400 $\mu$ V/V + 5.0 $\mu$ V<br>820 $\mu$ V/V + 10 $\mu$ V<br>1100 $\mu$ V/V + 20 $\mu$ V<br>2600 $\mu$ V/V + 20 $\mu$ V  |             |
| 22 to 220 mV                       | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 190 $\mu$ V/V + 12 $\mu$ V<br>72 $\mu$ V/V + 7.0 $\mu$ V<br>48 $\mu$ V/V + 7.0 $\mu$ V<br>95 $\mu$ V/V + 7.0 $\mu$ V<br>250 $\mu$ V/V + 17 $\mu$ V<br>510 $\mu$ V/V + 20 $\mu$ V<br>1100 $\mu$ V/V + 25 $\mu$ V<br>2800 $\mu$ V/V + 45 $\mu$ V     |             |
| 220 mV to 2.2 V                    | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 190 $\mu$ V/V + 40 $\mu$ V<br>72 $\mu$ V/V + 15 $\mu$ V<br>36 $\mu$ V/V + 8 $\mu$ V<br>54 $\mu$ V/V + 10 $\mu$ V<br>79 $\mu$ V/V + 30 $\mu$ V<br>260 $\mu$ V/V + 80 $\mu$ V<br>780 $\mu$ V/V + 200 $\mu$ V<br>1400 $\mu$ V/V + 300 $\mu$ V         |             |
| (2.2 to 22) V                      | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 190 $\mu$ V/V + 400 $\mu$ V<br>70 $\mu$ V/V + 150 $\mu$ V<br>33 $\mu$ V/V + 50 $\mu$ V<br>52 $\mu$ V/V + 100 $\mu$ V<br>64 $\mu$ V/V + 200 $\mu$ V<br>380 $\mu$ V/V + 600 $\mu$ V<br>840 $\mu$ V/V + 2000 $\mu$ V<br>3900 $\mu$ V/V + 3200 $\mu$ V |             |

| Parameter/Range                              | Frequency                                                                                                                                          | CMC <sup>2, 5</sup> (±)                                                                                                                                                                                                                                                                                          | Comments                 |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| AC Voltage <sup>3</sup> – Generate<br>(cont) |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                  |                          |
| (22 to 220) V                                | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 20 kHz<br>(20 to 50) kHz<br>(50 to 100) kHz<br>(100 to 300) kHz<br>(300 to 500) kHz<br>500 kHz to 1 MHz | 190 $\mu\text{V}/\text{V}$ + 4.0 mV<br>72 $\mu\text{V}/\text{V}$ + 1.5 mV<br>44 $\mu\text{V}/\text{V}$ + 0.6 mV<br>64 $\mu\text{V}/\text{V}$ + 1.0 mV<br>120 $\mu\text{V}/\text{V}$ + 2.5 mV<br>700 $\mu\text{V}/\text{V}$ + 16 mV<br>3400 $\mu\text{V}/\text{V}$ + 40 mV<br>6200 $\mu\text{V}/\text{V}$ + 80 mV | Fluke 5730A              |
| (220 to 1100) V                              | 15 Hz to 50 Hz<br>50 Hz to 1 kHz                                                                                                                   | 230 $\mu\text{V}/\text{V}$ + 16 mV<br>60 $\mu\text{V}/\text{V}$ + 3.5 mV                                                                                                                                                                                                                                         |                          |
| (220 to 750) V                               | (30 to 50) kHz<br>(50 to 100) kHz                                                                                                                  | 470 $\mu\text{V}/\text{V}$ + 11 $\mu\text{V}$<br>1800 $\mu\text{V}/\text{V}$ + 45 $\mu\text{V}$                                                                                                                                                                                                                  | Fluke 5725A<br>amplifier |
| (750 to 1100) V                              | (1 to 20) kHz<br>(20 to 30) kHz                                                                                                                    | 130 $\mu\text{V}/\text{V}$ + 6 $\mu\text{V}$<br>470 $\mu\text{V}/\text{V}$ + 11 $\mu\text{V}$                                                                                                                                                                                                                    |                          |
| AC Current <sup>3</sup> – Measure            |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                  |                          |
| Up to 20.2 $\mu\text{A}$                     | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz                                                                                                   | 2100 $\mu\text{A}/\text{A}$ + 5 nA<br>2100 $\mu\text{A}/\text{A}$ + 5 nA<br>2100 $\mu\text{A}/\text{A}$ + 5 nA                                                                                                                                                                                                   | Fluke 8588A              |
| (20.2 to 202) $\mu\text{A}$                  | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                                | 260 $\mu\text{A}/\text{A}$ + 10 nA<br>510 $\mu\text{A}/\text{A}$ + 0.1 $\mu\text{A}$<br>720 $\mu\text{A}/\text{A}$ + 1 $\mu\text{A}$<br>4100 $\mu\text{A}/\text{A}$ + 2 nA                                                                                                                                       |                          |
| (0.202 to 2.02) mA                           | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                                | 260 $\mu\text{A}/\text{A}$ + 0.1 $\mu\text{A}$<br>510 $\mu\text{A}/\text{A}$ + 0.1 $\mu\text{A}$<br>720 $\mu\text{A}/\text{A}$ + 0.1 $\mu\text{A}$<br>4100 $\mu\text{A}/\text{A}$ + 0.2 $\mu\text{A}$                                                                                                            |                          |
| (2.02 to 20.20) mA                           | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz<br>(30 to 100) kHz                                                                                | 260 $\mu\text{A}/\text{A}$ + 1 $\mu\text{A}$<br>510 $\mu\text{A}/\text{A}$ + 1 $\mu\text{A}$<br>720 $\mu\text{A}/\text{A}$ + 1 $\mu\text{A}$<br>4100 $\mu\text{A}/\text{A}$ + 2 $\mu\text{A}$                                                                                                                    |                          |
| (20.2 to 202) mA                             | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz                                                                                                   | 260 $\mu\text{A}/\text{A}$ + 10 $\mu\text{A}$<br>500 $\mu\text{A}/\text{A}$ + 10 $\mu\text{A}$<br>710 $\mu\text{A}/\text{A}$ + 10 $\mu\text{A}$                                                                                                                                                                  |                          |

| Parameter/Range                             | Frequency                                                                         | CMC <sup>2, 5</sup> (±)                                                                               | Comments                 |
|---------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------|
| AC Current <sup>3</sup> – Measure<br>(cont) |                                                                                   |                                                                                                       |                          |
| (0.202 to 2.02) A                           | 1 Hz to 2 kHz<br>(2 to 10) kHz<br>(10 to 30) kHz                                  | 260 µA/A + 210 µA<br>510 µA/A + 210 µA<br>710 µA/A + 210 µA                                           | Fluke 8588A              |
| (2.02 to 20.2) A                            | 10 Hz to 2 kHz<br>(2 to 10) kHz                                                   | 810 µA/A + 1 mA<br>810 µA/A + 1 mA                                                                    |                          |
| (20.2 to 30.2) A                            | 10 Hz to 2 kHz<br>(2 to 10) kHz                                                   | 800 µA/A + 130 mA<br>1200 µA/A + 130 mA                                                               |                          |
| AC Current <sup>3</sup> – Generate          |                                                                                   |                                                                                                       |                          |
| (22 to 220) µA                              | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz | 210 µA/A + 16 µA<br>140 µA/A + 10 µA<br>80 µA/A + 8 µA<br>220 µA/A + 12 µA<br>850 µA/A + 65 µA        | Fluke 5730A              |
| (.22 to 2.2) mA                             | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz | 190 µA/A + 40 µA<br>120 µA/A + 35 µA<br>80 µA/A + 35 µA<br>160 µA/A + 110 µA<br>850 µA/A + 650 µA     |                          |
| (2.2 to 22) mA                              | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz | 190 µA/A + 400 µA<br>120 µA/A + 350 µA<br>80 µA/A + 350 µA<br>160 µA/A + 550 µA<br>850 µA/A + 5000 µA |                          |
| (22 to 220) mA                              | (10 to 20) Hz<br>(20 to 40) Hz<br>40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz | 200 µA/A + 4 µA<br>130 µA/A + 3.5 µA<br>80 µA/A + 2.5 µA<br>160 µA/A + 3.5 µA<br>850 µA/A + 10 µA     |                          |
| (0.22 to 2.2) A                             | 40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz                                   | 190 µA/A + 35 µA<br>350 µA/A + 80 µA<br>5400 µA/A + 160 µA                                            |                          |
| (2.2 to 11) A                               | 40 Hz to 1 kHz<br>(1 to 5) kHz<br>(5 to 10) kHz                                   | 360 µA/A + 35 µA<br>740 µA/A + 80 µA<br>2800 µA/A + 160 µA                                            | Fluke 5725A<br>amplifier |

| Parameter/Range                              | Frequency                                      | CMC <sup>2, 5</sup> (±)                                                | Comments                          |
|----------------------------------------------|------------------------------------------------|------------------------------------------------------------------------|-----------------------------------|
| AC Current <sup>3</sup> – Generate<br>(cont) |                                                |                                                                        |                                   |
| (12 to 30.2) A                               | (3 to 45) Hz<br>45 Hz to 1 kHz<br>(1 to 5) kHz | 780 $\mu$ A/A + 10 mA<br>540 $\mu$ A/A + 8 mA<br>3900 $\mu$ A/A + 8 mA | Fluke 5560A                       |
| (30.2 to 60) A                               | (45 to 65) Hz<br>(65 to 440) Hz                | 0.64 % output + 0.03 A<br>1.0 % output + 0.03 A                        | Fluke 5500A coil &<br>Fluke 5560A |
| (60 to 155) A                                | (45 to 65) Hz<br>(65 to 440) Hz                | 0.66 % output + 0.25 A<br>1.0 % output + 0.25 A                        |                                   |
| (155 to 600) A                               | (45 to 65) Hz<br>(65 to 440) Hz                | 0.62 % output + 0.25 A<br>1.0 % output + 0.25 A                        |                                   |
| (600 to 1510) A                              | (45 to 65) Hz<br>(65 to 440) Hz                | 0.60 % output + 0.90 A<br>1.0 % output + 0.90 A                        |                                   |

| Parameter/Equipment                 | Range                                                                                                                                                                                | CMC <sup>2, 5</sup> (±)                                                                                                                                                | Comments    |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Capacitance <sup>3</sup> – Generate | Up to 1.2 nF<br>(1.2 to 12) nF<br>(12 to 120) nF<br>120 nF to 1.2 $\mu$ F<br>(1.2 to 12) $\mu$ F<br>(12 to 120) $\mu$ F<br>120 $\mu$ F to 1.2 mF<br>(1.2 to 12) mF<br>(12 to 120) mF | 0.23 % + 2 pF<br>0.24 % + 5 pF<br>0.09 % + 30 pF<br>0.08 % + 300 pF<br>0.09 % + 3 nF<br>0.09 % + 25 nF<br>0.15 % + 250 nF<br>0.15 % + 3 $\mu$ F<br>0.30 % + 30 $\mu$ F | Fluke 5560A |

## II. Fluid Quantities

| Parameter/Equipment                     | Range                                                                                   | CMC <sup>2</sup> (±)                                         | Comments                          |
|-----------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------|
| Piston Operated<br>Volumetric Apparatus | (2 to 10) $\mu$ l<br>(10 to 50) $\mu$ l<br>(50 to 200) $\mu$ l<br>(200 to 1000) $\mu$ l | 0.058 $\mu$ l<br>0.10 $\mu$ l<br>0.26 $\mu$ l<br>2.4 $\mu$ l | Pipettes<br>Gravimetric<br>method |

### III. Mechanical

| Parameter/Equipment                         | Range                                                                                                                    | CMC <sup>2, 4, 6</sup> ( $\pm$ )                                                                                     | Comments                   |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------------------|
| Pressure <sup>3</sup> – Measuring Equipment | (Up to 100) psia<br>(>100 to 300) psia<br>(>300 to 1000) psia                                                            | 0.04 psia<br>0.14 psia<br>0.17 psia                                                                                  | Fluke PPC4 pressure module |
| Scales & Balances <sup>3</sup>              | >100 mg to 20 g<br>(>20 to 250) g<br>>250 g to 1 kg<br>(>1 to 3) kg<br>(>3 to 10) kg<br>(>10 to 20) kg<br>(>20 to 24) kg | 0.03 mg + 0.6R<br>0.11 mg + 0.6R<br>0.70 mg + 0.6R<br>2.0 mg + 0.6R<br>4.4 mg + 0.6R<br>16 mg + 0.6R<br>26 mg + 0.6R | Class 1 weights            |

### IV. Thermodynamics

| Parameter/Equipment                                         | Range                                                         | CMC <sup>2, 4, 6</sup> ( $\pm$ )                         | Comments                                                                         |
|-------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------|
| Humidity <sup>3</sup> – Measuring Equipment                 | (10 to 20) % RH<br>(>20 to 50) % RH<br>(>50 to 80) % RH       | 0.13 % RH + 0.6R<br>0.36 % RH + 0.6R<br>0.76 % RH + 0.6R | Thunder Scientific 2500                                                          |
| Humidity <sup>3</sup> – Measure                             | (10 to 35) % RH<br>(35 to 50) % RH<br>(50 to 80) % RH         | 0.61 % RH<br>0.63 % RH<br>1.1 % RH                       | Rotronics HC2A-3                                                                 |
| Temperature <sup>3</sup> – Measure                          | -197 °C<br>(-197 to 0) °C<br>(0 to 231) °C<br>(231 to 420) °C | 0.003 °C<br>0.002 °C<br>0.0045 °C<br>0.0064 °C           | SPRT                                                                             |
| Temperature <sup>3</sup> – Measuring Equipment              | (-90 to 140) °C                                               | 0.06 °C + 0.6R                                           | SPRT, Fluke Superthermometer readout & dry block                                 |
| Temperature – Measuring Equipment<br><br>Triple Point Water | <br><br>0.010 °C                                              | <br><br>0.002 °C                                         | <br><br>Fluke Mini fixed reference point cells<br>Fluke Superthermometer readout |

## V. Time & Frequency

| Parameter/Equipment                             | Range            | CMC <sup>2, 6</sup> ( $\pm$ ) | Comments                             |
|-------------------------------------------------|------------------|-------------------------------|--------------------------------------|
| Frequency <sup>3</sup> – Measure                | (1 to 350) MHz   | 1.2 $\mu$ Hz/Hz               | Frequency counter<br>Keysight 53220A |
| Frequency <sup>3</sup> – Measuring<br>Equipment | 0.01 Hz to 2 MHz | 3.3 $\mu$ Hz/Hz               | Fluke 5560A                          |

<sup>1</sup> This laboratory offers commercial and field calibration service.

<sup>2</sup> Calibration and Measurement Capability (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

<sup>3</sup> Field calibration service is available for this calibration. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

<sup>4</sup> In the statement of Calibration and Measurement Capability,  $R$  represents the numerical value of the resolution of the device. In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.

<sup>5</sup> The stated measure values are determined using the indicated instruments (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.

<sup>6</sup> The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

<sup>7</sup> This scope meets A2LA's *P112 Flexible Scope Policy*.



## Accredited Laboratory

A2LA has accredited

**ELLAB, INC.**

*Doylestown, PA*

for technical competence in the field of

**Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets the requirements of ANSI/NCCL Z540-1-1994 and R205 – Specific Requirements: Calibration Laboratory Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 16<sup>th</sup> day of June 2026.

A blue ink signature of Mr. Trace McInturff, Vice President of Accreditation Services.

Mr. Trace McInturff, Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 4828.01  
Valid to January 31, 2028

*For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.*