

# Technical Data NT 600

## Base equipment with measurement electronics MT20

| Test points                          |                                                                                                                                                                                     |      |                                    |       |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------|-------|
| Type test point cards                | RM60                                                                                                                                                                                | RM80 | RM100 / RM16                       | RM120 |
| Max. number of test points base unit | 1024                                                                                                                                                                                |      | 512                                |       |
| Max. number of expansion units       | 4                                                                                                                                                                                   |      |                                    |       |
| Max. total number of test points     | 5120                                                                                                                                                                                |      | 2560                               |       |
| Test point interface                 | Female connector DIN 41612, 64-way                                                                                                                                                  |      | Female connector DIN 41612, 32-way |       |
|                                      |                                                                                                                                                                                     |      |                                    |       |
| Low voltage test                     |                                                                                                                                                                                     |      |                                    |       |
| Test voltage                         | 1 – 25 V; in steps of 1 V (±3 %, min. 0.2 V)                                                                                                                                        |      |                                    |       |
| Test current                         | max. 25 mA                                                                                                                                                                          |      |                                    |       |
| Threshold continuity test            | 1 Ohm – 1 kOhm (±5 %, min. 1 Ohm)                                                                                                                                                   |      |                                    |       |
| Threshold short circuit test         | 20 kOhm – 1 MOhm (±5 %)<br>Option: up to 5 MOhm (±20 % at test voltages >= 20 V)                                                                                                    |      |                                    |       |
|                                      |                                                                                                                                                                                     |      |                                    |       |
| Component test                       |                                                                                                                                                                                     |      |                                    |       |
| Resistors                            | 1 Ohm – 1 MOhm (±5 %, min. 1 Ohm)<br>Option: up to 5 MOhm (±20 % at test voltages >= 20 V)                                                                                          |      |                                    |       |
| Capacitors                           | 10 nF – 20 mF (±10 %)<br>Option: from 100 pF (±10 %, min. ±20 pF)                                                                                                                   |      |                                    |       |
| Diodes                               | Forward voltage: < 1.0 V<br>Reverse voltage: max. 25 V                                                                                                                              |      |                                    |       |
| Zener diodes                         | Forward voltage: < 3.0 V<br>Zener voltage: max. 20 V (±10 %)                                                                                                                        |      |                                    |       |
| LEDs                                 | Forward-Voltage: < 4.0 V<br>Reverse voltage: max. 25 V                                                                                                                              |      |                                    |       |
| Suppressor diodes                    | Break-down voltage: 3 V – 23 V (±10 %)                                                                                                                                              |      |                                    |       |
|                                      |                                                                                                                                                                                     |      |                                    |       |
| Other                                |                                                                                                                                                                                     |      |                                    |       |
| Power supply                         | 100 – 240 VAC (50 - 60 Hz)                                                                                                                                                          |      |                                    |       |
| Dimensions (W x H x D)               | 450 mm x 275 mm x 395 mm                                                                                                                                                            |      |                                    |       |
| Weight                               | approx. 16 kg                                                                                                                                                                       |      |                                    |       |
| Environmental conditions             | Temperature range: operation: +10 °C – +40 °C<br>storage: +10 °C – +60 °C<br>Relative humidity: 30 % – 70 %, non-condensing                                                         |      |                                    |       |
| Operating                            | Control software NT Control, executable on a PC (not part of the delivery) with operating system Microsoft Windows® 7 Pro up to Windows® 10 Pro (country variant German or English) |      |                                    |       |
|                                      | Clearly designed operator interface, customizable                                                                                                                                   |      |                                    |       |
|                                      | Transparent test procedures, extensive graphical fault description                                                                                                                  |      |                                    |       |
|                                      | Detailed printouts of the test results on all printers supported by Windows®                                                                                                        |      |                                    |       |
|                                      | Report, label and lot printing                                                                                                                                                      |      |                                    |       |
| Programming                          | Remote maintenance                                                                                                                                                                  |      |                                    |       |
|                                      | Autoprogramming of golden patterns                                                                                                                                                  |      |                                    |       |
|                                      | Test program editors                                                                                                                                                                |      |                                    |       |
|                                      | Test point naming in several formats, output format selectable                                                                                                                      |      |                                    |       |
|                                      | Individual test procedure programming with Sax Basic Engine                                                                                                                         |      |                                    |       |

|                   |                                                                                                       |
|-------------------|-------------------------------------------------------------------------------------------------------|
|                   | Correction value determination for R, C, L and Z (option)                                             |
|                   | Function test (option)                                                                                |
|                   | AC/DC stimulus sources (option)                                                                       |
|                   | Voltage measurement / external voltage detection (option)                                             |
|                   | Test program selection via I/O card (option)                                                          |
|                   | UNICAD converter for CAD- and Excel link-data (option)                                                |
|                   | Downward compatible to existing test programs in the ATX-format                                       |
|                   | Temperature and humidity logging, 0 - 100 % rel. humidity $\pm 2$ %, -40 – 80°C $\pm 0.3$ K (option)  |
| Diagnosis         | Self-diagnosis for the measurement electronics and the test point cards                               |
| Interfaces        | Network                                                                                               |
|                   | Interface for expansion units                                                                         |
|                   | Serial interfaces RS232 / USB 2.0                                                                     |
|                   | 3 x I/O, digital, 24 V, D-Sub 15-way                                                                  |
|                   | Interface for warning lamp red-green, foot switch, test result lamp                                   |
|                   | Pin number probe for test point identification                                                        |
|                   | Safety loop for the protection of the work place                                                      |
|                   | I/O interface with 8, 16 or 24 opto-decoupled inputs and potential-free outputs (option)              |
|                   | RJ12 interface for the connection of a temperature and humidity sensor                                |
| Scope of delivery | External LCR measuring bridge and digital multimeter (option)                                         |
|                   | NT 600, main cable, pin number probe, USB flash drive with NT Control and documentation in PDF format |

## Measurement electronics option MT40-40 / MT40-250

| Low voltage test                 |                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                    |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Test voltage                     | MT40-40                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.2 – 40 V ( $\pm 1$ %, $\pm 10$ mV); in steps of 0,1 V            |
|                                  | MT40-250                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.25 – 250 V ( $\pm 2$ %, $\pm 125$ mV); in steps of 0,25 V        |
| Test current                     | MT40-40                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0.1 – 100 mA ( $\pm 1$ %, $\pm 0.025$ mA);<br>in steps of 0,025 mA |
|                                  | MT40-250                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.1 – 10 mA ( $\pm 1$ %, $\pm 0.025$ mA); in steps of 0.025 mA     |
| Time factor (waiting time)       | 0 – 650 ms; in steps of 10 $\mu$ s                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                    |
| Threshold for continuity test    | 1 Ohm – 1 kOhm ( $\pm 2$ %, min. 1 Ohm); in steps of 1 Ohm                                                                                                                                                                                                                                                                                                                                                                                  |                                                                    |
| Threshold for short circuit test | 20 kOhm – 10 MOhm ( $\pm 2$ %); in steps of 10 kOhm<br>Option: up to 100 MOhm ( $\pm 10$ %); in steps of 10 kOhm                                                                                                                                                                                                                                                                                                                            |                                                                    |
| Component test                   |                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                    |
| Resistors                        | 1 – 10 MOhm ( $\pm 2$ %, min. 1 Ohm)<br>Option: up to 100 MOhm ( $\pm 10$ %)                                                                                                                                                                                                                                                                                                                                                                |                                                                    |
| Capacitors                       | <ul style="list-style-type: none"><li>at testers with relay test point cards:<br/>10 nF – 20 mF (<math>\pm 5</math> %)<br/>Option: from 10 pF (<math>\pm 10</math> %, min. 5 pF)<br/>max. test voltage at <math>\geq 500</math> <math>\mu</math>F = 2,2 V;<br/>at 10 <math>\mu</math>F – 500 <math>\mu</math>F = 4,2 V;<br/>at 500 nF – 10 <math>\mu</math>F = 5 V;<br/>at <math>&lt; 500</math> nF = 40 V (Limit Cap.Volt = OFF)</li></ul> |                                                                    |
| Diodes:                          | Forward voltage: $\leq 1.0$ V<br>MT40-40: reverse voltage max. 40 V<br>MT40-250: reverse voltage max. 250 V                                                                                                                                                                                                                                                                                                                                 |                                                                    |
| Zener diodes                     | Forward voltage: $\leq 1.0$ V<br>MT40-40: Zener voltage $> 2.4$ V; max. 35 V ( $\pm 10$ %)<br>MT40-250: Zener voltage $> 2.4$ V; max. 200 V ( $\pm 10$ %)                                                                                                                                                                                                                                                                                   |                                                                    |
| LEDs                             | Forward voltage: $\leq 4.0$ V<br>MT40-40: reverse voltage max. 40 V<br>MT40-250: reverse voltage max. 250 V                                                                                                                                                                                                                                                                                                                                 |                                                                    |
| Suppressor diodes                | MT40-40: breakdown voltage 3 V – 35 V ( $\pm 10$ %)<br>MT40-250: breakdown voltage 3 V – 200 V ( $\pm 10$ %)                                                                                                                                                                                                                                                                                                                                |                                                                    |

## Measurement electronics option MT2000 (3 mA / 6 mA)

| Dielectric strength test      |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                       |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Voltage type                  | AC, 50 Hz / 60 Hz                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                       |
| Test voltage                  | RM60 / RM100 / RM16                                                                                                                                                                                                                                                                                                                                                                                                                        | 100 – 750 VAC (±5 %, min. 10 V); in steps of 5 V                                                                      |
|                               | RM80 / RM120                                                                                                                                                                                                                                                                                                                                                                                                                               | 100 – 1060 VAC (±5 %, min. 10 V); in steps of 5 V                                                                     |
| Short circuit current         | MT2000-3mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 2.1 mA <sub>eff</sub> , 3 mA <sub>p</sub> (±5 %); non-programmable; safety current limited according to EN 50191 |
|                               | MT2000-6mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 4.2 mA <sub>eff</sub> , 6 mA <sub>s</sub> (±5 %); non-programmable                                               |
| Test times                    | Rise time:                                                                                                                                                                                                                                                                                                                                                                                                                                 | 80 – 65000 ms; in steps of 20 ms                                                                                      |
|                               | Dwell time:                                                                                                                                                                                                                                                                                                                                                                                                                                | 40 – 65000 ms; in steps of 20 ms                                                                                      |
|                               | Fall time:                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0 – 65000 ms; in steps of 20 ms                                                                                       |
| Breakdown detection           | <ul style="list-style-type: none"><li>• Limit exceedance I<sub>maxreal</sub> 0.5 – 4.2 mA<sub>eff</sub>; in steps of 0,1 mA; I<sub>maxreal</sub> has to be lower than I<sub>max</sub></li><li>• Limit exceedance I<sub>max</sub> 0.5 – 4.2 mA<sub>eff</sub>; in steps of 0,1 mA</li><li>• Breakdown detector du/dt; non-programmable; fast and sensible breakdown detector. Prevents the unit under test from damage by the arc.</li></ul> |                                                                                                                       |
| Voltage type                  | DC                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                       |
| Test voltage                  | RM60 / RM100 / RM16                                                                                                                                                                                                                                                                                                                                                                                                                        | 40 – 1000 VDC (±5 %, min. 5 V); in steps of 5 V                                                                       |
|                               | RM80 / RM120                                                                                                                                                                                                                                                                                                                                                                                                                               | 40 – 1500 VDC (±5 %, min. 5 V); in steps of 5 V                                                                       |
| Short circuit current         | MT2000-3mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 3 mA (±5 %); non-programmable; safety current limited according to EN 50191                                      |
|                               | MT2000-6mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 6 mA (±5 %); non-programmable                                                                                    |
| Test times                    | Rise time:                                                                                                                                                                                                                                                                                                                                                                                                                                 | 20 – 65000 ms; in steps of 20 ms                                                                                      |
|                               | Dwell time:                                                                                                                                                                                                                                                                                                                                                                                                                                | 20 – 65000 ms; in steps of 20 ms                                                                                      |
|                               | Fall time:                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0 – 65000 ms; in steps of 20 ms                                                                                       |
| Breakdown detection           | <ul style="list-style-type: none"><li>• Limit exceedance I<sub>max</sub> 0.5 – 6 mA; in steps of 0.1 mA</li><li>• Breakdown detector du/dt; non-programmable; fast and sensible breakdown detector. Prevents the unit under test from damage by the arc.</li></ul>                                                                                                                                                                         |                                                                                                                       |
| Insulation test               |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                       |
| Voltage type                  | DC                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                       |
| Test voltage                  | RM60 / RM100 / RM16                                                                                                                                                                                                                                                                                                                                                                                                                        | 40 – 1000 VDC (±5 %, min. 5 V); in steps of 5 V                                                                       |
|                               | RM80 / RM120                                                                                                                                                                                                                                                                                                                                                                                                                               | 40 – 1500 VDC (±5 %, min. 5 V); in steps of 5 V                                                                       |
| Short circuit current         | MT2000-3mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 3 mA (±5 %); non-programmable; safety current limited according to EN 50191                                      |
|                               | MT2000-6mA                                                                                                                                                                                                                                                                                                                                                                                                                                 | max. 6 mA (±5 %); non-programmable                                                                                    |
| Test times                    | Rise time:                                                                                                                                                                                                                                                                                                                                                                                                                                 | 20 – 65000 ms; in steps of 20 ms                                                                                      |
|                               | Dwell time:                                                                                                                                                                                                                                                                                                                                                                                                                                | 20 – 65000 ms; in steps of 20 ms                                                                                      |
| Threshold for insulation test | 500 kOhm – 100 MOhm (±5 %, voltage ≥ 100 V)<br>100 MOhm – 2 GOhm (±5 %, voltage ≥ 500 V)<br>Option: up to 10 GOhm (±15 %, voltage ≥ 1000 V)<br>in steps of 500 kOhm<br>Voltage breakdown detection at test voltages ≥ 200 V                                                                                                                                                                                                                |                                                                                                                       |

|                     |                                                                                                                                        |                |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Breakdown detection | Breakdown detector du/dt; non-programmable; fast and sensible breakdown detector. Prevents the unit under test from damage by the arc. |                |
| Component test      |                                                                                                                                        |                |
| Varistors           |                                                                                                                                        |                |
| Varistor voltage    | RM60 / RM100 / RM16                                                                                                                    | 40 – 900 VDC   |
|                     | RM80 / RM120                                                                                                                           | 40 – 1300 VDC  |
| Test current:       | 1 mA                                                                                                                                   |                |
| Surge arrestor      |                                                                                                                                        |                |
| Breakdown voltage   | RM60 / RM100 / RM16                                                                                                                    | 100 – 900 VDC  |
|                     | RM80 / RM120                                                                                                                           | 100 – 1300 VDC |
| Ramp                | 100 V/s or 1000 V/s                                                                                                                    |                |

## Measurement electronics option MT1500DC

| High voltage test                          |                                                                                                                                                           |                                                                                       |                    |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------|
| Test voltage                               | RM60 / RM100 / RM16                                                                                                                                       | 40 – 1000 VDC (±2 %); in steps of 1 V                                                 |                    |
|                                            | RM80 / RM120                                                                                                                                              | 40 – 1500 VDC (±2 %); in steps of 1 V                                                 |                    |
| Test current                               | max. 2 mA (safety current limited according to EN 61010)                                                                                                  |                                                                                       |                    |
| Testing times                              | Rise time 0 – 60000 ms; in steps of 10 ms<br>Dwell time 0 – 60000 ms; in steps of 10 ms                                                                   |                                                                                       |                    |
| Insulation test                            | 500 kOhm – 2 GOhm<br>Option: up to 10 GOhm (not valid for Distributed Test Systems or unearthed operation)<br>in steps of 500 kOhm                        |                                                                                       |                    |
| Dielectric strength test                   | Fast recognitions of voltage breakdowns at test voltages ≥ 200 V (arc detections)                                                                         |                                                                                       |                    |
| Accuracy in dependence of the voltage:     |                                                                                                                                                           |                                                                                       |                    |
| Voltage                                    | 500 kOhm – 500 MOhm                                                                                                                                       | > 500 MOhm – 2 GOhm                                                                   | > 2 GOhm – 10 GOhm |
| 1500 V                                     | 2 %                                                                                                                                                       | 5 %                                                                                   | 15 %               |
| ≥ 1000 V                                   | 2 %                                                                                                                                                       | 5 %                                                                                   | ≥ 15 %             |
| ≥ 500 V                                    | 2 %                                                                                                                                                       | ≥ 15 %                                                                                | ≥ 15 %             |
|                                            | 500 kOhm – 100 MOhm                                                                                                                                       | > 100 MOhm – 2 GOhm                                                                   | > 2 GOhm – 10 GOhm |
| ≥ 100 V                                    | 2 %                                                                                                                                                       | ≥ 15 %                                                                                | ≥ 15 %             |
|                                            |                                                                                                                                                           |                                                                                       |                    |
| High current test                          |                                                                                                                                                           |                                                                                       |                    |
| Test current                               | 50 mA – 2 A (1 A with RM16); in steps of 10 mA                                                                                                            |                                                                                       |                    |
| Test voltage                               | max. 22 VDC                                                                                                                                               |                                                                                       |                    |
| Test times                                 | Dwell time 0 – 60000 ms; in steps of 100 ms                                                                                                               |                                                                                       |                    |
| Threshold continuity test                  | 500 mOhm – 10 Ohm, ±2 %, min. 200 mOhm<br>10 Ohm – 1 kOhm, ±5 % (dwell time ≥ 100 ms)<br>in steps of 500 mOhm                                             |                                                                                       |                    |
|                                            |                                                                                                                                                           |                                                                                       |                    |
| Four-wire measurement<br>1 mOhm (option)   | 1 mOhm – 1000 Ohm; in steps of 1 mOhm<br>±2 %, min. 1 mOhm at test current ≥ 1 A<br>±5 %, min. 5 mOhm at test current < 1 A, min. 50 mOhm                 |                                                                                       |                    |
|                                            | Resolution                                                                                                                                                | Measuring range                                                                       |                    |
|                                            | 13 µOhm                                                                                                                                                   | at 2 A test current: 100 µOhm – 50 mOhm                                               |                    |
|                                            | 245 µOhm                                                                                                                                                  | at 2 A test current: 50 mOhm – 1 Ohm                                                  |                    |
|                                            | 4,9 mOhm                                                                                                                                                  | at 2 A test current: 1 Ohm – 11 Ohm                                                   |                    |
|                                            | 0.045 % of measured value                                                                                                                                 | if test current of 2 A is not reached due to voltage limitation:<br>11 Ohm – 1000 Ohm |                    |
|                                            | Note: The measuring ranges change depending on the specified test current.                                                                                |                                                                                       |                    |
| Four-wire measurement<br>100 µOhm (option) | 100 µOhm – 1000 Ohm; minimum step size 100 µOhm                                                                                                           |                                                                                       |                    |
|                                            | Measuring range 100 µOhm – 1 mOhm:<br>Measurement accuracy absolute ±20 % at test current 2 A<br>Repeating accuracy ±10 µOhm<br>Measuring time min. 4.8 s |                                                                                       |                    |
|                                            | Measuring range 1 mOhm – 1000 Ohm:<br>±2 %, min. 1 mOhm at test current ≥ 1 A<br>±5 %, min. 5 mOhm at test current < 1 A, min. 50 mOhm                    |                                                                                       |                    |
|                                            | Resolution                                                                                                                                                | Measuring range                                                                       |                    |
|                                            | 1 µOhm                                                                                                                                                    | at 2 A test current: 100 µOhm – 50 mOhm                                               |                    |
|                                            | 16 µOhm                                                                                                                                                   | at 2 A test current: 50 mOhm – 1 Ohm                                                  |                    |
| Not suitable for unearthed operation.      | 305 µOhm                                                                                                                                                  | at 2 A test current: 1 Ohm – 11 Ohm                                                   |                    |
|                                            | 0.0028 % of measured value                                                                                                                                | if test current of 2 A is not reached due to voltage limitation:<br>11 Ohm – 1000 Ohm |                    |
|                                            | Note: The measuring ranges change depending on the specified test current.                                                                                |                                                                                       |                    |

|                                       |                      |                |
|---------------------------------------|----------------------|----------------|
| Short time interruptions AMC (option) | Interruptions ≥ 1 μs |                |
|                                       |                      |                |
| Component test                        |                      |                |
| Varistors                             |                      |                |
| Varistor voltage                      | RM60 / RM100 / RM16  | 40 – 900 VDC   |
|                                       | RM80 / RM120         | 40 – 1300 VDC  |
| Test current                          | 1 mA                 |                |
| Surge arrestors                       |                      |                |
| Breakdown voltage                     | RM60 / RM100 / RM16  | 100 – 900 VDC  |
|                                       | RM80 / RM120         | 100 – 1300 VDC |
| Ramp                                  | 100 V/s or 1000 V/s  |                |

### Measurement electronics option MT\_EXT

|                            |                                                      |
|----------------------------|------------------------------------------------------|
| <b>Voltage measurement</b> |                                                      |
| Voltage AC                 | 0.2 – 500 V ( $\pm 3 \%$ , min. 100 mV), max. 400 Hz |
| Voltage DC                 | 0.2 – 700 V ( $\pm 3 \%$ , min. 100 mV)              |

### Measurement electronics option MT\_LCR

|                         |                                                                |
|-------------------------|----------------------------------------------------------------|
| <b>Component test</b>   |                                                                |
| Test voltage            | 2 V ( $\pm 0.6$ V)                                             |
| Measurement frequencies | 100 Hz, 1 kHz, 10 kHz                                          |
| Inductances             | 200 $\mu\text{H}$ – 1 H ( $\pm 5 \%$ , min. 50 $\mu\text{H}$ ) |
| Capacitors              | 100 pF – 10 $\mu\text{F}$ ( $\pm 5 \%$ , min. 50 pF)           |
| Resistors               | 1 Ohm – 50 kOhm ( $\pm 5 \%$ , min. 100 mOhm)                  |

Conditions for all tolerance statements: operating mode „Precise Mode“, earthbound operation, environmental conditions 15 – 35 °C / 20 – 60 % rel. humidity (non-condensing)

The statements for the component test refer to the test of single components, which are connected separately with test points.

Technical data and tolerances are subject to change depending on a specific ambient of the test object or application.