Release Notes NORMA PA FW V1.5

Improvement and extension of the harmonic measurement (new mode compliant to Standard IEC/EN61000-4-7):

1. **Mode FFT**: as before (sampling with fixed frequency and Hanning window, selectable frequency range by filter stages);
   Improved calculation accuracy at low signal amplitudes
2. **Mode DFT**: as before (calculation of the integer harmonics by interpolation of the FFT results - see 1. above);
3. **Mode STD**: new; compliant to Standard IEC/EN61000-4-7 by using firmware synchronization / decimation technique and rectangular window
   (valid for interval lengths of 10 (50Hz) and 12 (60Hz) = 200ms at nominal frequency)

**Settings (user-selectable):**

- **a)** Number of fundamental cycles in the interval (2048 decimated samples):
  4 – 6 – 8 – 10(50Hz) – 12(60Hz)
- **b)** Grouping mode in accordance to standard IEC/EN61000-4-7:
  - none: Spectral Components (601 bins of the basic FFT);
    width = 1/interval length = 5Hz nominal for 10(50Hz) and 12(60Hz) resp.;
    no THD calculation
  - harm: Harmonic Components (integer multiples of the fundamental);
    THD according to standard (U and I only)
  - hgrp: Harmonic Groups;
    THDG according to standard (U and I only)
  - hsgrp: Harmonic Subgroups;
    THDS according to standard (U and I only)
  - isgrp: Inter-harmonic Subgroups;
    TIDS (U and I only; not defined in the standard)
  - sgrp: both Harmonic + Inter-harmonic Subgroups in one graph/table;
    THDT (U and I only; not defined in the standard) = THDS + TIDS

In the grouping modes the harmonics are calculated up to order 50 (inter-harmonics up to order 49).

The THD values are calculated from the fixed harmonic range 2\(^{nd}\)...40\(^{th}\). The THD is only shown in harmonics table view.

Note: all relative values in [%] representation are always related to the fundamental (H01). If the fundamental is less than 5% of the nominal range, the relative value gets undefined and shows "--.--".
A valid synchronization is needed throughout the interval (same source as used for averaging); in the absence of synchronization an empty graph or table is displayed. All channels / values are synchronized to a common frequency.

In contrast to the averaging, the sync range for harmonics STD mode is reduced:

**341kHz sample rate:**

<table>
<thead>
<tr>
<th>Fundamental Cycles Setting</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>&lt; 1,25 Hz</td>
<td>&gt; 200 Hz</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 1,6 Hz</td>
<td>&gt; 300 Hz</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 2,5 Hz</td>
<td>&gt; 400 Hz</td>
</tr>
<tr>
<td>10(50Hz)</td>
<td>&lt; 3 Hz</td>
<td>&gt; 500 Hz</td>
</tr>
<tr>
<td>12(60Hz)</td>
<td>&lt; 3,5 Hz</td>
<td>&gt; 600 Hz</td>
</tr>
</tbody>
</table>

**1MHz sample rate:**

<table>
<thead>
<tr>
<th>Fundamental Cycles Setting</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>&lt; 1 Hz</td>
<td>&gt; 650 Hz</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 1,5 Hz</td>
<td>&gt; 1000 Hz</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 1,8 Hz</td>
<td>&gt; 1300 Hz</td>
</tr>
<tr>
<td>10(50Hz)</td>
<td>&lt; 2 Hz</td>
<td>&gt; 1600 Hz</td>
</tr>
<tr>
<td>12(60Hz)</td>
<td>&lt; 2,5 Hz</td>
<td>&gt; 2000 Hz</td>
</tr>
</tbody>
</table>

**100kHz sample rate:**

<table>
<thead>
<tr>
<th>Fundamental Cycles Setting</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>&lt; 0,7 Hz</td>
<td>&gt; 65 Hz</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 1 Hz</td>
<td>&gt; 100 Hz</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 1,4 Hz</td>
<td>&gt; 130 Hz</td>
</tr>
<tr>
<td>10(50Hz)</td>
<td>&lt; 1,7 Hz</td>
<td>&gt; 160 Hz</td>
</tr>
<tr>
<td>12(60Hz)</td>
<td>&lt; 2 Hz</td>
<td>&gt; 200 Hz</td>
</tr>
</tbody>
</table>

For further details see updated Operators Manual.
Remote Control Commands (new parameters / commands in **bold**):

CALCulate:TRANsform:FREQuency:MODE FFT | DFT | **STD**
CALCulate:TRANsform:FREQuency:CYCles 4 | 6 | 8 | 10 | 12
CALCulate:TRANsform:FREQuency:GROuping
  COMPONENT | HARMonic | HGROup | HSGrOup | ISGrOup | SGrOup

Each harmonic measurement, which is to be read out via interface, needs to be triggered explicitly (as before):

CALCulate:TRANsform:FREQuency ONCE

The format for data readout by the commands
CALCulate:DATA:PREamble? and
CALCulate:DATA?

is unchanged; in mode STD the header returns the (same) synchronization frequency for all variables.

Command for readout of THDs from harmonics calculation:
CALCulate:DATA:THD? => returns a list of THD values for every function

*For further details see updated Remote Control Users Guide.*
New VNC® Support (remote front-panel operation by PC mouse/keyboard – Virtual Network Computing)

Support for an additional protocol over Ethernet interface has been added:

The device can be configured to run a VNC server by selecting this protocol type for the Ethernet interface on the main setup screen. A VNC client program running on a PC or other computer can connect to the device and get front-panel control by mouse and keyboard action while being presented with a continuously updated device screen.

The high priority tasks (calculation of gapless measurement data, local screen refresh) allow only for a thin implementation of the VNC server in the device (limited protocol options and speed). Only a single connection is allowed, no support for SCPI remote control commands while in VNC mode.

VNC is a registered trademark of RealVNC Ltd.

For further details see updated Operators Manual.