A combination of inputs and generator outputs make a complete stand-alone analyzer test system. Type 3056 is ideal for applications where system excitation is required – such as audio and electroacoustic test applications.

Type 3160 comes in two basic variants, offering the choice between 2 inputs/2 outputs and 4 inputs/2 outputs. All input and output channels have a frequency range of DC to 51.2 kHz.

Type 3160 works equally well as a single-module test system, or as one part of a large LAN-XI measurement system. The combination of inputs and output channels makes it one of the most versatile data acquisition modules available, while interchangeable front-panels give the flexibility to use a wide range of transducers.

**Uses and Features**

**Uses**
- General sound and vibration measurements
- Generator output channels for system excitation for sound and vibration measurements
- Ideal for audio and electroacoustic measurements
- Measurement front-end module for PULSE™ measurement and analysis software
- Front-end for PC-based Data Recorder Type 7708
- Single-module measurements
- Multi-module measurements/distributed system
- Stand-alone recording (no PC) using LAN-XI Notar™ software

**Features**
- 2 or 4 input channels
- 2 generator output channels
- DC to 51.2 kHz input range
- 131 ksamples/s sampling rate
- Power for 200 V microphones
- Dyn-X technology
- REq-X technology
- Supports TEDS transducers
- Interchangeable front panels
Input Channels

Independent Channels
The input channels on a module can be set up independently. You can set up the high-pass filters and input gain separately and attach different types of transducer to different channels.

IEEE 1451.4 Transducers
All input modules support TEDS transducers. This allows automatic front-end and analyzer setup based on TEDS information stored in the transducer, for example, sensitivity, serial number, manufacturer and calibration date. The individual frequency response of a transducer can be corrected for using PULSE’s Transducer Response Equalisation, REq-X, to achieve higher accuracy over extended frequency ranges.

Overload
Constant Current Line Drive (CCLD) conditioning monitors the supply voltage used by CCLD-compatible transducers. Available CCLD transducers include:
- Accelerometers
- Charge amplifiers
- Microphone preamplifiers
- Tacho probes

If conditioning errors, such as a broken cable, are detected, an error is indicated as an overload on the specific channel connector (using a ring-LED around the connector) and in the PC software.

Overload indications for input channels include (see Specifications for details):
- Signal overload with adjustable detection level
- CCLD overload: detection of cable break, short-circuit or CCLD transducer working point fault
- Microphone preamplifier overload: detection of microphone preamplifier current consumption too high or too low
- Common mode voltage overload – relevant when input coupling is floating

Ground-loop Noise Suppression
The module’s floating/grounded, differential input design and the fact that all external connections (LAN, power supply) are galvanically isolated in the module provide optimal ground-loop noise suppression.

Output Channels

Features
- Two output channels: full generator functionality from 0 to 51.2 kHz
- Output voltage up to 10 V\text{peak} and output current up to 40 mA\text{peak} in two output ranges only
- Waveforms determined by software (see below)
- High amplitude and frequency linearity
- Extremely low noise floor
- Selectable floating or grounded outputs
- Capable of heavy complex loading without instability
- Low out-of-band spurious noise
- Overload detection on both channels individually (voltage and current) indicated by alternating red/blue LEDs on front panel
- Generator channel indicated by blue LED on front panel (active or not)
- Automatic shutdown (muting) of both channels simultaneously at power failure
- Full output phase control among LAN-XI modules

The two output channels on Type 3160 can be used as high-quality signal generators with a frequency range from 0 to 51.2 kHz and can supply the signals necessary for performing system analysis.

Type 3160 is designed around a powerful digital signal processor and a low-noise, 24-bit, D/A converter. Type 3160 has exceptional flexibility, stability and accuracy. Output levels are adjustable in hardware (two ranges) with maximum outputs of 316 mV\text{peak} and 10 V\text{peak}. High-quality levels from 1 \mu V to 316 mV or 10 V

\* Signal generators are not synchronized between LAN-XI and IDA\* generator modules. This does not affect continuous signals (random, white- or pink-noise) but is not suitable for burst random signals and sine signals requiring phase control between generators.
are obtained. The output signal is provided by a BNC connector and can be referred to ground or floating. It is possible to add a DC offset, but any unwanted DC offset is automatically removed.

When Type 3160 is powered by PoE, only the generator channels and two input channels can be used. If DC or mains power is available, the generator channels and all four input channels can be used.

**Waveforms**

The waveform types supported by PULSE are:

- Single fixed sine (continuous or burst)
- Single swept sine
- Dual fixed sine
- Dual swept sine
- Fixed sine plus swept sine
- Stepped sine (with Steady State Response Analyzer)
- Random (continuous or burst)
- Pseudo-random
- Periodic random
- User-defined, arbitrary waveforms can be downloaded

**Ranges**

The fact that there are only two hardware ranges allows amplitude sweeping over a larger range without the presence of disturbing transients from range-shifting attenuators. To avoid these transients, the range of interest can be locked.

Due to the large dynamic range, it is possible to generate very accurate low-level signals.

**Linearity**

Frequency linearity is better than ±0.1 dB over the entire frequency range, and amplitude linearity is better than 0.1 dB over at least 100 dB amplitude range referred to full scale.

**Overload**

Output voltages above 11 V peak or output currents above 40 mA peak are indicated as overloads by the circular LEDs on the output channels.

**Security**

Automatic shutdown of both outputs is initiated in cases of heavy overload (shorted output) that could affect module functionality by drawing more current than available. The signal ramps up again when the overload is removed.

---

**Compliance with Standards**

| CE-mark | CE-mark indicates compliance with: EMC Directive and Low Voltage Directive |
| RCM mark | RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME |
| China RoHS mark | China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People’s Republic of China |
| WEEE mark | WEEE mark indicates compliance with the EU WEEE Directive |

**Safety**

EN/IEC 61010–1 and ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use

**EMC Emission**

EN/IEC 61000–6–3: Generic emission standard for residential, commercial, and light-industrial environments

CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits

**EMC Immunity**

EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments

EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments

EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements

**Note:** The above is only guaranteed using accessories listed in this Product Data

**Temperature**

IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat

Ambient Operating Temperature: −10 to +55°C (14 to 131°F)

Storage Temperature: −25 to +70°C (−13 to +158°F)

**Humidity**

IEC 60068–2–78: Damp Heat: 93% RH (non-condensing at 40°C (104°F))

**Mechanical (non-operating)**

IEC 60068–2–6: Vibration: 0.3 mm, 2 g, 10 – 500 Hz

IEC 60068–2–27: Shock: 100 g

IEC 60068–2–29: Bump: 1000 bumps at 25 g

**Enclosure**

IEC 60529: Protection provided by enclosures: IP 31
EFFECT OF RADIATED AND CONDUCTED RF, MAGNETIC FIELD
AND VIBRATION
Radiated RF: 80–2700 MHz, 80% AM 1 kHz, 10 V/m
Conducted RF: 0.15–80 MHz, 80% AM 1 kHz, 10 V
Magnetic Field: 30 A/m, 50 Hz

Vibration: 5–500 Hz, 12.7 mm, 15 m/s²
Input measured with shorted input. All values are RMS. Conducted RF immunity on all channels is only guaranteed using an external connection from measuring ground to chassis terminal

<table>
<thead>
<tr>
<th>Input</th>
<th>Radiated RF</th>
<th>Conducted RF</th>
<th>Magnetic Field</th>
<th>Vibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct/CCLD</td>
<td>&lt;250 μV</td>
<td>&lt;300 μV</td>
<td>&lt;4 μV</td>
<td>&lt;80 μV</td>
</tr>
<tr>
<td>Preamplifier</td>
<td>&lt;250 μV</td>
<td>&lt;50 μV</td>
<td>&lt;8 μV</td>
<td>&lt;80 μV</td>
</tr>
</tbody>
</table>

Specifications – Generator, Input/Output Module LAN-XI 51.2 kHz Type 3160

POWER REQUIREMENTS
DC Input: 10–32 V DC
Connector: LEMO coax., FFA.00.113, ground on shield
Power Consumption:
DC Input: <15 W
Supply via PoE: According to IEEE 802.3af, Max. cable length 50 m

DIMENSIONS AND WEIGHT
Height: 132.6 mm (5.22")
Width: 27.5 mm (1.08")
Depth: 250 mm (9.84")
Weight: 750 g (1.65 lb)

Temperature Protection:
Temperature sensor limits module's internal temperature to 80°C (176°F).
If temperature exceeds limit, system will automatically enable fan in LAN-XI frame or shut down module outside frame

Specifications – LAN Interface

CONNECTOR
RJ 45 (10baseT/100baseTX) connector complying with IEEE–802.3
100baseX
Types 3660-C and -D permit the use of a ruggedized RJ45 data connector (Neutrik NE8MC-1) to screw the cable to the frame
Types 3660-C and -D communicate at 1000 Mbits/s: shielded cables of type “CAT 5e” or better should be used
Individual modules communicate at 100 Mbits/s
All LAN connectors support MDIX, which means that cables may be “crossed” or not
For stand-alone modules, PoE is also supported (IEEE 802.3af). PoE requires screened shielded twisted pair (S/STP or S/FTP) CAT6 LAN cables

PROTOCOL
The following standard protocols are used:
• TCP
• DHCP (incl. Auto-IP)
• DNS (on top of UDP)
• IEEE 1588–2002 (on top of UDP)
• IP
• Ethernet

ACQUISITION PERFORMANCE
Each LAN-XI module generates data at almost 14 Mbit/s when measuring four channels at 51.2 kHz bandwidth. The modules are capable of handling their own maximum traffic while the built-in switch in the frame's backplane has more than sufficient capacity. This means that bottlenecks can only occur outside these, for example in:
• External switches
• PC
For convenience, it is possible to daisy-chain LAN-XI frames. However, it is not recommended to daisy-chain more than two frames. For larger configurations, a star configuration with a central switch is recommended. This must have a switch capacity well beyond N × 20 Mbit/s, where N is the total number of modules

PTP PERFORMANCE
PTP Synchronisation (with 1 Gigabit LAN Switch):
Typical sample synchronisation better than 200 ns
(approx. ±0.07° @ 1 kHz, ±2° @ 25.6 kHz)
Tested with:
• Cisco® SG300-10MP, 10-port 10/100/1000 Managed Gigabit Switch with Maximum PoE (8 ports)
• Netgear® 5-port Gigabit Switch GS105
Better performance can be expected with a dedicated PTP switch:
• UL-0265: 10-port Gigabit Managed Switch with PTPv2 and PoE (8 ports).
This is a dedicated PTP switch, preconfigured for optimal use with LAN-XI

Specifications – Generator, Input/Output Module LAN-XI 51.2 kHz Type 3160

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DC Input: 10–32 V DC
Connector: LEMO coax., FFA.00.113, ground on shield
Power Consumption:
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If temperature exceeds limit, system will automatically enable fan in LAN-XI frame or shut down module outside frame
### INPUT CHANNELS

| Frequency Range | DC to 51.2 kHz  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower frequency range can be set in PULSE software</td>
<td></td>
</tr>
<tr>
<td>Sampling Rate</td>
<td>131 ksamples/s</td>
</tr>
<tr>
<td>A/D Conversion</td>
<td>2 × 24 bit</td>
</tr>
<tr>
<td>Data Transfer</td>
<td>24 bit</td>
</tr>
</tbody>
</table>
| Input Voltage Range | 10 V<sub>peak</sub>  
| Extended range: 31.6 V<sub>peak</sub> |
| Input Signal Coupling | Differential  
| Signal ground is "floating" (1 MΩ re: chassis) |
| Input Impedance | Direct, Microphone: 1 MΩ || <300 pF  
| CCLD: >100 kΩ || <300 pF |
| Absolute Maximum Input | ≤60 V<sub>peak</sub> without damage |

| High-pass Filters | – 0.1 dB *  
| ** Defined as the nominal  
| –10%/3 dB filter frequency  
| 0.1 Hz – 10% analog high-pass filter  
| 0.7 Hz – 0.1 dB digital high-pass filter  
| 1 Hz – 10% digital high-pass filter  
| 7 Hz – 0.1 dB digital high-pass filter  
| 22.4 Hz – 0.1 dB analog high-pass filter  
| Intensity filter (analog)  
| 115 Hz  
| 23.00 Hz  
| 15.8 Hz  
| 12.5 Hz  
| 0.1 Hz  
| 0.15 Hz  
| 0.7 Hz  
| 1.0 Hz  
| 1.45 Hz  
| 0.5 Hz  
| 0.707 Hz  
| –20 dB/dec.  
| –20 dB/dec.  
| –20 dB/dec.  
| –20 dB/dec.  
| –20 dB/dec. |

| Amplitude Linearity | 0 to 80 dB below full scale  
| 0.05 dB, typ. ±0.01 dB |
| 80 to 100 dB below full scale  
| 0.2 dB, typ. ±0.02 dB |
| 100 to 120 dB below full scale  
| typ. ±0.02 dB |
| 120 to 140 dB below full scale  
| typ. ±0.02 dB |
| 140 to 160 dB below full scale  
| typ. ±1 dB |

| Overall Frequency Response | 0 to 1 kHz, from lower limit f<sub>L</sub> to upper limit f<sub>U</sub>  
| ±0.1 dB |

| Noise | Lin*  
| Guaranteed  
| Typical |
| Signal level <316 mV<sub>peak</sub>  
| 10 Hz to 25.6 kHz  
| 10 Hz to 51.2 kHz  
| 10 V<sub>peak</sub>  
| <4 μV<sub>rms</sub>  
| <13 μV<sub>rms</sub>  
| <25 nV<sub>rms</sub>/√Hz  
| <3 μV<sub>rms</sub>  
| <10 μV<sub>rms</sub>  
| <19 nV<sub>rms</sub>/√Hz  |
| Signal level >316 mV<sub>peak</sub>  
| 10 Hz to 25.6 kHz  
| 10 Hz to 51.2 kHz  
| 10 V<sub>peak</sub>  
| <60 μV<sub>rms</sub>  
| <350 μV<sub>rms</sub>  
| <375 nV<sub>rms</sub>/√Hz  
| <50 μV<sub>rms</sub>  
| <250 μV<sub>rms</sub>  
| <313 nV<sub>rms</sub>/√Hz  |
| Signal level <1 V<sub>peak</sub>  
| 10 Hz to 25.6 kHz  
| 10 Hz to 51.2 kHz  
| 31.6 V<sub>peak</sub>  
| <20 μV<sub>rms</sub>  
| <45 μV<sub>rms</sub>  
| <125 nV<sub>rms</sub>/√Hz  
| <15 μV<sub>rms</sub>  
| <35 μV<sub>rms</sub>  
| <95 nV<sub>rms</sub>/√Hz  |
| Signal level >1 V<sub>peak</sub>  
| 10 Hz to 25.6 kHz  
| 10 Hz to 51.2 kHz  
| 31.6 V<sub>peak</sub>  
| <200 μV<sub>rms</sub>  
| <1200 μV<sub>rms</sub>  
| <1250 nV<sub>rms</sub>/√Hz  
| <150 μV<sub>rms</sub>  
| <800 μV<sub>rms</sub>  
| <950 nV<sub>rms</sub>/√Hz  |

| Spurious-free Dynamic Range re Full-scale Input | 10 V<sub>peak</sub>  
| 160 dB |
| 31.6 V<sub>peak</sub>  
| 140 dB |

| DC Offset re Full Scale | Guaranteed  
| Typical |
| 10 V<sub>peak</sub>  
| <–90 dB  
| –100 dB |
| 31.6 V<sub>peak</sub>  
| <–90 dB  
| –100 dB |

| Harmonic Distortion (all harmonics) | Guaranteed  
| Typical |
| 60 dB  
| (–60 dB in 31.6 V range)  
| <–100 dB  
| (–80 dB @ 1 kHz in 31.6 V range)  
| 60 dB  
| (–60 dB in 31.6 V range)  
| <–100 dB  
| (–80 dB @ 1 kHz in 31.6 V range)  
| 60 dB  
| (–60 dB in 31.6 V range)  
| <–100 dB  
| (–80 dB @ 1 kHz in 31.6 V range) |

| Crosstalk: Between any two channels of a module or between any two channels in different modules | Frequency Range  
| Guaranteed  
| Typical |
| 0–51.2 kHz  
| –100 dB  
| –140 dB |
### INPUT CHANNELS (CONTINUED)

#### Channel-to-Channel Match

<table>
<thead>
<tr>
<th>(10 V&lt;sub&gt;peak&lt;/sub&gt; input range)</th>
<th>Guaranteed</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Gain Difference</td>
<td>0.2 dB from lower frequency limit, f&lt;sub&gt;L&lt;/sub&gt;, to 51.2 kHz (0.4 dB at −10% filter frequency)</td>
<td>±0.05 dB</td>
</tr>
<tr>
<td>Maximum Phase Difference (within one frame)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f&lt;sub&gt;L&lt;/sub&gt; is defined as the −0.1 dB frequency of the high-pass filter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Channel-to-Channel Match

<table>
<thead>
<tr>
<th>(31.6 V&lt;sub&gt;peak&lt;/sub&gt; input range)</th>
<th>Guaranteed</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Gain Difference</td>
<td>0.6 dB from lower frequency limit, f&lt;sub&gt;L&lt;/sub&gt;, to 51.2 kHz (1 dB at −10% filter frequency)</td>
<td></td>
</tr>
<tr>
<td>Maximum Phase Difference (within one frame)</td>
<td>4° from lower frequency limit, f&lt;sub&gt;L&lt;/sub&gt;, to 51.2 kHz</td>
<td></td>
</tr>
</tbody>
</table>

#### Sound Intensity Phase Match

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Guaranteed Phase Match</th>
<th>Typical Phase Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>50–250 Hz</td>
<td>±0.017°</td>
<td>±0.005°</td>
</tr>
<tr>
<td>250 Hz–2.5 kHz</td>
<td>0.017° × (f/250)</td>
<td>±0.005°</td>
</tr>
<tr>
<td>2.5–6.4 kHz</td>
<td>±0.17°</td>
<td>±0.08°</td>
</tr>
</tbody>
</table>

#### Common Mode Rejection in 10 V<sub>peak</sub> input range

<table>
<thead>
<tr>
<th>Values for 31.6 V&lt;sub&gt;peak&lt;/sub&gt; range are 10 dB lower.</th>
<th>Guaranteed</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–120 Hz</td>
<td>70 dB</td>
<td>80 dB</td>
</tr>
<tr>
<td>120 Hz–1 kHz</td>
<td>55 dB</td>
<td>60 dB</td>
</tr>
<tr>
<td>1–51.2 kHz</td>
<td>30 dB</td>
<td>40 dB</td>
</tr>
</tbody>
</table>

#### Absolute Max. Common Mode Voltage

| ±5 V<sub>peak</sub> without damage |
| ±4 V<sub>peak</sub> without clipping |

If common mode voltage exceeds the max. value, care must be taken to limit the signal ground current in order to prevent damage. Max. is 100 mA. The instrument will limit the voltage to the stated max. “without damage” common mode value.

#### Anti-aliasing Filter

<table>
<thead>
<tr>
<th>Filter Type</th>
<th>3rd order Butterworth</th>
</tr>
</thead>
<tbody>
<tr>
<td>−0.1 dB @</td>
<td>51.2 kHz</td>
</tr>
<tr>
<td>−3 dB @</td>
<td>128 kHz</td>
</tr>
<tr>
<td>Slope</td>
<td>−18 dB/octave</td>
</tr>
</tbody>
</table>

#### Supply for Microphone Pre amplifiers

| ±14.0 V, max. 100 mA per channel (max. 100 mA total/module) |
| 200 V ±1 V, or 0 V (set per channel) |

#### Supply for Microphone Polarization

| 4 to 5 mA from 24 V source, option to DC-couple CCLD power supply |

#### Supply for CCLD

| CCLD for Type 2981 |
| (Power supply for legacy types MM-0012 and MM-0024 not available) |

#### Analog Special Functions

| Microphone Charge Injection Calibration: All modules with 7-pin LEMO support CIC via dedicated application software and OLE interface |
| Transducers: Supports IEEE 1451.4-capable transducers with standardised TEDS (up to 100 m cable length) |

#### Overload Detection

| Signal Overload: Adjustible detection level ±1 V<sub>peak</sub> to ±10 V<sub>peak</sub>. Default level ±10 V<sub>peak</sub> (CCLD mode ±7 V<sub>peak</sub>). (31.6 V range: ±31.6 V) can be set in PULSE Transducer Database |
| CCLD Overload: Detection of cable break or short-circuit + detection of CCLD transducer working point fault. Detection level: ±2 V/20 V |
| Microphone Preamplifier Overload: Detection of microphone preamplifier current consumption too high or too low. Detection level default 10 mA/1 mA. Adjustable detection level 1 to 20 mA or 100 mA if disabled |
| Common Mode Voltage Overload: Detection level: ±3.0 V |

#### Protection

If signal input level exceeds the measuring range significantly, the input will go into protection mode until the signal goes below the detection level again for at least 0.5 s. While in protection mode, the input is partly switched off and the input impedance is greatly increased. (The measured value will be strongly attenuated but still detectable)

In DC mode –10 V<sub>peak</sub> range, the detection limit is ±12 V. In all other measuring modes (except CCLD) the limit is ±50 V<sub>peak</sub> including DC component or ±12 V<sub>peak</sub> AC

In CCLD mode the limit is ±50–2 V<sub>peak</sub> including DC component or ±12 V<sub>peak</sub> AC

In the 31.6 V range, the limit is ±50 V<sub>peak</sub>.
# OUTPUT CHANNELS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Output Connector</strong></td>
<td>2 × BNC</td>
</tr>
<tr>
<td><strong>Output Coupling</strong></td>
<td>DC</td>
</tr>
<tr>
<td><strong>Signal Ground Coupling</strong></td>
<td>Floating or grounded to chassis</td>
</tr>
<tr>
<td><strong>D/A Conversion</strong></td>
<td>24 bit</td>
</tr>
<tr>
<td><strong>DC Offset (DC Value set to 0 V)</strong></td>
<td>≤1 mV auto-adjusted by loopback (&lt;−80 dB re full scale)</td>
</tr>
<tr>
<td><strong>Output Voltage Range (DC)</strong></td>
<td>0 to ±10 V ±0.5% of requested value</td>
</tr>
<tr>
<td><strong>Output Voltage Range (AC)</strong></td>
<td>1 μV_RMS – 10 V_peak in two ranges</td>
</tr>
<tr>
<td><strong>Output Impedance</strong></td>
<td>50 Ω</td>
</tr>
<tr>
<td><strong>Output Load</strong></td>
<td>Max. 40 mA_peak</td>
</tr>
<tr>
<td><strong>Frequency Range</strong></td>
<td>0 – 51.2 kHz</td>
</tr>
<tr>
<td><strong>Frequency Response re 1 kHz</strong></td>
<td>±0.1 dB, 1 mHz to 51.2 kHz</td>
</tr>
<tr>
<td><strong>Frequency Accuracy</strong></td>
<td>0.00025%</td>
</tr>
<tr>
<td><strong>Frequency Resolution</strong></td>
<td>1 mHz (defined in PULSE software)</td>
</tr>
<tr>
<td><strong>Phase Resolution</strong></td>
<td>100 mdegrees (defined in PULSE software)</td>
</tr>
<tr>
<td><strong>Phase Deviation Between Channels</strong></td>
<td>&lt;20 mdegrees for frequencies below 1 kHz *</td>
</tr>
<tr>
<td><strong>Waveform</strong></td>
<td>Software determined arbitrary waveforms up to 2 Msamples</td>
</tr>
<tr>
<td><strong>Amplitude Linearity @ 1 kHz</strong></td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Noise (μVrms (nV/√Hz) in 50 kHz bandwidth)</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Harmonic Distortion Products</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Harmonic Distortion Products</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Spurious In Band (non-harmonic)</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Spurious Out of Band (non-harmonic)</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Absolute Amplitude Precision</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Crosstalk</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Common Mode Rejection</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Maximum Common Mode Voltage</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Reconstruction Filter</td>
<td>Guaranteed Typical</td>
</tr>
<tr>
<td>Overload Detection</td>
<td>Reported to PULSE and indicated by light rings on output connectors for output voltage above 11 V_peak and output current above 40 mA_peak</td>
</tr>
</tbody>
</table>

\* Signal generators are not synchronized between LAN-XI and IDA\textsuperscript{a} generator modules. This does not affect continuous signals (random, white- or pink-noise) but is not suitable for burst random signals and sine signals requiring phase control between generators.
### Ordering Information

**Type 3160-A-042** Generator, 4/2-ch. Input/Output Module LAN-XI
51.2 kHz (Mic, CCLD, V)

includes the following accessories:
- UA-2100-060: LAN-XI Detachable front panel with 6 BNC input connectors
- ZG-0426: Mains Adaptor (100 – 240 V)
- AO-1450: Shielded CAT 6 LAN Cable with RJ 45 (2 m)

**Type 3160-A-022** Generator, 2/2-ch. Input/Output Module LAN-XI
51.2 kHz (Mic, CCLD, V)

includes the following accessories:
- UA-2100-022: LAN-XI Detachable front panel with 4 BNC input/output connectors
- ZG-0426: Mains Adaptor (100 – 240 V)
- AO-1450: Shielded CAT 6 LAN Cable with RJ 45 (2 m)

### OPTIONAL ACCESSORIES

<table>
<thead>
<tr>
<th>Accessory Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO-0090</td>
<td>7-pin LEMO to BNC male (1.2 m) for floating ground</td>
</tr>
<tr>
<td>AO-0091</td>
<td>7-pin LEMO to BNC female (1.2 m) for floating ground</td>
</tr>
<tr>
<td>AO-0526</td>
<td>4-pin Microtech to 3 × BNC Cable</td>
</tr>
<tr>
<td>AO-0546</td>
<td>DC Power Cable, Car Utility Socket to 1 module</td>
</tr>
<tr>
<td>AO-0548</td>
<td>DC Power Cable, Source to 4 modules</td>
</tr>
<tr>
<td>AO-1450</td>
<td>Shielded CAT 6 LAN Cable with RJ45 (2 m)</td>
</tr>
</tbody>
</table>

### SOFTWARE

Please refer to the System Data for PULSE Software (BU 0229)

### Service Products

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3160-CAI</td>
<td>Type 3160 Initial Accredited Calibration</td>
</tr>
<tr>
<td>3160-CAF</td>
<td>Type 3160 Accredited Calibration</td>
</tr>
<tr>
<td>3160-CTF</td>
<td>Type 3160 Traceable Calibration</td>
</tr>
<tr>
<td>3160-TCF</td>
<td>Type 3160 LAN-XI Conformance Test with Certificate</td>
</tr>
</tbody>
</table>

A wide range of Brüel & Kjær Accelerometers, Microphones, Preamplifiers and Sound Intensity Probes is available for use with a LAN-XI system. The system supports IEEE 1451.4-capable transducers with standardised TEDS

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