



## ZPU™-5000 ZOOM® PROCESSING UNIT

Multi-Channel Processing Instrumentation & Monitoring/Protection Unit

### Application

Complete on-line monitoring, real time analysis, protection, alarm management and trending of large rotating machines such as:

- Turbogenerators
- Hydrogenerators
- Large electric motors

### Description

The ZOOM® Processing Unit (ZPU™) simultaneously monitors multiple parameters on large rotating machines. It performs various types of measurements in automatic and test modes, processes data, checks alarm conditions and transmits data to the ZOOM Controller for a quick and efficient data interpretation of machine condition through the ZOOM software.

The ZPU-5000 can synchronize acquisition of all parameters with the passing of each rotor pole for salient pole machines or use an external acquisition trigger for non salient pole machines. It tracks up to 16 high speed inputs (a mix of pressure, displacement, vibration, etc.) from standstill to over-speed conditions of the machine under study. Interconnecting additional ZPUs extends monitoring range and capabilities.

### Main Features

- Up to 16 high speed inputs  
*Accepts: 4-20mA, 0-5V, 0-10V, +/- 5V, +/-10V, -2/-18V*  
*Also compatible with ICP® transmission mode*  
*Sampling rate : 10000 samples/sec (per channel)*
- Up to 64 analog outputs
  - 32 processed raw outputs (two per analog input) Voltage and current
  - 32 trending outputs (two per analog input) Voltage and current
    - Note: Trending outputs can also be used for outputting combined values (Smax, ØSmax)
- Continuous and independent alarm monitoring of all inputs with four configurable alarm thresholds per input (drivers for external relays included).  
*In addition:*
  - System OK (driver for external relay)
  - Channels OK (driver for external relay)
- Performs synchronized measurements of connected parameters from standstill to runaway speed in automatic and test modes (*Signature, Pole, Sampling, Trending and Alarm measurements*)
- Vacuum Florescent Display (VFD) for visual interpretation
- 3U Height 19 inches Rack-mount enclosure
- One communication port used for easy connection to VibroSystM ThermoWatch® Stator and Modbus products.
- 1 Ethernet port 10/100 Base T
- 2 USB ports
- Safety Compliance
  - Certified to IEC 61010-1:2001 (Second Edition)



## ZPU™-5000 Processing Unit General Specifications

The design of the ZPU-5000 acquisition unit relies on a highly integrated and industry proven processor board combined with plug-in modules. For optimal flexibility and performance, the main acquisition functions of the ZPU-5000 are thus taken in charge by dedicated modules:

- control (one module per acquisition unit)
- communication (one module per acquisition unit)
- analog inputs/outputs (up to 8 dual-channel modules per acquisition unit)

### CONTROL MODULE

This plug-in module supervises control and synchronization signals for ZPU-5000. Related inputs and outputs include:

- two inputs for synchronization 1/rev. signal on pump storage machines
- one output for treated synchronization 1/rev. signal
- one input for a pulse generator signal (needed for reference when taking signature and pole measurements on machines with non-salient pole rotor, or systems where air gap sensors are not required)
- one input for an acquisition trigger signal (used for trigger acquisition with an external signal)
- one input for an alarm inhibition (used for turning off surveillance and relay activation)
- one input for a rotation direction signal (pumped-storage applications)
- one output for driving the “System OK” relay
- one output for driving the “Channels OK” relay

### COMMUNICATION MODULE

This module enables communications with various instruments:

- One (1) Ethernet 100 Mbps port for communication with ZOOM Controller
- One (1) RS-422/RS-485 serial port for communication with digital measuring chains TWS™, Modbus RTU, ZOOMLook™ (STATE™-100)
- One (1) USB port for connection of a portable storage device to copy the configuration or update the firmware

### ANALOG I/O MODULES

Analog I/O modules receive and process signals from various sensors and conditioners. Each dual-channel module can receive current or voltage signals from two different sources, to which a digital process is applied. Each channel also supports 4 analog outputs and 4 open-collector outputs for control of alarm relays.

## Electrical Characteristics

### CONTROL MODULE

#### Inputs:

- |                 |                           |
|-----------------|---------------------------|
| - Type          | Pull-up connected to 24 V |
| - Trigger level | 3.8 V                     |
| - Hysteresis    | ±250 mV                   |
| - Pulse length  | 10 µsec. minimum          |

#### Outputs:

- |        |  |
|--------|--|
| - Type | NPN Open-Collector<br>(35V max./15mA max.) |
|--------|--|

*Note: a +24V (100mA) power supply output is available from this module, which may be used as a power source for the synchronization sensors (1/rev.).*

### COMMUNICATION MODULE

#### Ethernet port

- |            |               |
|------------|---------------|
| - Protocol | TCP/IP        |
| - Speed    | Up to 100Mbps |

#### RS-485/422 port

- |                             |   |
|-----------------------------|---|
| - Electrical Specifications | 4 wires full duplex or<br>2 wires half duplex |
| - Speed                     | 115,200 bps                                   |

#### USB port (1.1, 2.0 compatible)

- |              |                |
|--------------|----------------|
| - Connection | Type A, female |
|--------------|----------------|

### ANALOG I/O MODULES

#### Types available

- |                         |  |
|-------------------------|--|
| - 0 /10V input          | 0 to +10 Volts (DC @ 1 KHz)                          |
| - 0 /5V input           | 0 to +5 Volts (DC @ 1 KHz)                           |
| - +/-5V input           | -5 to +5 Volts (DC @ 1 KHz)                          |
| - +/-10V input          | -10 to +10 Volts (DC @ 1 KHz)                        |
| - -2/-18V input         | -2 to -18 Volts (DC @ 1 KHz)                         |
| - 4/20mA input          | 4 to 20 mA (DC @ 1 KHz)                              |
| - ICP transmission mode | <i>Accelerometers and<br/>velocimeters using ICP</i> |
| - Air Gap input         | 4 to 20 mA (DC @ 1 KHz)                              |

#### Processing

- |                  |          |
|------------------|----------|
| - DSP            | 135 MIPS |
| - A/D resolution | 16 bits  |

#### Relay driver outputs (4 per channel)

- |                 |                                     |
|-----------------|-------------------------------------|
| - LO “alert”    | Bipolar FET, ±30V/25mA max, Iso.Gnd |
| - HI “alert”    | Bipolar FET, ±30V/25mA max, Iso.Gnd |
| - LOLO “danger” | Bipolar FET, ±30V/25mA max, Iso.Gnd |
| - HIHI “danger” | Bipolar FET, ±30V/25mA max, Iso.Gnd |



### Analog outputs (4 per channel)

- Processed raw current output: 4 to 20 mA
- Processed raw voltage output: 0 to +10 V
- Trending current output: 4 to 20 mA
- Trending voltage output: 0 to +10 V

**Available processes:** (each channel is individually programmable)

#### - Processed raw output:

- Simple integration
- Double integration
- No processing

#### - Trending output:

- Air Gap Value
- Peak to peak value
- Peak value
- RMS value
- Minimum value
- Maximum value
- No processing
- Vectorial value (S) from raw values (X-Y) received from two channels of the same module
- Maximum vectorial value (Smax) from raw values (X-Y) received from two channels of the same module
- Angle value ( $\theta$ ) of Smax

### PROCESSOR BOARD

- Type EBX, Intel N450, 1.66Ghz
- Memory 1 Gbytes SDRAM

### POWER SUPPLY

- Input Voltage 100–240 V<sub>AC</sub>, 105–250 V<sub>DC</sub>
- Input Frequency 50-60 Hz
- Power Consumption 65 W
- Fuse Two 250 V / 3.15 A slow-blow

### ENVIRONMENTAL

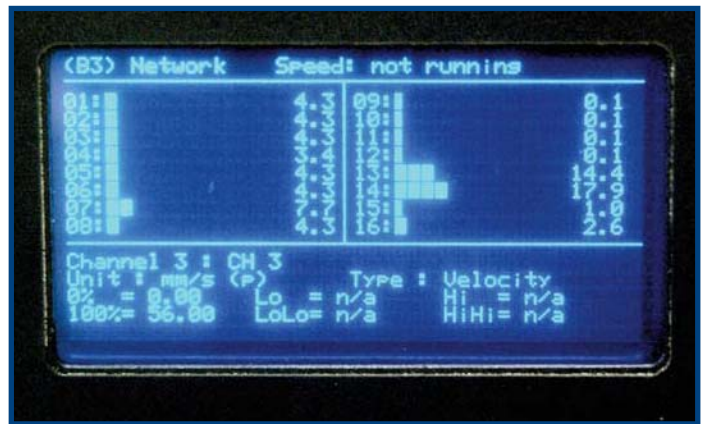
- Temperature Range
  - Operation 0°C to 50°C (32°F to 122°F)
  - Storage -40°C to 80°C (-40°F to 176°F)
- Humidity 95% non-condensing max.
- Max. Altitude 2000 m

### PHYSICAL CHARACTERISTICS

- Casing 3U high 19" rack-mount  
NEMA1 / IP20



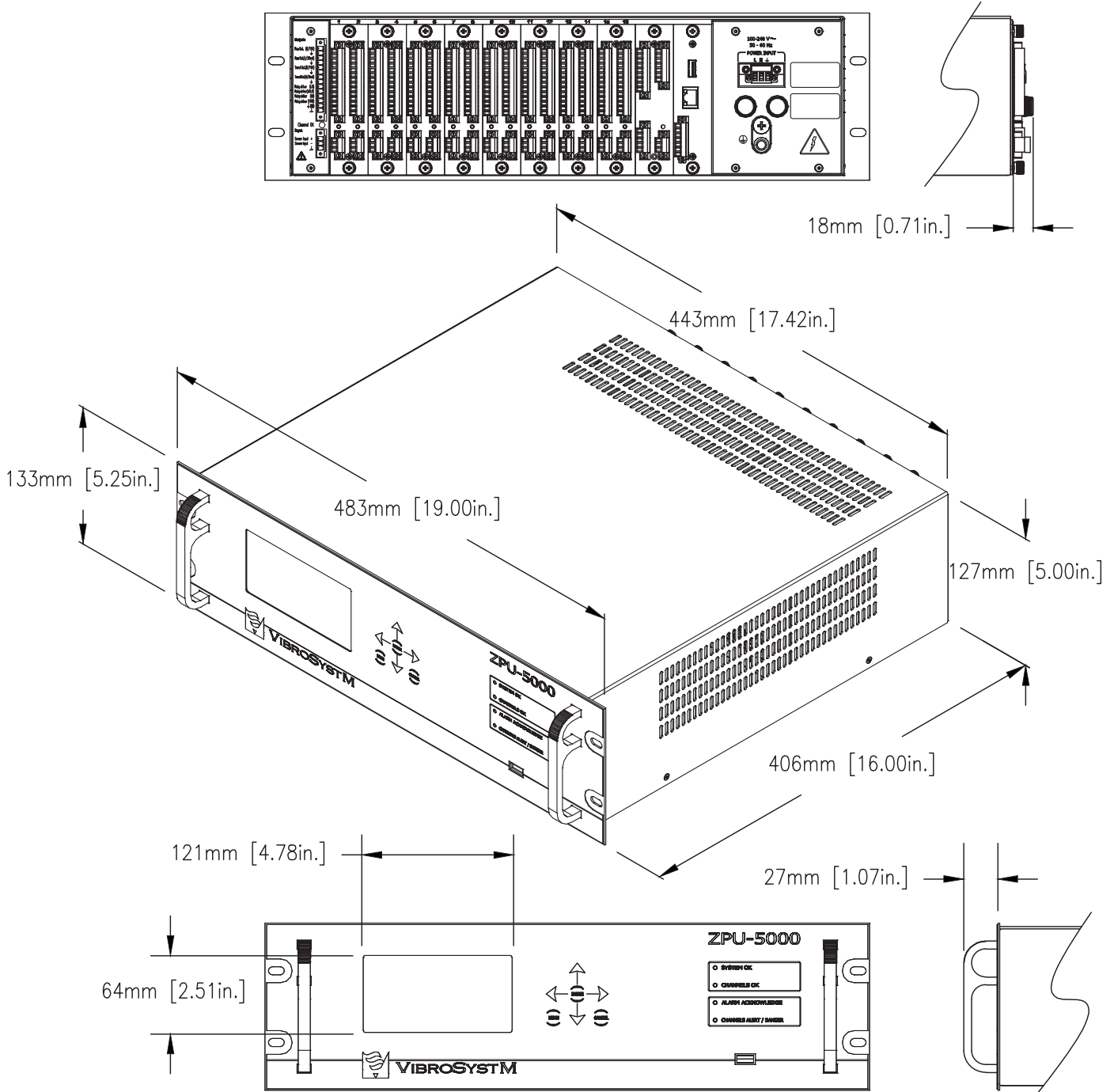
View of ZPU-5000 plug-in modules



Display panel showing real-time information



## Annexe 1



PV120713A