Overview
The Gram & Juhl DAM-XY01 sensor is an intelligent sensor with built-in digital signal analysis that offers advanced motion monitoring facilities at low system costs. Applications include monitoring and analysis of structures, such as wind turbines, bridges, towers, cranes, and buildings. Since the DAM-XY01 is a self-contained digital device there is no risk of damaging an external sensor and cabling is straightforward. This makes the DAM-XY01 most reliable for critical systems.

Structural Vibration Monitoring SVM
The DAM-XY01, with its DC coupling, is well suited to measure low frequencies simultaneously in X and Y direction. This is used for calculating the motion of the structure onto which the sensor is mounted. When narrowed in bandwidth, e.g. around a resonance frequency, this converges to an ellipsis showing orientation and maximum deflection.

Continuous Vibration Guards
The sensor has four continuously running vibration guards. The guards are independently configured regarding direction(s), frequency band, level, and response time. Alarms are signalled via a relay switch and an analogue voltage. Further, all alarm events are stored internally in non-volatile memory. The vibrations guards are optimised to provide the fastest possible response time.

The Sensor
The DAM-XY01 has an internal two-axial accelerometer. Further, the unit has input for tachometer pulses or triggers, solid-state relay and an analogue output (0-5Volt). Thus, motions can be related to machine operation as expressed via RPM, which allows for advanced monitoring.

Stand-alone or Internet operation
The DAM works on its own or on a network. When operating with a host e.g. the hardware front end, the M-System, in the TCM® System, monitoring results are communicated via a RS485 multi-drop serial bus. The host can be connected to as many as 32 DAM units on a single DAM network. The DAM network protocol is open so any controller with a serial port may interface to the DAM network. The DAM-XY01 can be applied to remote monitoring using the TCM® WEB software.

Open System Architecture
In a networked environment, access to DAM units is provided via the Gram & Juhl TCM® system or some custom service (open protocol). Contact Gram & Juhl A/S for further information.

Sensor Measurements

<table>
<thead>
<tr>
<th>DAM Measurements</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time, FFT, Overall</td>
<td>SVM</td>
</tr>
<tr>
<td>Vibration Guards</td>
<td>✓</td>
</tr>
<tr>
<td>Zoom, Envelope</td>
<td>✓</td>
</tr>
<tr>
<td>Zoom, Cepstrum</td>
<td>✓</td>
</tr>
</tbody>
</table>

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Structural Vibration Monitor DAM-XY01

Measurements

Vibration guards
No. of independent guards 4
Sensing direction X, Y or XY
Centre Frequency [0 Hz .. 100 Hz]
Bandwidth >2%
Filter Response Minimum Phase
Averaging Exp. running mean

SVM and MCM measurements
Motion pattern (Major axis, minor axis, orientation)
Averaging on all measurements except time
Configurable frequency span DC–1 kHz.
Autospectrum with Zoom and Envelope. 400 lines within span.
Configurable Overall.
Cepstrum non-lifttered.
Time series 16384 samples at configurable sampling rate

Vibration Sensor Specification

- Dynamic range > 70dB
- Calibrated at 10 Hz (±0.1 dB)
- Frequency accuracy 30 ppm
- Coupling DC or AC (digital filter)
- Full Scale Range ±180 m/s²
- Nonlinearity 0.2% of Full Scale
- Transverse sensitivity ±2%
- Overload detection
- Sensitivity temperature drift 0.5%
- Noise 250µG/√Hz

RPM / TRIGGER Input

- RPM range 60000 RPM
- Input Level TTL
- Accuracy 0.4 ms
- RPM divider 1..6535

Analogue output

- Bandwidth 100 Hz (2nd order filter)
- Range 0-5 Volt
- Noise 1mVolt RMS

Alarm Output

- Type Solid state non-polarized
- Current max 100 mA
- Voltage 50 V DC
- Voltage ripple max 100 mVrms

Mechanics

- Housing Stainless steel (non corrosive)
- Connector M12-8, shielded connector male
- Enclosure IP68 to 5 bars
- Mounting 3 holes, M6 bolts, see drawing
- Weight 400g

Power supply

- Voltage 12-24 V DC, ripple < 0.1 Vrms
- Continuous Power 1.5 W
- Start current 0.15 A

Environmental

- Operating temp. -25 to 75 °C
- Sustained acceleration <50 Grms
- Storage temp. -40° to +80 °C
- ESD and over-voltage protected (transients)

Compliance with standards

- CE (low voltage)
- EN 50081-1, EN61000-6-3 (emission)
- EN 50082-2, EN61000-6-2 (immunity)
- Surge protected
- Shielded cable DIN 47250-6/01.83 or better

Software

- Can be used in conjunction with the M-System as part of the TCM® System (no special software required).
- Sensor firmware is on-site upgradeable and configurable.
- Open communication protocol

Connector

<table>
<thead>
<tr>
<th>Pin, Colour</th>
<th>Description</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, White</td>
<td>A RS485+</td>
<td>1</td>
</tr>
<tr>
<td>2, Brown</td>
<td>POWER +, 12-24 VDC</td>
<td>2</td>
</tr>
<tr>
<td>3, Green</td>
<td>RPM / TRIG TTL input</td>
<td>3</td>
</tr>
<tr>
<td>4, Yellow</td>
<td>RELAY</td>
<td>4</td>
</tr>
<tr>
<td>5, Grey</td>
<td>B RS485+</td>
<td>5</td>
</tr>
<tr>
<td>6, Pink</td>
<td>RELAY</td>
<td>6</td>
</tr>
<tr>
<td>7, Blue</td>
<td>POWER -, 0 VDC</td>
<td>7</td>
</tr>
<tr>
<td>8, Red</td>
<td>0-5VOLT OUT</td>
<td>8</td>
</tr>
</tbody>
</table>

Note: If communication pins are unused they should be interconnected with a 120 Ohm 0.25W resistor. Unused RPM input should be tied to ground.