OneProd

MVX

8-32 Channels Monitoring and Predictive Maintenance System

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1. GENERAL PRESENTATION OF THE PRODUCT

OneproD-MVX results from 01dB-Metravib's long-time experience in the permanent monitoring of industrial machines of all sectors.

OneproD-MVX is a signal acquisition system than can acquire up to 32 channels simultaneously in the 0-20 kHz range in order to monitor rotating machines and/or provide data to a predictive maintenance platform.

OneproD-MVX is available with 8, 16, 24 or 32 channels. Each version is available with two operating levels, depending on its use: "Easy" or "Premium".

2. OPERATING

2.1. General principle

MVX can successively achieve:
- The successive acquisition of all measurement channels
- The immediate post-processing of data

MVX can carry out 2 types of measurements:
- Monitoring measurements, performed continuously and not stored. Scalar indicators, built-up from these measurements are available, as they come along, on the Ethernet and RS485 ports.
- Maintenance measurements, stored by **MVX** and later transferred to a **OneproD-XPR** platform. These measurements are carried out periodically or on event (detection of an alarm, change of operating conditions).

2.2. Operating modes

- Stand-alone monitoring:
  - o **MVX** performs monitoring measurements only
  - o **MVX** works out scalar indicators
  - o Its set-up is achieved with the **OneproD-CSM** tool
  - o **MVX** operates then on a fully stand-alone mode
  - o Indicators can be displayed in **OneproD-VIO**
- Monitoring and Predictive Maintenance:
  - o **MVX** performs monitoring and maintenance measurements
  - o Maintenance measurements (scalar values, spectra, time signals) are stored in **MVX**, and then transferred to **OneproD-XPR**.
  - o The presence of **OneproD-XPR** is required to set up, drive and download **MVX**.
  - o **MVX** operates in a partially stand-alone mode

In both modes, measurements can be grouped (usually by machines). Each measurement group can then be assigned to the operating conditions of the machine.

2.3. Measurement conditions

Each measurement group can be conditioned with up to 6 conditions as follows:
- 1 rotation speed (trigger input)
- 2 continuous process levels (DC input)
- 3 logical input statuses

2.4.   Acquisition features

- Anti-aliasing filtering: yes
- Conversion technology: Delta-sigma
- Number of bits: 24
- Sampling frequency: 51.2 kHz
- Measurement acquisition time: from 1s to 255s
- Size of elementary acquisition blocks: 1024 samples

2.5.   Processing functions

2.5.1. Direct elaboration of indicators on time blocks

- Filtering
  - High-pass (3rd order): none, 2 Hz, 10 Hz, 3 kHz.
  - Low-pass (3rd order): 300 Hz, 1 kHz, 2 kHz, 3 kHz or none,
- Integration
  - Simple
  - Double
- Detection
  - RMS
  - Peak
  - Peak-to-peak
  - Equivalent peak
  - Equivalent peak-to-peak
  - Average value
- Calculation mode
  - Average value of acquisition blocks
  - Maximum value of acquisition blocks
- Specific processing
  - Bearing defect factor
  - Kurtosis

2.5.2. Calculation of rotation speed

- Calculation from the frequency of a synchronisation signal
- Meshing ratio: from **1 / 1** to **65535 / 65535**

2.5.3. Time acquisition

- Sampling frequency (by decimation): 128 Hz ; 256 Hz ; 512 Hz ; 1.28 kHz ; 2.56 kHz ; 5.12 kHz ; 12.8 kHz ; 25.6 kHz ; 51.2kHz.
- Number of samples: 1024 ; 2048 ; 4096 ; 8192
- Possible extension with DAT option: see Paragraph 2.8
- Free or synchronised acquisition

2.5.4. Spectral acquisition

- Frequency range: 20 Hz ; 50 Hz ; 100 Hz ; 200 Hz ; 500 Hz ; 1 kHz ; 2 kHz ; 5 kHz ; 10 kHz ; 20 kHz.
- Number of lines: 100 ; 200 ; 400 ; 800 ; 1600 or 3200
- Number of averages: from 1 to 4096
- Free or synchronised acquisition
- Type of average: linear, exponential, peak
- Overlap: 0% ; 50% ; 75%
- High-pass filter: 2 Hz ; 10 Hz ; 3 kHz

- Integration: none, 1 or 2
- Zoom factor: none; x2; x4; x8; x16; x32; x64; x128; Maximum resolution: 30 mHz
- Windowing: Hanning; Rectangular; Flat-top
- Synchronous analysis: yes / no
- Envelope detection: yes / no

2.5.5. Elaboration of indicators from a spectrum

- Up to 10 indicators can be defined from a spectrum
- "Broadband" indicators: RMS, equivalent peak or equivalent peak-to-peak level between two fixed frequencies
- "Narrow band" indicators: RMS, equivalent peak or equivalent peak-to-peak level defined over a few spectral lines centred on a fixed or variable frequency
  - o the number of lines can be parameterised
  - o the centre frequency is defined by two coefficients, A and B, and by the following formula: $Fc = A.F0 + B$ (with F0= rotation frequency)

2.6.   Alarm processing

- Alarm modes: none; high; low; within window; off window
- 2 alarm thresholds for high or low alarm modes
- 4 alarm thresholds for "within window" and "off window" alarm modes
- Selectable activation of an "alarm" logical output and of a "danger" logical output for each indicator
- Direction of command for logical outputs: normally active / inactive
- Automatic acknowledgement with hysteresis adjustment
- Manual acknowledgement with selection of a logical input

2.7.   MODBUS communication

MVX includes a built-in MODBUS server.

2.7.1. Medium selection
- RS485 port
- Ethernet port (MODBUS-TCP)

2.7.2. Available data
- Number of indicators
- Values of indicators
- Status of indicators
- Units of indicators

2.8.   Long time acquisition ("DAT" option)

- Extension of the number of points for the time acquisition
- For each channel, one can select among: 16k; 32k; 64k; 128k; 256k; 512k; 1024k; 2048k; 4096k
- Memory limit: the total quantity of samples must not exceed 48 Mega-samples.
  - o Example 1: 4096k x 8 channels = 32 Msamples >>> **YES**
  - o Example 2: 2048k x 32 channels = 64 Msamples >>> **NO**

3. ELECTRICAL CHARACTERISTICS

3.1. Power supply

Magnitude	Specification	Conditions
Voltage supply	from 18V to 28V dc	Permanent
	from 18V to 36V dc	< 30s
	from 18V to 50V dc	< 100 ms
	from 20V to 28V dc	Recommended
Galvanic insulation / earth	Checked at +/- 108V dc	Permanent

Typical power consumption: 40W

Maximum power consumption: 60W

The system will reboot in case of a voltage supply < 18V dc.

3.2. Analogue inputs

All **MVX** inputs are single ended inputs, which means their cold points are connected together to **MVX** earth terminals.

Number: 8, 16, 24 or 32 depending on the option.

Inputs can be parameterised according to different input types:

3.2.1. IEPE input

- Open-loop voltage: ca. 23 V
- Constant current: 4mA +/- 0.5mA
- Coupling: AC
- Lower cut-off frequency: 0.1 Hz (slope: 6 dB/octave)

- Input impedance: > 60 kOhms in AC
- AC input voltage: up to 16 V peak-to-peak
- Overload protection: up to +/- 40 V

3.2.2. AC-DC or "process" input

- Coupling: DC
- Input impedance:
  - > 60 kOhms in AC
  - > 150 kOhms in DC

- Max. measurable voltage: +/- 23.5 Vdc
- Overload protection: up to +/- 40 V

3.2.3. 4-20mA input

- Type of input: passive
- Max. allowed voltage: 14 V
- Input resistance : see opposite

3.2.4. Tachometric input

- Input impedance: > 60 kOhms
- Max. voltage: +/- 23,5 V
- Lower cut-off frequency: 0 Hz
- Number of pulses per revolution: from 1 to 65535


4-20 mA input
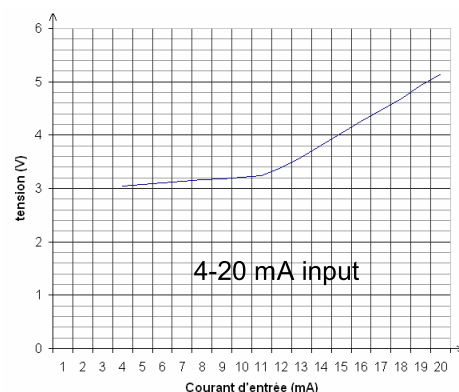
3.3. Logical inputs

- Type: Optocoupler
- Maximum common mode voltage: +/- 100 Vdc
- Maximum differential voltage: 35 V
- Minimum voltage for guaranteed High level: 13 V
- Minimum voltage for guaranteed Low level: 8 V
- Input current under 13 V: 6 mA
- Input current under 35 V: 21 mA
- Number: 4 for MVX-160 or 8 for MVX-320

Logical inputs are grouped by four, with a common cold point.

Equivalent diagram for a group of inputs:

External command circuit (here on input #1)

Terminal box of MVX

(Inside MVX)
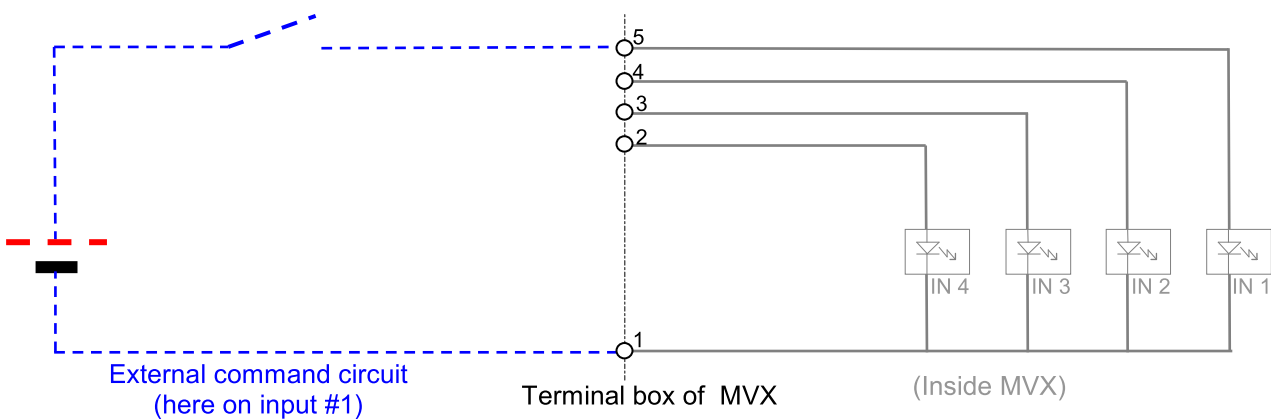
3.4. Logical alarm outputs

- Type: Optocouplers
- Maximum common mode voltage: +/- 100 Vdc
- Maximum gated voltage:
- Switchable current: 30 mA
- Protection against short circuits
- Built-in free wheel diode
- Voltage drop: ~ 1,25 V for 30 mA
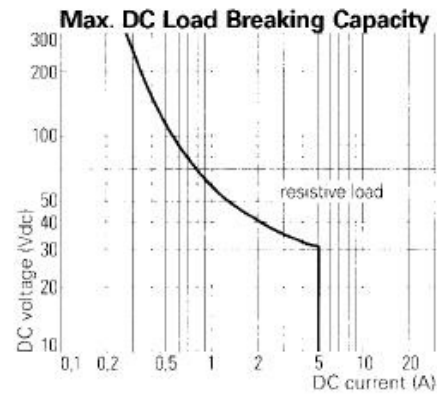- Number: 4 for MVX-160 or 8 for MVX-320

Logical outputs are grouped by four, with a common cold point.

Equivalent diagram for a group of outputs:

(Inside MVX)

Terminal box of MVX

External relays (here on output #1)
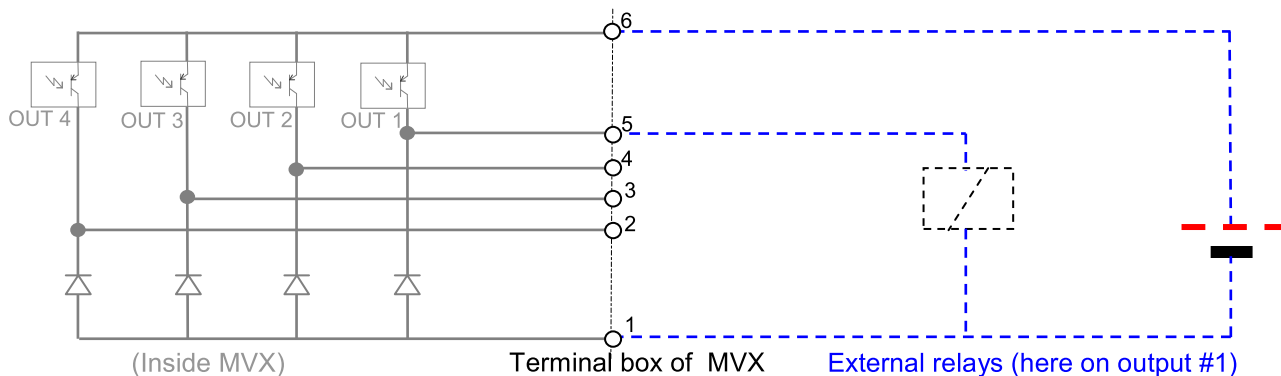
3.5. Integrity relay output

- 1 C/O contact
- Rated voltage: 250 Vac
- Cut-off power: 1250 VA

Max. DC Load Breaking Capacity

4. COMMUNICATION

4.1. RS485 port

- Type: 2 wires,
- Communication: half-duplex
- Galvanic insulation: YES
- Transfer rate: 9600 bauds
- Format: 8 bits, 1 stop-bit, no parity

4.2. Ethernet ports

Two 10/100 base T ports can be used non simultaneously:
- Port A:
  - o Located on the left side
  - o Requires an Ethernet cross cable to communicate with a PC
- Port B:
  - o Located on the right side
  - o Requires a "straight" Ethernet cable to communicate with a PC

4.3. USB ports

- The 2 existing connectors are not used.

5.   MARKING & STANDARDS

5.1.   CE marking

EMC:

PhØnomène perturbatoire	Mode d'application	Norme	SpØcification
Champ ØlectromagnØtique	Enveloppe	EN61000-4-3	Niveau de champ = 10V/m FrØquence de Modulation : 1Khz Profondeur de modulation :80% Porteuse : 80 MHz à 1000 MHz Critère A
Ondes de choc	EntrØe d'alimentation en courant continu	EN61000-4-5	Onde 1,2 / 50 µs 500V entre ligne & terre 500V entre lignes Critère B
Ondes de choc	Lignes de signaux	EN61000-4-5	Onde 1,2 / 50 µs 1kV entre ligne & terre Critère B
Transitoires rapides	Lignes de signaux	EN61000-4-4	Onde 5/50 ns de 1kV FrØquence de rØpØtition : 5kHz Injection à la pince capacitive Critère B
Transitoires rapides	EntrØe d'alimentation en courant continu	EN61000-4-4	Onde 5/50 ns de 2kV FrØquence de rØpØtition : 5kHz Injection directe Critère B
Tension RF	Lignes de signaux	EN61000-4-6	Tension perturbatrice : 10V Modulation d'amplitude : 1kHz Profondeur de modulation : 80% Porteuse : 150 KHz à 80 MHz Critère A
Tension RF	EntrØe d'alimentation en courant continu	EN61000-4-6	Tension perturbatrice : 10V Modulation d'amplitude : 1kHz Profondeur de modulation : 80% Porteuse : 150 kHz à 80 MHz Critère A
DØcharges Ølectrostatiques	Enveloppe	EN61000-4-2	8kV dans l'air 4kV au contact Critère B

5.2.   Explosive atmosphere

(Certification pending)

For an installation in ZONE 2

- ATEX: *CE xxxx* Ex II 3 *G*
- CSA : CL1 – DIV2 – Groups A to D

6.   PHYSICAL CHARACTERISTICS

- Overall dimensions:
    - o **MVX-160**: 350 x 171 x 100 mm
    - o **MVX-320**: 350 x 171 x 86 mm
- Weight: about 3.1kg (or 6.8 lbs)
- Casing matter: galvanised steel
- Mounting: DIN TS 35 rail
- Optional mounting using screws with accessory MVX-ACC-SUP-01

Connections:
- Terminal boxes with unpluggable screwed-on connectors **(*)**
- Wire section: 0.2 to 2.5 mm† (28 – 12 AWG)
- Screw tightening torque: 0.5 Nm

(*): except for Ethernet connection: 2 RJ45 connectors
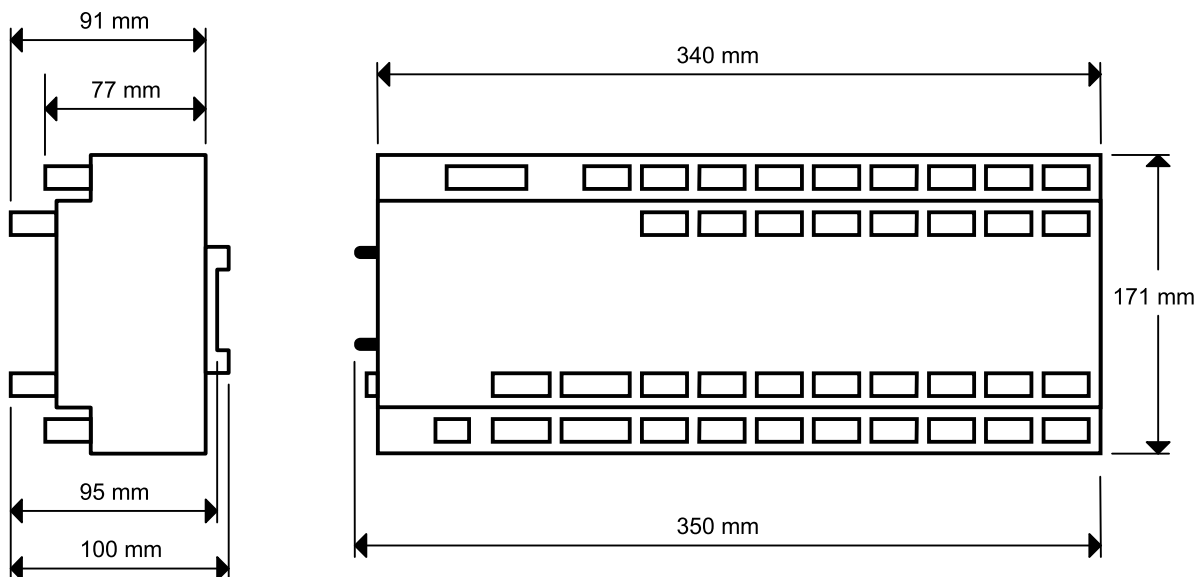
7.   ENVIRONMENTAL CHARACTERISTICS

- Protection: IP 20
- Operating temperature: from -20 to +60 ℃
- Humidity: 95% max, with no condensation
- Storage temperature: from -20 to +75℃
- Cooling: through forced air
- Air flow rate: up to 35 m3/h

8. ORDERING INFORMATION

Reference code	Commercial reference	Name
MVX3001000	MVX-160-EAS-08	OneproD MVX-160 Easy 8 channels
MVX3002000	MVX-160-EAS-16	OneproD MVX-160 Easy 16 channels
MVX3021000	MVX-320-EAS-24	OneproD MVX-320 Easy 24 channels
MVX3022000	MVX-320-EAS-32	OneproD MVX-320 Easy 32 channels
MVX3011000	MVX-160-PRE-08	OneproD MVX-160 Premium 8 channels
MVX3012000	MVX-160-PRE-16	OneproD MVX-160 Premium 16 channels
MVX3031000	MVX-320-PRE-24	OneproD MVX-320 Premium 24 channels
MVX3032000	MVX-320-PRE-32	OneproD MVX-320 Premium 32 channels
MVX2021000	MVX-OPT-REC	DAT recorder option for MVX
MVX3305000	MVX-ACC-SUP-01	Baseplate for screw mounting
MVX3304000	MVX-ACC-SUP-02	19" Adapter for MVX
MVX3303000	MVX-ACC-PWS-2A5	2.5 A / 230 Vac/24Vdc power supply
MVX3302000	MVX-ACC-PWS-5A0	5A - 230 Vac/24Vdc power supply
MVX3301000	MVX-ACC-RELAY-4M1	Set of 4 x 1-relay modules (4X1 C/O contact)

Upgrades:

MVX can be upgraded to a more performing model or to a model with more measurement channels (please contact us).

<u>**Contents:**</u>

OneproD-MVX is delivered with:
- A 5-meter Ethernet cable
- The **OneproD-CSM** configuration software
- The **OneproD-VIO** visual display software, version limited to a single MVX unit
- The **OneproD-CAST** software toolbox
- User manuals in French and English (on CD-ROM)

9. APPENDIX: EASY / PREMIUM OPERATING DIFFERENCES

Function	OneproD-MVX EASY	OneproD-MVX PREMIUM
Time acquisition	☑	☑
Spectral acquisition	☑	☑
Continuous monitoring	☑	☑
Periodic acquisition	☑	☑
Taking into account of operating conditions	☑	☑
Elaboration of "standard" indicators (*)	☑	☑
Elaboration of indicators based on other filters		☑
Elaboration of Kurtosis indicators		☑
Elaboration of $Smax_{pp}$ indicators		☑
Calculation of the RMS value	☑	☑
Calculation of the "equivalent peak" value	☑	☑
Calculation of the "equivalent peak-to-peak" value	☑	☑
Calculation of the "true peak" value		☑
Calculation of the "true peak-to-peak" value		☑
Calculation of broad-band indicators from spectrum		☑
Calculation of narrow-band indicators from spectrum		☑
Envelope detection		☑
DAT mode (long time signal)	(Option)	(Option)

(*): List of "standard" indicators:
- Broad-band 2Hz / 20kHz acceleration
- HF 3kHz / 20kHz acceleration
- 2Hz / 1000Hz velocity
- 10Hz / 1000Hz velocity
- 2Hz / 1000Hz absolute displacement
- 10Hz / 1000Hz absolute displacement
- 2Hz / 20kHz relative displacement
- Relative position (GAP)
- Bearing defect factor