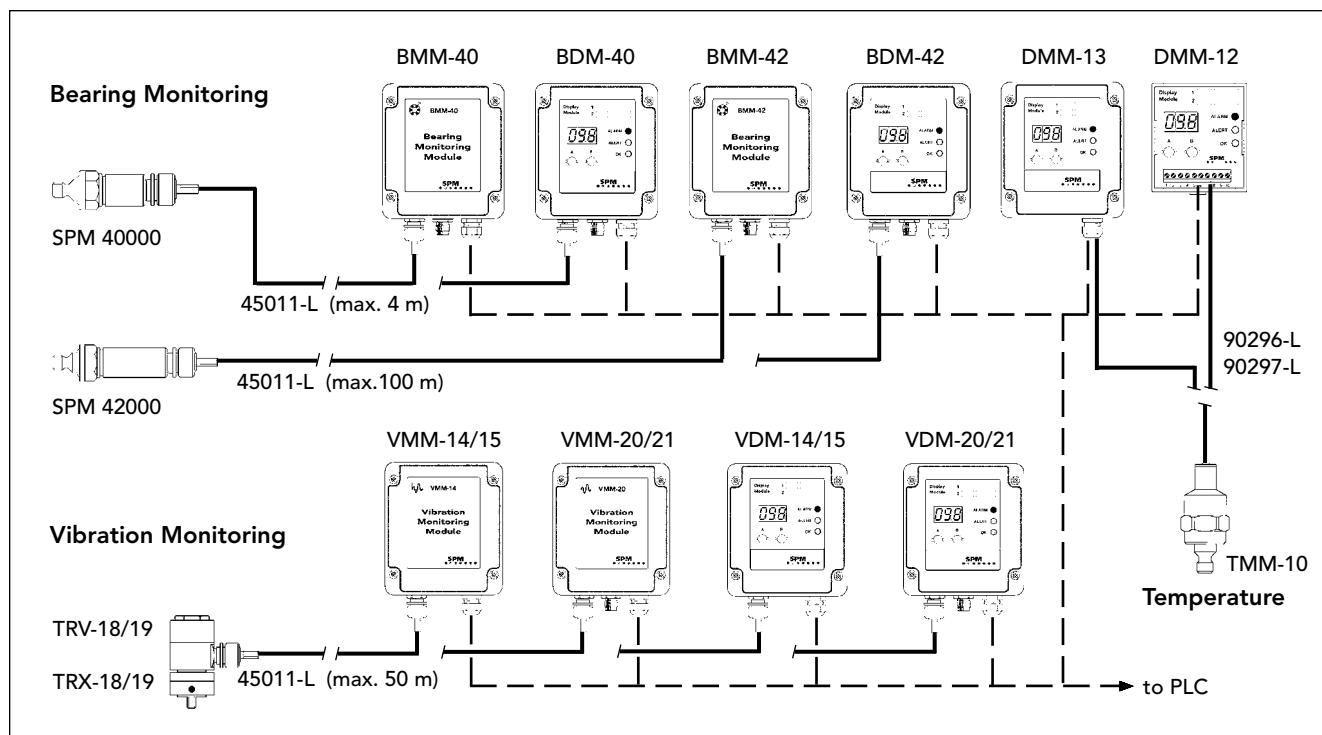


CMM System - Encapsulated Modules



The CMM System

The CMM system is a permanently installed, continuous condition monitoring system, consisting of transducers, converters, and combined display and control modules.

The transducers measure bearing condition (shock pulse method), vibration severity (ISO 10816), and temperature.

The converters, with or without display of measured value, transform the shock pulse and vibration transducer signals into 4 to 20 mA analog signals. The temperature transducer has an output of 4 to 20 mA.

The display modules (DMM) have two input channels for 4 to 20 mA, and two relay outputs (24 V/100 mA).

Display Modules

DMM-12 2 channels, 4-20 mA in, 2 relays (24 V/100 mA), for 35 mm DIN rail

DMM-13 2 channels, 4-20 mA in, 2 relays (24 V/100 mA), in cabinet IP 65

Vibration Monitoring Modules

VMM-14 1 channel, 10-1000 Hz

VMM-15 1 channel, 3 -1000 Hz

VMM-20 2 channels, 10-1000 Hz

VMM-21 2 channels, 3 -1000 Hz

VDM-14 1 channel with display, 10-1000 Hz

VDM-15 1 channel with display, 3 -1000 Hz

VDM-20 2 channels with display, 10-1000 Hz

VDM-21 2 channels with display, 3 -1000 Hz

Bearing Monitoring Modules

BMM-40 2 channels, for transducer 40000 (max. cable length L = 4 m)

BMM-42 2 channels, for transducer 42000 (max. cable length L = 100 m)

BDM-40 2 channels with display, for transducer 40000 (max. cable length L = 4 m)

BDM-42 2 channels with display, for transducer 42000 (max. cable length L = 100 m)

Transducers and cables

TRV-18 Vibration transducer, M8

TRV-19 Vibration transducer, UNF 1/4"

TRX-18 Insulation foot for vibration transducer TRV-18

TRX-19 Insulation foot for vibration transducer TRV-19

40000 Shock Pulse Transducer

42000 Shock Pulse Transducer with matching unit

45011-L Coaxial cable with connectors, temp. range -10° to +70°C (L = length in meters)

45300-L Coaxial cable with connectors, temp. range -40° to +125° C (L = length in meters)

TMM-10 Temperature transducer, -16° to +120° C

90296-L Twinned cable for TMM-10, max. 125° C

Accessories

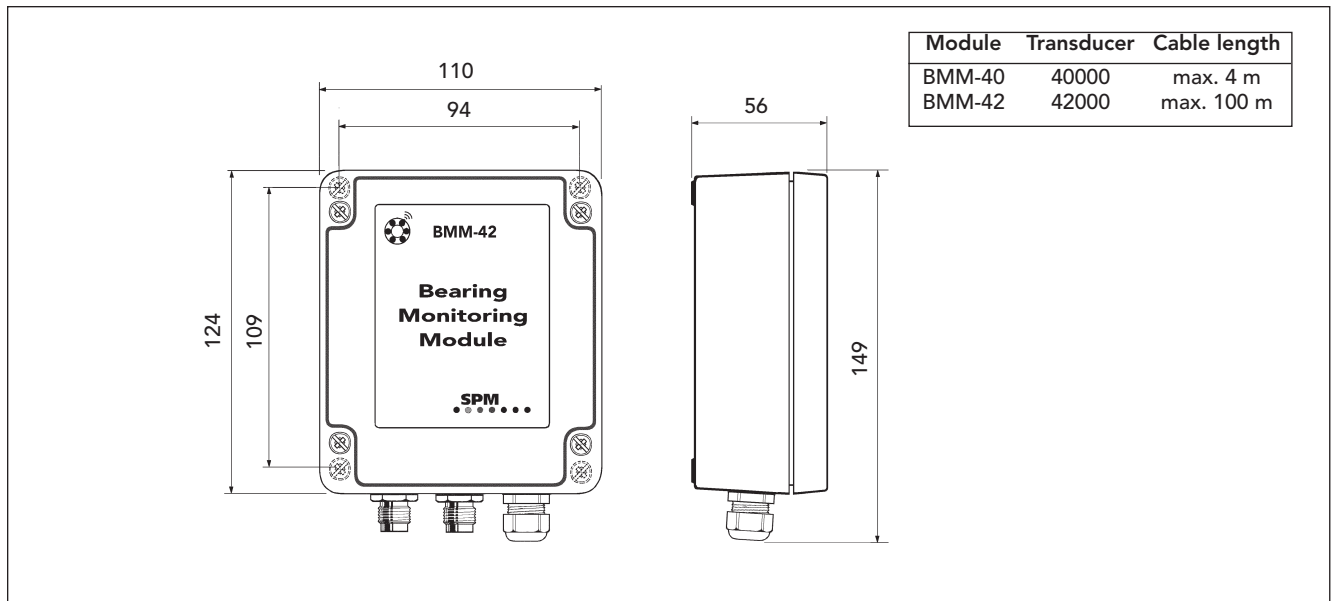
14141 Cabinet with mounting rails for DMM-12

14142 Mounting rail, 35 mm DIN, length 357 mm

OMR-10 Power supply module for 35 mm DIN rail, 15 W, 24 V, 0.6 A



CMM System - Bearing Monitoring Module BMM



Bearing Monitoring Modules BMM are converters with two channels which output 4-20 mA proportional to the unnormalized maximum value of the shock pulses measured on a bearing. The measuring time is approximately 1 second per channel. The measuring range for both channels together can be jumper set to either 0 to 80 or 20 to 100 dBsv.

The 4-20 mA current can be supplied to an display module of type DMM, to a PLC or to a computer controlled monitoring system (e.g. SPM's CMS System).

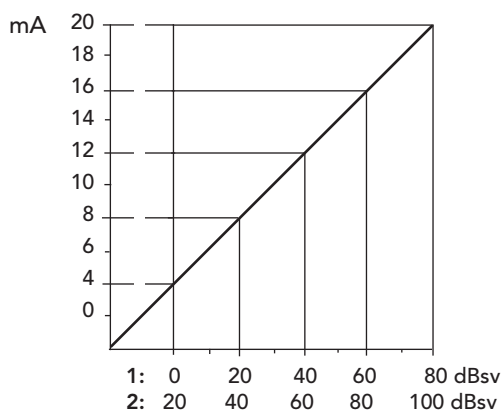
There are two versions:

BMM-40 for shock pulse transducer type 40000. The coaxial cable used between transducer and module is max. 4 m.

BMM-42 for shock pulse transducer type 42000. The coaxial cable used between transducer and module is max. 100 m.

The modules are wall mounted and supplied with 12 to 24VDC. A transducer line fault is indicated by an output of ≤ 1 mA. This output can be changed to 4 mA by a jumper setting, which is common for both channels.

Signal conversion

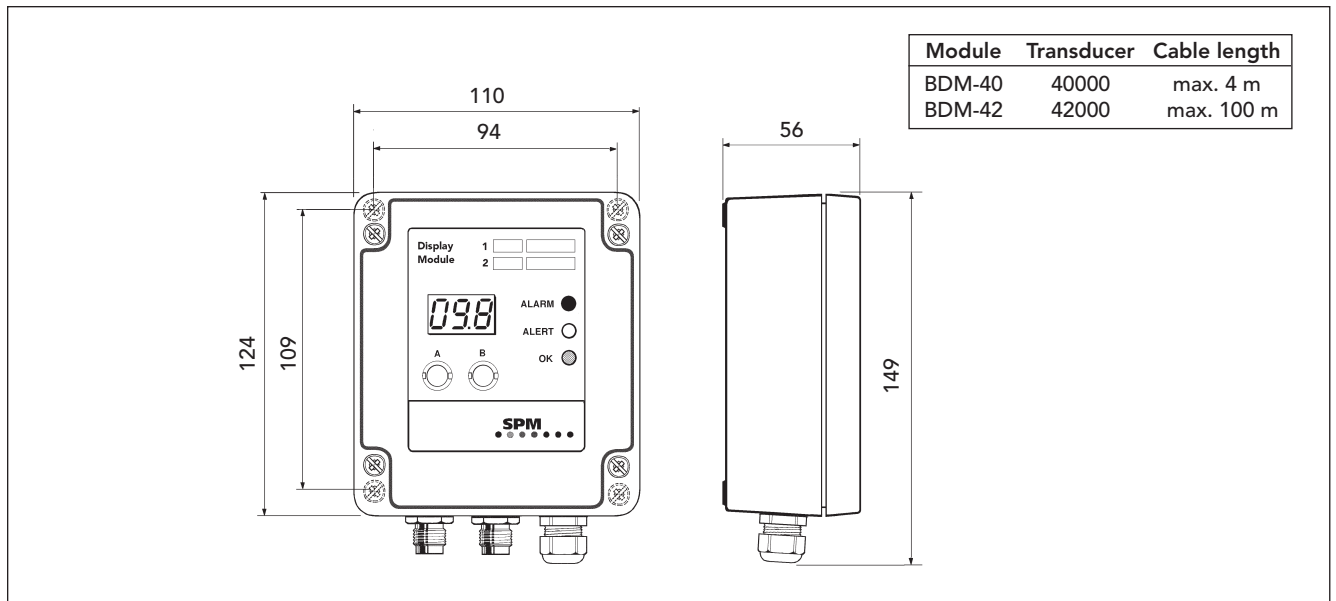


Technical data

| | |
|---------------------|--|
| Measuring method: | SPM dBm, unnormalized maximum value |
| Measuring channels: | 2, multiplexing |
| Measuring range 1: | 0 to 80 dBsv (5 dB /mA, 0.2 mA/dB) |
| Measuring range 2: | 20 to 100 dBsv (6.25 dB/mA, 0.16 mA/dB) |
| Measuring time: | approx. 1 second per channel |
| Transducer type: | SPM 40000 (BMM-40), SPM 42000 (BMM-42) |
| Transducer cable: | coaxial cable, SPM 90005-L, or SPM 90267-L (L = length in m) |
| Analog output: | 4 to 20 mA, no galvanic separation |
| Fault indication: | ≤ 1 mA out = interrupted or faulty transducer line |
| Loop resistance: | 100 Ω . Higher resistance will reduce signal accuracy (max. 400 Ω at 12 V, 800 Ω at 24 V) |
| Power supply: | 12 to 24V DC ($\pm 10\%$, tested according to EN 50082-2) |
| Supply current: | max. 0.1 A |
| Cable inlet: | IP65 at \varnothing 5.5 to 10 mm |
| Input connectors: | silver plated brass, 10 to 15 μ |
| Housing: | polycarbonate, IP65 |
| Vibration exposure: | max 5 mm/s RMS |
| Temperature range: | 0° to 55° C |
| Dimensions: | 110 x 149 x 56 mm |
| Mounting screws: | 4 screws, \varnothing 4 mm, spacing 109x94mm |
| Weight: | 300 g |



CMM System - Bearing Display Module BDM



Bearing Display Modules BDM have two functions:

- they measure bearing condition (unnormalized maximum value) on two channels and convert the result into an analog 4-20 mA signal which can be sent to a PLC.
- they display analog 4-20 mA signals as a 3 digit measured value. All units have two inputs for analog 4-20 mA, connected to the value display, the condition display and the alarm relays. The analog signal normally comes from the module's measuring channels, but can even come from external sources.

There are two versions:

BDM-40 for shock pulse transducer type 40000. The coaxial cable between transducer and module is max. 4 m.

BDM-42 for shock pulse transducer type 42000. The coaxial cable between transducer and module is max. 100 m.

The measuring range for both channels can be jumper set to either 0 to 80 or 20 to 100 dBsv. The modules are wall mounted and supplied with 12 to 24 VDC. A transducer line fault is indicated by an output of ≤ 1 mA. This output can be disconnected by a jumper setting.

The display circuit acts as a programmable ampere meter with two channels. Using two push-buttons, one can select preprogrammed measuring units and ranges from a list and set two alarm levels (with alarm delay) for each channel. These are connected to the condition display (green-yellow-red) and to two relay outputs.

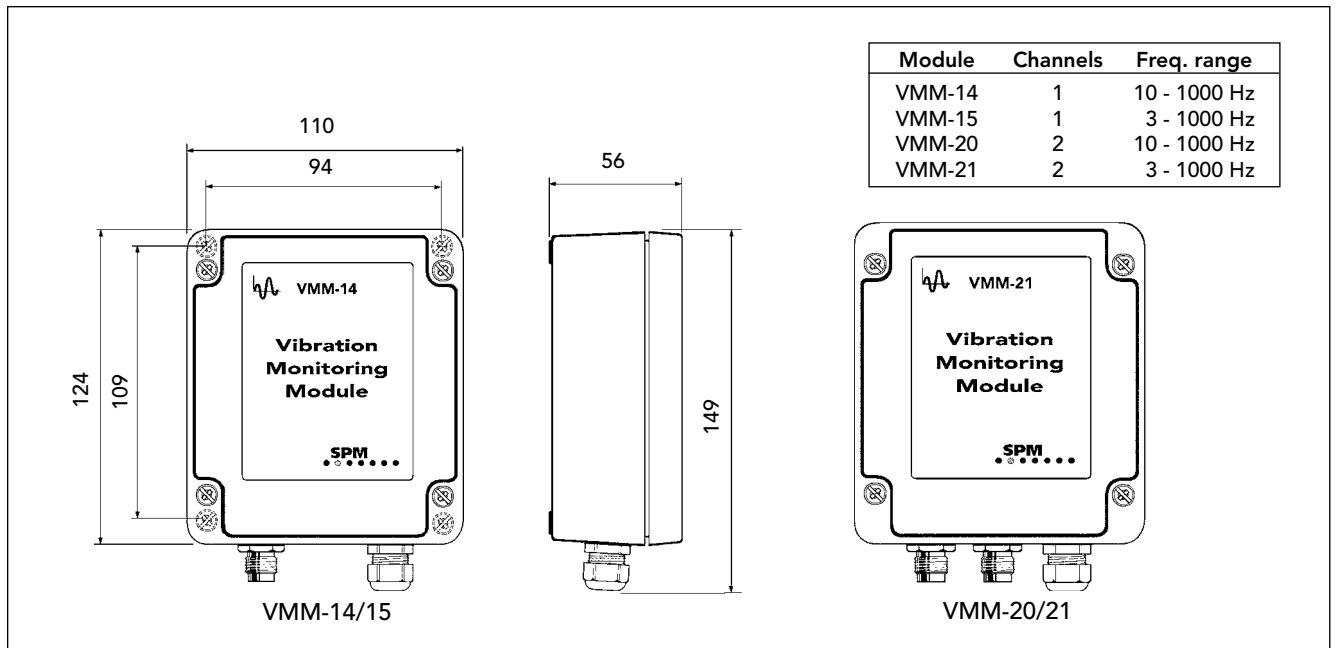
The relays can be controlled by either display channel. In one channel mode, both relays are slaved to a single display channel and provide relay switching at two levels (ALERT and ALARM). In two channel mode, each display channel uses one relay which switches at the ALARM level.

Technical data

| | |
|---------------------|--|
| Measuring method: | SPM dBm, unnormalized maximum value |
| Measuring channels: | 2, multiplexing |
| Measuring range 1: | 0 to 80 dBsv (5 dB /mA, 0.2mA/dB) |
| Measuring range 2: | 20 to 100 dBsv (6.25 dB /mA, 0.16 mA/dB) |
| Measuring time: | approx. 1 second per channel |
| Transducer type: | SPM 40000 (BDM-40), SPM 42000 (BDM-42) |
| Transducer cable: | coaxial cable, SPM 90005-L, or 90267-L (L = length in m) |
| Analog output: | 4 to 20 mA, no galvanic separation |
| Fault indication: | ≤ 1 mA out = interrupted or faulty transducer line |
| Loop resistance: | 100 Ω . Higher resistance will reduce signal accuracy (max. 400 Ω at 12 V, 800 Ω at 24 V) |
| Power supply: | 12 to 24V DC ($\pm 10\%$, tested accord- ing to EN 50082-2) |
| Supply current: | max 0.15 A |
| Cable inlet: | IP 65 at \varnothing 5.5 to 10 mm |
| Input connectors: | silver plated brass, 10 to 15 μ |
| Housing: | polycarbonate, IP65 |
| Temperature range: | 0° to 55° C |
| Vibration exposure: | max 5 mm/s RMS |
| Dimensions: | 110 x 149 x 56 mm |
| Mounting screws: | 4 screws, \varnothing 4 mm, spacing 109x94 mm |
| Weight: | 400 g |
| Signal to display: | 4 to 20 mA, 2 channels |
| Relays: | 2, max. 24 V/100 mA |
| Value display: | 3 digits LED |
| Condition display: | green, yellow, and red LED |
| Alarm limits: | 2 per input channel, set with push- buttons |
| Push-buttons: | 2, for display control, alarm limit and alarm delay setting |



CMM System - Vibration Monitoring Module VMM



Vibration Monitoring Modules VMM are programmable converters which supply a 4-20 mA signal proportional to the RMS-value of vibration velocity. There are four versions:

VMM-14: 1 channel, frequency range 10 - 1000 Hz

VMM-15: 1 channel, frequency range 3 - 1000 Hz

VMM-20: 2 channels, frequency range 10 - 1000 Hz

VMM-21: 2 channels, frequency range 3 - 1000 Hz.

The frequency range of 3 to 1000 Hz is suitable for machines with rotational speed down to 180 r.p.m.

The measuring range can be DIP switch set to either 0 to 5, 0 to 10, 0 to 20 or 0 to 40 mm/s.

The 4-20 mA output can be supplied to a display module type DMM, to a PLC or to a computer controlled monitoring system (e.g. SPM's CMS System).

A transducer line fault causes an output of <1 mA. If this should interfere with PLC operations, the min. output can be jumper set to 4 mA, individually for each channel.

The vibration transducer is connected via coaxial cable with TNC connectors. The module is wall mounted with 4 screws \varnothing 4 mm and supplied with 12 to 24 V DC. The cable inlet is tight for cable diameters 5.5 to 10 mm.

Technical data

Measuring method: vibration severity similar to ISO 10816 (modified frequency range, VMM-15/21)

Channels: 1 (VMM-14/15), 2 (VMM-20/21)

Measuring range 1: 0 - 5 mm/s (0 - 0.19 inch/s)

Resolution: 3.2 mA = 1 mm/s; 1 mA = 0.313 mm/s

Measuring range 2: 0 - 10mm/s (0 - 0.39 inch/s)

Resolution: 1.6 mA = 1 mm/s; 1 mA = 0.625 mm/s

Measuring range 3: 0 - 20mm/s (0 - 0.78 inch/s)

Resolution: 0.8 mA = 1 mm/s; 1 mA = 1.25 mm/s

Measuring range 4: 0 - 40mm/s (0 - 1.57 inch/s)

Resolution: 0.4 mA = 1 mm/s; 1 mA = 2.5 mm/s

Frequency range: 10 to 1000 Hz (VMM-14/20)
3 to 1000 Hz (VMM-15/21)

Transducer type: TRV-18/19, SLD121

Transducer cable: coaxial cable, SPM 90005-L, or 90267-L, (L = max. 50 m)

Analog output: 4 to 20 mA, no galvanic separation

Fault indication: \leq 1 mA out for open or short circuit

Loop resistance: 100 Ω . Higher resistance will reduce signal accuracy (max. 400 Ω at 12 V, 800 Ω at 24 V)

Power supply: 12 to 24V DC (\pm 10%, according to EN 50082-2)

Supply current: max 0.1 A

Cable inlet: IP 65 at \varnothing 5.5 to 10 mm

Input connectors: silver plated brass, 10 to 15 μ

Housing: polycarbonate, IP65

Temperature range: 0° to 55° C

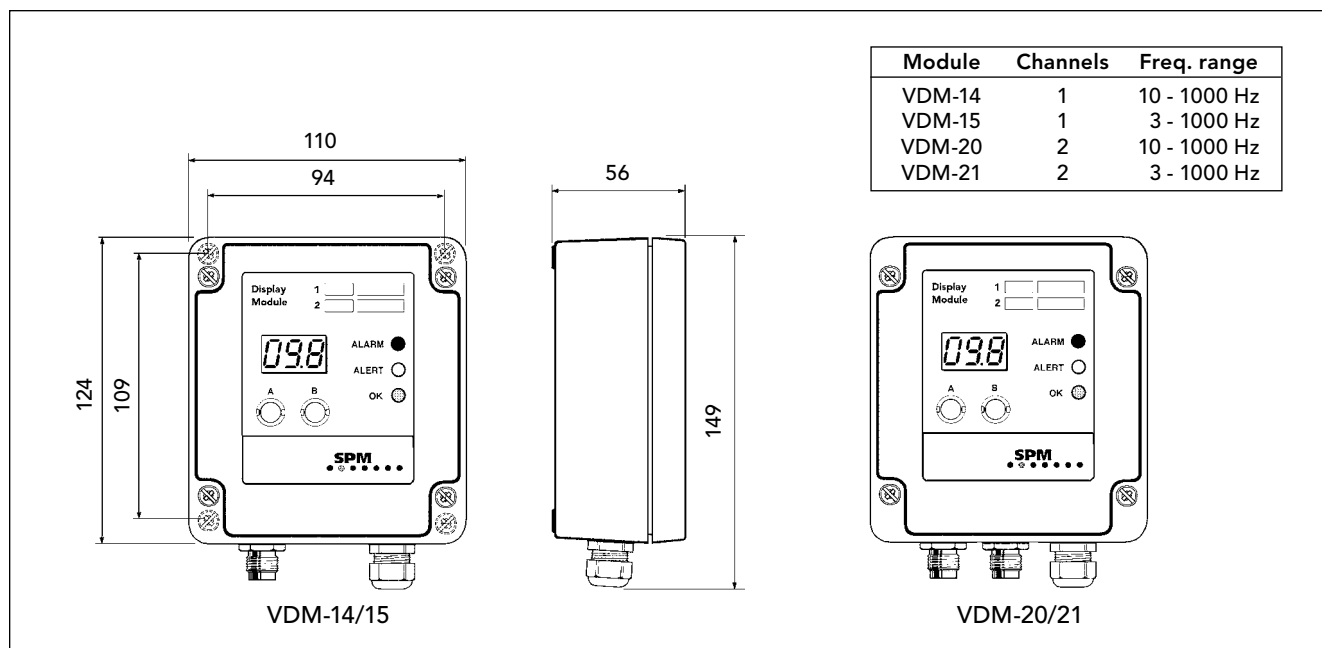
Dimensions: 110 x 149 x 56 mm

Mounting screws: 4 screws, \varnothing 4mm, spacing 109x94 mm

Weight: 300 g



CMM System - Vibration Display Module VDM



Vibration Display Modules VDM have two functions:

- they measure the RMS-value of vibration velocity on one or two channels and convert it to an analog 4-20 mA signal which can be sent to a PLC.
- they display analog 4-20 mA signals as a 3 digit measured value. All units have two inputs for analog 4-20 mA, connected to the value display, the condition display and the alarm relays. The analog signal normally comes from the unit's measuring channel(s), but can even come from external sources.

There are four versions:

VDM-14: 1 vibration channel, frequency range 10 - 1000 Hz

VDM-15: 1 vibration channel, frequency range 3 - 1000 Hz

VDM-20: 2 vibration channels, frequency range 10 - 1000 Hz

VDM-21: 2 vibration channels, frequency range 3 - 1000 Hz.

The vibration transducer is connected via coaxial cable. The module is wall mounted and supplied with 12 to 24 V DC. The cable inlet is tight for cable diameters 5.5 to 10 mm. A transducer line fault causes an output of <1 mA. If this should interfere with PLC operations, the min. output can be jumper set to 4 mA, individually for each measuring channel.

The display circuit acts as a programmable ampere meter with two channels. Using two push-buttons, one can select preprogrammed measuring units and ranges from a list and set two alarm levels (with alarm delay) for each channel. These are connected to the condition display (green - yellow - red) and to two relay outputs. The relays can be controlled by either display channel. In one channel mode, both relays are slaved to a single display channel and provide relay switching at two levels (ALERT and ALARM). In two channel mode, each display channel uses one relay which switches at the ALARM level.

Technical data

| | |
|---------------------|--|
| Measuring method: | vibration severity similar to ISO 10816 (modified lower freq., VDM-15/21) |
| Vibration channels: | 1 (VDM-14/15), 2 (VDM-20/21) |
| Measuring range 1: | 0-5 mm/s (0-0,19 inch/s) |
| Resolution: | 3,2 mA = 1 mm/s; 1 mA = 0,313 mm/s |
| Measuring range 2: | 0-10mm/s (0-0,39 inch/s) |
| Resolution: | 1,6 mA = 1 mm/s; 1 mA = 0,625 mm/s |
| Measuring range 3: | 0-20mm/s (0-0,78 inch/s) |
| Resolution: | 0,8 mA = 1 mm/s; 1 mA = 1,25 mm/s |
| Measuring range 4: | 0-40mm/s (0-1,57 inch/s) |
| Resolution: | 0,4 mA = 1 mm/s; 1 mA = 2,5 mm/s |
| Frequency range: | 10 to 1000Hz (VDM-14/20) 3 to 1000 Hz (VDM-15/21) |
| Transducer type: | TRV-18/19, SLD121 |
| Transducer cable: | coaxial cable, SPM 90005-L , or 90267-L (L= max. 50 m) |
| Analog output: | 4 to 20 mA, no galvanic separation |
| Fault indication: | ≤ 1 mA out for open or short circuit |
| Loop resistance: | 100 Ω. Higher resistance will reduce signal accuracy (max. 400 Ω at 12 V, 800 Ω at 24 V) |
| Power supply: | 12 to 24V DC (± 10%, tested according to EN 50082-2), max 0.15 A |
| Housing: | polycarbonate, IP65 |
| Temperature range: | 0 to 55 °C |
| Vibration exposure: | max. 5 mm/s RMS |
| Cable inlet: | IP 65 at ø 5.5 to 10 mm |
| Input connectors: | silver plated brass, 10 to 15 µ |
| Dimensions: | 110 x 149 x 56 mm |
| Mounting screws: | 4 screws, ø 4 mm, spacing 109 x 94 mm |
| Weight: | 400 g |
| Signal to display: | 4 to 20 mA, 2 channels |
| Relays: | 2, max. 24 V/100 mA |
| Value display: | 3 digits, LED |
| Condition display: | green, yellow, and red LED |
| Alarm limits: | 2 per display channel |
| Push-buttons: | 2, for display control and programming |



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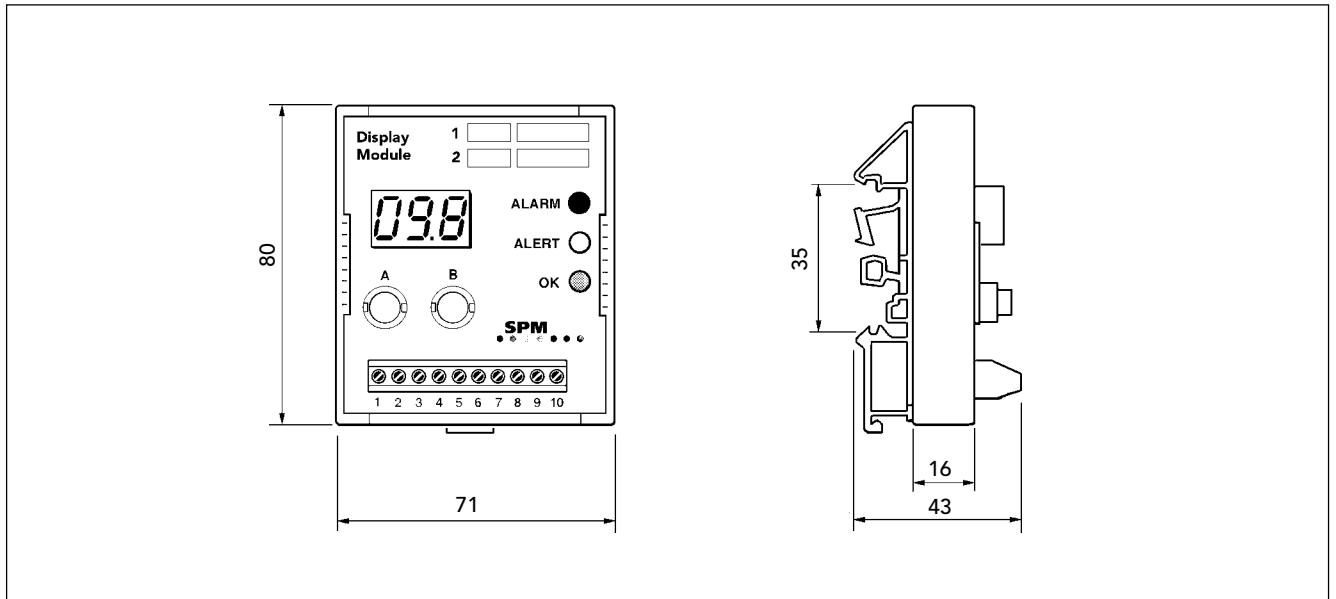
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CMM System - Display Module DMM-12



DMM-12 is a condition display module for 4-20 mA analog signals. Measured quantities and ranges are selected from a preprogrammed list (13 programs) or from user defined programs (7 programs).

The display module is clipped onto a standard mounting rail in a control cabinet or similar, and supplied with 12 to 24 V DC, source referred to earth.

The display module has two input channels and two relay outputs. The relays can be controlled by either input channel. In one channel mode, both relays are slaved to a single input channel and provide relay switching at two levels (ALERT and ALARM). In two channel mode, each input channel uses one relay which switches at a preset ALARM level.

Programmable parameters for each input channel are the measuring range, the two alarm levels ALERT and ALARM, and the alarm delay. These are input using two push buttons. Power failure will not erase the program.

Condition display is provided by three coloured LEDs. The green LED is on while measured values are below the ALERT level. Measured values between ALERT and ALARM on either channel trigger a yellow LED, and a red LED lights up when a measured value exceeds an ALARM level. A blinking yellow LED indicates a system fault (incoming signal below 4 mA).

The measured value is displayed with three digits. In two channel mode the status LED's and the display alternates between the two channels and shows the channel number followed by the measured value on this channel.

Technical data

| | |
|---------------------|--|
| Input channels: | 2 |
| Input signals: | 4 to 20 mA |
| Relays (2): | 24V / 100 mA |
| Measuring range: | selected to match the signal input |
| Value display: | 3 digits, LED |
| Status display: | green, yellow, and red LED |
| Alarm limits: | 2 per input channel, set with push-buttons |
| Alarm delay: | 0 - 600 seconds for each alarm level |
| Push-buttons: | 2, for display control and programming |
| Fault indication: | blinking yellow LED = signal below 4 mA |
| Power supply: | 12 to 24V DC ($\pm 10\%$, tested according to EN50082-2) |
| Supply current: | max 0.1 A |
| Vibration exposure: | max. 5 mm/s RMS |
| Housing: | polyamide, not protected |
| Temperature range: | 0 Y to 55 Y C |
| Dimensions: | 80 x 71 x 43 mm |
| Mounting: | clip on to 35 mm DIN rail |
| Weight: | 100 g |

