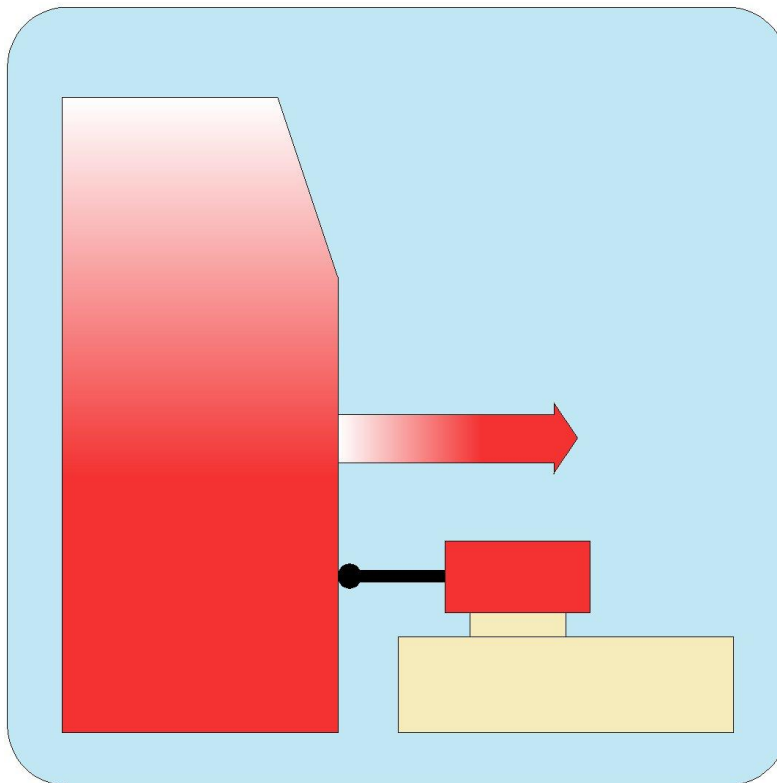


MMS 6410

Dual Channel Measuring Amplifier for Inductive Displacement Sensors



- Part of the MMS 6000 machine monitoring system
- For connection of inductive displacement sensors for measuring the absolute expansion, e.g. epro sensors PR 9350/.
- Signal frequency range up to 100 Hz
- Zero adjustment and zero shift independently from the chosen measuring range
- Measuring results of both channels to be combined with each other e.g. for calculation of sum and difference values
- Sensor supply balanced to ground to suppress disturbances in industrial environments
- RS 232 interface for configuration and reading out measuring results
- RS 485 interface for connection to epro's MMS 6800 analysis and diagnosis system or to host computers

Applications:

The **MMS 6410** dual channel measuring amplifier measures shaft displacements with the help of inductive transducers in half- or full bridge configuration or with the help of differential transformers. Each measuring channel may operate separately or calculate sum or difference values of the measuring results of both channels

The **MMS 6410** measuring amplifier per-

mits measurement of static as well as of dynamic signals such as displacements, angles, forces, torsions or any other physical quantities, that can be measured with inductive transducers.

Measurements of displacements serve the construction of turbine protection systems. They provide signals for analysis and diagnosis systems to be further processed in field bus systems and networks.

Such cards of the **MMS 6000** family are suitable to build up systems for increasing performance, efficiency and safety of operation and to extend the machines' life times. Application fields of the **epro** measuring amplifiers are steam, gas and water turbines, compressors, fans, centrifuges and other turbo machinery.

Technical data:

Sensor inputs:

Two independent inputs for inductive sensor in half- or full bridge configuration and for differential transformers. The signal inputs are differential inputs, galvanically isolated from the system supply, open circuit and short circuit proof.

Max. input voltage:

3.6 V
(protected against over voltages)

Nominal input voltage range:

2.5V_{rms}
Input impedance:
200 kOhm

Measuring ranges:

Measuring frequency range:
0....100 Hz -3dB

Measuring range displacement measurement:

Depending on transducer measuring range; one or both outputs may be inverted.

Sensor supply:

Each input includes a separate, buffered output to supply inductive sensors.

Carrier frequency:

4.75 kHz

Nominal supply voltage:

4 V_{rms}

Permissible load:

120....600 Ohm

The outputs are balanced to ground, open-circuit and short-circuit proof.

Control inputs:

Common logical binary inputs for the two channels.

Optocoupler mode:

"Pre-alarm (ALERT)", open circuit or closed circuit mode
"Main alarm (DANGER)", open circuit or closed circuit mode
Channel or module inhibit

Limit value multiplier for changing alarm limits during run-up and run-down of the machine. The multiplier is adjustable in the range:

1.000....4.999

24 V logic

Input resistance:

> 10 kOhm

Key pulse input:

1 pulse per revolution for analysis purposes of the system:

24 V logic

Input resistance:

> 30 kOhm

Pulse duration:

min. 10µs (edge-triggered)

Measuring modes:

General:

Each channel has to be configured individually via the available interfaces. The configuration may be changed any time during operation.

Measuring modes for the dual channel mode:

- Expansion measurement

Programmable measuring parameters:

- Measuring range
- Measuring unit
- Transducer sensitivity

- Warning and alarm limits
- Combination of channels
- Hysteresis

- Channel identification by means of KKS numbers or freely selectable designations

Limit supervision:

There are 2 alarm limits for each channel, adjustable independently from each other. Supervision of the limit values may be disabled with an external digital signal or via the Channel-Clear function in case of a module error.

Having loaded a new parameter configuration to the module, the alarm outputs remain blocked for a delay time of 15 sec.

Adjustment range limit values:

5....100% of f.s.d

Resolution and reproducibility:

1‰ of f.s.d

Delay time:

0-1-2-3-4-5 sec. adjustable

Switching characteristics:

rising signal level

Switching hysteresis:

configurable
(only at falling signal levels)

Outputs:

via potential-free optocoupler outputs at the rear connector

U_{\max} = 48 V DC

I_{\max} = 100 mA

Module and sensor supervision:

The internal module supervision comprises the following functions:

- Transducer signal within a predefined good range
- Wiring between transducer and module (short-circuit, interruption)
- System supply voltage within predefined limits
- Configuration and parameter setting OK
- Measuring values within measuring range

- Operating temperature of the module
- System watchdog

During the change from the error to the ok-state and after power-on of the module, all functions of the module are blocked for a delay time of 15s (alarm enable after a delay time of 60s).

A green LED on the module front indicates the "Channel clear" state. During an error state, this LED is switched off, during the delay period it flashes.

The states for both channels are output to the connecting strip at the rear via optocouplers for the purpose of galvanical isolation

$$U_{\max} = 48 \text{ V DC}$$

$$I_{\max} = 100 \text{ mA}$$

Reasons for module disturbances can be read out in detail via the communication interface. This permits the technicians to remove the reason for the fault immediately.

Signal outputs at the connecting strip:

Connecting strip:

according to type F48M, DIN41612
Communication interface RS485

One current output per channel, proportional to measuring range and chosen variable.

Nominal range:

0/4...20 mA
open circuit and short-circuit proof

Permissible burden:

≤500 Ohm

Resolution:

16 Bit

Accuracy:

±1% of f.s.d.

One voltage output per channel, proportional to chosen variable and measuring range.

Nominal range:

0...+10 V

open circuit and short-circuit proof

Load resistance:

≥10 kOhm

Resolution:

8 Bit

Accuracy:

±1 % of f.s.d

One voltage output per channel, proportional to the sensor signal.

Nominal range:

0...12 V_{pp}

open circuit and short-circuit proof

Load resistance:

≥100 kOhm

Frequency range:

0 Hz...20 kHz (±20 % -3 dB)

Accuracy:

±1 % of f.s.d

Operating elements at the module front:

Two sensor signal outputs, independently from each other, one for each channel:

The signals are proportional to the sensor signals and can be tapped at the SMB sockets on the module front.

Range: ± 12 V
Load resistance: 100 kOhm
Internal resistance: 1 kOhm

Frequency range:

dynamic carrier frequency output with superimposed displacement signal.

2 green LED's:

indicate "Channel Clear" separately for channel 1 and channel 2.

4 red LED's:

indicate pre and main alarm separately for both channels.

1 Mini DIN diode socket:

RS232 interface for connection of a computer for configuration and data interchange with the module.

Handle:

To pull out and insert the module and for labelling purposes.

Power supply:

Redundant supply input via two supply inputs, decoupled via diodes. At least one supply input is required for the supply of the module.

Supply voltage:

18...24...31.2 V DC
according to IEC 654-2, class DC4

Power consumption:

max. 8 W (max. 300 mA at 24 V)

Other supply voltages can be realized with additional system power supplies.

System design:

At standalone operation, unlimited number of modules.

Max. 31 modules / 62 channels may be operated at one RS 485 bus

If more modules / channels are necessary, e.g. with an MMS 6815, another RS 485 bus must be installed.

Environmental conditions:

Protection class:

Module: IP 00 according to DIN 40050
Front plate: IP21 according to DIN 40050

Climate conditions:

according to DIN 40040 class KTF
operating temperature range:
0...+65°C

Temperature range for storage and transport:

-30...+85°C

Permissible relative humidity:

5...95%, non condensing

Permissible vibration:

according to IEC 68-2, part 6

Vibration amplitude:

0.15 mm in range 10...55 Hz

Vibration acceleration:

16.6 m/s² in range 55...150Hz

Permissible shock:

according to IEC 68-2, part 29
peak value of acceleration:

98 m/s²

nominal shock duration:

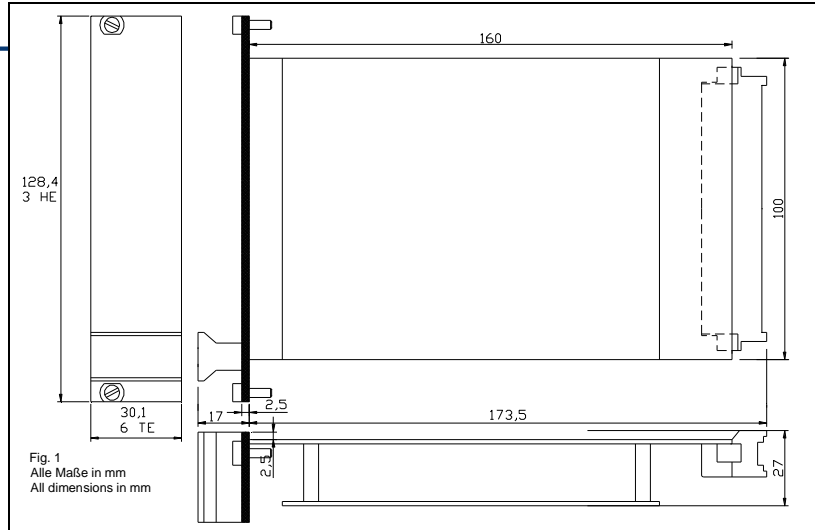
16 ms

EMC resistance:

according to EN50081-1 / EN50082-2

Dimensions:

PCB/EURO card format acc. to
 DIN 41494 (100 x 160 mm)
 Width: 30,0 mm (6 TE)
 Height: 128,4 mm (3 HE)
 Length: 160,0 mm
 Net weight: app. 320 g
 Gross weight: app. 450 g
 incl. standard export packing
 Packing volume: app. 2,5 dm³
 Space requirements:
 14 modules (28 channels) fit into each
 19" rack



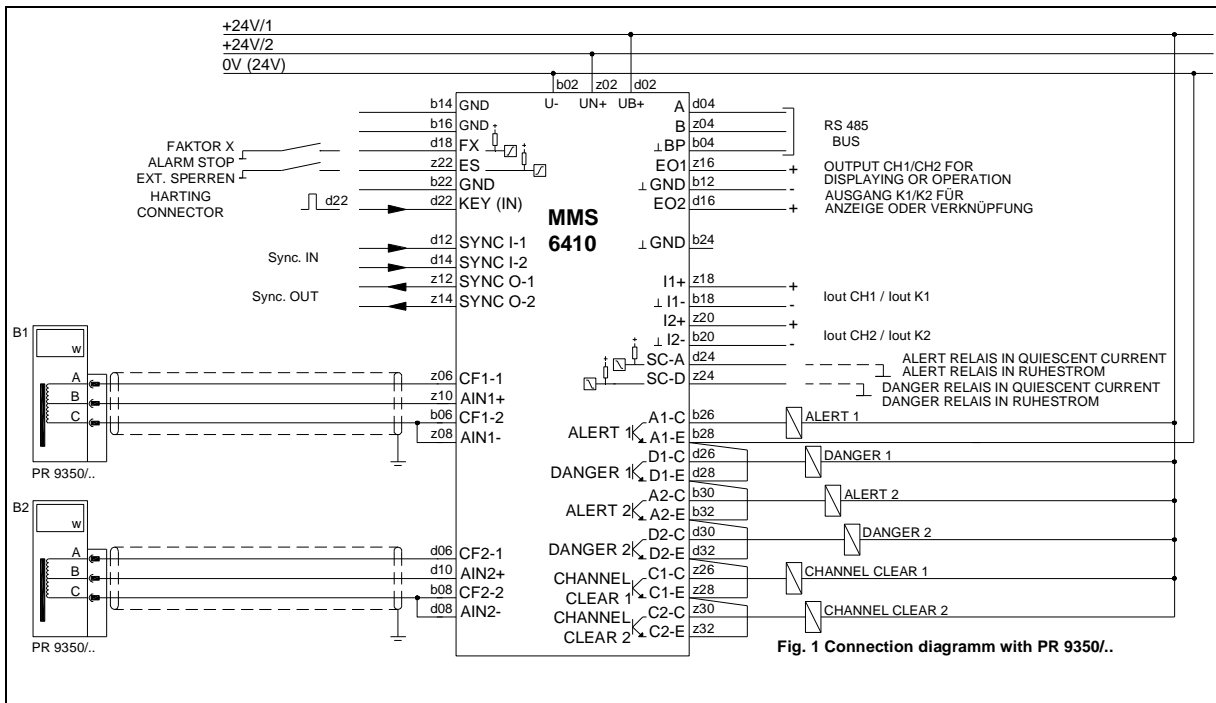
Requirements on configuration PC:

Configuration of modules is made via the RS 232 interface on the module front or via the RS 485 bus by means of a computer (laptop) with the following minimum specifications:

Processor: 486 DX, 33 MHz
Interfaces: one free RS 232 interface (COM 1 or COM 2) with FIFO type 156550 UART

Capacity of fixed disk: min. 5 MB
Required working memory: min. 620 KB
Operating system: MS DOS Version 6.22 or higher or WIN@ 95/98 or NT 4.0

Connection diagram:



Order number:

MMS 6640 Dual Channel Measuring Amplifier for Inductive Sensors **9100 – 00005**
MMS 6910 Operating accessories **9510 – 00001**
 consisting of: operating and installation manual, configuration software and various connection cables

The F48M mating connector has to be ordered separately depending on the intended wiring technology.

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