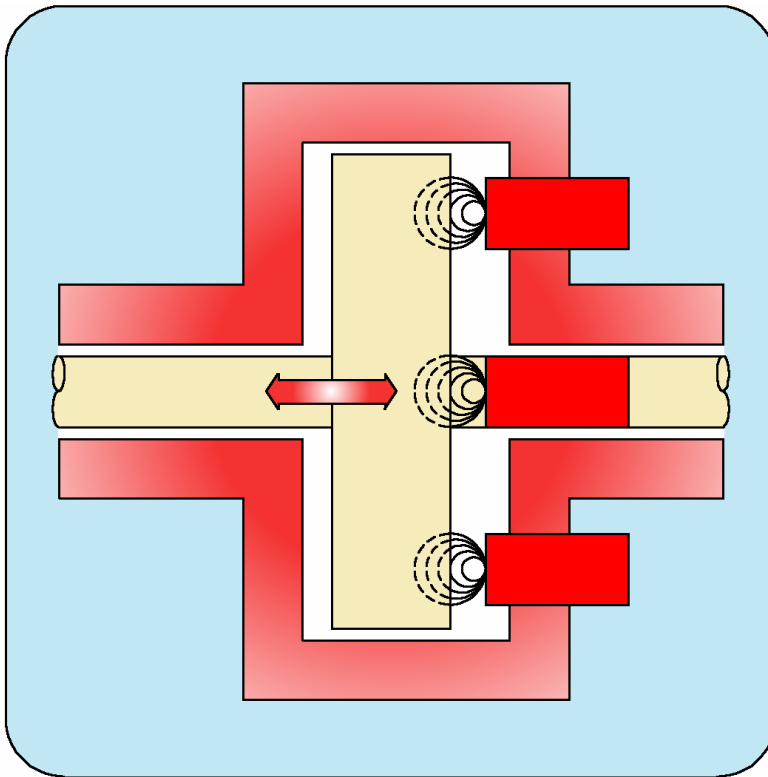# DAPS
Digital Axial Position Protection System

- Microcontroler based measuring system
- Up to 6 limit values per channel
- Two current outputs per channel, one of them galvanically isolated
- Mutual comparison of output signals between all channels
- Redundant power supply
- Self-test functions for electronic circuits and transducers
- Simplified fault detection by display messages in plaintext
- Galvanical isolation of binary input and output signals
- Wiring by means of preformed cables and converters in the control cubicle
- RS 232 interface for parameter setting
- RS 485 interface for data exchange with the epro MMS 6850 analysis and diagnosis system
- Hot swap of boards during operation

Short description:

The axial-position measuring and protection system DAPS serve the measurement and protection of inadmissible high axial displacements of the rotor disk.

Due to the consistent triple channel design, beginning with the signal acquisition up to the evaluation of the measured shaft displacement, the operational safety and also the protection function on a high level can be ensured.

Alarm outputs and error messages are output via short-circuit proof optocoupler outputs.

The system includes an extended fault detection function. The three sensors are continuously checked on operating within the permitted limits.

Moreover, the channels mutually check and supervise the output signals of each other.

If the internal fault detection circuit detects an error, this will be indicated via the output contacts and shown on the display as plaintext.

By using preformed connection cables and screw terminals, the system may be integrated economically in a 19" cabinet.

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Technical Data:

Signal inputs:
Differential input, nonreactive, open-circuit and open circuit and short-circuit proof

Input voltage range:
0...27,3 V DC

Limit range:
0...30 V

Input resistance:
> 100 kOhm

Sensor signal outputs:
SMB front sockets, buffered, open-circuit and open circuit and short-circuit proof, non-reactive

Signal output:
0...4,1 V; Signal = 0,15 x Sensor input signal

Accuracy:
±1% of f.s.d

Frequency range:
0...10 Hz

Permissible load:
> 1 MOhm

Internal resistance:
10 kOhm

Signal conditioning for characteristical values:
Before processing, the input signals are standardized by the processor. The characteristical value is proportional to the measured axial expansion.

Max. measuring range:
Depending on the type of sensor, e.g. PR 6423/00
± 1,0 mm

Current outputs of characteristical values:
Calculation of characteristical values and evaluation depend on the functions defined during the configuration

Current output 1:
0/4...20 mA galvanically isolated

Accuracy:
±0.1% of f.s.d. /16 bits

Current output 2:
0/4...20 mA galvanically not isolated, with feed back of the output signal for comparison of analog results

Accuracy:
±0.1% of f.s.d. /16 bits

Channel supervision and visualization:
Each channel permanently checks the signal of the sensor connected to its input and compares the current outputs of the two other channels with the signal of the own current output continuously. Thus a maximum in safety can be ensured. Faults are indicated with two green LED´s at the monitor front. Signaling of the channel supervision is carried out via opto-decoupled collector/emitter lines.

Status = fault:
max. 48 V DC

Status = o.k.:
max. 100 mA

Binary inputs:
The binary inputs of the module are galvanically isolated, but however, have a common GND.

Signal level:
Low: 0...+3 V
High: +13...+48 V

External blocking:
To disable the function-/ alarm outputs, e.g. for service and maintenance works etc.

Reset Latch:
To reset the latch function of function and alarm outputs

Test input:
For testing the monitoring functions with an internally generated test value

Binary outputs:
Altogether six function outputs with separate function or limit setting. The functions of the binary outputs as well as the switching characteristics are defined during configuration.

Limit setting:
by parameter setting, depending on the assigned function.

Visualization of the condition:
With a yellow LED for each of the function-/ alarm outputs.

Limit data for binary outputs:
Output 1 - 3
  C - E open:
    max. U_{CE} 48 V
  C - E conducting:
    max. I_{CE} 50 mA
Output 4 - 6
  C - E open:
    max. U_{CE} 48 V
  C - E conducting:
    max. I_{CE} 100 mA

Communication interfaces:
RS 232:
Front socket to connect a laptop for configuration and visualization

RS 485:
Bus interface for communication with the epro MMS 6850 analysis and Diagnosis system via the MMS 6831 interface card.

Power supply:
Two redundant inputs, decoupled via diodes, for nominal +24 V with common ground

Permissible voltage range:
18...31,2V dc according to IEC 654-2 class DC 4

Sensor supply:
Decoupled and galvanically isolated to the system voltages and to the supply voltage. Open circuit and short-circuit proof

Technical Data:

Supply voltage:
26,75 V DC

Residual ripple:
<20 mV$_{SS}$ (at nominal
current 20 mA)

Max. current:
35 mA

Environmental conditions:

Application class:
KTF according to DIN 40 040

Reference temperature:
+25°C

Nominal operating range:
0...+65°C

Temperature for storage and transport
-30...+85°C
Rel. humidity 5...95% non-condensing

Protection class:
IP 00, open construction
according to DIN 40050

EMC
according to EN 50 081-1 /
EN 50 082-2 fulfilled

Mechanical design of the printed circuit board:
Euro-format (100 x160 mm)
according to DIN 41 494

Width:
with display 14 TE
(approx. 71 mm)
without display 6 TE
(approx. 30 mm)

Connector:
DIN 41 612, type F 48 M

Dimension of the total system:
DAPS
42 TE (approx. 213 mm)

Limit value-/ function supervision:

The MMS 6250 module provides altogether 6 so-called function outputs. These function outputs may be used as alarm outputs as well as for indication of individual module- or error conditions.
The function outputs may be assigned the following functions:

- off
- GW
- GW +Latch
- Analog error
- Sensor fault
- Gap error

- Test value 1 active
- Test value 2 active

Description of the function outputs:

GW

positive limit value,
switches at exceeding the limit value. The output will be reset to its initial state after the measuring value has fallen below the limit value minus hysteresis value.

negative limit value,
switches at falling below the limit value. The output will be reset to its initial state after the measuring value has exceeded the limit plus hysteresis value.

Alarm + Latch
same as > GW but with latching function

For each function output a delay time in the range 0 to 25.5 seconds can be chosen.

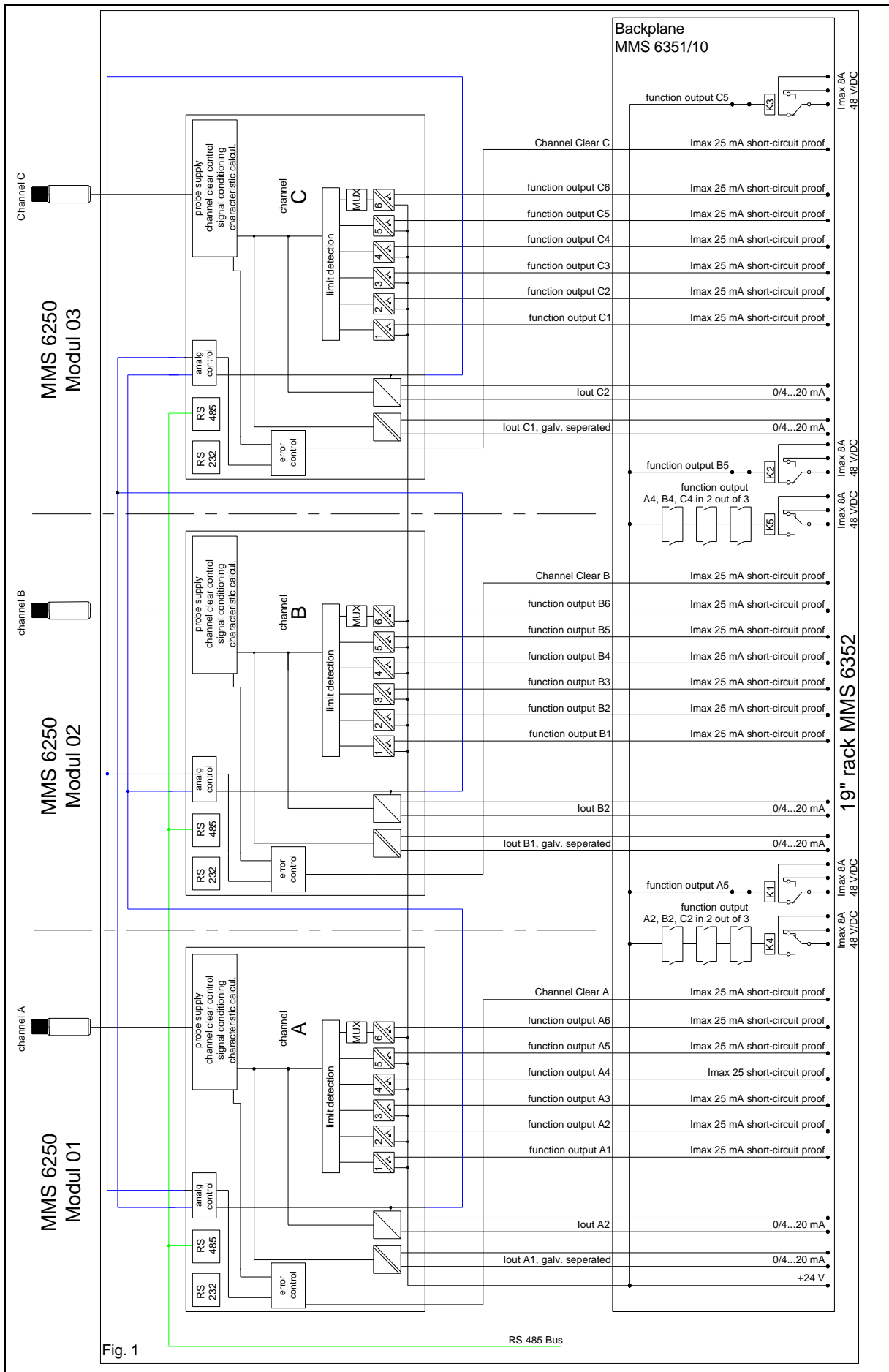## Programmable measuring parameters:

- Measuring range
- Analog difference
- Warning and alarm limits
- Principle of action
- Alarm functions
- Test value 1
- Test value 2

- Alarm delay
- Hysteresis
- Channel identification by means of KKS numbers or freely selectable designations
- Current outputs
- Current calibration

- Current suppression
- Current smoothing
- Gap limit
- Channel clear limits

System configuration:

DAPS
- 3 x MMS 6250/D
- 1 x MMS 6351/10
- 1 x MMS 6352
- 6 x MMS 6361
- 6 x MMS 6360
- 1 x MMS 6950 W
alternatively
- 3 x MMS 6250

Principle circuit diagram DAPS with backplane MMS 6351/10:

Fig. 1

Module/transducer supervision:

The internal module supervision comprises the following functions:

- Transducer signal within a predefined good range
- Wiring between sensor and module (interruption, short-circuit of sensor supply)
- System supply voltage within predefined limits

- Measuring values within measuring range
- System Watch – Dog

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 5 sec.

Reasons for module disturbances can be read out in detail via the communication interface or, at modules with a display, directly on the display. This permits the technicians to remove the reason for the fault immediately.

Operating elements at the module front:

One nonreactive sensor signal output via SMB socket:
    Range: 0...4,1 V
    Load resistance: ≥1 MOhm
    Internal resistance: 10 kOhm

6 yellow LED´s:
    One LED for each of the function- limit values

2 green LED´s
    LED 1
      Channel supervision for the channel assigned to this card
    LED 2,3
      Indication of the state of the two adjacent system channels (analog comparison). If one of the adjacent channels fails, it will be indicated via the relevant LED.

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 labeling 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. 20 W (max. 840 mA at 24 V)

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

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/s^2 in range 55...150 Hz

Permissible shock:
    according to IEC 68-2, part 29
    peak value of acceleration:
      98 m/s^2
    nominal shock duration:
      16 ms

EMC resistance:
    according to EN50081-1 / EN50082-2

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:
    Pentium II, 266 MHz
Interfaces:
    one free RS 232 interface (COM 1 or COM 2)

Capacity of hard disk:
    min. 5 MB
Required working memory:
    min. 32 MB
Operating system:
    Windows® 95/98, NT 4.0, 2000 or XP

Backplane MMS 6351/10:

Screw terminal adapter MMS 6361:

SUB D

screw
connectors
Schraub-
anschlüsse
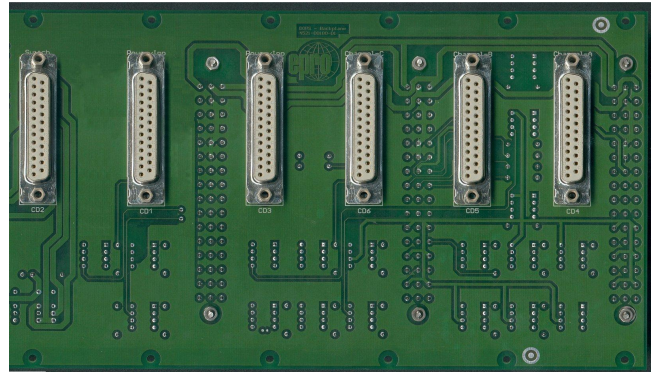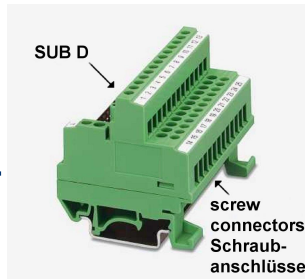
Order numbers:

MMS 6250	Shaft Position measuring amplifier...	**9100 – 00057**
MMS 6250/D	Shaft Position measuring amplifier with digital indicator................................	**9100 – 00056**
MMS 6351/10	Backplane AS..…………………………………	**9100 – 00049**
MMS 6352	19 " mounting frame..	**9100 – 00053**
MMS 6253/TS	Adapter card for replacement of AEG Turloop (MMG 1211).........................	**9120 – 00006**
MMS 6360	Connection cable 25-pole SUB D..	**9510 – 00006**
MMS 6361	Adapter 25 pole. SUB D on screw terminals...	**9100 – 00052**
MMS 6950 W	Configuration kit..	**9510 – 00005**

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