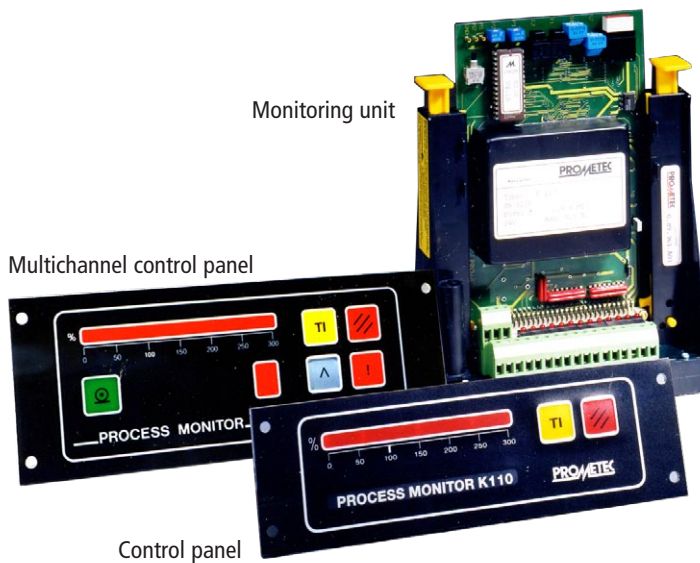


# PROCESS MONITOR K90, K 100, K 110

*Detects collisions, severe process degenerations and air cuts, using up to 4 static thresholds and working values, works with all NC machines*



**monitors single- and multispindle drilling machines for tool breakage and wear**

- *Collision detection*
- *Detection of process degenerations*
- *Accident risk reduction*
- *Increasing productivity*
- *Minimizing non-productive times*
- *Quality assurance and optimization*

## System Characteristics

The PROCESS MONITOR K 90, K 100 and K 110 units are low-priced single-channel monitoring units for fast detection of abnormal process states on NC machines with machining stations like tool turrets, tool holders or milling/drilling spindles, etc.

You can use several units in parallel for systems with more than one machining station. For example, you can realize monitoring systems for transfer lines, automatic lathes, revolving transfer machines etc. with a maximum of 9 machining stations, using one master unit and up to eight lower-priced slave units. Operating functions (teach-in, reset) for systems of this kind are selected via a special multichannel control panel.

Sensor signal values are monitored via a number of static thresholds (see table on reverse side), each referred to the maximum signal level (100 %) for a normal monitoring cycle. This signal level is learnt automatically in a teach-in cycle for the first part in each batch and standardized at 100 %. The corresponding gain factor for each monitoring cycle is saved.

If the relevant function has been selected, a second teach-in cycle with the second part determines the working value (area value) below the signal level curve. Two additional static thresholds (LIMITS A and B) monitor the working value for unacceptably high or low values.

You may also deactivate the teach-in function for monitoring with fixed gain factors.

The LIMIT 1 to LIMIT 4 thresholds respond to values above or below the signal level after adjustable response times. Useful default values for threshold values and response times are preset, and can be modified as required via the monitoring unit.

The ultrafast LIMIT 1-1 threshold detects machine collisions in any axis within approximately 1 ms (with piezoelectric sensors).

The PROCESS MONITOR K 110 has an additional variable threshold (LIMIT 1-2) to increase collision monitoring sensitivity. Like the PROCESS MONITOR K 100, it also has a LIMIT 0 threshold for optimum collision detection in rapid traverse.

The table on the reverse side shows the range of monitoring functions available with the PROCESS MONITOR K 90, K 100, and K 110.

Please note that the PROCESS MONITOR K 90 or K 100 has a data memory for a single monitoring cycle, whereas the PROCESS MONITOR K 110 can save two monitoring cycles for two different work cycles within a subprogram. Apart from collision detection, which is always available, 1, 2, or 3 additional functions can be selected and assigned to the signal outputs via the monitoring unit.

If you are running several work cycles, e.g. on turret lathes, you can program the PROCESS MONITOR K 110 for two monitoring cycle groups to cover roughing and finishing ranges via the NC program. The optimized threshold precision enables the unit to detect process degenerations with finishing tools, e.g. severe force-peak-induced breakages (LIMIT 2), or air cuts (LIMIT 4-2).

**Suitable sensors**

You can combine the PROCESS MONITOR K 90, K 100, or K 110 with all force, ultra sound, acoustic emission, fluid sound and effective power sensors from our comprehensive sensor range. If you select piezoelectric force types, we recommend using 2 sensors or measuring elements for increased reliability of detection with machine collisions and process degenerations. Signal zero levels are compensated automatically with all sensor types.

We are happy to advise you in choosing the optimum sensor solution for your application.

**Technical Data**

**Printed-circuit board** in Euroboard format with holder, easy fitting via two securing screws or on 35 mm top hat rail in switch cabinet

**Dimensions** (holder with board)  
W x H x D = 137x63x195 mm

**Simple PLC interface:**

**2 sensor inputs** ( $U_{max} = \pm 10 V$ )

**4 voltage-free outputs** (optocouplers) for message functions ( $I_{max} = 45 mA$ )

**3 additional fast-response break contacts** for LIMIT 0 and 1-1 ( $I_{max} = 100 mA, U_{max} = 50 V$ )

**Control panel** small, clear, easy-to-use for high reliability of control and operation with analogue threshold and signal displays with reset and teach-in keys

**Dimensions** W x H x D = 178x55x30 mm,  
Multichannel control panel 178x70x30 mm

**Supply voltage** Unit 24 V= ( $\pm 20\%$ , max. 0.5 A)  
Control panel 24 V= ( $\pm 20\%$ , max. 0.1 A)

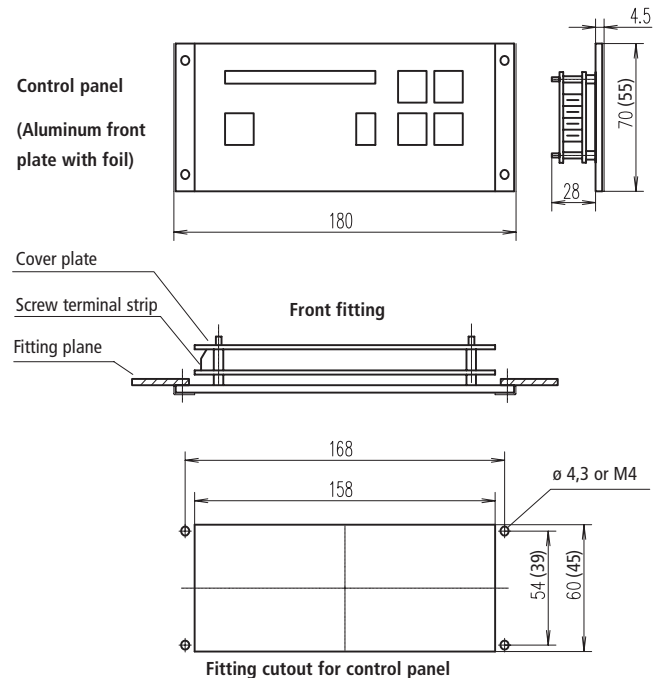
**Part numbers**  
K 110: **0.91.170.A03**  
K 110 Control panel: **0.55.220.K110**  
K 100: **0.91.171.A03**  
K 100 Control panel: **0.55.221.K100**  
K 90: **0.91.172.A03**  
K 90 Control panel: **0.55.222.K90**  
Board holder for x 90-110: **0.89.361.A01**

optional:  
K 110 as sub-unit: **0.91.160.A03SUB**  
K 100 as sub-unit: **0.91.161.A03SUB**  
K 90 as sub-unit: **0.91.162.A03SUB**

Multichannel control panel:  
**0.55.231.X100**

**Function table**

Monitoring functions	K 110	K 100	K 90
Number of monitoring cycles (cuts)	2	1	1
Collision detection in feed drive rapid traverse with special threshold, LIMIT 0	•	•	
Collision detection with fixed threshold value at 300%, LIMIT 1-1	•	•	•
Collision detection with adjustable threshold value 100-300 %, LIMIT 1-2	•		
Process degeneration with adjustable threshold value >100 % and response time 5 ms, LIMIT 2-1	•	•	•
Process degeneration with adjustable threshold value <100 % and response time 5 ms-1s, LIMIT 2-2	•	•	•
Contact detection for cut duration or service life measurement with adjustable threshold value <100 %, LIMIT 4-1	•	•	•
Air cut detection with adjustable threshold value <100 %, LIMIT 4-2	•	•	•
Process degeneration via working value with adjustable threshold value >100 %, LIMIT A	•	•	•
Process degeneration via working value with adjustable threshold value >100 %, LIMIT B	•	•	•



All measurements in Millimeters. Please note that dimensions in brackets refer to the single channel version and that drawing for this is not to scale.