# GEM**CPU**

## GENIOR MODULAR TOOL AND PROCESS MONITORING SYSTEM



Illustration similar

**Model variants:**

GEM**CPU**DP/F for connection to Profibus and Fanuc/Focas (left) and GEM**CPU**PN for connection to Profinet (right), further model variants available (see below)

## Modular System

GENIOR MODULAR is an autonomous, intelligent monitoring system with a modular structure. The different fieldbus interfaces of the GENIOR MODULAR system guarantee monitoring solutions for different machine designs. GEM**CPU** monitoring modules are available for Profibus (including FANUC/Focas) and Profinet connection, as well as in the EtherNet/IP version and for the Siemens 828D controller. The system collects measurement data digitally via the fieldbus interface or, together with appropriate measuring transducer modules, for special monitoring tasks, also via external sensors.

**Fig. below:** Mounting a GEM**CPU**DP/F monitoring module with four external software modules (plug-ins)
on a standard mounting rail.
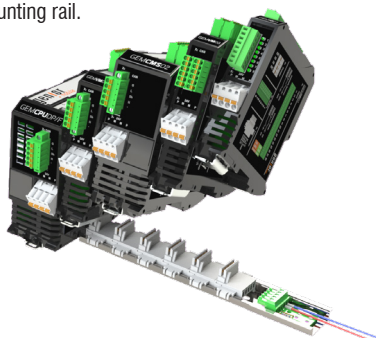


## Properties

- Monitoring system for machines and systems
- Breakage monitoring, detection of missing tools, tool wear evaluation and Adaptive Control (AC)
- Different interface variants: Profibus, Profinet, parallel wiring, FANUC/Focas, EtherNet/IP
- Different monitoring strategies: e.g. automatic limits, dx/dt, gear hobbing
- Monitoring of:
  ... up tp 10 channels (GEM**CPU**DP/F, GEM**CPU**PN, GEM**CPU**IP)
  ... up to 2 channels (GEM**CPU**S828)
- Signal sampling rate configurable between 2 - 20 ms
- Sensorless monitoring: up to 16 digital CNC signals
- Monitoring with additional (arbitrary) sensors: connection of up to 8 additional software modules per GEM**CPU** module
- Automatic adaptation of the limits to the measurement signal without operator intervention
- Expert Mode: individual adjustments possible manually
- Connection to the data management system C-THRU 4.0: cyclic transfer of machining data for further evaluations
- Plug-ins: Software modules for data evaluation in the production environment
- MultiView: up to 8 modules can be displayed in one visualization

# GENIOR MODULAR MONITORING MODULE

## ARTICLE NUMBERS

| | |
|---|---|
| O830Z510004 | GEM**CPU**DP/F for Profibus / Focas |
| O830Z510006 | GEM**CPU**PN for Profinet |
| O830Z510007 | GEM**CPU**S828 for Siemens S828 |
| O830Z510008 | GEM**CPU**IP for EtherNet/IP |

## TECHNICAL DATA

| | |
|---|---|
| DIMENSIONS | see drawing |
| STANDARD IP ADDRESS | 192.168.214.60 |
| WEIGHT | 243 g |
| MATERIAL | Polyamide PA 6.6 |
| STORAGE TEMPERATURE | -20 °C ... +60 °C |
| OPERATING TEMPERATURE | 0 °C ... +55 °C |
| UL-CLASSIFICATION | VO (UL94) |
| DEGREE OF PROTECTION | IP30 |
| ATMOSPH. REL. HUMIDITY | 5 – 85%, no condensation |
| INSTALLATION | DIN EN 60715 standard mounting rail |
| CONTACTING | Spring terminals, in-rail bus connector |
| SUPPLY VOLTAGE | 24 V DC (± 20 %) |
| NOM. CURRENT CONSUMPTION | max. 500 mA |
| PROCESSOR | Quad core 800 MHz |
| HARD DISK | 2 GB MSATA SLC Fail safe |

## CONNECTIONS

| | DP/F | PN | S828 | EtherNet/IP |
|---|---|---|---|---|
| WIRE CROSS SECTION | 0.2...1.5 mm² | | | |
| 10/100 BASE T ETHERNET | √ | √ | √ | √ |
| PROFIBUS UP TO 12 MBITS/S | √ | – | – | – |
| FANUC/FOCAS | √ | – | – | – |
| PROFINET | – | √ | √ | – |
| ETHERNET/IP | – | – | – | √ |
| USB HOST | √ | √ | √ | √ |
| CAN | √ | √ | √ | √ |
| MQTT | √ | √ | √ | √ |

## LICENSE KEYS  please order separately

| | |
|---|---|
| OCMZ5100004 | Activation of sensorless torque monitoring |
| OCMZ5100005 | Activation of a further monitoring channel |
| OCMZ5100003 | Activation of AC control |
| OCMZ5100002 | Activation of wear monitoring |
| OCMZ5100007 | Activation of the data importer |
| OCMZ5100008 | Activation of the monitoring strategy gear hobbing |

## Product matrix

Software tools and various software modules for data evaluation (plug-ins) complete the GENIOR MODULAR product matrix. The modularity of the system allows easy extension and integration of these external software modules into the MultiView visualization and into process monitoring with GENIOR MODULAR.
Acquired data is converted into intelligent data (information) that can be stored locally or on network devices for further evaluations such as analyses, trend curves, statistics or reports.

## REQUIREMENTS FOR THE VISUALIZATION

| | |
|---|---|
| WINDOWS OPERATING SYSTEM | WIN XP (SP3) / WIN 7 / WIN 8 / WIN 10 / WIN 11 |

## SOFTWARE MODULES  please order separately

| | | |
|---|---|---|
| O830Z710308 | GEM**FM**01 | Force, strain and coolant flow, ±10 V, 4...20 mA |
| O830Z910301 | GEM**TP**01 | True power |
| O830Z910304 | GEM**TP** | True power |
| O830Z711101 | GEM**AM**01 | Acoustic emission |
| O830B2300004 | GEM**CMS** | Machine protection and detection of collisions |
| O830Z710102 | GEM**VM**01 | Vibration and acceleration |
| O830Z910101 | GEM**AMS** | Machine protection and temperature monitoring |
| O830ZA00101 | GEM**VM** | Machine monitoring, vibration and temperature |
| O830Z910302 | GEM**TF**01 | Torque and axial force |
| O830Z910303 | GEM**IO**01 | Input-/output converter |
| O830Z915002 | GEM**GP** | Universal monitoring module |
| O830ZA00501 | GEM**DS** | Spindle growth |
| O830ZA05000 | GEM**WR** | Monitoring module for the 2.4 GHz WRS radio system |
| Conformity | CE, UKCA | |

# GENIOR MODULAR MONITORING MODULE

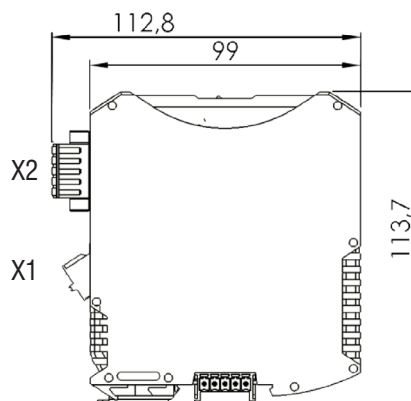**GEMCPUDP/F**

**GEMCPUPN / GEMCPUIP / GEMCPUS828**

**GEMCPUDP/F / GEMCPUPN / GEMCPUIP / GEMCPUS828**

X5

X4

X3

X2

45

Front view

X6

X5

X4

X3

X2

112,8

99

Front view

112,8

99

X2

X1

113,7
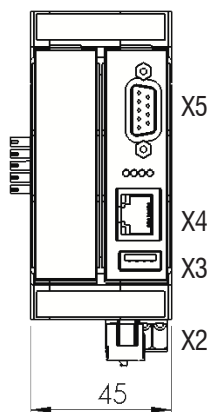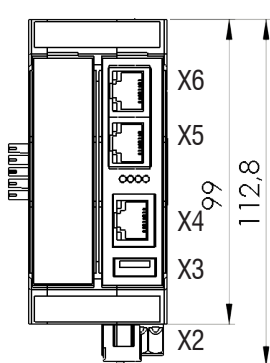
View from the right side

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## Software tools

Collected data on monitored machining processes and machine status can be converted into intelligent data (information) using various software tools, which can be stored locally or on network devices for further evaluation such as analyses, trend curve statistics or reports.

**GEM**BOARD

**GEM**BOARD is a display tool that provides a remote overview of the status (e.g. alarms) of all GEM**CPU** monitoring modules in the production environment during operation and also allows the adjustment of module settings.

**Fingerprint**

**Fingerprint** uses defined signals to monitor machine components. If defined limit values are violated, the software generates an alarm and thus enables timely intervention by service personnel. In addition to real-time monitoring, Fingerprint also creates a database for predictive maintenance.

**GEM DataManager**

**GEM DataManager** is a software tool that cyclically transfers raw data from active GEMCPU monitoring modules to a server or PC for further use.

**CTHRU**4.0

This database management system for ARTIS tool, process and machine condition monitoring permits detailed and traceable monitoring of each individual machining step. The **C-THRU** Report Generator with its individually combinable filter options is used for this purpose. It allows evaluation of the machining processes, provides information on processes and thus makes extensive fault diagnosis possible. Consistent process monitoring and continuous documentation with **C-THRU**4.0 help to optimize the use of resources.

**C-Analyse**

The web-based information system **C-Analyse** is used to select the stored C-THRU4.0-SQL data. It visualizes states, filters data and allows to link them arbitrarily. The report function is used to create user-specific reports for specific time periods (daily, weekly, etc.).

# GENIOR MODULAR MONITORING MODULE

## Expert Mode

The GENIOR MODULAR tool and process monitoring system operates mainly automatically, as the limits adapt themselves automatically to the signals.

Special operating conditions sometimes make it necessary to intervene in the automatic monitoring and to adapt certain parameters selectively to the conditions. This is possible with the GENIOR MODULAR Expert Mode.

This can be used for instance to:

- influence limits
- select/deselect monitoring methods
- hide signal parts
- determine process types (short vs. long process)
- adapt the feed rate to different machining stages (Adpative Control)
- individually adapt the basic settings provided in the delivery state
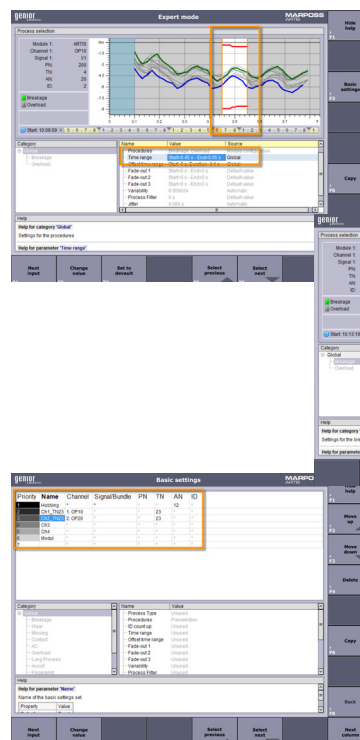


Fig. left:
Monitoring in GEM Expert Mode with freely defined time window



Fig. above:
Six different sensitivity levels for the Breakage limit selectable



Fig. left:
Basic settings can be adjusted and prioritized individually



Fig. right:
Monitoring with static limits
① Learning
② Signal increase
⑤, ⑧ Breakage
④, ⑦ Wear
③, ⑥ Missing
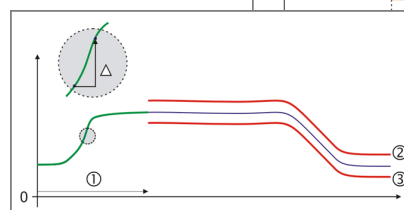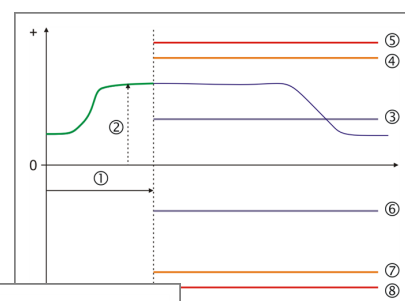
Fig. left:
Monitoring with dynamic limits
① Learning
② upper spike limit
③ lower spike limit

Fig. above: Machining processes with a process duration > 3 minutes can be monitored by the monitoring method **Long Process**.