The new MACH 4000 Family.

Requirements and Solutions

The new MACH 4000 Gigabit switches and routers offer maximum transmission rates in the backbone area where many networks are linked. This is increasingly desired not only in factories and transportation automation, but also on ships, where ETHERNET will become the future standard. In addition to maximum flexibility and reliability, switches that are extremely compact in size are also required.

With its modular, stackable system, the latest MACH 4000 generation provides maximum performance in the industrial backbone: Up to 48 GE ports and 3 x10GE ports speak for themselves and assure fast switching in the industrial ETHERNET. The new MACH 4000 family is available in various versions to meet all requirements: From 24 GE ports up to 48 GE ports or additionally with 3 x10GE ports. All of this is packed into a compact chassis that offers a high port density and modularity in a minimum of space. Plus additional functions for industry, such as HIPER-Ring, redundant coupling, or shock and vibration resistance with GL approval.

Hirschmann Competence Center

In addition to the highest quality network components, Hirschmann offers through its Competence Center the appropriate consulting, service, support and training expertise to assist you in achieving your overall objective. Please contact us about your individual requirements.

www.hicomcenter.com
"The information/details in this publication merely contain general descriptions or performance factors which, when applied in an actual situation, do not always correspond with the described form, and may be amended by way of the further development of products. The desired performance factors shall only be deemed binding if these are expressly agreed on conclusion of the contract."
Even more performance on board:

**MACH 4000 with 10Gigabit ETHERNET.**

- High-performance, modular backbone router
- Now also with 10Gigabit ETHERNET ports
- Extremely low height in a 19" chassis
- Additional approvals for industry
- Temperature range from 0°C to +60°C
- Fast ring redundancy - HIPER-Ring

HIRSCHMANN
Applications

On the one hand, Industrial ETHERNET is becoming increasingly important in factory and process automation, where optimum interaction among production areas via the HIPER-Ring protocol and redundant coupling is essential. And, on the other hand, also in transportation automation, such as on ships, in locks and waterways, in tunnels or for video monitoring. In short: in all transportation applications where extremely fast switching is required for convergent networks, i.e. combinations of voice, data and video via HIPER-Ring. As robust backbone switches and routers, the new MACH 4000 family assures maximum performance, optimum reliability and cost-effective port prices in industrial networks. Perfectly packaged in a compact, industrial-grade chassis that can be expanded with a variety of media modules for specific requirements.
The new MACH Gigabit switches and routers are available in various versions: either simply as a Layer 2 Switch (L2P), additionally with static routing (L3E) or in a dynamic routing version with multicast routing (L3P). Each with a choice of power supply and individually populated with the appropriate modules. Through appropriate cascading, the Gigabit ETHERNET successors of the MACH 3005 can be configured as compact systems with high port density.

- The combination of pre-installed and modular ports offers an excellent price/performance ratio.
- Each media module supports up to 8 ports
- Expandable by up to 4 media modules
- Extended temperature range from 0 up to +60°C
- Plug & Play function
- Supports power sources with 100 up to 240 V AC, 120 up to 350 V DC, 24 V DC and 48 V DC
- HIPER-Ring protocol with redundant coupling
- Power supply redundancy through use of M4-POWER chassis

**Product Features**

**MACH 4000 System**

- MACH4000 Switch
- Power Supply
- Fan Module
- Gigabit ETHERNET SFP Fiber Optic Module
- TP Media Module
- SFP Media Module
- 10Gigabit ETHERNET XFP Fiber Optic Module
- Fast ETHERNET SFP Fiber Optic Module
- Power Supply Chassis
- Power Supply Module
- Power Supply Module with two Inputs for redundant power source
**Product Family MACH 4000**

**Product description**

**Description**

- MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
- MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.
- MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Professional.

**Type**

- **Type 1**
  - Port type and quantity: [Image -1x-1 to 596x842]
  - Order No.: 943 878-101, 943 878-201, 943 878-301

- **Type 2**
  - Port type and quantity: [Image -1x-1 to 596x842]
  - Order No.: 943 915-101, 943 915-201, 943 915-301

- **Type 3**
  - Port type and quantity: [Image -1x-1 to 596x842]
  - Order No.: 943 911-101, 943 911-201, 943 911-301

- **Type 4**
  - Port type and quantity: [Image -1x-1 to 596x842]
  - Order No.: 943 859-101, 943 859-201, 943 859-301

**Software**

**Version**

- L2P - Layer 2 Professional
- L3E - Layer 3 Enhanced
- L3P - Layer 3 Professional

**Management**

- Serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP

**Configuration**

- Command line interface (CLI), V24, TELNET, BootP, DHCP, HIDiscovery, auto-configuration adapter (ACA21-USB)

**Diagnostics**

- LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), cable test, signal contact, syslog, logfile, RMON, port mirroring

**Security**

- QoS 8 classes, port prioritisation (IEEE 802.1p), VLAN (802.1Q), ACL, SSM, SSL

**Other services**

- Mapping, traffic shaping, flow control (IEEE 802.1x), port-channel, SNTP (Simple Network Time Protocol), broadcast limiter, DHCP Option 82

**Redundancy functions**

- HIPER-Ring (ring structure), RSTP (rapid spanning tree protocol), redundant network/ring coupling (master/receiver functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)

**Routing**

- Static routing, Layer 3 – ACL

**Kernel redundancy**

- VRPR, HRRPv2 (pending)

**Dynamic routing**

- RIP V2, RIP V1/2

**Multicast routing**

- DVMRP/PM, PIM DM

**Datas and facts**

**More interfaces**

- Signalling contact: 1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 24 V DC)
- V.24 interface: 1 x RJ 11 socket, serial interface to the configuration of devices
- USB interface: USB interface to connect auto-configuration adapter (ACA21-USB)

**Network size - cascability**

- Line-star topology: any

**Ring structure (HIPER-Ring)**

- Ring-recovery time <50 ms typ. at LWL

**Power requirements**

- Operating voltage: power supply unit M4-S-xx or M4-Power chassis with power supply unit please order separately
- Power consumption: 70 W (without media modules)
- Redundancy: redundant 24 V power supply by M4-Power basic device

**Ambient conditions**

- Operating temperature: 0°C up to +60°C for MACH 4002-48+4G, else 0°C up to +50°C
- Storage/transport temperature: -25°C up to +70°C
- Relative humidity (non-condensing): 10% up to 90%

**Mechanical construction**

- Dimensions (W x H x D): 480 mm x 88 mm x 435 mm
- Mounting: 19" control cabinet
- Protection class: IP 20

**Approvals**

- Safety of information technology equipment: cUL 60950 (E168643), EN 60950-1/A11:2004 + Corrigendum: 2004 (pending)
- Safety of industrial control equipment: cUL 508 IE1755311 (pending)

**Railway norm EN 50121-4:2000**

- EN 50121-4:2000, electromagnetic compatibility along the route (>10m)

**Scope of delivery and accessories**

- Scope of delivery: device, terminal block, operating manual, fan M4-AIR installed
- Accessories to order separately: power supply unit, auto-configuration adapter ACA21-USB, Industrial HiVision network management
Power supplies

Product description

<table>
<thead>
<tr>
<th>Description</th>
<th>Plug-in power supply for MACH 4002 switch chassis</th>
<th>Power supply plug-in for MACH 4002 switch chassis with two inputs for redundant power supply</th>
<th>Power supply plug-in for MACH 4002 switch chassis with two inputs for redundant power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>M4-S-AC/DC 300W</td>
<td>M4-S-24VDC 300W</td>
<td>M4-S-48VDC 300W</td>
</tr>
<tr>
<td>Order No.</td>
<td>943 875-001</td>
<td>943 871-001</td>
<td>943 872-001</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Voltage input</th>
<th>non-heating appliance socket</th>
<th>plug-in terminal block</th>
<th>plug-in terminal block</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>100 – 240 V AC, 120 – 350 V DC</td>
<td>24 V DC (19 V – 32 V)</td>
<td>48 V DC (38 V – 60 V)</td>
</tr>
<tr>
<td>Input frequency</td>
<td>47 – 63 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>1.8 A (230 V), 4.2 A (115 V)</td>
<td>max. 21 A (24 V DC)</td>
<td>max. 10 A (48 V DC)</td>
</tr>
<tr>
<td>Activation current</td>
<td>typ. &lt; 40 A at 265 V AC and cold start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal power of voltage supply</td>
<td>350 W (230 V), 370 W (110 V)</td>
<td>380 W</td>
<td>350 W</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>LEDs (P1) at switch chassis</td>
<td>LEDs (P1 and P2) at switch chassis</td>
<td>LEDs (P1 and P2) at switch chassis</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C up to +60°C</td>
<td>0°C up to +60°C</td>
<td>0°C up to +60°C</td>
</tr>
</tbody>
</table>

Plug-in power supplies

Product description

<table>
<thead>
<tr>
<th>Description</th>
<th>Power supply plug-in for M4-POWER chassis</th>
<th>Power supply plug-in for M4-POWER chassis with two inputs for redundant power supply</th>
<th>Power supply plug-in for M4-POWER chassis with two inputs for redundant power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>M4-P-AC/DC 300 W</td>
<td>M4-P-24VDC 300 W</td>
<td>M4-P-48VDC 300 W</td>
</tr>
<tr>
<td>Order No.</td>
<td>943 875-001</td>
<td>943 876-001</td>
<td>943 877-001</td>
</tr>
</tbody>
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Technical data

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<th>non-heating appliance socket</th>
<th>plug-in terminal block</th>
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<tbody>
<tr>
<td>Operating voltage</td>
<td>100 – 240 V AC, 120 – 350 V DC</td>
<td>24 V DC (19 V – 32 V)</td>
<td>48 V DC (38 V – 72 V)</td>
</tr>
<tr>
<td>Input frequency</td>
<td>47 – 63 Hz</td>
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<td></td>
</tr>
<tr>
<td>Current consumption</td>
<td>1.8 A (230 V), 4.2 A (115 V)</td>
<td>21 A (24 V DC)</td>
<td>max. 10 A (48 V DC)</td>
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<tr>
<td>Activation current</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nominal power of voltage supply</td>
<td>350 W (230 V), 370 W (110 V)</td>
<td>380 W</td>
<td>350 W</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>LEDs (P3) at switch chassis</td>
<td>LEDs (P3 and P4) at switch chassis</td>
<td>LEDs (P3 and P4) at switch chassis</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C up to +60°C</td>
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</tr>
</tbody>
</table>

Fan

Product description

<table>
<thead>
<tr>
<th>Description</th>
<th>Plug-in fan for MACH 4002 switch chassis, four redundant single fans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>M4-AIR</td>
</tr>
<tr>
<td>Order No.</td>
<td>943 869-001</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>operating voltage via MACH4002 switch chassis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostics</td>
<td>LEDs (FAN) at basic device</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C up to +60°C</td>
</tr>
</tbody>
</table>
### Power supplies

#### Product description

- **Type**: M4-8TP-RJ 45, M4-FAST 8TP-RJ 45 PoE, M4-FAST 8-SFP, M4-GIGA 8-SFP
- **Media module for MACH 4000**:
  - 10/100/1000BASE-TX (with media module)
- **Technical data**:
  - **Port type and quantity**: 8x 10/100/1000BASE-TX (RJ 45) sockets for TP cable, auto-crossing, auto-negotiation, auto-polarity
  - **Diagnostics**: LEDs (power, link status, data, auto-negotiation, full duplex, ring port, LED test)
  - **Power supply**: via the backplane of the MACH 4000 switch
  - **Operating voltage**: 2W
  - **Operating temperature**: 0°C up to +60°C

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#### SFP fiber optic Fast-ETHERNET transceiver

**Product description**

- **Type**: M-FAST SFP-LH/LC, M-FAST SFP-LH+/LC, M-FAST SFP-MM/LC
- **Order No.**
  - M-FAST SFP-LH/LC: 943 868-001
  - M-FAST SFP-LH+/LC: 943 049-001
  - M-FAST SFP-MM/LC: 943 014-001
- **Network size - length of cable**
  - Multimode fiber (MM) 50/125 µm: 60 – 120 km
  - Single mode fiber (SM): 5 km (4 km at 62.5/125 µm)
- **Technical data**
  - **Port type and quantity**: 1x100BASE-FX with LC-Connector
  - **Diagnostics**: optical input- and output power, transceiver temperature (diagnostic not for M-FAST SFP-MM/LC)
  - **Power consumption**: 1W
  - **Operating temperature**: 0°C up to +60°C

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#### SFP fiber optic Gigabit-ETHERNET transceiver

**Product description**

- **Type**: M-SFP-LH/LC, M-SFP-LH+/LC, M-SFP-MM/LC
- **Order No.**
  - M-SFP-LH/LC: 943 867-001
  - M-SFP-LH+/LC: 943 042-001
  - M-SFP-MM/LC: 943 015-001
- **Network size - length of cable**
  - Multimode fiber (MM) 50/125 µm: 60 – 120 km
  - Single mode fiber (SM): 550 m (275 m)
- **Technical data**
  - **Port type and quantity**: 1x1000BASE-FX with LC-Connector
  - **Diagnostics**: optical input- and output power, transceiver temperature
  - **Power consumption**: 3W
  - **Operating temperature**: 0°C up to +60°C

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#### XFP fiber optic 10Gigabit-ETHERNET transceiver

**Product description**

- **Type**: M-XFP-ZR/LC, M-XFP-ER/LC, M-XFP-LR/LC, M-XFP-SR/LC
- **Order No.**
  - M-XFP-ZR/LC: 943 921-001
  - M-XFP-ER/LC: 943 920-001
  - M-XFP-LR/LC: 943 919-001
  - M-XFP-SR/LC: 943 917-001
- **Network size - length of cable**
  - Multimode fiber (MM) 50/125 µm: 40 – 80 km
  - Single mode fiber (SM): 300 m* (33 m)
- **Technical data**
  - **Port type and quantity**: 1x100BASE-FX with LC-Connector
  - **Diagnostics**: optical input- and output power, transceiver temperature
  - **Power consumption**: 3W
  - **Operating temperature**: 0°C up to +60°C

*modal bandwidth 2000 [MHz x km]