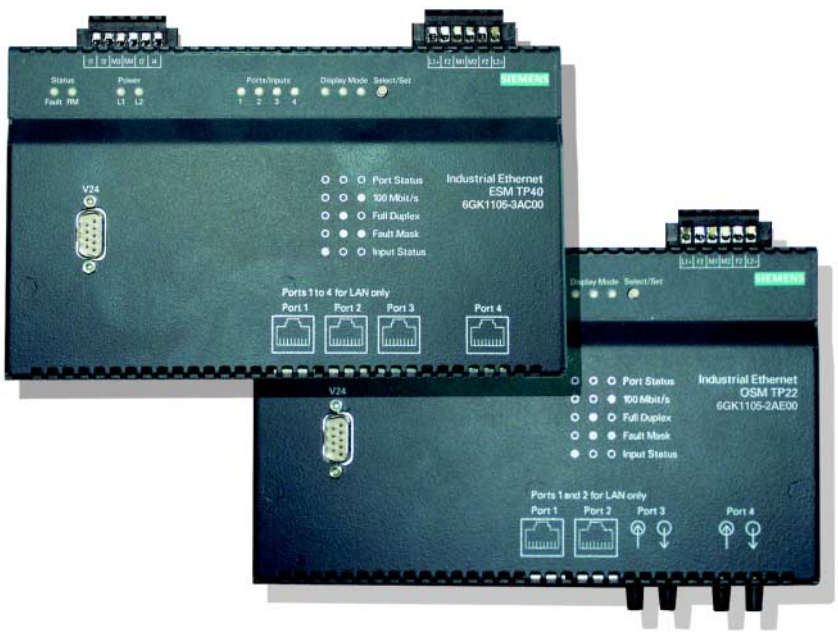
Industrial Ethernet
OSM TP22 and ESM TP40



- The OSM TP22 (optical switch module) and ESM TP40 (electrical switch module) are expand the OSM/ESM range and permit connection of 1 or 2 stations at 10/100 Mbit/s to Industrial Ethernet networks with a linear or ring structure.
- Integral redundancy manager for fast media redundancy in a redundant ring.
- Extremely simple network configuration and expansion without complex configuration rules or parameterization.
- Web-based management and SNMP (Simple Network Management Protocol).
- Incorporation of digital signals, e.g. door switches, temperature monitors or alarm contacts, into the management function using 4 digital inputs.

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Industrial Ethernet OSM TP22 and ESM TP40

Application

The OSM TP22 optical switch modules and the ESM TP40 electrical switch modules permit cost-effective design of switched networks with 100 Mbit/s and a low connection density. They are therefore ideally suited for use in control cabinets with 1 or 2 connected stations (see Fig. 1).

OSM TP22 and ESM TP40 are members of the OSM/ESM range and can be used in combination with these products in an Industrial Ethernet network.
The redundancy manager integrated in OSM TP22 and ESM TP40 permits the design of redundant Industrial Ethernet ring structures with switching technology with fast media redundancy (max. reconfiguration time 0.3 s).
OSM TP22 with two fiber-optic ports (FO ports) are required to design optical linear or ring structures (see Fig. 2).
Electrical linear or ring structures are designed using two twisted pair ports of the ESM TP40.
The data transfer rate in the ring is 100 Mbit/s. Up to 50 OSM or ESM can be used per ring.
In addition to the two ring ports, the OSM TP22 and ESM TP40 have two further ports (RJ45 interface) to which stations as well as network segments can be connected.
Several rings can be connected together in redundant mode using OSM TP62 or ESM TP80.

Correct functioning of the modules can be monitored using the alarm contact. Furthermore, OSM and ESM can be integrated in network management systems based on SNMP. Simple parameterization and monitoring are possible using the Web-based management.

Alarm contacts of e.g. PROFIBUS OLM, door switches or temperature monitoring functions can be connected to OSM TP22 or ESM TP40 using four floating digital inputs. These inputs can be monitored by the network management (display status, generate trap or e-mail on change in status).

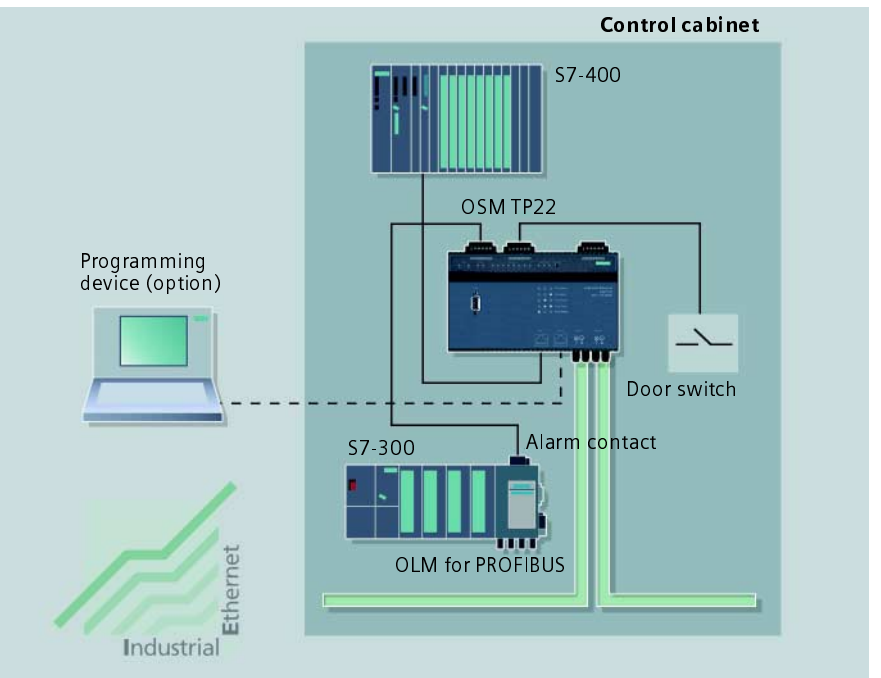

Fig. 1: Control cabinet with OSM TP22

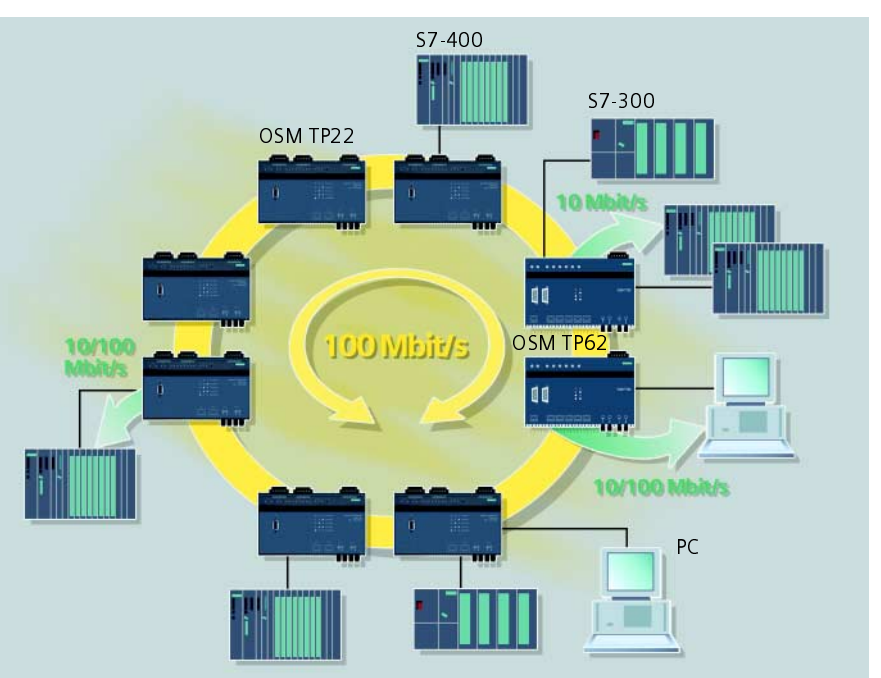

Fig. 2: Optical ring with OSM TP22 and OSM TP62

Industrial Ethernet OSM TP22 and ESM TP40

Design

OSM TP22 and ESM TP40 have a rugged metal housing suitable for mounting as follows:

- On DIN rails
- Wall mounting
- 19-inch mounting (when using two modules).

All modules have:

- a 6-pin terminal block for connection of power supply (redundant 24 V DC supply) and floating alarm contact
- a 6-pin terminal block for connection of four digital inputs.

Operating mode and status information are displayed on a row of LEDs and a selection pushbutton.

The OSM TP22 and ESM TP40 can be parameterized, diagnosed or updated to the latest firmware release using the serial interface. The firmware update can also be carried out using the network.

OSM TP22 and ESM TP40 have a total of four ports of the following type:

- 10/100BaseTX RJ45:
  RJ45 socket, automatic detection of data transfer rate (10 or 100 Mbit/s) for connection of TP cords (max. length 10 m; up to 100 m with Industrial Ethernet fast connect outlets RJ45 and FC TP standard cable).
- 100BaseFX BFOC MM:
  2 BFOC sockets per port, data transfer rate 100 Mbit/s, for connection of multimode fiber-optic cable in highly loaded EMC environment and for distances up to 3000 m between two OSM.

Functions

- Increase in network performance:
  Filtering of the data transfer using the Ethernet (MAC) address of the terminals means that local data transfer remains local and that only data to stations of another subnetwork are passed on by the OSM or ESM.
- Simple configuration and expansion of network:
  OSM and ESM save the data received at the ports and automatically pass them on to the target address. Limitation of the network expansion by collision recognition (CSMA/CD procedure) finishes at the OSM/ESM port. A total network expansion up to 150 km or more is possible without problem.
- Limitation of fault propagation to the affected subnetwork:
  OSM and ESM only pass on valid data.
- Integration of existing subnetworks with 10 Mbit/s into Fast Ethernet networks with 100 Mbit/s:
  OSM and ESM automatically recognize the data transfer rate (10 or 100 Mbit/s) at RJ45 ports, as well as full duplex or half duplex mode.

Fast redundancy in the ring:
Reliable communication is achieved by closing an optical line with OSM or an electrical line with ESM into a ring. OSM and ESM have an integral redundancy manager (RM) which permanently monitors the network functions. It recognizes the failure of a transmission section in the ring or an OSM or ESM, and activates the redundant link within a maximum of 0.3 s.

Network topology and configuring

OSM TP22 and ESM TP40 are usually accommodated together with the connected stations in a switchgear cabinet. The cabinets are connected together in a line or (with increased availability demands) as a ring.
This can be carried out either optically with fiber-optic cables (OSM TP22) or electrically with TP cables (ESM TP40).

When configuring the network, you need only observe the following conditions:

- Max. length of fiber-optic cable between two modules:
  3000 m with multimode fiber-optic cable
- Max. length of TP cord:
  10 m (total length up to 100 m when additionally using Industrial Ethernet FC outlets RJ45 and Industrial Ethernet FC TP standard cable)

Network configuration rules such as "Runtime equivalent" and "Variability value" end at the switch port, and are insignificant for the cascading of switches such as OSM and ESM.

Industrial Ethernet OSM TP22 and ESM TP40

Startup and diagnostics

The following settings are possible directly on the OSM and ESM:

- Redundancy manager RM:
  When designing a ring, one module in the ring is switched to RM mode.
  The non-ring ports of the RM can be freely used to connect terminals and networks.
- Alarm screen form:
  The alarm screen form is set using keys to the current status of the module (reference status). The form defines which ports and power supplies are to be monitored.
  The alarm contact only signals a fault if a monitored port or monitored power supply fails (deviation between reference and actual statuses).

OSM and ESM have the following diagnostics facilities:

- Status information is display locally on LEDs:
  - RM mode
  - Alarm contact status
  - Status of the two power supplies
  - Port status
  - Port mode (10/100 Mbit/s, full duplex/half duplex)
  - Alarm screen form (reference status)
  - Status of the 4 digital inputs

The status of the alarm contact is output by using floating relay contacts. The module can thus be monitored by another controller when using an input module.

Function	OSM TP22/ESM TP40	OSM/ESM [1]
Total number of ports	**4**	**8**
Integral redundancy manager	☺	☺
Integral standby function	-	☺
ITP version	-	☺
Long-distance version	-	☺
Network management		
▪ CLI (serial, TELNET)	☺	☺
▪ Web based management	☺	☺
▪ Programmable filters	-	☺
▪ RMON	-	☺

1) OSM TP 62, OSM ITP62, OSM ITP53, OSM ITP 62-LD, OSM BC08,ESM TP80, ESM ITP80

Table 1: OSM TP22/ESM TP40 functions compared with 8-port OSM/ESM

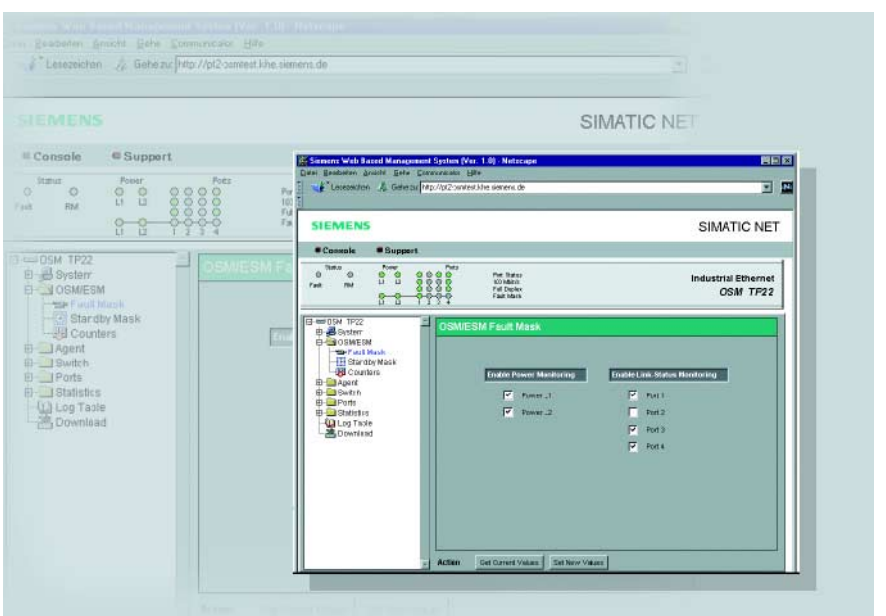

Fig. 3: Web based management

Industrial Ethernet OSM TP22 and ESM TP40

Startup and diagnostics
(continued)

Furthermore, OSM TP22 and ESM TP40 can be monitored using network management. The following interfaces are available:

- Local on module:
  By using the serial interface and PC with terminal emulation by command line (CLI - command line interface).
- Remote using browser
  (Web based management):
  Selection of OSM or ESM using the network from a PC with browser (see Fig. 3).
- Remote using SNMP:
  Linking of OSM and ESM with the network to a network management station.

Network management offers the following functions:

- Password-protected logging in for administrator (read and write privileges) and user (only read privileges)
- Reading of version and status information
- Settings for alarm screen form and address information
- Fixed parameter settings for ports (data transfer rate, half duplex/full duplex)
- Output of statistical information
- Diagnostics of data transfer using a parameterizable mirror port with a commercially available network analyzer
- Downloading of new firmware releases or configuration data from a TFTP server using the network
- Saving of configuration data or log table on a TFTP server using the network.

If faults occur in the network, the OSM TP22 and ESM TP40 can automatically send error messages (traps) to a network management system, or e-mails to a specified network administrator.

- Reliable communication resulting from extremely fast reconfiguration of network in event of fault (< 0.3 s)
- Investments made in existing networks are saved by:
  - Problem-free linking of existing 10 Mbit/s terminals or network segments to Fast Ethernet networks with 100 Mbit/s
  - Increase in performance by decoupling of load, and data transfer rate of 100 Mbit/s
- Simple network configuration without runtime calculations even for very large networks
- High network availability resulting from:
  - Redundant power supply
  - Redundant network structures based on fiber-optic and twisted pair cables, integral redundancy manager
- Ideal solution for networking 1 or 2 stations per location
- Simple linking of digital signals into diagnostics using network management functions
- Simple monitoring and diagnostics using alarm contacts

Industrial Ethernet OSM TP22 and ESM TP40

Technical specifications	
Interfaces	
▪ Connection of terminals or network segments	RJ45 socket (10/100 Mbit/s; TP)
▪ Connection of fiber-optic cables to further modules/terminals	2 x 2 BFOC sockets (100 Mbit/s; 100BaseFX) for multimode fiber-optic cable
▪ Connection for power supply and alarm contact	6-pin plug-on terminal block
▪ Connection for 4 floating digital inputs	6-pin plug-on terminal blocks; input voltage: - Rated value 24 V DC - For "1" state: +13 ...+30V - For "0" state: -30 ... +3V Max. input current: 8 mA
Power supply	2 x 24 V DC (18 V to 32 V)
Current consumption	1000 mA
Power loss at 24 V DC	20 W
Network expansion parameters	
▪ Fiber-optic cable length between two OSM TP22	0 - 3 km (62.5/125 µm glass fiber; 1.0 dB/km at 1300 nm; 600 MHz x km or 50/125 µm glass fiber; 1.0 dB/km at 1300 nm; 600 MHz x km)
▪ TP cable length	0 - 10 m; 0 - 100 m with structured cabling (e.g. with Industrial Ethernet FC Outlet)
Cascading depth	
▪ Linear/star structure	Any (only depends on signal propagation time)
▪ Redundant ring	50 (with reconfiguration time < 0.3 s)
Permissible ambient conditions	
▪ Operating temperature	0 °C to +55 °C
▪ Storage/transport temperature	-20 °C to +80 °C
▪ Operating height	2000 m above sea level
▪ Relative humidity during operation	< 95%
Design	
▪ Dimensions (W x H x D) in mm	217 x 156.5 x 69
▪ Weight in g	1300
▪ Mounting	DIN rail, fixed 19" mounting (in pairs)
Degree of protection	IP 20

Ordering data	
Industrial Ethernet OSM TP22 Optical switch module with 2 fiber-optic ports 100 Mbit/s, 2 RJ45 ports 10/100 Mbit/s and 4 digital inputs; redundant 24 V DC power supply and alarm contact	**6GK1105-2AE00**
Industrial Ethernet ESM TP40 Electrical switch module with 4 RJ45 boards 10/100 Mbit/s and 4 digital inputs; redundant 24 V DC power supply and alarm contact	**6GK1105-3AC00**
Industrial Ethernet FC outlet RJ45 For connecting Industrial Ethernet FC cables and TP cords; staggered prices starting with 10 and 50 units	**6GK1901-1FC00-0AA0**
Industrial Ethernet TP standard cable TP installation cable for connection to Industrial Ethernet FC Outlet RJ45 for universal use	**6XV1840-2AH10**
TP cord RJ45/RJ45 TP cable with 2 RJ45 plugs 0.5 m 1 m 2 m	 **6XV1850-2GE50** **6XV1850-2GH10** **6XV1850-2GH20**
TP XP cord RJ45/RJ45 Crossed TP cable with 2 RJ45 plugs 0.5 m 1 m 2 m	 **6XV1850-2HE50** **6XV1850-2HH10** **6XV1850-2HH20**

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