SIEMENS
SIMATIC NET

Industrial Ethernet OSM/ESM

Operating Instructions

Preface, Contents

Introduction 1

Functions 2

Network Topologies with OSM/ESM 3

Interfaces, Displays and Operator Controls 4

Installation, Commissioning 5

Firmware Update 6

Technical Specifications 7

Standards and Approvals 8

Glossary 9

References 10

Index 11

Release 05/2003

C79000-Z8976-C068-10

Preface

Purpose of the Operating Instructions

These Operating Instructions provide you with support during configuration, commissioning, and troubleshooting of networks with Industrial Ethernet OSMs (Optical Switch Module) and Industrial Ethernet ESMs (Electrical Switch Module).

The Package

The OSM/ESM includes the following components:

- OSM/ESM device
- 6-pin plug-in terminal block for connection of the power supply and the signaling contact
- One or two 6-pin plug-in terminal blocks for OSMs/ESMs with digital inputs
- Kit for wall mounting or mounting in 19" cubicle
- Product information bulletin
- CD

Installing an OSM/ESM

- Follow the instructions in Chapter 5 of these operating instructions.

Validity of the Operating Instructions

These operating instructions are valid for the following devices:

- OSM ITP62
- OSM ITP62-LD
- OSM ITP53
- ESM ITP80
- OSM TP62
- ESM TP80
- OSM BC08
- OSM TP22
- ESM TP40

Further Documentation

The OSM/ESM Network Management manual /1/ describes how to operate the OSM/ESM with network management.

The "SIMATIC NET Industrial Twisted Pair and Fiber Optic Networks" manual /2/ contains further information if you want to connect the OSM/ESM to other SIMATIC NET network components (for example OLM, ELM) or if you want to connect entire network segments to an OSM/ESM.

The "Triaxial Networks for Industrial Ethernet" manual /3/ contains instructions on creating triaxial networks that you can connect via an ELM to an OSM/ESM.

Finding Information

To help you to find the information you require more quickly, the manual includes not only the table of contents but also the following sections in the Appendix:

- Glossary
- Index

Guide to the Manual

To help you to find specific information quickly, these operating instructions include the following parts:

- At the front of the operating instructions you will find a complete table of contents.
- The chapters have headings in the left margin with an overview of the contents of the paragraphs in the section.
- Following the appendix, you will find a Glossary in which the most important specialist terms used in the instructions are defined.
- At the back of the operating instructions, you will find an index with which you can find topics quickly.

Audience

These Operating Instructions are intended for staff involved in configuration, commissioning, and troubleshooting networks with Industrial Ethernet OSMs (Optical Switch Module) and Industrial Ethernet ESMs (Electrical Switch Module).

Personnel Qualification Requirements

Only qualified personnel should be allowed to install and work on this equipment. Qualified personnel as referred to in the operating instructions or in the warning notes are defined as persons who are familiar with the installation, assembly, startup and operation of this product and who possess the relevant qualifications for their work, e.g.:

- Training in or authorization for connecting up, grounding or labeling circuits and devices or systems in accordance with current standards in safety technology;
- Training in or authorization for the maintenance and use of suitable safety equipment in accordance with current standards in safety technology;
- First Aid qualification.

Standards and Approvals

The OSM /ESM meets the requirements for the CE mark. You will find detailed information on the existing approvals and certifications in the Appendix in this manual.

Contents

1 Introduction 6

1.1 Overview of the Variants of the OSM/ESM 7
1.1.1 OSM ITP62 7
1.1.2 OSM ITP62-LD 9
1.1.3 OSM ITP53 11
1.1.4 ESM ITP80 13
1.1.5 OSM TP62 15
1.1.6 ESM TP80 17
1.1.7 OSM BC08 19
1.1.8 OSM TP22 21
1.1.9 ESM TP40 23

2 Functions 25

3 Network Topologies with OSM/ESM 28

3.1 Bus Structure 29
3.2 Redundant Ring Structure 31
3.3 Redundant Coupling of Network Segments 33
3.4 Compatibility of OSM Version 2/ESM with OSM/ORM Version 1 37
3.5 Coupling Network Segments 41

4 Interfaces, Displays and Operator Controls 43

4.1 ITP/TP Ports 44
4.1.1 ITP Ports 44
4.1.2 TP Ports 44
4.1.3 Properties of the TP/ITP Ports 45
4.1.4 FO Ports 47
4.1.5 Standby-Sync Port 48
4.1.6 Serial Interface 49
4.1.7 Signaling Contact/Terminal Block for Attaching the Power Supply 50
4.1.8 Digital Inputs 53
4.2 Displays and Operator Controls 54
4.2.1 LED Display "Status" 54
4.2.2 LED "Power" 56
4.2.3 Port LEDs 58
4.2.4 Operator Controls 60

5 Installation, Commissioning, Cleaning and Maintenance 62

5.1 Unpacking, Checking the Consignment 63
5.2 Installation 64
5.3 Cleaning 71
5.4 Maintenance 72

6 Firmware Update 73

7 Technical Specifications 78
8 Standards and Approvals 84
9 Glossary 88
10 References 91
11 Index 93

1.1.4 ESM ITP80

Possible Attachments

The ESM ITP80 allows attachment of up to eight DTEs or network segments with ITP connectors (sub-D9 female). By coupling further ESMs to ports 7 and 8 it is possible to create optical bus and ring structures.

The ESM ITP80 also has eight digital inputs. The states of the inputs are available in a management information base (MIB) and can be read using an SNMP get request. Depending on the configuration of the device, changes at these inputs can also trigger the sending of E-mails, SNMP traps and/or entries in the log of the ESM. The use of these functions is described in the OSM/ESM Network Management User Manual /1/.



Figure 4: ESM ITP80

Properties of the ESM ITP80	
Electrical ports	8 x 10/100 Mbps autonegotiation/autocrossover ports ITP connectors (sub-D 9-pin female)
Maximum distance between two ESMs	100 m
Maximum ring span with 50 ESMs	5 km
Digital Inputs	8 x DC 24V

Note

Industrial Ethernet OSM ITP80 is available in two versions:

- ESM ITP80 with eight digital inputs:
  The eight digital inputs are connected over two plug-in 6-pin terminal blocks on the top of the device. To display the status of these inputs using the eight device LEDs, there is an additional display mode known as the "Input Status" that is selected using a third mode LED.
- ESM ITP80 without digital inputs:
  There are no digital inputs and the "Input Status" display mode is not available. The operating states are displayed by two mode LEDs.

Power Supply

The power supply can be connected redundantly. Both inputs are isolated. There is no load distribution. With redundant power supply, the power supply unit with the higher output voltage supplies the OSM/ESM alone.

Signaling Contact

The following is signaled via a floating signaling contact (relay contact) when contact is broken:

- The failure of a monitored power supply. Which power supply is monitored is specified in the fault mask (see Section 4.2.3).
- The incorrect link status of a monitored port (in other words, the port is not correctly attached or there are no link test pulses coming from the partner device). The ports to be monitored are selected using the fault mask.
- When at least one port is segmented.
- If the DIP switch setting was changed during operation.
  (Inconsistency between the switch setting and the actual operating state because the switch setting is adopted only after a restart)

In the RM Mode (additional)

- The incorrect link status of port 7 or port 8 of the OSM ITP62, OSM ITP53, ESM ITP80, OSM TP62, ESM TP80, and OSM BC08 or of port 3 or port 4 of the OSM TP22 and ESM TP40, regardless of the status of the fault mask.
- When a second OSM is switched to the RM mode in the same ring.

OSM/ESM in Normal Mode and ITP XP Standard Cable 9/9 Plugged into the Standby-Sync Port:

- Short-circuited ITP XP Standard Cable 9/9
- Bad standby configuration: The partner device connected via the ITP XP Standard Cable 9/9 is not switched to standby.
- If there is an incorrect link status on a standby port.

4.2 Displays and Operator Controls

The OSM/ESM has the following LED displays:

4.2.1 LED Display "Status"

The status display indicates the operating mode of an OSM/ESM:

Fault (red LED):

Status	Meaning
Lit	The OSM/ESM has detected an error. The signaling contact opens at the same time. The signaled errors are described in Chapter 4.1.7.
Not lit	No errors detected by the OSM/ESM.

Stby – Standby (green LED):

This LED does not exist on the OSM TP22 and ESM TP40.

Status	Meaning
Lit	The standby function is activated, the OSM/ESM is in the standby passive mode.
Not lit	The standby function is deactivated.
Flashes	The standby function is activated, OSM/ESM is in the standby active mode; in other words, the master OSM/ESM has failed and the standby OSM/ESM takes over data traffic.

4.2.4.2 "Select/Set" Button

The "Select/Set" button on the front panel of the OSM/ESM has the following functions:

- Pressing the button briefly moves on the display of the port LEDs (display mode). The current display mode is indicated by the display mode LEDs.
- If the display is in the port status (all display mode LEDs off) and if the button is pressed for three seconds, the display mode LEDs begin to flash. If you then continue to press the button for a further two seconds, the OSM/ESM is reset.

When it is reset, all the settings of the OSM/ESM are set to their defaults (as set in the factory). This allows you to cancel settings made, for example, with Web-Based Management (WBM) (see also OSM/ESM Network Management, User Manual).

- If the display is in the fault mask status and you press the button for two seconds, the display LEDs start to flash. If you then press the button for a further two seconds, the current status of the ports and the supply voltages are entered in the fault mask. This means, if, for example, the ports 1, 5, 6 had a valid connection (in other words the port status displays of these ports are lit green or yellow) and if power supply 1 was active at the point when the values were entered in the fault mask, ports 1, 5, 6 and power supply 1 will then be monitored.

Note

If the "Select/Set" button is pressed while the device is starting up (takes approximately 20 seconds) after turning on the OSM/ESM, the OSM/ESM changes to the load firmware status (all display mode LEDs flash simultaneously). This status is exited by pressing the button again. For further information on loading the firmware, refer to Chapter 6.

Technical Specifications 7

Ports	
Attachment of DTEs or network segments twisted pair/Industrial Twisted Pair	6 x 9-pin sub-D female connectors for OSM ITP62, OSM ITP62-LD 5 x 9-pin sub-D female connectors for OSM ITP53 8 x 9-pin sub-D female connectors for ESM ITP80 2 x RJ-45 jacks for OSM TP22 4 x RJ-45 jacks for ESM TP40 6 x RJ-45 jacks for OSM TP62 8 x RJ-45 jacks for ESM TP80 All electrical ports support 10/100 Mbps autonegotiation OSMs/ESMs with digital inputs: The electrical ports support autocrossover.
Standby-sync port for redundant coupling of rings	1 x 9-pin sub-D female connector (not OSM TP22, ESM TP40)
Attachment of further OSMs and DTEs via FO	2 x 2 BFOC sockets for OSM ITP 62, OSM ITP62-LD, OSM TP62, OSM TP22 3 x 2 BFOC sockets for OSM ITP 53 8 x 2 BFOC sockets for OSM BC08 (100 Mbps, 100BaseFX, full duplex)
Connector for power supply and signaling contact	1 x 6-pin plug-in terminal block
Power supply (redundant inputs decoupled)	2 sources of DC 24V (DC 18 to 32V) safety extra-low voltage (SELV) Power supply connected over high resistance to casing (not electrically isolated). Tested in compliance with IEC 6100-4-5, 1995 "Surge Immunity Test" using the DEHN Blitzductor VT AD 24V, Type No. 918 402 lightning protection device

Ports	
Power loss at 24 V DC	20 W
Load on the signaling contact	DC 24 V / max. 100 mA safety extra-low voltage (SELV)
Current consumption at rated voltage	1000 mA
Overcurrent protection at input	Non-replaceable fuse (1.6 A / 250 V / slow)
Digital Inputs	Input voltage: • Rated voltage DC 24 V safety extra-low voltage (SELV) • For state "1": +13 ...+30V • For state "0": –30 ... +3V Max. input current: 8 mA Max. cable length: 30 m Inputs electrically isolated from electronics.

Permitted Cable Lengths	
FO cable length between two OSMs	For OSM ITP62, OSM ITP53, OSM TP62, OSM TP22: 0-3000 m (62.5/125 µm glass fiber; 1 dB/km at 1300 nm; 600 MHz*km; 6 dB max. permitted FO cable attenuation at 3 dB link power margin) 0-3000 m (50/125 µm glass fiber; 1 dB/km at 1300 nm; 600 MHz*km; 6 dB max. permitted FO cable attenuation at 3 dB link power margin) For OSM ITP62-LD: 0-26000 m (10/125 µm single mode fiber; 0,5 dB/km at 1300 nm; 13 dB max. permitted FO cable attenuation at 2 dB link power margin)
ITP cable length	0-100 m
TP cable length	0-10 m with TP cord up to 100 m total length when using the FastConnect cabling system
Length of the ITP XP Standard Cable 9/9 at standby-sync port	0-40 m

Cascading Depth	
Bus/star structure	Any (only depending on signal propagation time)
Redundant ring	50 (for reconfiguration time < 0.3 s)

Switching Properties of OSM/ESM	
Number of learnable addresses	Up to 7000
Aging time	40s (default)
Latency	4 µs (measured at 75% load between two ports operating at 100 Mbps)
Switching procedure	Store and forward

Permitted Ambient Conditions/EMC	
Operating temperature	0°C to +60°C
Storage/transport temperature	-40°C to +80°C
Relative humidity in operation	‹ 95% (no condensation)
Operating altitude	Max. 2000 m
Noise emission	EN 55081 Class A
Noise immunity	EN 50082-2
Laser protection	Class 1 complying with IEC 60825 -1

Mechanical Design	
Dimensions (W x H x D) in mm	217 x161 x 69
Weight in g	1400
Installation options	Standard rail S7-300 rail Wall mounted Installation in 19" cubicle **Only horizontal installation permitted** **(ventilation slits top/bottom)**
Degree of protection	IP 20

Consignment / Order Numbers	
Consignment	- SIMATIC NET Industrial Ethernet OSM/ESM - Fittings for 19" cubicle installation/wall mounting - 6-pin plug-in terminal block for power supply and signaling contact - One to two 6-pin plug-in terminal blocks for OSMs/ESMs with digital inputs - Documentation on the CD - Product information bulletin
Order number:	
Industrial Ethernet OSM ITP62 with digital inputs	6GK1105-2AA10
Industrial Ethernet OSM ITP62 without digital inputs	6GK1105-2AA00
Industrial Ethernet OSM ITP62-LD with digital inputs	6GK1105-2AC10
Industrial Ethernet OSM ITP62-LD without digital inputs	6GK1105-2AC00
Industrial Ethernet OSM ITP53 with digital inputs	6GK1105-2AD10
Industrial Ethernet OSM ITP53 without digital inputs	6GK1105-2AD00
Industrial Ethernet OSM ITP80 with digital inputs	6GK1105-3AA10
Industrial Ethernet OSM ITP80 without digital inputs	6GK1105-3AA00
Industrial Ethernet OSM TP62 with digital inputs	6GK1105-2AB10
Industrial Ethernet OSM TP62 without digital inputs	6GK1105-2AB00
Industrial Ethernet OSM TP80 with digital inputs	6GK1105-3AB10
Industrial Ethernet OSM TP80 without digital inputs	6GK1105-3AB00
Industrial Ethernet OSM TP22 with digital inputs	6GK1105-2AE00
Industrial Ethernet OSM TP40 with digital inputs	6GK1105-3AC00
Industrial Ethernet OSM BC08 with digital inputs	6GK1105-4AA00

Accessories	
Industrial Twisted Pair and Fiber Optic Networks Manual	6GK1970-1BA10-0AA1
Triaxial networks for Industrial Ethernet manual	6GK1970-1AA20-0AA0

Standards and Approvals

8

Product name:

The OSM/ESM products listed below, comply with the following standards and directives if they have the corresponding symbols on the type plate:

Industrial Ethernet OSM ITP62 with digital inputs	6GK1105-2AA10
Industrial Ethernet OSM ITP62 without digital inputs	6GK1105-2AA00
Industrial Ethernet OSM ITP62-LD with digital inputs	6GK1105-2AC10
Industrial Ethernet OSM ITP62-LD without digital inputs	6GK1105-2AC00
Industrial Ethernet OSM ITP53 with digital inputs	6GK1105-2AD10
Industrial Ethernet OSM ITP53 without digital inputs	6GK1105-2AD00
Industrial Ethernet OSM ITP80 with digital inputs	6GK1105-3AA10
Industrial Ethernet OSM ITP80 without digital inputs	6GK1105-3AA00
Industrial Ethernet OSM TP62 with digital inputs	6GK1105-2AB10
Industrial Ethernet OSM TP62 without digital inputs	6GK1105-2AB00
Industrial Ethernet OSM TP80 with digital inputs	6GK1105-3AB10
Industrial Ethernet OSM TP80 without digital inputs	6GK1105-3AB00
Industrial Ethernet OSM TP22 with digital inputs	6GK1105-2AE00
Industrial Ethernet OSM TP40 with digital inputs	6GK1105-3AC00
Industrial Ethernet OSM BC08 with digital inputs	6GK1105-4AA00

CE Mark

SIMATIC NET OSMs/ESMs meet the requirements of the following EU directives:

Directive 89/336/EEC “Electromagnetic Compatibility" (EMC directive)

Directive 73/23/EEC "Electrical Equipment Designed For Use Within Certain Voltage Limits" (Low Voltage Directive)

The EU declaration of conformity is available for the responsible authorities according to the above-mentioned EU directive at the following address: