

M7-400 Expansions

12

Chapter Overview

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12.1 Overview

Introduction

You can expand your automation computer from the M7-400 range by adding expansion modules for interface submodules, short AT modules, and/or the mass storage module. The interface submodules can include the IF 962-COM, IF 962-LPT, ...

The following expansion modules are available:

- EXM 478 expansion module for up to 3 interface submodules
- ATM 478 AT adapter module for one short AT module
- MSM 478 mass storage module with hard disk and floppy disk drive and an LPT1 printer port.

Expansion Socket

On the right-hand side of a CPU or an M7-400 application module there is a 120-pin socket (AT-ISA bus) for connecting expansions. There is a matching connector for this socket on the left-hand side of the EXM 478, ATM 478, and MSM 478 expansion modules (Figure 12-1).

The EXM 478, ATM 478 and MSM 478 expansion modules have one expansion socket each on the right-hand side so that further expansion modules can be plugged in.

Behavior on the S7-400 Backplane Bus

The expansion modules can be accessed via the relevant programmable module and not via the S7-400 backplane bus.

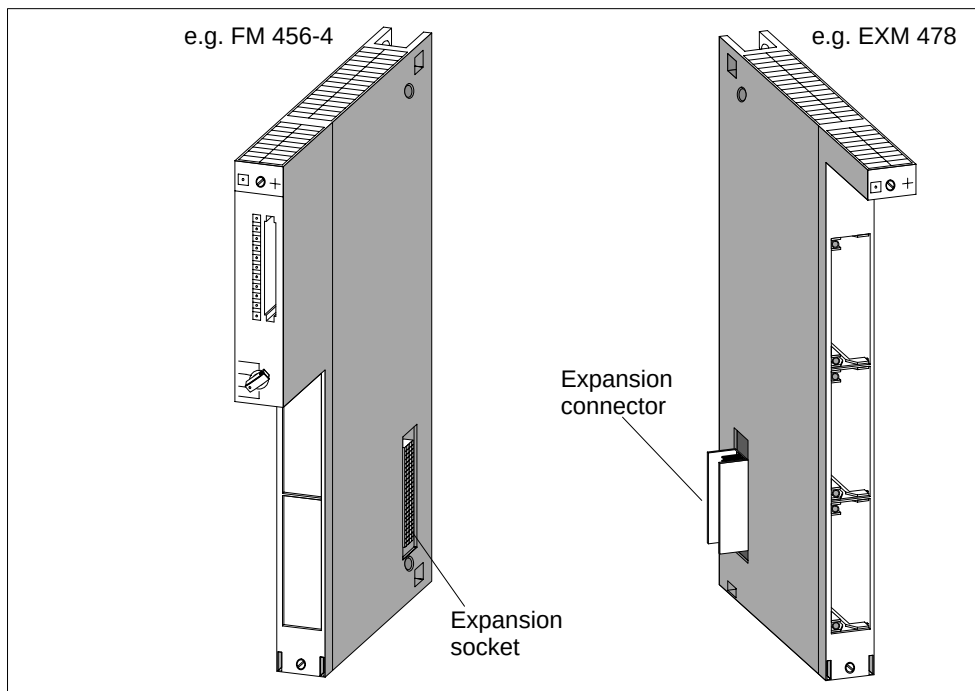


Figure 12-1 Positions of Expansion Socket and Expansion Connector

Maximum Expansion

Figure 12-2 shows the maximum possible expansion using expansion modules for a CPU 486-3, CPU 488-3, or FM 456.

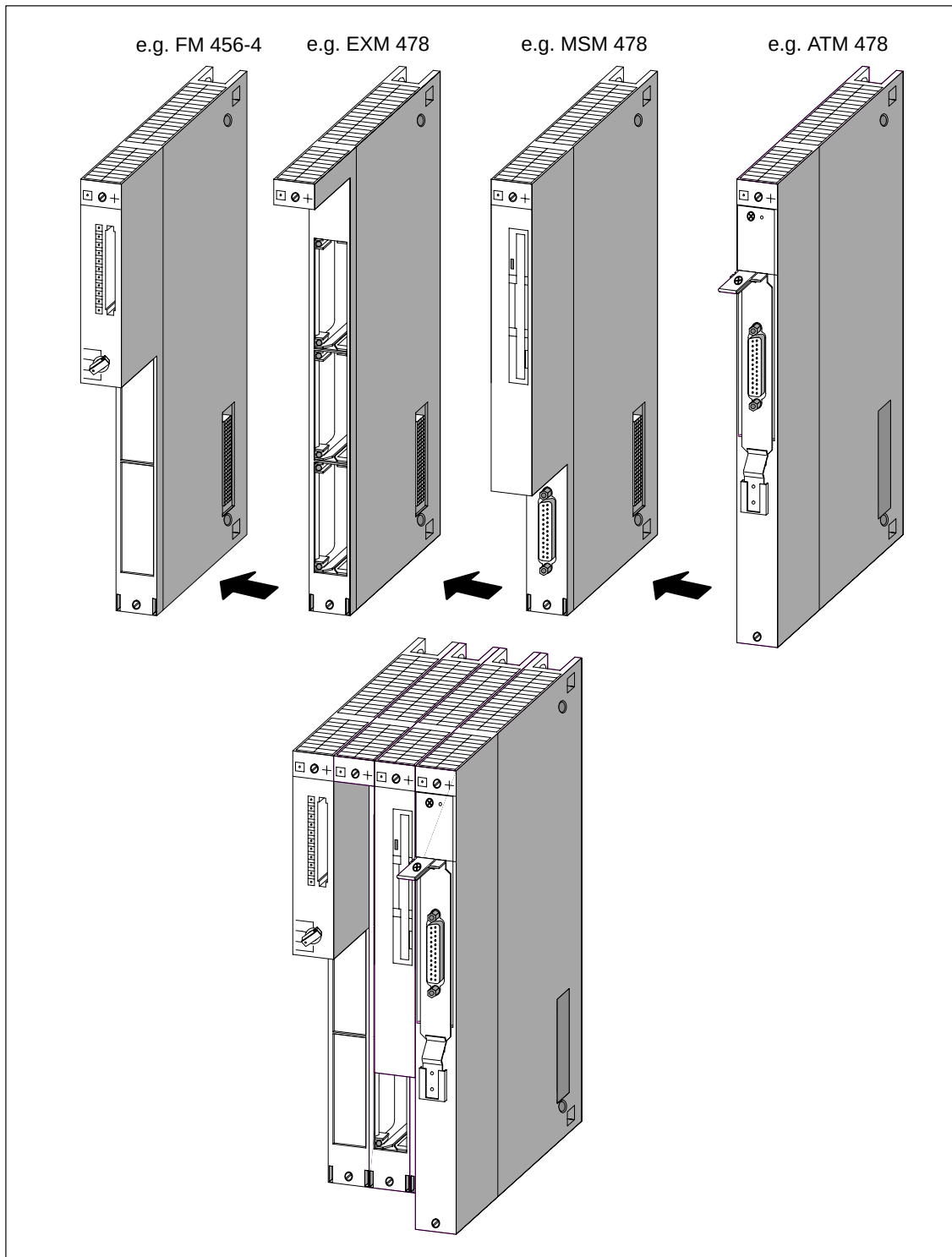


Figure 12-2 Maximum Expansion with Expansion Modules

Permissible Combinations

You can see from the table below which expansions can be connected to the programmable M7-400 modules.

Table 12-1 Expansion Possibilities of the CPU 486-3, CPU 488-3, or FM 456

Programmable M7-400 Module	Slot	Slot	Slot
Slot n in the Case of Single-Width Modules	n + 1	n + 2	n + 3
Slot n and n+1 in the Case of Double-Width Modules	n + 2	n + 3	n + 4
CPU 486-3, CPU 488-3, FM 456-4	–	–	–
	EXM 478	–	–
	EXM 478	EXM 478	–
	EXM 478	EXM 478	EXM 478
	EXM 478	EXM 478	ATM 478
	EXM 478	ATM 478	ATM 478
	EXM 478	ATM 478	–
	ATM 478	–	–
	ATM 478	ATM 478	–
	ATM 478	ATM 478	ATM 478
	MSM 478	–	–
	EXM 478	MSM 478	–
	EXM 478	EXM 478	MSM 478
	EXM 478	MSM 478	ATM 478
	MSM 478	ATM 478	ATM 478
	MSM 478	ATM 478	–

Rules for the Combinations

The following rules apply for expansions from left to right after a CPU or application module (slots n + 1, n + 2, n + 3 or n + 2, n + 3, n + 4):

1. Up to 3 EXM 478 expansion modules
2. Max. 1 MSM 478 mass storage module
(that is, always after the CPU 486-3, CPU 488-3, FM 456, or EXM 478)
3. Up to 3 ATM 478 AT adapter modules
(that is, always after the CPU 486-3, CPU 488-3, FM 456, EXM 478, or MSM 478)

In total, a CPU or application module can be expanded with up to three modules.

12.2 EXM 478 Expansion Module; (6ES7 478-2AC00-0AC0)

Characteristics

The EXM 478 expansion module is used to house up to three interface submodules. By installing the relevant interface submodule in this expansion module, such as the IF 962-VGA and IF 962-LPT, you can connect, for example, a VGA monitor, a keyboard, and a printer to your automation computer.

The EXM 478 expansion module has a 120-pin connector on the left-hand side and a 120-pin socket on the right-hand side for connecting a further expansion module or a mass storage module.

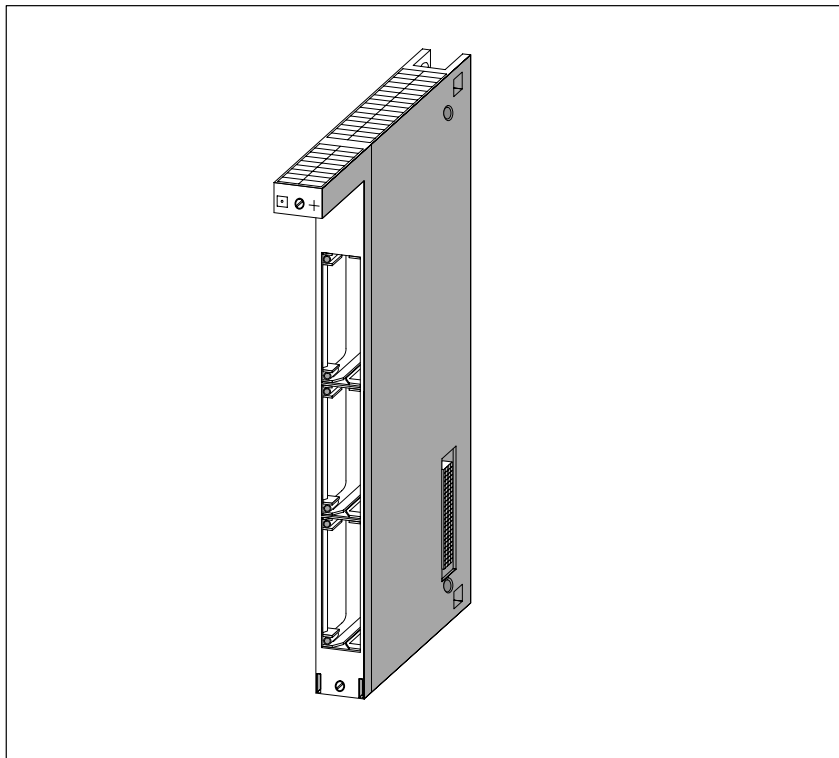


Figure 12-3 EXM 478 Expansion Module

12.2.1 Addressing the EXM 478 Expansion Module

Introduction

In order to be able to program the interface submodules in the EXM 478 expansion module, you must be able to determine their addresses. There are the following addressing methods:

- Addressing in the AT-compatible I/O address area
- Addressing in the M7-400-specific I/O address area

In this section, you will find information on both methods of addressing the interface submodules.

Addressing in the AT-Compatible I/O Address Area

Some of the interface submodules are automatically configured by the BIOS for operation in the AT-compatible I/O address area. This automatic configuration takes place, for example, for:

- The IF 962-VGA interface submodule
- Up to 4 COM ports (COM1 to COM4)
- Up to 3 LPT ports (one LPT port on the MSM 478 and two interface submodules IF 962-LPT)

Further interfaces are configured in the BIOS setup. See the CPU/FM description to learn how to operate the BIOS setup. The description of the interface submodules will show the specific settings possible.

To configure in the BIOS setup, you must know the submodule receptacle numbers of the interface submodule receptacles (slots). You will find this information in Figure 12-4 later in this section.

Addressing in the M7-400-Specific I/O Address Area

All interface submodules can be accessed via M7-400-specific I/O addresses. There is a description of how to determine the I/O address of an interface submodule in the “specific address area” starting from page 12-10.

You require this information to program an interface submodule that is not addressed in the AT-compatible address area.

Numbering of the Submodule Receptacles

Each receptacle (slot) for an interface submodule has a submodule receptacle number assigned to it. The submodule receptacle number depends on the configuration of your CPU or FM. The submodule slot numbers are shown in Figures 12-4 and 12-5.

You require these submodule receptacle numbers for configurations that you make in the BIOS setup or to determine the I/O addresses of an interface submodule.

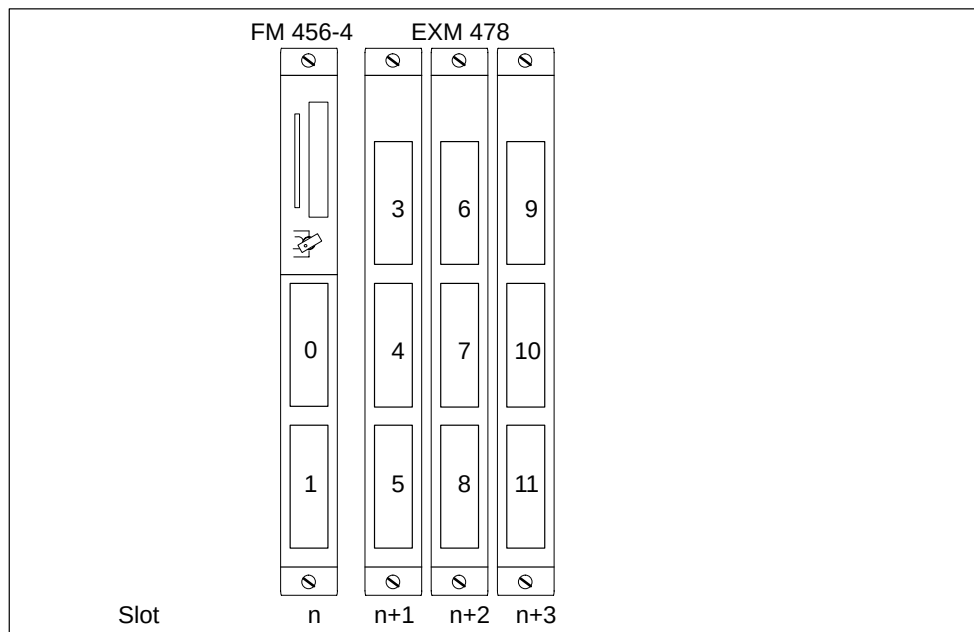


Figure 12-4 Submodule Receptacle Numbers for the FM 456-4 and EXM 478

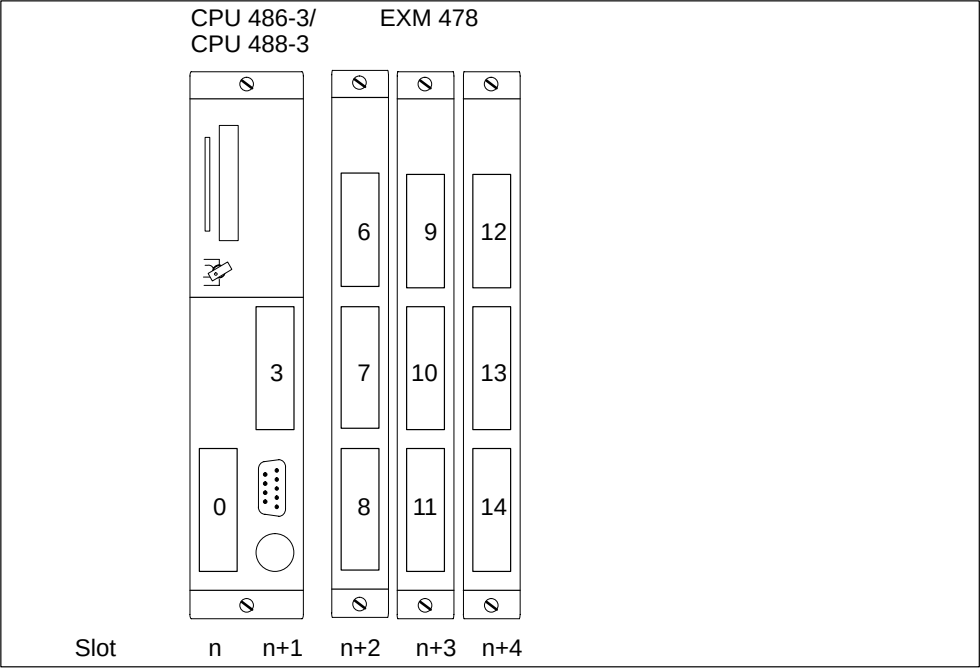


Figure 12-5 Submodule Receptacle Numbers for the CPU 486-3, CPU 488-3, and EXM 478

Division of Addresses in the M7-400-Specific I/O Address Area

The EXM 478 expansion module is operated on the ISA bus of the programmable module. The I/O address area from C000_H (to D2FF_H) in the CPU 486-3, CPU 488-3, or the FM 456 application module is reserved for this purpose. Each expansion module occupies 256 bytes (100_H) in this area. The division of the address area is shown in Figure 12-6 using the FM 456-4 as an example.

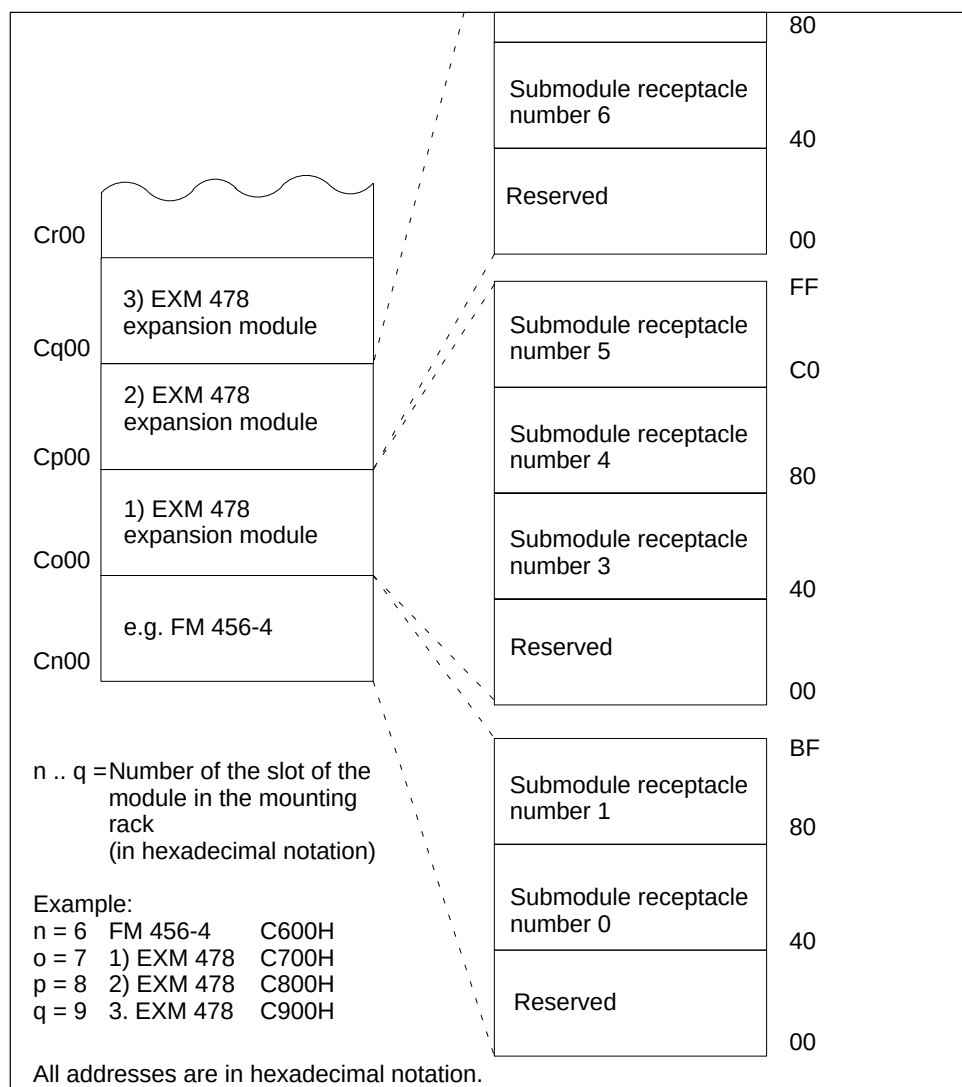


Figure 12-6 Base Addresses of the Expansion Modules and the Interface Submodules

Addresses Within an Expansion Module

Each expansion module occupies 256 bytes (100_H) within the CPU/FM address area. The division of the 256 addresses within an expansion module can be seen from Table 12-2.

Table 12-2 Division of Addresses Within an Expansion Module

Address	Function/Slot	Remarks
00 _H to 3F _H	Reserved	In this address area, the automation computer's BIOS makes basic settings in the expansion module such as assignment of interrupts, etc.
40 _H to 7F _H	Interface submodule x	
80 _H to BF _H	Interface submodule y	
C0 _H to FF _H	Interface submodule z	

Base Addresses of the Interface Submodules

Special characteristics of the interface submodules such as the location of the AT-compatible I/O addresses (IF 962-COM, IF 962-LPT, ...) are set via the base addresses, or the interface submodules are accessed exclusively via these base addresses (IF 961-DIO, IF 961-AIO,...).

The base address for an interface submodule is obtained from the sum of the slot-dependent address of the expansion module and the interface submodule address within the expansion module. You can find the resulting base addresses in Tables 12-3 and 12-4:

Table 12-3 Base Addresses of the Interface Submodules with FM 456-4

Base Address	Modules	Interface Submodule in Submodule Receptacle ...
Cn40 _H	FM 456-4 Slot n	Number 0
Cn80 _H		Number 1
Co40 _H	1st EXM 478 in slot o = n + 1	Number 3
Co80 _H		Number 4
CoC0 _H		Number 5
Cp40 _H	2nd EXM 478 in slot p = n + 2	Number 6
Cp80 _H		Number 7
CpC0 _H		Number 8
Cq40 _H	3rd EXM 478 in slot q = n + 3	Number 9
Cq80 _H		Number 10
CqC0 _H		Number 11
n .. q = Number of the module slot in the mounting rack in hexadecimal notation.		

Table 12-4 Base Addresses of the Expansion Modules with CPU 486-3,
CPU 488-3

Base Address	Modules	Interface Submodule in Submodule Receptacle ...
Cn40 _H	CPU 486-3, CPU 488-3 Slot n	Number 0
Co40 _H	CPU 486-3, CPU 488-3 Slot o = n + 1	Number 3
Cp40 _H	1st EXM 478 in slot p = n + 2	Number 6
Cp80 _H		Number 7
CpC0 _H		Number 8
Cq40 _H	2nd EXM 478 in slot q = n + 3	Number 9
Cq80 _H		Number 10
CqC0 _H		Number 11
Cr40 _H	3rd EXM 478 in slot r = n + 4	Number 12
Cr80 _H		Number 13
CrC0 _H		Number 14
n .. r = Number of the module slot in the mounting rack in hexadecimal notation.		

12.2.2 Interrupt Assignments, Signal Switching EXM 478

Introduction

Up to three interrupts per interface submodule are permitted in an EXM 478 expansion module. The various possible methods of interrupt assignment or interrupt operation are described below.

Interrupt Assignment

When configuring the interface submodules in the BIOS setup, you can assign ISA interrupts to the three interrupts of an interface submodule (IRQa, IRQb, IRQc). For this purpose, enter the ISA interrupt provided in the relevant screen form.

If you enter the value “F0_H” instead of the ISA interrupt, this interrupt is processed via a shared interrupt. See below for details.

Shared Interrupt

Since the number of interrupts is limited due to AT-compatibility, it is possible to assign several individual interrupts of the interface submodules to a shared interrupt in the EXM 478 expansion modules. The shared interrupt is shared by all interface submodule interrupts within an expansion module where the interrupt assignment “F0_H” has been entered.

The shared interrupt is assigned to the ISA interrupt during configuration of the interface submodule in the BIOS setup.

Signal Switching

In an EXM 478 expansion module, two interface submodule signals can be switched to another (signal switching). This signal switching is done during configuration of the interface submodule in the BIOS setup.

Refer to the interface submodule description to find out if an interface submodule requires signals from a further interface submodule, that is, if signal switching is necessary.

Note

You will find a detailed description of the BIOS setup in the M7-400 application module or CPU description.

12.2.3 Technical Specifications of the EXM 478 Expansion Module

Technical Specifications of the EXM 478

The table below contains the technical specifications of the EXM 478 expansion module:

EXM 478	
6ES7 478-2AC00-0AC0	
Performance Features	
Number of connectable interface modules	3
Connection of expansion modules	Yes
Technical Specifications	
Supply voltage	5 VDC
Current consumption (without interface submodules)	0.2 A
Power losses (without interface submodules)	0.5 W
Permissible power losses (with 3 interface submodules)	
• Without forced ventilation	max. 10 W
• With forced ventilation	max. 12 W
Dimensions	
W x H x D (mm)	25 x 290 x 210
Weight	0.65 kg

Note

The sum of the power losses of the EXM 478 expansion module and the interface submodules it contains must not exceed the maximum permissible power losses.
