

AMIKON TECHNICAL DOCUMENTATION

Manufacturer's Manual

Siemens 6ES7590-0BH00-0AA0

Active Backplane Bus ST 1+8

FAMILY	VARIANT	GRID	ROLE
SIMATIC	ST 1+8	35 mm	Active backplane

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ORIGINAL MANUFACTURER REFERENCE

SIMATIC S7-1500H, ET 200MP - Active backplane bus ST 1+12, ST 1+8 and ST 1+4. Equipment Manual, November 2024, A5E46240468-AD. This Amikon reference package retains selected original Siemens pages, their aspect ratio, colors, notices and printed page numbers.

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SELECTED ORIGINAL SECTIONS

- Document identity and safety context: original pages 1, 2 and 4.
- Purpose, use areas and compatibility: pages 10, 11, 13 and 14.
- Operation and safe replacement: pages 20, 21 and 29.
- Configuration and technical specifications: pages 23, 26, 30 and 31.
- Supported H-CPU and ET 200MP modules: pages 34-36.

Complete original Siemens manual - all drawings and cross-references

Use the ST 1+8 columns and exact module/firmware requirements. Mounting figures are reproduced separately in the Amikon Installation Instructions. This selected-page package is not a new manufacturer-issued manual and does not replace the complete original.

SIMATIC

S7-1500H, ET 200MP

Active backplane bus ST 1+12
slot, active backplane bus ST 1+8
slot, active backplane bus ST 1+4
slot

Equipment Manual

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Introduction

Purpose of the documentation

This documentation provides important information on assembling and commissioning the active backplane bus.

Basic knowledge required

A basic knowledge of automation engineering is required to understand the documentation.

Scope of the documentation

This documentation applies to all products from the following product families:

- S7-1500H
- SIMATIC ET 200MP

Conventions

- Interface module: This term refers to IM 155-5 PN HF and IM 155-5 mF HF. If a piece of information only affects one of the CPU versions, it is explicitly named.
- S7-1500H: This term refers to the CPU1517H and CPU1518HF. If a piece of information only affects one of the CPU versions, it is explicitly named.
- STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".
- The figures in this manual show the active backplane bus ST 1+12 slot. The figures also apply accordingly for the active backplane bus ST 1+8 slot and the active backplane bus ST 1+4 slot.

Recycling and disposal

The products are low in pollutants and can be recycled. For ecologically compatible recycling and disposal of your old device, contact a certificated waste disposal service for electronic scrap.

Product overview

3.1 New functions

Changes compared to the previous version

Compared to the previous version, this manual contains the following change:

- When you use the PS 60W 24/48/60VDC HF system power supply, note the following:
 - With H-CPU's as of firmware version V4.0, the entire data area can be used as retentive memory.
With the 1518HF CPU, you can only use 100 MB as retentive memory.
 - You can only plug in one power supply module.
- Support for interface module "IM 155-5 MF HF (6ES7155-5MU00-0CN0)"

3.2 Application area and function

Introduction

The active backplane bus serves to increase the system availability. It is designed for occasional pulling and plugging of I/O modules for expansion or in case of faults.

Benefits

The benefits of the active backplane bus are:

- Reaction-free replacement of a defective module:
 - Without the CPU reporting a station failure
 - Without disturbing modules in the station
- Startup with one or more module gaps. You have the option of plugging in additional modules later.
- Startup with configuration control is possible. You have the possibility to re-configure your plant.

Application

The area of application is everywhere where plant downtimes are not desired. The availability of the plant has the highest priority.

The areas of application are, for example:

- Logistics
 - High-bay storage facilities
 - Baggage conveyors at airports
 - Letter and paper sorting systems in postal logistics
- Infrastructure
 - Water/waste water
 - Tunnels
- Continuous processes that must not be interrupted due to the technical process management
 - Semiconductor industry
 - Chemical
 - Pharmaceutical
 - Battery manufacturing
- Applications in which plant operation must be maintained as long as possible, for example, when a service technician is not immediately available.
 - Offshore installations (oil platforms)
 - Compressors along gas pipelines that maintain the working pressure
- Other applications
 - Signal boxes in railway engineering
 - Shipbuilding

Properties

The active backplane bus can be used for ET 200MP with:

Designation	Article number	As of hardware functional status	As of firmware version
IM 155-5 PN HF	6ES7155-5AA00-0AC0	FS01	V4.4
IM 155-5 MF HF	6ES7155-5MU00-0CN0	FS01	V5.0
Digital input modules DI and F-DI	See List of I/O modules ET 200MP (Page 35)		
Digital output modules DQ and F-DQ			
Analog input modules AI			
Analog output modules AQ			
System power supply			
Technology modules			
Communications modules			

The active backplane bus can be used for S7-1500H with:

Designation	Article number	As of hardware functional status	As of firmware version
CPU 1517H-3 PN	6ES7517-3HP00-0AB0	FS01	V3.1
CPU 1517H-4 PN	6ES7517-4HQ10-0AB0	FS01	V4.0
CPU 1518HF-4 PN	6ES7518-4JP00-0AB0	FS01	V3.1
	6ES7518-4JT10-0AB0	FS01	V4.0
CP 1543-1 communications module	6GK7543-1AX00-0XE0		V3.0
System power supply	See List of I/O modules S7-1500H (Page 34)		

The active backplane bus supports:

- Identification data I&M0 to 3
- Firmware update
- Prioritized startup (only applies for ET 200MP)

The following restriction applies for operating the ET 200MP with the active backplane bus

Pulling and plugging during operation (hotswap) cannot be performed in isochronous mode. If any I/O module is plugged or unplugged in a station configured for isochronous mode, the connection to the controller is re-established and the I/O modules are temporarily inaccessible.

Maximum configuration

In addition to the CPU or interface module, the active backplane bus can be equipped with a maximum of:

- 12 modules for the active backplane bus ST 1+12 (applies only for ET 200MP)
- 8 modules for the active backplane bus ST 1+8
- 4 modules for the active backplane bus ST 1+4

Accessories

You order the following accessories separately:

- Slot protection
- Mounting rail

See also Spare parts/accessories [\(Page 33\)](#)

Operation

With the active backplane bus, you can cover the following scenarios during operation:

- Plugging and unplugging I/O modules without reaction on the station or the CPU goes into STOP.
- Plugging I/O modules into slots previously left free without the CPU going into STOP.

Pulling and plugging with S7-1500H

The following tables show the responses of the H-system depending on the system state and scenario.

Table 5-1 RUN-Redundant system state

Scenario	Response
Pulling and plugging an I/O module from the rack	The H-system remains in the RUN-Redundant state.
Pulling and plugging a CPU from the rack	The H-system remains in the RUN-Redundant state. With direct supply of the CPU with 24 DC V. The communication to the CPs is interrupted.
Plugging an unconfigured CP	The H-system remains in the RUN-Redundant state. The CP can be used for online access to the system.

Table 5-2 RUN Solo system state

Scenario	Response
Pulling and plugging an I/O module from the rack on the primary CPU	The H-system remains in the RUN Solo state.
Pulling and plugging the primary CPU from the rack	The H-system remains in the RUN Solo state. With direct supply of the CPU with 24 DC V. The communication to the CPs is interrupted.
Plugging an unconfigured CP	The H-system remains in the RUN Solo state. The CP can be used for online access to the system.

Pulling and plugging interface modules

You cannot pull and plug the interface module without any reaction.

Do not pull or plug the interface module under load.

Removing and inserting I/O modules

You can pull and plug I/O modules without any reaction.

1. Only pull or plug the front connector of the I/O modules when it is de-energized.
2. With I/O modules, pull the front connector out of the I/O module using the unlocking strap. Swivel the front connector downward and remove it from the grooves.
3. Then you may pull the I/O module.
4. When plugging in, proceed in reverse order (see also S7-1500 Automation System system manual (<https://support.industry.siemens.com/cs/ww/en/view/59191792>)).

Pulling and plugging power supply module

You can pull and plug the power supply module without any reaction if the power balance of the power supply remains positive.

NOTE

Diagnostic message in case of failure of both system power supplies on the identical slots of the respective H-CPU

A diagnostic message is issued in case of failure of both system power supplies on the identical slots of the H-CPU. The ERROR LEDs on both H-CPU flash red. However, the S7-1500H redundant system remains in the RUN-Redundant system state.

Example: In an H-system, the system power supplies on slot 2 on mounting rail 0 and mounting rail 1 have failed.

You can find more information in the S7-1500R/H System Manual (<https://support.industry.siemens.com/cs/us/en/view/109754833>).

Only pull or plug the power supply module when it is de-energized.

Use in explosive area Zone 2

WARNING

Pulling or plugging a module is prohibited in a potentially explosive atmosphere

If you pull or plug a module or connector during operation, there is a risk of sparking. Sparks can cause an explosion in the hazardous area; death or serious physical injury as well as damage to property can result.

Do not pull or plug the module or the connectors until one of the following two conditions is met: The area is no longer hazardous or the device and its plug connectors are de-energized.

See product information Deployment of the modules in zone 2 hazardous atmospheres (<https://support.industry.siemens.com/cs/ww/de/view/19692172>).

Configure

6.1 Configuring S7-1500H with active backplane bus

6.1.1 Configure

Requirement

You need TIA Portal as of V19.

Configure

You configure the SIMATIC S7-1500H with STEP 7 (TIA Portal).

1. Insert the S7-1500H on slot 1.
2. Insert the I/O modules onto slots 2 to 9.
 - maximum two power supply module to the right of the CPU

NOTE**Power supply with PS 60W 24/48/60VDC HF**

If you use a PS 60W 24-48-60VDC HF (6ES7505-0RB00-0AB0), you can only plug in one power supply module.

- maximum 6 communications modules

The configuration must be identical in both racks.

Note

Contrary to plugging modules, the replacement of a rack cannot be started by double-clicking on the catalog entry. The reason for this is that a double-click only works if there is slot free and permitted available. However, only one permissible area is available for a rack, which is always automatically occupied by the standard rack type when a device is plugged in the network view.

Additional information

You can find more information in the STEP 7.

6.2 Configuring ET 200MP with active backplane bus

6.2.1 Configure

Configure

You configure the interface module with STEP 7 or the configuration software of another manufacturer.

Configuration software	
STEP 7 (TIA Portal)	GSD file
- as of TIA Portal V16 with HSP0318 for the active backplane bus ST 1+12 - as of TIA Portal V16 with HSP0334 for the active backplane bus ST 1+8 and the active backplane bus ST 1+4	- GSDML V2.34 and higher for the active backplane bus ST 1+12 - GSDML V2.35 and higher for the active backplane bus ST 1+8 and the active backplane bus ST 1+4
IM 155-5 MF HF (6ES7155-5MU00-0CN0) - Active backplane bus V1.1.0 or higher - TIA Portal V19 or higher	IM 155-5 MF HF (6ES7155-5MU00-0CN0) GSDML V2.43 or higher
-	"Insert" the active backplane bus on slot 0.
Insert the interface module in slot 1.	
Insert the I/O modules on slots 2 to 13.	

NOTE

GSD file

When configuring using a GSD file, more I/O modules can be configured than can be physically inserted. If you configure more I/O modules than can be inserted, the interface module sends the message "Module cannot be reached".

Alarm and system messages

Pull/plug interrupt

Each pulling and plugging action of a configured module results in a pull/plug interrupt.

OB 83 is started when a configured module is pulled in RUN mode. If OB 83 is not programmed, the CPU switches to STOP.

When plugging a module into a configured slot in the RUN state, OB 83 is started and the parameter assignment is made if the module matches.

You can find additional information in the STEP 7 online help.

Firmware update

The firmware update is possible:

- Firmware update of the S7-1500H, the interface module or the active backplane bus leads to a restart of the station.

Pull/plug interrupts of the plugged modules can be reported during a firmware update of the active backplane bus.

- Firmware update of a module leads to a restart of this module only. Other modules are not affected.
- Firmware update of a I/O module in isochronous mode results in a restart of the station.

The isochronous mode only applies for a configuration with the IM 155-5 PN HF.

Technical specifications

Technical specifications of the active backplane bus

The following table shows the technical specifications as of 11/2024. On the Internet, you will find a data sheet with technical specifications that are updated daily for the active backplane bus ST 1+12

(<https://support.industry.siemens.com/cs/de/en/pv/6ES7590-0BL00-0AA0/td?dl=en>), active backplane bus ST 1+8

(<https://support.industry.siemens.com/cs/de/en/pv/6ES7590-0BH00-0AA0/td?dl=en>) and active backplane bus ST 1+4

(<https://support.industry.siemens.com/cs/de/en/pv/6ES7590-0BD00-0AA0/td?dl=en>).

Article number	6ES7590-0BL00-0AA0	6ES7590-0BH00-0AA0	6ES7590-0BD00-0AA0
General information			
Product type designation	Active backplane ST 1+12 slot	Active Backplane ST 1+8 Slot	Active Backplane ST 1+4 Slot
HW functional status	FS01	From FS01	
Firmware version	V1.0.0	from V1.0.0	
• FW update possible	Yes		
Product function			
• I&M data	Yes; I&M0 to I&M3		
• Isochronous mode	Yes		
• Prioritized startup	Yes		
Engineering with			
• STEP 7 TIA Portal configurable/integrated from version	V16	V16 / V17	
• STEP 7 configurable/integrated from version	V5.6 and higher		
• PROFINET from GSD version/GSD revision	V2.34 / -	V2.35 / -	
Power			
Power available from the backplane bus	2 W		
Power loss			
Power loss, typ.	2 W		

Article number	6ES7590-0BL00-0A-A0	6ES7590-0BH00-0-AA0	6ES7590-0BD00-0-AA0
Hardware configuration			
Slots			
• Grid size	35 mm; Utilization of 25 mm-wide modules possible		
• Number of slots	13	9	5
– of which for CPU, max.	0	1; for S7-1500H CPU with CPU firmware V3.1 or higher; interface modules up to V1.1.0 only (active backplane bus)	
– of which for IM, max.	1		
– of which for PS, max.	12; Max. 2 PS per station	8; Max. 2 PS per station	4; Max. 2 PS per station
– of which for IO/CM/CP/TM, max.	12	8	4
– of which for F-IO, max.	12	8	4
• Number of single-width slots, max.	12	8	4
Ambient conditions			
Ambient temperature during operation			
• horizontal installation, min.	-30 °C		
• horizontal installation, max.	60 °C		
• vertical installation, min.	-30 °C		
• vertical installation, max.	40 °C		
Ambient temperature during storage/transportation			
• min.	-40 °C		
• max.	70 °C		
Altitude during operation relating to sea level			
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual		
Dimensions			
Width	434 mm	294 mm	154 mm
Height	99 mm		
Depth	14 mm		
Weights			
Weight, approx.	352 g	246 g	128 g

List of I/O modules

A.1 List of I/O modules S7-1500H

List of H-CPU's

The following table contains the H-CPU's and the HW and FW version as of which they can be used for the active backplane bus.

Designation	Article number	as of hardware functional status	as of firmware version
CPU 1517H-3 PN	6ES7517-3HP00-0AB0	FS01	V3.1
CPU 1517H-4 PN	6ES7517-4HQ10-0AB0	FS01	V4.0
CPU 1518HF-4 PN	6ES7518-4JP00-0AB0	FS01	V3.1
	6ES7518-4JT10-0AB0	FS01	V4.0

List of the modules

The following table contains the modules of the S7-1500H for the active backplane bus and the HW and FW version as of which they can be used.

The I/O modules as of delivery date 05/2020 can be used without restrictions.

Designation	Article number	as of hardware functional status	as of firmware version
PS 25W 24VDC	6ES7505-0KA00-0AB0	FS02	V1.0.1
	6ES7505-0KA01-0AB0	FS01	V2.0
PS 60W 24/48/60VDC	6ES7505-0RA00-0AB0	FS03	V1.0.1
PS 60W 24/48/60VDC HF	6ES7505-0RB00-0AB0	FS01	V1.0.0
PS 60 W 120/230V AC/DC	6ES7507-0RA00-0AB0	FS03	V1.0.1
CP 1543-1	6GK7543-1AX00-0XE0	FS01	V3.0

A.2 List of I/O modules ET 200MP

List of interface modules

The following table contains the interface modules and as of which HW and FW versions they can be used.

Designation	Article number	as of hardware functional status	as of firmware version
IM 155-5 PN HF	6ES7155-5AA00-0AC0	FS01	V4.4
IM 155-5 MF HF	6ES7155-5MU00-0CN0	FS01	V5.0

List of modules with start of delivery before 03/2020

The I/O modules as of delivery date 03/2020 can be used without restrictions.

The following table contains the modules of the S7-1500 for the active backplane bus and as of which HW and FW version they can be used.

Designation	Article number	as of hardware functional status	as of firmware version
DI 16x24VDC HF	6ES7521-1BH00-0AB0	FS02	V2.0.1
DI 16x24VDC BA	6ES7521-1BH10-0AA0	FS01	V1.0.0
DI 32x24VDC HF	6ES7521-1BL00-0AB0	FS02	V2.0.1
DI 32x24VDC BA	6ES7521-1BL10-0AA0	FS01	V1.0.0
DI 16x24...125VUC HF	6ES7521-7EH00-0AB0	FS01	V1.0.0
DI 16x24VDC SRC BA	6ES7521-1BH50-0AA0	FS02	V2.0.0
DI 16x230VAC BA	6ES7521-1FH00-0AA0	FS02	V2.0.0
DQ 16x24VDC/0.5A ST	6ES7522-1BH00-0AB0	FS02	V2.0.2
DQ 16x24VDC/0.5A HF	6ES7522-1BH01-0AB0	FS01	V1.0.0
DQ 16x24VDC/0.5A BA	6ES7522-1BH10-0AA0	FS01	V1.0.0
DQ 32x24VDC/0.5A ST	6ES7522-1BL00-0AB0	FS02	V2.0.2
DQ 32x24VDC/0.5A HF	6ES7522-1BL01-0AB0	FS01	V1.0.0
DQ 32x24VDC/0.5A BA	6ES7522-1BL10-0AA0	FS01	V1.0.0
DQ 8x24VDC/2A HF	6ES7522-1BF00-0AB0	FS02	V2.0.0
DQ 16x24...48VUC/125VDV/0.5A ST	6ES7522-5EH00-0AB0	FS01	V1.0.0
DQ 8x230V/5A ST Relay	6ES7522-5HF00-0AB0	FS02	V2.0.0
DQ 8x230VAC/2A ST Triac	6ES7522-5FF00-0AB0	FS02	V2.0.0
DQ 16x230VAC/2A ST relay	6ES7522-5HH00-0AB0	FS01	V1.0.0
DQ 16Vx230VAC/1A ST Triac	6ES7522-5FH00-0AB0	FS01	V1.0.0
DI 16x24VDC/ DQ 16xDC24VDC/0.5A BA	6ES7523-1BL00-0AA0	FS01	V1.0.0
F-DI 16x24VDC	6ES7526-1BH00-0AB0	FS01	V1.0.2
F-DQ 8x24VDC/2A PPM	6ES7526-2BF00-0AB0	FS03	V1.0.2
AI 8xU/I/RTD/TC ST	6ES7531-7KF00-0AB0	FS02	V2.0.1

List of I/O modules

A.2 List of I/O modules ET 200MP

Designation	Article number	as of hardware functional status	as of firmware version
AI 8xU/I/R/RTD BA	6ES7531-7QF00-0AB0	FS01	V1.0.0
AI 8xU/I/R/RTD/TC HF	6ES7531-7PF00-0AB0	FS01	V1.0.0
AI 4xU/I/RTD/TC ST	6ES7531-7QD00-0AB0	FS01	V1.0.0
AI 8xU/I HS	6ES7531-7NF10-0AB0	FS01	V1.0.1
AI 8xU/I HF	6ES7531-7NF00-0AB0	FS01	V1.0.0
AQ 2xU/I ST	6ES7532-5NB00-0AB0	FS01	V1.0.0
AQ 4xU/I ST	6ES7532-5HD00-0AB0	FS02	V2.0.0
AQ 4xU/I HF	6ES7532-5ND00-0AB0	FS01	V1.0.0
AQ 8xU/I HS	6ES7532-5HF00-0AB0	FS01	V1.0.0
AI 4xU/I/RTD/TC/AQ 2xU/I ST	6ES7534-7QE00-0AB0	FS01	V1.0.0
PS 25W 24VDC	6ES7505-0KA00-0AB0	FS02	V1.0.1
PS 60W 24/48/60VDC	6ES7505-0RA00-0AB0	FS03	V1.0.1
PS 60 W 120/230V AC/DC	6ES7507-0RA00-0AB0	FS03	V1.0.1
TM Count 2x24V	6ES7550-1AA00-0AB0	FS01	V1.0.0
TM PosInput 2	6ES7551-1AB00-0AB0	FS01	V1.0.0
TM Timer DIDQ 16x24V	6ES7552-1AA00-0AB0	FS01	V1.0.0
TM PTO 4	6ES7553-1AA00-0AB0	FS01	V1.0.0
TM SIWAREX WP521 ST	7MH4980-1AA01	FS01	V1.1.0
TM SIWAREX WP522 ST	7MH4980-2AA01	FS01	V1.1.0
TM NPU	6ES7556-1AA00-0AB0	FS01	V1.0.0
CM PtP RS232 BA	6ES7540-1AD00-0AA0	FS01	V1.0.3
CM PtP RS232 HF	6ES7541-1AD00-0AB0	FS01	V1.0.3
CM PtP RS422/485 BA	6ES7540-1AB00-0AA0	FS01	V1.0.3
CM PtP RS422/485 HF	6ES7541-1AB00-0AB0	FS01	V1.0.3
CM 8xIO-Link	6ES7547-1JF00-0AB0	FS01	V1.0.0