

SIMATIC ET 200M –
the S7-300 in distributed applications



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ET 200M



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Introduction, areas of application

Introduction

Distributed I/O devices are gaining increasing significance. A central control CPU communicates via the PROFIBUS DP with distributed I/Os operating at their distributed locations.

As a result, expensive wiring costs can be reduced and fast (12 Mbit/s) and reliable data transmission can be built up.

The distributed I/O device ET 200M is a modular DP slave with IP 20 degree of protection. Up to 8 signal and function modules can be used as I/O modules (these represent the interface to the process), as well as S7-300 communications processors, with no restrictions or rules on how they need to be plugged in. With the use of active bus modules, modules can be exchanged or expanded without shutting down operation. They are coupled to the PROFIBUS DP via connection modules – optionally also via fiber optics.

In addition to the standard modules, the varied module range also comprises a whole host of other modules which are designed to solve specific industrial applications.

Fault-tolerant installations

Fault-tolerant systems are used wherever a shutdown of a plant or installation is not permitted, for example in power generating plants, energy distribution, power supply stations or in chemical plants.



In conjunction with the fault-tolerant S7-400H (redundant CPUs), the ET 200M can be connected either in single-sided mode (normal availability) or switched (increased availability).

Failsafe systems

Failsafe systems revert to a safe state in the event of a fault, thus ensuring the safety of people, machines and the environment, e.g. on presses, robots or transport systems for people. Various ET 200M signal modules are available for connecting failsafe signals to the S7-300F or S7-400F/FH, offering SIL 2 or SIL 3 depending on the type of connection.

Areas with increased risk of explosion

Intrinsically safe versions of various digital and analog modules exist for use in areas with increased risk of explosion (ex-zones), e.g. in chemical plants, pharmaceutical applications or on oil rigs. These enable isolated processing by channel of signals from ex-zone 1. In addition there are also HART-capable analog modules.

Highly-dynamic production processes

Distributed control solutions for fast-running machines in high-precision production and machining processes are becoming increasingly important, for example for drive control systems. Here, the time delay between the detection of a signal by the distributed I/O device and the corresponding actuator response must be kept as short and as reproducible as possible. This synchronous coupling of a SIMATIC automation solution to the equidistant PROFIBUS is termed "isochrone mode" and is supported by various ET 200M signal modules.



Features, advantages

The ET 200M I/O system has many features which offer key advantages:

Easy installation

The modules are hooked into the rails and screwed in place. The integrated backplane bus is built up automatically in the process. The sensors and actuators are connected via front connectors. If the module is replaced, then the connector just needs to be replugged onto the new module of the same type. The wiring remains intact. The coding of the front connector ensures that no mistakes are made when plugging in.

Fast connections

Connections are even easier and faster with SIMATIC TOP connect. Pre-assembled front connectors with individual cable strands and a complete modular plug-in system are both available.

High packing density

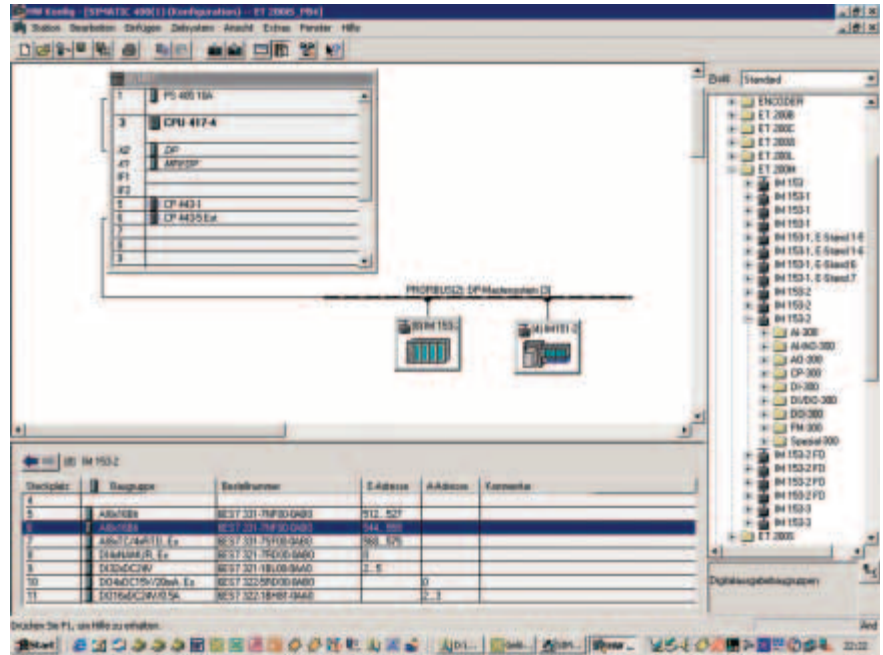
The high number of channels on the modules is reason enough to opt for a space saving layout with the ET 200M. Modules with 8 to 32 channels (digital) or 2 to 8 channels (analog) per module are available.

Easy configuration

When used in the SIMATIC environment, the modules are configured and parameterized via STEP 7. When used outside the SIMATIC environment, the configuration and parameterization are integrated into the particular system via GSD files.

Modules with diagnostics and interrupt functions

Many modules also monitor the detection of signals (diagnostics) and the signals received from the process (process interrupt). This enables the system to respond immediately to any irregularities and to every process event. STEP 7 can be used to set the parameters that define whether and how the control system responds to these events.



Hardware configuration with STEP 7 – intuitive to use thanks to its graphical user interface



Module replacement without shutting down the system – thanks to the use of active bus modules (hot swapping)

Interface modules IM 153

Various IM 153 interface modules are available as standard DP slaves for connection of the different S7-300 modules in the ET 200M distributed I/O device to the PROFIBUS DP.

They differ in terms of functional scope and in the type of data transmission, as well as in the permissible temperature ranges (see table below).



Function	IM 153-1AA0 (Basic)	IM 153-2AA (Standard)	IM 153-2BA (High Feature)	IM 153-2BB (High Feature)
Transmission medium	Copper	Copper	Copper	Fiber optics
Standard DP V1 implemented	✓	✓	✓	✓
Module replacement with the system running	✓	✓	✓	✓
Clock time synchronization on the PROFIBUS, time-stamping of messages ¹⁾	--	✓	✓	✓
Use of function module (FM) and communications processors (CP)	Restricted	✓	✓	✓
Forwarding of configuration data to intelligent field devices	--	✓	✓	✓
Connection to high-availability (redundant) systems (software redundancy, S7-400H)	--	✓	✓	✓
Configuration changes in RUN mode ²⁾				
▪ In the redundant system	--	✓	✓	✓
▪ In the non-redundant system	--	--	4	4
Identification data ³⁾	--	--	4	4
Supports isochrone mode ⁴⁾	--	--	4	--
Firmware update via Bus / Micro Memory Card	--	--	4	4
Certified for Ex-zone 2	4	4	4	4

¹⁾ Changes at digital inputs are already given a local time stamp (in the IM 153 of the ET 200M) and transmitted via a process interrupt to the CPU.

²⁾ Configuration changes in RUN mode mean that changes can be made to the hardware configuration, e.g. a reconfiguration or addition of modules, while the system is running, without any retroactive effects.

³⁾ Identification data are data stored in a module, e.g. order no., version no., installation date and installation identifiers which identify the module uniquely and can be accessed online, for example in order to simplify troubleshooting.

⁴⁾ Isochrone mode means the synchronous coupling of the distributed I/Os and the user program to the equidistant PROFIBUS. As a result, the measurement of actual values and the output of desired values are performed synchronously and equidistantly, with data imagers which are consistent at the same time.

Module overview

The wide range of available modules permits a modular adaptation of the ET 200M to the most varied tasks.

In addition to the standard modules (digital and analog modules), the following modules are available for specialized applications:

Modules for technological functions	Function	Basic order no.
FM 350-1	Counting, measuring	6ES7 350-1AH..
FM 350-2	Counting, measuring, metering	6ES7 350-2AH..
FM 351	Controlled positioning (open loop), fast/slow positioning process	6ES7 351-1AH..
FM 352	Electronic cam control	6ES7 352-1AH..
FM 352-5	High-speed Boolean operations	6ES7 352-5AH..
FM 353	Positioning with stepper motors	6ES7 353-1AH..
FM 354	Positioning with servo motors	6ES7 354-1AH..
FM 355C	Universal closed-loop controls (continuous controller)	6ES7 355-0VH..
FM 355S	Universal closed-loop controls (step controller)	6ES7 355-1VH.
FM 355-2	Temperature regulation with self-optimization	6ES7 355-2CH..
FM 357-2	Multiple-axis interpolation, synchronous	6ES7 357-4AH..

Modules for failsafe systems	Function	Basic order no.
SM 326F	Digital input (24 x 24 V on one channel or 12 x 24V on two channels)	6ES7 326-1BK..
SM 326F	Digital input (10 x 24V)	6ES7 326-1BF..
SM 326 NAMUR	Digital input (8 x NAMUR on one channel or 4 x NAMUR on two channels)	6ES7 326-1RF..
SM 336F	Analog input (6/4 inputs on one channel or 3/2 inputs on two channels)	6ES7 336-1HE..

Modules for areas with increased risk of explosion	Function	Basic order no.
SM 321	Digital input (4 x NAMUR)	6ES7 321-7RD0.
SM 322	Digital output (4 x 15 or 24 V)	6ES7 322-5.D0.
SM 331	Analog input (4 x 0...20 mA or 4...20 mA)	6ES7 331-7RD0.
SM 331	Analog input (8 thermocouples or 4 thermal resistors)	6ES7 331-7SF0.
SM 332	Analog output (4 x 0...20 mA or 4...20 mA)	6ES7 332-5RD0.
SM 331	HART analog input (2 x 0...20 mA or 4...20 mA)	6ES7 331-7TB0.
SM 332	HART analog output (2 x 0...20 mA or 4...20 mA)	6ES7 332-5TB0.

Technical data

ET 200M modules	
Degree of protection	IP 20
Ambient temperature	0 to 60°C (horizontal installation), 0 to 40°C (vertical installation)
Vibrational stability	Frequencies run through at a rate of change of 1 octave/minute 10 runs through the frequency range per axis for each of the 3 mutually perpendicular axes
▪ Vibration type	
▪ Vibration duration	
Resistance to impacts	Semi-sinusoidal Max. value 15 g, duration 11 ms 3 impacts each in both the +/- directions in each of the 3 mutually perpendicular axes
▪ Type of impact	
▪ Strength of impact	
▪ Impact direction	
Maximum expansion	8 I/O modules
Transmission rate	Up to 12 Mbit/s
Connection technology	Screw-type or spring action
Load current supplies	2 A, 5 A, 10 A
Width	n x 40 mm
Height	125 mm
Depth	120 mm

Standards and certifications	
UL	UL 508
CSA	C22.2 No. 142
cULus	UL 1604 (Hazardous Locations) CSA-213 (Hazardous Locations)
FM	Class Number 3611, 3600, 3810
Ex	EN 50021
IEC	IEC 61131-2
PROFIBUS	IEC 61784-1:2002 Ed1 CP3/1
Shipbuilding	ABS, BV, DNV, GL, LRS, Class NK

Further information on the SIMATIC Controllers is available on the Internet at: www.siemens.com/automation

To find your nearest contact person for **personal assistance** please go to: www.siemens.com/automation/partner

Electronic orders can be placed directly with A&D Mall **via the Internet:** www.siemens.com/automation/mall