ifm electronic

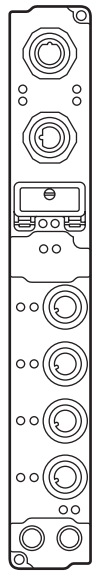
CE

Device manual
Field modules DP

UK

ecomat300

AC2630 / AC2631 / AC2634
AC2636 / AC2637 / AC2638



7390983 / 00 03 / 2013

Contents

This document is the original instructions.

1 Preliminary note

This document applies to devices of the "Field modules DP" (art. no: AC26xx). These instructions are part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

Symbols

►	Instructions
>	Reaction, result
[…]	Designation of keys, buttons or indications
→	Cross-reference
	Important note Non-compliance can result in malfunction or interference.
	Information Supplementary note

Warning signs used

⚠ WARNING

Warning of serious personal injury.
Death or serious irreversible injuries may result.

⚠ CAUTION

Warning of personal injury.
Slight reversible injuries may result.

NOTE

Warning of damage to property.

2 Safety instructions

These instructions contain texts and figures concerning the correct handling of the device and must be read before installation or use.

Observe the operating instructions. Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can seriously affect the safety of operators and machinery.

- ► Prepare installation
- ► Disconnect the power supply of the device.
- ► Ensure that devices cannot be accidentally restarted.
- ► Verify safe isolation from the supply.
- ► Earth and short circuit.
- ► Cover or enclose adjacent units that are live.
- ► Follow the specific mounting instructions of the device.
- ► Only suitably qualified personnel in accordance with EN 50 110-1/-2 (VDC 0105 part 100) is permitted to work on this device/system.
- ► Before installation and before touching the device ensure that you are free of electrostatic charge.
- ► The funtional earth (FE) must be connected to the protective earth (PE) or to the potential equalisation. The system installer is responsible for implementing this connection.
- ► Connecting cables and signal lines must be installed in such a manner that inductive or capacitive interference do not impair the automatic functions.
- ► Install automation equipment and related operating elements in such a way that they are protected against unintentional operation.
- ► Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation device.
- ► Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supplies compliant with IEC 60 364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410) .
- ► Fluctuations or deviations of the mains voltage from the rated value must not exceed the tolerance limits specified in the technical data, otherwise this may cause malfunction and dangerous operation.
- ► E-stop devices to IEC/EN 60 204-1 must be effective in all operating modes of the automation device. Unlatching the e-stop devices must not cause restart.

- ► Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- ► Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, an emergency stop must be carried out.
- ► Wherever faults in the automation system may cause personal injuries or damage to property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (e.g. by means of separate limit switches, mechanical interlocks etc.)
- ► The electrical installation must be carried out in accordance with the relevant regulations (e.g. with regard to cable cross-sections, fuses, PE).
- ► All work relating to transport, installation, commissioning and maintenance must only be carried out by qualified personnel. (IEC 60 364 or HD 384 or DIN VDE 0100 and national work safety regulations have to be observed).
- ► All shrouds and doors must be kept closed during operation.

3 Documentation

This documentation relates to the hardware and firmware status at the time of editing this manual. The features of the devices are continuously developed further and improved.

3.1 Firmware and hardware status

3.1.1 Downward compatibility

The modules are downward compatible. Older modules cannot, however, feature the same characteristics as new module versions. However, existing characteristics have been retained so that older modules can always be replaced with the new ones.

The documentation describes the differences between the modules.

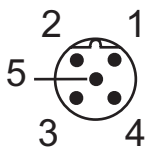
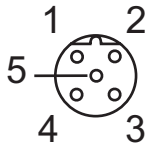
The firmware and hardware status of the modules can be taken from the version number printed on the side of the module. The version number can be identified by the prefix "D".

Firmware and hardware status		
Indication on module	**Declaration**	**Example**
D. kkjjxyzu		D.22011501
kk	Calendar week	Week 22
jj	Year	of the year 2001
x	Firmware bus board	Firmware bus, version 1
y	Hardware bus board	Hardware, version 5
z	Firmware I/O board	Firmware I/O, 0 (no firmware needed for this board)
u	Hardware I/O board	Hardware I/O, version 1

4 Connections

4.1 Fieldbus connection

The fieldbus connection is established using reverse-keyed M12x1 connectors.

	1: not connected 2: line A 3: GND 4: line B 5: shield (also on coupling nut)		1: 5 V DC 2: line A 3: GND 4: line B 5: shield (also on coupling nut)
M12 connector for the in-coming bus line		M12 connector for the outgoing bus line	

4.2 Fieldbus termination

The bus is terminated using an external terminating resistor. The modules are not capable of fieldbus termination.

The bus termination must be accomplished externally using a connector with integrated terminating resistor (E12315) as passive terminating resistor.

4.3 Nominal current consumption of modules connected to PROFIBUS-DP

It is important to consider the current consumption of the individual modules for power-feed, module protection and assessment of the voltage drop on the power cable.

Chapter 7 contains a table with the nominal current consumption of the modules.

4.4 Connection to a Siemens PLC type S7-300

In order to describe the connection of the modules to an S7-300 type Siemens controller, the software package "SIMATIC Manager" version 5.5 with Service Pack 2 from the company Siemens is used.

4.4.1 Importing the GSD file

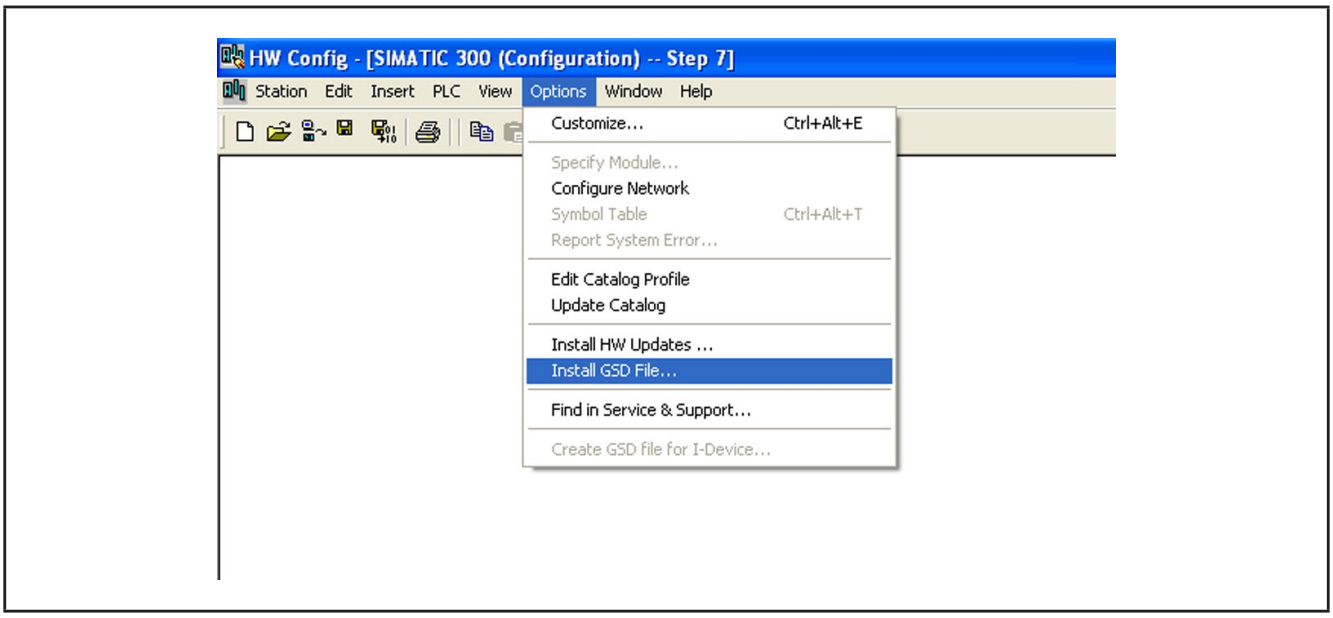
Prior to initial configuration of the system in the hardware configurator of the software, the GSD files must be imported into the software.

Start the software and proceed as follows to import the above GSx files:

► Open new or existing project.

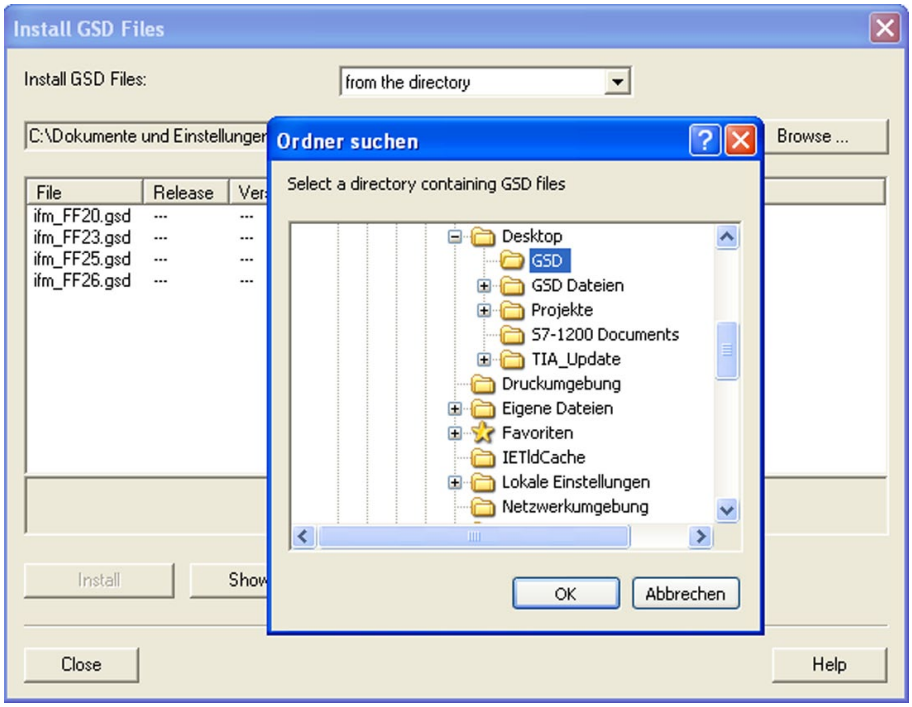
► Open hardware configurator

Copy the required GSx file to the software via menu item [Options] → [Install GSD File...].



Importing a GSD file

► Select the GSD file from the according source directory.



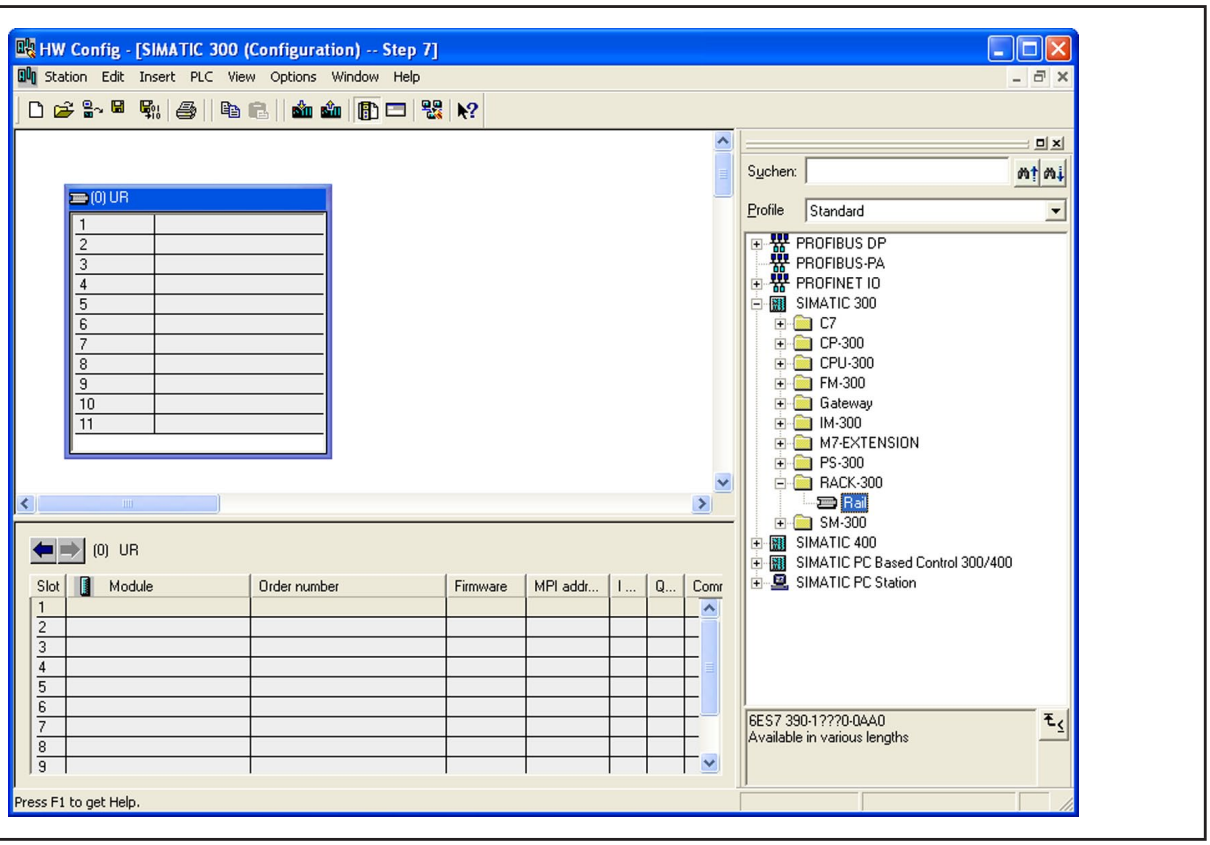
Selecting the GSD file from the directory

After correct import and an update of the hardware catalogue via [Options] → [Update Catalog] the modules will be displayed as separate entries in the hardware catalogue.

The exact configuration procedure can be found in the operating manual which is supplied together with the software.

Selecting a CPU

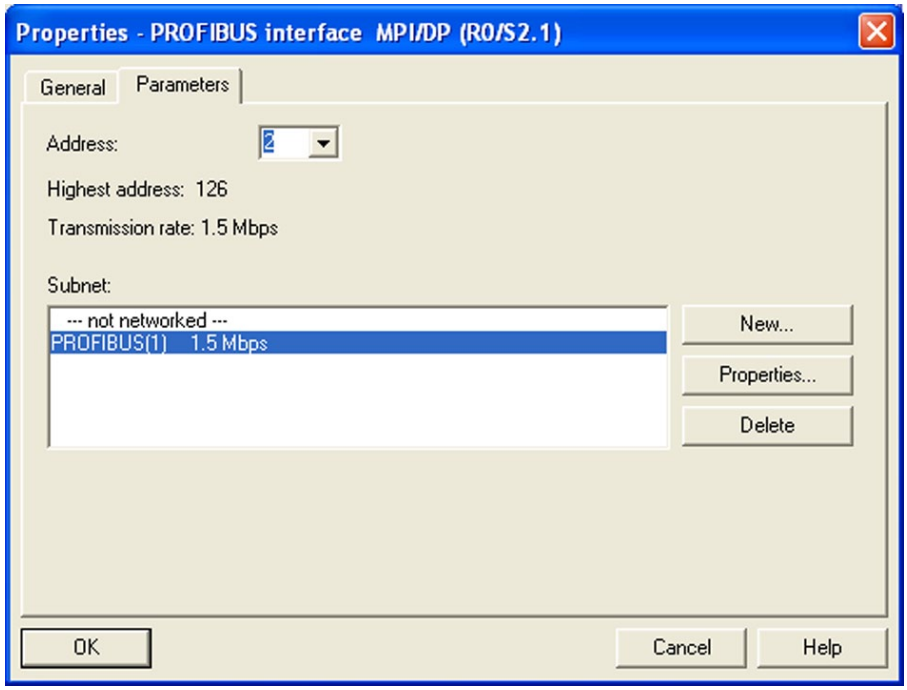
First, select a module rack. In this example, rack 300 is selected under [SIMATIC 300] → [RACK 300]



Selecting the module rack

Then the CPU type is determined.

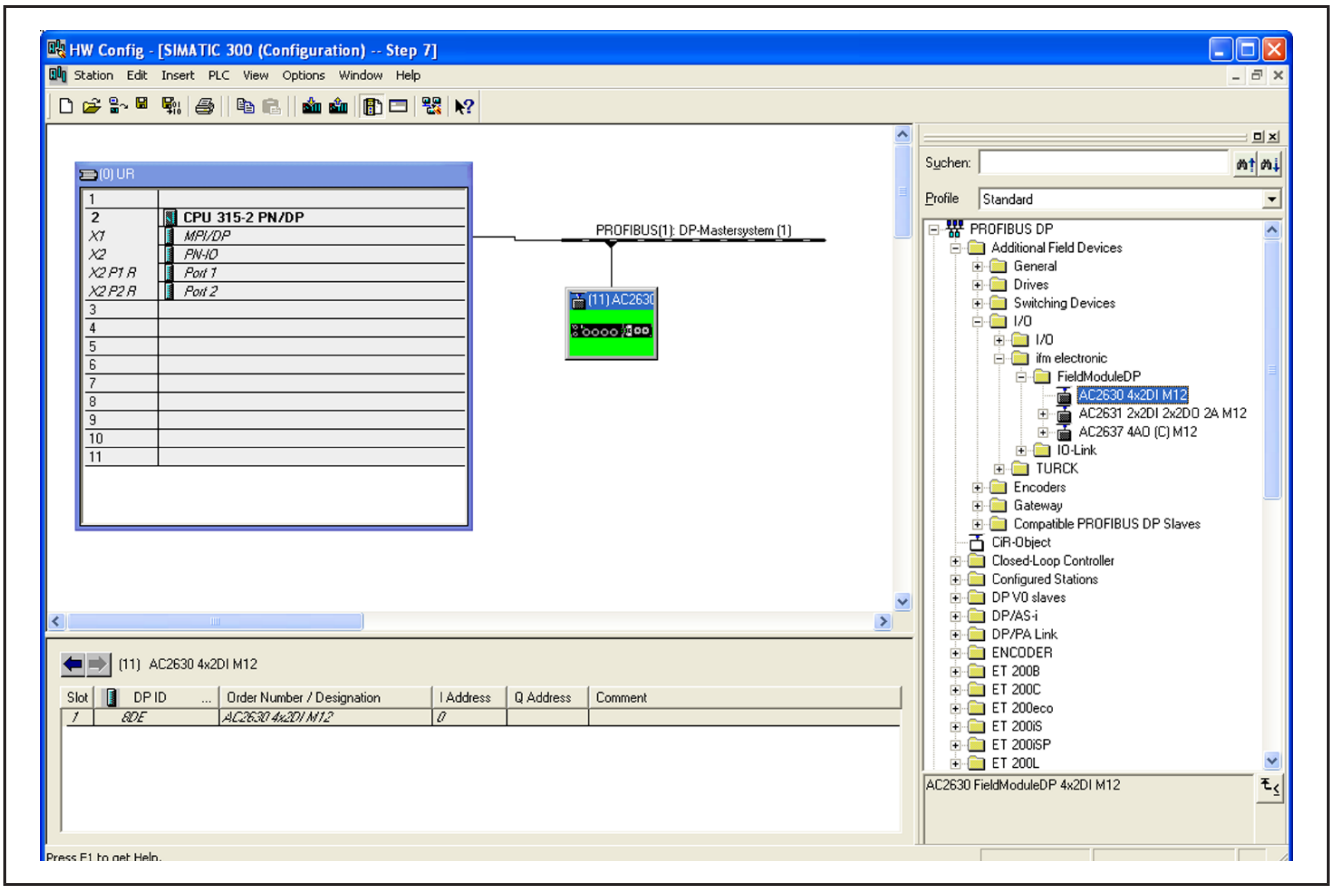
Enter the PROFIBUS address of the CPU in the dialogue box and select the subnet [PROFIBUS].
Use the button [Properties] to further define the subnet.



Selecting the subnet

4.5 Selection of modules as slaves

To enter modules as slaves, select the required entries in the hardware catalogue under [Additional Field Devices] → [I/O].



Selecting the modules as slave

Configuration of the stand-alone modules

The stand-alone modules can be moved from the hardware catalogue to the PROFIBUS master system using the Drag & Drop function.

5 Data mapping of the modules

5.1 Data mapping: Stand-alone and extension modules

5.1.1 Digital input modules

Bit	7	6	5	4	3	2	1	0
M12	C3P2	C3P4	C2P2	C2P4	C1P2	C1P4	C0P2	C0P4

Input data in the process image (C = female connector, P = pin)

5.1.2 Digital output modules

Bit	7	6	5	4	3	2	1	0
M12	C3P2	C3P4	C2P2	C2P4	C1P2	C1P4	C0P2	C0P4

Output data in the process image (C = female connector, P = pin)

5.1.3 Digital combined modules

4 digital inputs and 4 digital outputs

4 bits input and 4 bits output are mapped:

	Bit	7...4	3	2	1	0
Input	Byte 0 (M12)	Reserved	C1P2	C1P4	C0P2	C0P4
Output	Byte 0 (M12)		C3P2	C3P4	C2P2	C2P4

Data in the process image (C = female connector, P = pin)

5.1.4 Analogue input modules

The data mapping of all analogue input modules is identical.

Evaluation in the MOTOROLA format (default mapping)

Address	Input data		Output data	
Word	High byte	Low byte	-	-
0	Channel 1 / DB 0	Channel 1 / DB 1	-	-
1	Channel 2 / DB 0	Channel 2 / DB 1	-	-
2	Channel 3 / DB 0	Channel 3 / DB 1	-	-
3	Channel 4 / DB 0	Channel 4 / DB 1	-	-

Evaluation in the Intel format (DB = data byte)

Address	Input data		Output data	
Word	High byte	Low byte	-	-
0	Channel 1 / DB 1	Channel 1 / DB 0	-	-
1	Channel 2 / DB 1	Channel 2 / DB 0	-	-
2	Channel 3 / DB 1	Channel 3 / DB 0	-	-
3	Channel 4 / DB 1	Channel 4 / DB 0	-	-

5.1.5 Analogue output modules

The data mapping of all analogue output modules is identical.

Evaluation in the MOTOROLA format (default mapping)

Address	Input data		Output data	
Word	-	-	High byte	Low byte
0	-	-	Channel 1 / DB 1	Channel 1 / DB 0
1	-	-	Channel 2 / DB 1	Channel 2 / DB 0
2	-	-	Channel 3 / DB 1	Channel 3 / DB 0
3	-	-	Channel 4 / DB 1	Channel 4 / DB 0

Evaluation in the Intel format (DB = data byte)

Address	Input data		Output data	
Word	-	-	High byte	Low byte
0	-	-	Channel 1 / DB 1	Channel 1 / DB 0
1	-	-	Channel 2 / DB 1	Channel 2 / DB 0
2	-	-	Channel 3 / DB 1	Channel 3 / DB 0
3	-	-	Channel 4 / DB 1	Channel 4 / DB 0

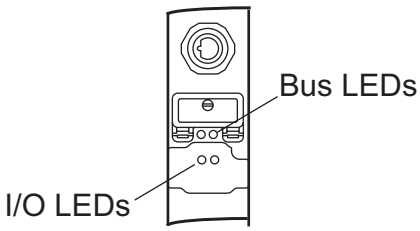
6 Error handling and diagnosis

6.1 Error handling via LEDs

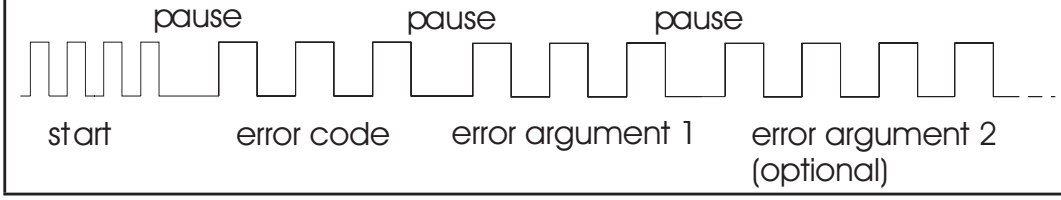
The following kinds of errors are distinguished in the modules:

- PROFIBUS errors
- Local module error
  The flash codes can be seen in the table below. The meaning of the channel LEDs is described in Chapter 8.

6.1.1 Flash codes



Flash sequence	Description
Fast flashing	Start
First slow sequence	Error code
Second slow sequence	Error argument 1
Third slow sequence (optional)	Error argument 2 (with more than 20 extensions)



LED green	LED red			Description	Corrective measure
	Error code	Error argument			
		1	2		
off	off		-	No data exchange	Module in Synchron mode → activate cyclic data
off	1	0	-	EEPROM - check sum error	Reset to factory settings
off	2	-	-	Reserved	-
off	3	-	-	Reserved	-
	3 B	-	-	Reserved	-
off	4	-	-	Reserved	-
off	5	-	-	Reserved	-
off	11	-	-	Reserved	-
off	12	-	-	Reserved	-
off	13	-	-	Reserved	-
on	off	-	-	Module is in data exchange (no error)	

6.1.2 Diagnostic LEDs for PROFIBUS

LED			Description	Corrective measures
green	red	I/O RUN		
on	on	no impact	Module is waiting for communication	Baud rate detected Start communication Possibly the wrong ident. number
off	on	no impact	Module in baud rate search mode	Start PROFIBUS Connect and check bus line
off	off	no impact	Module is waiting for cyclic communication	Start cyclic PROFIBUS communication
on	flashing	no impact	Baud rate detected Start-up error	Parameter or configuration error (see flash code)

on	off	off	DP start-up okay, but still no Data_Exchange_ Message	Start cyclic PROFIBUS communication
on	off	on	Module is exchanging data	no error

6.1.3 Error causes

Should you have any problems with the module, the status LEDs will provide information on the probably error cause.

Avoidance of typical errors

Checking the PROFIBUS cabling

A PROFIBUS cable (or a cable segment when using a repeater) can be tested with a few resistance measurements.
For this, the cable should be disconnected from all stations:

Measurement points	Typical resistance
between "A" and "B" at the beginning of the cable	approx. 110 Ω
between "A" and "B" at the end of the cable	approx. 110 Ω
between "A" at the beginning and "A" at the end of the cable	approx. 0 Ω
between "B" at the beginning and "B" at the end of the cable	approx. 0 Ω
between shield at the beginning and shield at the end of the cable	approx. 0 Ω

If these measurements are successful, the cable is error-free.

Should there be further bus errors, these are usually caused by EMC. Please also observe the installation guidelines of the PROFIBUS user organisation (www.profibus.com).

6.2 Error diagnosis via software

In the event of an error, the modules automatically send the diagnostic data to the DP master.

Please note, that the parameter [IP module diagnostics] of the modules with diagnostic capabilities must be enabled.

In general, DP masters have the possibility to check by means of a flag in the PLC whether diagnostic data have changed.

The diagnostic data can then normally be read via a function block. If more diagnostic data apply than can be transmitted, this will be indicated in the diagnostic data.

6.2.1 General structure of the diagnostic messages

Diagnostic bytes	Diagnostic contents
0 to 5	Standard DP diagnosis (to PROFIBUS-DP standard)
6 to 61	Vendor-specific diagnosis
6 and 7	Length of diagnostic data and diagnostic code (defined by PROFIBUS-DP standard)
8 to 15	Reserved
16 to 61	Channel-specific diagnosis

6.2.2 Diagnostic message of the stand-alone modules

DP diagnosis to DP standard

Bytes	Bit	Description
0	0	No slave response (set internally by the DP master)
	1	Slave in start-up mode (evaluation of parameters and configuration)
	2	Configuration error
	3	Ext_Diag_Data present (from byte 6)
	4	Function is not supported
	5	Faulty slave response (set internally by the DP master)
	6	Parameterisation error
	7	Slave is exchanging data with another master (set internally by the DP master)
1	0	Slave must be re-parameterised
	1	Slave with static diagnosis
	2	1 (acc. to PNO specification)
	3	DP watchdog is active
	4	Slave is in freeze mode
	5	Slave is in Sync mode
	6	Reserved
	7	Slave is de-activated (set internally by the DP master)
2	0-6	Reserved
	7	Too many Ext_Diag_Data
3		Station address of the master with which data are transferred
4, 5		Ident. number

Vendor-specific diagnosis

Bytes	Bit	Description
6		Length of Ext_Diag_Data including length byte
7		0x81 (code DPV1 diagnostic format)
8 to 15		0x00

Channel-specific diagnosis

Bytes	Bit	Description
16	0-5	0x00
	6/ 7	Faulty channel number: 0x00 = error in channel 0 0x40 = error in channel 1 0x80 = error in channel 2 0xC0 = error in channel 3
17	0-5	Status byte of channel
	6	General error bit (set in the event of an error)
18	0-5 6-7	Bit assignment analogue to byte 16 for another faulty channel
19	0-5 6-7	Bit assignment analogue to byte 17 for another faulty channel
...		
60	0-5 6-7	Bit assignment analogue to byte 16 for another faulty channel
61	0-5 6	Bit assignment analogue to byte 17 for another faulty channel

7 ifm Profibus DP modules

7.1 General technical information

ifm Profibus DP modules connect each I/O module directly to the Profibus. Thus, a 100% transparent transmission is ensured.

The module variety ranges from standardised digital industrial signals to analogue input/output modules. For temperature monitoring, resistance temperature detection modules are available. The compact robust housing with fully potted electronics allows usage directly on the machine.

7.2 Supply voltage

The supply voltage is connected via 4-pole M8 connectors on each module.

7.2.1 Operating voltage

U_B: 24 VDC (-15 %/+20 %)

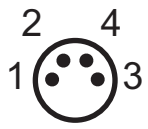
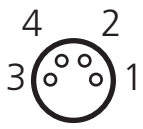
The 24 VDC operating voltage U_B is used to power the fieldbus (termination), the processor logic, the inputs as well as the sensors.
The operating voltage is electrically isolated from the fieldbus (ASIC).

7.2.2 Load voltage

U_L: 24 VDC (-15 %/+20 %)

The load voltage U_L powers the digital outputs. It can be fed separately. If the load voltage is turned off (e.g. in an emergency-stop), both the fieldbus function and the supply and the input function will be retained.

The modules are each equipped with a 4-pole M8 plug and a 4-pole M8 socket for voltage supply.

	1: 24 V DC U_B 2: 24 V DC U_L 3: GND 4: GND		1: 24 V DC U_B 2: 24 V DC U_L 3: GND 4: GND
Pin connection M8 plug and M8 socket			

7.3 Nominal current consumption of the modules

It is important to consider the current consumption of the individual modules for power-feed, module protection and assessment of the voltage drop on the power cable. The table below shows the nominal current consumption of the modules at 24 V DC. The sensor supply or the current for possible outputs has to be added.

Part Number	Nominal current consumption
AC2630 4x2DI	I_B = 85 mA I_L = 5 mA
AC2631 2x2DI 2x2DO	I_B = 90 mA I_L = 5 mA
AC2634 4AI (PT100)	I_B = 110 mA I_L = 5 mA
AC2636 4AI (C)	I_B = 140 mA I_L = 5 mA
AC2637 4AO (C)	I_B = 115 mA I_L = 35 mA
AC2638 4AI (V)	I_B = 140 mA I_L = 35 mA

7.4 Electrical isolation

7.4.1 Digital modules

In the digital input/output modules, the ground potentials (GND) of supply and load voltage are connected.

7.4.2 Analogue modules

In the analogue input/output modules, these ground potentials are separated to ensure the electrical isolation of the analogue signals from the operating voltage.

Should you use U_L for feed-through, please make sure during connection of a module without electrical isolation between U_B and U_L (e.g. all digital modules) that the electrical isolation is neutralised by the feed-through of U_L.

7.5 Incoming line and power supply

The max. load applied to each of the connecting poins of all modules must not exceed 4 A.

The following points have to be observed:

- Current consumption of the modules
  (see Nominal current consumption → Chapter 7.3)
- Current consumption of the sensors
- Current consumption of the actuators

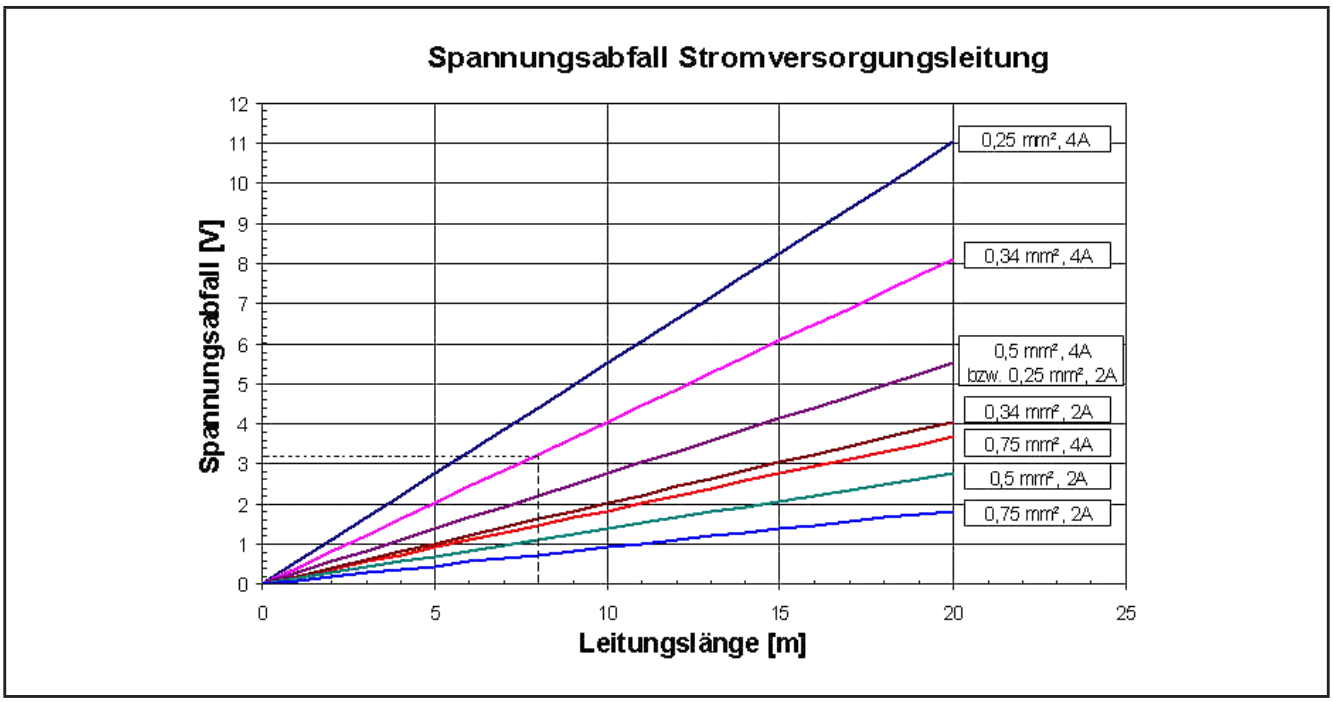
– Cable lengths and power losses on the cables
(see chapter Power loss of power cable)
– If power is fed through, make sure that the maximum permissible current of 4 A / pin is not exceeded.

7.5.1 Power loss of power cable

When using power cables do not exceed a total length of 15 m at 4 A (with power feed-through).

When connecting the modules to 24 V DC please observe that the functionality of the modules cannot be ensured from a voltage drop of 6 V.
Voltage fluctuations of the power supply also have to be taken into account.

Example: At a load of 4 A an 8 m power cable with 0,34 mm² has a voltage drop of 3.2 V.

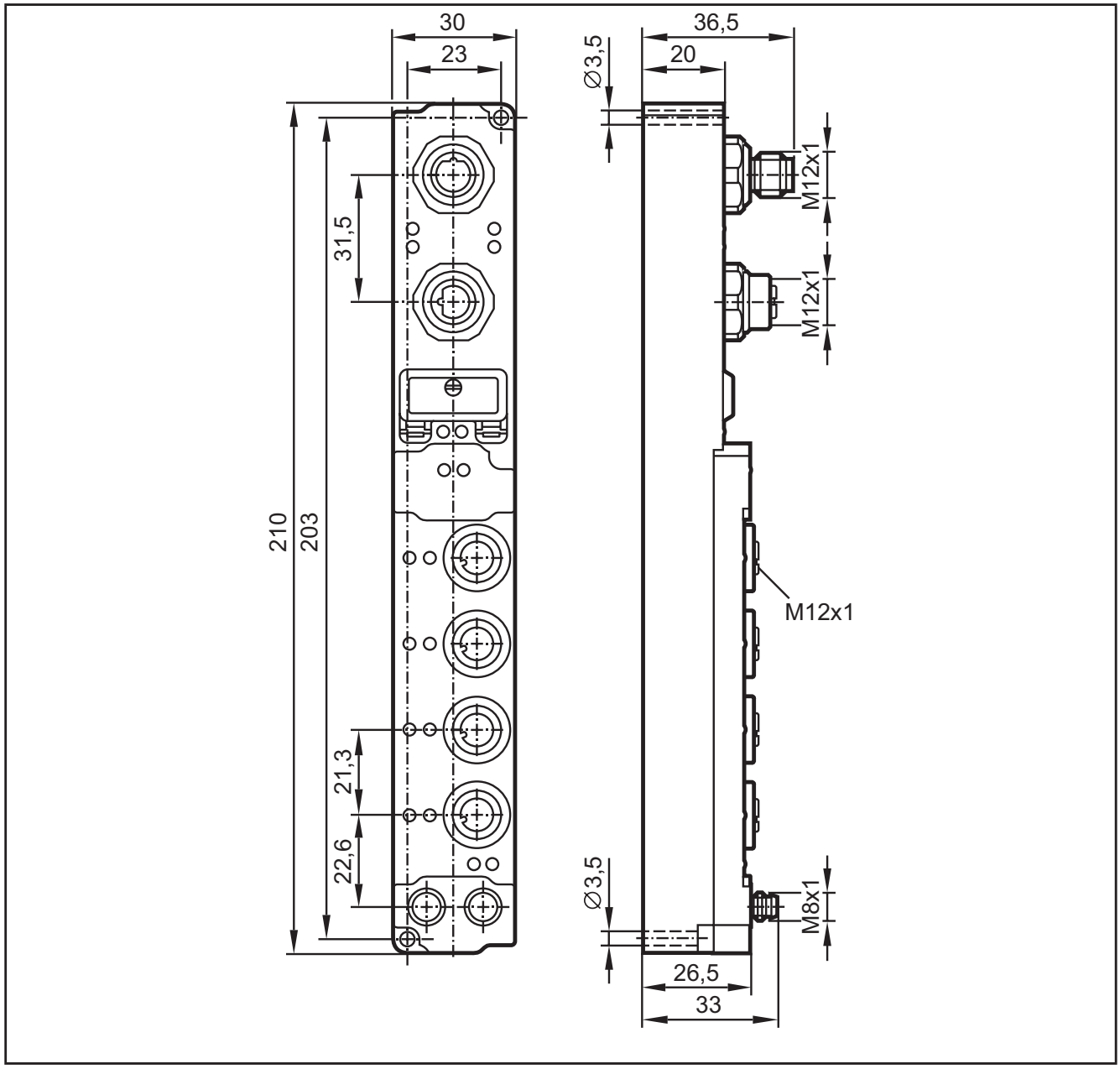


Voltage loss

7.6 Start-up behaviour of the modules

During start-up of the module the I/O LEDs illuminate and flash. In an error-free condition the I/O LEDs should stop flashing after 2-3 seconds. If an error has occurred, it depends on the type of error which LED starts flashing.

7.7 Scale drawing



8 Devices

8.1 Technical data

Detailed technical data can be found in the individual data sheets indicating article number AC26xx → www.ifm.com.

8.2 Digital stand-alone modules

8.2.1 AC2630 FieldModuleDP 4x2DI M12

The digital module detects the binary control signals at the process level and transfers them to the higher-level automation device. The signal status is indicated via LEDs.
The sensors are supplied from the operating voltage U_B. The load voltage U_L is not needed in the input module, but can be used for optional power feed-through.

8.2.2 AC2631 FieldModuleDP 2x2DI 2x2DO M12

This digital I/O module combines 4 digital inputs with an input filter of 3.0 ms and 4 digital 24 V DC outputs in one device.

The outputs are suited for load currents up to 500 mA; the maximum total current of I_Σ = 2 A should not be exceeded. The outputs have short-circuit and reverse-polarity protection.

The signal status can be indicated for each channel via LEDs.

The inputs are located on the upper half of the modules with two inputs on one socket.

8.3 Analogue input modules

8.3.1 AC2638 FieldModuleDP 4AI (V) M12

The analogue module AC2638 processes signals in the range of -10 V...+10 V. The voltage is digitalised with a resolution of 16 bit, electrically isolated and transferred to the higher-level automation device.

The 4 input channels are differential inputs and have a common internal ground potential. The provided load voltage U_L (freely selectable up to 30 V DC) is used to power the connected sensors. Thus it is possible, for example, to power a measuring potentiometer with 10 V DC from an external voltage source.

In addition, an automatic limit value monitoring is provided.

The module is parameterised via the fieldbus. The parameters are stored permanently in the module, even in the event of a power failure.

The analogue input signal is measured via a differential input. If the sensor does not provide two lines for differential measurement (e.g. 24 V, GND and signal), then GND and input have to be bridged.

Pin 5 (shield) is capacitively coupled to the conductive base surface of the module.

Supply voltage

U_B powers the fieldbus electronics. It is electrically isolated from U_L.

U_L is used for sensor supply; it is not required for the function of the modules.

Functions of the channel LEDs

LED	Status	Description
R "Run"	green	Data are transferred to the D/A converter.
	off	Presently, there is no data transfer.
E "Error"	red	Data transmission error Example: – Wire break – Measuring value outside the measuring range – Temperature compensation out of valid range
	off	Error-free data transfer

Process data

The analogue input module processes signals from -10 V...10 V with a resolution of 16 bits.

Process data		Measured value
hex	decimal	
8000	-32768	-10 V
C001	-16383	- 5V
0000	0	0
3FFF	16383	5V
7FFF	32767	10 V

8.3.2 AC2636 FieldModuleDP 4AI (C) M12

The analogue module AC2636 processes signals in the range of 0/4...20 mA. The input current is digitalised with a resolution of 16 bit, electrically isolated and transferred to the higher-level automation device.

The 4 input channels are differential inputs and have a common internal ground potential.

The module is equipped with various features. The default settings have been selected in such a way that device configuration is usually not necessary.

The scaling of the inputs 0/4...20 mA can be modified, if required; an automatic limit value monitoring is also provided.

The module is parameterised via the fieldbus. The parameters are stored permanently in the module, even in the event of a power failure.

The analogue input signal is measured via a differential input. If the sensor does not provide two lines for differential measurement (e.g. 24 V, GND and signal), then GND and input have to be bridged.

Pin 5 (shield) is capacitively coupled to the conductive base surface of the module.

Functions of the channel LEDs

LED	Status	Description
R "Run"	green	Data are transferred to the D/A converter.
	off	Presently, there is no data transfer.
E "Error"	red	Data transmission error Example: – Wire break – Measuring value outside the measuring range
	off	Error-free data transfer

Process data

The analogue input module processes signals from 0/4...20 mA with a resolution of 16 bits.

Adjustment of the measuring values at 0...20 mA

Process data		Measured value
hex	decimal	
0000	0	0 mA
3FFF	16383	10 mA
7FFF	32767	20 mA

Adjustment of the measuring values at 4...20 mA

Process data		Measured value
hex	decimal	
0000	0	4 mA
3FFF	16383	12 mA
7FFF	32767	20 mA

Data representation is according to the integer number format (INT). The process data are entered in the default settings in the two's complement format (-1 corresponds to 0xFFFF).

8.3.3 AC2634 FieldModuleDP 4AI (PT100) M12

The analogue module AC2634 allows direct connection of resistance sensors. The circuit can operate sensors in 2, 3 or 4-wire technology.

Linear performance over the entire temperature range is accomplished via a micro-processor. The temperature range is freely selectable.

The module can also be used for resistance measurement. In this case, the measuring value is output in a range from 10 Ω to 1.2/5.0 kΩ with a resolution of 1/16 Ω (The internal resolution of the resistance value is 1/255 Ω).
In the temperature range of the Pt100 sensor in 4-wire technology, the resolution is 0.1 °C. Sensor malfunction, e.g. wire break, is indicated via error LEDs.

The module is equipped with various features. The default settings have been selected in such a way that device configuration is usually not necessary.

The module is parameterised via the fieldbus.

Supply voltage

U_B powers the fieldbus and the sensor electronics. It is electrically isolated from U_L. For module function U_L is not needed. An infeed is not necessary.

Connections

4-wire technology
4-wire technology allows measurement and correction of measuring errors which are caused by the ohmic resistance of cables and contacts.

3-wire technology
The resistance is only measured in one direction to the resistance sensor and then multiplied by two. The ingoing and outgoing lines must have an almost identical ohmic resistance.

Two-wire technology

Measuring errors might occur which vary greatly depending on temperature deltas and conductor cross-sections.

The settings of one channel always affect the entire module and thus all other channels.
All channels should be adjusted identically in order to prevent operating problems.

Pin 5 (shield) is capacitively coupled to the conductive base surface of the module.

Functions of the channel LEDs

LED	Status	Description
R "Run"	green	Data are transferred to the D/A converter.
	off	Presently, there is no data transfer.
E "Error"	red	Data transmission error Example: – Wire break – Measuring value outside the measuring range – Temperature compensation out of valid range
	off	Error-free data transfer

Process data

Process data		Measured value
hex	decimal (integer)	
0xF63C	-2500	-250 °C
0xF830	-2000	-200 °C
0xFC18	-1000	-100 °C
0xFFFF	-1	-0.1 °C
0x0000	0	0.0 °C
0x0001	1	0.1 °C
0x03E8	1000	100 °C
0x07D0	2000	200 °C
0x1388	5000	500 °C
0x2134	8500	850 °C

Feature register (R32)

The basic settings of the module can be modified in the feature register.

Selection of the 2, 3, or 4-wire measuring method is read only from the feature register of channel 1.

In order to write to the register, it is first required to remove the write protection in the code word register (R31).
Write the value [0x1235] to the register 31.

Default setting: 0x0010

Bit	Value	Description	
4	0	Hide Siemens additional bits **A** (default)	
	1	Show Siemens additional bits Diagnostic data are written to the process data (bits 0-2).	
8	0	Deactivate overrange protection	
	1	Activate overrange protection **A** (default) If the temperature of 850 °C is exceeded, the status bits are set accordingly and the output value is limited to 850 °C.	
10 and 9	00	4-wire connection activated **A** (default)	
	01	3-wire connection activated **B**	
15, 14, 13, 12		Pt100	-200°C to 850°C
		Ni100	-60°C to 250°C
		Pt1000	-200°C to 850°C
		Pt500	-200°C to 850°C
		Pt200	-200°C to 850°C
		Ni1000	-200°C to 850°C
		Ni120	-80°C to 320°C
		RSNE1000	Nickel 1000: Special temperature curve of Siemens
		Ohm	10 to 5000 Ω
		Ohm	10 to 1200 Ω

Diagnostic information in the process data when using a Siemens controller type S7

If the parameter "Show Siemens additional bits" (R32, bit 4) is activated, bits 0 to 2 of the process data are used for status evaluation.

The process date is shown in bits 15-3 with bit 15 as the sign bit.

Bit	Name	Description
0	Overflow	0 = measuring value in valid range 1 = measuring value overflow
1	Error	0 = no error 1 = error
2	-	Reserved
14 to 3	Measured value	Process date
15	Sign	0 = positive sign 1 = negative sign

8.3.4 AC2637 FieldModuleDP 4AO (C) M12

The analogue output module AC2637 generates an analogue output signal of 0/4...20 mA.

The four channels feature electrical isolation from the supply voltage and a common ground. The module operates with an accuracy deviation of max. ± 0.1% of the final value of the measuring range

The outputs can be scaled via the fieldbus; the settings made are stored in the module.

The actuator is connected via output +/-. The actuator can be operated optionally with 24 VDC. In order to ensure effective discharge of the immission, the ground surface must be conductive and feature low-resistance earthing.

Pin 5 (shield) is capacitively coupled to the conductive base surface of the module.

Functions of the channel LEDs

LED	Status	Description
R "Run"	green	Data are transferred to the D/A converter.
	off	Presently, there is no data transfer.
E "Error"		No function. Illuminates shortly during power-up

Process data

The analogue output module generates output signals in a range of 0...20 mA. The output current is output by the module with a resolution of up to 16 bits.

Pprocess data		**Measured value**
hex	decimal	
0x0000	0	0 mA
0x3FFF	16383	10 mA
0x7FFF	32767	20 mA

Adjustment of the measuring values at 4...20 mA

Process data		**Measured value**
hex	decimal	
0000	0	4 mA
3FFF	16383	12 mA
7FFF	32767	20 mA

Feature register (R32)

The basic settings of the module can be modified in the feature register. In order to write to the register, it is required to remove the write protection in the code word register.

Bit	**Value**	**Description**
2	0	Watchdog timer active **A** (default)
	1	Watchdog timer inactive
3 and 4		Reserved
5	0	Mode: 0...20 mA **A** (default)
	1	Mode: 4...20 mA
6 and 7		Reserved
9 to 15		Reserved

Explanation of the watchdog timer

The watchdog timer is active on delivery. In case of a watchdog overflow either the manufacturer or the user switch-on value is output as a substitute value at the module output.