

CL200

RM2-DP12

Module Description

Edition

102

CL200

RM2-DP12

Module Description

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1 Safety Instructions

Before you start working with the RM2-DP12 module, we recommend that you thoroughly familiarize yourself with the contents of this manual. Keep this manual in a place where it is always accessible to all users.

1.1 Intended Use

This manual contains instructions regarding the intended use of the module.

The described products

- have been developed, manufactured, tested and documented in compliance with the safety standards. These products pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.
- fully comply with the requirements of
 - the EMC Directives (89/336/EEC, 93/68/EEC, and 93/44/EEC)
 - the Low-Voltage Directive (73/23/EEC)
 - the harmonized standards EN 50081-2 and EN 50082-2
- are designed for operation in industrial environments (Class A emissions), i.e.
 - no direct connection to the public low-voltage power supply;
 - connection to the medium- or high-voltage system via a transformer.

The following applies to the usage in residential environments, in business and commercial areas and in small enterprises:

- Installation in a switch cabinet or an enclosure with high shield attenuation.
- Lines that exit the screened area must be provided with filtering or screening measures.
- The user will be required to obtain an individual operating license issued by the appropriate national authority or approval body. In Germany, this is the *Regulierungsbehörde für Post und Telekommunikation* (Regulatory Body for Post and Telecommunication), and its local offices.

⇒ **This is a class A device which may cause radio interference in residential environments. In this case, the operator may be required to take suitable countermeasures and to bear the cost of the same.**

Proper transport, handling and storage, placement and installation of the product are indispensable prerequisites for its correct and safe operation.

1.2 Qualified Personnel

The requirements for qualified personnel depend on the qualification profiles described by ZVEI (central association of the electrical industry) and VDMA (association of German machine and plant builders). Please refer to the following publication (in German):

Weiterbildung in der Automatisierungstechnik
edited by: ZVEI und VDMA
MaschinenbauVerlag
Postfach 71 08 64
60498 Frankfurt / Germany

This manual is intended for PLC project planning engineers. This personnel requires special knowledge of controllers.

Interventions in the hardware and software of our products, unless described otherwise in this manual, may only be performed by Bosch's own specifically trained personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual can result in serious bodily injury or property damage.

Only electrotechnicians as recognized under IEV 826-09-1 (modified) who are familiar with the contents of this manual may install and service the described products.

Such personnel

- is, due to their professional training, skills and experience and based upon their knowledge of and familiarity with applicable technical standards, capable of evaluating the work to be carried out, and of recognizing possible dangers.
- has acquired, based upon several years of working in a comparable field, a level of knowledge and skills that may be deemed equal to that after formal professional education.

Please note our comprehensive range of training courses. Our training center will be pleased to provide you with further information, telephone: +49-6062-78-258.

1.3 Safety Markings on Products



Warning of dangerous electrical voltage!



Warning of danger caused by batteries!



Components sensitive to electrostatic discharge!



Disconnect from mains before opening!



PE protective earth conductor



Functional earthing or low-noise earth only!



Connection of shield conductor only!

1.4 Safety Instructions in this Manual



DANGEROUS ELECTRICAL VOLTAGE

This symbol is used to warn of a **dangerous electrical voltage**. The failure to observe the instructions in this manual in whole or in part may result in **personal injuries**.



DANGER

This symbol is used whenever insufficient or lacking compliance with instructions may result in **personal injury**.



CAUTION

This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

⇒ This symbol is used to alert the user to an item of special interest.

- ◆ This symbol is used if user activities are required.

1.5 Safety Instructions Concerning the Described Product

**DANGER**

Danger of life through inadequate EMERGENCY-STOP devices!
EMERGENCY-STOP devices must be active and within reach in all system modes. Releasing an EMERGENCY-STOP device must not result in an uncontrolled restart of the system!
First check the EMERGENCY-STOP circuit, then switch the system on!

**DANGER**

Danger for persons and equipment!
Before operating the system, test every new program!

**DANGER**

Retrofits or modifications may adversely affect the safety of the described products!

The consequences may include severe personal injury, damage to equipment, or environmental hazards. Therefore, possible retrofits or modifications to the system using third-party equipment have to be approved by Bosch.

**DANGEROUS ELECTRICAL VOLTAGE**

Unless described otherwise, maintenance work must be performed on inactive systems! During this process, the system must be protected against unauthorized or accidental restart.

Measuring or testing procedures on the live system are exclusively reserved to qualified electrical personnel!

**CAUTION**

Do not plug or unplug the module as long as the controller is switched on! The module could be destroyed. Turn off or unplug the controller's power supply module, the external power supply and the signal voltage first. Only then plug or unplug the module!

**CAUTION**

Please use lacking compliance only spare parts approved by Bosch!

**CAUTION**

Please comply with all ESD protection measures when using the module! Prevent electrostatic discharges!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge (ESD)!

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g. by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected to the working surface via a cable with an integrated 1 M Ω resistor.
- ESD-sensitive components may by no means come into contact with chargeable objects, including most plastic materials.
- When ESD-sensitive components are installed in or removed from a device, the device must be de-energized.

1.6 Documentation, Software Release and Trademarks

Documentation

This manual provides information about the RM2-DP12 module of the CL200 PLC controller.

Modifications

Modifications in the present manual as compared to the previous edition are marked by black vertical bars in the margin.

Trademarks

Upon delivery, all trademarks of software installed on Bosch products are the property of the respective manufacturer.

Upon delivery, all installed software is copyright-protected. The software may only be reproduced with the approval of Bosch or in accordance with the license agreement of the respective manufacturer.

PROFIBUS® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

2 Introduction to the RM2-DP12 System

The RM2-DP12 module provides you with the possibility to create, at the PROFIBUS-DP, a modular slave node with modules of the CL200 PLC module range.

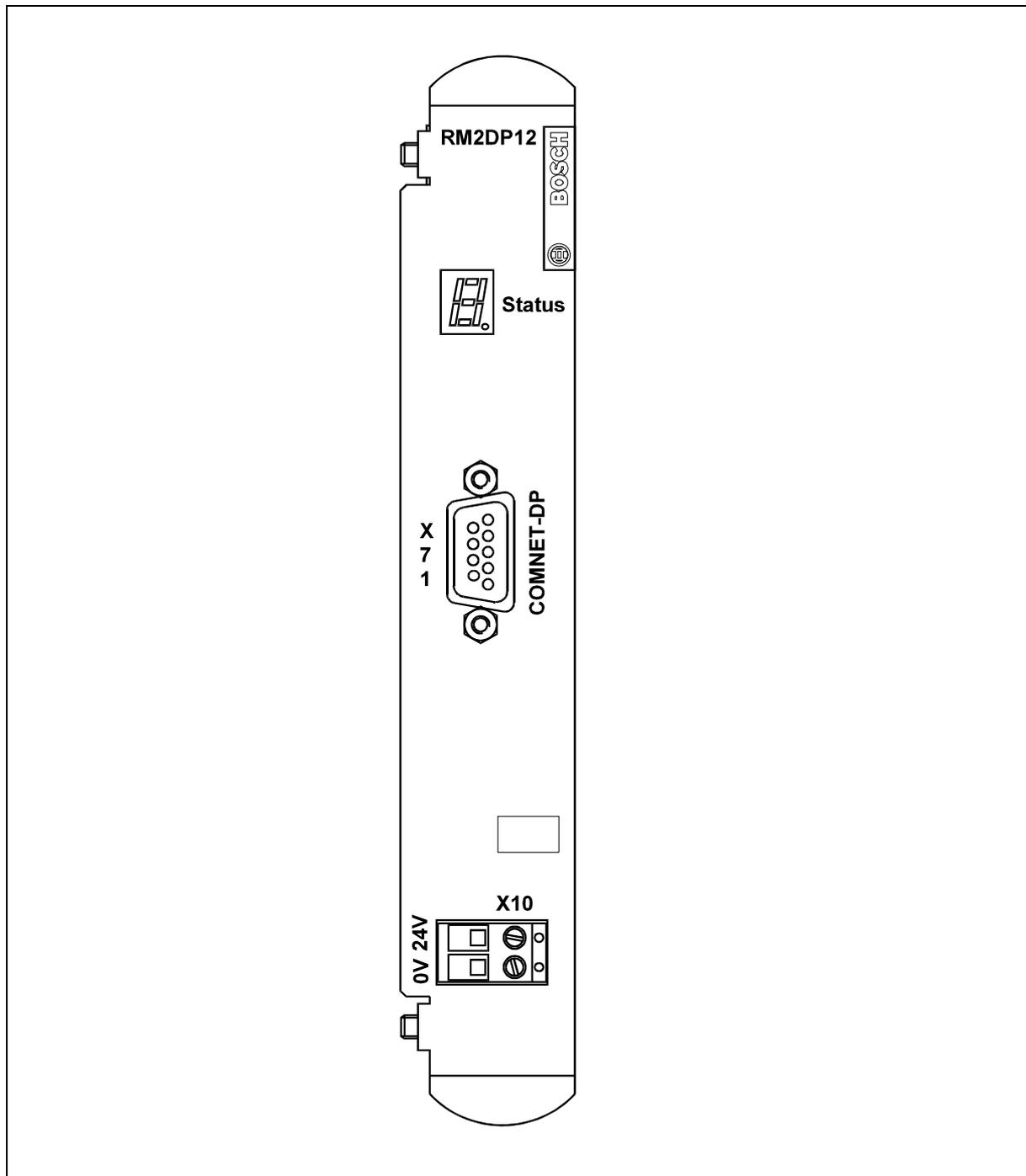


Fig. 1 RM2-DP12

The RM2-DP12 can be plugged into a CL200 mounting rack. It is supplied with a 24 V voltage and provides the internal 7.5 V supply voltage (1.2 A) for the in- and output modules.

The module is provided with a **singular module width** and must be operated on **slot 1**.

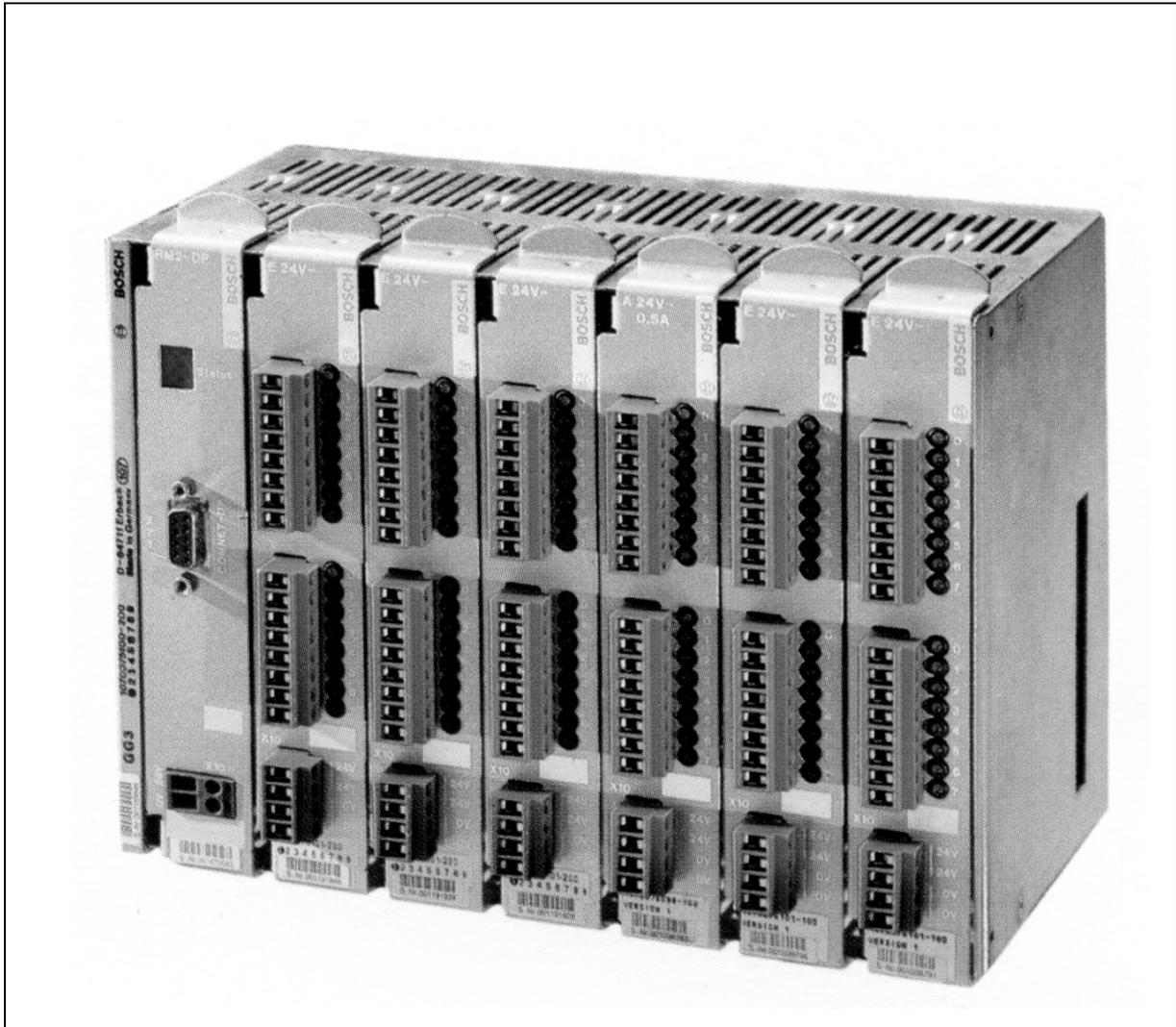


Fig. 2 RM2-DP12 with mounting rack

3 Power Supply

The RM2-DP12 necessitates an external 24 V power supply. The X10 connection for the 24 V power supply is located on the front panel.

The RM2-DP12 module provides the internal 7.5 V power supply for the in- and output modules, so that an additional power supply unit for the internal supply of the modules is not necessary (also refer to I/O modules).



CAUTION

Do not operate the RM2-DP12 module together with an NT200 power supply unit or with a ZE200 central unit.

X10 pin assignment:

Pin	Designation
1	24 V
2	0 V

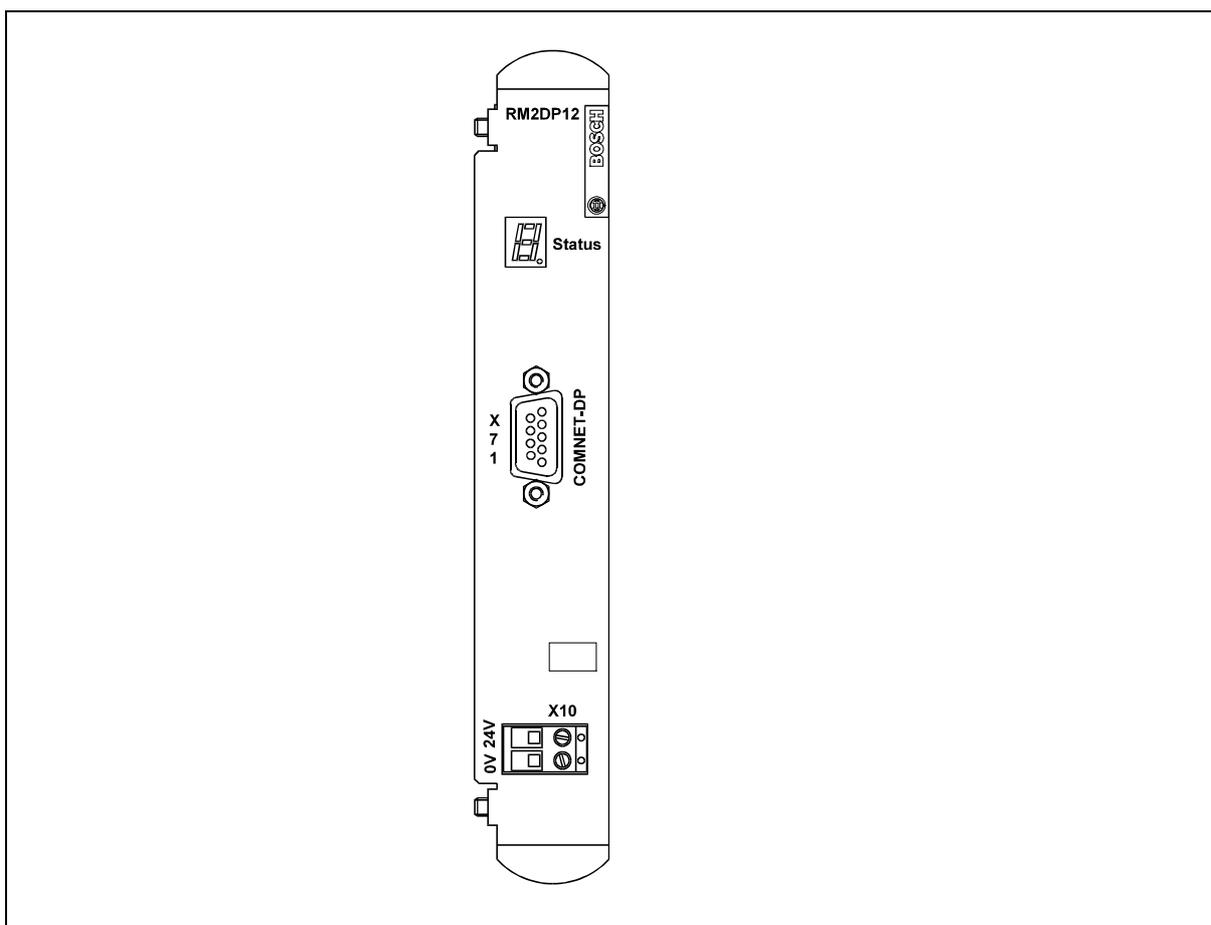


Fig. 3 X10 power supply

4 PROFIBUS-DP

4.1 Connection

The RM2-DP12 and the PROFIBUS are connected via a 9-pin D-Sub plug which, for security reasons, should be screwed to the RM2-DP12's D-Sub socket. The **X71** connection for the PROFIBUS is located on the front panel.

The pin assignment corresponds to the PROFIBUS standard.

PROFIBUS-DP X71 connection

Pin	Name	Significance
1	-	n.c.
2	-	n.c.
3	B_LTG	Receiving/sending data - P
4	RTS_SIG	Repeater control signal
5	GND_ISO	Data ground
6	P5V_ISO	Supply voltage +
7	-	n.c.
8	A_LTG	Receiving/sending data - N
9	GND_ISO	Repeater control signal

Fig.4 Pin assignment PROFIBUS-DP

At the PROFIBUS-DP X71 connection, up to 100 mA can be picked up externally from P5VISO.

4.2 Setting of Bus Address

Each node at the PROFIBUS-DP must receive its own bus address.

The bus address of the RM2-DP12 module is set by means of the **S1** DIP switch.

⇒ The set bus address will only be scanned during run-up, i.e. when the supply voltage is applied to the X10 connection.

Switch	8	7	6	5	4	3	2	1
Significance	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Value	128	64	32	16	8	4	2	1

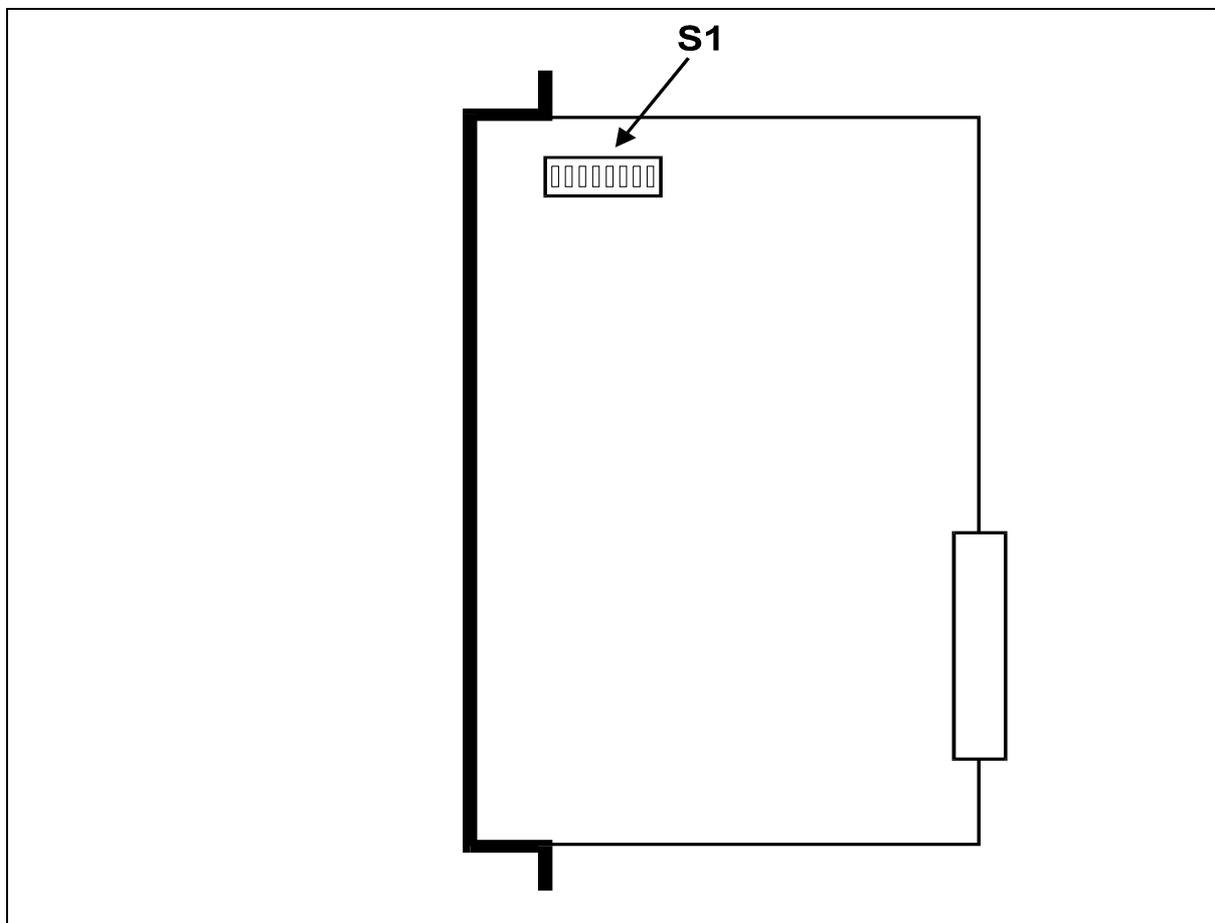


Fig. 5 DIP Switch S1

4.3 Baud Rate

The module adapts itself automatically to the PROFIBUS-DP's baud rate (**9600 Baud - 12 Mbaud**).

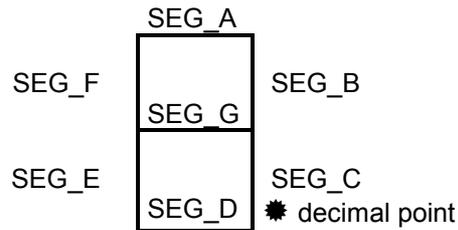
5 Status Display

The operational statuses of the module are shown on a 7 segment display.

Furthermore, the operational statuses are divided into 4 groups:

- Static display
- Flashing display
- Alternating display with starting signal F
- Alternating display with starting signal H

7 segment display:



5.1 Static Display

Display	Status
.	Normal operation (<i>Operate Mode</i>)
r.	Remote Test
<SEG_A>.	SYNC Mode
<SEG_D>.	FREEZE Mode
<SEG_A+SEG_D>.	SYNC/FREEZE Mode
0.	CLEAR Mode
1.	I/O diagnostic message
2.	LEAVE Master
3.	Offline
4.	-
5.	Parameterization error
6.	Configuration error
7.	-
8.	Hardware test active
9.	Peripheral bus Init

Explanation:

Operational Mode: Normal operational status. Cyclic I/O data exchange without error and warnings.

Remote Test: A special test program is processed (the JP1 soldering jumper must be closed).

SYNC Mode: The outputs remain frozen until the next SYNC or UNSYNC commands are received.

FREEZE Mode: The inputs remain frozen until the next FREEZE or UNFREEZE commands are received.

SYNC/FREEZE Mode: Superimposition of SYNC and FREEZE mode.

CLEAR Mode: Upon receipt of a CLEAR command, the outputs are unlatched. An UNCLEAR command from the master will reset this status. The reading of the input data will be continued.

I/O diagnostic message: One or more I/O modules indicate an error.

LEAVE Master: The slave is at the bus, i.e. that it is synchronous to the baud rate and waits for the parameterization and configuration by a master. Reasons for this indication are:

- Slave is not addressed by a master (wrong node address).
- The address monitoring function for the master has become inactive.
- Wrong ID number in the parameterization message.
- Parameterization data length too large.

Offline: The slave cannot synchronize itself to the baud rate or it is not at the bus.

Parameterization Error: The parameterization data sent by the master does not correspond to that of the slave.

Configuration Error: The configuration data sent by the master does not correspond to that of the slave.

Hardware test active: Carry out the hardware test in POWER_ON status.

Peripheral bus Init: One or more peripheral bus modules are still in their initialization phase and hold the RM2-DP12 module in POWER_ON status.

5.2 Flashing Display

Display	Status
0.	-
1.	-
2.	Overflow of DP in-/output data buffer
3.	Overflow of DP input data buffer
4.	Overflow of DP output data buffer
5.	Overflow of DP configuration data buffer
6.	No I/O assignment found
7.	General peripheral bus error ¹
8.	Peripheral bus time out ¹
9.	Peripheral bus initialization error
A.	Invalid DP bus address
b.	Hardware watchdog active
C.	Hardware error
d.	Hardware error
E.	Hardware error
F.	Hardware error

Explanation:

Overflow of DP in-/output data buffer: The number of the input and output data bytes recognized at the peripheral bus is higher than the number that can be transmitted via the PROFIBUS-DP.

Overflow of DP input data buffer: The number of the input data bytes recognized at the peripheral bus is higher than the number that can be transmitted via the PROFIBUS-DP.

Overflow of DP output data buffer: The number of the output data bytes recognized at the peripheral bus is higher than the number that can be transmitted via the PROFIBUS-DP.

No I/O assignment found: No I/O module could be recognized at the peripheral bus.

General peripheral bus error¹: Possible causes for errors are:

- Plugging or unplugging an I/O module during operation.
- Missing 24 V power supply of the POS-SA 1/2 module.

Peripheral bus time out¹: An I/O module at the peripheral bus delays access via the permissible value. A possible cause for the error might be a defective I/O module.

¹ These displays are not shown anymore in version 211 and higher

Peripheral bus initialization error: Possible causes for errors are:

- Hardware error of an I/O module.
- Missing 24 V power supply of the POS-SA 1/2 module.
- Module number in the input or output area is given twice.

Invalid bus address: The PROFIBUS-DP address set on the S1 DIP switch lies outside of the permissible range (valid range: 2-125).

Hardware watchdog active: The hardware watchdog has reacted because of a fatal system error.

5.3 Alternating Display with Starting Signal F

Display	Significance
F → 7 → Module number²	Error on image exchange with I/O module
F → A → Module number	Module number of an input module lies outside of the permissible range i.e. > 47
F → b → Module number	Module number of an output module lies outside of the permissible range i.e. > 47
F → d → Module number	In- and output module have been given the same module number.
F → C → Module number	A module is logically located in the wrong area, i.e. <ul style="list-style-type: none"> • An output module is logically located in the input area. • An input module is logically located in the output area. • An input/output module (I/O) is logically located only in the input area or only in the output area. The reason is a hardware error or a firmware error of the respective module.
F → E → Module number	Peripheral bus module is not supported e.g. intelligent module
F → F → Module number	Unknown peripheral bus module

² This display is possible in version 211 and higher.

5.4 Alternating Display with Starting Signal H

Internal hard- or software error.

6 I/O Modules

6.1 Supply

The RM2-DP12 module provides the internal 7.5 V supply voltage for the in- and output modules. The 7.5 V supply voltage can be loaded with a maximum of 1.2 A.

⇒ **Please observe the limit value of the current!**

Current input of the modules

Module	Identification Number	Address Assignment [Byte]	Current Input [mA]
E24V-, 16 inputs	075101	2 I	25 mA
E24V-, 32 inputs	075924	4 I	45 mA
A24V-/0.5A, 16 outputs	075098	2 O	60 mA
A24V-/0.5A, 32 outputs	078917	4 O	68 mA
A24V-/2A, 8 outputs	077418	1 O	40 mA
Relay, 8 outputs	077200	1 O	38 mA
E16/A8	081376	2 I / 2 O	45 mA
E16/A16	081661	2 I / 2 O	57 mA
Aana, analog output	077138	4 O	80 mA
A20 ana (4)	078914	8 O	70 mA
A10 ana (4)	078507	8 O	60 mA
A10 ana (8)	078295	16 O	60 mA
Eana, analog input	077141	32 I	80 mA
E20 ana	078911	32 I	80 mA
POS-SA1	077100	4 O Fifo mode	10 mA
POS-SA2	077103	4 O Fifo mode	10 mA
POS-LR1	078529	50 I / 48 O	1 mA
POS-LR2	078533	50 I / 48 O	1 mA
AG/S200	075916		30 mA
BM2-ASI	078284	24 I / 23 O	200 mA

Intelligent modules like e.g. R200, R200P, COM2-E are not supported.

6.2 Addressing

In contrast to the operation of I/O modules in the CL200 controller, the DIP switch positions on the I/O modules do not correspond to the address of the module in the I/O field (absolute address), but to a module number assigned by the user.

Each I/O module on the mounting rack must be assigned a module number.

The module numbers of this I/O module will be assigned during configuration (Software: COMNET-DP utilities or WinDP).

The assignment of the module numbers should begin at address 0 and then should be increased by one subsequently, in order to avoid empty modules.

6.3 Additional Information regarding the I/O Modules:

The data of the digital in- or output modules are transmitted byte per byte.

For special applications, the E24V-16fold input module and the A24V-/0.5A-16fold output module can transmit the data entirely consistently while the E24V-32fold input module can transmit the data word-consistently.

If you want to use this function, the following conditions must be fulfilled:

- Enter the module as consistent in the configuration software.
- Plug the jumper on the module onto "Consistency".

Example:

Connection of an absolute encoder with a data width of 16 bit to a digital input module.

6.4 Expansion Possibilities

With the RM2-DP12 module, six I/O modules can be operated on one mounting rack.

If this is not sufficient for an application, there are two ways of expansion:

- Two mounting racks are placed next to each other and connected via a short flat ribbon cable.
- Several tiers on top or next to each other, with a tier consisting of one or two mounting racks. The tiers are connected via the AG/S200 interface module.

6.5 Limits of Expansions

With regard to the expansion possibilities of the CL200 peripherals, the following limit values exist for the modular DP station:

- Please observe the limit value of the current! The I/O modules' maximum current input from the peripheral bus supply (7.5 V) must not exceed **1.2 A!**
- For **inputs**, a maximum of **244 bytes** is supported.
- For **outputs**, a maximum of **244 bytes** is supported.
- The **sum** of all possible in- and outputs is **384 bytes**.
- A maximum of **38 I/O modules**.

7 Ambient Temperature

The RM2-DP12 module is operated without a fan.

In order to avoid a thermal damage of the RM2-DP12 module, please comply with the following:

- The ambient temperature must not exceed 55°C.
- Ensure sufficient air circulation in order to avoid heat accumulation.
- Expansions are possible, but keep the distances between the mounting racks defined for the CL200.
- In a multiple tier construction, the module can only be operated in the lower tier.

8 DP Diagnostic Information

The RM2-DP12 module supports standard diagnostic information and the extended diagnosis possibilities of the PROFIBUS-DP. Among the extended diagnostic information, the RM2-DP12 supports the "identifier-related diagnosis", i.e. that for each I/O module 1 bit is reserved in the diagnostic buffer, which can indicate if the I/O module is under diagnosis or not. The 'device- or channel-related diagnosis' provided in the PROFIBUS standard is not supported by the RM2-DP12.

In case of a diagnosis, the diagnostic information will be made available to the DP master module (master class 1) or to the programming device (master class 2, e.g. for display on the DP monitor) via the PROFIBUS-DP. In addition, status '1' will be displayed on the 7 segment display as a group message for 'diagnosis is pending'.

Diagnostic information overview:

[Byte]	Function
[0]	Station_Status_1
[1]	Station_Status_2
[2]	Station_Status_3
[3]	Master_Add
[4]	Ident_High
[5]	Ident_Low
[6]	Header for external diagnosis
[7-12]	6 bytes external diagnosis

Coding of the identifier-related diagnosis:

Byte no.	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Significance
6	0	1	0	0	0	1	1	1	Header byte
7	x7	x6	x5	x4	x3	x2	x1	x0	Module no.: 0-7
8	x15	x14	x13	x12	x11	x10	x9	x8	Module no.: 8-15
9	x23	x22	x21	x20	x19	x18	x17	x16	Module no.: 16-23
10	x31	x30	x29	x28	x27	x26	x25	x24	Module no.: 24-31
11	x39	x38	x37	x36	x35	x34	x33	x32	Module no.: 32-39
12	x47	x46	x45	x44	x43	x42	x41	x40	Module no.: 40-47

Identifier-related diagnosis:

A set bit means that in this I/O range a diagnosis is pending.

9 Technical Data

Technical Data

Complies fully with the requirements of

Weight:

Dimensions (W x H x D):

Front panel: :

Storage temperature:

Operating temperature:

Slot:

Power Supply:

Current input:

Discharge capacity:

Internal supply for I/O modules:

Supply of bus interface (X71):

Degree of protection:

Class of protection:

Insulation test:

Atmospheric pressure:

Humidity rating:

Corrosion / chemical resistance:

Dirt resistance:

Transportability:

RM2-DP12 Module

IEC1131-2

DIN VDE 0110

DIN EN 60204-1 (as per VDE 0113)

270 g approximately

30 x 182 x 115 mm

Module width 1

-25...+70°C as per IEC 1131-2

0...55°C as per IEC 1131-2

The module must only be operated on slot 1 in the mounting rack.

24 VDC (-15...+20%)

Power failures of up to 10 ms with nominal voltage, with a 1 s break in between as per IEC 1131-2.

1.35 A max.

24 V against protective earth: 4.7 nF

0 V against protective earth: 4.7 nF

7.5 V (+/- 5%) / 1.2 A max.

P5VISO/GNDISO (+/- 5%) / externally 100 mA max. RS485, electrically isolated.

IP20 as per DIN VDE 0470-1 incorporated in the housing.

1 as per VDE 0106 T1 or VDE 0160 (IEC 536)

350 VAC
500 VDC

Operation up to 2000 m above sea level as per IEC 1131-2

RH-2; 5%...95% as per IEC 1131-2.
F as per DIN 40040

Condensation not permissible.

The ambient air must be free of elevated concentrations of acids, alkali, corrosive agents, salt, metal vapors or other electrically conductive pollutants.

Degree of contamination 2 as per EN 1131-2

The RM2-DP12 module requires a dustfree environment. The housing and compartments in which the mounting rack is located must comply with the minimum degree of protection IP54 as per DIN VDE 0470-1.

Height of fall in packaging 1.0 m as per IEC 1131-2

Mechanical stress (shock and vibration resistance):

Vibrations:	Sinusoidal oscillations in all 3 axes as per IEC 1131-2 Frequency 10 - 57 Hz with 0.0375 mm constant amplitude with 0.075 mm occasional amplitude Frequency 57 - 150 Hz with 0.5 g constant amplitude, with 1.0 g occasional amplitude
Shock:	Impact resistance on all 3 axes as per IEC 1131-2, semi-sinusoidal, duration: 11 ms with 15 g.

Interference radiation:

Harmful radiation	None
Radio interference suppression of housing	Class A, test conditions as per EN 50081-2: Frequency 30 - 230 mHz, limit value 30 dB (mV/m) in 30 m frequency 230 - 1000 mHz limit value 37 dB (mV/m) in 30 m

EMI resistance:

High-frequency electromagnetic fields as per IEC 1131-2	Test field strength: 10 V/m Frequency range: 27 to 500 MHz Sweep rate: 0.0015 dec./s
Electrostatic discharges on accessible housing parts as per EN 50082-2. ESD resistance 4 for humidity rating RH-2.	Air discharge: 16 kV Contact discharge: 6.5 kV

Conducted interferences:

24V voltage supply	Rapid burst pulses, symmetrical: 4 kV as per IEC 801-4 Dampened sine wave 1 MHz, symmetrical as per IEC 255-4: not relevant
Serial data line (DP bus)	Rapid burst pulses, symmetrical: 4 kV as per IEC 801-4 Dampened sine wave 1 MHz, symmetrical as per IEC 255-4: not relevant

