

4.7 Digital Input/Output Module 07 DC 91

16 digital inputs, 8 digital outputs, 8 configurable inputs/outputs, 24 V DC, CS31 system bus

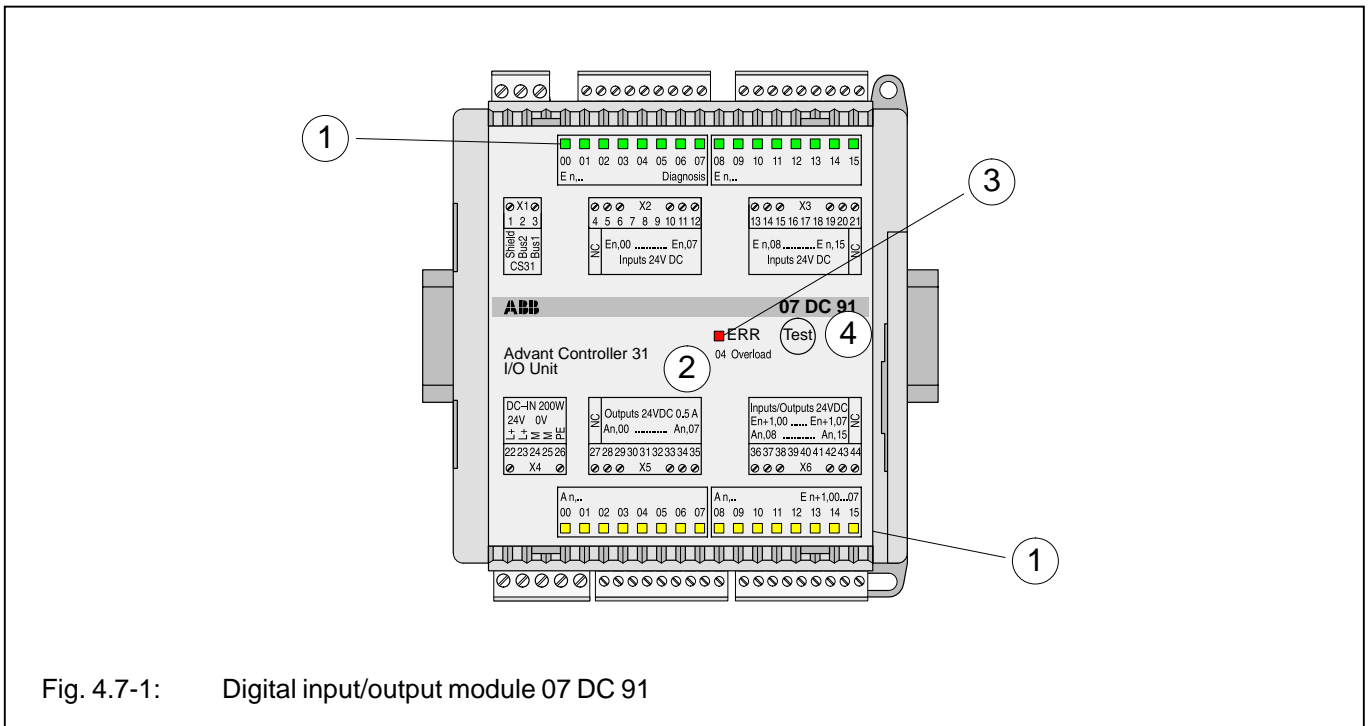


Fig. 4.7-1: Digital input/output module 07 DC 91

Contents

Intended purpose	4.7-1
Display and operating elements on the front panel	4.7-1
Electrical connection	4.7-1
Addressing	4.7-3
Input/output configuration	4.7-4
Normal operation	4.7-4
Diagnosis and display	4.7-4
Technical data	4.7-5
Dimensions for installation	4.7-8

The technical data are identical with the normal inputs and outputs.

The operating voltage of the module is 24 V DC.

The system bus connection is electrically isolated from the rest of the unit.

The module offers a number of diagnosis functions (see chapter "Diagnosis and displays").

Intended purpose

The digital input/output module 07 DC 91 is used as a remote module on the CS31 system bus. It has 32 channels with the following features:

- 16 inputs, 24 V DC, in two groups.
- 8 outputs, 24 V DC, in one group.
The outputs
 - work with transistors,
 - have a rated load capacity of 0.5 A and
 - are protected against overload and short circuits.
- 8 inputs/outputs, each of which can be addressed
 - as input,
 - as output or
 - as re-readable output (combined input/output)

Displays and operating elements on the front panel

- ① 16 green LEDs to indicate the signal status at the inputs,
16 yellow LEDs to indicate the signal status at the outputs or at the configurable inputs/outputs
- ② List of diagnosis information related to the LEDs, when used for diagnosis display
- ③ Red LED for error message
- ④ Test button

Electrical connection

The module is mounted on a DIN rail (15 mm high) or with 4 screws. The following illustration shows the electrical connection of the input/output module.

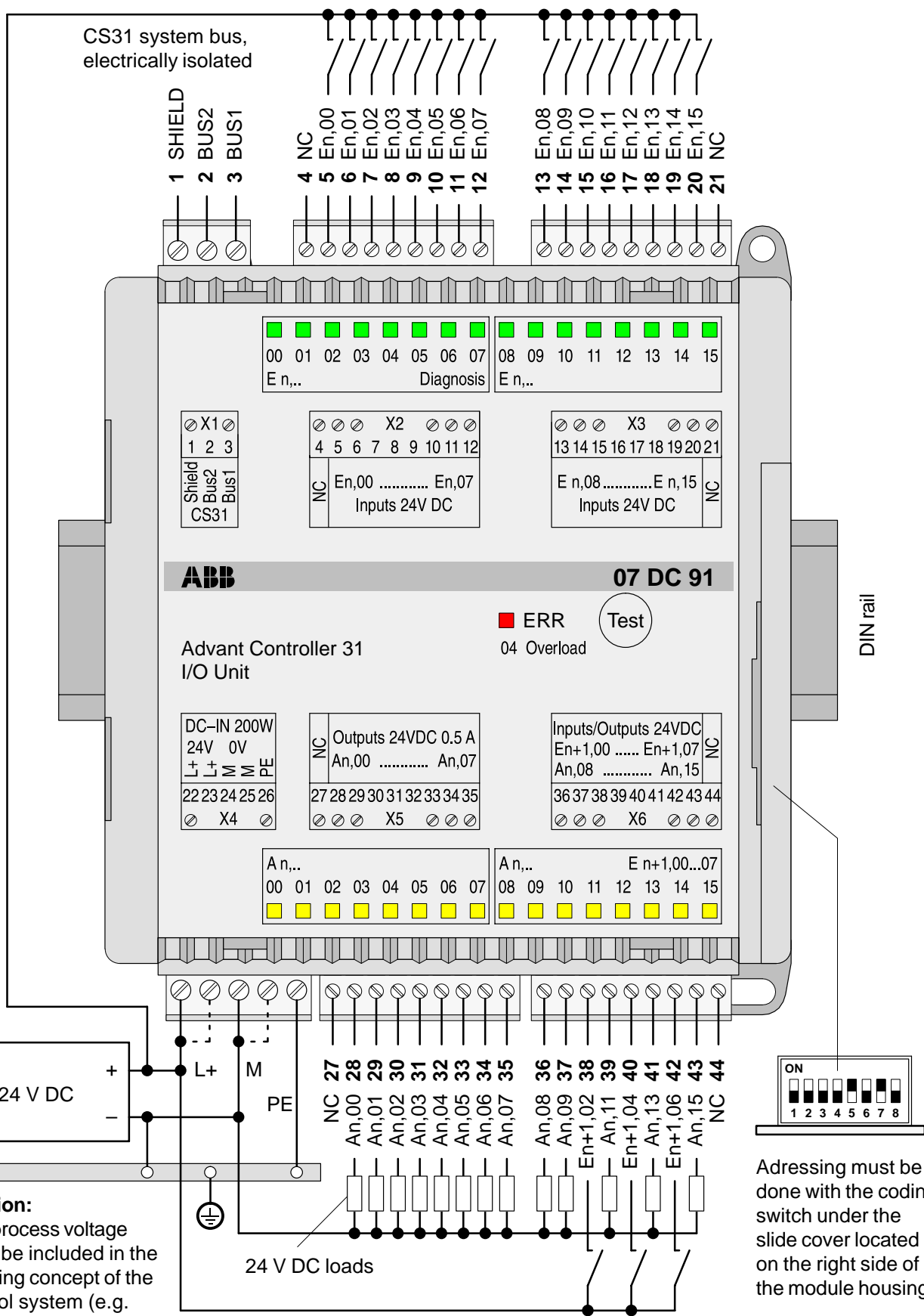


Fig. 4.7-2: Electrical connection of the digital input/output module 07 DC 91. The example shows 19 channels used as inputs and 13 channels used as outputs.

Addressing

An address must be set for each module to enable the central unit to correctly access the inputs and outputs.

A detailed description about "Addressing" can be found in the chapter "Addressing" for the central processing unit and coupler.

The address must be set at the DIL switch, located under the slide cover on the right side of the module.

When using the central units 07 KR 91, 07 KT 9x as bus master, the following **operating modes** (address allocations) apply, depending on the position of the address DIL switch No.1:

Central units 07 KR 91 / 07 KT 9x			
When the address DIL switch No. 1 is set to ON , it means that 16 inputs and 16 outputs are permanently allocated. In this case all configurable channels are outputs.			
Address DIL switch No. 8 is not used.			
Terminal/Input		Terminal/Output	
5	E n,00	28	A n,00
6	E n,01	29	A n,01
7	E n,02	30	A n,02
8	E n,03	31	A n,03
9	E n,04	32	A n,04
10	E n,05	33	A n,05
11	E n,06	34	A n,06
12	E n,07	35	A n,07
13	E n,08	36	A n,08
14	E n,09	37	A n,09
15	E n,10	38	A n,10
16	E n,11	39	A n,11
17	E n,12	40	A n,12
18	E n,13	41	A n,13
19	E n,14	42	A n,14
20	E n,15	43	A n,15

n: The group number can be set at address DIL switch with switches 2...7.
Recommended module addresses for 07 KR 91 / 07 KT 9x as bus master are 08, 10, 12...60 (even-numbered addresses)

With this setting, the module uses **only one** group number on the CS31 system bus. In this case 16 inputs and outputs are available.

Fig. 4.7-3: Addresses of the channels when DIL switch No. 1 is set to ON

Central units 07 KR 91 / 07 KT 9x				
When the address DIL switch No. 1 is in the OFF position (factory setting), it means that 16 inputs and 8 outputs are permanently set. The 8 configurable channels can be addressed individually as inputs or outputs.				
Address DIL switch No. 8 is not used.				
Terminal/Input		Terminal/Output		Input
5	E n,00	28	A n,00	
6	E n,01	29	A n,01	
7	E n,02	30	A n,02	
8	E n,03	31	A n,03	
9	E n,04	32	A n,04	
10	E n,05	33	A n,05	
11	E n,06	34	A n,06	
12	E n,07	35	A n,07	
13	E n,08	36	A n,08	E n+1,00
14	E n,09	37	A n,09	E n+1,01
15	E n,10	38	A n,10	E n+1,02
16	E n,11	39	A n,11	E n+1,03
17	E n,12	40	A n,12	E n+1,04
18	E n,13	41	A n,13	E n+1,05
19	E n,14	42	A n,14	E n+1,06
20	E n,15	43	A n,15	E n+1,07

n: The group number can be set at address DIL switch with switches 2...7.
Recommended module addresses for 07 KR 91 / 07 KT 9x as bus master: 08, 10, 12...60 (even-numbered addresses)

With this setting, the module uses **two** group numbers on the CS31 system bus occupying 24 binary input channels and 16 binary output channels. 16 inputs, 8 outputs and 8 configurable inputs/outputs are available. An +1,00...15 and En1,08...15 are not used. They can be used for other modules if needed.

Fig. 4.7-4: Addresses of channels when DIL switch No. 1 is set to OFF

Note:
Module 07 DC 91 reads the setting of the address switch **only** during the initialization, after switching on the power supply, meaning that changes of the setting during operation remain ineffective until the next initialization process.

Input/output configuration

Module 07 DC 91 does not store any configuration data. The 8 configurable channels are defined as inputs or outputs by the user program, e.g. by reading or writing data in the user program. Every configurable input/output channel can be used as input or output (or re-readable output). When used as input, the channel must not be assigned a 1 signal (see Fig. 4.7-3 and 4.7-4 for setting of the address DIL switch and address assignment).

Normal operation

- The module initializes automatically after power is switched on. During this time all LEDs are switched on.
- If the CS31 system bus does not run, the LED ③ flashes
- LED ③ goes out again after the bus operation runs correctly and the module does not detect an error.
- The 16 green and the 16 yellow LEDs ① indicate the signal status of the 32 channels.

Diagnosis and display

In case of an overload or a short-circuit, the output switches off and then performs re-starting attempts. An acknowledgement of the output is therefore not necessary. However, the error message is displayed by the LED.

Diagnosis functions:

- Short-circuit / overload of outputs ($I > 0.7 \text{ A}$)
- Reporting of a short-circuit or overload condition to the central unit
- Storing and making this information available when recalled (kind of error and error location)
- Error inside of module
- Error on CS31 system bus

If one of these errors occur, the red LED ③ lights up. **The error is transmitted to the central unit or the coupler.** For additional information see instructions supplied there under "Diagnosis".

Using test button ④ and the LED displays ① a diagnosis interrogation can be performed directly at the unit.

Pressing the test button for the first time, En,00 is selected: the status LED of the selected input flashes, all other status displays are switched off during this test. After releasing the test button, the diagnosis information for this channel is displayed for about 3 seconds by the green LEDs 00 to 07.

Explanation of LEDs:

00	not used
01	not used
02	not used
03	not used
04	Overload or short circuit, only for outputs
05	not used
06	not used
07	not used

The explanation for the LEDs ② is also printed on the front panel in English.

With every successive pressing and releasing of the test button, the process is repeated for the other input and output channels (I/O channels).

After calling up the last channel and pressing the test button once again, an LED test is performed. All LEDs must light up. Then the setting of the address switch is displayed for about 3 seconds by LEDs 00 to 07 which the 07 DC 91 module has set during initialization. In this case LED 0 shows the setting of switch 1 (LEDs 0...7 are assigned to switches 1...8).

The error messages in the I/O module and central unit are deleted, as soon as the errors have been corrected, if no further errors exist **and** when the error correction has been acknowledged.

Acknowledgement of an error after error correction:

- by pressing the test button for about 5 seconds, or
- by the PLC program, or
- by the PC.

Note:

The short-circuit and overload message indicates which channel has got the error.

The error message refers to a group of 4 outputs. This means, a short-circuit on one single channel (channel 0, 1, 2 or 3) is indicated as an error for all 4 channels (the whole group). The diagnosis message sent to the PLC always contains the first channel of the channel group, in this case channel 0.

After conclusion of the diagnosis interrogation, the 32 green and yellow LEDs again show the signal status of the channels.

Technical Data for 07 DC 91

In general, the technical system data listed under "System data and system configuration" in chapter 1 of volume 2 of the "Advant Controller 31" system description are valid. Additional data or data which are different from the system data are listed as follows.

Technical data of the complete unit

Permissible temperature range during operation	0...55 °C
Rated supply voltage	24 V DC
Rated signal voltage for inputs and outputs	24 V DC
Max. current consumption without load	0.15 A
Max. rated load for supply terminals	4.0 A
Max. power dissipation in module (outputs without load)	5 W
Max. power dissipation in module (outputs under load)	10 W
Protection against reversed polarity of power connection	yes
Conductor cross section for removable connectors	
power input	max. 2.5 mm ²
CS31 system bus	max. 2.5 mm ²
signal terminals	max. 1.5 mm ²
Number of binary inputs	16
Number of binary transistor outputs	8
Number of configurable inputs and outputs	8
Reference potential for all inputs and outputs	Terminals 24/25 (minus pole of supply voltage, terminal M)
Number of interfaces	1 CS31 system bus interface
Electrical isolation	CS31 system bus interface against the rest of the unit
Address setting	Coding switch under the slide cover located on the right side of the housing
Diagnosis	see chapter "Diagnosis and displays"
Operation and error messages	a total of 33 LEDs

Technical data of the digital inputs

Number of channels per unit	16
Distribution of channels in groups	2 groups of 8 channels each, channels En,00...En,07, and En,08...En,15
Reference potential for all inputs	Terminals 24/25 (minus pole of supply voltage, terminal M)
Electrical isolation	from CS31 system bus
Input delay	typ. 7 ms
Signalization of input signals	one green LED per channel, LED activated according to the input signal
Input signal voltage	24 V DC
0 signal	- 30 V...+ 5 V
1 signal	+ 13 V...+ 30 V
residual ripple at 0 signal	within - 30 V...+ 5 V
at 1 signal	within + 13 V...+ 30 V

Input current per channel	
Input voltage = + 24 V	typ. 7.0 mA
Input voltage = + 5 V	≥ 1.0 mA
Input voltage = + 13 V	≥ 2.0 mA
Input voltage = + 30 V	≤ 9.0 mA
Conductor cross section for removable connectors	max. 1.5 mm ² (grid space 3.81 mm)

Technical data of digital outputs

Number of channels per unit	8 transistor outputs
Distribution of channels in groups	1 group of 8 channels channels An,00...An,07
Reference potential for all inputs	Terminals 24/25 (minus pole of supply voltage, terminal M)
Common voltage supply terminals for all outputs	Terminals 22/23 (plus pole of supply voltage, terminal L+)
Electrical isolation	from CS31 system bus
Signalization of output signals	one yellow LED for each channel, LED activated according to output signal
Output current	
nominal value	500 mA at L+ = 24 V
maximum value	4 A total current per group
leakage current at 0 signal	< 0.5 mA
De-magnetization during inductive load	via internal varistor
Switching frequency at inductive load	max. 0.5 Hz
Switching frequency with lamps	max. 11 Hz at max. 5 W
Protection against short-circuit/overload	yes
overload message ($I \geq 0.7$ A)	yes, after approx. 100 ms
limiting of output current	yes
reactivation after short-circuit/overload	automatically
Resistance to feedback against 24V signals	yes
Total load current (including output current of configured inputs and outputs)	max. 8 A
Conductor cross section for removable connectors	max. 1.5 mm ² (grid space 3.81 mm)

Technical data of configurable inputs and outputs

The configurable channels are defined individually by the user program as either inputs or outputs. This is done by reading or writing data to/from the respective channel.

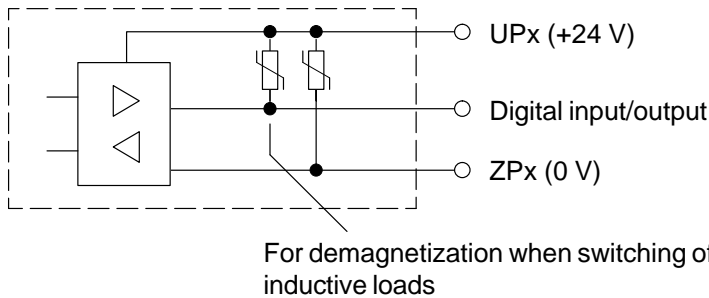
Number of channels per unit	8 inputs / transistor outputs
Distribution of channels in groups	1 group of 8 channels
when using channels as inputs	channels En+1,00...En+1,07
when using channels as outputs	channels An,08...An,15
Signalization of input and output signals	one yellow LED per channel, LED activated according to binary signal
Technical data when used as outputs	refer to digital outputs

Technical data when used as inputs

Input current per channel	refer to digital inputs
Input signal voltage	24 V DC
0 signal	- 6 V...+ 5 V *
1 signal	+ 13 V...+ 30 V
residual ripple at 0 signal	within - 6 V...+ 5 V *
at 1 signal	within + 13 V...+ 30 V

* Due to the direct connection to the output, the demagnetizing varistor is also effective at the input when disconnecting inductive loads (see figure). This is why the difference between UPx and the input signal may not exceed the clamp voltage of the varistor. The varistor limits the voltage to approx. 36 V. Following this, the input voltage must range from - 12 V to + 30 V when UPx = 24 V and from - 6 V to + 30 V when UPx = 30 V.

The following figure shows the circuit arrangement of a digital input/output.



Connection to the CS31 system bus

Interface standard	EIA RS-485
Electrical isolation	against voltage supply, input and output
Conductor cross section for removable 3-pole connector	max. 2.5 mm ²

Mechanical data

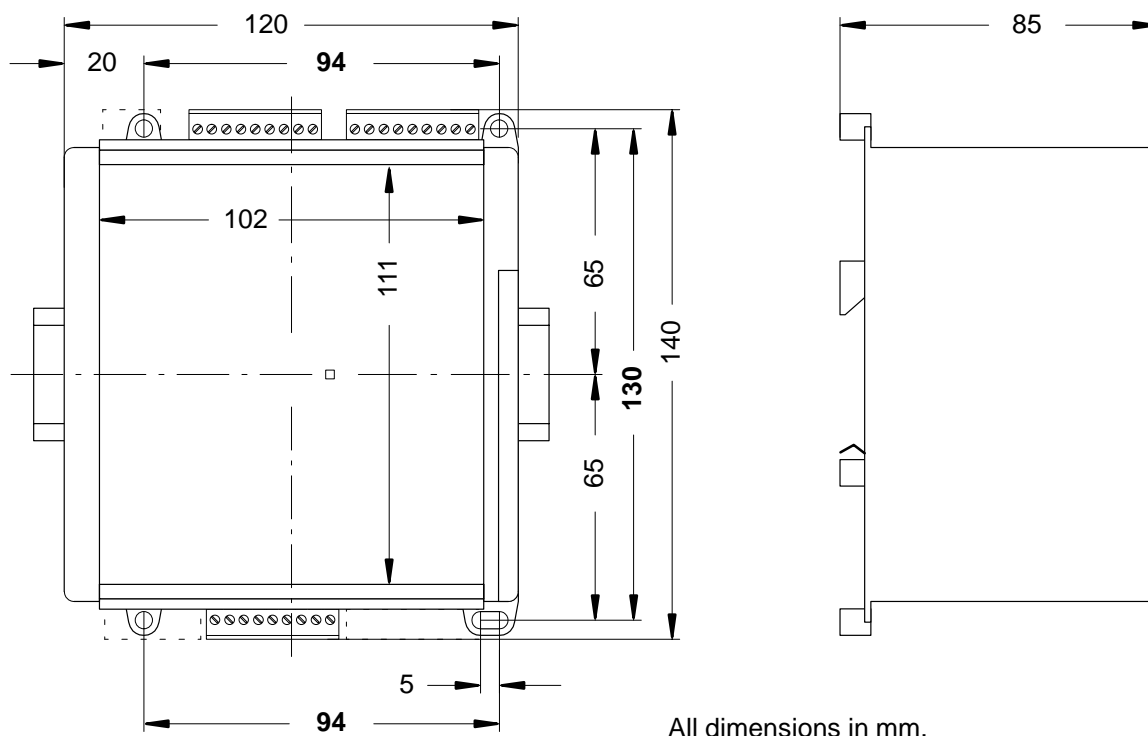
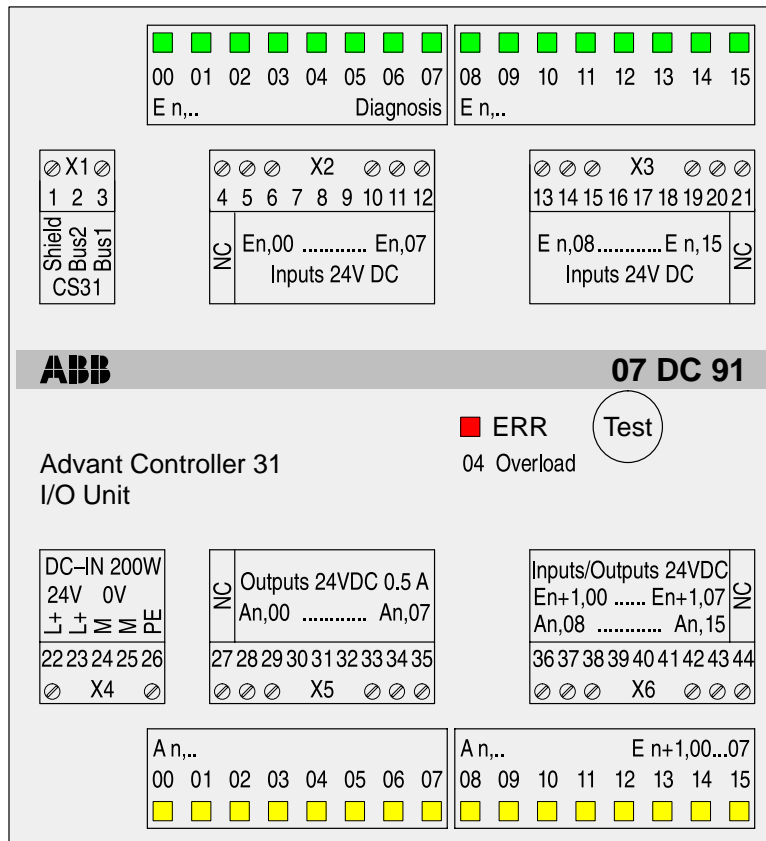
Mounting to DIN rail	according to DIN EN 50022-35, 15 mm deep. The DIN rail is centrally positioned between upper and lower edges of the module.
Mounting with screws	by 4 screws M4
Width x height x depth	120 x 140 x 85 mm
Connector conductor cross section	removable connectors with screw-type terminals max. 2.5 mm ² (grid space 5.08 mm) max. 1.5 mm ² (grid space 3.81 mm)
Weight	450 g
Dimensions for installation	refer to figure on next page

Installation instructions

Installation position	vertical with connectors pointing up and down
Cooling	The natural convection cooling must not be hindered by cable ducts or other additional components installed in the cabinet.

Ordering data

Module 07 DC 91	Order No. GJR5 2514 00 R0202
Scope of delivery	Digital input/output module 07 DC 91 1 5-pin connector (grid space 5.08 mm) 1 3-pin connector (grid space 5.08 mm) 4 9-pin connectors (grid space 3.81 mm)



The depth of the module is 85 mm. If a DIN rail is used, the installation depth must be increased by the dimension of the rail.

Fig. 4.7-5: 07 DC 91, Front panel foil and outside dimension
Dimensions for installation holes are shown in bold print