Module and
Application Description

BBC
BROWN BOVERI .

PROCONTROL 13
Signal Conditioning

Input Module for Binary Signals
16fold

D AT 1630 86 E, edition 09/86

81 EB11-E /R0100 /R0200

Application

The input module for binary signals 81 EB11 is used to input up to 16 standard binary signals to the IO-bus.

The module is designed for feeding the operating voltage to contacts, it is not provided for line monitoring.

The module converts the binary values available in parallel form into serial data which are suitable for transfer via the IO-bus.

The binary values can be produced either by contacts or electronically. The module is provided for connection of:

- Single contacts in 2-wire arrangement, supplied by the module
- Single contacts with separate supply
- Binary values which are produced electronically.

The module is available in two versions:

- 81 EB11-E/R0100 Binary value inputs with or without transmitter supply

- 81 EB11-E/R0200 Binary value inputs with or without transmitter supply and parallel output of the input signals in a second division

Features

The module can be plugged into every multi-purpose processing station of the PROCONTROL bus system. It has a slot requirement of one division (version R0100) or two divisions (version R0200).

It incorporates a standard interface to the IO-bus.

The module receives the binary signals from binary value transmitters installed in the process and transfers the binary values, in the form of telegrams, to the PROCONTROL bus system via the IO-bus.

The code switches for setting the module address can be set with the module withdrawn, and read through a cut-out on the module front.

There is no interaction between the bus side and the process. No provision is made for potential isolation.

Any disturbances in data output and disturbances in the processing section of the module are detected and indicated on the module front by a red light-emitting diode ST.

At the same time, disturbance annunciation signal SME is output via the IO-bus.

The module occupies eight successive addresses on the IO-bus in both module versions.

The inputs are protected against overvoltages of up to 1.5 kV in accordance with GKWE 800 035.

To increase the contact voltage, a negative bias voltage UV is additionally generated on the module.

Description

Basically, the module consists of three functional blocks:

- Acquisition and conditioning of the binary input signals arriving from the process

- Parallel/serial conversion of the conditioned binary signals

- Bus adaption with output of the binary values in the form of telegrams to the IO-bus after the module has been called.

There is no interaction between the bus side and the process. No potential isolation is provided.

SIGNAL INPUT

The module is designed to scan up to 16 binary value transmitters which are installed in the process and supplied by the module.

The binary values are acquired by the input circuit in parallel form, with a time delay of typically 2.6 ms (filter time constant).

These binary signals are converted into serial form to make them acceptable to the IO-bus, and sent to the IO-bus as data telegram when the module is called.

The up to 16 binary values are received by the module via process connector X2 .

In version 0200, the input signals are additionally available in parallel form at terminals AB1 to AB16 of connector X3 for further processing.

WIRING OF UNUSED FUNCTION UNITS

It is not necessary to wire unused function units.

An unused function unit produces the value 0 in the data telegram.

DATA OUTPUT TO IO-BUS

Whenever the module is called by its starting address, it transfers the data and specification telegrams of its function units to the IO-bus, beginning with the next transfer cycles.

The standard interface to the IO-bus is provided by bus connector X1.

Bus connector X1 also incorporates the feed-in for supply voltage US and zero potential Z.

Data communication with the module

The module is provided on its front with 3 hex. code switches which serve to set the module starting address.

When the module is called by its starting address as defined by the hex. code switches, it transfers its data and specification telegrams to the IO-bus during the following transfer cycles.

When the module is called by an address telegram with its module starting address, it transfers the data telegram of its first 4 function units in the next transfer cycle.

The subsequent addresses of the remaining function units are recognized internal to the module and transferred to the IO-bus during the following transfer cycles.

FORMATION OF ADDRESS

The bus control module transfers address telegrams of 16 bit length to call the individual modules connected to the IO-bus. In the module, every incoming address is compared with its own module address.
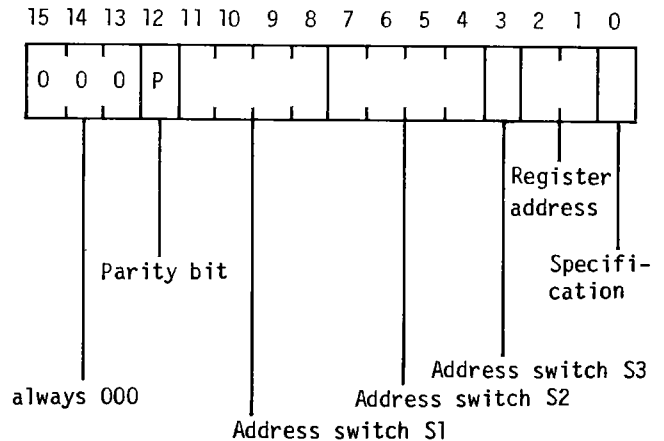This comparison takes place in parallel mode.

The address transferred by the bus control module is as follows:
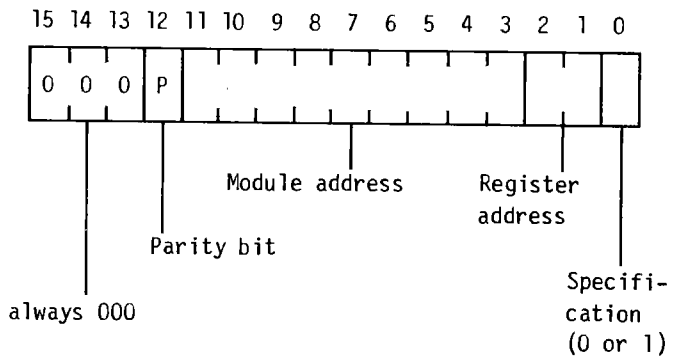
The address transferred by the bus control module is compared with the address set on the module.

The address required by the module for comparison is as follows:

If bits 3 to 11 of the address telegrams are the same, the module responds and transfers, during the next clock cycle, the data telegram of its first register address to the IO-bus.

The binary value registers are directly addressed with bit 1 and 2.

The 0 address bit is the so-called specification bit. Depending on state of the specification bit, either a specification telegram or data telegram is transferred.

> 0 ≙ data telegram
> 1 ≙ specification telegram

Formation of telegrams

A total of eight telegrams are formed by the module. Whenever the module is addressed by the bus control module, a telegram is sent to the IO-bus.

DATA TELEGRAM

The 16 binary signals are transferred under the even-numbered addresses.
Each data telegram has a length of 16 bits with the following contents:

SPECIFICATION TELEGRAM

The specification telegrams are transferred under the odd-numbered addresses. The specification telegram has a length of 16 bits with the following contents:

For module version R0100

```
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
┌────────────────────────────────────┐
│ 1  0  0  1  1                       │
└────────────────────────────────────┘
```

For module version R0200

```
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
┌────────────────────────────────────┐
│ 1  0  0  0  1                       │
└────────────────────────────────────┘
```

Reg. No	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	R4	NR4	0	R3	NR3	0	R2	NR2	0	R1	NR1	0	SM1
2	0	0	0	R8	NR8	0	R7	NR7	0	R6	NR6	0	R5	NR5	0	SM2
4	0	0	0	R12	NR12	0	R11	NR11	0	R10	NR10	0	R9	NR9	0	SM3
6	0	0	0	R16	NR16	0	R15	NR15	0	R14	NR14	0	R13	NR13	0	SM4

Reg.No = Register number
R (X) = Binary input signal X
NO(X) = Binary input signal X inverted
SM(X) = General disturbance bit telegram

Annunciation functions

Disturbances in the module, in the process peripherals and in the communication with the IO-bus are detected and signalled by the module.

Disturbances can be signalled by the module in the following three ways:

- Visual disturbance annunciation on the module by the light-emitting diode ST visible on the module front which emits a steady red light in the event of a disturbance

- Annunciation via bus line SME of the IO-bus

- Annunciation by setting of general disturbance bit SM in the data telegram.

ANNUNCIATION ON THE MODULE

The red light-emitting diode ST is connected with bus line SME. It emits a steady light when a disturbance annunciation is transferred via bus line SME, and/or a general disturbance bit SM is set in a data telegram.

ANNUNCIATIONS TO THE IO-BUS

A disturbance annunciation is output in the following cases:

- If the module is not addressed by a valid address telegram within 7 seconds.

    Disturbance annunciation signal SME and light-emitting diode ST are set. If the module is called again by the bus control module, SME and ST are reset after 200 ms.

- If one or more of the bus connecting lines are disturbed, e.g. by a short-circuit on the bus drivers for the data signals.

    Disturbance annunciation signal SME and light-emitting diode ST are set as long as the disturbances are present. After the disturbance has been removed, SME and ST are reset after 200 ms.

- When the module-internal negative bias voltage for the binary transmitters fails.

    General disturbance bit SM in the data telegram and light-emitting diode ST are set as long as the disturbance is present. After the disturbance has been removed, SM is reset immediately, while ST is reset after 200 ms.

Setting of the module

SETTING OF ADDRESS

The module starting address is to be set by means of address switches S1, S2 and S3. The module starting address is the address of the first 4 function units.

In addition to this address, the module occupies the next 7 IO-bus addresses.

The address is set with the module withdrawn, and can be read on the front panel.

S1 is the most significant address switch, S3 the least significant address switch.

Possible setting of the hex. code address switches:

1.Addr. switch S1	2.Addr. switch S2	3.Addr. switch S3
adjustable 0 - F	adjustable 0 - F	adjustable 0 or 8 permitted

Only bit 3 of the address word is set with the 3rd address switch. Therefore, only address 0 or 8 can be set.

When the module is used in connection with a bus coupling module 88 QT02, value 1 must be set on address switch S1.

By setting the 1st address switch to position "1", the bus coupling module 88 QT02 is notified that specification telegrams are transferred by the module.
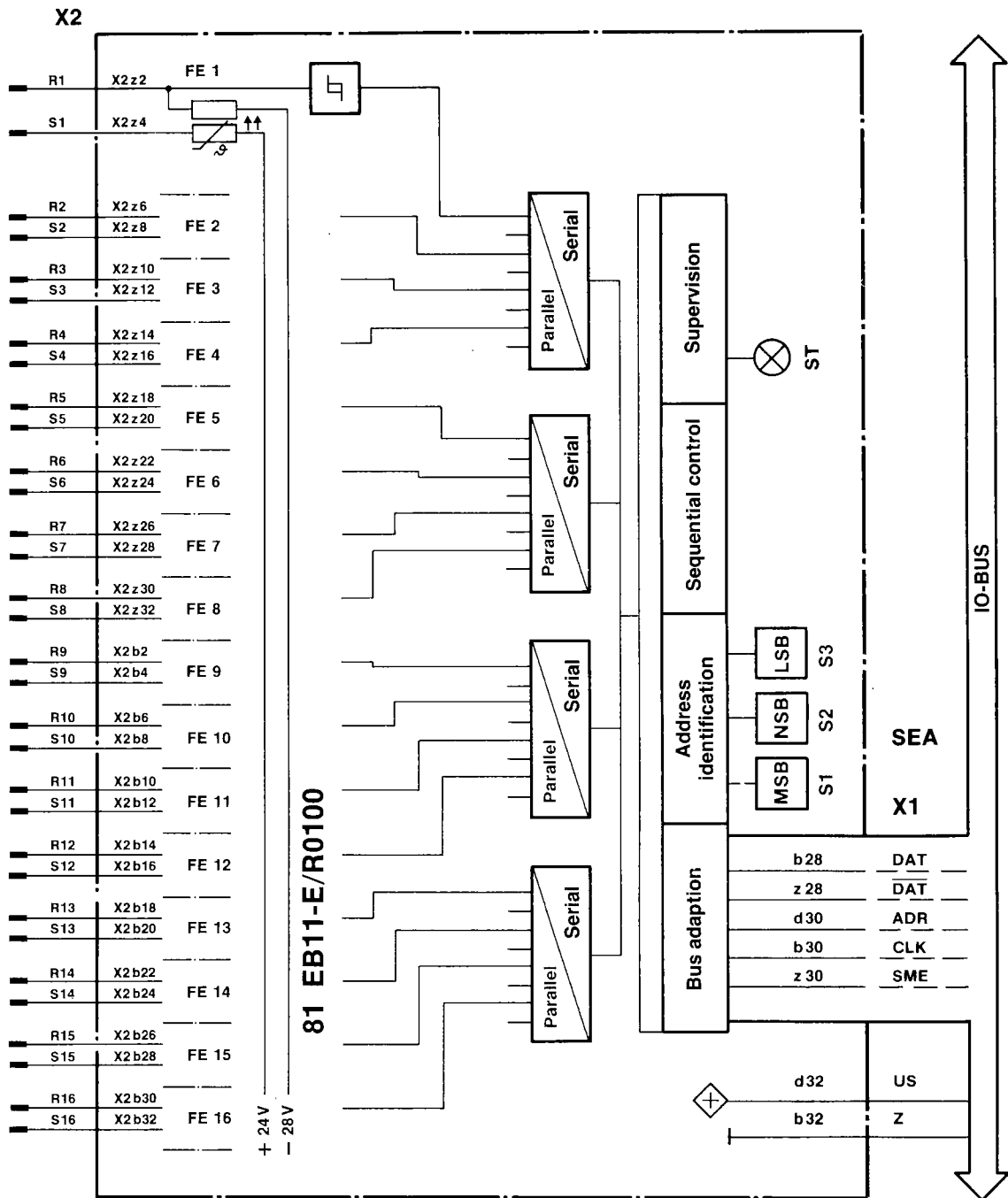
Functional diagrams

MODULE VERSION 81 EB11-E/R0100

The module consists of a printed circuit board (see "Mechanical design") which is equipped with two connectors X1 and X2 as well as three address switches S1, S2 and S3.

TERMINAL DESIGNATIONS:

Connector X1 incorporates the standard interface SEA and the operating voltage supply. Connector X2 incorporates the process connections.

MODULE VERSION 81 EB11-E/R0200

The module consists of two printed circuit boards (see "Mechanical design") which are equipped with three connectors X1, X2 and X3 as well as three address switches S1, S2 and S3.

TERMINAL DESIGNATIONS:

Connector X1 incorporates the standard interface SEA and the operating voltage supply. Connectors X2 and X3 contain the process connections.
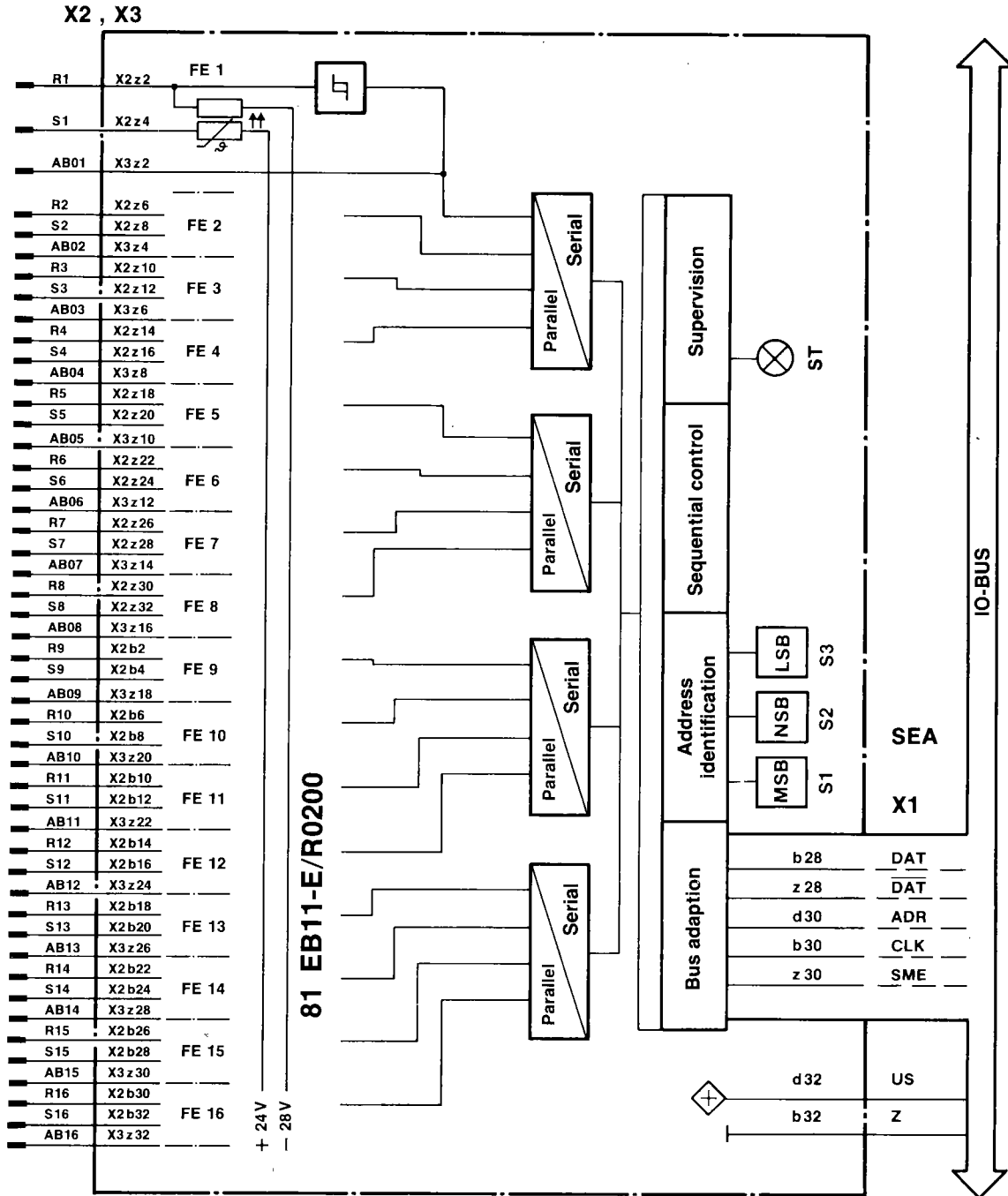
Mechanical design

The two module versions differ in their mechanical design only by the number of divisions required.

	Module version R0100	Module version R0200
Board size:	6 U, 1 T, 160 mm deep	6 U, 2 T, 160 mm deep
Connector:	to DIN 41 612	
	1 x IO-bus connection 48-pole, edge connector type F (connector X1)	1 x IO-bus connection 48-pole, edge connector type F (connector X1)
	1 x process connection 32-pole, edge connector type F (connector X2)	2 x process connection 32-pole, edge connector type F (connector X2,X3)
Weight:	approx. 0.42 kg	approx. 0.84 kg

View of connector side:
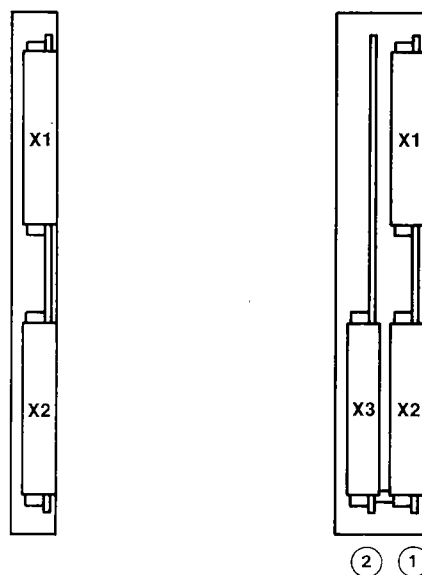
The printed circuit boards (1) and (2) of module version R0200 are connected with each other mechanically and electrically. For both module versions, the printed circuit board 1 is identical. The printed circuit board 2 is only present in module version R0200.

The exact contact allocation of the individual connectors can be seen from operating principles description "Connectors for IO-Bus Modules" GKWE 705 321 or from the functional diagram of the module.
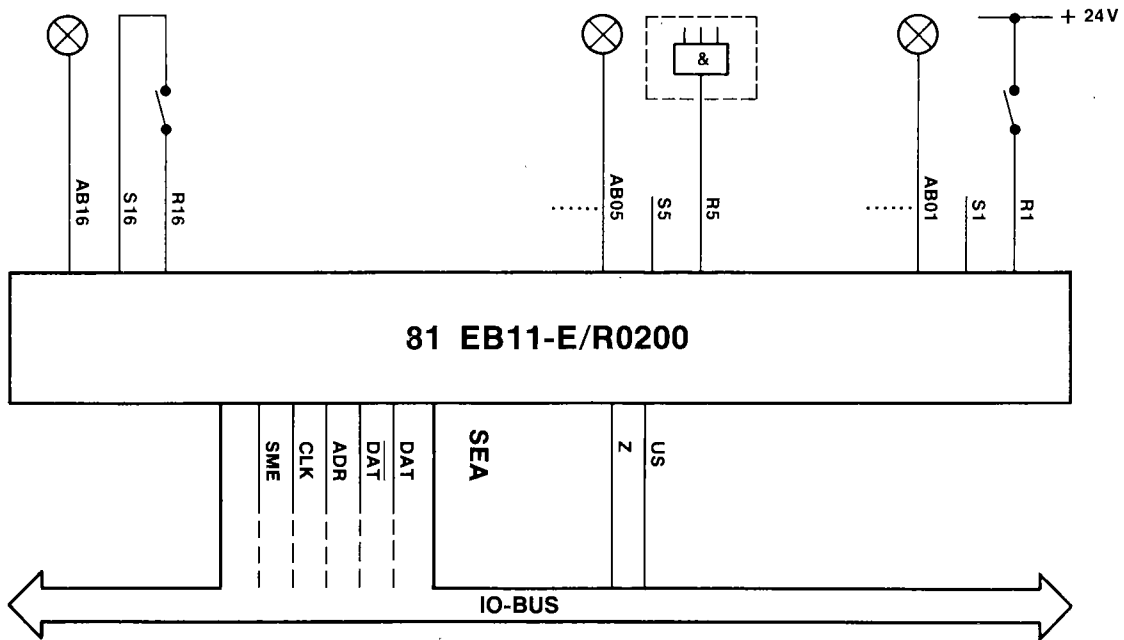
Connection diagrams

MODULE VERSION 81 EB11-E/R0100

The module has 16 binary value inputs for binary
signals produced by contacts or electronically.
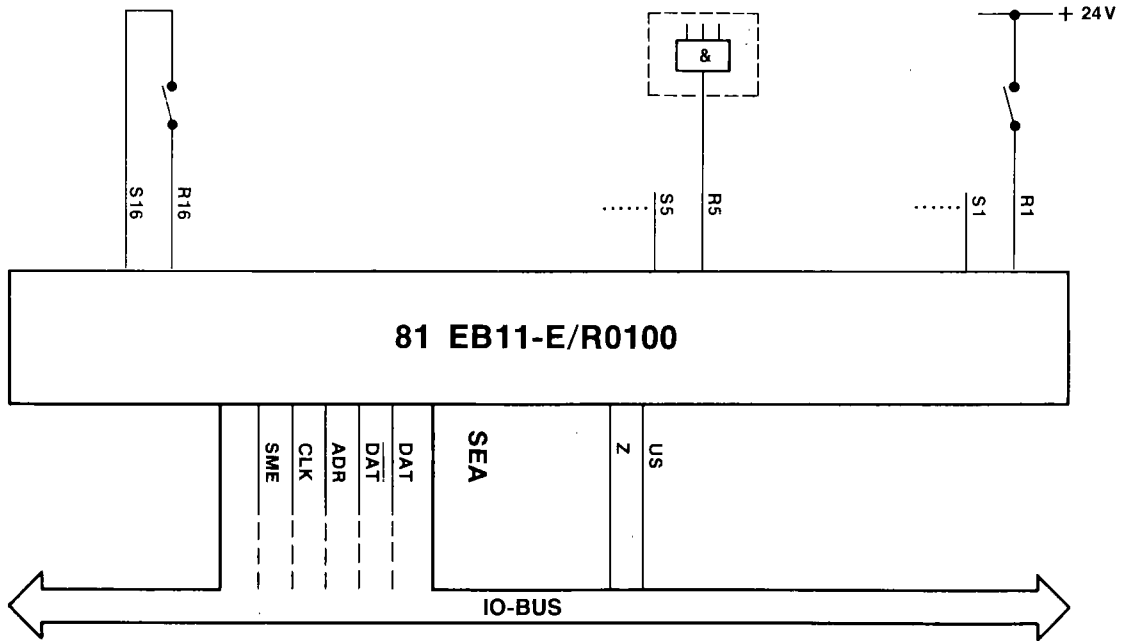
MODULE VERSION 81 EB11-E/R0200
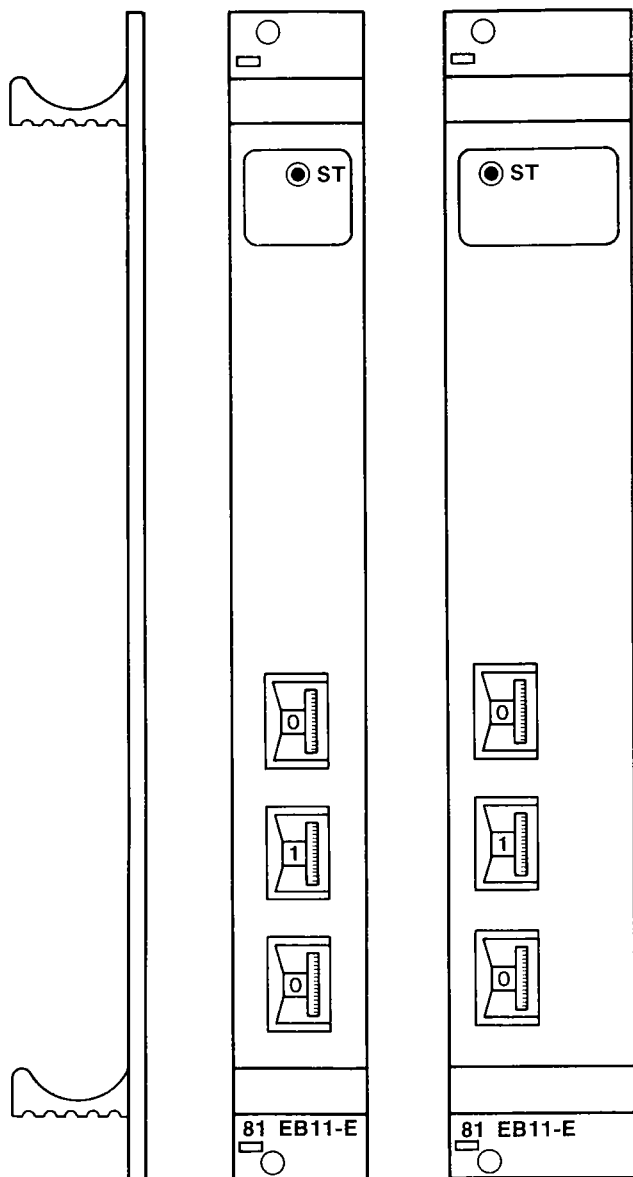
The module has 16 binary value inputs for binary
signals produced by contacts or electronically,
with parallel output of these signals.

POSITIONS OF THE ADJUSTABLE COMPONENTS AND VISUAL
DISPLAYS ON THE FRONT

The front panels differ in width according to the
module version. The functions for the components
and visual displays are the same.

Light-emitting diode for disturbance annunciation
ST

IO-bus address	Hexadecimal	Decimal
S1	100	256
S2	10	16
S3	1	1

81 EB11
/R0100

81 EB11
/R0200

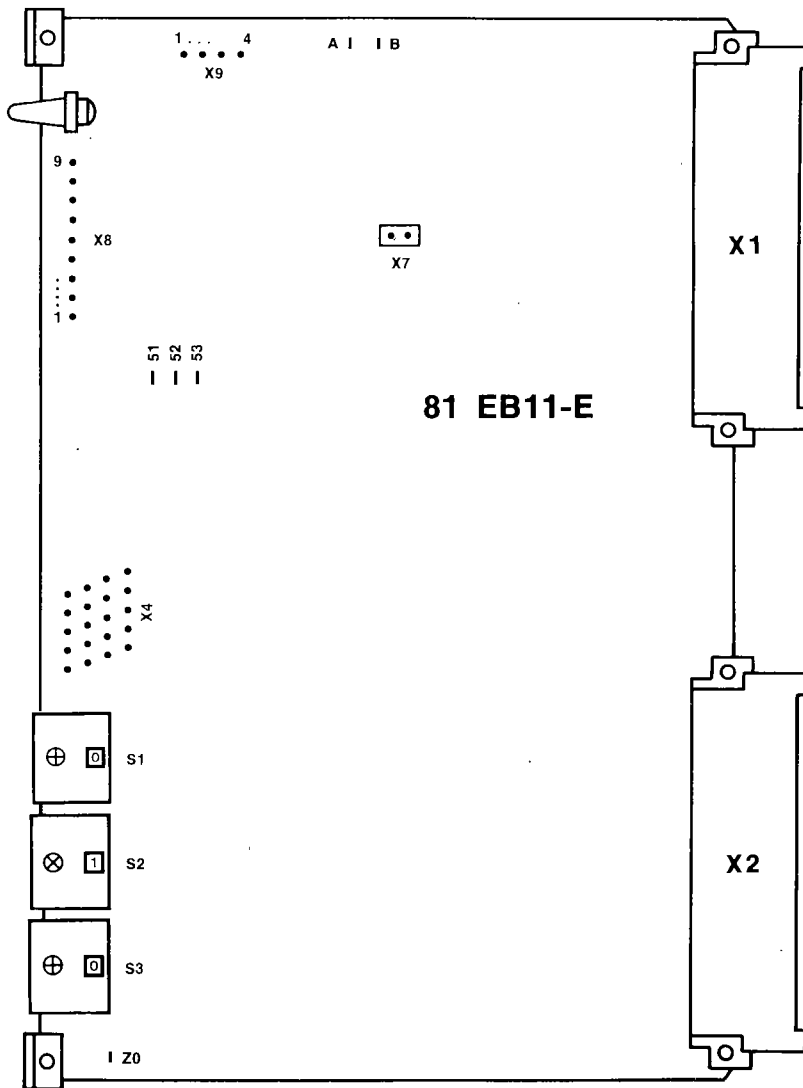POSITIONS OF THE ADJUSTABLE COMPONENTS ON PRINTED CIRCUIT BOARD (1)

Printed circuit board (1) contains the three address switches S1, S2 and S3 for setting the module starting address, as well as the two connectors X1 for IO-bus connection (standard interface SEA) and X2 for process connection.

POSITION OF PLUG-IN JUMPERS ON THE PRINTED CIRCUIT BOARD

	RO100	RO200
Specification	S1 - S2	S2 - S3
X7	in place	in place
X8.1 - X8.9	-	-
X9.1 - X9.4	-	-
X4	connector for printed circuit board 2, if required	

AB: For earthing the front panel, the soldering jumper must be in place for both versions.

ZO: Reference potential (Minitermipoint pins)

81 EB11-E

POSITIONS OF THE ADJUSTABLE COMPONENTS ON PRINTED
CIRCUIT BOARD (2)

81 EB11-E

X3
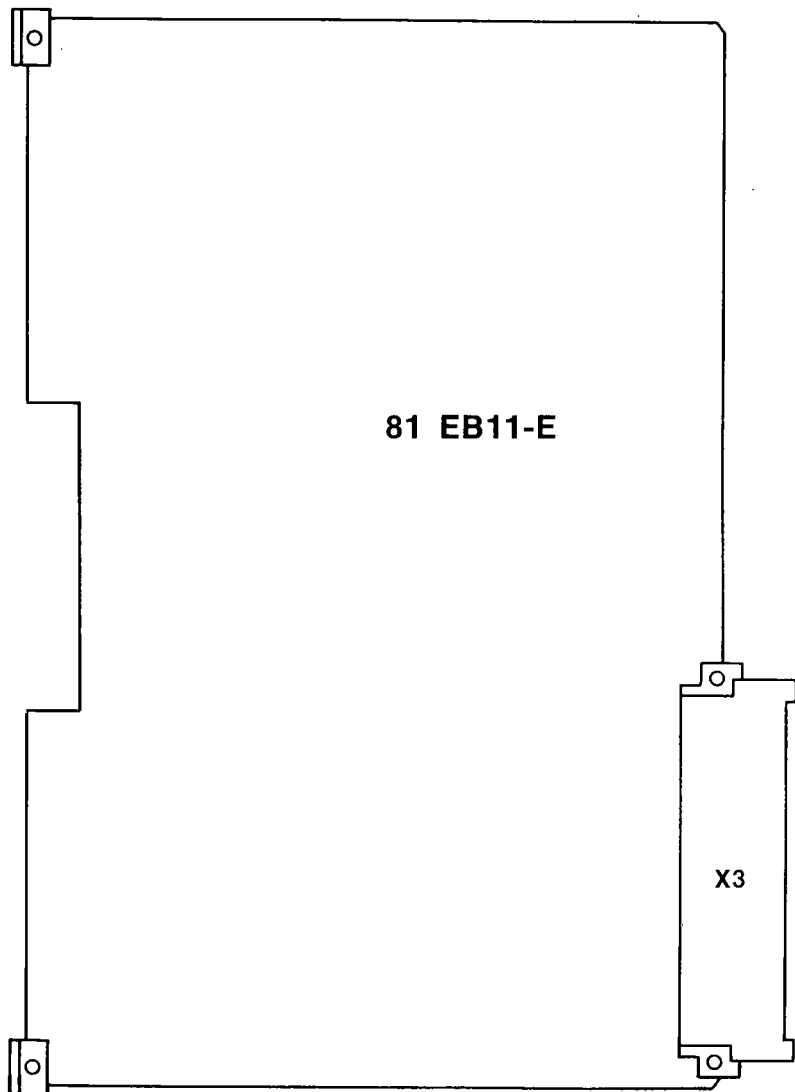
Technical data

In addition to the system data, the following values apply:

MODULE VERSION	R0100	R0200
POWER SUPPLY		
Rated voltage:	16.8 ... 33 V	16.8 ... 33 V
Operating voltage U_s:	24 V	24 V
Current consumption I_{typ}:	140 mA	140 ... 210 mA
I_{max}:	550 mA	2250 mA
Power dissipation P_{vtyp}:	3.4 W	3.4 ... 5.1 W

The values specified for I_{typ} and P_{vtyp} apply for unloaded inputs and outputs. To obtain an exact value, the input and output loads must be added.

Reference potential IO-bus Z:	0 V	0 V
INPUTS		
Number of contacts to be connected: (2-wire-circuit)	16	16
Input designation:	R1 ... R16	R1 ... R16
	S1 ... S16	S1 ... S16
INPUT VALUES PER INPUT		
Contact operating voltage U_e:	52 V	52 V
Negative bias voltage U_v: (produced inside module)	-28 V	-28 V
Contact current I_e:	5 mA	5 mA
Filter time constant typ.:	2.6 ms	2.6 ms
Response time $t_{Rtyp.}$:	4 ms	4 ms
$t_{Rmax.}$	40 ms	40 ms

(The time from the change in the signal status up to the instant this change is written into the output register)

Input resistance to U_v:	11 kOhm	11 kOhm
Loading of module with contact closed:	16 mA	16 mA
Loading capacity of electronic binary value transmitter:	>5 mA	>5 mA

The contact inputs are protected acc. to GKWE 800 035 up to 1.5 kV.

OUTPUTS

To IO-bus:	IO-bus standard interface SEA	
Number of binary value outputs:	-	16
Output designation:	-	AB01 ... AB16

The binary outputs are short-circuit-proof to U_s and Z. Quenching diodes are installed in the module.

	RO100	RO200
MODULE VERSION		

OUTPUT VALUES PER OUTPUT

	RO100	RO200
Output voltage for logic 0:	-	0 V ... 1 V
Output voltage for logic 1:	-	U_S - 1 V
Maximum output current $I_{a\ max}$:	-	100 mA

PERMISSIBLE TEMPERATURE RANGES

	RO100	RO200
Operating temperature:	0 °C ... 70 °C	0 °C ... 70 °C
Storage temperature:	- 40 °C ... 85 °C	- 40 °C ... 85 °C

ORDERING DATA

Complete module:

Type designation: 81 EB11-E/RO100   Order number: GJR2355200RO100
                  81 EB11-E/RO200   GJR2355200RO200

Technical data are subject to change without notice.

ABB