System description

# ABB Procontic b

## Programmable control system

## Hardware

Order-Nummer:
GATS 1311 01 R2001, part 2
Replaced
Druckschrift-Nummer
D AT 1620 87 E

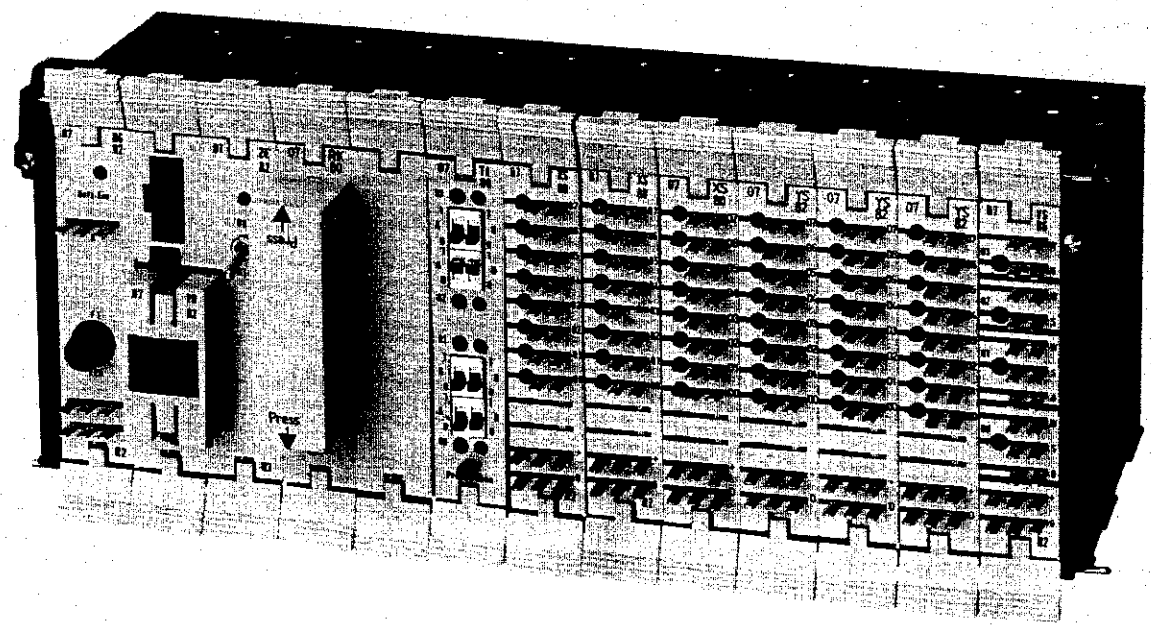

**ABB Schalt- und Steuerungstechnik GmbH**

ASEA BROWN BOVERI

## REGULATIONS

### Regulations Concerning the Setting up of Installations

Apart from the basic "Regulations for the Setting up of Power Units" VDE* 0100 and for "The Rating of Creepage Paths and Air Gaps" VDE 0110 the regulations "The Equipment of Power Units with Electrical Components" VDE 0160 in connection with VDE 0660, part 500, have to be taken into due considération. Further attention has to be paid to VDE 0113 in case of the control of working and processing machines. If operating elements are to be arranged near shock-hazard parts, VDE 0106, part 100, is relevant.
The user has to ensure the units as well as the appertaining components to be installed according to these regulations. Respectively valid safety regulations, e.g. regulations for the prevention of accidents and the law concerning technical working material, are valid for machines and units connected as well.

PROCONTIC units have been built according to VDE regulation 0160. The protection against direct touching as demanded by chapter 5.5.1 of this VDE regulation is to be made sure by the user, e.g. by installing a switch cabinet.
PROCONTIC units have been laid out for operation according to insulation class A of VDE 0110. If considerable dirt can be expected during operations, the units have to be installed in casings of the respective kind of protection.

* VDE stands for "Association of German Electrical Engineers".

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R* = Module in various variants.

## 1.1 Bus Organization

PROCONTIC b is a modular programmable control system in block design (similar to SIGMA®-tronic b). A special rack is provided which may house up to 21 of the individual modules (plug-in boards). All units are connected to each other by the common bus board. The slots for the bit-peripheric-units (I/O's, timers, counters) are location coded, which means that each slot has its individual device address (group no.) whereof at each slot a maximum of eight channel addresses (channel nos.) may be called on.

The device numbers in the rack are sequenced from left to right, starting at "00". For bit-peripheric-units the last 16 slots are reserved. The channel numbers in each unit are counted from bottom up, starting at "00" (for racks with coding receptacle or code switch <=7) or at "08" (for racks with coding receptacle or code switch >7).

The transmission goes bit-by-bit. For In- and Outputs separate channels are used.

### 1.1.1 Connector Configuration of the Signals

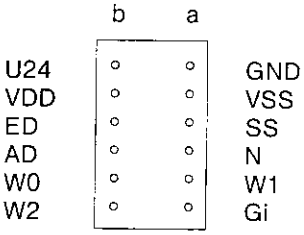
In the PROCONTIC b system two kinds of connectors are used:

12-pole connectors for all binary peripheric units;
32-pole connectors for the central units

### 1.1.2 Connectors for the I/O slots (XPE)

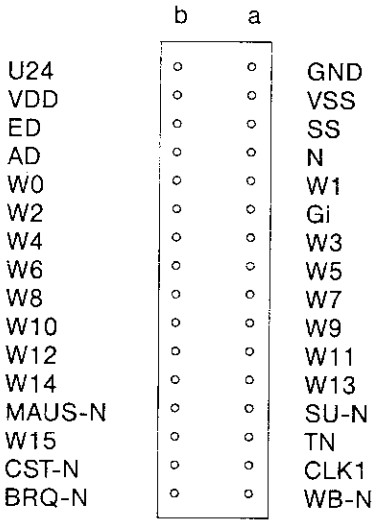
For these slots only the binary I/O-cards with a maximum of eight channels can be used. The slots are location-coded on the bus board.

PIN configuration of the connector XPE:



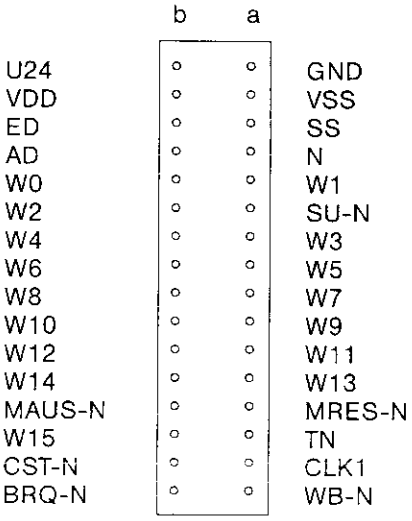

### 1.1.3 Connectors for the system slots (XSP)

These slots may be used for the more complex devices as CPU extension, analog signal processing a.s.o. but also for simple I/O units of the bit peripheric. The system slots lack the Gi-signal.
PIN configuration of the connector XSP:




### 1.1.4 Connectors for the central unit slots (XZE)

The first three slots (1-3) are for power supply, bus coupling and CPU.
PIN configuration of the connector XZE:



## 1.2 Description of the signals

| Abbreviation | Definition | Explanation |
|---|---|---|
| U24 | internal 24V power supply range: 24V +/– 30% 1.5 A max. | equivalent to the voltage at the "+" terminal, but filtered with a L/C combination, used as power supply for the consumers on the bus (f.i. LED's, relays etc.) |
| GND | "rough" ground, | 0V-common connector for power y-point of the power consumer supply transformer |
| $V_{DD}$ | positive logic voltage<br>07 NG 80: 12 V +/– 5 %, 150 mA max.<br>07 NG 82: 10 V +/– 5 %, 1.5 A max. | sufficient power for standard rack<br>2 × NG 82 for all standard and optional racks. |
| $V_{SS}$ | logic common O V | for logic ground only, $V_{SS}$ and GND are connected at the y-point of the power supply |
| SU-N | power failure signal:<br>"0"-active open collector signal by the power supply, pull-up resistance:<br>1 kOhm +/– 2 %<br>sink current 20 mA max. | $V_{DD}$ is monitored at – 5 % after switching on and at – 15 % when switching off. After powering up SU-N stays at low signal for min. 60ms and max. 500ms.<br>SU-N is accessable on the system slots only. |
| MRES-N | master reset: "0" active open collector signal by pull up resistance:<br>1 kOhm +/– 2 %, sink current 20mA max. | MRES-N is influenced by:<br>* SU-N; SU-N=0 – MRES-N=0<br>* commissioning unit (it may the CPU, clamp MRES-N to 0)<br>* RUN-STOP switch, the positive MRES-N flank sets the program counter to the address "0000", start of the processing. |
| N | normalizing signal signal by the CPU, drain current 2,5 mA max. pull-down resistance:<br>10 kOhm +/– 2 % on the CPU<br>(for the CMOS inputs only) | by the normalizing signal N=1 "1"-active open drain all output latches, the accumulator and the date memory are set to "0"; AD will be clamped to low and the execution of the program end command (PE) and the jump commands is prevented.<br>(suited N is influenced by:<br>* MRES-N; MRES-N=0 – N=1<br>* SU-N; SU-N=0 – N=1<br>* may be kept to 1 by the word processors |
| $G_i$ | selection signal by the bus decoder, CMOS output with "0"-active signal, pull-up resistance: 6,8 kOhm +/– 2 % per module | the $G_i$-signal is brought to each slot by open feeders from the bus decoder. With $G_i$=0 the slot is enabled. |

| Abbre-viation | Definition | Explanation |
|---|---|---|
| ED | input data<br>CMOS output of the bit peripheral units capacitive load: 300 pF max, pull-down resistor against $V_{SS}$: 8,2 kOhm +/– 2 % min,<br>residual current per output: < 3 µA | this signal leads the status of the selected binary input channel to the processing |
| AD | output data CMOS output of the CPU,<br>capacitive load: 300 pF max.<br>resistive load: source = 2.5 mA<br>resistive load: sink = 5mA | the signal AD leads the binary result of the CPU to the outputs and memories. There it is stored with SS = low, AD = 3 state, when CST-N and WB-N are 0 |
| SS | write disable<br>CMOS output of the CPU, capacitive load: 300 pF max.<br>resistive load: source = 2.5 mA<br>resistive load: sink = 5 mA | the signal SS is generated by the bit processor when a binary date shall be written into the peripheral. SS = 3 state, when CST-N and WB-N are 0 |
| W00 to W15 | 16 bit PROCONTIC word CMOS output of the CPU,<br>capacitive load: 300 pF max.<br>resistive load: source = 2.5 mA<br>resistive load: sink = 5 mA<br>pull-up resistance: 100 kOhm +/– 2 % max. on the bus board | this PROCONTIC word read the program memory stays stable for the whole processing cycle: special meaning of the individual bits:<br>W15. parity bit<br>W14: word/bit switching<br>W10. negation bit<br>W00...W15: 3-state, when BRQ-N=0 |
| TN | processing cycle CMOS output of theCPU,<br>capacitive load: 300 pF max.<br>resistive load: sink = 5 mA | the processing in the bit processor is generated by the positive TN flank 3-state, when CST-N = 0 |
| CLK 1 | central basic cycle of the CPU<br>819.2 kHz +/– 200 Hz CMOS output<br>capacitive load: 100 pF max. | |
| MAUS-N | decoded program-end signal of the CPU open collector output, sink current: 5 mA max. pull-up resistance on the CPU: 10 kOhm | the program end decoded by the bit processor is returned to the program memory by TN = 0. MAUS-N = 0 generates a reset of the program counter to address "0000" |
| CST-N | program counter stop open collector signal sink current: 20 mA max. pull-up resistance on the CPU: 1 kOhm | there are two timing phases:<br>all units connected to the bus generate the CST with the first positive CLKA flank to TN; the commissioning unit generates CST with the second positive CLK 1 flank to TN. |
| WB-N | word bus operation open collector signal pull-up resistance on CPU: 10 kOhm pull-up resistance on bus board: 10 kOhm sink current: 20 mA max. | |

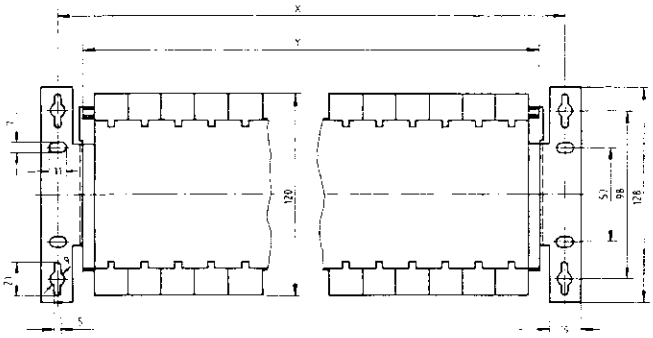
### 1.3 Bus decoder

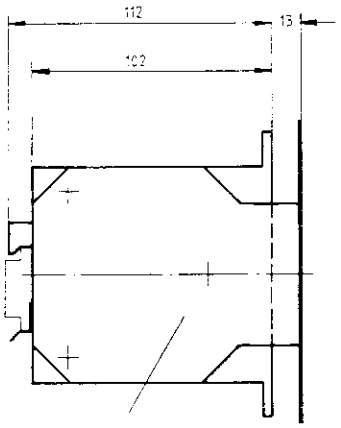
On the bus board there is the bus decoder, which selects the individual slots through open feeders (combination of W4, W5,W6 and W7).

The bus is enabled for channel no. "00" to "07" resp. "08" to "15" by a jumper (<= 7 resp. > 7).

The bus decoder disables the bit bus (all $G_i$ signals carry 1) for all commands not definite for the bit peripheral.

### 1.4 Dimensions of the rack






Mounting bracket for installation into the 19" rack.

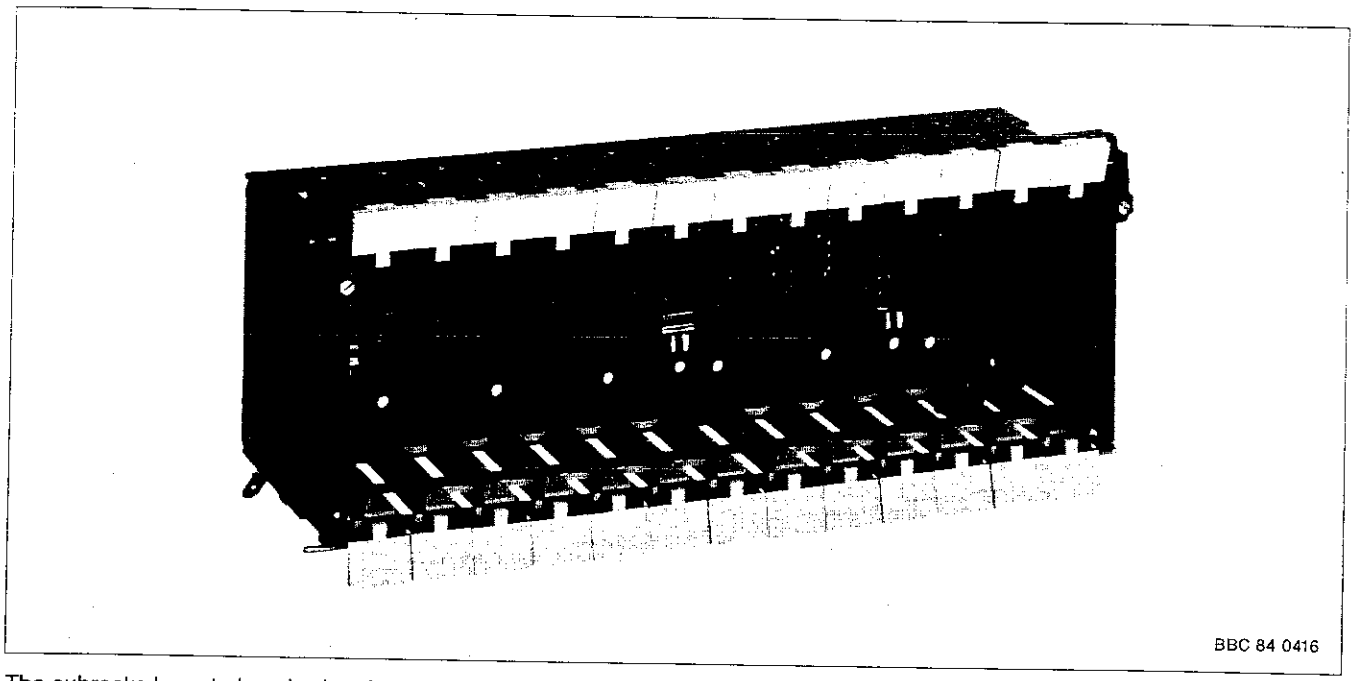
| | slot | X (mm) | Y (mm) |
|---|---|---|---|
| 07 IE 82/84 | 7 | 185 | 157 |
| 07 ET 82 | 13 | 305 | 277 |
| 07 ET 83/84 | 21 | 465 | 437 |

### 1.5 Device Code for the Rack

| Device | D* | slot no. in 07 ET 84 | 07 ET 83 | 07 ET 82 |
|---|---|---|---|---|
| 07 ZE 82 | 2 | II-III | II-III | II-III |
| 07 ZE 84 | 3 | II-IV | II-IV | II-IV |
| 07 ZE 86 | 4 | II-V | II-V | II-V |
| 07 RK 80 | 1 | IV-15 | IV-09 | IV-02 |
| 07 AS 82 | 1 | V-15 | IV-09 | IV-02 |
| 07 BT 82 | 1 | I | I | I |
| 07 BT 84 | 1 | I | I | I |
| 07 BV 84 | 1 | I | I | I |
| 07 TI 80 | 1 | 00-03 | 00-03 | 00-03 |
| 07 TI 81 | 1 | 00-03 | 00-03 | 00-02 |
| 07 TZ 82 | 3 | IV-15 | IV-09 | IV-02 |
| 07 WP 84 | 3 | IV-15 | IV-09 | |
| 07 ZG 84 | 2 | 00-15 | 00-15 | 00-07 |
| 07 XS 80 | 1 | 00-15 | 00-15 | 00-07 |
| 07 XS 81 | 1 | 00-15 | 00-15 | 00-07 |
| 07 XS 86 | 1 | 00-15 | 00-15 | 00-07 |
| 07 XS 87 | 1 | 00-15 | 00-15 | 00-07 |
| 07 YS 80 | 1 | 00-15 | 00-15 | 00-07 |
| 07 YS 81 | 1 | 00-15 | 00-15 | 00-07 |
| 07 YS 82 | 1 | 00-15 | 00-15 | 00-07 |
| 07 YS 86 | 1 | 00-15 | 00-15 | 00-07 |
| 07 AB 83 | 1 | 00-15 | 00-15 | 00-07 |
| 07 AE 83 | 1 | 00-15 | 00-15 | 00-07 |
| 07 EA 80 | 2 | 00-15 | | |
| 07 EA 81 | 2 | 00-15 | | |
| 07 AA 80 | 2 | 00-15 | | |
| 07 AA 81 | 2 | 00-15 | | |
| 07 AG 80 | 2 | 00-15 | 00-15 | 00-07 |
| 07 AG 81 | 2 | 00-15 | 00-15 | 00-07 |

* D = Dimension

## 1.6 Short subrack for bit processing 07 ET 82 R2



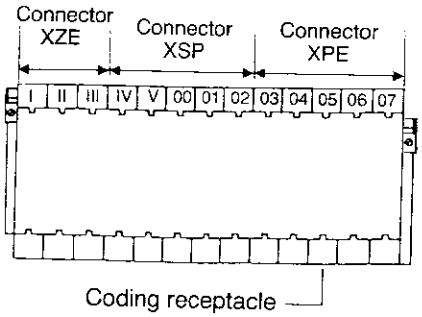

The subracks have to be wired at the earth connector.

**Technical data:**

| | |
|---|---|
| Number of slots | 13 |
| I/O slots | 8 |
| System slots | 8 |
| Weight | 0.8 kg |
| Order number | GJR5217400R2 |

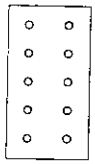
**Appurtenances:**

| | |
|---|---|
| Mounting bracket 07 MW 80 | GJR1948116R1 |



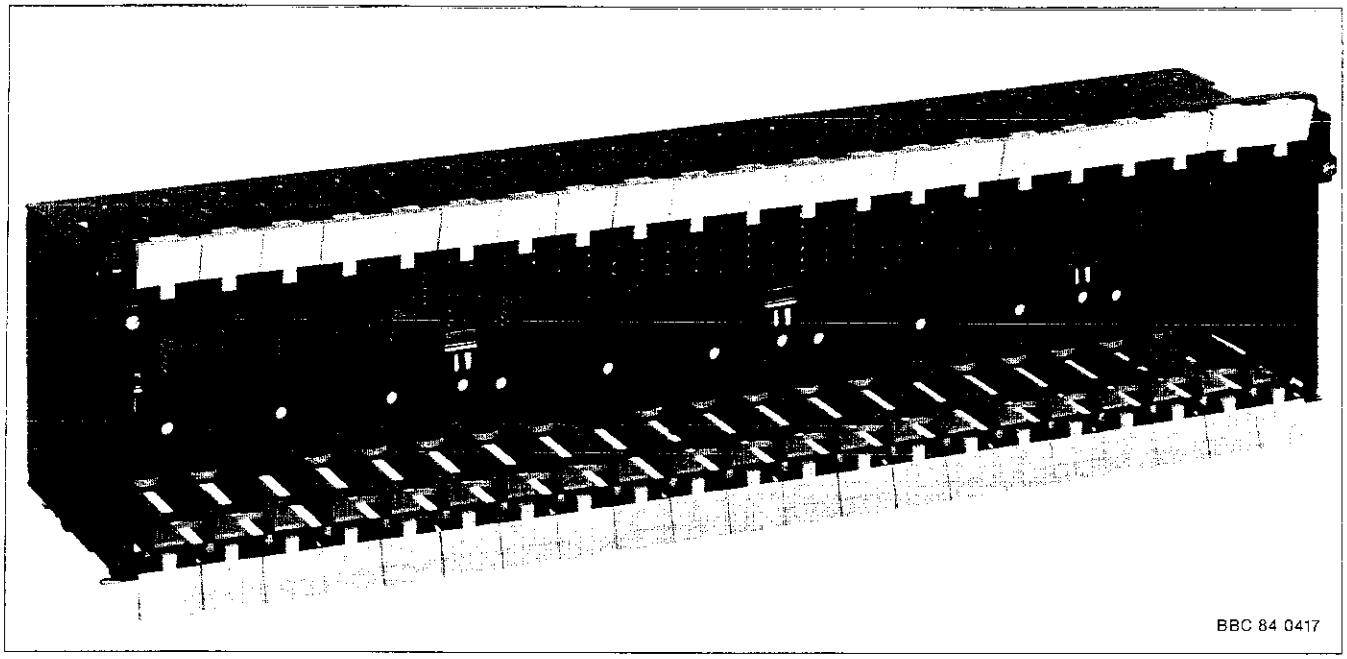

The coding receptacles is placed at system slot 05.

Meaning of the coding jumpers:

| Coding receptacles | Name of jumper | modules | jumper inserted |
|---|---|---|---|
|  | TN | Times | modules blocked |
| | XN | Inputs | |
| | YN | Outputs | |
| | <=7 | Channel 00...07 | equivalent channel no. |
| | >7 | Channel 08...15 | |

The small subrack 07 ET 82 R2 is intended for minor control functions and should only be used singly. It is only scheduled for bit operations.

## 1.7 Subrack for bit processing 07 ET 83 R2



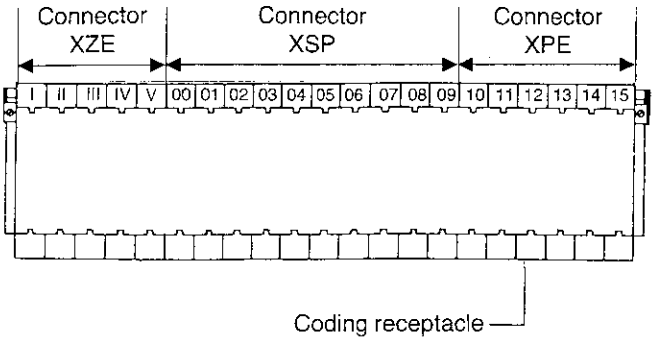

The subracks have to be wired at the earth connector.

**Technical data:**

| | |
|---|---|
| No. of slots | 21 |
| I/O slots | 16 |
| System slots | 15 |
| Weight | 1.2 kg |
| Order number | GJR5217500R2 |

**Appurtenances:**

| | |
|---|---|
| Mounting bracket 07 MW 80 | GJR1948116R1 |




The subrack 07 ET 83 R2 is only scheduled for bit operations. For two or more bit subracks two subracks with jumpers >=7 and <7 must be provided in each case.
The setting also depends on the bank numbers which are set on the bus coupling module 07 BV 84. (See Chapter 3.1).

If certain types of equipment are undesirable in a subrack they have to be excluded (blocked by inserted jumpers).

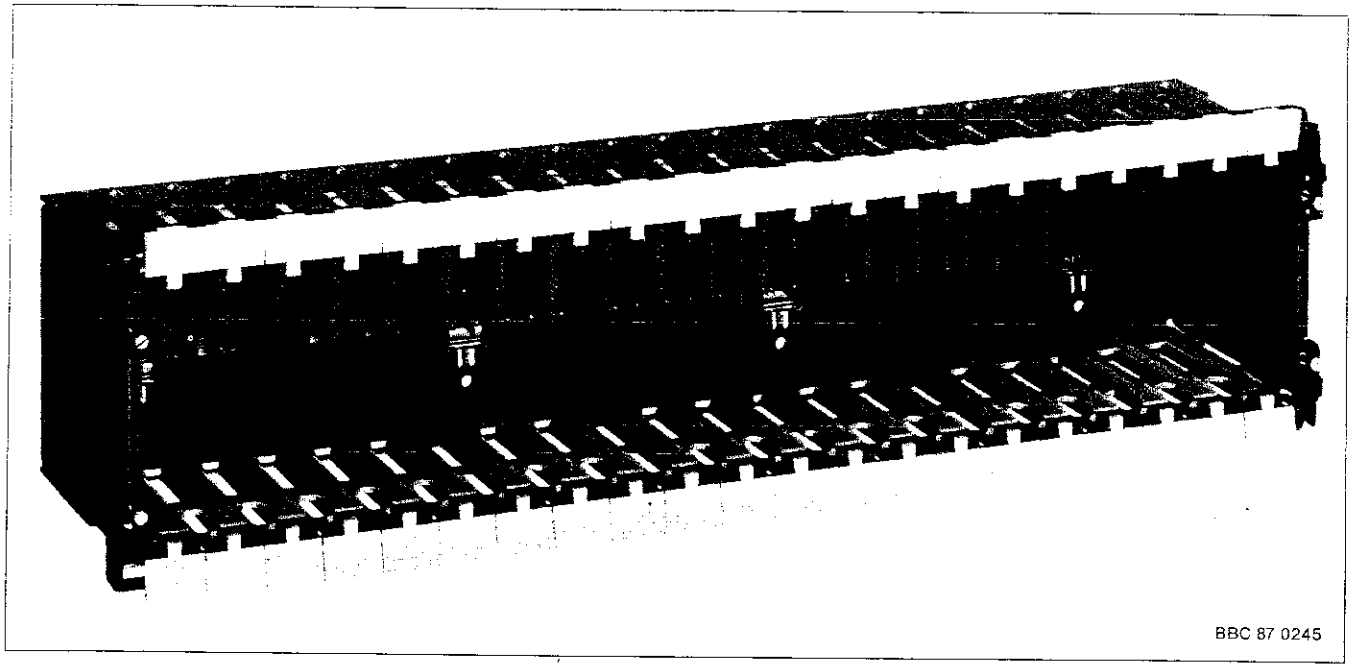
**Attention:**
For the timing module 07 TZ 82 the jumper TN must be inserted.
For word- periphery modules (e. g. analog I/O) the word/bit subrack 07 ET 84 is required.

The coding receptacles is placed at system slot 12.

Meaning of the coding jumpers:

| Coding receptacles | Name of jumper | modules | jumper inserted |
|---|---|---|---|
| o o | TN | Times | modules blocked |
| o o | XN | Inputs | |
| o o | YN | Outputs | |
| o o | <=7 | Channel 00...07 | equivalent channel no. |
| o o | >7 | Channel 08...15 | |

## 1.8 Subrack for word and bit processing 07 ET 84 R2



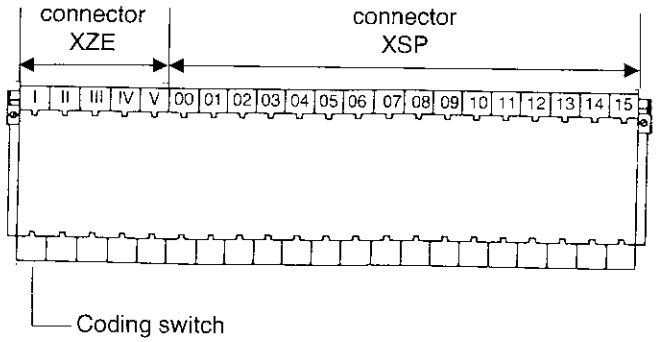

The subracks have to be wired at the earth connector.

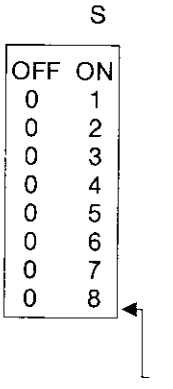
**Technical data:**

| | |
|---|---|
| No. of slots | 21 |
| I/O slots | 16 |
| System slots | 21 |
| Weight | 1.2 kg |
| Order number | GJR5218500R2 |

**Appurtenances:**

| | |
|---|---|
| Mounting bracket 07 MW 80 | GJR1948116R1 |



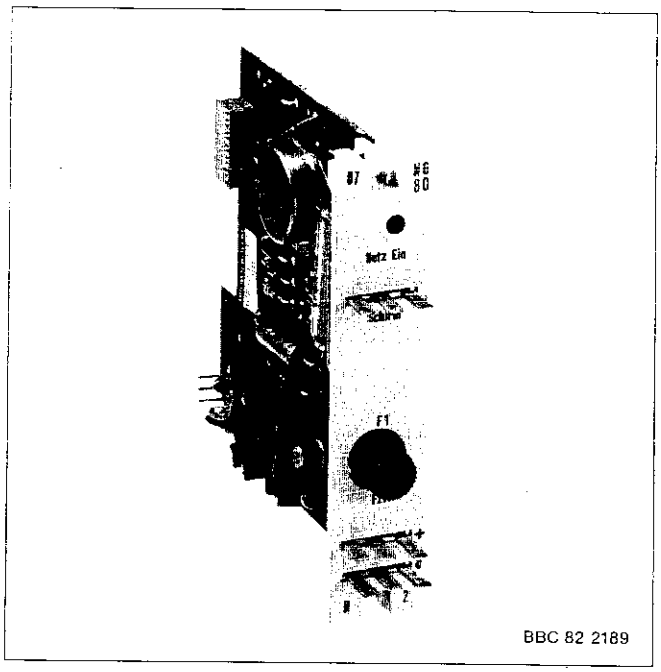

| Function | OFF | ON |
|---|---|---|
| Binary inputs | blocked | free |
| Binary outputs | blocked | free |
| Times | blocked | free |
| Analog input | blocked | free |
| Analog output | blocked | free |
| Channel 0-7 | free | blocked |
| Channel 8-15 | free | blocked |
| Free | | |

The coding receptacles is placed at system slot I.

Meaning of the coding switches

**Attention:**
The bus is delivered in blocked condition. The coding switches have to be set prior to commissioning.

## 2.1 Power supply unit 07 NG 80 R4




**Technical data:**

| | |
|---|---|
| Input voltage | 24 V d.c. |
| | with $U_{SS}$ = 4 V ripple content |
| Allowed potential difference | +/– 30 % |
| Output voltage | 12 V d.c. +/– 5 % controlled 150 mA |
| | 24 V d.c. +/– 30 % filtered |
| Fine-wire fuse | F2A (front panel) |
| Power dissipation | max. 3 W |
| Undervoltage tripping | <10.8 V |
| Voltage dips | |
| w/o switch-off | <=1 ms |
| with switch-off | green LED goes out and processor is stopped |
| Weight | 0.08 kg |
| Dimension | 1 division |
| Order number | GJR5211700R4 |

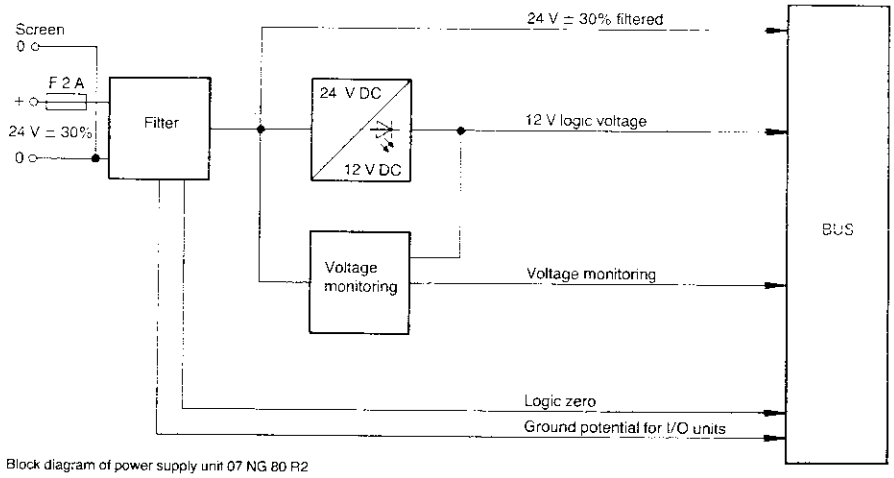
The power supply unit 07 NG 80 R4 serves to supply the PROCONTIC b with electric power.

The presence of the 12 V d.c. output voltage is indicated by means of an LED and monitored by the power supply unit for undervoltage. If the voltage drops to below 10.8 V processing of the program by the central unit is stopped. When the operating voltage returns and the switch is set to position RUN the central unit goes through a normalization cycle by means of which all outputs, flags and registers addressed in the program are reset.

**Exception:**
See main memory 07 AS 82 respectively central control module 07 ZE 86.

Voltage dips < 1 ms at 24 V d.c. are bridged.

The terminal "screen" on the front panel of the power supply unit serves to screen the system cable 07 SK 81 R4 or 07 SK 85 R1 (see chapter 12 appurtenances).




Block diagram of power supply unit 07 NG 80 R2

## 2.2 Power supply unit 07 NG 82 R4


**Technical data:**

| | |
|---|---|
| Input voltage | 24 V d.c. |
| | with Uss = 4 V ripple content |
| Allowed potential difference | +/– 30 % |
| Output voltage | 10 V d.c. +/– 5 % controlled 1.5 A |
| | 24 V d.c. +/– 30% filtered |
| Fine-wire fuse | F2A (front panel) |
| Power dissipation | max. 3 W |
| Undervoltage tripping | < 8.7 V |
| Voltage dips | |
| w/o switch-off | <=1 ms |
| with switch-off | green LED goes out and the processor is stopped |
| Weight | 0.08 kg |
| Dimension | 1 division |
| Order number | GJR5215100R4 |

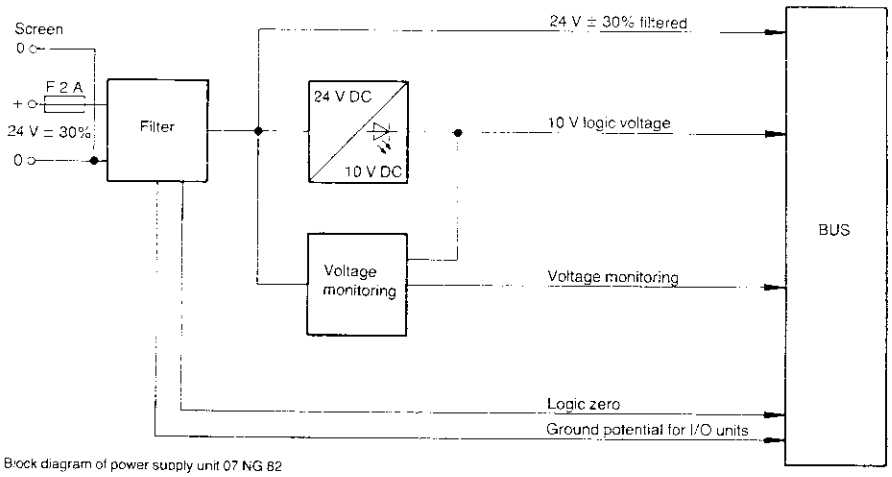
The power supply unit 07 NG 82 R4 serves to supply the PROCONTIC b with electric power.

Presence of the 10 V d.c. output voltage is indicated by an LED and monitored by the power supply unit for undervoltage. If the voltage drops to below 8.7 V the processing of the program by the central unit is interrupted. When the operating voltage returns and the switch is in the position RUN the central unit passes through a normalization cycle by means of which all outputs, flags, and registers addressed by the program are reset.

**Exception:**
See central control module 07 ZE 86.

Voltage dips < 1 ms at 24 V d.c. are bridged.

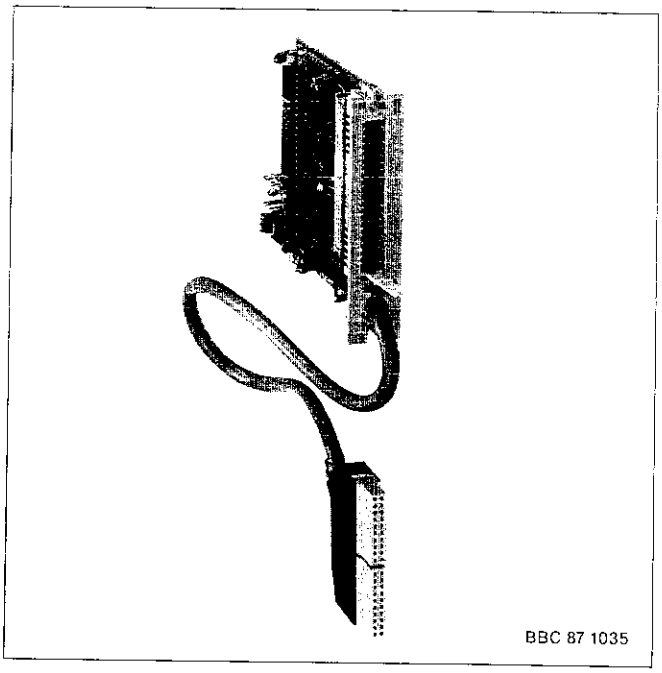
The terminal "screen" on the front panel of the power supply unit serves to screen the system cable 07 SK 81 R4 or 07 SK 85 R1 (see chapter 12 appurtenances).




Block diagram of power supply unit 07 NG 82

# 3 Bus coupling module

## 3.1 Bus coupling module 07 BV 84 R1




**Technical data:**

| | |
|---|---|
| Power from the internal logic power supply (+10 V) | 10 mA |
| Weight | 0.14 kg |
| Dimension | 1 division |
| Order number | GJR5230500R1 |

The task of the bus coupling module 07 BV 84 R1 is:

- To decouple control signals from the front plug and to transfer them to the subrack BUS.
- To decode the bank number for bit I/O modules > 15,15 (jumpers)
- It allows to operate bit I/O modules > 15,15 in extension subracks (only in connection with 07 BT 84).

The bus coupling modules is plugged into the first division (division I) of an extension subrack.

By means of a soldered jumper the address area from which the connected subrack replies can be selected on the bus coupling module.

| Jumper | Group no. | Module address |
|---|---|---|
| A-B * | 00 ... 15 | E/A **00**,00 ... **15**,15 |
| A-D | 16 ... 31 | E/A **16**,00 ... **31**,15 |
| A-C | 32 ... 47 | E/A **32**,00 ... **47**,15 |
| A-E | 48 ... 63 | E/A **48**,00 ... **63**,15 |

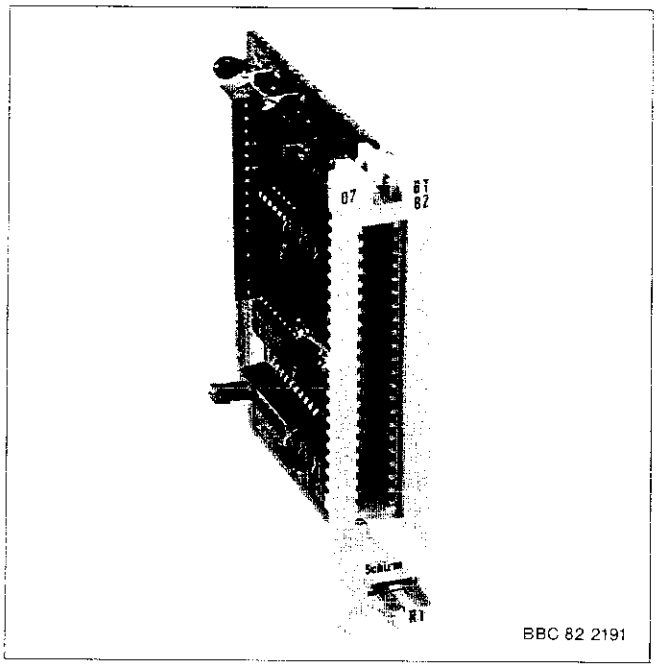
* = as delivered

If the 07 BV 84 module is used for word processing the driver must be a 07 BT 84 module.

In case of bit processing the 07 BV 84 R1 module operates in conjunction with a 07 BT 82 module, starting with revision index no. R3.

Examples and further details of the PROCONTIC b systems are in volume 8.1, planning, included.

## 3.2 Bus driver module 07 BT 82 R3




**Technical data:**

| | |
|---|---|
| Power from the internal logic power supply(+10 V) | 10 mA |
| Dimension | 1 division |
| Weight | approx. 75 g |
| Order number | GJR5215600R3 |

In PROCONTIC b systems with two or several subracks the BUS driver 07 BT 82 is required in the basic stage 07 ET 83. It serves to amplify and exchange the BUS signals from the extension stages coupled via BUS coupling modules with the basic subrack.

In the front panel of the module there is a 40-pole push-on terminal strip which receives the connector coming from the BUS coupling module 07 BV 82 and a double FASTON blade connector. By means of the FASTON blade connector the BUS driver must be connected to the zero potential of the power supply unit 07 NG 82.

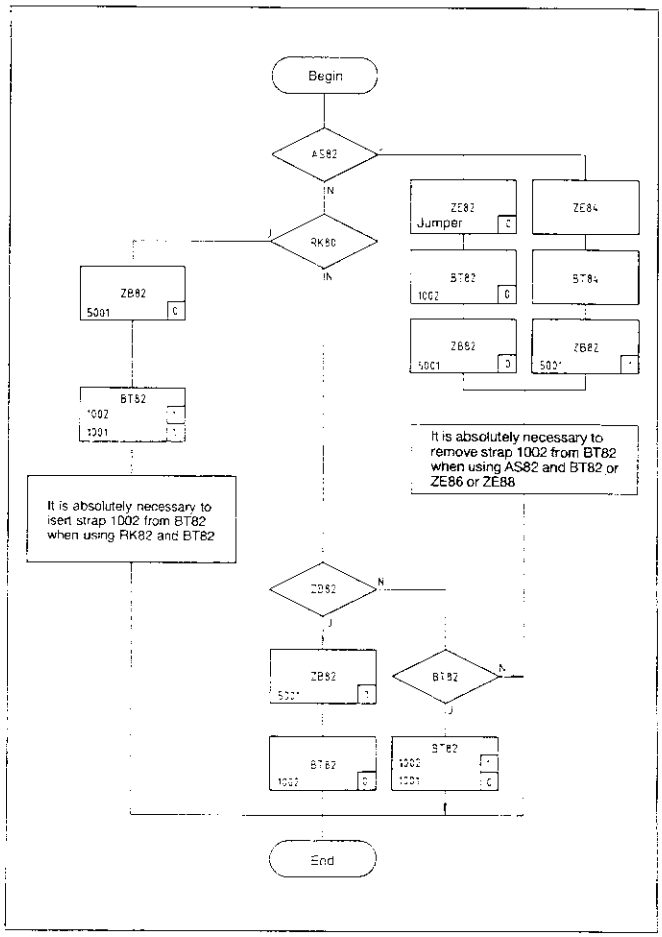
**Important note:**
The BUS driver is delivered with the jumper 1001 fitted. This jumper is necessary if the PROCONTIC b system is to be operated with a 07 RK 80 register module.

If the system is used without a register module the jumper in the BUS driver must be removed.

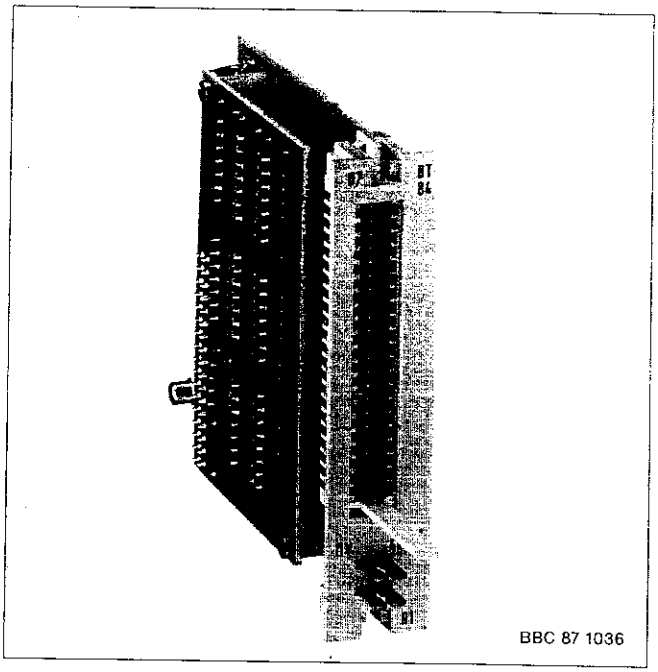
**Caution:**
The system must never be operated without jumper 1001 on the BUS driver and with a register unit.

A switching between address area for I/O-units (I/O > 15,15) is only with the bus driver 07 BT 84 pos sible.

Examples and further details of the PROCONTIC b systems are in volume 8.1, planning, included.



## 3.3 Bus driver module 07 BT 84 R1




**Technical data:**

| | |
|---|---|
| Power from the internal logic power supply (+10 V) | 10 mA |
| Weight | 0.08 kg |
| Dimension | 1 division |
| Order number | GJR5230400R1 |

### Tasks

- Control signals at the BUS are decoupled and transmitted to the front panel connector.
- In case of word transmission: determination of the data traffic direction
- Address area switchover for I/O modules. (The BUS driver on principle has its own subrack in bank 0).
- Allows operation of analog I/O units and/or bit I/O units > 15,15 in extension subracks.

### Placing in the system

The BUS driver is plugged into the first division (from left) of the physically lowest subrack. The central unit 07 ZE 84 is immediately adjacent.(The power supply unit 07 NG 82 is plugged into the subrack above beside the BUS coupling module).

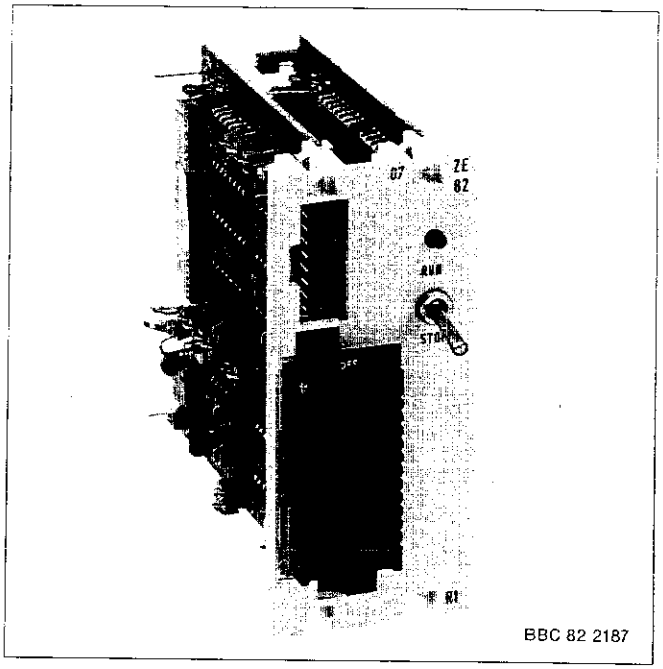
The BUS driver receives the connector of the BUS coupling module arranged above it.

**Note:**
The module 07 BT 84 R1 can not be used together with the central unit 07 ZE 82.

Examples and further details of the PROCONTIC b systems are in volume 8.1, planning, included.

# 4 Central control modules and program memories

## 4.1 Central control module 07 ZE 82 R4




**Technical data:**

| | |
|---|---|
| Max. storage capacity | 2K |
| Cycle time at 1K | 2.5 ms |
| Main memory | 128 |
| Output memory | 128 |
| Power consumption | 100 mA |
| Dimension | 1 division |
| Weight | 0.18 kg |
| Order number | GJR5215900R4 |

**Appurtenances:**

| | |
|---|---|
| EPROM memory 07 PR 82 R1 | GJR5216000R1 |

The central control unit 07 ZE 82 R3 has a 256 bit main memory and a cycle time of 2.5 ms at 1 K words.

On the central control unit an interlockable receptacle for receiving the programming memory 07 PR 82 is arranged.

An interface on the front panel is provided for connecting the programming and test unit 07 IE 84.

**Functions of the central unit:**

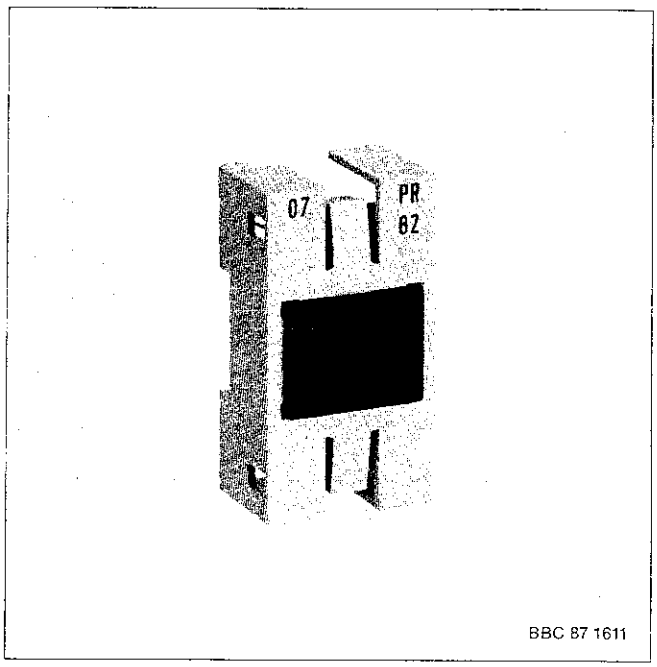
a. To trigger the word address counter
b. To accept the program word to be processed from the program memory
c. To decode the program word (operator part)
d. To perform the logic operations (Boolean operations)
e. To transmit and to receive the data bit (status)
f. To control and to monitor the processing
g. Start/stop normalization logic
h Main memory:
128 function flags M
128 output memories A
(output memories which are not required may be used as function flags A).

**Functions of the changeover switch RUN/STOP:**

a. Position STOP:
   A running program is interrupted and/or a start of the program is prevented.
b. Position RUN:
   The program is started. Processing is indicated by a green light-emitting diode. With the startup and/or when the power supply is re-established after an interruption the central unit goes through a normalization cycle during which all outputs, flags and registers addressed by the program are reset.

**Attention:**
Using the main memory 07 AS 82 the jumper 1001 has to be removed.
The central control module 07 ZE 82 may not be operated without EPROM or without a connected commissioning and test unit, while undefinied states may appear in the output modules. The reason for this are the open datalines of the EPROM socket.

## 4.2 Program memory 07 PR 82 R1




**Technical data:**

| | |
|---|---|
| Memory capacity | 2K words |
| Weight | approx. 30 g |
| Order number | GJR5216000R1 |

The program memory 07 PR 82 for 2 K words of user program is inside a protective hood and is plugged into the central unit 07 ZE 82 together with this hood. For erasing the EPROM in a UV eraser the black cover plate on the protective hood shall be removed.

**Programming:**

The program memory arranged on the central unit 07 ZE 82 can be loaded directly with the commissioning and test unit 07 IE 84.

**Handling note:**

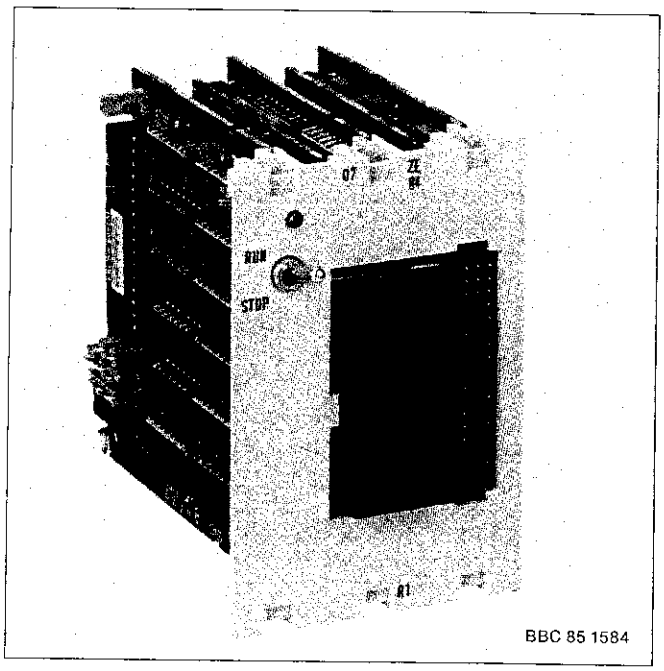
Before the program memory is plugged in the plug-in base on the central unit shall be unlocked (position OFF), and afterwards re-locked (position ON).

The correct orientation of the RPROM in the protective hood and on the central unit must be ensured (protective hood with written text at the upper end, EPROM with marking at the lower end).

The program memory must never be removed or plugged in while energized; the PROCONTIC b feed voltage must be turned off first.

**Attention:**
The program memory 07 PR 82 may only be used for 07 ZE 82.

## 4.3 Central control module 07 ZE 84 R2




**Technical data:**

| | |
|---|---|
| Max. storage capacity | 4 K /8 K |
| Cycle time at 1 K bit program | 2.5 ms |
| Cycle time tolerance | +/– 0.005 % |
| Main memory | Operable only in conjunction with main memory 07 AS 82 |
| Power consumption | 300 mA |
| Weight | 0.35 kg |
| Dimension | 3 divisions |
| Order number | GJR5218700R2 |

**Appurtenances:**

| | |
|---|---|
| EPROM memory 07 PR 84 R2 (8K) | GJR5218400R2 |

**Functions of the central unit**

a) To trigger the word address counter
b) To accept the program word to be processed from the program memory
c) To decode the program word (bit commands only)
d) To perform the logic operation
e) To transmit and to receive the data bit (status)
f) Start/stop and normalization logic
g) Job sharing with 07 WP 84/ 07 TZ 82
h) Support of the 07 IE 84 for testing and diagnosis
i) Execution of jumps

**Function of the changeover switch RUN/STOP**

a) Position STOP

A running program is interrupted and a renewed start upon reestablishment of the power supply is prevented.
LED = off

b) Position RUN
Following a change from STOP to RUN or establishment of the power supply the central unit goes through a normalization cycle lasting 160 ms. If neither a 07 TZ 82 and/or 07 WP 84 module is available the program goes into RUN (provided that a commissioning unit which may be connected will also give the release). If a 07 TZ 82 and/or a 07 WP 84 is in use these modules will first go through their normalization cycles. The central unit goes into RUN when these modules give the release.
LED = is alight.

The entire normalization cycle will be completed in approx. 2 seconds
During operation with a 07 TZ 82 and/or a 07 WP 84 the LED will intermittently go out when these modules have access to the BUS and the central unit is stopped. The result is that in case of short bit programs in conjunction with longer word programs the LED will remain dark. Since the LEDs of the word processor do not announce a fault it can still be seen that the central unit is running.

**Set of instructions of the central control unit 07 ZE 84**

1. Bit instructions

| | | |
|---|---|---|
| | E | Inputs |
| | A | Outputs |
| | T | Times |
| | M' | Global flags |
| | M | Local flags |
| | S' | Global step cascades |
| | S | Local step cascades |
| # | B0 | Binary constant |
| # | B1 | Binary constant |
| | NOP0 | Blank word |
| | NOP1 | Full word |

2. Subroutine instructions (bit processing)

| | | |
|---|---|---|
| = | MA | Subroutine start |
| =N | A | Subroutine start inversely |
| = | MC | Subroutine start, with normalization |
| =N | MC | Subroutine start inversely, with normalization |
| ! | ME | Subroutine end |

3. Module instructions

| | | |
|---|---|---|
| ! | B...,P... | Call logging module |
| ! | B...,A... | Call user module |
| ! | B...,F... | Call function module |
| ! | BE | Module end (absolute) |
| = | BE | Module end (conditional) |

4. Branch instruction

| | | |
|---|---|---|
| ! | SP | Absolute branch to a specified adress |
| = | SP | Conditional branch to a specified adress |
| ! | SPM | Absolute branch to a definied label |
| = | SPM | Conditional branch to a definied label |
| ! | MR | Definied label |

5. Program end instruction

| | | |
|---|---|---|
| ! | PE | Absolut rogram end |
| = | PE | Conditional program end |
| =N | PE | Conditional inversely program end inversely |

**Memory size of 07 ZE 84 with 8 k**

0000 Start of the main program

!PE End of the module definitions

!PB A...
Module a
!BE
!PB A...
Module n
!BE
module definitions (max. 3328 words)

| | | | |
|---|---|---|---|
| 7422 | !PE | End of the main program | |
| 7423 | !PE | definitions | |
| 7424 | 256 | indirect constants | |
| 7680 | 256 | Jump flags | see jump constants distributor |
| 7936 | 256 | Pointer to module | |
| 8191 | | definitions | |

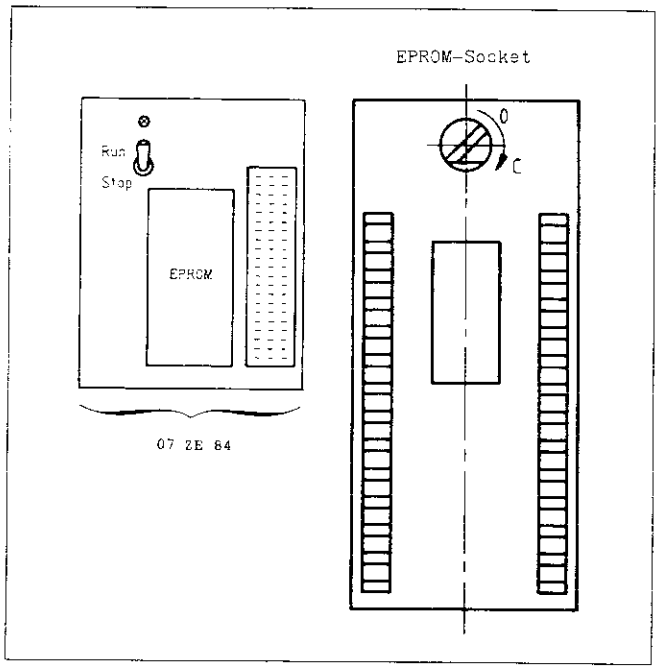
The central control unit is plugged into slots II... IV (second to fourth division from left) of a subrack.
The power supply unit 07 NG 82 is required for its operation.

**Attention:**
The module has no main memory of its own and can therefore be operated only in conjunction with 07 AS 82. The central control module 07 ZE 84 may not be operated without EPROM or without a connected commissioning and test unit, while undefinied states may appear in the output modules. The reason for this are the open datalines of the EPROM socket.

For commissioning and testing the commissioning unit 07 IE 84 is connected to the 48-pole interface.

Basically the said program area of 8K (16 bit) words is available to the user.
Part of the memory (768 words = 3/4K) is required for organization purposes, however, if at least one of the following features is used:

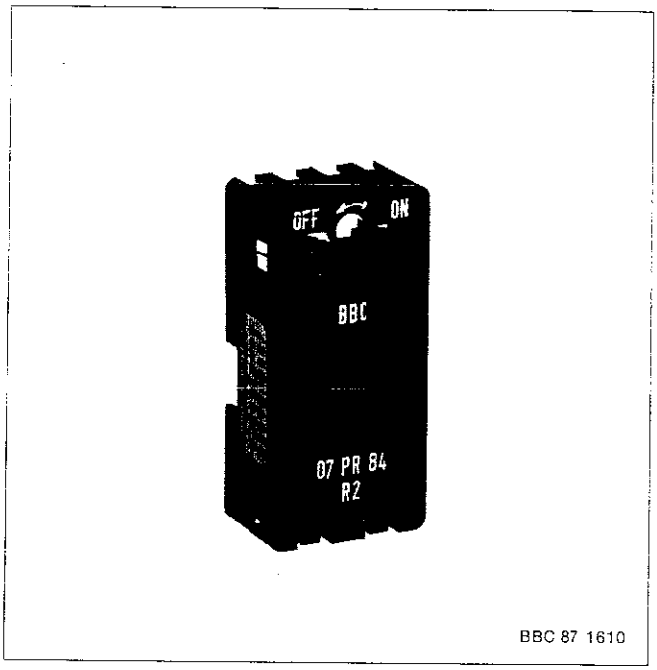
a) Jumps to flags (SPM...)
b) Modules with a jump to module definitions (!PB)
c) Indirect constants (K.)




There is an interlockable receptacle for receiving the program memory on the front panel: 07 PR 84 R2 (8K)

Management of the protected memory area is taken over by the programming units. To protect this memory area the module definitions are terminated with a double PE (!PE !PE). To make sure that the double PE is recognized correctly there must be at least one PROCONTIC word (and/or 1 x NOP0) between the !PE (end of the main program) and the double PE.

## 4.4 Program memory 07 PR 84 R2




**Technical data:**

| | |
|---|---|
| Memory capacity | 8K words |
| Weight | approx. 30 g |
| Order number | GJR5218400R2 |

The program memory 07 PR 84 R2 for 8 K words of user program is inside a protective hood and is plugged into the central unit 07 ZE 84 together with this hood. For erasing the EPROM in a UV eraser the black cover plate on the protective hood shall be removed.

**Programming:**

The program memory arranged on the central unit 07 ZE 84 can be loaded directly with the commissioning and test unit 07 IE 84

**Handling note:**

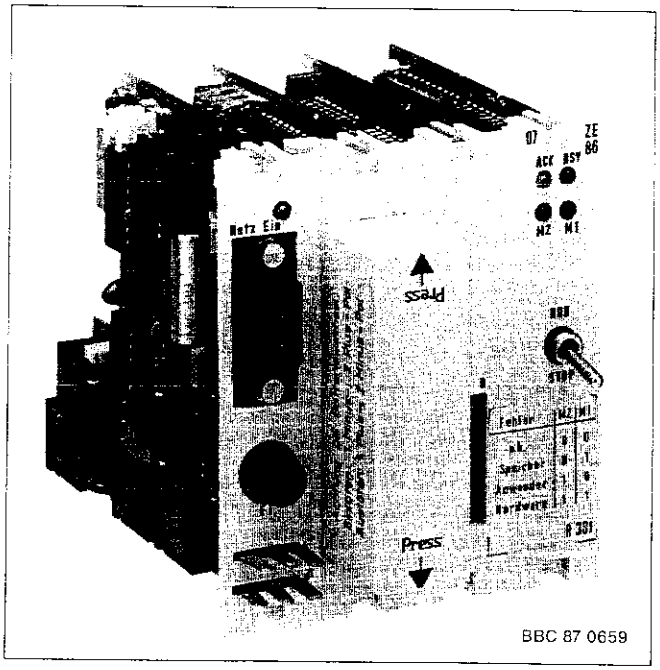
Before the program memory is plugged in the plug-in base on the central unit shall be unlocked (position OFF), and afterwards re-locked (position ON).

The correct orientation of the EPROM in the protective hood and on the central unit must be ensured (protective hood with written text at the upper end, EPROM with marking at the upper end).

The program memory must never be removed or plugged in while energized; the PROCONTIC b feed voltage must be turned off first.

**Attention:**
The program memory 07 PR 84 R2 may only be used for 07 ZE 84.

## 4.5 Central control Unit 07 ZE 86 R301/R401



BBC 87 0659

**Technical data:**

| | |
|---|---|
| power supply external by front plugs | 24 V d.c |
| permissible voltage tolerance | +/– 30 % |
| permissible ribble, peak-to-peak | < 4 V |
| power consumption | 500 mA max. |
| Integrated power supply: | |
| Output voltages | |
| $U_{10}$ for PROCONTIC bus | +10 V d.c., +/– 5 %, regulated, 200 mA max |
| $+U_5$ for 07 ZE 86 internal | + 5 V d.c., +/– 5 %, regulated, 500 mA max |
| $-U_5$ for 07 ZE 86 internal | – 5 V d.c., +/– 10 %, regulated, 100 mA max |
| Fuse (F1) | 2 A (fast acting) |
| Power loss | 3 W |
| Undervoltage monitoring | 8.7 V resp. 4.5 V |
| Voltage fluctuation | |
| w/o shut-down | < 1 ms |
| with shut-down | green LED goes off and processor is disabled |
| CPU EEPROM | 8 K words |
| Write cycles EEPROM | 10 000 max |
| Cycle time for 1k bit program | approximately 5 ms (see volume 8.2 for exact informations) |
| Processing memory | integrated |
| | 1024 outputs (A) |
| | 1024 global flags (M') |
| | 16 local flags (M) |
| | 1024 global steps (S') |
| | 16 local steps (S) |
| | 128 output word |
| | 128 output analog |
| | 128 mark word |
| | 128 mark analog |

| | |
|---|---|
| Function modules | see listing |
| Buffer | individual range selectable by slider switch |
| Display | 4 LEDs |
| Integrated interfaces | RS423 or RS422 |
| Operations mode 1 | as a commissionig or test unit interface |
| Connector for interface | Cannon D, 9 pole |
| Serial transmission format | selectable |
| Ambient conditions: | |
| operating temperature | 0 ... +55° C |
| storage temperature | −25 ... +75° C |
| humidity class | F |
| Dimensions | 4 divisions |
| Weight | 0,38kg |
| Order number | GJR5231500R301<br>GJR5231500R401 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 87 R2 for programming unit | GJR5230800R2 |
| System cable 07 SK 88 R1 for serial interface operations mode 1 | GJR5231700R1 |
| Spare battery | GJR5223500R1 |

**Functions of the Central Processing Unit:**

- suited for word and bit processing, supported by a gate-array for bus control and a bit accelerator for faster bit processing
- all PROCONTIC b commands can be applied
- as background modules (called for by =BS..,type) only the types P... resp. F000 can be called up (for protocolling over the serial interface). All other types are not allowed.
- indirect jumps (SPM...) over the whole address range
- MA and MC are supported even on the word level. The assignment of word outputs, for example the commands = AW...,.. and = AA...,.. shall not be listed in between MA, MC and ME. MA means that up to ME no other command will be executed; with MC all binary assignments but the step chains will be valued to "0"
- all PROCONTIC b units can be operated with this CPU; exceptions: 07 TI 80, 07 TI 81, 07 TZ 82 and the word processor 07 WP 84
- **CAUTION:**
  On all PROCONTIC b racks the times must be disabled; to do so, the code switch "3" must be in "off" position (07 ET 84) resp. the jumper "TN" (07 ET 82, 07 ET 83) on the bus board must be installed
- 1024 binary out- and inputs, 1024 binary markers and memories, and 256 analog in- and outputs may be addressed
- the interface for the programming unit (RS 423) is integrated into the CPU; as programming unit the modules 07 PC 30 and 07 PC 31 can be connected directly via the serial interface
- 60 time ranges, selectable by software, are included; in one program up to 48 time ranges may be used (work load of the processor)
- 16 counters, selectable by software, are included
- cycle monitoring is active only with the cycle monitoring module F 060 used in the program
- integrated power supply to generate the internal PROCONTIC logic voltages (10 V/5V) to supply the CPU and one rack
- by using different cable at the interface port either a programming unit (07 SK 87 R2) or a printer/terminal (07 SK 88 R1) may be connected

**Description:**

For high power consumption up to 2 power supply units 07 NG 82 may be applied in the extension rack. With proper power supply the green LED "Netz Ein" will be illuminated with a 200...400ms delay after switching on the external power.

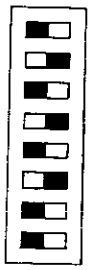
The programming unit will be connected with the interface by the cable 07 SK 87 R2. Thus the CPU can be programmed directly.

The battery for buffering the internal markers etc. is not part of the unit and must be ordered separately. If used without buffering, all switches must be in "N" (normalized) position. After the first run of a new program the switches shall always be in "N" position. After that individual ranges may be buffered with the switches. This applies also after replacing a buffered CPU.

Slider switch at the front panel for selection the buffered ranges

N: to normalize P: to buffer

Position



| | | | | |
|---|---|---|---|---|
| 8 | P | | N | MW, MA |
| 7 | P | | N | free |
| 6 | P | | N | M', M |
| 5 | P | | N | free |
| 4 | P | | N | S', S |
| 3 | P | | N | free |
| 2 | P | | N | band rate |
| 1 | P | | N | free |

A RUN/STOP switch is provided for the control function. This switch is called for at each end of a cycle.

For monitoring purposes 4 LEDs are installed.

Yellow LED for (ACK) serial interface active.
Green LED for (BSY) flashes, PROCONTIC runs.

Red LEDs

| error | M2 | M1 | |
|---|---|---|---|
| O.K. | 0 | 0 | no error |
| memory | 0 | 1 | (error no. 10-29) |
| user | 1 | 0 | (error no. 30-99) |
| hardware | 1 | 1 | (error no. 0-9) |

R401

List attached to unit

(see also error list)

The normalizing cycle is indicated by the LEDs. After powering up,all LEDs flash for a moment. After that during the hardware normalization the yellow LED comes up. When the yellow LED goes off and no red LED comes up the hardware normalization was finished successfully.In case of an error the detailed error data can be called for via the monitoring function $F. In case of an error the PROCONTIC will not go in RUN mode. During transition from STOP to RUN the PROCONTIC program is checked. If there is no error (none of the red LEDs is on), the flashing of the green LED indicates the cycle run of the program.

**Indications for EEPROM:**

THe CPU does not have a special RAM memory for the PROCONTIC program during commissioning. This means that all modifications must be done in the EEPROM. The modified PROCONTIC words are programmed only. A faulty programming is indicated by an error signal.

A buffer of 256 words is provided in the master system RAM for temporary storage of the PROCONTIC words coming over the interface.A pre-erase (function D) of the memory is not required when completely transferring the program in position B8.

**Serial interface:**

The serial interface can be used in two operational modes:

- programming and testing interface
- ASCII interface

The selection of the operational mode is done by choosing the corresponding system cable.

| operating mode \ mode | RS 423 |
|---|---|
| programming and testing interface | SK 87 R2 |
| ASCII interface | SK 88 R1 |

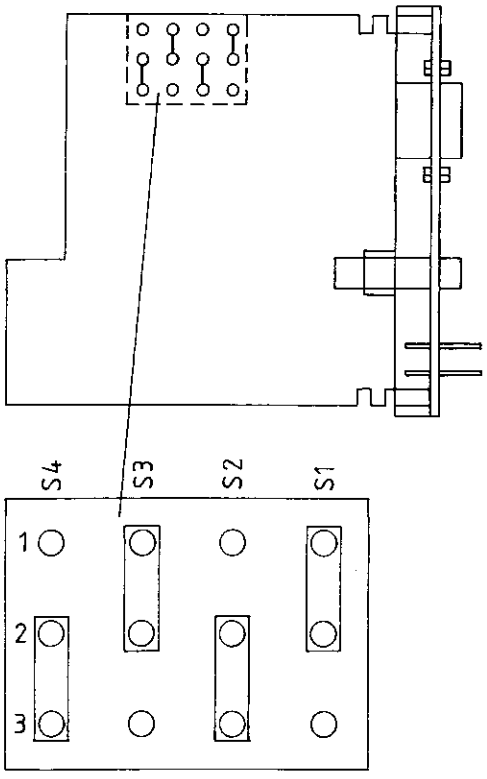
**Technical specifications of the serial interface:**

The interface can be used electrically either in the RS 422 or in the RS 423 mode. Selection is done by jumper on the printed circuit board 1 (state of delivery = RS 423).

**RS 423 mode:**

| PIN | Function |
|---|---|
| 1 | shield |
| 2 | transmitter wire |
| 3 | receiver wire |
| 4 | do not use |
| 5 | free (connected to PIN 2 internally) |
| 6 | switching form programming unit to printer |
| 7 | signal ground |
| 8 | free (connected to PIN 7 internally) |
| 9 | free (connected to PIN 3 internally) |

The four jumpers on the circuit board 1 are set for RS 423 as shown below (state of delivery):

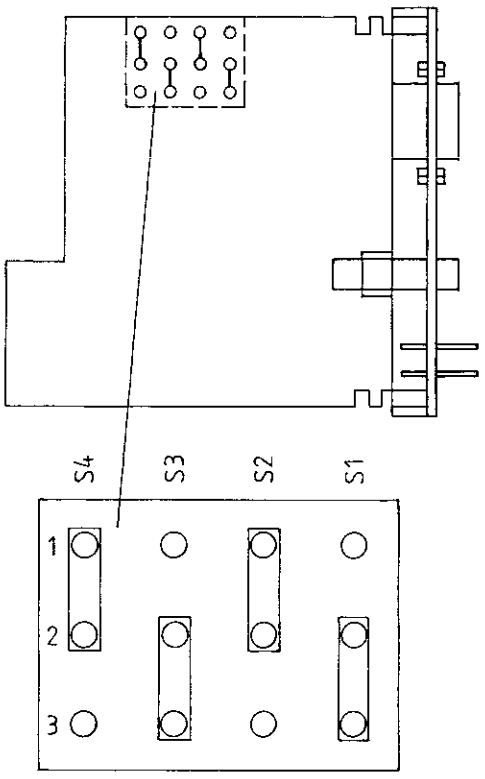



The PIN configuration of the 9-pole trapezoidal plug in RS 422 mode (invers to the state of delivery)

**RS 422 mode:**

| PIN | Function |
|---|---|
| 1 | shield |
| 2 | free (connected to PIN 5 internally) |
| 3 | free (connected to PIN 9 internally) |
| 4 | transmitter + |
| 5 | transmitter – |
| 6 | switching from programming unit to printer |
| 7 | free (connected to PIN 8 internally) |
| 8 | receiver + |
| 9 | receiver – |

The four jumpers on the pcb 1 are set for RS 422 as shown below (changed by the user):




| Mode | | |
|---|---|---|
| | RS 423 | RS 422 |
| S1 | 12 | 23 |
| S2 | 23 | 12 |
| S3 | 12 | 23 |
| S4 | 23 | 12 |

### a. Programming and testing interface

Via this interface the system can be connected to the programming and testing units 07 PC 30, 07 TD 12 and 07 PC 31 by the system cable 07 SK 87.

There are four basic features:

- the diagnosis is done over the standard telegrams of the programming units
- (independent of RUN/STOP) always the whole program memory can be read
- modification of the program in RUN mode is not possible
- status-read at the end of the cycle possible only
- simulation of variables at the end of the cycle possible only
- only one stop-point on address 0000 possible
- cycle monitoring by the timer (250ms)
- when comparing the programming unit with the stored program (function"V" in $ SPS) an error indication may come up in the programming unit, even when the programs match. In this case the address of the error is higher than the valid work limit. This indication is generated by the CPU when recalculating the jump addresses into the administration part.
- since the CPU normalizes the variables not before the transition from STOP to RUN, it is possible to apply all test functions even with the non-working control.
- the images of the variables are received only. The output units connected are reset.

### b. ASCII-interface with cable 07 SK 88 R1:

Over the interface texts and values can be transferred to peripheral units (CRT, printer etc.) by the protocolling modules.

Monitoring functions render possible the in- and outputs of word variables, the modification of the band rate as well as time and counter references and actual values and the call for of error data including the software version number. Monitoring functions have the structure $.....=<final character>. At a faulty input with an active echo a "?" will be reflected.

AS final character only the signal projected in SIN/F002 is accepted. As default value <CR> is specified for the final character.

**Monitoring functions:**

The basic setting (switch BAUD in N position) includes 300 Baud, 8 data bits without parity, 1 stoop bit and with echo. The baud rate may be modified by $B=xx in the monitor or over the function module SIN. All modifications are stored in the buffered RAM and stay memorized with the switch BAUD in "P" position.

Programming of the baud rate:

$ B30<CR>= 300 Baud
$ B60<CR>= 600 Baud
$ B12<CR>= 1200 Baud
$ B24<CR>= 2400 Baud
$ B48<CR>= 4800 Baud
$ B96<CR>= 9600 Baud

In this case the interface has the functions listed below:

- call for time values (reference and actual)
  $ST00,00=<CR> resp. $SIT00,00=<CR>
- setting of time values
  $ST00,00=abcEx, whereas a,b,c = 0...9 and x = 1...5
- call for counter values (reference and actual)
  $SZ00,00=<CR> resp. $IZ00,00=<CR>
- setting of counter values
  $SZ00,00=abcde<CR>, whereas a,b,c,d,e =0...9
- output of word variables
  $MW01,00=<CR> resp.$MA02,00=<CR>
- modification of word variables
  $MW01,00=+21300<CR> resp.
  $MA02,00=+12,34<CR>
- output of bit flags (07 ZE 86 R401)
  $M'01,00=<CR>
- modification of bit flags (07 ZE 86 R401)
  $M'01,00=1<CR>
  The global flags in the range M'00,00...M'63,15 are addressed only.
- indication of the stand-still address in an error case by monitoring function($F=<CR>)
- at three different test instants the error data are stored in the memory and can be called for by $F<CR>. The call may be continued until the indication "no error data stored in the stack" appears.

a. Check of the hardware after each power-up.
   Check of the PROCONTIC bus.
   Check of the bit processor.
   Check of the CMOS-RAM's.
   Check of the operating system (check sum)
b. Check of the program at transition from STOP to RUN.
   PTY monitoring of the user program reference signal errors in time values.
c. Check with the running program.
   (see also the table with the error indications)

- indication of the software version number($V=<CR>) f.i. 07 ZE 86 V1.1
- indication of the maximum cycle time($ZY=<CR>).Here the max. cycle time is output in steps of 10 ms.
- as final character either <CR> or <blanc> is accepted.

For further details about the monitoring functions see the software description.

**Table of the internal error indications**

| error no. | meaning | display red LED | | address |
|---|---|---|---|---|
| | | M2 | M1 | |
| 1 | PROCONTIC bus | x | x | int. CPU |
| 2 | acceleration test | x | x | int. CPU |
| 3 | INTO error | x | x | int. CPU |
| 4 | control bus | x | x | int. CPU |
| 5 | PTY error | x | x | PC-ADR. |
| 6 | RAM error | x | x | int. CPU |
| 7 | EEPROM error | x | x | PC-ADR. |
| 8 | EEPROM error | x | x | int. CPU |
| 29 | reference error counter | | x | |
| 30 | reference error times | x | | |
| 31* | interface no. | x | | PC-ADR. |
| 32* | baud rate error** | x | | PC-ADR. |
| 33* | operation mode error** | x | | PC-ADR. |
| 34* | parity error** | x | | PC-ADR. |
| – | | | | |
| – | | | | |
| 38 | flag error | x | | |
| 39 | no or not sufficient PE | x | | PC-ADR. |
| 40* | too many module calls | x | | PC-ADR. |
| 41* | BE forgotten | x | | PC-ADR. |
| – | | | | |
| – | | | | |
| 50* | jump error | x | | PC-ADR. |
| 51* | special command error | x | | PC-ADR. |
| 52* | command error | x | | PC-ADR. |
| 53 | head module error | x | | PC-ADR. |
| 54 | time module too long | x | | |
| – | | | | |
| – | | | | |
| 80 | cycle error | x | | |

int. CPU = internal error, program address shown is not related to the error

PC-ADR. = (<indication> converted in decimal minus 32768):2

* error to be recognized at program execution

x LED is on

** interface

**Special Features of the CPU**

Jump commands and module calls:

For jump commands and module calls in the 07 ZE 86 the limitation of markers (SPM) and module definitions to always be in the upper 4k-block is neutralized. The new CPU calculates at initializing the address itself so that they may be randomly arranged in the program memory.

**Caution:**
Jumps on addresses are still executed in jumps module 4k.

The conversion attributes from bit to word (b,c) may be combined with all bit variables, f.i. bA 17,00.

**Caution:**
These attributes change the Boole accumulator, this means after that no further linkage is possible.

The division in "word" modules and "bit" modules is neutralized. All module numbers from 0 to 63 are tolerated for word and bit processing. The local flag ranges however exist only 16 times and are derived 16 from the module no. So module no. 0 has the identical local flag range as module no. 16, 32 etc. All modules may be parametrized with a maximum of 16 word and 16 bit parameters.

THe module call BA.., A.. always must be terminated with NOPO, even when no parameter list follows.

The modules !BS..,A.. and =BS..,A.. are not supported, since with a single processor system background operation is not possible.

The modules BS..,F000 and BS..,P.. are, when called, written into a list only (50 modules max.). After the program end the next following module in the list will be taken, also all associated ASCII characters and values put into an output buffer. This means that the values derive from the cycle at which end the module was effectively processed. The values are always output in 5 digits. The real output over the serial interface is now interrupt controlled, meaning that for each cycle a maximum of one text module is output.

The protocollers with BS..,F000 or BS..,P.. can be called for with all numbers (0 to 62). The module bit B63 indicates that the stand-by pattern for the protocoller is full.

All 60 times and 16 counters may be programmed.

To not overload the reaction time of the processor only 46 times for each program are allowed. If more times are programmed there will be no error indication but the reaction time of the system will be extended.

The function $IT...,.=D (continuous read of the actual value) is not possible in this case.

With counters and timers the status exchange between the internal timer and the PLC-program is asynchronous, this means it is done always then when a timer or counter is run off and not at the end of the cycle (like 07 TZ 82 f.i.).

The module SIP (F001) is treated as a "normal" function module, which means it may be called for conditioned or unconditioned.
It is within the cyclic program and not following !PE as in the 07 WP 84. The module F060 (cycle monitoring) is not required for the data exchange with the SIP module.The function module SIP occupies a value of the past. The target variable will be cancelled after the reset. The further reaction of the module is identical with the one of the word processor 07 WP 84.

The module for the cycle monitoring F060 must be called for in the program once only, to enable or disable the cycle monitoring. A continuous call is not necessary.

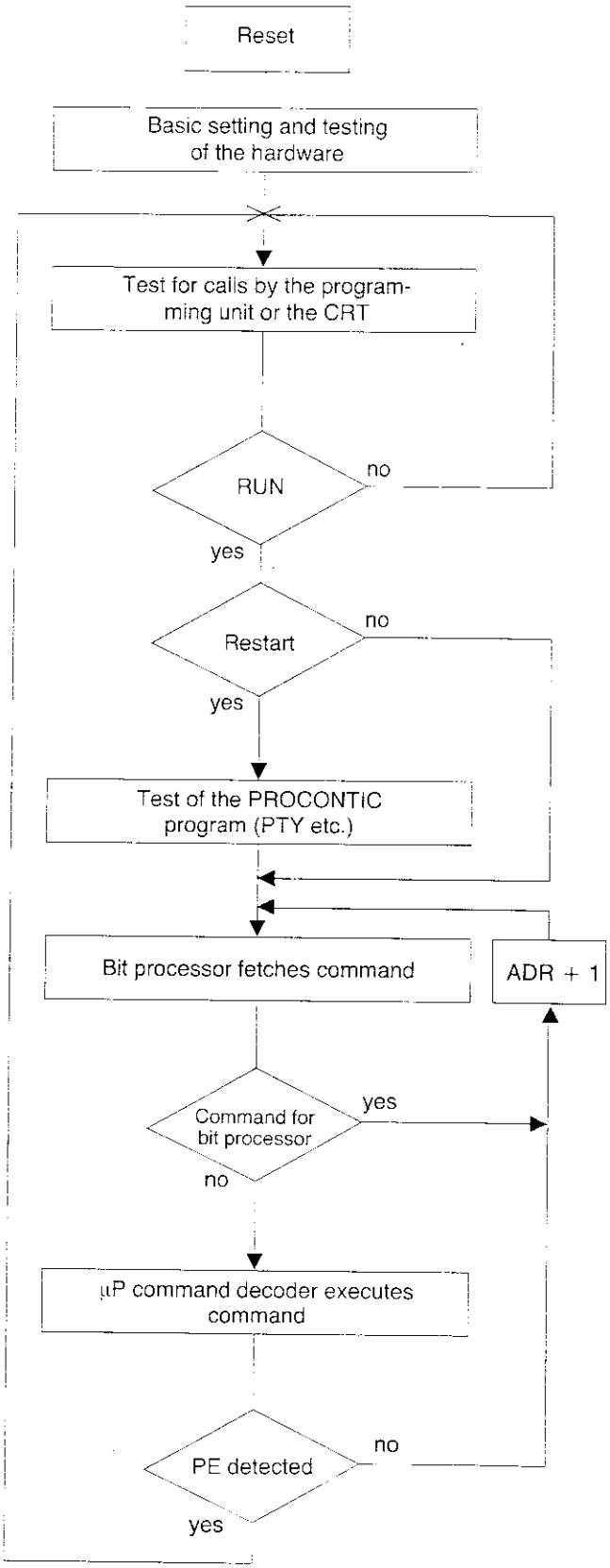
Since the normalizing of all variables is not done before the transition from STOP to RUN, for testing the variables of the last cycle processed are available even with the control not running.

### Module processing

These function modules are handled by the CPU:

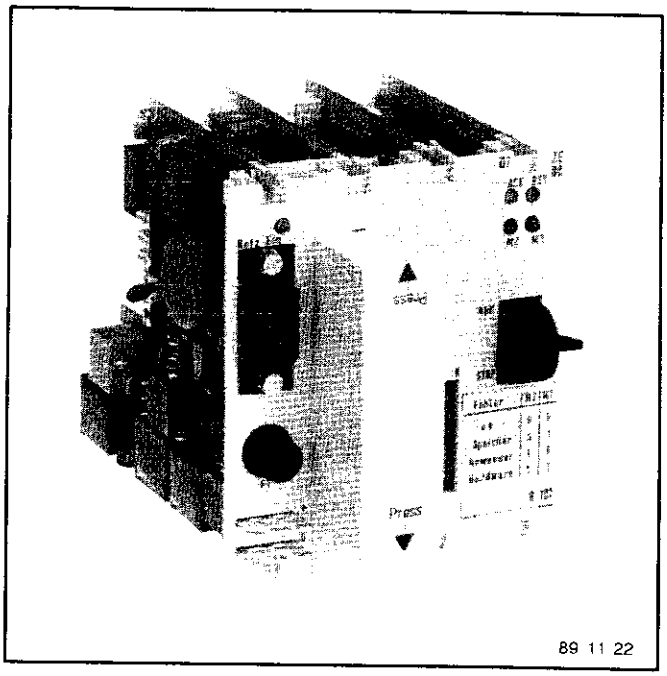
| | | |
|---|---|---|
| F000 | TEX | text module |
| F001 | SIP | serial input |
| F002 | SIN | interface initializing |
| F003 | EMAS | receiver module (07 ZE 86 R401) |
| F020 | IDS | indirect write |
| F021 | IDL | indirect read |
| F022 | BETR | absolute value generator |
| F023 | BEG | limiter |
| F024 | KPL | complementary generator (complement to 1) |
| F040 | PIR | PI-regulator |
| F060 | ZYK | cycle monitoring |
| F127 | KOP | head module (07 ZE 86 R401) |

**Principle function management of 07 ZE 86:**



# 4.6 Central control unit 07 ZE 88 R101/R102

(07 ZE 88 R101: 8 K words, 07 ZE 88 R102: 16 K words)




## Technical Data:

| | |
|---|---|
| power supply external by front plugs | 24 V DC |
| permissible voltage tolerance | +/- 30% |
| permissible ripple, peak-to-peak | < 4 V |
| maximal power consumption | 500 mA |

### Integrated Power Supply:

| | |
|---|---|
| Output voltages | |
| $U_{10}$ for ABB Procontic b bus | + 10 V DC, +/- 5%, regulated, 200 mA max. |
| $U_5$ for 07 ZE 88 internal | + 5 V DC, +/- 5%, regulated, 500 mA max. |
| $-U_{10}$ for 07 ZE 88 internal | - 10 V DC, +/- 10%, regulated, 100 mA max. |
| Fuse (F1) | 2 A (fast acting) |
| Power loss | 3 W |
| Undervoltage monitoring $U_{10}$ respective $U_5$ | 8.7 V respective 4.5 V |
| Voltage fluctuation | |
| without shut-down | < 1 ms |
| with shut-down | green LED goes off and processor is disabled |
| CPU EEPROM | R101: 8 K words / R102: 16 K words |
| Write cycles EEPROM | 10 000 max. |
| Cycle time for 1 K bit program | appr. 5 ms, (see volume 8.2 for exact informations) |

| | |
|---|---|
| Processing memory | integrated with<br>1024 outputs (A)<br>1024 global flags (M')<br>16 local flag areas (M)<br>1024 global steps (S')<br>16 lokal step areas (S)<br>128 outputs word<br>128 outputs analog<br>128 flags word<br>128 flags analog |
| Funktion modules | see listing on 4-20 page |
| Buffer | individual range selectable by slider switch |
| Display | 4 LEDs |

**Integrated Interfaces:**

| | |
|---|---|
| Sort of interface | RS232C |
| Operations mode 1 | as a commissioning or test unit interface |
| Operation mode 2 | as a serial ASCII interface |
| Connector for interface | D-Sub, 9-polig, male |
| Serial transmission format | selectable |

**Ambient conditions:**

| | |
|---|---|
| Operating temperature | 0°C . . . + 55°C |
| Storage temperature | - 25°C . . . + 75°C |
| Humidity class | F |
| Dimensions | 4 divisions |
| Weight | 0,38 kg |
| Order number | |
| 8 K-Version | GJR5231800R101 |
| 16 K-Version | GJR5231800R102 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 87 R2 for programming unit in operation mode 1 | GJR5230800R2 |
| System cable 07 SK 88 R1 for seriel interface in operation mode 2 | GJR5231700R1 |
| Replacement battery | GJR5223500R1 |

## Functions of the central processing unit:

- suited for word and bit processing, supported by a gate-array for bus control and a bit accelerator for faster bit processing.
- all ABB Procontic b commands can be applied.
- as background modules (called for by =BS..,type) only the types P... resp. F000 can be called up (for protocolling over the serial interface). All other types are not allowed.
- Indirect jumps ( SPM...) over the whole address range.
- MA and MC are supported even on the word level. The assignment of word outputs, for example = AW..,.. and = AA..,.. shall not be listed in between MA, MC and ME. MA means that up to ME no other command will be executed; with MC all binary assignments but the step changes will be valued to '0'. Directly for ME the use of a word function is not allowed, hier a NOP0 has to be written. Started timer (=T..,..) will not be executed in a closed subroutine program, i. e. the timer runs further.
- All ABB Procontic b units can be operated with this CPU; exceptions the timer 07 TI 80, 07 TI 81, 07 TZ 82 and the word processor 07 WP 84.

- **Caution:**
  On all ABB Procontic b racks the times must be disabled; to do so, the code switch '3' must be in 'OFF' position (07 ET 84) resp. the jumper 'TN' (07 ET 82, 07 ET 83) on the bus board must be installed.
- 1024 binary outputs and inputs, 1024 binary flags and memories and 256 analog in- and outputs may be addressed.
- The interface for the programming unit (RS 423) is integrated into the CPU; as programming unit the modules 07 PC 30 and 07 PC 31 can be connected directly via the serial interface (cable 07 SK 87 R2).
  **Note:**
  With the programming system 907 PC 30 only programs upto 8K can be programmed. For bigger programs the programming system 907 PC 31 has to be used.
- 60 time ranges, selectable by software, are included; in one program up to 48 time ranges may be used (work load of the processor).
- 16 counters, selectable by software, are included.
- cycle monitoring is active only with the monitoring module F060 used in program.
- Integrated power supply to generate the internal ABB Procontic logic voltages (10 V/5 V) to supply the CPU and one rack.
- by using different cable at the interface port either a programming unit (07 SK 87 R2) or a printer/terminal (07 SK 88 R1) may be connected.

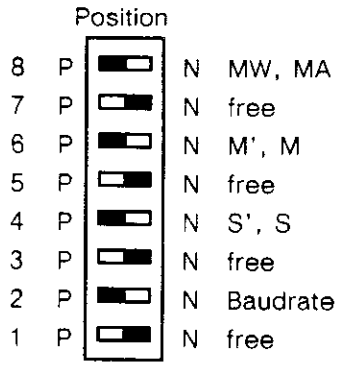
## Description:

For high power consumption up to 2 power supply units 07 NG 82 may be applied in the first extention rack. With proper power supply the green LED 'Netz ein' (power on) will be illuminated with a 200...400 ms delay after switching on the external power.

The programming unit will be connected with the interface by the cable 07 SK 87 R2. Thus the CPU can be programmed directly.

If the CPU is used without buffering, all switches must be in 'N' (normalized) positon. During the first run of a new program the switches shall always be in 'N' position. After that individual ranges may be buffered with the switches.
This applies also after replacing a buffered CPU.

Slider switch at the front panel for selection the buffered ranges.




N = to normalize P = to buffer

A RUN/STOP switch is provided for the control function. This switch is called at each end of a cycle.

For monitoring purposes 4 LEDs are installed.

Yellow LED for (ACK) serial interface active.
Green LED for (BSY) flashes, ABB Procontic b runs.

Red LEDs:

| error | M2 | M1 | |
|---|---|---|---|
| o. k. | 0 | 0 | no error |
| memory | 0 | 1 | (error no. 10 - 28) |
| user | 1 | 0 | (error no. 30 - 99) |
| hardware | 1 | 1 | (error no. 0 - 9) |

R101/R102

List attached to unit
(See also the table of the error list, page 4-19).

The normalizing cycle is indicated by the LEDs. After powering up, all LEDs flash for a moment. After that during the hardware normalization the yellow LED comes up. When the yellow LED goes off and no red LED comes up the hardware normalization was finished successfully. In case of an error the ABB Procontic will not go in RUN mode. During transition from STOP to RUN the ABB Procontic program is checked. If there is no error (none of the LEDs are on), the flashing of the green LED indicates the cycle run of the program.

## Indications for EEPROM:

The CPU does not have a special RAM memory for the ABB Procontic program during commissioning. This means that all modifications must be done in the EEPROM. The modified ABB Procontic words are programmed only.
A faulty programming is indicated by an error signal.

A buffer of 256 words is provided in the master system RAM for temporary storage of the ABB Procontic words coming over the interface.
A pre-erase (function D) of the memory is not required when completely transferring the program in position B8 or B16.

## Serial interface:

The serial interface can be used in two operational modes:

- programming and testing interface
- ASCII interface

The selection of the operational mode is done by choosing the corresponding cable.

| mode / operating mode | RS-232-C |
|---|---|
| programming- and testing interface | 07 SK 87 R2 |
| ASCII-interface | 07 SK 88 R1 |

## Technical specifications of the serial interface:

| Pin | Function |
|---|---|
| 1 | shield |
| 2 | transmitter wire |
| 3 | receive wire |
| 4 | free |
| 5 | free |
| 6 | switching from programming unit to printer |
| 7 | signal ground |
| 8 | free |
| 9 | free |

**a. Programming and testing interface**

Via this interface the system can be connected to the programming and testing units 07 PC 30, 07 PC 31, 07 PC 32 und 07 PH 31.

There are following basic features:
- The diagnosis is done over the standard telegrams of the programming units
- (independent of RUN/STOP) always the whole program memory can be read
- modifications in Run mode is not possible
- status-read at the end of the cycle possible only
- simulation of variables at the end of the cycle possible only
- only one stop-point on address 0000 possible
- cycle monitoring by the timer (350 ms)
- using the programming unit 07 PC 30 for comparing the programming unit with the stored program (function 'V' in $SPS) an error indication may come up in the programming unit, even when the programs match. in this case the address of the error is higher than the valid work limit. This indication is generated by the CPU when recalculating the jump addresses into the administration part.
- since the CPU normalizes the variables not before the transition from STOP to RUN, it is possible to apply all test functions even with the non-working control.
- the images of the variables are received only. The output units connected are reset.

The description how to connect a programming unit see volume 8.1 planning, chapter 6.6.

**b. ASCII interface with cable 07 SK 88 R1:**

Over the interface texts and values can be transferred to peripheral units (CTR, printer etc.) by the protocolling modules.

Monitoring functions render possible the in- and outputs of word variables, the modification of the baud rate as well as timer and counter references and current values and the call for of error data including the software version number. Monitoring functions have the structure $.....=<final character>. At a faulty input with an active echo a '?' will be reflected.

As final character only the signal projected in SIN/F002 is accepted. As default value <CR> is specified for the final character.

## Monitoring functions:

The basic setting (switch BAUD in N position) includes 300 baud, 8 data bits without parity, 1 stop bit and with echo. The baud rate may be modified by $B=xx in the monitor or over the function module SIN. All modifications are stored in the buffered RAM and stay memorized with the switch BAUD in 'P' position.

Programming of the baud rate:

$ B30<CR> = 300 Baud
$ B60<CR> = 600 Baud
$ B12<CR> = 1200 Baud
$ B24<CR> = 2400 Baud
$ B48<CR> = 4800 Baud
$ B96<CR> = 9600 Baud

In this case the interface has the functions listed below:

- call for time values (reference and current)
  $ST00,00=<CR> resp. $IT00,00<CR>
- setting of time values
  $ST00,00=abcEx, whereas a, b, c = 0...9 and x = 1...5
- call for counter values (reference and current)
  $SZ00,00=<CR> resp. $IZ00,00=<CR>
- setting of counter values
  $SZ00,00=abcde<CR>, whereas a, b, c, d, e = 0...9
- output of word variables
  $MW01,00=<CR> resp. $MA02,00=<CR>
- modification of word variables
  $MW01,00=+21300<CR>
  resp. $MA02,00=+1,234<CR>
- output of bit flags
  $M'01,00=<CR>
- modification of bit flags
  $M'01,00=1<CR>
  The global flags in the range M'00,00...M'63,15 are addressed only
- indication of the stand-still address in an error case by monitoring function ($F=<CR>)
- at three different test instants the error data are stored in the memory and can be called for by $F<CR>. The call may be continued until the indication 'no error data stored in the stack' ('Keine Fehlerdaten im Stack abgelegt') appears.

a. Check of the hardware after each power-up.
   Check of the ABB Procontic b bus
   Check of the bit processor
   Check of the CMOS-RAMs
   Check of the operating system (check sum)
b. Check of the program at transition from STOP to RUN.
   PTY monitoring of the user program reference signal errors in time values.
c. Check with running program
   (see also the table with the error indications)

- indication of the software version number ($V=<CR>)
- indication of the maximum cycle time ($ZY=<CR>). Here the max. cycle time is output in steps of 10 ms.
- as final character <CR> is accepted.

For further details about the monitoring functions see the software description 8.2.

## Table of the internal error indications

| error no. | meaning | display red LED | | address |
|---|---|---|---|---|
| | | M2 | M1 | |
| 1 | PROCONTIC bus | X | X | int. CPU |
| 2 | acceleration test | X | X | int. CPU |
| 3 | INTO error | X | X | int. CPU |
| 4 | control bus | X | X | int. CPU |
| 5 | PTY error | X | X | PC-ADD. |
| 6 | RAM error | X | X | int. CPU |
| 7 | EEPROM error | X | X | PC-ADD. |
| 8 | EPROM error | X | X | int. CPU |
| – | | | | |
| – | | | | |
| 29 | reference error counter | X | | |
| 30 | reference error timer | X | | |
| 31* | interface no. | X | | PC-ADD. |
| 32* | baud rate error | X | | PC-ADD. |
| 33* | operation mode error interface | X | | PC-ADD. |
| 34* | parity error, interface | X | | PC-ADD. |
| – | | | | |
| – | | | | |
| 38 | flag error | X | | |
| 39 | no or not sufficient PE or no IME after MA or ME | X | | |
| 40* | too many module calls | X | | PC-ADD. |
| 41* | BE forgotten | X | | |
| – | | | | |
| – | | | | |
| 50* | jump error | X | | PC-ADD. |
| 51* | special command error | X | | PC-ADD. |
| 52* | unknown command | X | | PC-ADD. |
| 53 | head module error | X | | PC-ADD. |
| 54 | time module too long | X | | |
| – | | | | |
| 80 | cycle error | X | | |

int. CPU = internal error, programm address shown is not related to the error.

PC-ADD. = (<indication> in decimal minus 32768):2

* error to be recognized at program execution

X LED is on

## Special features of the CPU

Jump commands and module calls;
For jump commands and module calls eff. from 07 ZE 86 the limitation of markers (SPM) and module definitions to always be in the upper 4k-block is neutralized.

**Caution:**
Jumps on addresses are still executed in jumps module 4K.

The conversation attributes from bit to word (b, c) may be combined with all bit variables, e.g. bA 17,00.

These attributes change the Boole accumulator, this means after that no further linkage is possible.

The division in 'word' modules and 'bit' modules is neutralized. All module numbers from 0 to 63 are tolerated for word and bit processing. The local flag ranges however exist only 16 and are derived 16 from the module no. So module no. 0 has the identical local flag range as module no. 16, 32 etc. All modules may be parametrized with a maximum of 16 word and 16 bit parameters.

The module call BS..,A.. always must be terminated with NOP0, even when no parameter list follows.

The modules ! BS..,A.. and = BS..,A.. are not supported, since with a single processor system background operation is not possible.

The modules BS..,F000 and BS..,P... are, when called, written into a list only (50 modules max.). After the program end the next following module in the list will be taken, also all associated ASCII characters and values put into an output buffer. This means that the values derive from the cycle at which end the module was effectively processed. The values are always output in 5 digits. The real output over the serial interface is now interrupt controlled, meaning that for each cycle a maximum of one text module is output.

The protocollers with BS..,F000 or BS..,P... can be called for with all numbers (0 to 62). The module bit B63 indicates that the stand-by pattern for the protocoller is full.

All 60 timers and 16 counters may be programmed. To not overload the reaction time of the processor only 46 timers for each program are allowed. If more timers are programmed there will be no error indication but the reaction time of the system will be extended.

The function $IT..,.. = D (continuous read of the actual value) is not possible in this case.

With counters and timers the status exchange between the internal timer and the PLC program is asynchronous, this means it is done always then when a timer or counter is run off and not at the end of the cycle (like 07 TZ 82 f. e.).

The module SIP (F001) is treated as a 'normal'function module, which means it may be called for conditioned or unconditioned.
It is within the cyclic program and not following ! PE as in the 07 WP 84. The module F060 (cycle monitoring) is not required for the data exchange with the SIP module. The function module SIP occupies a value of the past. The target variable will be cancelled after the reset. The further reaction of the module is identical with the one of the word processors 07 WP 84.

The module for the cycle monitoring F060 must be called for in program once only, to enable or disable the cycle monitoring . A continuous call is not necessary.

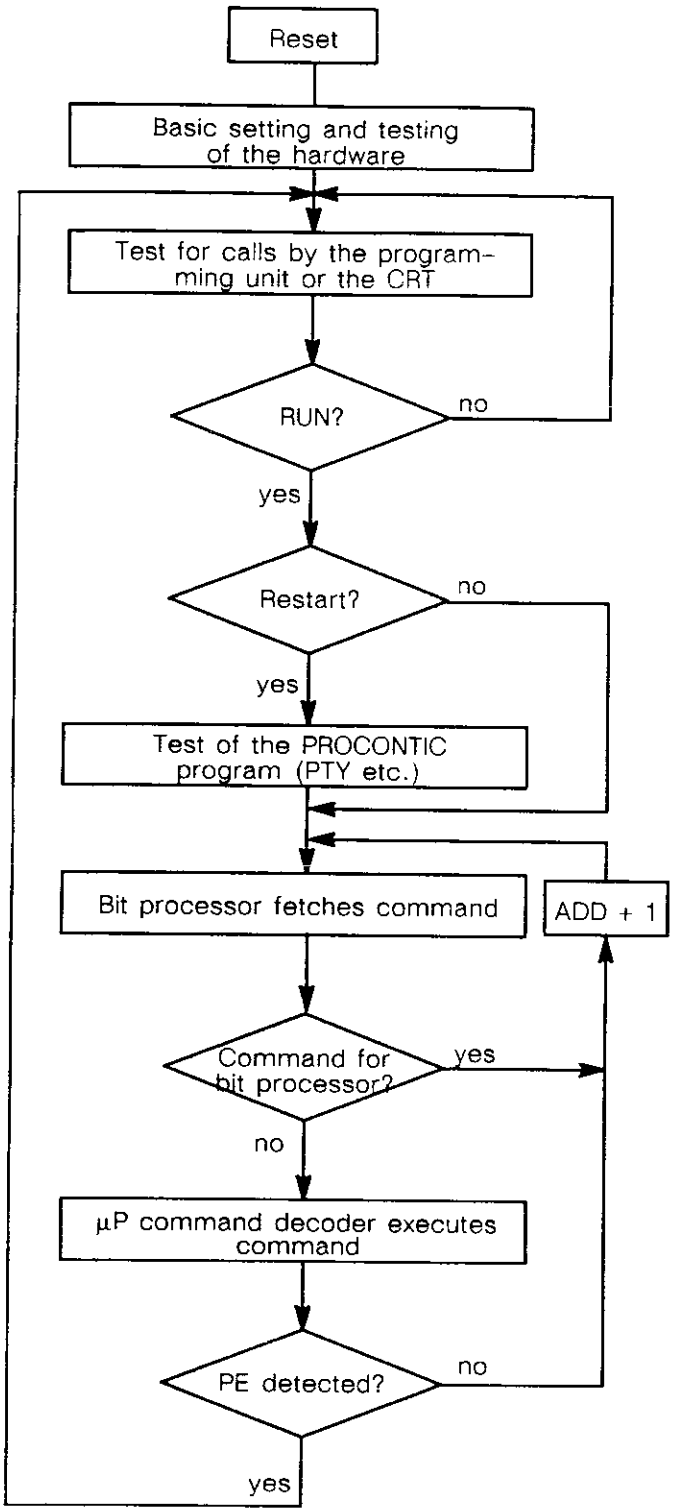
Since the normalizing of all variables is not done before the transition from STOP to RUN, for testing the variables of the last cycle processed are available even with the control not running.

## Module processing

These function modules are handled by the CPU:

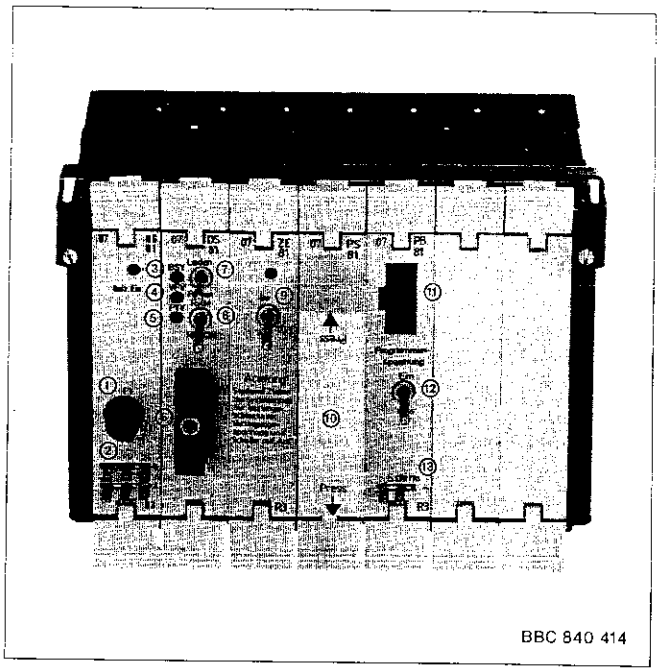
| | | |
|---|---|---|
| F000 | TEX | text module |
| F001 | SIP | serial input |
| F002 | SIN | interface initializing |
| F003 | EMAS | receiver module |
| F020 | IDS | indirect write |
| F021 | IDL | indirect read |
| F022 | BETR | absolute value generator |
| F023 | BEG | limiter |
| F024 | KPL | complementary generator (complement to 1) |
| F040 | PIR | PI regulator |
| F060 | ZYK | cycle monitoring |
| F127 | KOP | head module |

## Principle function management of 07 ZE 88



# 5 Commissioning and test module

## 5.1 Commissioning and test module 07 IE 82 R21

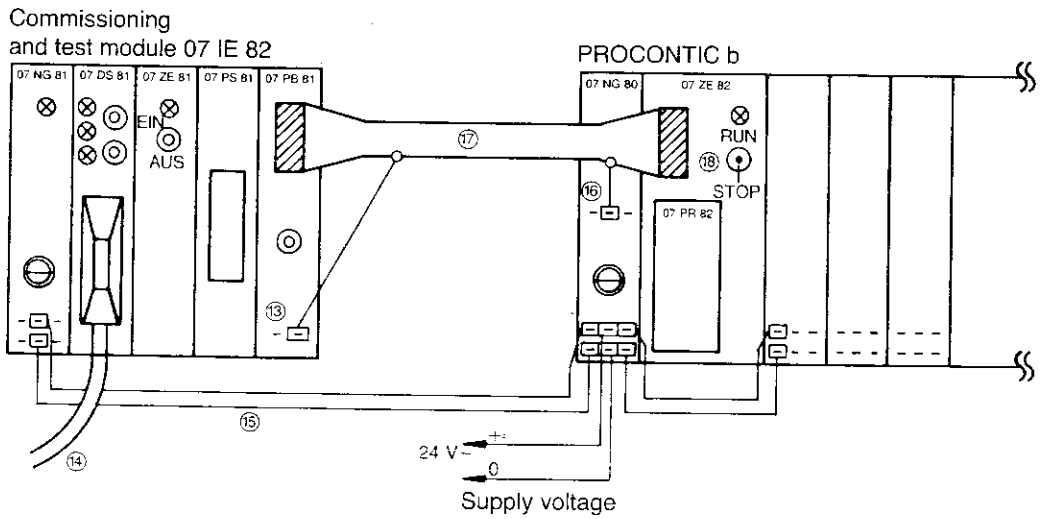



**Technical data:**

| | |
|---|---|
| Weight | 0.66 kg |
| Order number | not in extent of delivery |

**Appurtenances:**

| | |
|---|---|
| Order number for replacement battery | GJR5223500R1 |



The commissioning and test module 07 IE 82 R1 includes all functions which are not essential for the actual control operation of the PROCONTIC b system, but are needed during the commissioning phase and for testing and diagnostic purposes.

The module includes:

- Data interface with the PROCONTIC b programming modules
- A battery-buffered RAM memory (2 K words)
- Handling functions for RPROM programming and for reloading from RAM into RPROM or vice versa.

The commissioning and test unit is snapped onto the DIN rail adjacent to or below the PROCONTIC b and connected to the PROCONTIC b by means of the enclosed cable 07 SK 81 R1.

If the voltage of the lithium battery drops to below 2.9 V, the battery must be replaced (observe environmental protection regulations!).

1 Fuse for the power supply unit
2 Faston blade connectors for the commisioning unit power supply
3 BSY green LED: it indicates that the commisioning unit is performing a task, e.g. loading a RPROM, data exchange with the programming module (07 PT 40).
4 VFY red LED: The contents of RPROM- and RAM memory do not agree.
5 PTY red LED: there is a parity error in the selected memory
6 PT interface for connecting the PROCONTIC programming modules
7 Dual-position toggle switch.
Upward position: load RAM or EPROM
Downward position: memory comparison and check
8 Selector switch for RAM- or EPROM memories (states direction when loading).
9 On/off switch with green LED for operating the commissioning module. Connection and disconnection of the unit may only take place when the module is de-energized!
10 Buffer battery for RAM memory
11 Connector for connecting cable 07 SK 81 for the PROCONTIC b.
12 Switch for cutting out the RPROM programming voltage (protection against wrong programming).
13 2-pole Faston blade connector to be connected to the screen of the connecting cable 07 SK 81.
14 Connecting cable for the PROCONTIC programming modules
15 Connecting leads from the power supply unit of the PROCONTIC b to the power supply of the commissioning unit (this link must always be established first).
16 Screen of the connecting cable 07 SK 81 and connection of the zero volt potentials.
17 24-pole connecting cable 07 SK 81
18 Switch,
position STOP: Outputs and flags are normalized.
position RUN: Program implementation free

**Connection**

The commissioning module may be connected both when the program of the PROCONTIC b is running and when it is at a standstill.

a. Switch 9 ON/OFF: position "OFF".
b. Connect power supply 15 to Faston blade connector 2.
c. Connect screen 16 of the connecting cables 17 to Faston blade connector 13 of the commissioning unit and the PROCONTIC b
d. Connect connecting cable 07 SK 81 17 to connector 11 of the commissioning unit and the PROCONTIC b (observe coding lugs).
e. Switch 9 ON/OFF: position "ON", green LED is illuminated.
Important: bring switch 9 in "OFF" position prior to disconnection of the commissioning unit.

The PROCONTIC programming modules 07 PT 40 or 07 TD 12 can be linked to the commissioning unit at any time via jack 6.

**Generation or change of a program in the RAM of the commissioning unit or in the EPROM of the Procontic b**

a. Switch 18 RUN/STOP: position STOP
(PROCONTIC b interrupts the program processing if under way).
b. Switch 8 RAM/RPROM: position as desired (if necessary plug the desired EPROM into the socket of the PROCONTIC b while the feed voltage is off).
c. Connect feed voltage if not already done.
d. Preselect address by means of the programming module and enter the PROCONTIC words into the memory (green LED "BSY" will come on briefly). For all further functions of the programming module see description 07 PT 40.

Please note: address volume 2048 words,address 0 ... 2047. Fault if address number is exceeded. Wrong commands in the RPROM can be overwritten with full word (erased).

Testing of a program in a RAM or EPROM

a. Switch 18 RUN/STOP: position STOP
b. Switch 8 RAM/RPROM: position as desired
c. Connect feed voltage if not already done.
d. Momentary-contact switch 7 loading/testing: position "testing"
(LED "PTY" must remain dark).
e. Start PROCONTIC b (switch 18 in position "RUN").
f. Testing as per operating instruction of the respective programming module, e.g. 07 PT 40.
Status interrogation with and without address specification.
g. In case of a faulty program change program.

### Transfer of EPROM contents to RAM

a. Switch 8 RUN/STOP: position " STOP"
b. Insert EPROM into the socket on the PROCONTIC b while supply voltage is disconnected.
c. Reconnect supply voltage
d. Switch 8 RAM/EPROM: position "RAM".
e. Briefly operate momentary-contact switch 7 "loading". The green LED "BSY" is alight during the entire loading process.
f. Upon completion of the transfer (LED "BSY" has gone out) depress momentary-contact switch 7 "testing". An automatic test will take place:
In case of a correct transfer the LEDs "VFY" und "PTY" will remain dark.
Fault alarms:
LED "VFY" illuminated: RAM not loaded.
LED "PTY" illuminated: parity error.

### Transfer contents into an EPROM

a. Switch 18 RUN/STOP: position "STOP".
b. Switch 8 RAM/EPROM: position "EPROM".
If necessary insert erased EPROM into the socket of the PROCONTIC b while the supply voltage is off).
c. Connect supply voltage if not already done.
d. Turn on switch 12 "programming voltage" and briefly operate momentary-contact switch 7 "loading". The green LED "BSY" is illuminated during the entire loading process.
Fault alarms:
LED "VFY" illuminated:
Programming voltage had not been switched on. Another PROCONTIC program had already been written into the EPROM.
LED "PTY" illuminated:
The programming is immediately interrupted if any one of these errors occurs.
It is not possible to exceed the EPROM contents with the RAM (overwriting, e.g. with a full word, by means of the programming module is only possible directly in the EPROM.

### Adding of program sections to the EPROM

a. Transfer EPROM contents to RAM.
b. Overwrite program end command: (MOFF and/or !PE) in RAM and EPROM directly with full word.
c. Add new program starting with the end address in the RAM and debug.
d. Transfer RAM contents to EPROM. Only the altered words will be written (shortened loading process). The words where RAM and EPROM contents agree, are skipped (EPROM must include blank words at the added addresses).

### Duplication of EPROM's

a. Transfer EPROM contents to RAM.
b. Insert new EPROM into the socket on the PROCONTIC b while supply voltage is off.
c. Reconnect supply voltage.
d. Transfer RAM contents to RPROM.

### Comparison of EPROM contents

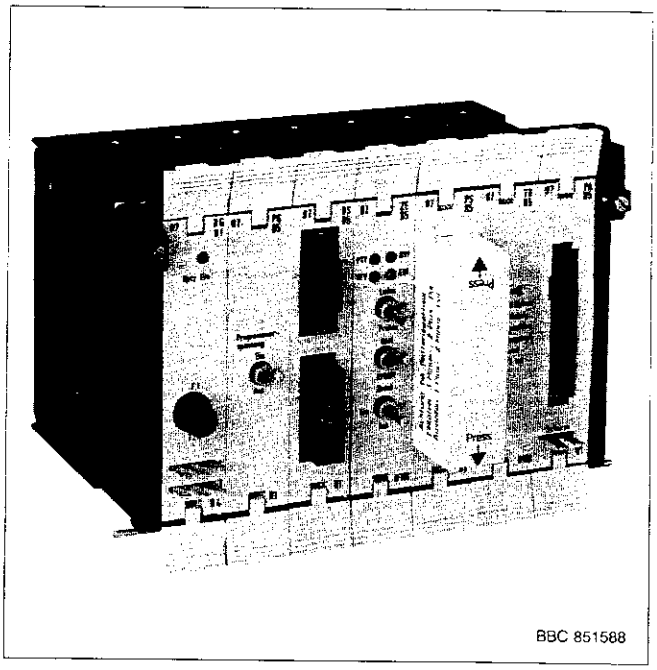
a. Transfer EPROM contents to RAM.
b. Insert new EPROM into the socket on the PROCONTIC b while the supply voltage is off.
c. Reconnect supply voltage
d. Depress momentary-contact switch 7 "testing" for at least 2 s. The memory contents are identical, if neither the LED "VFY" nor the LED "PTY" comes on.

### Checking of an EPROM for parity errors

a. Switch 18 RUN/STOP: position "STOP".
b. Switch 8 RAM/EPROM: position "EPROM".
c. Connect supply voltage if not already done.
d. Depress momentary-contact switch 7 "testing" for at least 2 s.
The LED "PTY" must remain dark.

**Note:**
Parity errors or unequality between EPROM and RAM can also be detected by a search run with the programming module 07 PT 40.
a. Transfer EPROM contents to RAM4
b. Depress key "read" on programming module without entering an address.
07 PT 40 stops at the first address where an error (PTY or VFY) is identified
c. Eliminate first error, repeat procedure.

## 5.2 Commissioning and test module 07 IE 84 R202




**Technical data:**

| | |
|---|---|
| Central units suitable for connection | 07 ZE 80 – 1K<br>07 ZE 82 – 2K<br>07 ZE 84 – 8K |
| Transfer to EPROMs | 07 PR 82<br>07 PR 84 |
| Power supply | 24 V d.c. |
| Allowed potential difference | +/– 30 % |
| Interface 1 | PROCONTIC standard interface for programming and test modules |
| Interface 2 | Serial interface V24 RS 423 for programming and test modules |
| Power consumption | 500 mA |
| Weight | 1.2 kg |
| Order number | GJR5219100R202 |

**Appurtenances:**

| | |
|---|---|
| Mounting bracket 07 MW 80 | GJR1948116R1 |
| System cable 07 SK 85 | GJR5219900R1 |

### Operating elements

Four switches (S1 ... S4) are fitted as operating elements. Switch S2 is a selector switch for selecting the data memory (RAM-EPROM). For data transfers (e.g. with programming modules or for "loading") it always indicates the target address.
Switch S1 is a changeover momentary-contact switch with an intermediate position. In the "loading" position the contents of the non-selected memory (switch S2) is transferred to the selected memory.

For a transfer to the EPROM the programming voltage (switch S4 to "ON") must first be connected. Here the data to be transferred are checked for parity. When the contents of the EPROM is transferred to the RAM no parity check is performed.

In the "testing" position the contents of the two memories (RAM and EPROM) are compared with each other. In case of unequality the LED "VFY" will come on. Furthermore the contents of the selected memory (switch S2) is checked for parity.

The functions "testing" and "loading" will be performed only if the switch S3 is set to "ON", a central unit has been connected and is at "Stop".

Switch S3 is a changeover switch with intermediate position stating the operating mode of the commissioning unit. In the "OFF" position all interfaces (with the PROCONTIC and the programming modules) are inoperative.
In position "ON" the commisioning unit is ready to operate (LED "ON" illuminated) and all interfaces are operated by the central control unit.
The switch position BREAK is without function.

**Display elements**

To indicate the various operating conditions a total of 5 light-emitting diodes has been fitted.

| | |
|---|---|
| "NETZ EIN" (POWER ON) | a green LED on the power supply unit indicates whether the internal system voltage (5 V) is available. |
| "EIN" (ON) | yellow LED, indicates the operating condition of the commissioning unit. |
| "BSY" | green LED, indicates that the commissioning unit is busy with processing a job. |
| "PTY" | red LED, there is a parity error in the selected memory. |
| "VFY" | red LED, is illuminated if the contents of RAM and EPROM do not agree. (Operating mode "testing") |

**Connection elements**

Programming module terminal (PT):

Connection of the programming modules 07 PT 40 R1311, 07 PT 42 R403, 07 TD 12, PDAG.
Not all functions can be fully used via this interface, e.g. address range 4K max.

Programming modules terminal (V24):

Connection of the programming modules 07 TD 12 R301, 07 PC 30, 07 PC 31, PDAG. All function are accessable via this serial interface.
The description how to connect a programming unit see volume 8.1 planning, chapter 6.6.

If the system cables 07 SK 81 and/or 85 are connected to a running PROCONTIC the following rule must be observed at all events:

- the commissioning and test unit is already connected to the same supply voltage
- the commissioning and test unit is inoperativ
  The switch S3 on the module 07 ZE 85 is set to "Aus" (off).
- vor plugging in the system cable, the two screen leads are connected to the "0 V"
- The programming and test unit is connected to the plug-contact, which protective earth is connected to the central earth point of the PROCONTIC b.
- first plug in the connecting cable in the connector of the commissioning and test unit

**Function description**

The commissioning and test unit 07 IE 84 is capable of operating all central control units of the PROCONTIC b system (07 ZE 80 R1; 07 ZE 82 R1; 07 ZE 82 R3; 07 ZE 84). Operation is basically the same for all central units.

Functions which can be addressed via the programming module interface (PT):

- Read and write (address range 4K max.) in the RAM while the control system is at a standstill
- Read and write in the EPROM while the control system is at a standstill (07 ZE 80 - 1K, 07 ZE 82 – 2K, 07 ZE 84 – 4K)
- Read in RAM and EPROM with running control system until "PE" *
- Transfer of the EPROM into the RAM
- Transfer of the RAM contents into the EPROM
- "Testing": comparison of the RAM contents with the EPROM contents

* in the case of the 07 ZE 84 the complete data memory (RAM, EPROM) is read.

**Functions which can be addressed additionally via the programming module interface (V24) in conjunction with the programming modules 07 TD 12 R301 and/or 07 PC 30 R101.**

- Read and write (addressable range 8K max.) in the RAM and/or EPROM while the control system is at a standstill (ZE80 – 1k, ZE82 – 2k, ZE84 – 8K).

- **Status reading (TEST).**

  All status values whose addresses are within a 1k block (addr. 0 to addr. 1023, addr.1024 to addr. 2047, etc.) are read in the course of one cycle (only in conjunction with the 07 ZE 84), i.e. all status values are from one cycle.

- **Fault diagnosis run (F):**

  If the function fault diagnosis run (in SPS mode) is called a parity check in the selected memory (switch S2) is performed first, and the first address with a parity error is displayed. If there is no parity error, then a normalization run is simulated. In the course of this the module management system is checked, and in case of a fault "faulty address access" is reported. Thereafter it will be checked whether there is a !PE in the program. The check is only made in combination with the ZE 84 module.

The following functions can be entered in "TEST mode" with the programming module

- **Abort (A):**

  Processing by the control system is stopped at once, all outputs and flags are normalized. A further start-up of the control system is only possible via the command "start" or by operating the RUN-STOP switch.

- **Start (S):**

  Start of processing with normalization

- **Stop (H):**

  Processing by the control system is stopped at address 0, without normalization of outputs and flags. Continuation of the control system is possible with the command "continue" (without normalization) or by operating the RUN-STOP switch on the central unit (with normalization).

- **Continue (F):**

  Restart of proccessing without normalization after a "stop" command.

- **Operating mode (B):**

There are 3 operating modes:

| | |
|---|---|
| – single word | cycle monotoring has to be |
| – single cycle | switch off on the 07 TZ 82 or |
| – normal operation | 07 WP 84. |

* In the operating mode single step (SE) the control system stops at address 0. With every "inching" exactly 1 PROCONTIC word (1 address in the program memory) is processed.

* In the operating mode single cycle (ZE) exactly one cycle is processed, starting with address 0, with every inching. If a stop point is set one cycle is processed, starting with the stop point address.

* In normal operation the program is processed cyclically if no further stop point is set.

- **Stop point (H):**

  With the function "set stop point" a stop point may be transmitted to the control system. If the control system is running it will come to an immediate halt at this stop point.
  If the control system is at a standstill (switch in position STOP) this stop point is filed in the memory and during the next cycle (switch in position RUN) the stop point will be activated, i.e. the control system will stop at this point.

- **Inching (T):**

  If a stop point has been set the control system will come to a halt at this point.
  If "inching" is effectet in the single step operating mode the control system will process the next address.

  In the single cycle operating mode the inching function will cause another cycle to be processed (from address 0 to address 0). If no stop point has been set and neither single step nor single cycle habe been selected a fault alarm will be issued.

- **Status (Z):**

  Via the "status" command a list of variables can be entered into the programming module. It is transmitted to the control system with "U". Thereafter the status of the variables is read at address 0 and transmitted to the programming module.
  A list may contain a maximum of 32 variables.
  The status values are from different cycles.

- **Simulation (V):**

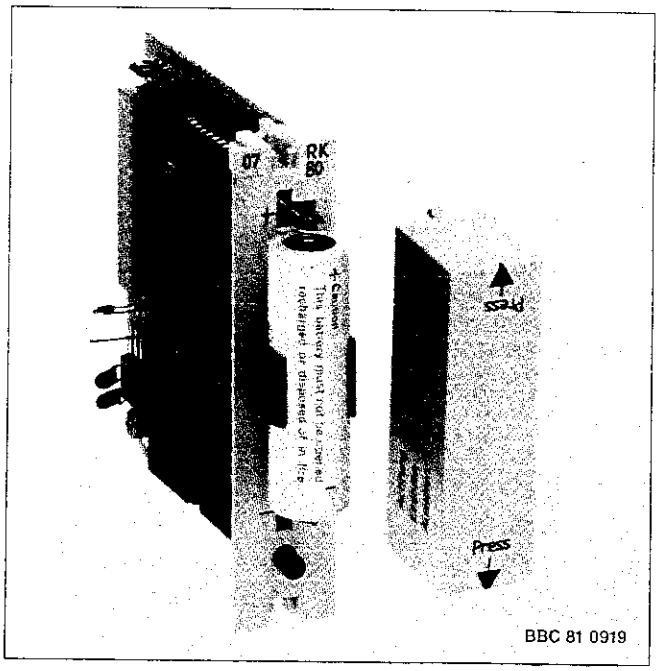
  With this command up to 32 bit variables, except input variables, can be simulated with the programming module. After the variables and the status to be simulated have been entered the data are transmitted to the control system with "U". Takeover of the simulated values takes place at program memory address 0. The simulated status values are retained until new status values are assigned by the program.

  The functions "status", "simulation" can be used in conjunction with the operating modes single word, single cycle and stop point.

- **Resetting of the commissioning unit (R):**

  This commmand is equivalent to a switch-off of the commissioning unit. (switch S3 OFF).
  This means that the interface 07 IE 84- 07 ZE is made inoperative and that all stop points are erased.
  If the control system was running in RAM when the command arrived an automatic switchover to EPROM and a normalization will take place.

## 6.1 Battery-backed register module 07 RK 80 R4




**Technical data:**

| | |
|---|---|
| Number of registers | 8 × 16 |
| Output memory | 64 |
| Battery-backing | adjustable |
| Power consumption | 12 mA |
| Weight | 0.115 kg |
| Dimension | 1 division |
| Order number | GJR5214400R4 |

**Appurtenances:**

| | |
|---|---|
| Replacement battery | GJR5223500R1 |

The register module 07 RK 80 includes 8 battery-backed register cascades with 16 register steps each.

They are addressed as follows by the operand, the module and the channel address:
Programming language as per DIN 19239

```
S 00,00 ... S 00,15
    .           .
    .           .
S 07,00 ... S 07,15
```

In addition the module is fitted with 64 battery-backed flag memories (retentive memories) which are addressed as:

```
A 08,08 ... A 08,15
    .           .
    .           .
A 15,08 ... A 15,15
```

In systems consisting of two or more subracks these 64 A flag memories are put as A output channels on the correspondingly coded busline of the subrack. For this purpose the jumper 1002 on the BUS driver 07 BT 82 must have been soldered in place.

The memory has two different operating modes which can be selected by means of a contact pin.

With the contact pin removed the memory contents is preserved both when the central control unit is switched off and when the feed voltage fails. The retentive A memories used as output will then have to be normalized by means of the software if required.

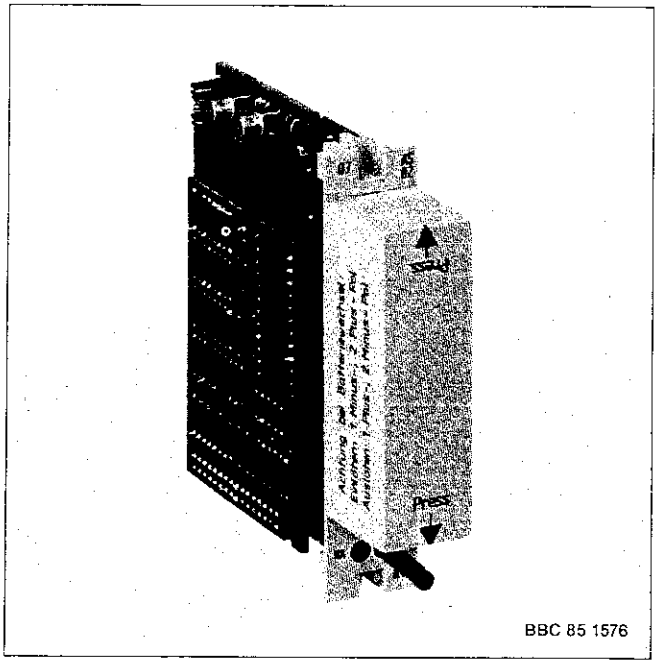
If the contact pin is inserted the memory is normalized when the supply voltage is applied and/or when the program is started.

In normalized condition the first register step of the 8 register cascades (S 00,00 ... S 07,00) has the status "1" and all retentive memories have the status "0".

The register module can only be operated in the system slot "00" of the basic subracks 07 ET 82 or 07 ET 83.

If the voltage of the lithium battery drops to below 2.9 V, the battery must be replaced (observe environment protection regulations!).

## 6.2 Main memory 07 AS 82 R1




**Technical data:**

| | |
|---|---|
| Locale flags (M) | 2 K (128 × 16) |
| Global flags (M') | 1 K ( 64 × 16) |
| Locale step cascades (S) | 2 K (128 × 16) |
| Global step cascades (S') | 1 K ( 64 × 16) |
| Output memory | 1 K ( 64 × 16) |
| Battery-backing | adjustable |
| Power consumption | 500 mA |
| Dimension | 1 division |
| Order number | GJR5218300R1 |

**Appurtenances:**

| | |
|---|---|
| Replacement battery | GJR5223500R1 |

The battery-backed main memory 07 AS 82 includes 192 step cascades with 16 steps each, 3 K bit retentive memory and 1 K bit output memory.

The main memory must be plugged into a system slot. The most suitable slot is directly adjacent to the central unit.

For operating the 07 AS 82 the power supply unit 07 NG 82 must be used.

The main memory can be used both with the 07 ZE 84 and with the 07 ZE 82R 3.

With the 07 ZE 82 module no bit modules (00...15) can be used. However, the extended main memory (which can be battery-backed) with the following operands is available:

```
A 00,00 ... A 15,15
M 00,00 ... M 07,15      (16 ×)
M'00,00 ... M'63,15
S 00,00 ... S 07,15      (16 ×)
S'00,00 ... S'63,15
```

The flags (M') and step cascades (S') can be addressed in the area 00,00 ... 07,15 also with M and/or S. They will then occupy single words (16 bits) only.

If the 07 AS 82 module is operated in conjunction with the modules 07 ZE 82, 07 BT 82, 07 ZB 82 the instructions below must be followed:

on the 07 ZE 82 jumper 1001 must be removed
on the 07 BT 82 jumper 1002 must be removed
on the 07 ZB 82 jumper 5001 must be removed

Before the 07 AS 82 module is inserted into the PROCONTIC system the positive pole of the lithium battery shall be affixed by soldering.

### Operating modes

The main memory has 3 different operating modes which can be selected by means of a contact pin.

a) Contact pin inserted in socket "NA".
When the system is energized and/or the program is started only the output memories are normalized. The memory contents of the flags and step cascades is retained.

b) Contact pin inserted in socket "N".
all memories (A, M, M', S and S') are normalized.

c) The contact pin is inserted in the socket without identification letter. The memory contents of the flags, the step cascades and the outputs is preserved when the central control unit is switched off and/or the power supply fails.

### Global and local operands

The 07 AS 82 makes a distinction between global and local operands.
Global operands are unequivocally determined by group no. and channel no.
They may be used both in the main program and in modules.

### Global operands

a) Global functions without memory image on the 07 AS 82.

| | |
|---|---|
| Inputs | E 00,00 ... E 63,15 |
| Times | T 00,00 ... T 03,15 |
| Counters | Z 00,00 ... Z 00,15 |

b. Global functions with memory image on the 07 AS 82.

| | |
|---|---|
| Outputs | A 00,00 ... A 63,15 |

### Global Flags

The 07 AS 82 module contains 1K bit global flags.
The global flags are addressed by the operand M', the group no. and the channel no. as follows:

```
M'00,00 ... M'00,15
    .           .
    .           .
M'63,00 ... M'63,15
```

### Global step cascades

The 07 AS 82 includes 64 global step cascades of 16 steps each.
The global step cascades are addressed by the operand S', the group no. and the channel no. as follows:

```
S'00,00 ... S'00,15
    .           .
    .           .
S'63,00 ... S'63,15
```

Global step cascades can be used both in the main program and in the program modules.

c. Local operands always have a memory image.

Local flags and step cscades can only be used in modules since for an unequivocal determination of the storage cell the module no., too, is needed apart from the group no. and the channel no.; i.e. if e.g. the flag M 02,01 occurs in a module and if this module is called once by module no. (12) and once by module no. (10) two different storage cells are addressed.

### Local flags

Local flags are addressed by the operand M, the group no. and the channel no. as follows:

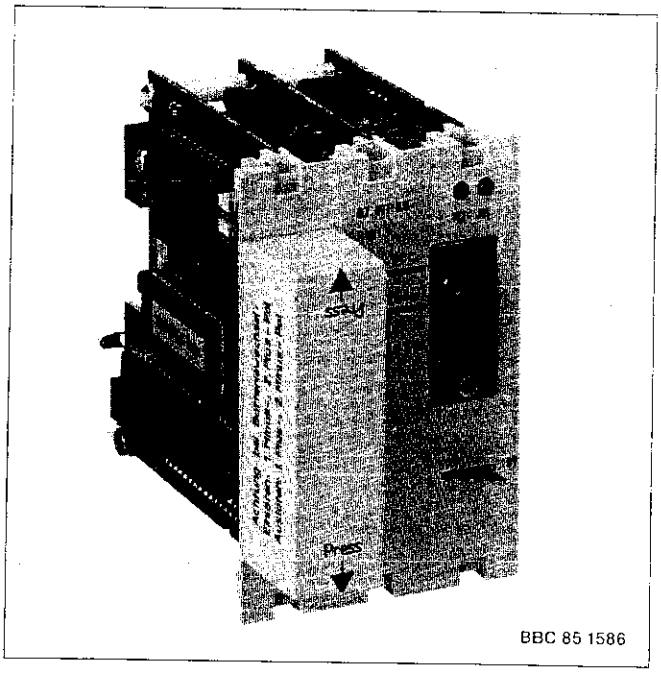
```
M 00,00 ... M 00,15
    .           .
    .           .
M 07,00 ... M 07,15
```

### Local step cascades

Local step cascades are addressed by the operand S, the group no. and the channel no. as follows:

```
S 00,00 ... S 00,15
    .           .
    .           .
S 00,15 ... S 07,15
```

## 7.1 Word processor 07 WP 84 R202/R 302




**Technical data:**

| | |
|---|---|
| power supply external by front plugs | – |
| power consumption external w/o load | – |
| power consumption from the internal filtered 24V | – |
| power consumption from the internal PROCONTIC b logic voltage $U_{10}$ | 400 mA |
| Ambient conditions: | |
| operating temperature | 0...+55°C |
| storage temperature | −25...+75°C |
| moisture class | F |
| Processing of words | arithmetic, compare operations, analog values, direct word processing |
| Processing of modules | BS resp. BA>15, time controlled, background- and function modules |
| Processing of attributes | a,c,w,b and d |
| Serial interface RS 423 | |
| Interface connector | Cannon D 9-pole |
| Serial transmission protocol | 7/8 bits, even parity selectable, 1 or 2 stop bits |
| Baud rates serial interface | 300, 600, 1200, 2400, 4800, 9600 |
| Serial output of text | random |
| Serial output of values | each bit and word variable, but not in combination with the attributes a and w |
| Dimensions | 3 divisions |
| Weight | 0.27kg |
| Order number | GJR5230300R302 |

**Appurtenances:**

| | |
|---|---|
| cable to the programming unit 07 SK 87 R2 | GJR5230800R2 |
| spare battery 07 LB 20 | GJR5223500R1 |

The word processor 07 WP 84 is a microprocessor controlled multifunctional device.

It has these features:

- word processing (arithmetic, compare operations, analog values)
- module processing. The 07 WP 84 may process the modules time cyclical, in the background as well as user and function modules
- attributes
- a serial RS 424 interface is capable of transferring texts and data
- the operational status of the unit is indicated by LEDs

**Planning directions:**

- the unit may be used in either slot of the basic rack (rack with CPU)
- the 07 WP 84 can be used in metal racks only
- before installing the 07 WP 84 into the PROCONTIC b the plus-pole of the lithium battery must be soldered on
- battery check: with a load of 3,9 kOhm over 5 s the voltage must not decrease below 2,9 V
- the sticker shipped with the unit must be fixed to the marked spot on the front panel
- 2 steel pins are shipped with the unit to be used as connectors for the ejectors
- the 0 V terminal must be connected with the OV of the PROCONTIC power supply
- to operate the 07 WP 84 the power supply 07 NG 82 must be used (see "power consumption of the PROCONTIC b modules")
- the 07 WP 84 can be used in conjunction with the 07 ZE 84 CPU only

**Normalizing**

The unit is normalized resp. initialized at each start of a cycle, like f.i. at power-up.

When normalizing, i.e. after power-up resp. start of the controlby the RUN-STOP switch, the whole program is checked for even parity. In an error case the message "parity error" is sent over the interface, the red LED M2 flashes with 0,5 Hz and the control does not start.

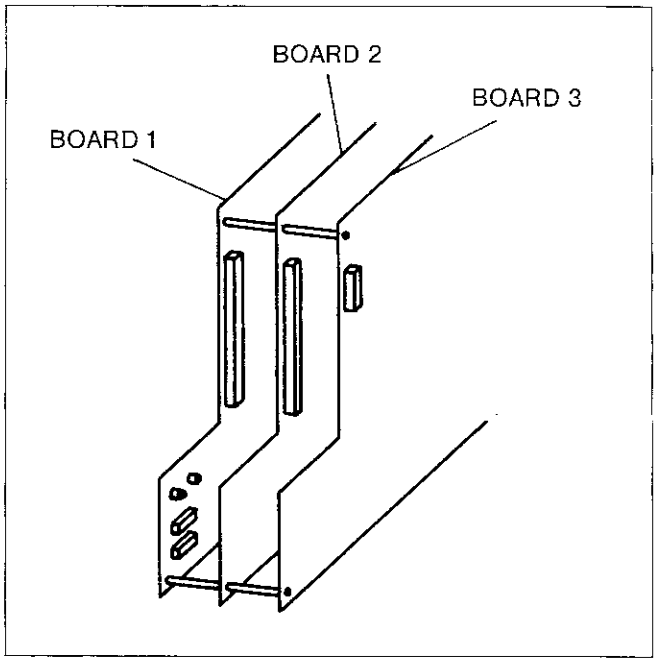
Also the control will not start in case while normalizing the access of the word processor to the bus is disturbed. "Parity error" is sent over the serial interface and the red LED M2 is on continuously.

When normalizing the program is investigated for a "program end" (! PE). The main program always must be terminated by a !PE. If indirect constants, modules or jumps are used in the program, a double PE must be applied before the jump or module distributor. This double PE is added by the programming units automatically. In an error case the message "PE-error" is sent over the interface, the red LED M2 flashes with 2 Hz and the control does not start.

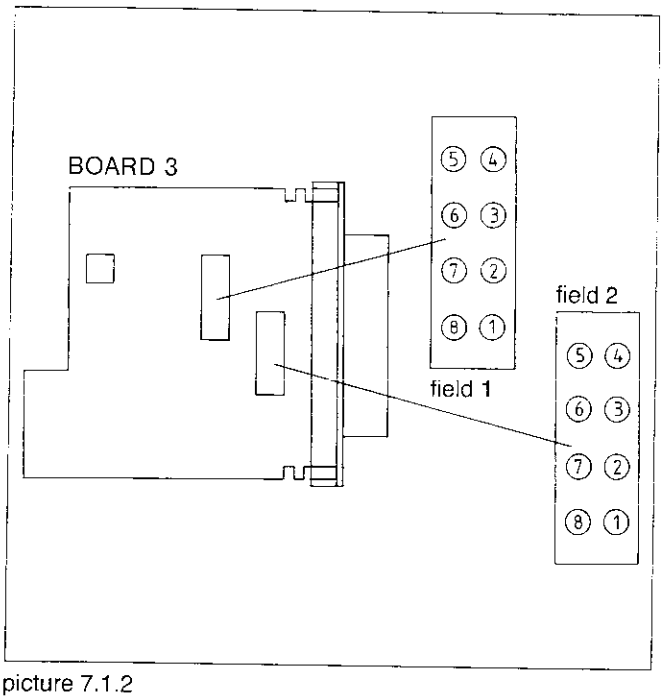
For the background modules a total of 1K words are available. THe time controlled modules are also stored in this range. When normalizing this limit is supervised. In an error case the message "error:sum of the BS modules type A exceeded", the red LED M2 is on continuously and the control does not start.

The frame of the head module is checked when normalizing. In an error case the message "error: head module! BA00,F127" is sent over the interface, the red LED M2 is on continuously and the control does not start.

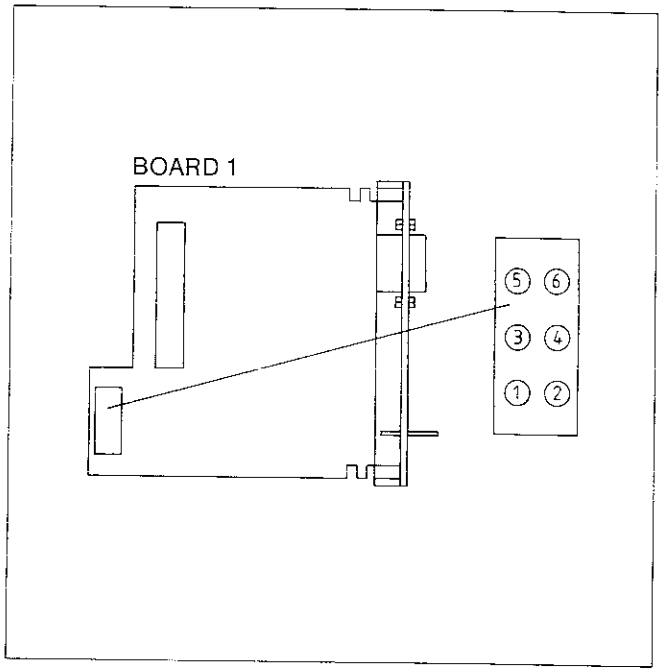
At normalization it is also checked for the maximum scanning time to be exceeded. In an error case the message "error: scanning time in the head module exceeded (max. 0,655 E3)", the red LED M2 is on continuously and the control does not start.




picture 7.1.1




picture 7.1.2




picture 7.1.3

The jumpers on board 3 (table 7.1.1) are factory installed and shall not be altered

| rubric | jumper | |
|---|---|---|
| 07 WP 84 | field 1 | field 2 |
| | 8 7 6 5<br>1 2 3 4 | 8 7 6 5<br>1 2 3 4 |
| R102 | * * * *<br>* * * * | * * * *<br>* * * * |
| R202 and R302 | * * * *<br>* * * * | * * * *<br>* * * * |

table 7.1.1

There are no jumpers on board 2.

The normalization process for the timer unit 07 TZ 82 and the word processor 07 WP 84 depends on the individual version of the units used. The jumpers must be installed according to table 7.1.2.

| rubric | | jumper | |
|---|---|---|---|
| 07 WP 84 | 07 TZ 82 | 07 WP 84 | 07 TZ 82 |
| | | 6 4 2<br>5 3 1 | 6 4 2<br>5 3 1 |
| R101 | R101 | * * *<br>* * * | * * *<br>* * * |
| R101 | R201 | * * *<br>* * * | * * *<br>* * * |
| R202 and R302 | R101 | * * *<br>* * * | * * *<br>* * * |
| R202 and R302 | R201 | * * *<br>* * * | * * *<br>* * * |

table 7.1.2

Buffering:

- 3/4 plugged word marker (MW, MA) buffered
- 3/4 removed word marker (MW, MA) not buffered
- AW/AA will generally be normalized

When the digital timer 07 TZ 82 or the word processor 07 WP 84 are used as stand-alone devices, no jumpers must be installed.

### Monitoring

The total cycle time of a time controlled module set, which is checked within the running cycle, may be as high as 10ms. In an error case this message is sent over the interface: "Error: PROCONTIC cycle exceeded 250ms". The red LED M2 is on continuously, the control is stopped and the outputs are set to zero.

With the function module F060 ZYK the cycle time can be controlled. The cycle time is with 250 ms fixed. If the time is exceeded in the running cycle, the following message is sent over the interface: "Error: PROCONTIC cycle longer as 250 ms". The red LED M2 is on contiouosly, the control is stopped and all outputs are set to zero.

The interface module F002 SIN may be called for by BA16...BA63 only. If called for by BS or a time controlled module, an error message will appear. Also these parameters are supervised: The interface ID must be 1. The selection of the baud rate to be 300, 600, 1200, 2400, 4800 or 9600 is checked. The combination 9 data bits + 2 stop bits is not possible. In an error case this message is sent over the interface: "Error: interface faulty initialized (F002)". The red LED M2 is on continuously, the control maintains the run status.

### Mechanical and electrical specifications of the interface

plug: 9-pole D-plug (included as kit)

configuration:

| | |
|---|---|
| PIN 1 | shield |
| PIN 2 | TXD (transmit data) |
| PIN 3 | RXD (receive data) |
| PIN 7 | OV (common) |

**Caution:**
All other terminals must not be used.

Electrical specifications acc. to RS 423 (+5V/-5V) selectable by SIN (F002).

### Standard selection:

Transmit: 7bits data with even parity bit*)
fully duplex,
1 stop bit

Receive: 7bits data plus parity bit*) (parity bit is not checked for)*)
fully duplex,
1 stop bit

*) valid for the word processor 07 WP 84 R 202 only. The word processor 07 WP 84 R 302 does transmit and receive without parity bit.

### The word processor 07 WP 84 for protocol and text duties

### Functions of the interface program

- protocol functions
  Texts and values may be issued by the protocol modules over the interface. The interrogations for the protocol modules included in the user program are done by the control. All ASCII characters may be used.This makes the use of printers,cassette recorders or CRT's possible.

- SIP-Module
  This module makes the input of word variables possible.

- EMAS-Module (07 WP 84 R302)
  This module makes the receipt of ASCII characters possible.

- Monitor
  The monitor function allows the in-and output of word variables (EW, EA, MW, MA, AW and AA in case of the 07 WP 84 R302 also the global bit flag M'), the selection of the baud rate and the call for the max. cycle time (with function module F060 ZYK only)

### The Monitor

The monitor is called for by the input $. The complete input of a command in the word processor 07 WP 84 R202 is terminated by return (ODH). For the 07WP 84 R302 version the termination character must be specified in the F002 SIN. As a standard return(ODH) may be used. Each character input (including the termination character) is echoed by the word processor 07 WP 84,unless the echo is disabled by the function module F002 SIN.
A faulty input is acknowledged by the word processor 07 WP 84 R302 with ?,CR and LF.After a faulty input (f.i.misspelled) happened, the input must be interrupted by a non-valid character. There is no rubout function included.

Processing of the monitor command is done on the level of the background modules.In case there are several background modules in the waiting line of the word processor, the monitor command is executed in between two modules.

### In-and output of word variables

The global bit flag M' and the analog word variables EW, EA, MW, AW and AA may be interrogated by the monitor.

Display of a flag:
input: $MW01,00=<CR> output:-23456
input: $MA00,00=<CR> output:+1,010

Modification of a flag:
input: $MW01,00=−26543<CR>
input: $MA00,00=+2,123<CR>
input: $M'00,00=1<CR>

### Reaction on faulty inputs

Characters are checked for:

1. $
2. E,M or A
3. W or A
4. number 0...9 (ASCII 30...39)
5. number 0...9 (ASCII 30...39)
6. ,(comma,decimal point)
7. number 0...9 (ASCII 30...39)
8. number 0...9 (ASCII 30...39)
9. = (assignment)
10. blank or return(read variables)
    + or – (write variables)
11. number 0...9 (ASCII 30...39)
12. number 0...9 (ASCII 30...39)
    in case of analog variables, (comma)
13. number 0...9 (ASCII 30...39)
14. number 0...9 (ASCII 30...39)
15. number 0...9 (ASCII 30...39)
16. return

### Interrogation of the maximum cycle time

The word processor 07 WP 84 from R202 on registers the running time of each PROCONTIC b cycle. The maximum cycle time is stored. The user may interrogate the maximum cycle time passed from starting the control to the moment of interrogation. The time is shown with a tolerance of 10 ms. The cycle time can be interrogated by using the function module F060 ZYK only. The interrogation is done over the serial interface by this command:

input: $ZY=<CR>  output: 020ms<CR><LF>

### Interface Protocol

Software handshake with XON/XOFF is provided in this manner:

– After receipt of a command XOFF is transmitted;

– After execution of the command XON is transmitted;

– After receiving a XOFF from the opposite station; the word processor can still store the character in the text buffer, but the content of the text buffer will not be transmitted to the opposite station.

**Caution:**
If the opposite station does not send XON on time, the text buffer may overflow; do secure by program (module bit B16)!

### Selection of the Baud Rate

The interface of the word processor 07 WP 84 is in standard mode with 300 baud after power-up resp. as long as the selection was not altered.

**Caution:**
To enable the programming unit for exchanging data with the word processor 07 WP 84 the baud rates of both units must match. So at first commissioning in the head ($HEAD) of the programming unit the baud rate must be set to 300 baud. In the TTY mode when questioning for half-duplex (Y/N) the N must be entered.

Input:

B**** <CR>

with **** = 300 (Baud)
600 (Baud)
1200 (Baud)
2400 (Baud)
4800 (Baud)
9600 (Baud)

The change of the baud rate is done immediately after entering. There is no acknowledgement. If the input is faulty there is no change but the output of "?". The baud rate entered is stored in a buffered RAM until it is changed again. The interface is interrupt controlled.

**Error List**

| error | red LED M2 | error message over RS 423 serial interface | reaction |
|---|---|---|---|
| **during normalization** | | | |
| parity | flashes with 0,5 Hz | parity error | PROCONTIC b will not go in RUN |
| data exchange with bus interrupted | ON continuously | BUS error | PROCONTIC b will not go in RUN |
| no or not sufficient !PE available in the program | flashes with 2 Hz | PE-error | PROCONTIC b will not go in RUN |
| exceeding BS calls type A | ON continuously | error: sum of the BS modules type A exceeded | PROCONTIC b will not go in RUN |
| format of head module faulty | ON continuously | error: head module !BA00,F127 | PROCONTIC b will not go in RUN |
| scanning time exceeded | ON continuously | error: scanning time in head module exceeded in (0.655E3 max) | PROCONTIC b will not go RUN |
| **during program processing** | | | |
| cycle time exceeded | ON continuously | error: PROCONTIC cycle exceeded 250 ms | PROCONTIC b goes in STOP |
| cycle time of a time-controlled module exceeded | ON continuously | error: cycle time of a time-controlled module exceeded 10ms | PROCONTIC b goes in STOP |
| interface initialization faulty | ON continuously | error: interface initialization faulty | PROCONTIC b stays in RUN |

Valid word commands to be executed by the word processor 07 WP 84 from R202 on:

operators

| | |
|---|---|
| ! | if |
| & | and |
| / | or |
| + | plus |
| – | minus |
| * | times |
| : | divided |

} arithmetic

| | |
|---|---|
| < | lower |
| <= | lower or equal |
| > | higher |
| >= | higher or equal |
| = | equal |
| >< | unequal |
| #" | text constant |

} compares

negations

| | |
|---|---|
| N | binary negation, causes 1 compliment in word processing |
| – | arithmetic negation |

operands

| | |
|---|---|
| EW | input word |
| EA | input analog |
| AW | output word |
| AA | output analog |
| RW | formal parameter word |
| RA | formal parameter analog |
| MW | marker word |
| MA | marker analog |
| KW | indirect constant word |
| KA | indirect constant analog |
| #W | direct constant word |

attributes

a
b
c
w

} attributes (format converters)

modules

! BS..,*...
= BS..,*...
! BA..,*...
= BA..,*...
! PBA...
! BE
= BE

The word processor 07 WP 84 from R202 on is capable of background processing. In certain functions the modules may be processed in a time cycle. To do so the head module must be used. It is specified in the head module in which sequences the individual modules are processed.

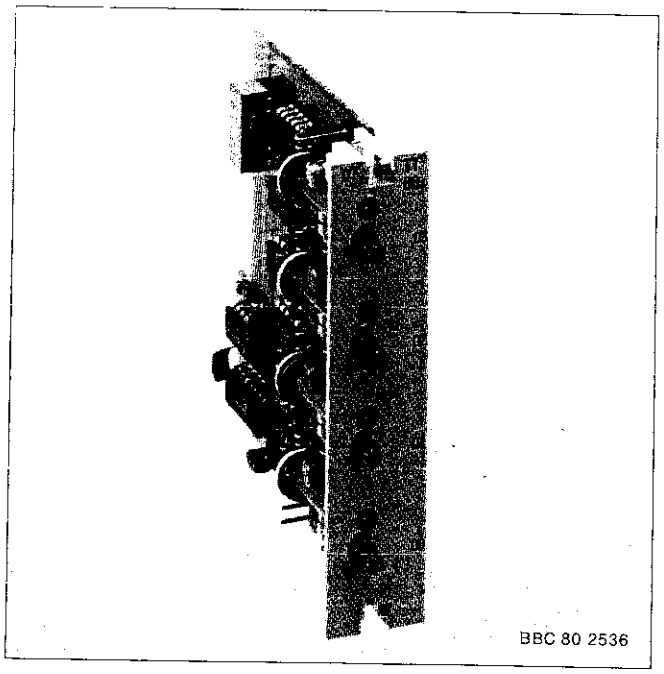
These function modules can be processed by the word processor:

| | | |
|---|---|---|
| F000 | TEX | text module |
| F001 | SIP | serial input |
| F002 | SIN | interface initialization |
| F003 | EMAS | receipt of ASCII characters (07WP84R302 only) |
| F020 | IDS | indirect write |
| F021 | IDS | indirect read |
| F022* | BET | absolute value builder |
| F023* | BEG | limiter |
| F024* | KPL | complementary builder (1 complement) |
| F040* | PIR | PI-regulator |
| F060 | ZYK | cycle monitor |
| F127 | KOP | head module |

*) The following modules may be processed time controlled: F022, F023, F024, F040.

# 8 Timers and counters

## 8.1 Analog timer 07 TI 80 R1




**Technical data:**

| | |
|---|---|
| Number of times | 4 analog times |
| Time range | 0.05 –128 s |
| Power consumption at 24 V d.c. | 20 mA |
| 12 V d.c. | 10 mA |
| Dimension | 1 division |
| Weight | 0.105 kg |
| Order number | GJR5211900R1 |

The timer 07 TI 80 R1 includes four 0-1 delay elements for delay times from 0.05 s to 128 s (other time functions and values via the software). A red light-emitting diode indicates for every timer element that the delay time is on.

In case of the 0-1 delay the time begins when a 1-signal is present at the input. The output is set when the time has expired and the input signal is still present.

The timer elements are addressed in the programming language by the operand T, the hardware module address and the channel address.

The hardware module address of the timer is determined by the slot in the basic stage and/or extension stage. But in both only slots 00 to 03 are allowable.

The channel address of the timer is determined by the coding of the subrack. In the PROCONTIC b system a maximum of two subracks only may be fitted with timers. The subracks without timers shall then be coded with the jumper TN on the coding receptacle of the BUS circuit board.

For one subrack a max. of 16 analog times are possible.
For two subracks a max. of 32 analog times are possible.

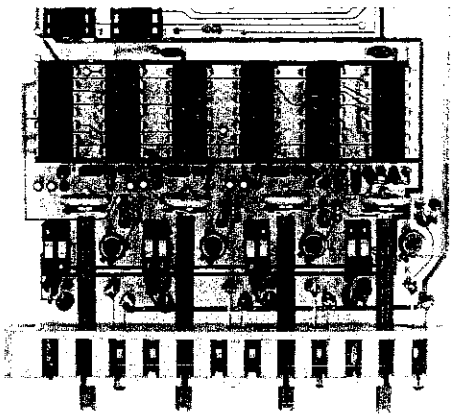
**Time setting:**

The coarse setting of the time for every timer element is performed by a miniature sliding switch on the circuit board of the timer. The fine adjustment is effected from outside by means of a potentiometer in the front panel (left stop = shortest time).

| Time range | Position of the sldg. switches | Time | Multiplier |
|---|---|---|---|
| I |  | 0.05...0.5 s | 0.25 |
| II |  | 0.2...2 s | 1 *) |
| III |  | 1.6...16 s | 8 |
| IV |  | 12.8...128 s | 64 |

*)= as delivered

The time may be measured in any range and be converted to any other time range by means of the multipliers.

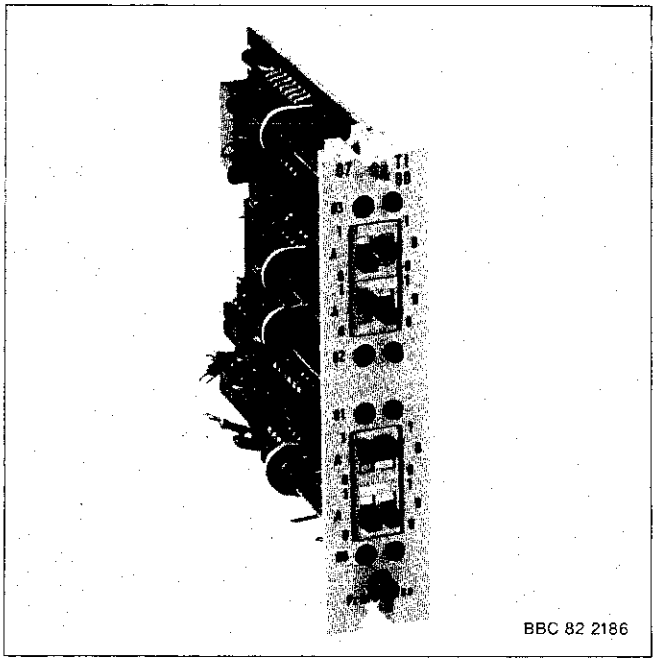


Channel number:
00 01 02 03
time range:
III II IV I

Miniature sliding switch to set the time

BBC 80 0164

## 8.2 Analog timer 07 TI 80 R2



BBC 82 2186

**Technical data:**

| | |
|---|---|
| Number of times | 4 analog times |
| Time range | 0.05 – 128 s |
| Power consumption at 24 V d.c. | 20 mA |
| 12 V d.c. | 10 mA |
| Dimension | 1 division |
| Weight | 0.105 kg |
| Order number | GJR5211900R2 |

The timer 07 TI 80 R2 includes four 0-1 delay elements for delay times from 0.05 s to 128 s (other time functions and values via the software). A red light-emitting diode indicates for every timer element that the delay time is on.

In case of the 0-1 delay the time begins when a 1-signal is present at the input. The output is set when the time has expired and the input signal is still present.

If the short-circuit plug is inserted into the test socket on the front panel while the program is not running all four times are started simultaneously. The times can thus be set and checked during the commissioning stage.

The timer elements are addressed in the programming language by the operand T, the hardware module address and the channel address.

The hardware module address of the timer is determined by the slot in the basic stage and/or extension stage. But in both only slots 00 to 03 are allowable.

The channel address of the timer is determined by the coding of the subrack. In the PROCONTIC b system a maximum of two subracks only may be fitted with timers. The subracks without timers shall then be coded with the jumper TN on the coding receptacle of the BUS circuit board.

For one subrack a max. of 16 analog times are possible.
For two subracks a max. of 32 analog times are possible.

**Time setting:**

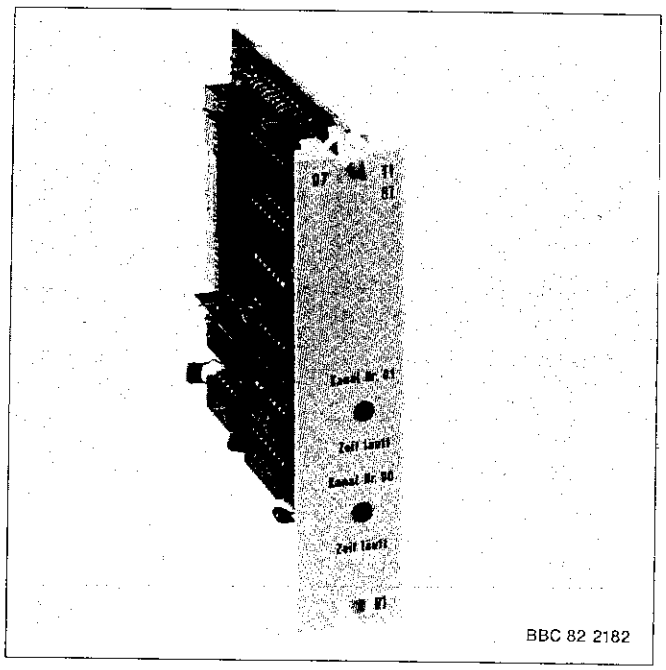
The coarse setting of the time for every timer element is performed by a miniature sliding switch on the circuit board of the timer. The fine adjustment is effected from outside by means of a potentiometer in the front panel (left stop = shortest time).

| Time range | Position of the sldg. switches | Time | Multiplier |
|---|---|---|---|
| I |  | 0.05...0.5 s | 0.25 |
| II |  | 0.2...2 s | 1*) |
| III |  | 1.6...16 s | 8 |
| IV |  | 12.8...128 s | 64 |

*)= as delivered

The time may be measured in any range and be converted to any other time range by means of the multipliers.

## 8.3 Digital timer 07 TI 81 R1




**Technical data:**

| | |
|---|---|
| Number of times | 2 |
| Time range | 0.1...9900s = 2 h 45 min |
| Power consumption at 24 V d.c. | 10 mA |
| 12 V d.c. | 10 mA |
| Dimension | 1 division |
| Weight | 0.08 kg |
| Order number | GJR5215200R1 |

The digital timer 07 TI 81 R1 includes two 0-1 delay elements for delay times from 0.1 s to 9900 s = 2 h 45 min. The delay times with a resolution accurate to 0.1 s can be selected via the program. A red LED indicates for every timer element that the delay time is on. In addition five different unalterable cycle times are available internally. They can be called up via the software.

In case of the 0-1 delay the time starts when a 1-signal is present at the input. The output is set when the time has expired and the input signal is still present.

The timer elements are set in the program by stated time values.

The hardware module address of the timer is determined by the slot in the basic subrack and/or extension subrack. But in both only slots 00 to 03 are allowable (in the subrack 07 ET 82 R2 to 02).

The possible channel addresses are listed in the preceding table. But a maximum of two subracks only may be fitted with timers in the PROCONTIC b system. The subracks without timers shall then be coded by means of the jumper TN on the coding receptacle of the BUS circuit board.

With one subrack a max. of 8 programmable digital times is possible.

With two subracks a max. of 16 programmable digital times are possible.

**Programming and delay time**

With an instruction sequence like (=S T00,01) setpoints for the time functions can be put in per user program by means of the programming unit.

The time setpoint must be newly assigned prior to every start of the timer.

To the time set-point the activation conditions may not be fulfilled.

Input of the time value with the programm unit 07 TD 12, 07 PC 30 or 07 PC 31.

| | |
|---|---|
| 1. input | <blanc> |
| 2. input | # |
| 3. input | 0 |
| 4. input | 1. cipher |
| 5. input | 2. cipher |
| 6. input | E |
| 7. input | 3. cipher |

**Calling of unalterable cycle times**

The unalterable internal cycle times are assigned to the following channel addresses of the timers.

| | | |
|---|---|---|
| T ..,03 and/or | T ..,11 = 20 | Hz = 50 ms |
| T ..,04 and/or | T ..,12 = 10 | Hz = 100 ms |
| T ..,05 and/or | T ..,13 = 5 | Hz = 200 ms |
| T ..,06 and/or | T ..,14 = 2.5 | Hz = 400 ms |
| T ..,07 and/or | T ..,15 = 1.25 | Hz = 800 ms |

The desired cycle time is called by means of the instruction sequence:

```
!  T ..,..     =  Operand ..,..
```

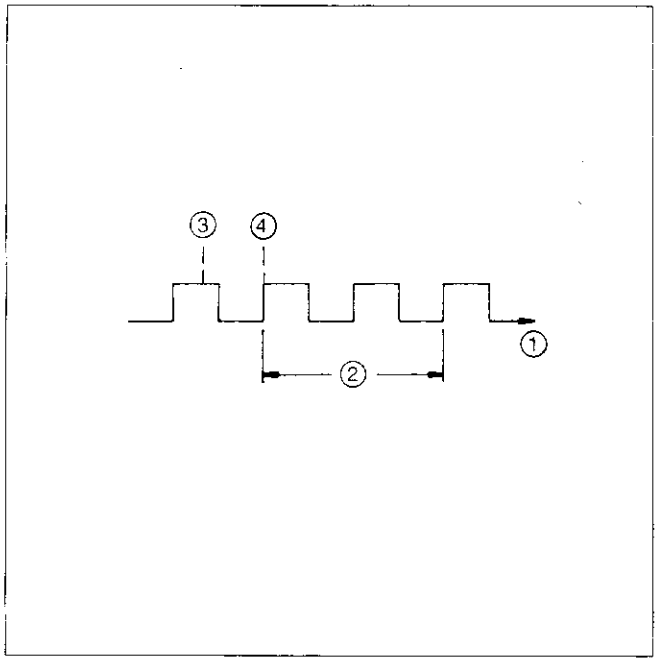
e.g.

```
!  T 00,07     &  M 01,01     =  A 03,07
```

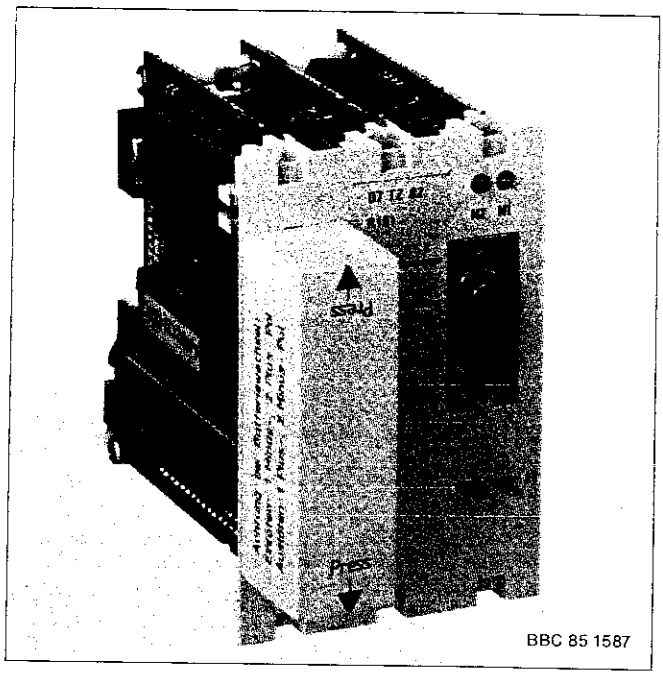
(cycle time 800 ms)

**Timing accuracy**

With the start of the user program an internal quartz-controlled time cycle ① of 0.1 s = 100 ms is started, too. After the starting condition ③ for programmed delay times or unalterable cycle times has been met the running time ④ starts with the next rising edge of the quartz-controlled time cycle. The remaining time value of the last time cycle is unknown. A residual time of 0 to 100 ms max. is thus added to the desired time ②.



## 8.4 Digital timer 07 TZ 82 R201




**Technical data:**

| | |
|---|---|
| Number of time delay elements | 60 (T 00,00 ... T 03,11) |
| Range of time delay | 0.01 s ... 27.5 h |
| Tolerance | +/– 0.005 % |
| External time setting | 4 decade, BCD via one input device |
| Number of timing generators | 3 |
| Frequency timing generator | 5, 2 and 0.5 Hz (T 03,12, T 03,13 and T 03,14) |
| Number of counters (forward) | 16 (Z 00,00 ... Z 00,15) |
| Counting range | 0 – 999 999 |
| External count setting | 4 decade, BCD via one input device |
| Counting range | 0 – 7 999 |
| Serial interface | RS 423 |
| Serial output of texts | random |
| Serial output of values | 4 decade |
| Input time set point, serial | 0.01 s ... 27.5 h |
| Input counter set point, serial | 0 ... 999 999 |
| Interface plug connector | Canon D, 9-pole |
| Serial transmission format | 7 bit data with even parity, 2 stop bits<br>or 8 bit data with parity on zero, 1 stop bit |
| Serial interface baud rates | 300, 600, 1200, 2400, 4800 or 9600 baud |
| Current consumption | 400 mA |
| Dimensions | 3 dimensions |
| Weight | 0.27 kg |
| Order number | GJR5217100R201 |

**Accessories:**

| | |
|---|---|
| Cable for the programming unit 07 SK 87 R2 | GJR5230800R2 |
| Spare battery 07 LB 20 | GJR5223500R1 |

The digital timer 07 TZ 82 R201 is a microprocessor-controlled multi function device.

It has the following functions:

- It can be used as a timer with 60 available freely programmable times. Over the serial interface information about the actual time status can be received.
- It contains a time pulse generator with 3 permanently set clock signals.
- An incorporated counter module permits pulses to be set, reset and counted. Furthermore, the current count can be polled via the serial interface.
- A serial RS423 interface is capable of transmitting texts and data and receiving time and count values.
- The operating status of the unit is indicated by LEDs.

**Information on planning:**

- The unit can be inserted at any system slot in the basic rack (rack with the central processing unit).
- The 07 TZ 82 can be used only in the metal racks.
- If the unit is used, no other timers may be used. In addition, all racks must be coded with "TN". For this purpose, the coding switch "3" must be switched to "OFF" (07 ET 84) or the strap "TN" (07 ET 82/83) must be connected to the bus board.
- Before fitting the 07 TZ 82 in the PROCONTIC b, the positive terminal of the lithium battery must be soldered on.
- Battery check:
  the voltage of the lithium battery must not drop below 2.9 V when subjected to a load of 3.9 kOhm for a period of 5 seconds.
- The supplied sticker must be attached at the point marked on the front panel of the 07 TZ 82.
- Two steel pins which are used to connect the ejectors are supplied with the 07 TZ 82.
- The 0 V terminal must be connected to the 0 V PROCONTIC b supply voltage.
- During operation of the 07 TZ 82, the power pack 07 NG 82 must be used (see software manuel 8.2, chapiter 11).
- The 07 TZ 82 can be operated only with the central processing unit 07 ZE 82 R3 or with the 07 ZE 84.

**Programming**

See software manual 8.2, timers and counters.

**Initialization**

The unit is initialized each time a cycle starts, e.g. when the voltage is connected.

During initialization, a check is made in order to establish whether data exchange is possible between the program memory and the unit. In the event of an error, the red LED lights steadily and message "Fehler Nr. 1" is output via the serial interface. In the event of an error, the program cycle does not start.

This also occurs if the parity check of the program statements establishes an error. In this case, message "Fehler Nr. 2" is output via the serial inter face and the red LED flashes at a frequency of 0.5 Hz.

A set point value can be assigned to the times via the serial interfaces. This required value is then stored in the memory with the incorporated battery. During initialization, a check is made in order to establish whether the set point value is still stored properly. If this is not the case, the red LED flashes at a frequency of 2 Hz and error message "Fehler Nr. 3" is output via the serial interface.

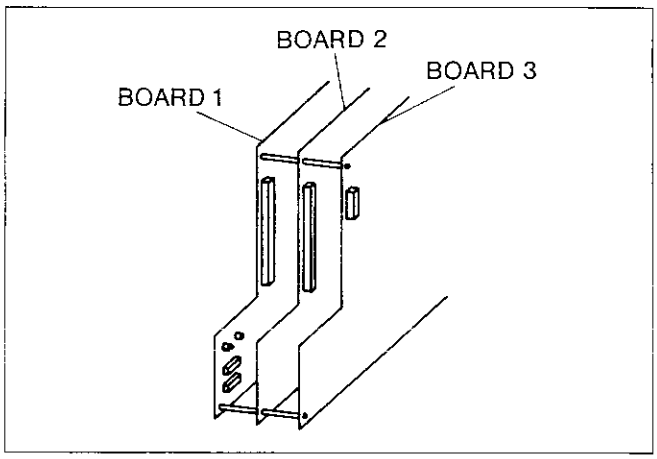
The set point value must then be entered again with the cycle stopped (switch set to stop).

Is in a program an inadmissible set point value for a counter present, the error is recognized during the initialization. The messages "Fehler Nr. 8" and "Fehler Nr. 7" are output via the serial interface. The red LED lights steadily and the digital timer 07 TZ 82 does not start. With the cycle stopped the program has to be checked. The PROCONTIC b must be started again.

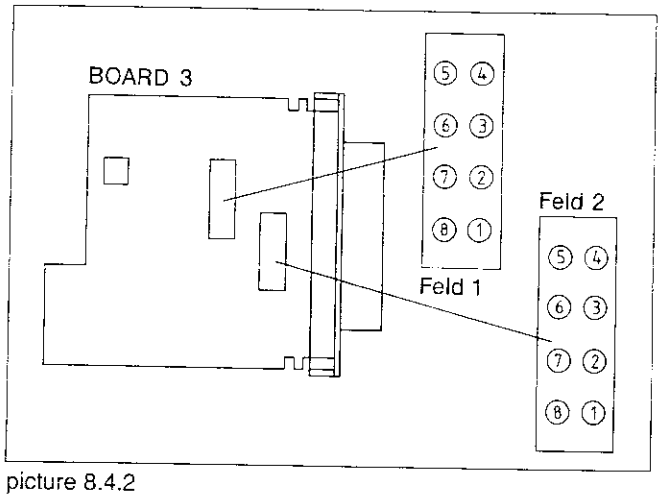
During the initialization are all set point and actual counter values compared. Is the actual counter value >= the required counter value, is the output bit (bit value) set.

During initialization, a check is also made in order to establish whether the control program has been terminated with an ! PE. Cycle start is aborted if the end-of-program character is missing.

Initialization is dependent upon the incorporated hardware configuration. For this reason, the units must be set on the basis of the table 8.4.2 dependent upon the configuration.




picture 8.4.1



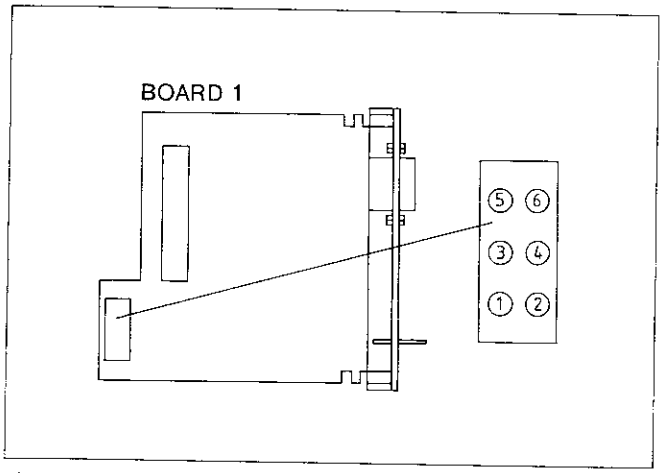

picture 8.4.2

The jumpers on board 3 (table 8.4.1) are fixed in the factory and may not be altered.

| rubric | jumper | |
|---|---|---|
| 07 TZ 82 | field 1 | field 2 |
| | 8 7 6 5 / 1 2 3 4 | 8 7 6 5 / 1 2 3 4 |
| R101 | * * * * | * * * * |
| | * * * * | * * * * |
| R201 | * * * * | * * * * |
| | * * * * | * * * * |

table 8.4.1

There are no jumpers on board 2




picture 8.4.3

The initialization of the timer unit 07 TZ 82 and the word processor 07 WP 84 depens on the individual softare version of the units installed. The straps must be set dependent upon the incorporated version as shown in the table 8.4.2:

| rubric | | jumper | |
|---|---|---|---|
| 07 WP 84 | 07 TZ 82 | 07 WP 84 | 07 TZ 82 |
| | | 6 4 2 / 5 3 1 | 6 4 2 / 5 3 1 |
| R101 | R101 | * * * | * * * |
| | | * * * | * * * |
| R101 | R201 | * * * | * * * |
| | | * * * | * * * |
| R202 | R101 | * * * | * * * |
| | | * * * | * * * |
| R202 | R201 | * * * | * * * |
| | | * * * | * * * |

table 8.4.2

If the digital timer 07 TZ 82 or the word processor 07 WP 84 are used on their own, these jumpers must be removed.

**Breakpoints (BP)**

If breakpoints are set during commissioning, cycle monitoring of the 07 TZ 82 R201 must be deactivated (see monitoring, next page)
Via serial interface (Example 1)
Via the program (Example 2)

**Monitoring**

During operation, the system monitors whether the set point value is correct in the case of assigned times. In the event of an error, the red LED flashes at a frequency of 2 Hz and the error flag T 03,15 is set. This can be polled in the program in order, for instance, to initiate a message. If the error signal T 03,15 responds, this guarantees a duration of the 1-signal of at least one PROCONTIC b cycle.

Block ! condition =S T 03,15 in the user program results in a cycle stop if the condition is fulfilled. A re-start can be implemented by pressing the RUN-stop switch.

If the cycle time exceeds 250 ms, the cycle time monitoring circuit responds and error message "Fehler Nr. 7" is output. A new start occurs when the RUN-stop switch is pressed.

The program can be stopped at a specific point via the programming unit in test mode for diagnosis and test work. A so called "breakpoint" (BP) is set. This BP results in response of the cycle monitor. In order to prevent this, the cycle monitor must be deactivated.

Example 1:

The 07 TZ 82 always monitors the cycle time and checks that it is maximum 250 ms (permanently set). No statement is required in the program for this purpose. This monitor can be deactivated by the interface, e.g. in breakpoint mode. If the monitoring time is exceeded, all outputs (word and bit) are set to 0 (the N signal reverts to 1). The following error message is output by the interface:

FEHLER NR. 7 (ERROR NO. 7)

The control system does not continue until the RUN/STOP switch has been pressed.

Setting via the serial interface.

$Z=0 Cycle monitoring deactivated.
$Z=1 Cycle monitoring activated.

Example 2:

The cycle monitor can be deactivated and activated in the program. This statement is dominant and overwrites statements via the serial interface.

If the user intends not to deactivate the monitor via the interface, this needs to be programmed by a module.

```
! BS00,F060          or  =  BS00,F060
  B xx,yy                    B xx,yy
```

Bit variable: B xx,yy

with B = E, A, M or M'.
and xx = all group numbers permitted for the operand
yy = 0 ... 15

The bit status of the bit parameter signifies the following:

B xx,yy = 0: Monitor activated
B xx,yy = 1: Monitor disabled

The module may be located at any position in the program.

Each time the module is called, the 07 TZ 82 checks the status of the bit parameter. The cycle time is measured in each case from ! PE to ! PE.

At program start (actuation of the RUN/STOP switch), the cycle monitoring function eventuelly disabled before, is enabled by the normalization.

**The 07 TZ 82 used for logging and text tasks**

**Functions of the interface**

Data can be entered and issued via the interface. Data output is triggered by calling logging modules incorporated in the user program, by means of error messages of the 07 TZ 82 or by a response to a data input (e.g. polling an actual value). An output is made in answer to each input via the interface.

All invalid entries are answered with "Bell" (ASCII 07).

**Mechanical and electrical data of the interface**

Connector: 9-pole D connector (enclosed)

Pin assignment

| | |
|---|---|
| Pin 1: | Screen connection |
| Pin 2: | TXD (send data) |
| Pin 3: | RXD (receive data) |
| Pin 7: | 0 V (reference conductor) |

**Important:** None of the other terminals may be used.

Electrical specification in accordance with RS 423 (+5 V/-5 V)

Transmission format 0:

Send: 7 data bits with parity bit on zero
Full duplex
1 stop bit

Receive: 7 data bits plus parity bit (PTY is not checked)
Full duplex
1 stop bit

Transmission format 1:

Send: 7 data bits with even parity bit
Full duplex
2 stop bits

Receive: 7 data bits plus parity bit (PTY is not checked)
Full duplex
2 stop bits

**V24 interface protocol**

Software handshake with XON/XOFF is scheduled in the following way:

- XOFF is sent after reception of the command.
- XON is sent after execution of the command.
- If the 07 TZ 82 receives an XOFF from the distant station, the 07 TZ 82 can, admittedly, still store characters in the test buffer but the contents of the buffer are not sent to the distant station.

**Important:** If the distant station does not issue XON promptly, the text buffer may overflow. This must be prevented via the program.

### Setting the transmission rate

The interface of the 07 TZ 82 is in basic setting with a transmission rate of 300 Baud the first time the unit is switched or if no setting has been carried out.

**Important:** In order to exchange data between the programming unit and the 07 TZ 82 the baud rates of both devices must correspond. This means that, during commissioning, the baud rate must be set to 300 baud in the header ($ Head) of the programming unit. In TTY mode, an N must be entered in answer to the query half duplex mode (Y/N).

Input: $B**** <CR>

with **** = 300 (baud)
600 (baud)
1200 (baud)
2400 (baud)
4800 (baud)
9600 (baud)

The change in baud rate is carried out immediately after the entry. No acknowledgement is output. If the entry is incorrect, a change does not occur and a "?" is output. The entered baud rate is stored in the buffered RAM until the baud rate is changed again. The character string is ≥ character/PROCONTIC b cycle.

### Setting the transmission protocol

The interface of the 07 TZ 82 is in basic setting with the transmission format 0 ( 7 bit data, no parity checked, 1 stop bit) the first time the unit is switched or if no setting has been carried out.

Input: $P=0<CR>

prepares the serial interface with the transmission format 0 (8 bit data, no parity checked, 1 stop bit).

Input: $P=1<CR>

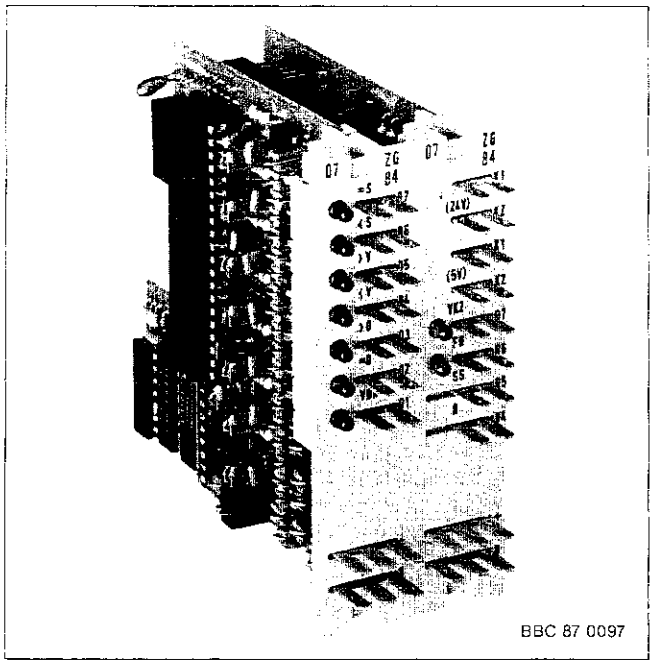
prepares the serial interface with the transmission format 1 (8 bit data, even parity, 2 stop bits).

A faulty input will not cause change, but the output of a "?". The given transmission format is stored into the buffered RAM, until it is changed again by a new input.

### Error list

| Error | Indicator red LED | Error message via RS 423 | Reaction |
|---|---|---|---|
| **During initialization** | | | |
| Data exchange with program memory fault | Lights steadily | Fehler Nr. 1 (Error No. 1) | PROCONTIC b does not revert to status RUN |
| Parity | Flashes at 0,5 Hz | Fehler Nr. 2 PROCONTIC b (Error No. 2) | does not revert to status RUN |
| Required time values not OK | Flashes at 2 Hz | Fehler Nr.3 (Error No. 3) | PROCONTIC b does not revert to status RUN |
| In the program is no PE present | Lights steadily | Fehler Nr.4 (Error No. 4) | PROCONTIC b does not revert to status RUN |
| If more than 255 NOP0s occur after a BS call | Lights steadily | Fehler Nr. 5 (Error No. 5) | PROCONTIC b does not revert to status RUN |
| Required counter in program is set wrong | Lights steadily | first Fehler Nr. 8 (Error no. 8) then Fehler Nr. 7 (Error no. 7) | PROCONTIC b does not revert to status RUN Help: check the program |
| **During program run** | | | |
| Required value of a timer not OK | Flashes at 2 Hz | | Error flag T03,15 is set |
| Cycle time exceeded | | Fehler Nr. 7 (Error No. 7) | Outputs are initialized. PROCONTIC b stops. Press RUN/STOP key. |

## 8.5 Fast counter 07 ZG 84 R1




### Technical Data:

Power supply:

| | |
|---|---|
| Voltage $U_S$ | 24 V d.c. +/– 30% |
| Internal power consumption | < 50 mA |
| Power consumption including outputs | < 600 mA |
| Voltage $U_{10}$ | 10 V d.c. +/– 5% |
| Power consumption | < 30 mA |
| Power dissipation | 3 W |

### Data of the signal inputs:

| | |
|---|---|
| 24V-inputs | |
| Voltages | |
| 0-signal | 0 ... 5 V |
| 1-signal | 13 ... 31.2 V |
| power consumption of 1-signal at 24 V | 5 mA typical |
| | |
| 5V inputs | |
| Voltages (standard TTL compatible) | |
| 0-signal | 0 ... 0.8 V |
| 1-signal | 2.4 ... 31.2 V |
| Consumption of 1-signal at 3.5 V | 0.15 mA typical |
| | |
| Flank rise required for inputs of the counter | |
| input signals, 24 V and 5 V | > 1 V/µs |
| other inputs | random |
| | |
| Indication VK 2 and FR | yellow LED |

### Data of the signal outputs:

| | |
|---|---|
| Rated current | 130 mA |
| Rated voltage | 24 V d.c. |
| Voltage drop between Us and output | 3.5 V |

Notice:
The outputs are short-circuit proof and may be used in WIRED OR mode.

| | |
|---|---|
| Display of the outputs | one red LED each |

**Signal delays**

| | |
|---|---|
| Counter inputs | approximately 40 µs |
| Up/down switching | approximately 150 µs |
| Release | approximately 75 µs |
| Dynamic setting | approximately 150 µs |
| Dynamic erase | approximately 150 µs |
| Dynamic erase/act.value=0 | approximately 25 µs |
| Dynamic setting/actual value = set point | approximately 25 µs |

**Minimum pulse width required**

| | |
|---|---|
| Dynamic erase (at the terminal) | 250 µs |
| Dynamic setting (at the terminal) | 250 µs |
| Dynamic erase (by bit bus) | 2 µs |
| Dynamic setting (by bit bus) | 2 µs |
| Counting (channel 1 or 2) "1" | 50 µs |
| "0" | 50 µs |
| Maximum counting frequency | 10 kHz |

**Ambient conditions:**

| | |
|---|---|
| Operating temperature | 0 ... +55°C |
| Storage temperature | −25 ... +75°C |
| Moisture class | F |
| Dimensions | 2 dimensions |
| Weight | 0.14 kg |
| Order number | GJR5232600R1 |

The 07 ZG 84 is a fast 16-bit universal timer. By both counting channels two main operation modes are possible:

- logic for the sense of direction, to be used with an encoder with 2 channels 90 shifted to each other
- pulse counter, whereas the counting direction (up or down) can separately be selected for each channel

The counting mode can be selected as binary or decimal.

For comparator functions two registers are available. The comparison results may be polled at the output terminals and over the bit bus.

**Hexadecimal numbers**

| actual value | bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | prefix | number | | | | | | | | | | | | | | |
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +7FFF | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| + 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| − 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| −7FFF | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| −(8000) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The value-8000(=0) is mostly not allowed for arithmetical processing.

**Decimal numbers**

The prefix minus is indicated by the four highest bits (bits 15,14,13,12) to be 1.

| actual value | bit | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 |
| +15999 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| +10000 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| + 9999 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| + 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| – 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| – 999 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |

The counter 07 NG 84 is suited for PROCONTIC b systems with bit processor or word processor. Only the bit bus is used (in- and outputs). The counting inputs are controlled directly by the process, the corresponding control signals (up/down switching, release, dynamic setting, dynamic erase) may react via the inputs or over the bit bus.

The counter counts 16 bits in the signed integer format (15 bits number + 1 bit prefix, negative numbers in 2-compliments). By internal switching also decimal counting in a range from –999 to +14999 may be selected (natural numbers with special code for the prefix). The counter status (actual value) can be polled over the bit bus.

The set point and the pre-trip point are also loaded into the counter over the bit bus. For data transfer always complete words (16 bits) are transferred.

The internal counter has overflows in the positive as well as in the negative range. It counts totally from –15999 to +15999. In this range the internal comparators still work properly (comparison with set point, pre-trip point and zero). The registers (set point, pre-trip point and actual value) are designed for 16 bits only and can store values according to the code shown above from –999 to +14999 only. Instead of the true counter status in the overflow ranges the numbers listed below are stored in the actual value register:

| counter status | value stored |
|---|---|
| +15999 | –999 |
| +15000 | – 0 |
| – 1000 | – 0 |
| – 1999 | –999 |
| – 2000 | – 0 |
| – 2999 | –999 |
| –15000 | – 0 |
| –15999 | –999 |

Since it will cause misunderstanding the loading of set point and pre-trip point with fault tetrades (bits 0 to 11) must be prevented in the application. If by error an O is entered instead of a 0, the system will internally convert the character into a 0 (without prefix).

**07 ZG 84 in combination with a bit processor**

In combination with a bit processor the decimal counting is preferred. The counter status can be shown with standard displays. It is best to convert the four highest bits in the software by the code listed below, before issuing them via an output unit:

| output | | | | | | | | | | value |
|---|---|---|---|---|---|---|---|---|---|---|
| actual value bit 15 | 14 | 13 | 12 | prefix | first digit "1" | bit 15 | 14 | 13 | 12 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 01 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 02 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 03 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 04 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 05 |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 06 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 07 |
| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 08 |
| 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 09 |
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 10 |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 11 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 12 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 13 |
| 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 14 |
| 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 15 |

**07 ZG 84 in combination with a word processor**

In combination with a word processor the binary counting is preferred, because arithmetical operations are better handled and the range of numbers is bigger. The conversion of the numbers to drive decimal displays is a word processor routine (range –32767 to +32767).
In the operation with a word processor the data assignment is done by means of an attribute,f.i. attribute b,converting a dual value into a single binary bit:

! MW ..,.. = bA..,00

**Functions of the 07 ZG 84**

Signal level of the count inputs:

The count pulses are led to the inputs K1 (channel 1) and K2 (channel 2). There is a choice between inputs for signals from 24V-systems and 5V-systems.

Use of an encoder(operating mode logic for sense of direction):

In standard operation at K1 and K2 an encoder with two traces 90 degree shifted to each other is connected. The logic for sense of direction is selectable for single, double or quadruple pulse operation.The operating mode is selected by a switch (DIL sliding switch) before commissioning. By the same procedure the operating mode "pulse counting" is selected(both channels are counting).

Subtracting counter (operating mode pulse counting):

Operating mode pulse counting produces a subtracting counter. The pulses entered at K1 are counted up (+) and the pulses at K2 are counted down (−). The pulse frequencies at K1 and K2 may differ and need not to be synchronized. The internal simultaneous logic synchronizes the pulses.

Adding counter (operating mode pulse counting):

With the input "up/down switching for channel 2", VK2, connected to the 1-signal, the operating mode pulse counting produces an adding counter. The pulses entered at K1 and K2 are accumulated in their combined value. Synchronization is done by the internal simultaneous logic. By selection before commissioning channel 1 may be used for counting down.

In normal operation the positive flanks of the input channels are counted. By selection it is possible to have either the positive, the negative or both flanks counted. In the latter case the counter operates at double frequency.

Up/down counter (operating mode pulse counting)

Up/down counting is done in operating mode pulse counting. The counter input is channel K2. The counting direction of the incoming pulses is depending on the signal at the input "Up/Down switching for channel 2. 1 means counting up, 0 means counting down.
This switching signal, which may also be entered over the bit bus,can be altered asynchronously to the incoming pulses.
The counter input K1 can be used in addition. Counting pulses entered here are additionally counted up resp. down if chosen so.
The counting direction of the counter,i.e.the processing direction of the last pulse entered,is indicated by the signal "counter direction" on the bus and at the terminal. This indication is also available in the operating mode "encoder".

Release:

The signal "release",to be entered via the terminal or over the bit bus, prevents the counter from counting when a 0-signal is applied. The release signal itself cannot generate counting pulses.
In order to count, a release signal (1-signal) must be present, either over the bus or by the terminal.

Dynamic erase:

The signal "dynamic erase" (over the bus or by the terminal) sets, with its 0-1 flank, the counter in the 0-position. While the 1-signal "dynamic erase" is applied, the counter may count again or be set to a number. At the begin of counting "dynamic erase" and "release" may simultaneously jump from "0" to "1".

Dynamic setting:

The signal "dynamic setting" with its "0 to 1" flank leads the set point buffered in the set point register (entered over the bit bus) to the counter (actual value = set point). There is no dominance between "dynamic setting" and "dynamic erase".

Actual value register 16 bits:

Since the events for the processing of the counting pulses are not synchronous to the events on the bit bus, the actual counter status (actual value) is stored in an intermediate memory. Thus it is available for interrogation over the bit bus. During interrogation of the 16 bits the register content is not altered, even with the counter continuing at the same time.

Set-point register 16 bits:

The set point is entered into the set point register over the bit bus. There it is available for processing by the counter. New set points are also loaded over the bus whenever requested.

Pre-trip point register 16 bits:

The pre-trip value, like the set point, is intermediately stored in a register.

Operation "independent" from the bus:

Due to the intermediate storage of set point and pre-trip point, after a one-time entering of this information, the counter is capable of processing independently from the bus.
This is true even after normalization was done over the bus

(switch in the central control module on "STOP" position). A bus traffic (read of actual value, write of set point or pre-trip point, set-erase-release-VR/switching of control signals) does now not take event any more, but all input signals coming from the terminals are still processed. The counter still can count and may be set, erased, released or reversed over the terminals. The comparison results are available at the output terminals.

Comparator:

The comparator compares the counter status (actual value) with the set point stored, the pre-trip point stored and zero. The comparison is completely performed on evenness, on higher than and on lower than values. The comparison results of interest for the application:

actual value = set point
actual value < set point
actual value > pre-trip point
actual value < pre-trip point
actual value > zero
actual value = zero

are made available as output signals over the terminals and over the bit bus. The relations not available there:

actual value > set point
actual value = pre-trip point
actual value < zero

may be generated by simple logic linkages of the output signals available where requested.

**Selections and locations of the switches:**

The 8 different operating modes possible are selected by an 8-pole DIL switch on the unit. The selection is done once when the unit is installed (see picture 1 for the location of the switches).

Notice:
In the state of delivery (all switches in "OFF" position) the unit is not functional.

Switch positions:

| S1 | | counting direction channel 1 |
|---|---|---|
| S1 | ON | counting forward |
| S1 | OFF | counting reverse |

S2 and S3 evaluation of channel 1 and 2:

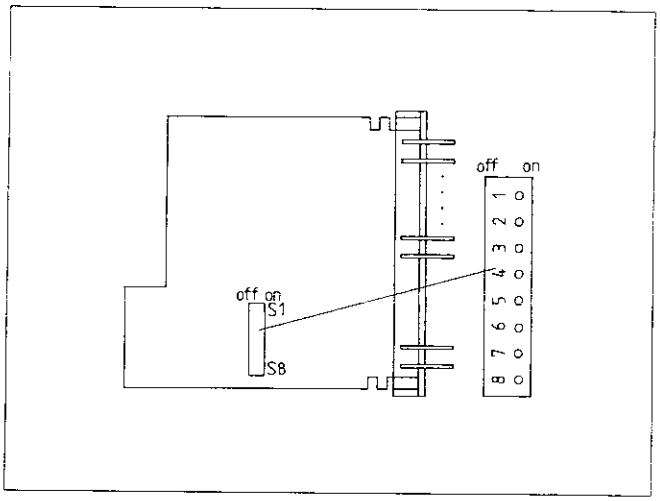
| S2 | S3 | explanation |
|---|---|---|
| ON | OFF | encoder-1 pulse/rev |
| OFF | ON | encoder-2 pulses/rev |
| ON | ON | encoder-4 pulses/rev |
| OFF | OFF | pulse counting |

S4 to S7, selection of the counting flanks for the pulse counting:

| channel 1 | | channel 2 | | explanation |
|---|---|---|---|---|
| S4 | S5 | S6 | S7 | |
| ON | OFF | ON | OFF | positive edge counts |
| OFF | ON | OFF | ON | negative edge counts |
| ON | ON | ON | ON | positive and negative flanks counts |

S8, counting mode:

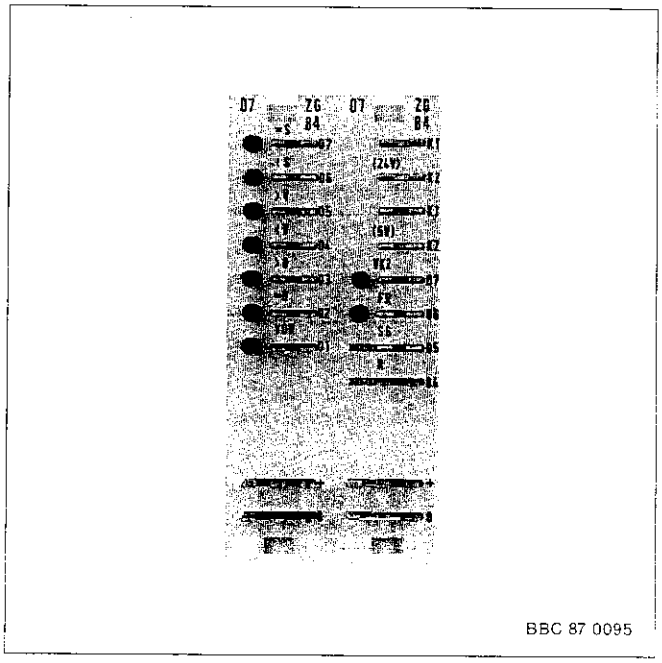
S8 OFF: decimal counting
S8 ON: binary counting




Picture 8.5.1 Location of the Switches

**Data saving at switching power OFF:**

There is no data saving in the counter or in the registers after switching power-off.
After switching power-ON the counter is in zero position, status of the set point register and status of the pre-trip point register are not defined until data are entered over the bit bus.




Picture 8.5.2 Front View of the Counter 07 ZG 84

Terminal asssigment of front panel
Left side of the module:

| channel | designation on the unit | explanation |
|---|---|---|
| 01 | VOR | counting direction (1=forward) |
| 02 | = 0 | actual value = 0 |
| 03 | > 0 | actual value > 0 |
| 04 | < V | actual value < pre-trip point |
| 05 | > V | actual value > pre-trip point |
| 06 | < S | actual value < set point |
| 07 | = S | actual value = set point channel 1 |

Terminal asssigment of front panel
Right side of the module:

| channel | designation on the unit | explanation |
|---|---|---|
| 04 | R | dynamic erase |
| 05 | SS | dynamic set (on set point) |
| 06 | FR | release |
| 07 | VK2 | forward/reverse switching channel 2 |
| K2 | ( 5V) | channel 2 ( 5V) |
| K1 | ( 5V) | channel 1 ( 5V) |
| K2 | (24V) | channel 2 (24V) |
| K1 | (24V) | channel 1 (24V) |

**Bus traffic**

Assignment of the addresses

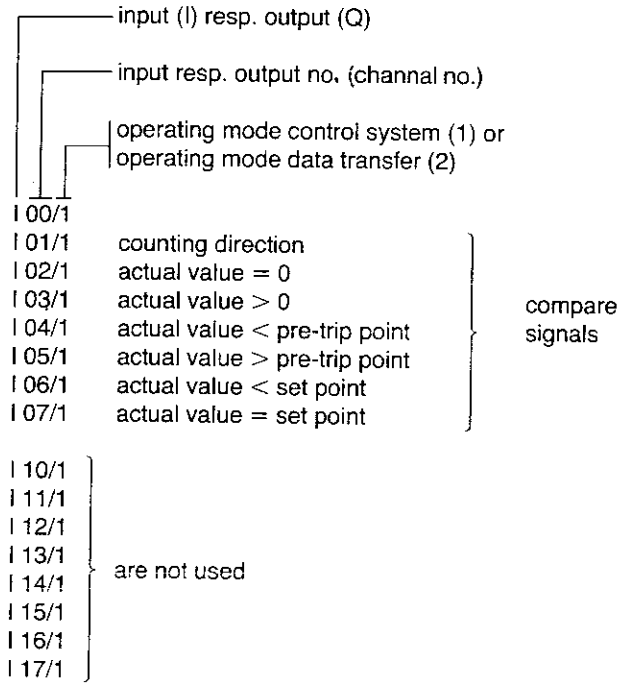
Addresses in the operating mode control: I../1, Q../1

**Note:**

**The meanings of terminals on the left side are addressed in software program on the right side. The meanings of the terminals on the right side are addressed in software program on the left side, respectevely.**

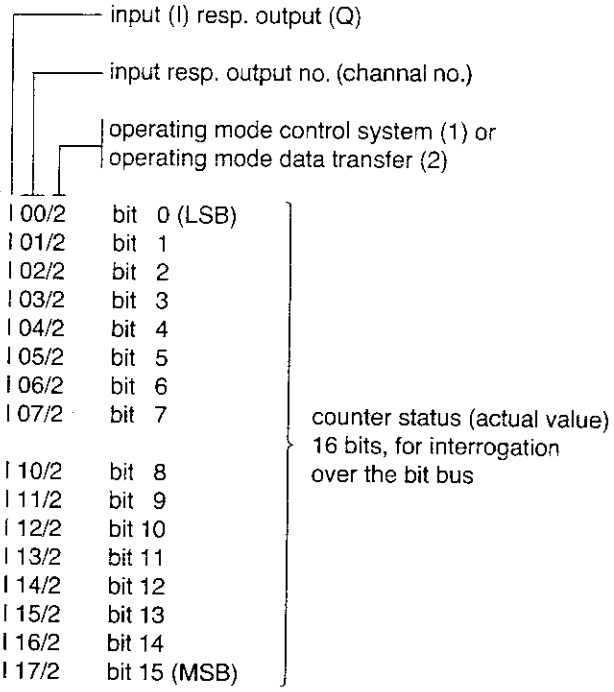
See program example volume 4, chaptre 12.

I 07/1...I 00/1 input addresses left side
I 17/1...I 10/1 input addresses right side
Q 07/1...Q 00/1 output addresses left side
Q 17/1...Q 10/1 output addresses right side




Addresses in operating mode data transfer: I../2, Q../2

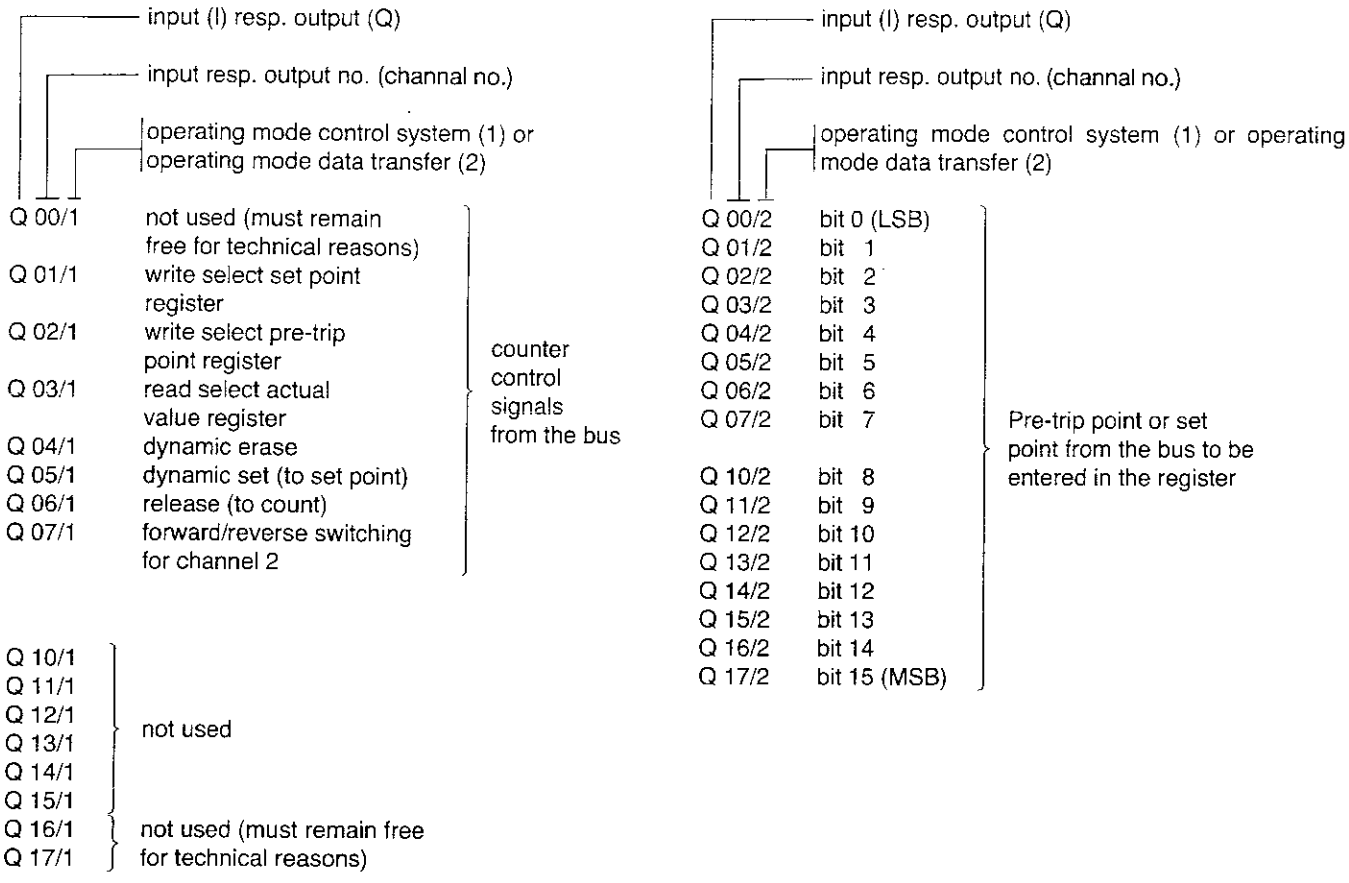
I 07/2...I 00/2 input addresses left side
I 17/2...I 10/2 input addresses right side
Q 07/2...Q 00/2 output addresses left side
Q 17/2...Q 10/2 output addresses right side



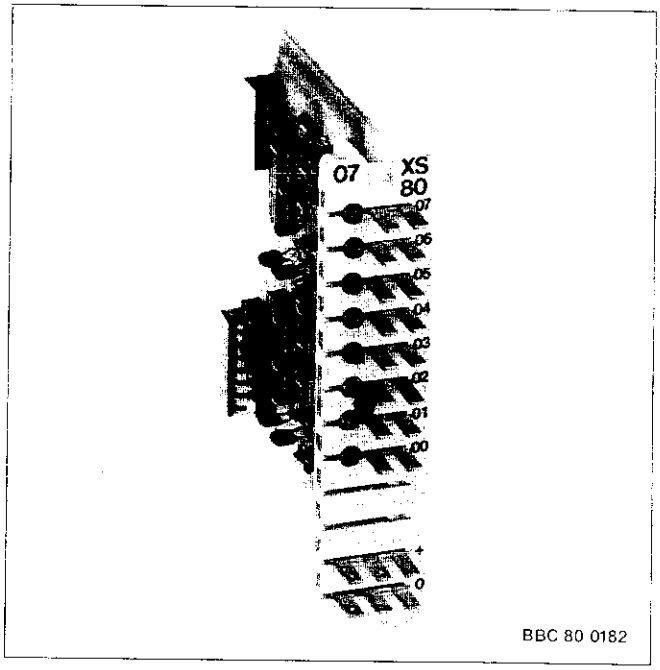

The switching between operating mode control and operating mode data transfer is executed by set and reset signals over write signals of the highest and the lowest address:

A..,00 indicates the set command for operating mode data transfer (write address 00, left unit side, writes bit 0), whereas .. stand for the terminal in the left half of the unit.

A..,07 indicates the reset command for operating mode data transfer (write address 07, right unit side, writes bit 15) and so the set command for operating mode control, whereas .. stand for the terminal in the right half of the unit.


input (I) resp. output (Q)
input resp. output no. (channal no.)
operating mode control system (1) or operating mode data transfer (2)
Q 00/1 not used (must remain free for technical reasons)
Q 01/1 write select set point register
Q 02/1 write select pre-trip point register
Q 03/1 read select actual value register
Q 04/1 dynamic erase
Q 05/1 dynamic set (to set point)
Q 06/1 release (to count)
Q 07/1 forward/reverse switching for channel 2
counter control signals from the bus
Q 10/1
Q 11/1
Q 12/1
Q 13/1
Q 14/1
Q 15/1
not used
Q 16/1
Q 17/1
not used (must remain free for technical reasons)
input (I) resp. output (Q)
input resp. output no. (channal no.)
operating mode control system (1) or operating mode data transfer (2)
Q 00/2 bit 0 (LSB)
Q 01/2 bit 1
Q 02/2 bit 2
Q 03/2 bit 3
Q 04/2 bit 4
Q 05/2 bit 5
Q 06/2 bit 6
Q 07/2 bit 7
Q 10/2 bit 8
Q 11/2 bit 9
Q 12/2 bit 10
Q 13/2 bit 11
Q 14/2 bit 12
Q 15/2 bit 13
Q 16/2 bit 14
Q 17/2 bit 15 (MSB)
Pre-trip point or set point from the bus to be entered in the register

## 9.1 Input module 07 XS 80 R5




**Technical data:**

| | |
|---|---|
| Input channels | 8 |
| Signal voltage 1-signal | 13 ... 31.2 V d.c. |
| 0-signal | 0 ... 5 V d.c. |
| Input resistance | 4.7 kohm |
| Input current at 24 V d.c. | 5 mA per input |
| Input delay | 8 ms |
| Power consumption at 24 V d.c. | 40 mA |
| at 10 V d.c. | 1 mA |
| Dimension | 1 division |
| Weight | 0.085 kg |
| Order number | GJR5212000R5 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

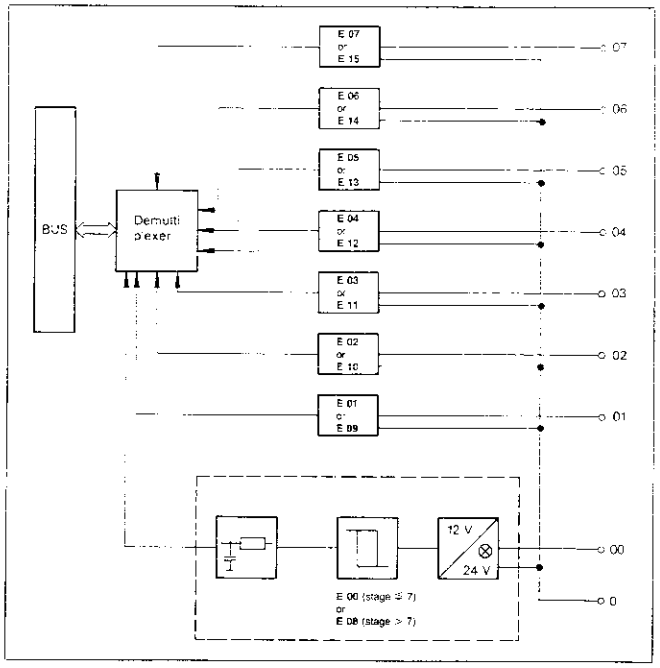
The input module 07 XS 80 has 8 functional units for 24 V input signals.

The input signals are cleared from interference, adapted and passed on for processing acc. to the control program. Every input channel is fitted with a yellow light-emitting diode operated with the input current.

The module address of the input module is determined by the slot in the basic subrack and/or extension subrack (any I/O slot).

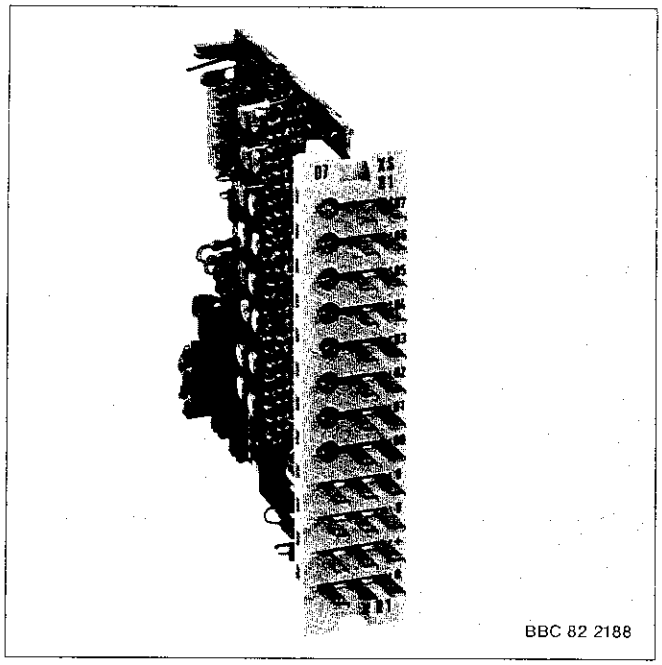
The input module is connected at the front by means of preassembled cables (see chapter 12, appurtenances). The 0 V d.c. potential of the input signals is brought in from outside via the terminal 0. The terminal + merely serves to pass the supply voltage on to further input/output modules.

For special process adaptation problems additional adaptor modules from the ABB system series SIGMA®-tronic b and SIGMA®-tronic e are available.



Block diagram of input module 07 XS 80.

## 9.2 Evalator 07 XS 81 R1




**Technical data:**

| | |
|---|---|
| Current input with 8 initiators connected | |
| with 0-signal (non-attenuated) | 45 mA |
| with 1-signal (attenuated) | 55 mA |
| Input no-load voltage | approx. 9 V d.c. |
| Input internal resistance | approx. 1kohm |
| Position of the switching thresholds between | 1.2 ... 2.1 mA |
| Switching hysteresis | approx. 0.2 mA |
| Allowable circuit resistance | max. 50 ohm |

| | |
|---|---|
| Response threshold of open-circuit monitoring | 0.1 ... 0.2 mA |
| Open initiator circuit causes | 0-signal |
| Signalling | 1 yellow LED each |
| Signal delay upon 0-1 and/or 1-0 change | approx. 3.3 ms |

The inputs are sustained short-circuit proof against 0 V.

**Values for the Zener barrier, if initiators are used in the "Ex" range, zone 1:**

| | |
|---|---|
| Series resistance | max. 200 ohm |
| Rated voltage | 12 V d.c. |
| Leakage current at 10 V d.c. | 40 µA |
| Dimension | 1 division |
| Weight | 0.13 kg |
| Order number | GJR5217200R1 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The evaluator 07 XS 81 includes 8 identical functional units for evaluating the circuit state of two-wire proximity switches (displacement sensors) as per DIN 19 234 and/or the corresponding NAMUR recommendations.

The input signals are cleared from interference, adapted and passed on for processing acc. to the control program. Every input channel is fitted with a yellow light-emitting diode operated with the input current.

The module address of the input module is determined by the slot in the basic subrack and/or extension subrack (any I/O slot).

The input module is connected at the front panel by means of preassembled cables (see chapter 12, Appurtenances ). The 0 V d.c. potential of the input signals is fed in from outside via the terminal 0.

The positive terminals of the proximity switches are plugged onto the connection pins 00 to 07 (E ..,00 to E ..,07 and/or E ..,08 to E ..,15). The negative terminals are connected to the two 0 V terminal pins. These are connected inside the module to the 0 terminal of the supply voltage. The input signals are cleared from interference, adapted for processing and passed on according to the control program. This is indicated by yellow light-emitting diodes.

The terminals 00 to 07 represent a voltage source with an internal resistance (source resistance) for the connected proximity switches. The switching states are derived from the current input of the proximity switches.

Inductive proximity switches for which the module is intended in the first place have a higher current input in non-attenuated state than in attenuated state. Since the 1-signal is assigned to the attenuated state (influenced by a body in the vicinity) the relationship between cause and effect is as follows:

| Proximity switch | Current input | evaluated switchg. state | LED |
|---|---|---|---|
| free | high | 0-signal | dark |
| covered | low | 1-signal | alight |

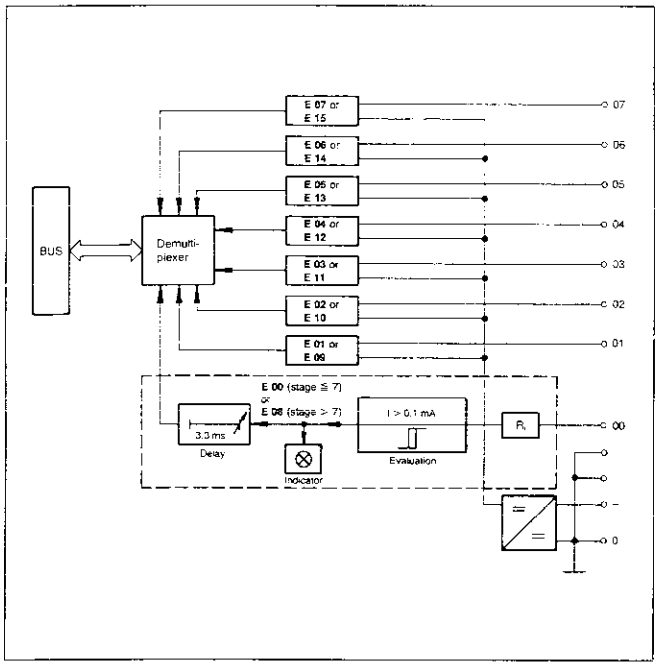
With capacitive proximity switches the effect goes into the opposite direction.

The input module 07 XS 81 has an open-circuit monitoring system which covers all functional units. In case of an open circuit between proximity switch and evaluator an 0-signal is reported.

Without additional measures switching amplifiers are not suitable for connecting displacement sensors from areas with an explosion hazard. If "Ex i"-licensed displacement sensors are used, if Zener barriers (also licensed) are arranged in between, and if all safety measures applicable for this area are taken ("Ex" ordinances, DIN EN 50020) it is also possible to evaluate displacement sensors arranged in "Ex" areas (zone 1, degree of protection: intrinsic safety). To guarantee perfect functioning the volume resistance of the Zener barrier shall not be more than 200 ohm, and the rated voltage shall be 12 V d.c. or more.

The switching amplifiers include signal delays for the suppression of injected interference.

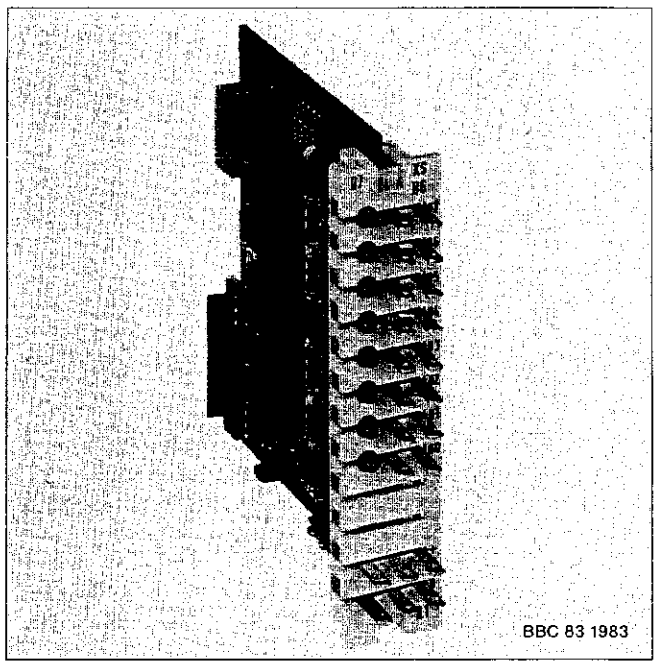
The inputs are sustained short-circuit proof against 0 V. In case of a short circuit of an input against 0 V a current of approx. 10 mA will flow. The switching amplifier will then evaluate 0-signal. If an input is accidentally connected with the 24 V d.c. supply voltage this will not result in the destruction of the module.




Block diagram of evalator 07 XS 81.

### 9.3 Input module 07 XS 86 R*

(R* = module in various variants)




**Technical data:**

| | |
|---|---|
| Input channels | 8 |
| Signal voltage 1-signal | 13 ... 62 V |
| 0-signal | -30 ... 5 V d.c. |
| Input resistance | 4.7 kohm |
| Input current at 24 V d.c. | 4.8 mA |
| Input delay version R1 | 8 ms |
| version R2 | 0.1 ms |
| Dimension | 1 division |
| Weight | 0.085 kg |
| | |
| Order number for input delay 8 ms | GJR5218200R1 |
| for input delay 0.1 ms | GJR5128200R2 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

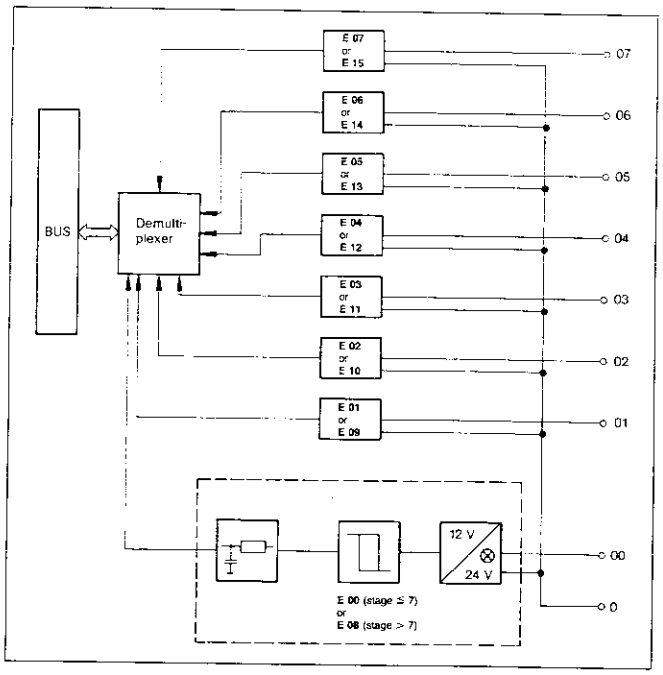
The input module 07 XS 86 has 8 functional units for 48 V input signals.

The input signals are cleared from interference, adapted for processing and passed on acc. to the control program. Every input channel is equipped with a yellow light-emitting diode operated with the input current.

The module address fo the input module is determined by the slot in the basic subrack and/or extension subrack (any I/O slot).

The input module is connected at the front panel by means of preassembled cables (see "Appurtenances"). The 0 V d.c. potential of the input signals is fed in from outside via the 0 terminal. The + terminal serves merely to pass the supply voltage on to further input/output modules.

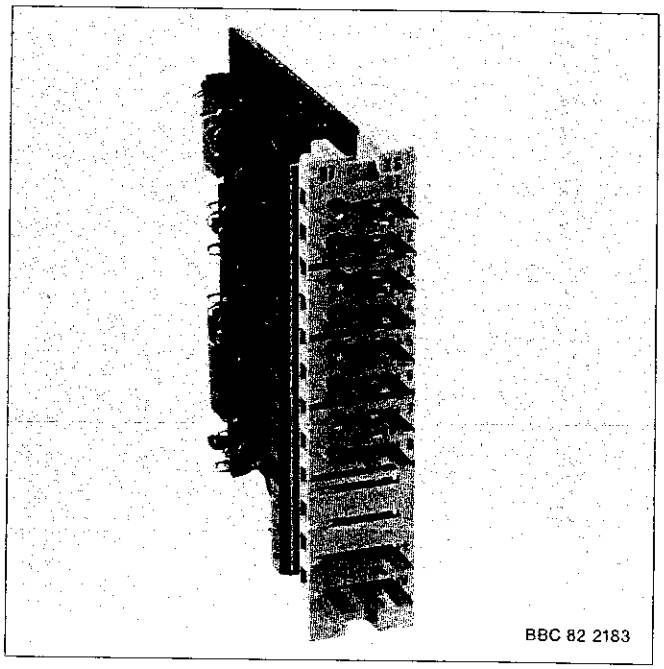
For special process adaptation problems additional adaptors from the ABB system series SIGMA®-tronic b and SIGMA®-tronic e are available.




Block diagram of input module 07 XS 86.

## 9.4 Potential isolators 07 XS 87 R*

(R* = module in various variants)




**Technical data:**

| | 07 XS 87 R1 | 07 XS 87 R2 |
|---|---|---|
| Input channels | 4 | 4 |
| 0-signal, d.c. or a.c. voltage | 0 ... 70 V | 0 ... 35 V |
| 1-Signal, d.c. or a.c. voltage | 176 ...250 V | 88 ...127 V |

| | | |
|---|---|---|
| Input current at 220 V | 4.1 mA | – |
| at 110 V | – | 2.5 mA |
| 0-1 delay with a.c. voltage | | 3 ... 13 ms |
| with d.c. voltage | | approx. 3 ms |
| 1-0 delay with a.c. voltage | | approx. 15 ms |
| with d.c. voltage | | approx. 15 ms |
| Frequency of a.c. voltage | | 47 ... 63 Hz |
| Allowable total capacitance of the input circuits against adjacent signal circuits with signals of identical magnitude: | | 18 nF |
| Dimension | | 1 division |
| Weight | | 0.085 kg |
| Order number | | |
| for 220 V | GJR5216500R1 | – |
| for 110 V | – | GJR5216500R2 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The isolator 07 XS 87 includes 4 identical functional units for the isolated input of d.c. or a.c. voltages.

The input signals are cleared from interference, adapted for processing and passed on acc. to the control program. Every input channel is fitted with a yellow light-emitting diode operated with the input current.

The module address of the input module is determined by the slot in the basic subrack and/or extension subrack (any I/O slot).

The input module is connected at the front panel by means of preassembled cables (see chapter 12, appurtenances ). The 0 V potential of the input signals is fed in from outside via the terminal 0. The + terminal serves merely to pass the supply voltage on to further input/output modules.

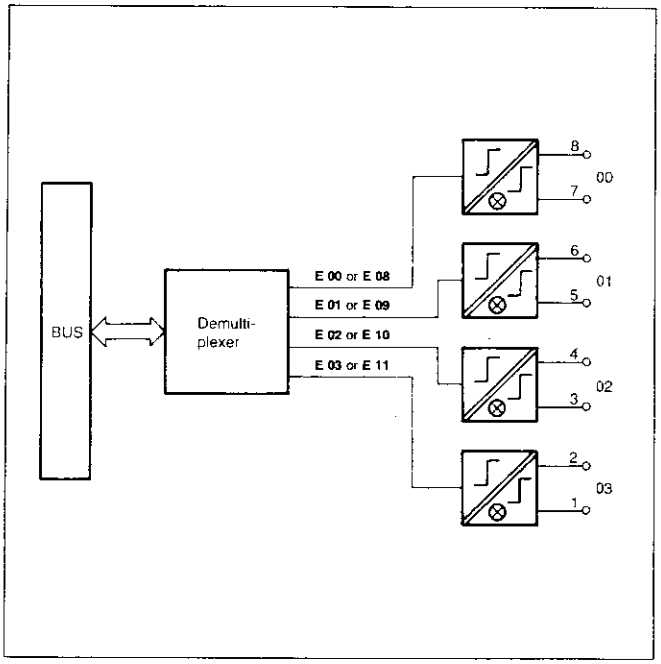
Connection of the input voltages:

| Functional unit = channel address | Terminal |
|---|---|
| 00 | 7 and 8 |
| 01 | 5 and 6 |
| 02 | 3 and 4 |
| 03 | 1 and 2 |

Any phase and poling. The voltage between two adjacent terminals must not exceed 250 V. Therefore the same terminal sequence shall always be chosen, e.g. phase/zero, phase/zero, +/–, phase/zero.

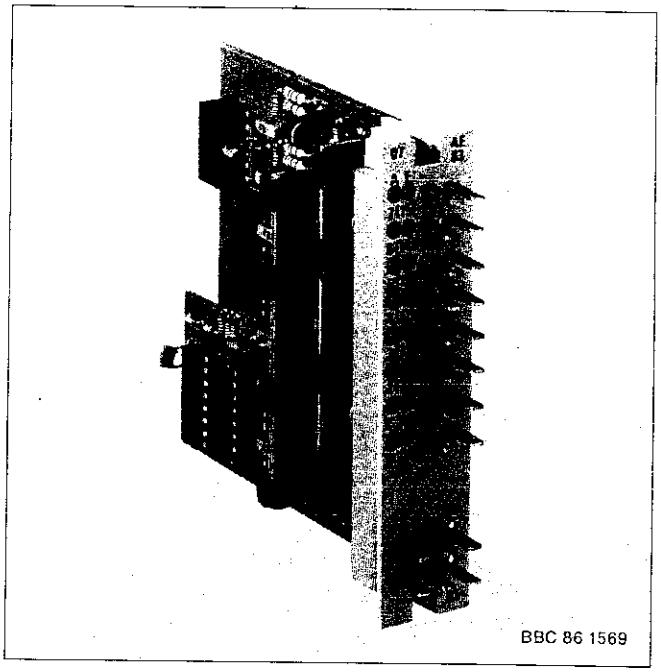
The potential isolator does not need a power supply of its own. The terminals + and 0 only serve to pass the supply voltage on to further input/output modules.

At voltages above 60 V the unused Faston blade connectors must be protected against accidental contact, e.g. by parallel insertion of a system cable 07 SK 82 and an empty connector housing.




Block diagram of the potential isolator 07 XS 87.

## 9.5 In- and output module 07 AE 83 R1




**Technical data:**

| | |
|---|---|
| External power supply via plug connector $U_S$ | 24 V d.c., +/- 30 % |
| Input channels | 8 |
| Voltage level 1-signal<br>0-signal | 13 ... 31.2 V d.c.<br>0 ... 5 V d.c. |
| input resistance<br>input current at 24 V d.c.<br>input delay | 6.8 kohm<br>approx. 3.3 mA<br>approx. 7 ms |
| Power consumption from logic voltage $U_{10}$ | 1 mA |
| Output channels | 8 |
| Power consumption per channel at $U_S$ = 24 V d.c., no output load | 5 mA |
| Power dissipation per channel at $U_S$ = 24 V d.c., no output load | approx. 120 mW + power dissipation caused by the load |
| Voltage drop in switched ON status between terminal + $U_S$ and the corresponding output | < 1.2 V |
| Dimension<br>Weight | 1 division<br>0.085 kg |
| Order number | GJR5231200R1 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| Protection against electric shock | GJR1948094P1 |

The input/output module 07 AE 83 R1 incorperates 8 modules for 24 V d.c. input signals and 8 modules for 24 V d.c./500 mA outputs.

**Inputs**

The input signals are suppressed and adapted for processing according to the control program. Each input has its own yellow LED, driven by the input current.

The adress of the input module is given by the slot in the standard rack resp. extention rack (any I/O slot).

For special requirements in the process adaption additional accessory units ara available within the SIGMA®-tronic b and the SIGMA®-tronic e product lines.

**Outputs**

All outputs are reset (0-signal) by the normalization cycle at the start of a program or after power is applied.

The trigger and the output sides are conductively connected. But there is no retroaction of the voltage switched by the output transistor upon the trigger circuit.

While triggered properly over the bus the output transistor conducts the current from the source over the load to the 0 V-common.

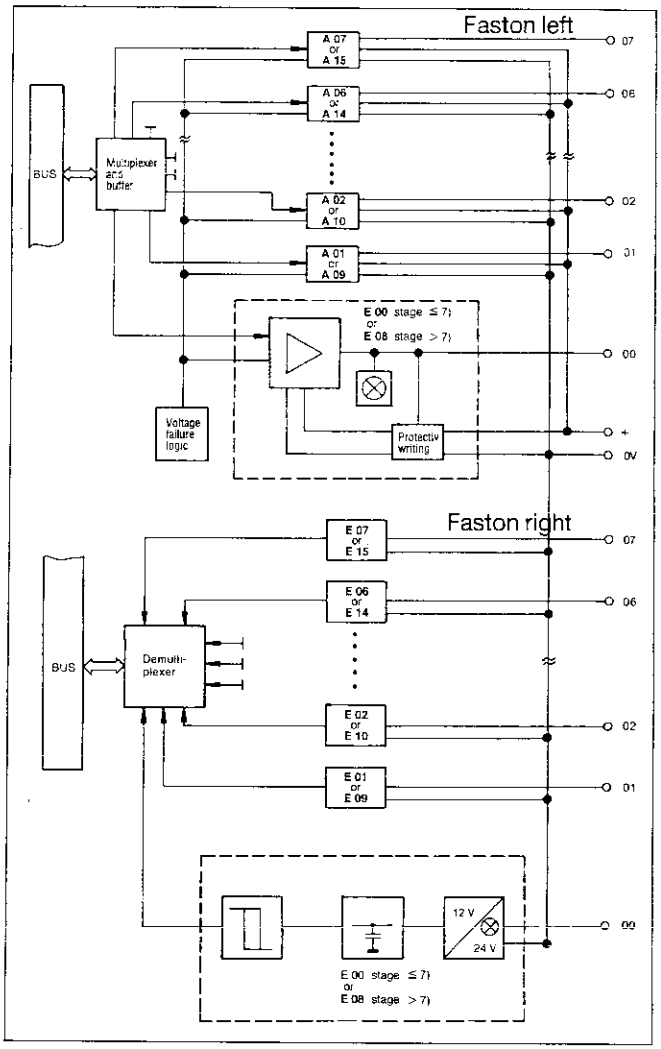
The logic status of each output channel is indicated by a red LED.

The in- and output unit 07 AE 83 R1 meets the DIN 19240 standard, where it is specified, that transistorized outputs may have a residual current of up to 0.2 % of the rated current in the OFF-state (with 0-signal).

The output unit is connected at the front panel via preassembled cables (see chapter 12, appurtenances). The load voltage of 24 V d.c. +/- 30 % is available at the terminals + and –. The high switching currents may cause a voltage drop in the power supply. Therefore it is recommended to isolate the power output stages from the signal wiring. A separate power supply source may be used for the output stages. In this case the 0 V-terminalsof the power supplies must be connected to each other. The transistorized switchingstage must be operated with smoothed d.c. voltage only, according to the PROCONTIC b systems data.

The maximum continous load rating of all 8 output channels may accumulate up to 1 A. This represens the terminal limit. With the outputs in alternately switching mode each of them can be loaded up to 500 mA.

For demagnetizing inductive loads, each output is connected to 0 V via a series circuit of a diode and a zener diode. The switch-OFF delay is thus reduced to a minimum.




Block diagram in- and output unit 07 AE 83.

**Notice:**
If the 07 AE 83 is used in the same main rack with the central prozessor module 07 ZE 82 or 07 ZE 84, the status indication is influenced by the corresponding input (same adress).

**The program is processed error free.**

**Measure to avoid a wrong display of the status:**
– if possible, do not use the 07 AE 83 in the main rack

To work with programming units:
– for 907 PC 30 or 07 PG 30: all assignments of outputs by the 07 AE 83 in the main rack shall be programmed with an additional ! A ..,..

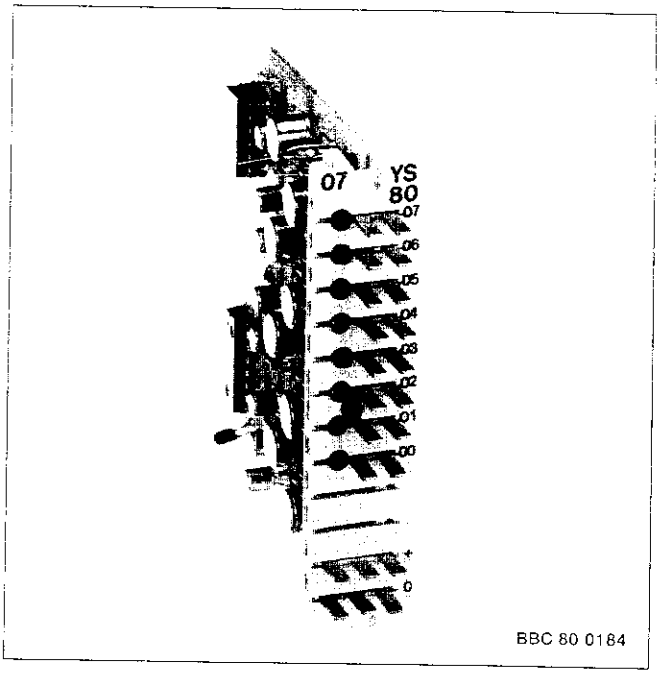
**Example:**

```
!  E 00,06     =  A 01,00     (status may be
                                wrongly indicated)
!  A 01,00                    (Status is correct)
!  E 02,00     et
```

– working with 907 PC 30:
Use the "extended test function" $ TEST only. Do not use the function TEST for = A ..,..

– working with 907 PC 31:
When setting to 'variable status' the status displayed correctly. When setting to 'power flow' the status may be displayed incorrectly.

## 9.6 Transistored switching stage 24 V d.c., 130 mA, with LED 07 YS 80 R1




**Technical data:**

| | |
|---|---|
| Output channels | 8 |
| Supply voltage | 24 V d.c. +/- 30% |
| Max. current input all 8 outputs triggered | 70 mA |
| no output triggered | 3 mA |
| Dissipation all 8 outputs triggered and without load | 1.75 W |
| Max.rated current at 24 V d.c. per output | 130 mA |
| Max. leakage current in OFF-state at 0-signal | 0.2 mA |
| Signalling of the output signal | 1 red LED each |
| Dimension | 1 division |
| Weight | 0.09 kg |
| Order number | GJR5212100R1 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The output module 07 YS 80 has 8 outputs 24 V d.c., 130 mA. The logic state of the respective output is indicated by a red LED.

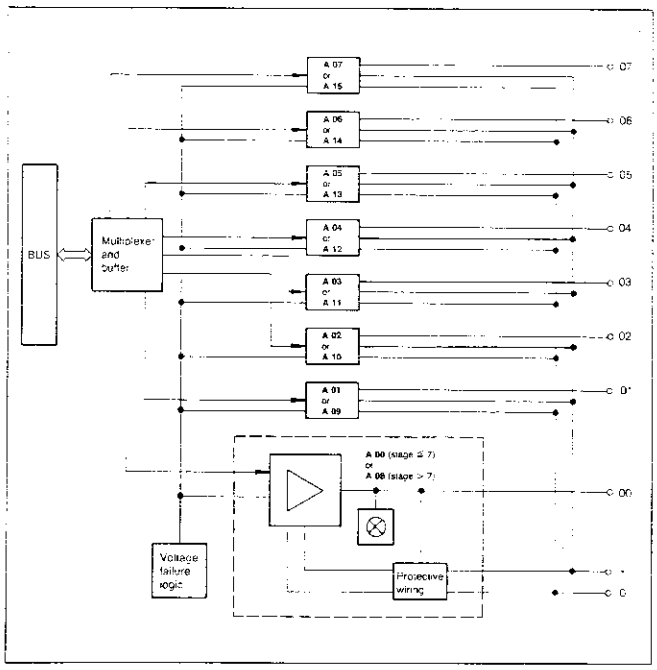
The module address of the output unit is determined by the slot in the basic stage and/or extension subrack (any I/O slot).

The output module is connected at the front panel by means of preassembled cables (see chapter 12, appurtenances). The loading voltage of 24 V d.c. +/-30% is present at the terminals + and 0. Each output is fitted with a demagnetizing diode for inductive loads and a decoupling diode. All outputs operate instantaneously.

When the program is started and/or the power supply is established all outputs are reset by the normalization cycle of the central unit (0-signal).

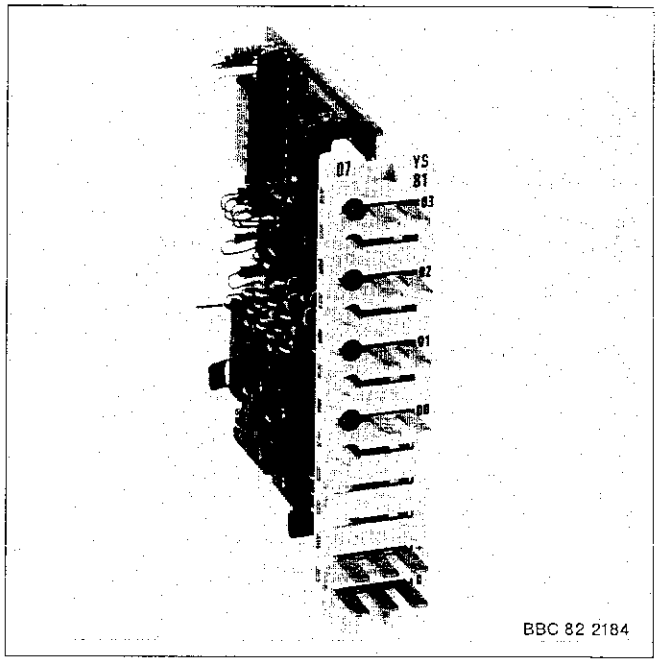
For special process adaptation problems adaptor modules from the BBC system series SIGMA®-tronic-b and SIGMA®-tronic-e are available.

According to the DIN 19240 draft standard 0.2 % of the rated current are allowable as residual current in the off-state with 0-signal. The module meets this standard.



Block diagramm of transistor output unit 07 YS 80

## 9.7 Transistored switching stage 24 V d.c., 2 A, with LED 07 YS 81 R2




**Technical data:**

| | |
|---|---|
| Output channels | 4 |
| Supply voltage | 24 V d.c. +/- 30% |
| Max. current input all 4 outputs triggered | 90 mA |
| no output triggered | 12 mA |
| Dissipation all 4 outputs triggered and not loaded | 2.1 W |
| Coincidence factor | 0.75 |
| Max.total current at 24 V d.c. | 6 A |
| Max.rated current at 24 V per funct. unit | 2 A |
| Load rating bei 24 V d.c. | inductive or ohmic 2 A each<br>or 1.8 A + lamp 2 W<br>or 1.5 A + lamp 5 W<br>or 1 A + lamp 10 W<br>or lamp 18 W |

| | |
|---|---|
| Signalling of the output signal | 1 red LED each |
| Max.switching frequency for inductive loads | 0.5 Hz |
| Max.leakage current in off-state at 0-signal | 4 mA |
| Dimension | 1 division |
| Weight | 0.11 kg |
| Order number | GJR5221800R2 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The output module 07 YS 81 includes 4 functional units for 24 V d.c., 2 A. The logic state of the respective output channel is indicated by a red LED.

The module address of the output module is determined by the slot in the basic stage and/or extension subrack (any I/O slot).

When the program is started and/or the power supply is established all outputs are reset by the normalization cycle of the central unit (0-signal).

There is galvanic coupling between the triggering and the output side. There is, however, no reaction of the voltage switched by the output transistor upon the triggering function.

When the corresponding triggering signals are given via the BUS circuit the output transistor will switch through and will thus effect a current flow from the applied power source via the load to the neutral bar.

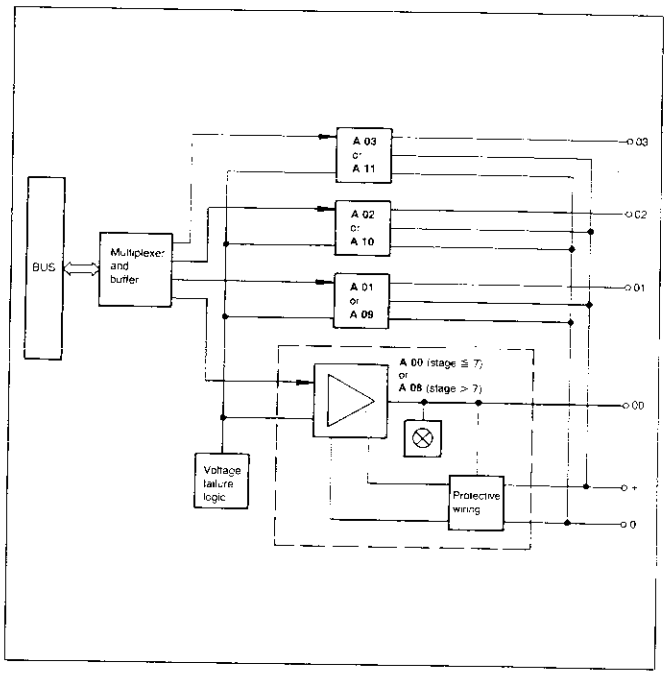
The load voltage of 24 V d.c. +/-30% is present at the terminals + and 0. The high switching currents may cause a voltage drop on the feed voltage side. It is therefore advisable to arrange the power supply for the power output stages separately. A separate power source may be used for the power supply of the power output stages. But the zero potentials must then be connected with each other. The transistorized switching stage should be operated only with a smoothed d.c. voltage in accordance with the PROCONTIC b system data.

The maximum continuous output load rating of all eight functional units together (total load rating) amounts to $I_{tot.} = 6$ A. This value is to be regarded as a thermal limit. With alternately switched outputs each can thus be loaded with 2 A.

To demagnetize inductive loads each output is connected in a series-parallel circuit of diode und Z diode against 0 V. The switch-off delay is thus reduced to a minimum.

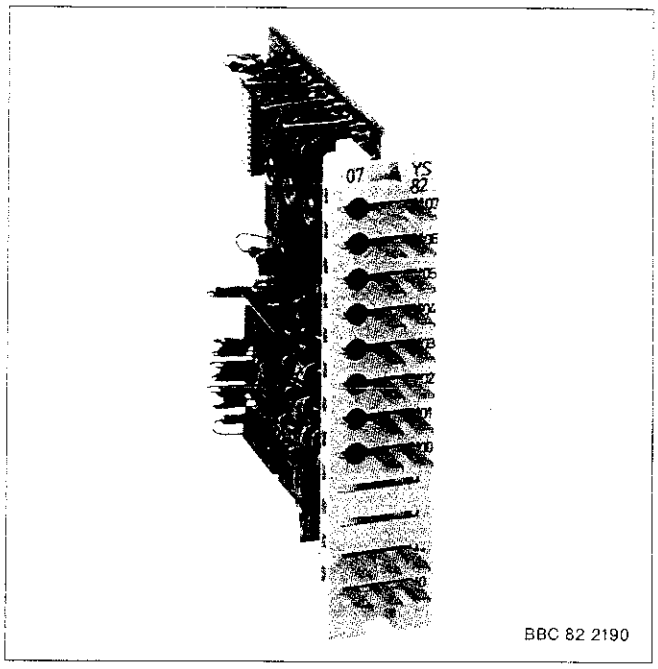
A 0 V monitoring circuit prevents any activation of circuits in case of a zero potential shift.

According to the DIN 19240 draft standard 0.2 % of the rated current are allowable as residual current in the off-state with 0-signal. The module meets this standard.




Block diagram of transistor output 07 YS 81.

## 9.8 Transistored switching stage 24 V d.c., 500 mA, with LED 07 YS 82 R1




**Technical data:**

| | |
|---|---|
| Output channels | 8 |
| Supply voltage | 24 V d.c. +/- 30% |
| Max. current input all 8 outputs triggered | 73 mA |
| no output triggered | 3 mA |
| Dissipation all 8 outputs triggered and not loaded | 1.75 W |
| Coincidence factor | 0.5 |
| Max. total current at 24 V d.c. | 2 A |
| Max. rated current at 24 V d.c. per funct. unit | 500 mA |
| Load rating at 24 V d.c. | inductive or ohmic 500 mA each or lamp 5 W |
| Max. leakage current in off-state at 0-signal | 1 mA |
| Signalling of the output signal | 1 red LED each |
| Max.switching frequency f. inductive loads | 0.5 Hz |
| Dimension | 1 division |
| Weight | 0.11 kg |
| Order number | GJR5221100R1 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 GJV3071902R1 | |
| Protection against electric shock | GJR1948094P1 |

The output module 07 YS 82 includes 8 functional units for 24 V d.c., 500 mA. The logic state of the respective output channel is indicated by a red LED.

The module address of the output module is determined by the slot in the basic stage and/or extension subrack (any I/O slot).

When the program is started and/or the power supply is established all outputs are reset by the normalization cycle of the central unit (0-signal).

There is galvanic coupling between the triggering and the output side. There is, however, no reaction of the voltage switched by the output transistor upon the triggering function.

When the corresponding triggering signals are given via the BUS circuit the output transistor will switch through and will thus effect a current flow from the applied power source via the load to the neutral bar.

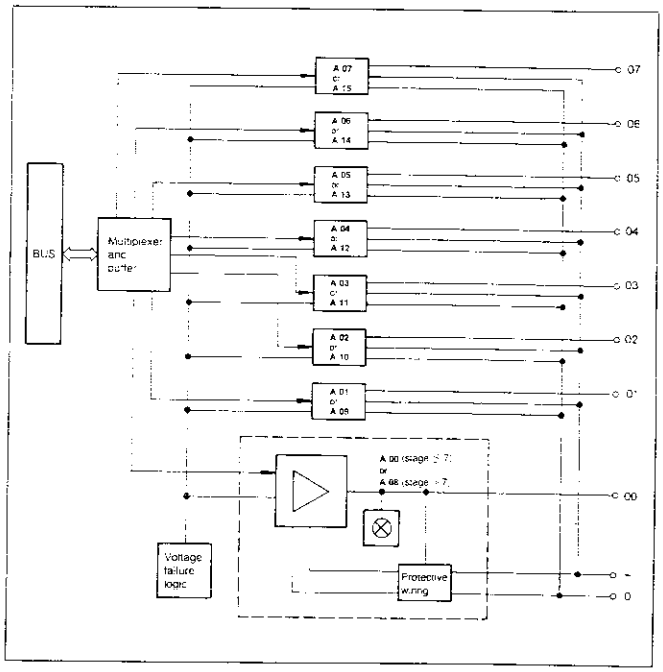
According to the DIN 19240 draft standard 0.2 % of the rated current are allowable as residual current in the off-state with 0-signal. The module meets this standard.

The output module is connected at the front panel via preassembled cables (see "Appurtenances"). The load voltage of 24 V d.c. +/-30% is present at terminals + and 0. The high switching currents may cause a voltage drop on the supply voltage side. It is therefore advisable to arrange the power supply for the power output stages separately. A separate power source may be used for the power supply of the power output stages. But the zero potentials must then be connected to each other.The transistorized switching stage shall be operated with a smoothed d.c. voltage only, in accordance with the PROCONTIC b system data.

The maximum continuous output load rating of all 8 functional units together (total load rating) is $I_{tot.} = 2$ A. This value is to be regarded as the thermal limit. With alternately switching outputs each can thus be loaded with 500 mA.

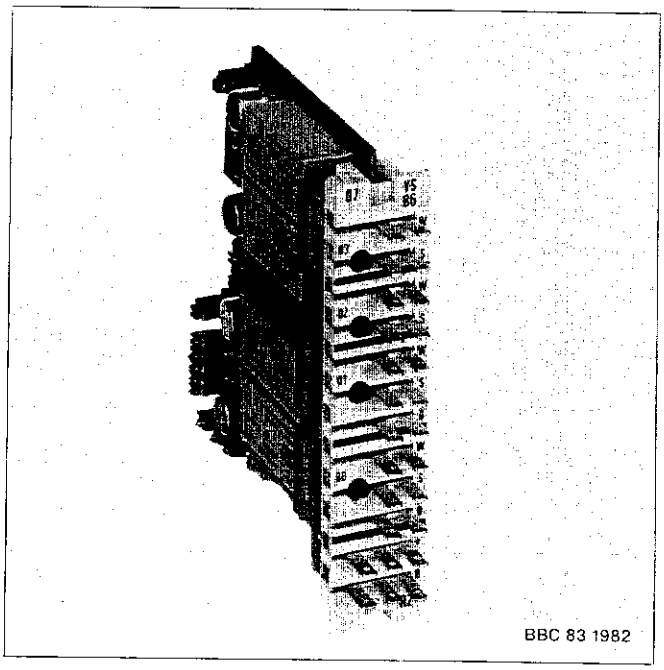
To demagnetize inductive loads each output is connected in a series-parallel circuit of diode und Z diode against 0 V. The switch-off delay is thus reduced to a minimum.

A 0 V monitoring circuit prevents any activation of circuits in case of a zero potential shift.




Block diagram of transistor output unit 07 YS 82

## 9.9 Relay switching stage 220 V, 2 A 07 YS 86 R2




**Technical data:**

| | |
|---|---|
| Output channels | 4 |
| Supply voltage for relay coils | 24 V d.c. +/-30 % |
| Min.switching capacity | 8 W |
| Max.switching capacity at U 250 V | 0.5 kVA |
| Min.switching voltage | 16 V |
| Max.switching voltage | 250 V |
| Max.switching current | 2A |
| Residual current, working contact, at 220 V | approx. 1.5 mA |

| | |
|---|---|
| Contact service life, w/o load | approx. $5 \times 10^7$ |
| at 220 V | approx. $5 \times 10^5$ |
| According to experience the service life of a.c. contactors and/or solenoid valves operated in the 100...500 VA range and cos phi 0.3...0.5 is | approx. $10^6$ |
| Making delay | approx. 8 ms |
| Breaking delay | approx. 7 ms |
| Bounce time | approx. 1ms |
| Dimension | 1 division |
| Weight | 0.140 kg |
| Order number | GJR5215400R2 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The output module 07 YS 86 R2 consists of four relay switching stages independent of each other, two of them being designed with 1 changeover contact, and the other two with 1 make contact. The logic state of the respective output channel is indicated by a red LED.

The module address of the output module is determined by the slot in the basic stage and/or extension subrack (any I/O slot).

When the program is started and/or the power supply is established all outputs are reset by the normalization cycle of the central unit (0-signal).

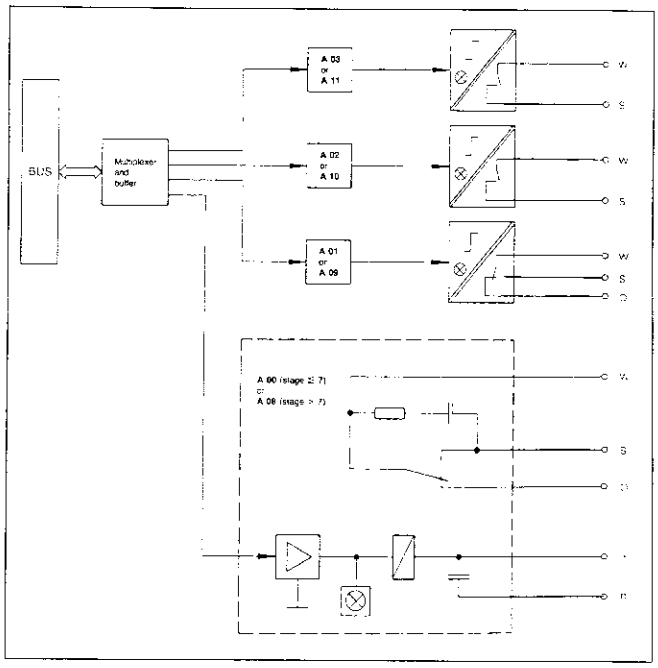
To protect the contacts, in particular when inductive loads are switched, an RC combination is arranged parallel between root and working contact. It represents a finite resistance for a.c. voltages; therefore with an open contact a voltage can be measured, depending on the sensitivity of the measuring instrument used.

For switching inductive d.c. loads an extinguishing circuit parallel to the load is required in addition, e.g. a free-wheeling diode alone or a series-parallel circuit consisting of a diode and a zener diode.

The supply voltage (24 V d.c.) for the relay coils is fed in from the front via the terminal pins + and 0. Any interruption of this supply voltage causes the four relays to drop out; this is necessary for protective circuits, e.g.

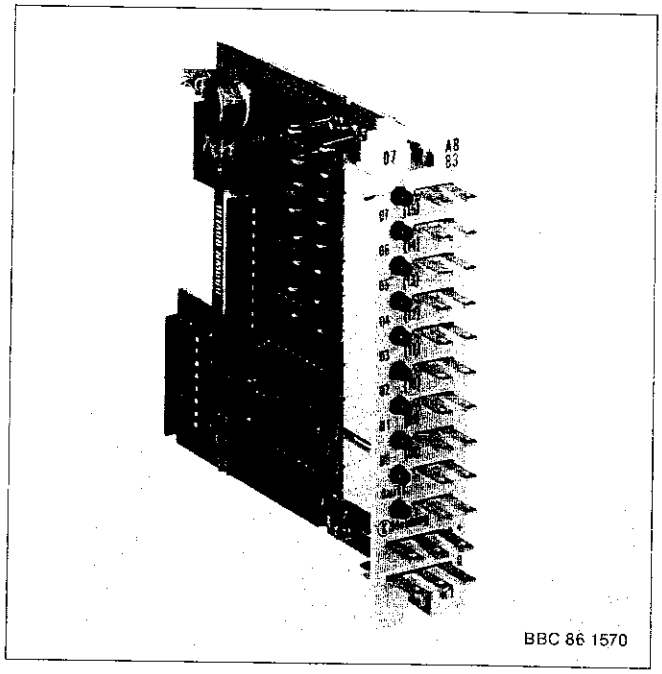
For switching voltages of > 25 V or > 60 V d.c. the unused faston blade connectors must be protected against accidental contact, e.g. by the parallel insertion of a system cable 07 SK 82 and a dummy connector housing.

The voltage between the various Faston connections must not exceed 250 V.




Block diagram of relay switching stage 07 YS 86.

## 9.10 Transistorized switching stage 24 V d.c., 500 mA with LED, 07 AB 83 R1




**Technical data:**

| | |
|---|---|
| Output channels | 8 |
| Supply voltage via plug connector $U_S$ | 24 V d.c. +/- 30% |
| Max. current input all 8 outputs triggered | < 100 mA (w/o load) |
| no output triggered | < 35 mA |
| Current input from $U_{10}$ | < 1 mA |
| Power dissiption all 8 outputs triggered and loaded ($U_S$ = 24 V, I = 2 A) | 4 W |
| Coincidence factor | 0.5 |
| Max. total current at 24 V d.c. | 2 A |
| Max. rated current at 24 V d.c. per output unit | 0.5 A short circuit protected |
| Short circuit current limit | < 1.2 A |
| Load rating at 24 V d.c. | inductive or ohmic 500 mA each or lamp 5 W |
| Max. leakage current in OFF-state at 0-signal | < 0.8 mA |
| Max. switching frequency for inductive loads | 0.5 Hz |
| Signalling of the output signal | 1 red LED each |
| Short circuit monitoring output | 100 mA, short circuit protected |
| Short circuit indication | red LED |
| Short circuit reset 0-signal | 0 V ... 5 V |
| 1-signal | 13 V ... 31.2 V |
| Indication of the short circuit reset | yellow LED |
| Dimension | 1 division |
| Weight | 0.11 kg |
| Order number | GJR5231400R1 |

**Appurtenances:**

| | |
|---|---|
| System cable 07 SK 82 R* | GJR5214900R* (R* module in various variants) |
| System plug connector 07 SK 84 R1 | GJV3071902R1 |
| Protection against electric shock | GJR1948094P1 |

The output module 07 AB 83 includes 8output channels for 24 V d.c./500 mA each. The outputs are short circuit protected. The logic state of the respective output channel is indicated by a red LED.

The adress of the output module is determined by the slot in the main rack resp. the extention rack (any I/O slot).

When the programm is started or after power is applied, all outputs are reset by the normalization cycle of the central processor unit (0-signal).

The trigger and the output sides are conductively connected. But there is no retroaction of the voltage switched by the output transistor upon the trigger circuit.

While triggered properly over the bus the output transistor conducts the current from the source over the load to the 0V-commom.

The 07AB83 meets the DIN 19240 standard, where ijt is specijfied, that transistorized outputs may have a residual current of up to 0,2 % of the rated current in the OFF-state (with 0-signal).

The output unit is connected at the front panel via preassembled cables (see accessories). The load voltage of 24 VDC +/ -30% is available at the terminals + and –. The high switching currents may cause a voltage drop in the power supply. Therefore it is recommended to isolate the power stages from the signal wiring. A separate power supply source may be used for the output stages. In this case the 0V-terminals of the power supplies must be connected to each other. The transistorized switching stage must be operated with smoothed DC voltage only, according to the PROCONTIC b systems data.

The maximum continuous load rating of all 8 ouput channels may accumulate up to 2A. This represents the thermal limit. With the outputs in alternately switching mode each of them can be loaded up to 500mA.

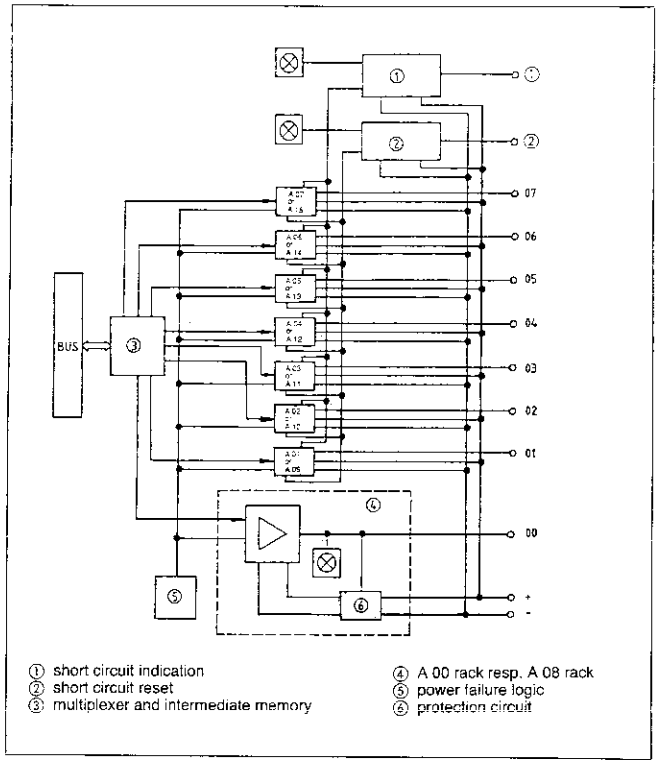
For demagnetizing inductive loads, each output is connected to 0V via a series circuit of a diode and a zener diode. The switch-OFF delay is thus reduced to a minimum.

A 0V-monitoring circuit prevents the outputs from irregularly switching ON caused by unsymetrical lead (0V-displacement).

The short circuit indicator signal is available on terminal no.10. This output can be loaded up to 100mA and is also short circuit protected. It is signalized by a red LED. The output of the short circuit protected. It is signalized by a red LED. The output of the short circuit indication may be connected in an wired OR circuit for a collective indication.

The short circuit reset signal is connected to terminal no. 9. It is signalized by a yellow LED. A permanent reset (steady 1-signal at the reset input) is not allowed (reduction of life time with an existing short circuit).

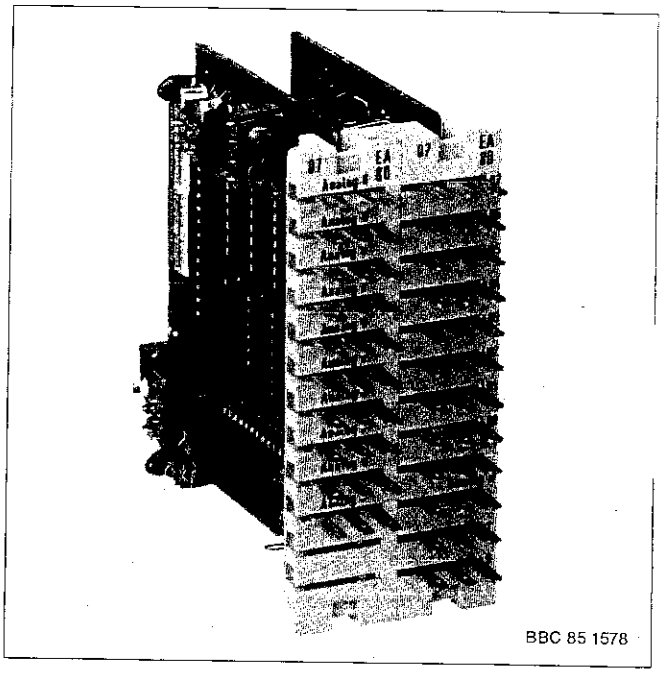
With an existing short circuit the signal at the corresponding output drops.




① short circuit indication
② short circuit reset
③ multiplexer and intermediate memory
④ A 00 rack resp. A 08 rack
⑤ power failure logic
⑥ protection circuit

Block Diagram: Transistor Switching Stage 07 AB 83.

## 10.1 Analog input module 07 EA 80 R1




**Technical data:**

| | |
|---|---|
| Input channels | 8 |

**Power supply:**

| | |
|---|---|
| Input terminal voltage $U_S$ | 24 V d.c. +/– 30 % |
| Current input from $U_s$ | <= 100 mA |
| Current input from $V_{DD}$ (BUS supply) | <= 40 mA |

**Input values:**

– Voltage input 0...10 V

| | |
|---|---|
| Analog input signal range | 0...9.964 V |
| Resolution | +/– 1/2 LSB (= +/- 19.6 mV) |
| Linearity error | +/– 3/4 LSB (= +/– 29.4 mV) |
| Intrinsic error related to the final value | +/– 0.5 % |
| Gain error between 2 channels | 1 LSB (39 mV) |
| Temperature coefficient | +/– 150 ppm/K |
| Input resistance | 100 kohm |

– Current input 0...20 mA

| | |
|---|---|
| Analog input signal range | 0...19.92 mA |
| Resolution | +/– 1/2 LSB (= +/– 35 µA) |
| Linearity error | +/– 3/4 LSB (= +/– 59 µA) |
| Intrinsic error related to the final value | +/– 0.75 % |
| Gain error between 2 channels | 1 LSB (= 78,4 µA) |
| Temperature coefficient | +/– 175 ppm/K |
| Input resistance | 250 ohm |

| | |
|---|---|
| – Current input 4...20 mA | |
| Analog input signal range | 4...19.938 mA |
| Resolution | +/– 1/2 LSB (= +/– 31 µA) |
| Linearity error | +/– 3/4 LSB (= +/– 47 µA) |
| Intrinsic error related to the final value | +/– 0.8 % |
| Gain error between 2 channels | 1 LSB (= 62 µA) |
| Temperature coefficient | +/– 175 ppm/K |
| Input resistance | 250 ohm |
| Input time per channel | 70 µs |
| Time constant of the input filters | 100 ms |
| Allowable potential difference between analog 0 V and PROCONTIC 0 V | +/– 150 mV |
| Ambient temperature | 0...55 °C |
| Humidity class | F |
| ut at terminal +10 V<br>oltage input only) | + 10 V +/– 2.25 % |
| ad current | 5 mA |
| Dimensions | 2 divisions |
| Weight | 0.2 kg |
| Order number | GJR5230200R1 |

With the analog input module 07 EA 80 it is possible to convert 8 analog values into digital values of 8-bit length and to make them available in a mail box register for callup via the word bus of the PROCONTIC b.

The module can be switched to either voltage input or current input.
Voltage input takes place in the range 0... +10 V. The current input can be set for the range 0... 20 mA or 4... 20 mA by changing the respective jumpers.

To eliminate interference all inputs are filtered by means of an RC element against analog 0V.

A constant voltage of +10 V for feeding the adjustment potentiometers is provided via the +10 V terminal in the voltage input operating mode.

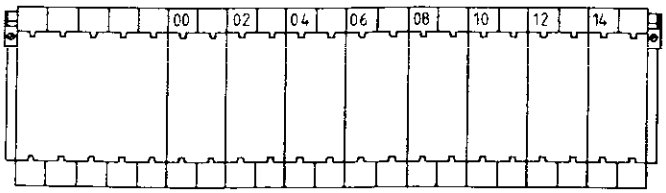
The different operating modes of voltage input and current input cannot be mixed within one and the same module. The use of analog input/output modules is possible in the bus assembly 07 ET 84 only.

The output channels are addressed via the module address of the left-hand side division and the channel numbers

00... 07 (in subracks <=7 coded)

and/or 08... 15 (in subracks > 7 coded)

**Attention:**
All analog input/output modules shall be placed within the BUS assembly so that the slot for the left-hand side division has an even-numbered module address.
Left division to slot 00, 02, 04, ..., 14




Slots for analog input/output modules in the word/bit subrack 07 ET 84

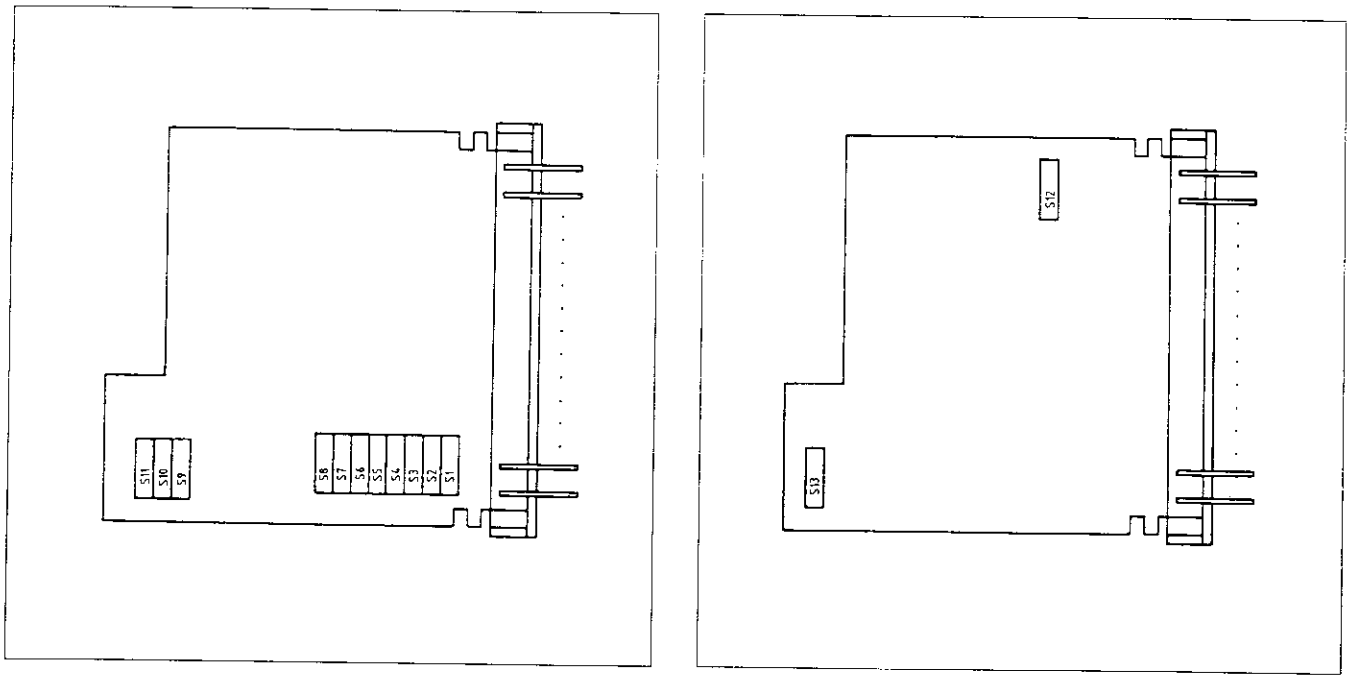
**Operating modes**

| Operating mode | Jumper | Jumper circuit state |
|---|---|---|
| Voltage input 0...+10 V | S1 to S8 | open |
| | S9 | closed |
| | S10, S11, S13 | open |
| Current input 0...20 mA | S1 to S8 | closed |
| | S10 | closed |
| | S9, S11, S13 | open |
| Current input 4...20 mA | S1 to S8 | closed |
| | S10, S11, S13 | closed |
| | S9 | open |

The jumper S12 must be open.

**Note:**
Closed jumpers have to be soldered by the finish of the commissioning.

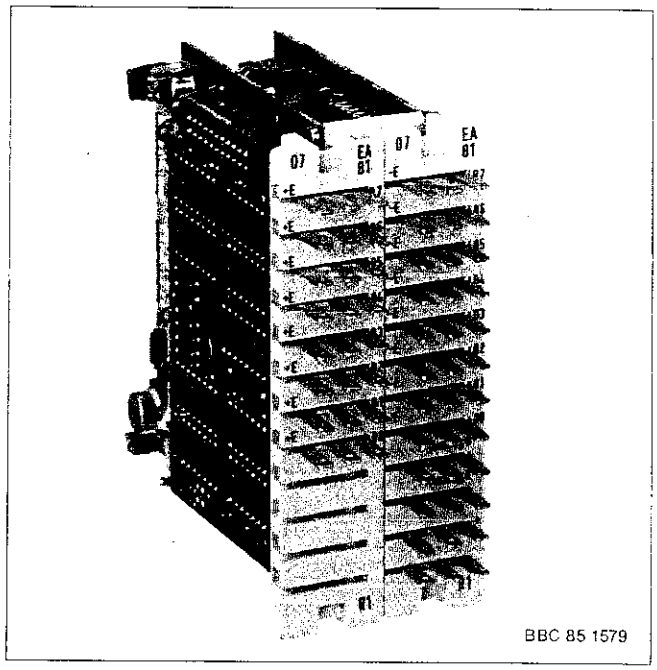
## Jumper on the module



## Analog value representation

| | | Analog input/output 12-bit | Analog input/output 8-bit bipolar | Analog input/output 8-bit unipolar | Analog values internal, in % | Integer values |
|---|---|---|---|---|---|---|
| Resolution | | 9.8 mV | 78 mV | 39 mV | 0.025 | 1 |
| Max. value | | + 12 V | + 9.92 V | + 9.96 V | + 800 | + 32767 |
| Min. value | | − 12 V | − 9.92 V | 0 V | − 800 | − 32767 |
| Valuation of databits (2 byte) | D 15 | = D 13 | = D 12 | = 0 | − 800 | − 32768 |
| | D 14 | = D 13 | = D 12 | = 0 | + 400 | 16384 |
| | D 13 | − 20 V | = D 12 | = 0 | + 200 | 8192 |
| | D 12 | + 10 V | − 10 V | = 0 | + 100 | 4096 |
| | D 11 | + 5 V | + 5 V | + 5 V | + 50 | 2048 |
| | D 10 | + 2.5 V | + 2.5 V | + 2.5 V | + 25 | 1024 |
| | D 09 | + 1.25 V | + 1.25 V | + 1.25 V | + 12.5 | 512 |
| | D 08 | + 0.625 V | + 0.625 V | + 0.625 V | + 6.25 | 256 |
| | D 07 | + 0.3125 V | + 0.3125 V | + 0.3125 V | + 3.125 | 128 |
| | D 06 | + 0.15625 V | + 0.15625 V | + 0.15625 V | + 1.5625 | 64 |
| | D 05 | + 0.078125 V | + 0.078125 V | + 0.078125 V | + 0.78125 | 32 |
| | D 04 | + 0.0390625 V | — | + 0.0390625 V | + 0.390625 | 16 |
| | D 03 | + 0.01953125 V | — | — | + 0.1953125 | 8 |
| | D 02 | + 0.009765625 V | — | — | + 0.09765625 | 4 |
| | D 01 | — | — | — | + 0.048828125 | 2 |
| | D 00 | — | — | — | + 0.024414625 | 1 |

## 10.2 Analog input module 07 EA 81 R1




**Technical data:**

| | |
|---|---|
| Input channels | 8 |

**Power supply:**

| | |
|---|---|
| Supply voltage $U_S$ | 24 V d.c. +/−30 % |
| Current input from $U_S$ | 120 mA |
| Current input from PROCONTIC logic power supply | 40 mA |

**Input values:**

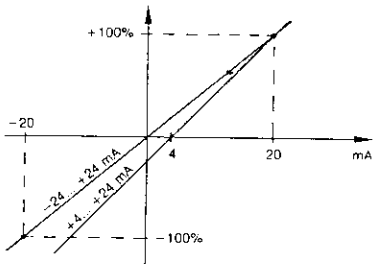
| | |
|---|---|
| – Voltage input +/– 10 V d.c. | |
| Range of the analog input signal between +E and –E | +/−12 V |
| Resolution | +/−5 mV (= +/−1/2 LSB) |
| Linearity error | +/−5 mV (= +/−1/2 LSB) |
| Common-mode rejection for the input signal | 75 dB |
| Common-mode rejection range | +/−12 V |
| Input resistance between +E and −E | 200 kohm |
| Intrinsic error related to the final value | +/−0.15 % |
| Temperature coefficient | +/−30 ppm/K |
| Electric strength at +E and –E | +/−30 V |
| – Voltage input +/– 2 V d.c. | |
| Analog input signal range between +E and –E | +/−2.4 V |
| Resolution | +/−1 mV (= +/−1/2 LSB) |
| Linearity error | +/−1 mV (= +/−1/2 LSB) |
| Common-mode suppression for the input signal | 75 dB |
| Input resistance between +E and –E | 200 kohm |
| Intrinsic error related to the final value | 0.25 % |
| Temperature coefficient | +/−30 ppm/K |
| Electric strength at +E and −E | +/−30 V |
| – Current input +/– 20 mA | |
| Analog input signal range between +E and −E | – 24 mA...+24 mA |
| Resolution | +/−10 µA (= +/−1/2 LSB) |
| Linearity error | +/−10 µA (= +/−1/2 LSB) |
| Load | 100 ohm |

| | |
|---|---|
| – Power input 4-20 mA | |
| Analog input signal range between +E and –E | 4...24 mA |
| Resolution | +/–8 µA (= +/–1/2 LSB) |
| Linearity error | +/–8 µA (= +/–1/2 LSB) |
| Load | 100 ohm |
| Dimensions | 2 divisions |
| Weight | 0.22 kg |
| Order number | GJR5214000R1 |

The analog input module 07 EA 81 is used for converting 8 analog values into digital values of 12-bit length each which can then be processed by the PROCONTIC b word bus.

The following operating modes of voltage and current input can be established by changeover of jumpers. (Jumper see page 10-7).

- Voltage input, bipolar
  +/– 10 V
  +/– 2 V
- Current input bipolar
  +/– 20 mA
- Current input, unipolar
  4-20 mA




The different operating modes of voltage and current input cannot be mixed within one and the same 07 EA 81 module. (Exception: +/– 2 V input and +/– 20 mA input).

For the current inputs +/– 20 mA are the jumpers S1 -S8 closed.
For the voltage input +/– 2 V are the jumpers S1 - S8 open.

Jumper 1 = channel 8
.
.
jumper 8 = channel 1

All analog values are entered via differential inputs. Potential differences in the 0 V circuit to 150 mV max. have no effect. Any injected system hum voltage is suppressed.

To suppress interference all inputs are filtered against analog 0 V via RC elements.

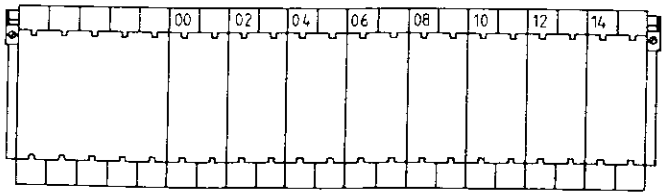
Utilization of analog input/output modules is only possible in the bus assembly 07 ET 84 with the word processor 07 WP 84 or the central control module 07 ZE 86.

The output channels are addressed via the module address of the left-hand side division and the channel numbers

00... 07 (in subracks < = 7 coded)

and/or 08... 15 (in subracks > 7 coded)

**Attention:**
All analog input/output modules shall be arranged in the bus assembly so that the slot of the left-hand side division has an even-numbered module address.
Left division in slot 00, 02, 04, ..., 14



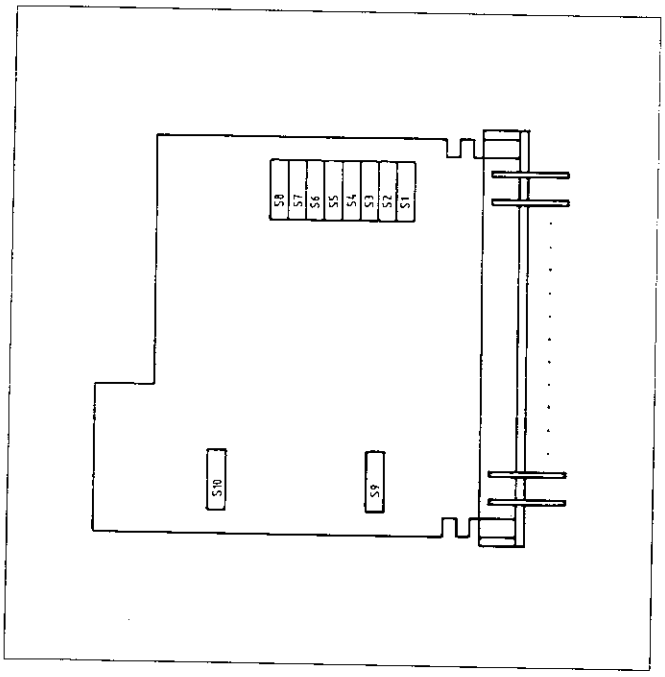

Slots for analog input/output modules in the word/bit subrack 07 ET 84

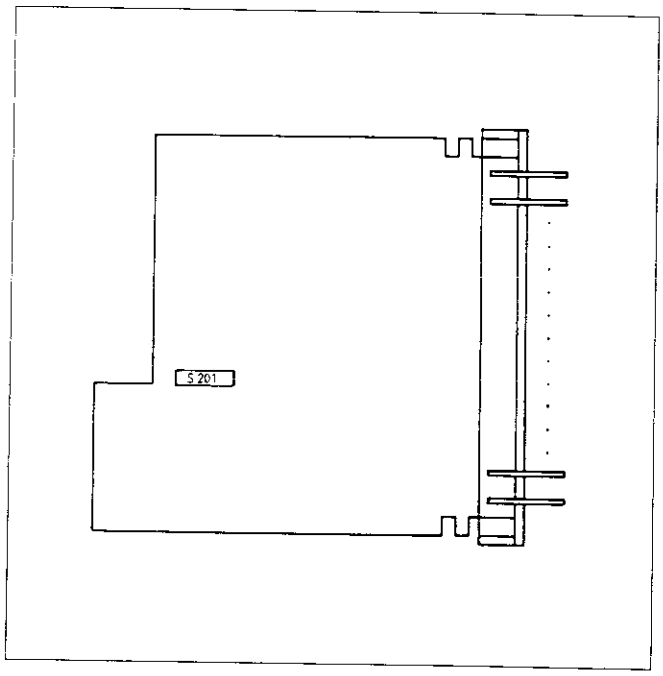
**Operating modes**

| Operating mode | Jumper | Jumper circuit state |
|---|---|---|
| Voltage input +/– 10 V | S1 to S8 | open |
| | S9 | root open |
| | S10 | root on right contact (3) |
| | S201 | closed |
| Current input +/– 20 mA | S1 to S8 | closed |
| | S9 | closed |
| | S10 | root on right contact (3) |
| | S201 | closed |
| Current input 4...20 mA | S1 to S8 | closed |
| | S9 | closed |
| | S10 | root on left contact (2) |
| | S201 | open |
| Voltage input +/– 2 V | S1 to S8 | open |
| | S9 | closed |
| | S10 | root on right contact (3) |
| | S201 | closed |

**Note:**
Closed jumpers have to be soldered by the finish of the commissioning.

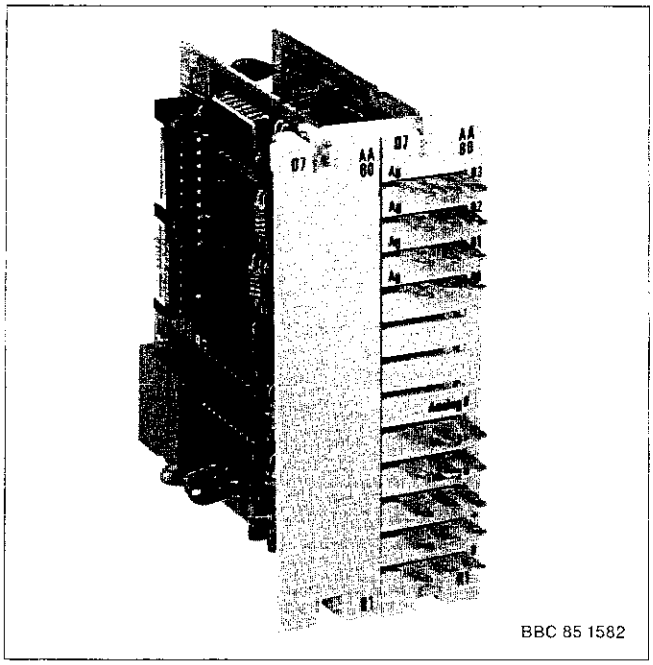
**Jumper on the module**




**Analog value representation**
See page 10-4.

## 10.3 Analog output module 07 AA 80 R1




**Technical data:**

| | |
|---|---|
| Output channels | 4 |

**Power supply:**

| | |
|---|---|
| Feed voltage $U_S$ | 24 V d.c. +/– 30 % |
| Current input from $U_S$ | <= 120 mA |
| Current input from PROCONTIC logic power supply | <= 10 mA |

**Output values:**

| | |
|---|---|
| Output voltage range | +/–9.96 V |
| Resolution | +/–40 mV (= +/–1/2 LSB) |
| Linearity error | +/–80 mV (= +/–1 LSB) |
| Intrinsic error related to the final value | +/–1 % |
| Temperature coefficient rel. to the fin. val. | +/–70 ppm/K |
| Max. output current | +/–5 mA |

**Other data:**

| | |
|---|---|
| Max. potential difference between "analog 0" and $U_{SS}$ (bus) | +/–150 mV |
| Ambient temperature | 0...55°C |
| Humidity class | F |
| Dimensions | 2 divisions |
| Weight | 0.17 kg |
| Order number | GJR5230000R1 |

The 07 AA 80 module includes 4 functional units for issuing analog signals in the bipolar voltage range +/– 10 V. The resolution amounts to 8 bits.

The module is equipped with an overflow protection device, so that for digital values in the MICAS format of + 100 % oder – 100 % the voltage values can be limited in each case to the maximum and/or minimum value.

All 4 outputs are safeguarded against destruction by means of a protective circuit with suppressor diode.

The supply voltage for the analog section is generated in the module by means of a non-floating DC/DC converter from the supply voltage $U_S$ (24 V) which is to be fed in via the front terminals + and 0.

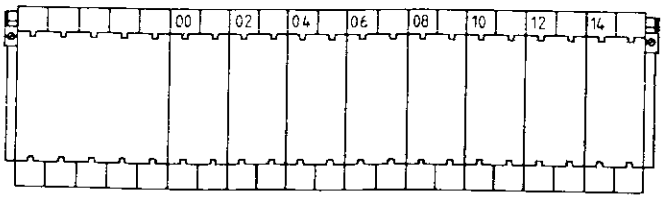
The max. output current per channel can be 5 mA. The use of analog input/output modules is only possible in the bus assembly 07 ET 84 with the word processor 07 WP 84 or the Central control module 07 ZE 86.

The output channels are addressed by means of the module address of the left division and the channel numbers

00...03 (in subracks <=7 coded)

and/or 08...11 (in subracks > 7 coded)

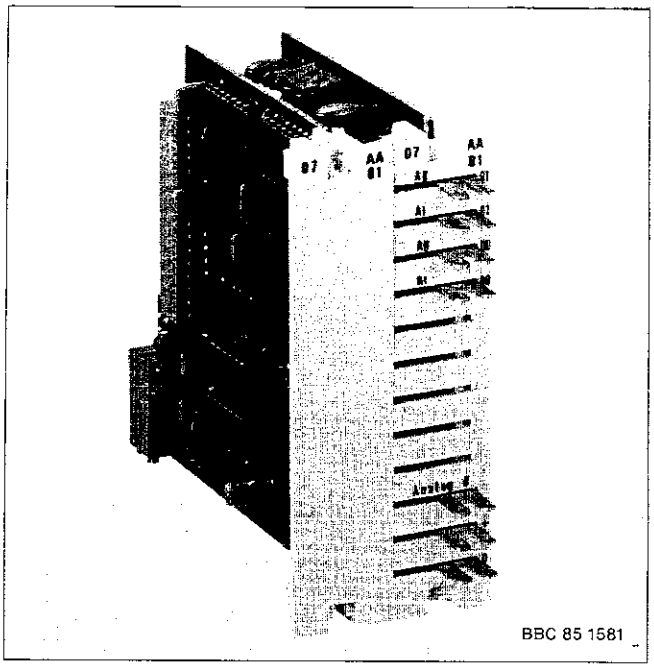
**Attention:**
All analog input/output modules shall be arranged in the bus assembly in such a way that the slot of the left-hand side division has an even-numbered module address.
Left division in slot 00, 02, 04, ..., 14




Slots for analog input/output modules in the word/bit subrack 07 ET 84

**Analog value representation**
See page 10-4.

## 10.4 Analog output module 07 AA 81 R1




**Technical data:**

| | |
|---|---|
| Output channels | 2 |

**Power supply:**

| | |
|---|---|
| Feed voltage $U_S$ | 24 V d.c. +/−30 % |
| Current input from $U_S$ | <= 120 mA |
| Current input from $V_{DD}$ (bus supply) | <= 10 mA |

**Output values:**

| | |
|---|---|
| – Voltage output +/− 10 V at terminal $A_U$ | |
| Output voltage range | +/−12 V |
| Max. output current | +/−5 mA |
| Resolution | +/−5 mV (= +/−1/2 LSB) |
| Linearity error | +/−5 mV (= +/−1/2 LSB) |
| Intrinsic error related to the final value | +/−0,15 % |
| Temperature coefficient rel. to the fin. val. | +/−20 ppm/K |
| – Power output 0...20 mA at terminal $A_I$ | |
| Output current range | 0 ... 24 mA |
| Resolution | +/−10 µA(= +/−1/2 LSB) |
| Linearity error | +/−10 µA (= +/−1/2 LSB) |
| Intrinsic error related to the final value | +/−0.25 % |
| Temperature coefficient rel. to the fin. val. | +/−20 ppm/K |
| Input resistance | 250 ohm |
| – Current output 4...20 mA at terminal $A_I$ | |
| Output current range | 4...20 mA |
| Resolution | +/−8 µA (= +/−1/2 LSB) |
| Linearity error | +/−8 µA (=+/−1/2 LSB) |
| Intrinsic error related to the final value | +/−0.15 % |

**Other data:**

| | |
|---|---|
| Ambient temperature | 0...55°C |
| Humidity class | F |
| Dimensions | 2 divisions |
| Weight | 0.17 kg |
| Order number | GJR5218600R1 |

The 07 AA 81 module contains 2 functional units for issuing analog signals.

The module can be switched over to bipolar voltage output in the range +/– 12 V and to unipolar current output in the range 0 ... 24 mA or 4 ... 24 mA. The resolution is 12-bit.

The terminals for current output and voltage output are brought out separately. The changeover to the different operating modes is effected by rearrangement of jumpers on the circuit board.

Different operating modes of voltage and current output cannot be mixed within one and the same module.

Both voltage and current outputs are safeguarded against destruction by a protective circuit using suppressor diodes.

The supply voltage for the analog section is generated in the module by means of a non-floating DC/DC converter from the supply voltage $U_S$ (24 V) which is to be fed in via the front terminals + and 0.

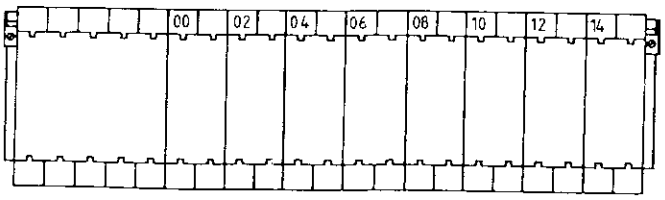
The use of analog input/output modules is only possible in the bus assembly 07 ET 84 with the word processor 07 WP 84 or the central control module 07 ZE 86.

The output channels are addressed by the module address of the left-hand side division and the channel numbers

00...01 (in subracks <=7 coded)

and/or 08...09 (in subracks > 7 coded)

**Attention:**
All analog input/output modules shall be arranged in the bus assembly in such a way that the slot of the left-hand side division has an even-numbered module address.
Left division in slot 00, 02, 04, ..., 14



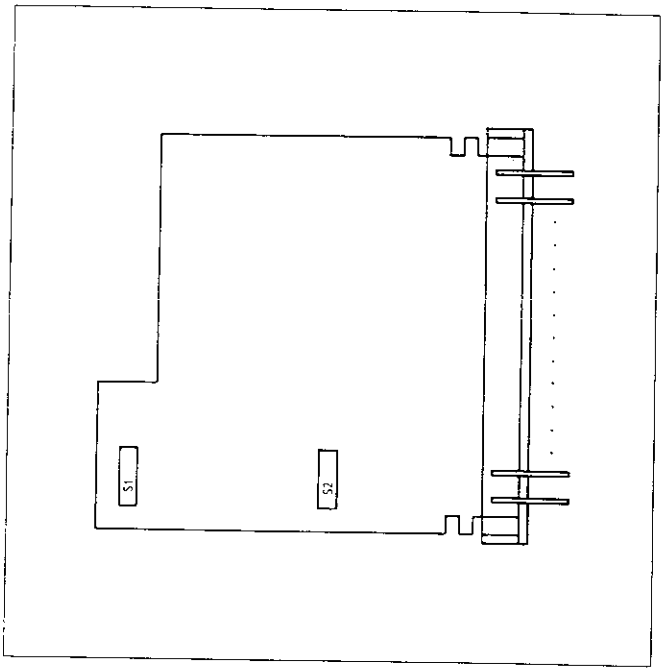

Slots for analog input/output modules in the word/bit subrack 07 ET 84

**Operating modes**

| Operating mode | Jumper | Jumper circuit state |
|---|---|---|
| Voltage output<br>+/– 10 V | S1<br>S2 | closed<br>root on right contact |
| Current output<br>0...20 mA | S1<br>S2 | closed<br>root on right contact |
| Current output<br>4...20 mA | S1<br>S2 | open<br>root on left contact |

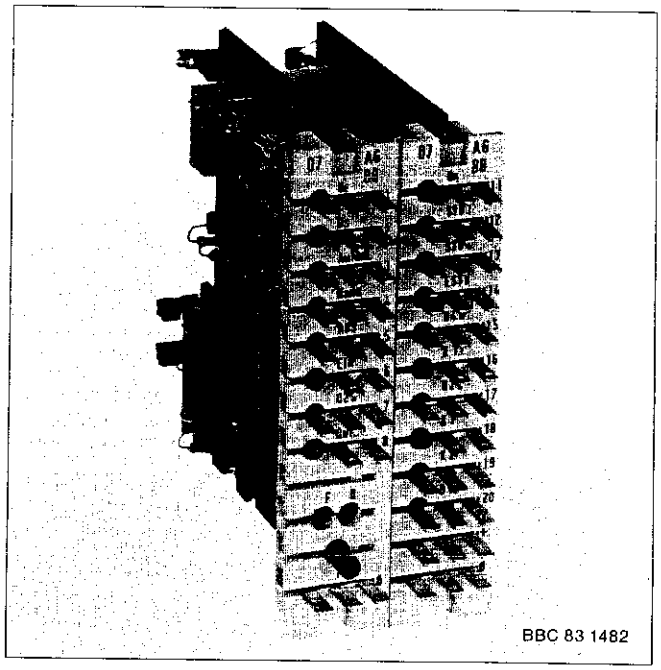
**Note:**
Closed jumpers have to be soldered by the finish of the commissioning.

**Jumper on the module**



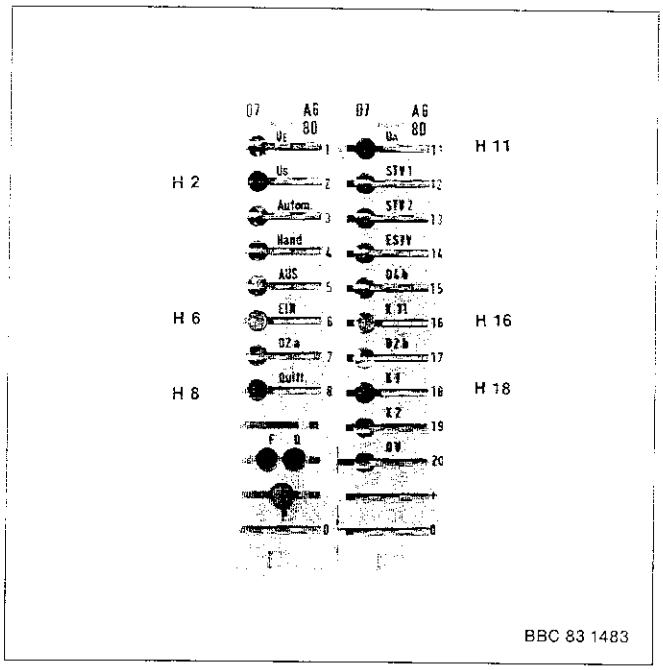

**Analog value representation**
See page 10-4.

## 11.1 Drive control module 07 AG 80 R1




**Technical data:**

| | |
|---|---|
| **Supply voltages for switch elements:** | |
| Input voltage $U_E$ | 24 V d.c. ... 48 V d.c. +/−30 % |
| Output voltage $U_A$ | 24 V d.c. ... 48 V d.c. +/−30 % |
| **Allowable input voltage ranges** | |
| 1-signal | + 13 V... + 65 V |
| 0-Signal | 0 V... + 5 V |
| Input delay | typ. 10 ms |
| **Current input per input:** | |
| at U = 24 V | $I_E$ = 1.2 mA |
| at U = 48 V | $I_E$ = 2.4 mA |
| Current from $U_E$ | total of the input currents |
| Current from $U_A$ | total of the input currents + output load at K 11 |
| Current input from PROCONTIC power supply unit (Plug-in card NG.. ) | $I_{max.}$ = 25 mA |
| Dissipation with energized relay, 2 LEDs alight, 13 input loads at 48 V | 2 W |
| **Max. switched current of the relay output:** | |
| at $U_A$ = 24 V | $I_L$ = 2 A |
| at $U_A$ = 48 V | $I_L$ = 0.5 A |
| Dimensions | 2 divisions |
| Weight | 0.200 kg |
| Order number | GJR5217700R1 |




H 2 = LED red, $U_S$ not present
H 6 = LED yellow, manual enable
H 8 = LED red, fault memory set
H 11 = LED red, $U_A$ not present
H 16 = LED yellow, relay energized
H 18 = LED red, fault

Sockets:
F = enable for manual mode
Q = acknowledgement in the case of manual mode or zero setting of the selector switch
P = parking socket for switching pin

The drive control module 07 AG 80 serves to control and monitor solenoid valves as well as drives with one sense of rotation for direct starting or star-delta starting.

For emergency and repair operations the drive may also be operated manually, if the user program is not running, provided that the supply voltages are available.

**Input channels:**

All inputs are suitable for signals from 24 V d.c. or 48 V d.c. systems (max. input voltages: + 65 V) and are delayed for typ. 10 ms.

**Injection $U_E$, $U_S$:**

The supply voltage for the input switches and momentary contact switches is applied to terminal 1 ($U_E$) and may be either 24 V d.c. or 48 V d.c. +/- 30 %. $U_E$ is protected by means of a 250 mA miniature fuse (fast) inside the module and is then available at terminal 2 (as $U_S$) for feeding the input switches and momentary-contact keys. The presence of the voltage $U_S$ can be evaluated by the PROCONTIC b via the input channel En, 07 ①. If $U_S$ is not available the red LED H2 will come on.

**Automatic – manual switchover:**

Between $U_S$ and the input terminals 3 and 4 a selector switch with three switch positions is arranged: automatic-zero-manual. In position zero the drive is always switched off, irrespective of whether it was in manual or automatic operation before. The signals automatic and manual can be processed further by the PROCONTIC b system as input channels En, 06 and En, 05.

**Automatic operation:**

In the automatic operating mode (selector switch in position "automatic") the drive obeys the ON command arriving via the output channel An, 03. Input signals from the manual level are ineffective.

**Manual operation:**

In the manual operating mode the drive obeys the output signal of the command memory which is connected via the ON key and disconnected via the OFF key. The ON key is used as normally open contact, and the OFF key is used as a normally closed contact.

**Prerequisites for automatic operation:**

The drive can operate in the "automatic" mode only if the following preconditions are met:
- ON-command via BUS (An, 03) has 1-signal.
- No disturbance is present.
- Changeover switch in position "automatic".

If due to an error, a fault or defect both "manual" and "automatic" are providing signals simultaneously the drive will never operate.

**Prerequisites for manual operation:**

The command memory is set via the ON-key. The command memory has an overriding function for erasing. The following preconditions must have been met if it is to be set:

- The OFF-key must not be depressed.
- The selector switch must be in the manual position.
- A memory release must be available, either via the jack "release manual" or via the BUS.
- No disturbance shall exist.

Simultaneous manual and automatic signal lead to erasure of the command memory.

**Release for manual operation:**

Under normal circumstances the command memory release is given via the output channel An, 01.
This provides the possibility to include the effects of as many interlocks (apart from safety-engineering interlocks) as desired via the software even in the manual operating mode; i.e. in the manual mode a switch-off can be effected and/or a switch-on prevented by means of the program. In case of software disturbances (or if the "RUN" switch of the PROCONTIC b is in the OFF position) and the drive shall be operated nevertheless (e.g. under "visual" control) the release can be enforced via the jack "release manual" (pin inserted). The yellow LED H6 will indicate whether a release has been given. It is alight in all positions of the selector switch. One can thus see even during automatic operation or with switch position "zero" whether the drive might be operated in the manual mode.

① *n = slot for the left division of the control module in the PROCONTIC b subrack, e.g. 00*
*n + 1 = slot for the right division of the control module in the PROCONTIC b subrack, e.g. 01*

The inserted pin in the jack "release manual" can be interrogated as 1-signal via the input channel En, 04; the software is thus informed of the fact that the release and/or non-release via the output channel An, 01 is ineffective.

**Disturbance memory:**

The disturbance memory has overriding setting function; it thus cannot be erased while the disturbance is still present.

The set disturbance memory erases the command memory and blocks the ON-command from the BUS (An, 03). The red LED H8 reports the set disturbance memory. It can be interrogated via the input channel En, 03 as to whether a disturbance exists. The condition of the disturbance memory can be interrogated via the variable En, 01.

**Acknowledgement when in automatic mode via the output channel An, 05**

It is possible (even likely) that the disturbance occurred while the ON-command had a 1-signal. The drive was thus disconnected by the onset of the disturbance. After the disturbance has been eliminated and upon acknowledgement of the disturbance memory the drive would be started up again if the ON-command is still present (triggered by the acknowledgement and not by an intentional ON-command). In case of a check-back disturbance the drive would make repeated reconnection attempts, i.e.start "pumping". This is undesirable and can have unpleasant effects. For this reason the ON-command is linked with the automatic mode acknowledgement.

An acknowledgement is in any case only possible if the ON-command has been removed before. After the acknowledgement the drive can start again when the ON-command is given another 1-signal.

In this way the drive cannot be restarted by the acknowledge signal and "pumping" in case of a check-back disturbance is also impossible.

**Acknowledgement in manual operating mode:**

This acknowledgement is possible in the positions "manual" and "zero" of the selector switch. The possibility to acknowledge in position "zero" has the advantage that a manual acknowledgement may be made before it is decided whether the drive shall then run in automatic or manual mode. In addition "orderly circumstances" (erased disturbance memory) can be established, if thereafter the drive shall not be reconnected for other reasons ("zero" position of the selector switch).

Manual acknowledgement may be made either via the input terminal 8 or the jack "manual acknowledgement". Joint acknowledgement for several drive control modules is possible by connecting the terminals 8 of the respective modules in parallel. In this case individual acknowledgement may still be made via the jack.

To prevent "pumping" with sustained acknowledgement and continually depressed ON-key in case of a check-back, manual acknowledgement is only possible while the ON-key is not depressed.

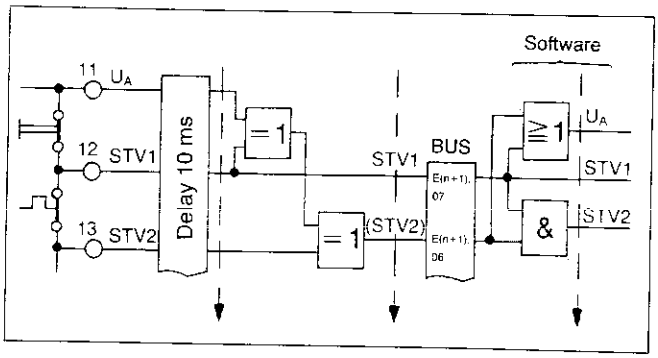
**Injection $U_A$:**

The injection of the safety switches and momentary contact switches is effected via terminal 11 ($U_A$) and can be based on two rated voltages, either 24 V or 48 V. The output load applied to terminal 16 is injected via $U_A$. The voltage source must be capable of supplying the corresponding power. In case of a low load at terminal 16, $U_A$ may be connected to $U_S$ and is thus also protected. $U_A$ is simultaneously processed as an input signal. If $U_A$ is missing the red LED H11 will come on.

**Safety-related interlock STV:**

As can be seen from the block diagram various break contacts (bimetal tripping contacts, emergency-off and limit switches) which must be arranged in the load-current circuit for safety-engineering reasons are connected to the input terminals 11 to 14. Terminal 14 (ESTV) is the end point of the safety interlock system.

For the BUS the input signals $U_A$, STV1 and STV2 are coded in order to save a bus address. The coded information can be interrogated via the input channels E (n + 1), 07 and E (n+1), 06.




| Message | $U_A$ | STV1 | STV-2 07 | E(n+1) 06 | E(n+1) |
|---|---|---|---|---|---|
| STV2 missing | 1 | 1 | 0 | 1 | 0 |
| STV1 missing | 1 | 0 | 0 | 0 | 1 |
| $U_A$ missing | 0 | 0 | 0 | 0 | 0 |
| everything ok | 1 | 1 | 1 | 1 | 1 |

Coding and possible software re-coding of the input signals $U_A$, STV1 and STV2.

**Connection of the external load:**

The external load is applied with two poles to terminals 16 (K 11) and 20 (O V). By this procedure only it is ensured that the de-magnetization diode V1 functions effectively and that the demagnetization has no disturbing influence on the other processes. In addition the load will reliably be de-energized in case of an interruption in the 0 V module feeder. For safety-engineering reasons this must be ensured under all circumstances.

**Check-back signals:**

The drive generates a check-back signal (usually the auxiliary contact of the power contactor) which is applied to terminal 18 (K1).

For star-delta drives the check-back signal of the delta contactor is applied to terminal 18 (K2). Both check-back signals and also the relay output (K11) can be interrogated via the input channels E (n + 1), 00, E (n + 1), 01 and E (n + 1), 03. The status of the relay output is made visible by the yellow LED H 16.

If no check-back signal is available from the drive side the check-back signal must be simulated in order to prevent a disturbance. This is done by an external connection between K11 and K1. The same procedure may be necessary for test operation when the power network is disconnected.

**Disturbance alarms:**

The signals K11 (drive) and K1 (check-back) are compared with each other. If they do no agree, this may be due to one of two reasons:
- the check-back signal is not received although the drive was triggered via K11.
- the check-back signal remains present although the drive was disconnected via K11.

The first of these cases is the more frequent one.

In both cases a disturbance alarm is generated in the module. To balance out the response delays of the various switching elements the disturbance alarm is delayed by 500 ms, which is sufficient even for small to medium-size direct current contactors.

An undelayed disturbance alarm is triggered if the end point of the safety-related interlock system ESTV is de-energized. The red light-emitting diode H18 reports the presence of a disturbance.

In the event of a missing check-back signal the disturbance will occur but briefly, because the disturbance alarm will disconnect the drive, and equality between K11 and K1 will be re-established.

The 500 ms delay element is designed such that the "disturbance" signal which can be processed as an operand **,03 in the program will in this case be available for more than 100 ms, so that it can be processed reliably by the software.

**Freely available inputs:**

For various purposes (e.g. for activating various previously prepared standard software variants) the drive control module has three free inputs (also for 24 V d.c. or 48 V d.c. signals). They are:
Input 02a (terminal 7) = variable En, 02
Input 04b (terminal 15) = variable E (n + 1), 04
Input 02b (terminal 17) = variable E (n + 1), 02
A fourth free input becomes available if the input K2 (terminal 19) is not required for the check-back signal:
Input K2 (terminal 19) = variable E (n + 1), 00
The free inputs are not fitted with LEDs in order to avoid any mix-up in connection with the diagnostic value of the ASG light-emitting diodes.

**Start-up reset:**

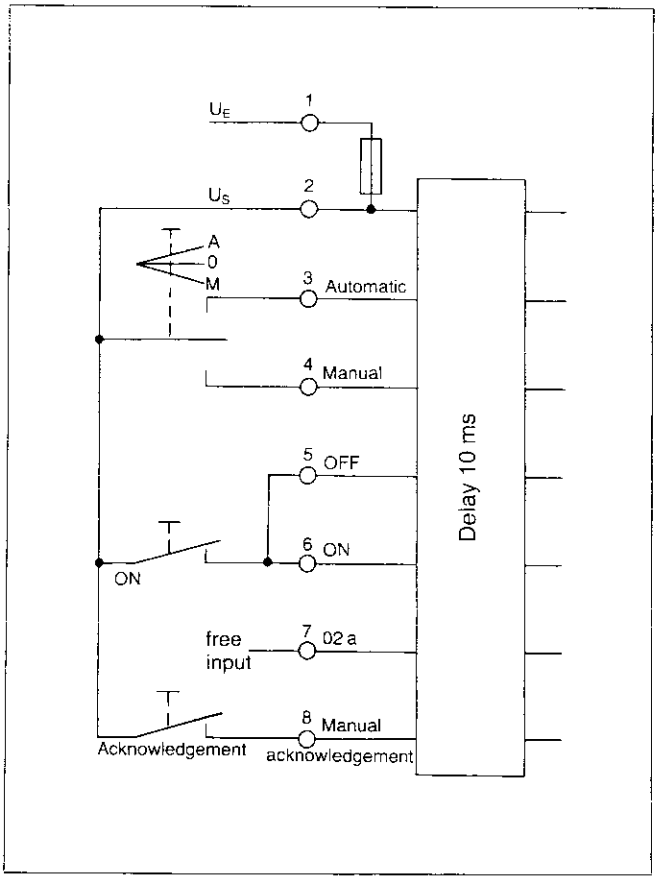
To prevent disturbance alarms due to lack of power at the ESTV the supply voltages of the PROCONTIC b system and $U_A$ must arrive at approximately the same time or $U_A$ must have been connected before when the equipment is energized. For the first 200 ms an internal reset function ensures that no disturbance alarms are identified or stored. In addition the command memory is erased while this goes on.

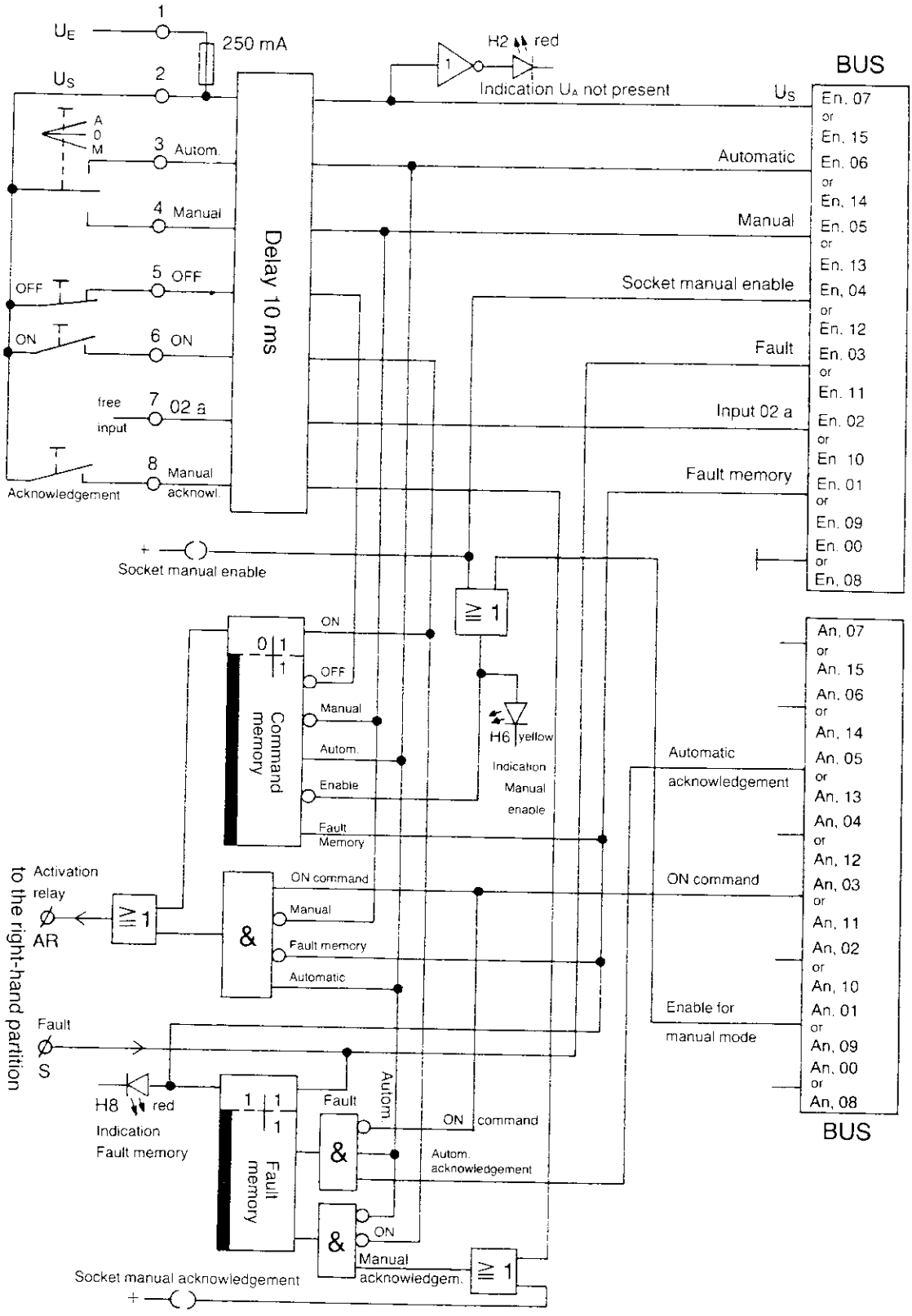
**Parking jack for the contact pin:**

A parking jack which has no other functions is provided for keeping the contact pin. If two contact pins are required the pin from the adjacent module must be borrowed.

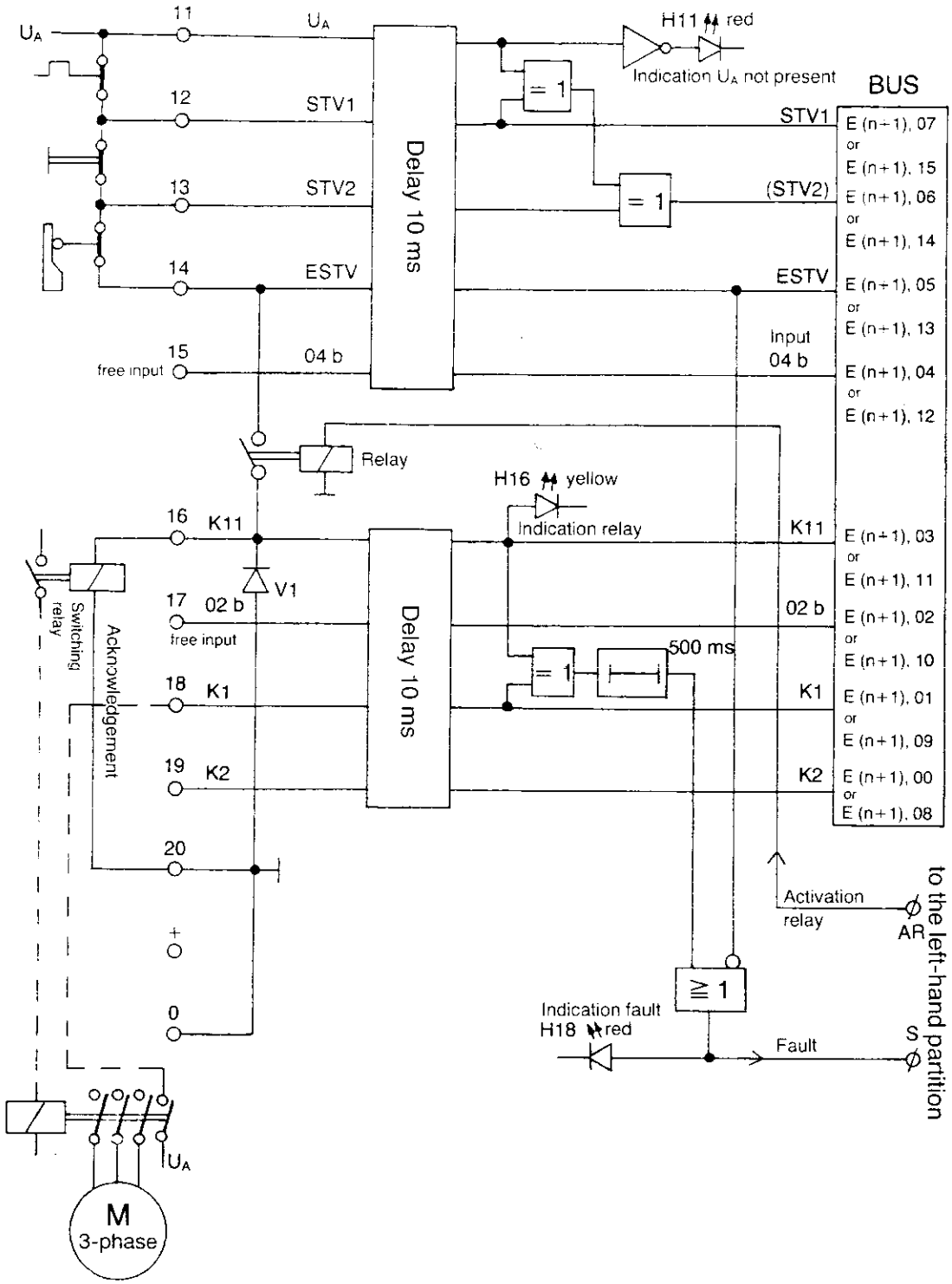
**Application note:**

Connection and disconnection of the drive in manual operating mode may also be effected by a single switch instead of the two momentary-contact keys "ON" and "OFF". For this purpose inputs 5 and 6 are connected in parallel.



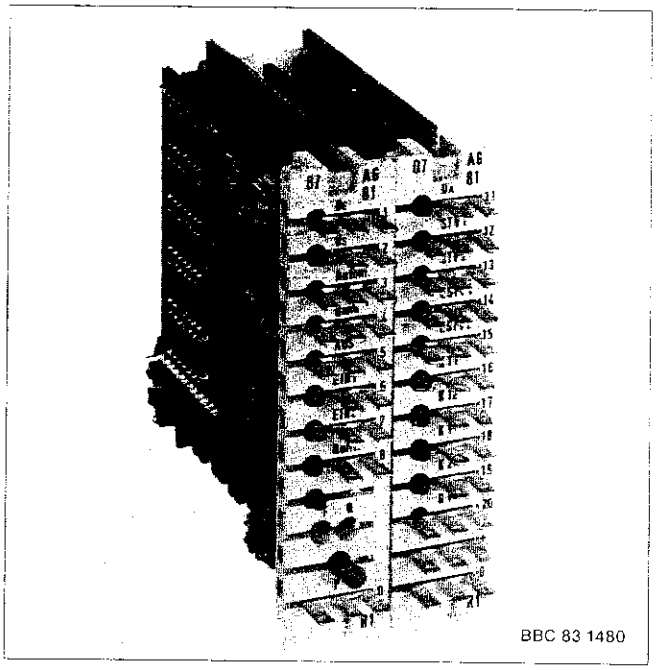



Block diagram: 07 AG 80 left-hand partition



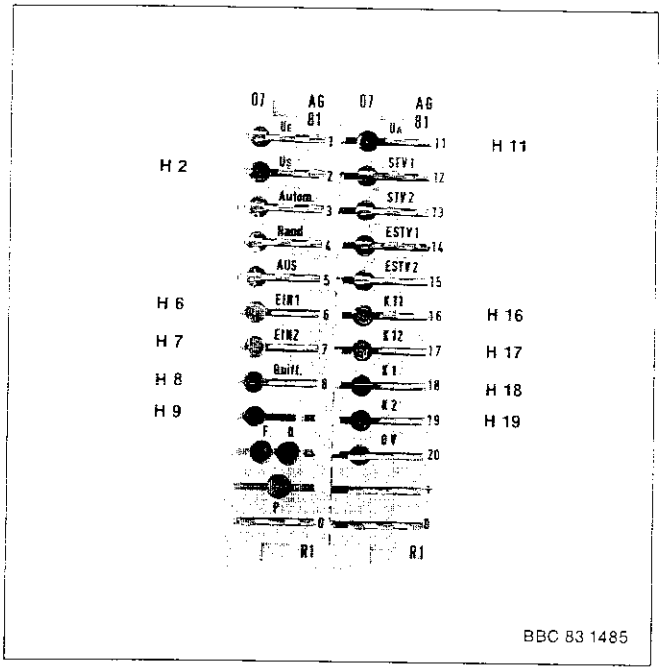

Block diagram: 07 AG 80 right-hand partition

## 11.2 Drive control module 07 AG 81 R1




**Technical data:**

| | |
|---|---|
| **Supply voltages für switch elements** | |
| Input voltage $U_E$ | 24 V d.c. ... 48 V d.c. +/−30 % |
| Output voltage $U_A$ | 24 V d.c. ... 48 V d.c. +/−30 % |
| **Allowable input voltage** | |
| 1-signal | + 13 V... + 65 V |
| 0-signal | 0 V... + 5 V |
| Input delay | typ. 10 ms |
| **Current input per input** | |
| at U = 24 V | $I_E$ = 1.2 mA |
| at U = 48 V | $I_E$ = 2.4 mA |
| Current from $U_E$ | total of the input currents |
| Current from $U_A$ | total of the input currents + output load at K 11 or K 12 |
| Current input from PROCONTIC power supply unit (plug-in card 07 NG..) | $I_{max.}$ = 43 mA |
| Dissipation with energized relay, 2 LEDs alight, 13 input loads at 48 V | 2 W |
| **Max. switched current of the relay output** | |
| at $U_A$ = 24 V | $I_L$ = 2 A |
| at $U_A$ = 48 V | $I_L$ = 0.5 A |
| Dimension | 2 divisions |
| Weight | 0.250 kg |
| Order number | GJR5217900R1 |




H 2 = LED red, $U_S$ not present
H 6 = LED yellow, manual enable 1
H 7 = LED yellow, manual enable 2
H 8 = LED red, fault memory 1
H 9 = LED red, fault memory 2
H 11 = LED red, $U_A$ not present
H 16 = LED yellow, relay 1 energized
H 17 = LED yellow, relay 2 energized
H 18 = LED red, fault channel 1
H 19 = LED red, fault channel 2

Sockets:
F = enable for manual mode
Q = acknowledgement in the case of manual mode or zero setting of the selector switch
P = parking socket for switching pin

The drive control module 07 AG 81 serves to control drives with two senses of rotation or two rotational speeds (Dahlander circuits).

For emergency and repair operations the drive may also be operated manually, if the user program is not running, provided that the supply voltages are available.

**Input channels:**

All inputs are suitable for signals from 24 V d.c. or 48 V d.c. systems (max. input voltages: + 65 V) and are delayed for typ. 10 ms.

**Injection $U_E$, $U_S$:**

The supply voltage for the input switches and momentary-contact keys is applied to terminal 1 ($U_E$) and may be either 24 V d.c. or 48 V d.c. +/− 30 %. $U_E$ is protected by means of a 250 mA miniature fuse (fast) inside the module and is then available at terminal 2 (as $U_S$) for feeding the input switches and momentary- contact keys. The presence of the voltage $U_S$ can be evaluated by the PROCONTIC b via the input channel En. 07 ①. If $U_S$ is missing the red LED H2 will come on.

**Automatic-manual switchover:**

Between $U_S$ and the input terminals 3 and 4 a selector switch with three switch positions is arranged: automatic-zero-manual. In position zero the drive is always switched off, irrespective of whether it was in manual or automatic operation before. The signals automatic and manual can be processed further by the PROCONTIC b system as input channels **, 06 and **, 05.

**Automatic operation:**

In the automatic operating mode (selector switch in position "automatic") the drive obeys the ON command arriving via output channel An, 02 and/or An, 03. Input signals from the manual level are ineffective.

**Manual operation:**

In the manual operating mode the drive obeys the output signal of the command memory which is connected via the ON key and disconnected via the OFF key. The ON key is used as normally open contact, and the OFF key is used as normally closed contact.

**Prerequisites for automatic operation:**

The drive can run in the "automatic" mode only if the following preconditions are met:

- One of the two ON-commands via the BUS (En,03 and/or En,02) has 1-signal. If by mistake both ON-commands have 1-signal the drive will be inoperative.
- There is no disturbance present (and not set disturbance memory) for the desired sense of rotation and/or rotational speed.
- The selector switch is in position "automatic".

If due to an error, a fault or defect both "manual" and "automatic" are providing signals simultaneously the drive will never operate.

**Prerequisites for manual operation:**

The command memories are set by way of the keys ON1 and ON2. If one of the two memories is set it blocks the other memory so that it cannot be switched on. The following conditions must have been met before a command memory can be set:

- The OFF-key shall not be depressed.
- The selector switch shall be in the "manual" position.
- A memory release must have been given for the desired sense of rotation and/or speed, either via the jack "release manual" or via the output channels An, 01 and/or An. 00.
- There is no disturbance and/or no set disturbance memory present for the desired sense of rotation.
  Simultaneous manual and automatic signals cause erasure of the command memories.

**Release for manual operation:**

Under normal circumstances the command memory release is given via output channel An, 01.

① *n = slot for the left division of the control nodule in the PROCONTIC b subrack, e.g. 00*
*n + 1 = slot of the right division of the control module in the PROCONTIC b subrack, e.g. 01*

This provides the possibility to include the effects of as many interlocks (apart from safety-engineering interlocks) as desired via the software even in the manual operating mode; i.e. in the manual mode a switch-off can be effected and/or a switch-on prevented by means of the program. In case of software disturbances (or if the "RUN" switch of the PROCONTIC b is in the OFF-position) and the drive shall be operated nevertheless (e.g. under "visual" control) the release can be enforced via the jack "release manual" (pin inserted). The yellow LEDs H6 and H7 will indicate whether a release has been given. They are alight in all positions of the selector switch. One can thus see even during automatic operation or in switch position "zero" whether the drive might be operated in the manual mode.

The inserted pin in the jack "release manual" can be interrogated as 1-signal via the input channel En, 04; the software is thus informed of the fact that the release and/or non-release via output channel An, 00 and/or An, 01 is ineffective.

**Disturbance memory:**

The disturbance memories have overriding setting function; they thus cannot be erased while the disturbance is still present.

Disturbance identification and storage is effected separately for the two senses of rotation and/or speeds. A set disturbance memory erases the associated command memory and also blocks the corresponding ON-command. The red LEDs H8 and H9 report the setting of the disturbance memories. The disturbance alarms can be interrogated via the input channels En, 03 and En, 02, and the status of the disturbance memories via the channels En, 00 and En, 01. If it is desired in a special case (e.g. for Dahlander circuit operation) that a set disturbance memory shall block both senses of rotation and/or rotational speeds, this can be achieved by inserting the jumper Br. 1. The jumper is included in the scope of supply of the module and is inserted when the equipment is delivered. It shall be removed if not required. The jumper does not cause any change of the messages "disturbance 1 and 2 and/or disturbance memory 1 and 2" and/or the LED displays.

**Acknowledgement when in automatic mode via the output channel An, 05**

It is possible (even likely) that the disturbance occurred while the ON-command had a 1-signal. The drive was thus disconnected by the onset of the disturbance. After the disturbance has been eliminated and upon acknowledgement of the disturbance memory the drive would be started up again if the ON-command is still present (triggered by the acknowledgement and not by an intentional ON-command). In case of a check-back disturbance the drive would make repeated reconnection attempts, i.e.start "pumping". This is undesirable and can have unpleasant effects. For this reason the ON-command is linked with the automatic mode acknowledgement.

An acknowledgement is in any case only possible if the ON-command has been removed before. After the acknowledgement the drive can start again when the ON-command receives another 1-signal.
In this way the drive cannot be restarted by the acknowledge signal, and "pumping" in case of a check-back disturbance is also impossible.

**Acknowledgement in manual operating mode:**

This acknowledgement is possible in the positions "manual" and "zero" of the selector switch. The possibility to acknowledge in position "zero" has the advantage that a manual acknowledgement may be made before it is decided whether the drive shall then run in automatic or manual mode. In addition "orderly circumstances" (erased disturbance memory) can be established, if thereafter the drive shall not be reconnected for other reasons ("zero" position of the selector switch).

Manual acknowledgement may either be made via the input terminal 8 or the jack "manual acknowledgement". Joint acknowledgement for several drive control modules is possible by connecting the terminals 8 of the respective modules in parallel. In this case individual acknowledgement may still be made via the jack.

To prevent "pumping" with sustained acknowledgement and continually depressed ON-key in case of a check-back, manual acknowledgement is only possible while the ON-key is not depressed.

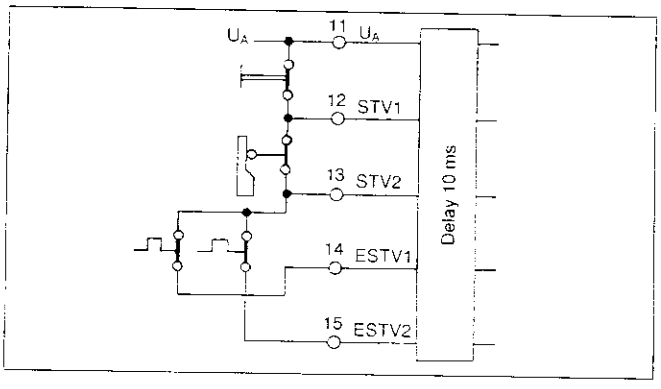
**Injection $U_A$:**

The injection of the safety switches and momentary-contact keys is effected via terminal 11 ($U_A$) and can be based on two rated voltages, either 24 V d.c. or 48 V d.c. The output loads applied to terminals 16 and 17 are injected via $U_A$. The voltage source must be capable of supplying the corresponding power. The two outputs are never simultaneously active, however. In case of a low load at the output terminals, $U_A$ may be connected to $U_S$ and is thus also protected. $U_A$ is simultaneously processed as an input signal. If $U_A$ is missing the red LED H11 will come on.

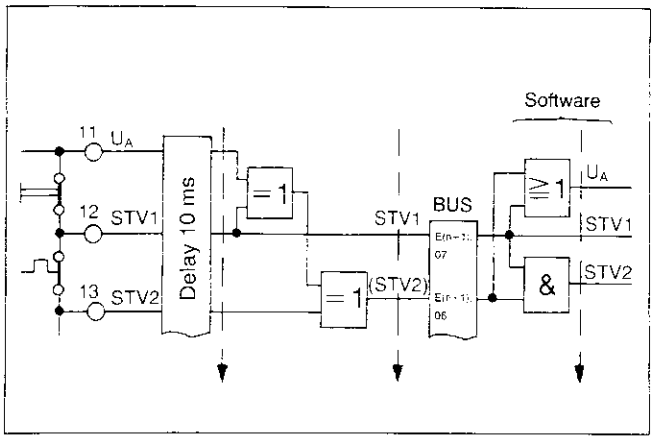
**Safety-engineering interlock STV:**

As can be seen from the block diagram various break contacts (bimetal tripping contacts, emergency-off and limit switches) which must be arranged in the load-current circuit for safety-engineering reasons are connected to input terminals 11 to 15. Terminals 14 and 15 (ESTV1 and ESTV2) are the end points of the safety interlock system for a reversing drive. Here the two limit switches generate the signals ESTV1 and ESTV2.

In case of a Dahlander circuit, however, only one limit switch is usually available, but perhaps two overcurrent tripping devices. The protective circuit will then be:



For the BUS the input signals $U_A$, STV1 and STV2 are encoded in order to save a bus address. The encoded information can be interrogated via the input channels E (n + 1), 07 and E (n+1), 06.




| Message | $U_A$ | STV1 | STV2 07 | E(n+1) 06 | E(n+1) |
|---|---|---|---|---|---|
| STV2 missing | 1 | 1 | 0 | 1 | 0 |
| STV1 missing | 1 | 0 | 0 | 0 | 1 |
| $U_A$ missing | 0 | 0 | 0 | 0 | 0 |
| everything ok | 1 | 1 | 1 | 1 | 1 |

Encoding and possible software re-encoding of input signals $U_A$, STV1 and STV2.

**Relay:**

The drive is switched on and off via internal relays (and possibly further external switching elements).

**Connection of the external load:**

The external load is applied with two poles to terminals 16 (K 11) and 20 (0 V). By this procedure only it is ensured that the de-magnetization diode V1 functions effectively and that the demagnetization has no disturbing influence on the other processes. In addition the load will reliably be de-energized in case of an interruption in the 0 V module feeder. For safety-engineering reasons this must be ensured under all circumstances.

**Check-back signals:**

The drive generates check-back signals (usually by way of the auxiliary contacts of the power contactors). They are applied to terminals 18 (K1) and 19 (K2). Both check-back signals and also the relay outputs (K11 and K12) can be interrogated via the input channels E (n + 1), 00 to E (n + 1), 03. The status of the relay outputs is made visible by the yellow LEDs H16 and H17.

It shall be noted that a relay can only pick up after the check-back from the other channel has gone to a 0-signal.

If no check-back signal is available from the drive side the check- back signal must be simulated in order to prevent a disturbance. This is done by external connections between K11 and K1 and also between K12 and K2. The same procedure may be necessary for test operation when the power system is disconnected.

**Disturbance alarms:**

The signals K11 (drive) and K1 (check-back) are compared with each other. If they do no agree, this may be due to one of two reasons:
- the check-back signal is not received although the drive was triggered via K11.
- the check-back signal remains present although the drive was disconnected via K11.

The first of the two cases is the more frequent one.

In both cases a disturbance alarm is generated in the module. To balance out the response delays of the various switching elements the disturbance alarm is delayed by 500 ms, which is sufficient even for small to medium-size direct current contactors.

An undelayed disturbance alarm is triggered if the end point of the safety-engineering interlock system ESTV is de-energized. The red light-emitting diode H18 reports the presence of a disturbance.

In the event of a missing check-back signal the disturbance will occur but briefly, because the disturbance alarm will disconnect the drive and equality between K11 and K1 will be re-established.

The 5oo ms delay elements are designed such that the signals "disturbance 1" and "disturbance 2" which can be processed as variables En, 03 and En, 02 in the program will in this case, too, be available for more than 100 ms, so that they can be processed reliably by the software.

**Start-up reset:**

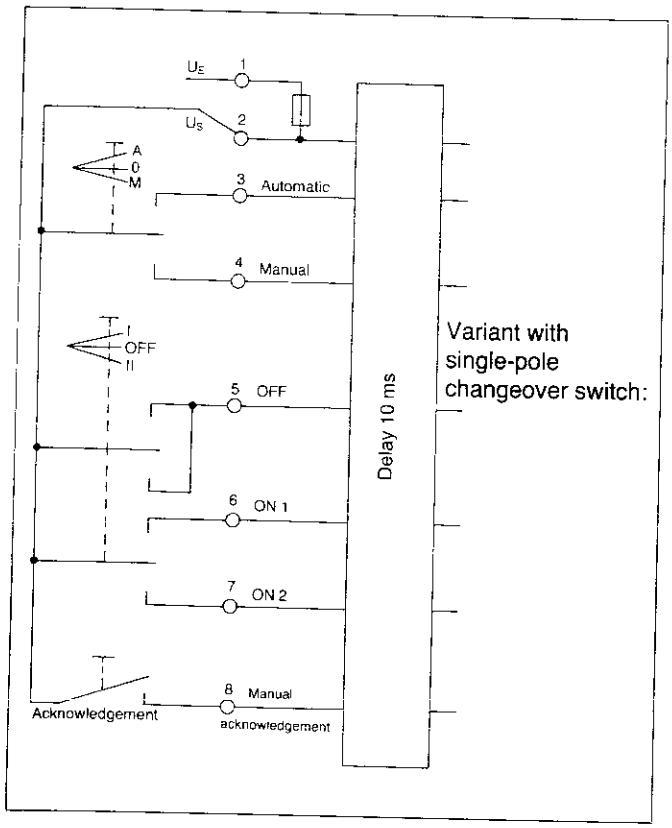
To prevent disturbance alarms due to lack of power at the ESTV the supply voltages of the PROCONTIC b system and $U_A$ must arrive at approximately the same time or $U_A$ must be connected earlier. For the first 200 ms an internal reset function ensures that no disturbance alarms are identified or stored. In addition the command memory is erased while this goes on.

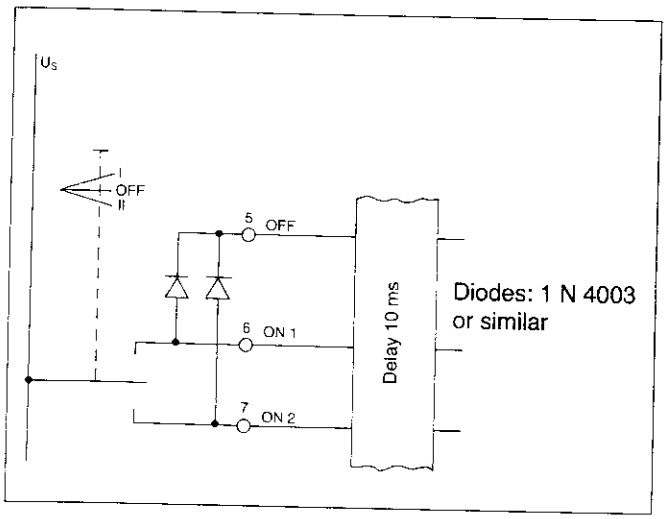
**Parking jack for the contact pin:**

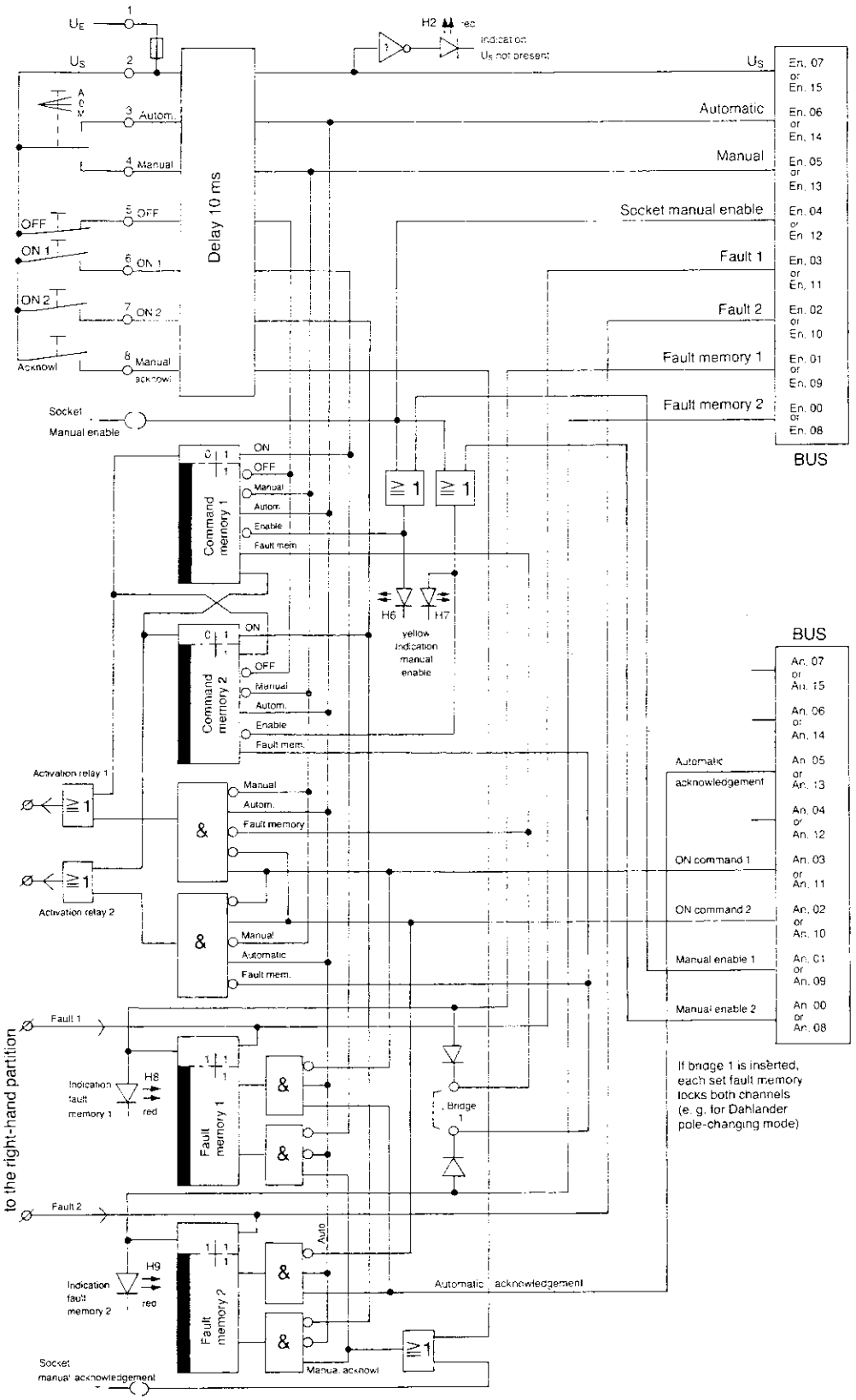
A parking jack which has no other functions is provided for keeping the contact pin. If two contact pins are required the pin from the adjacent module must be borrowed.

**Application note:**

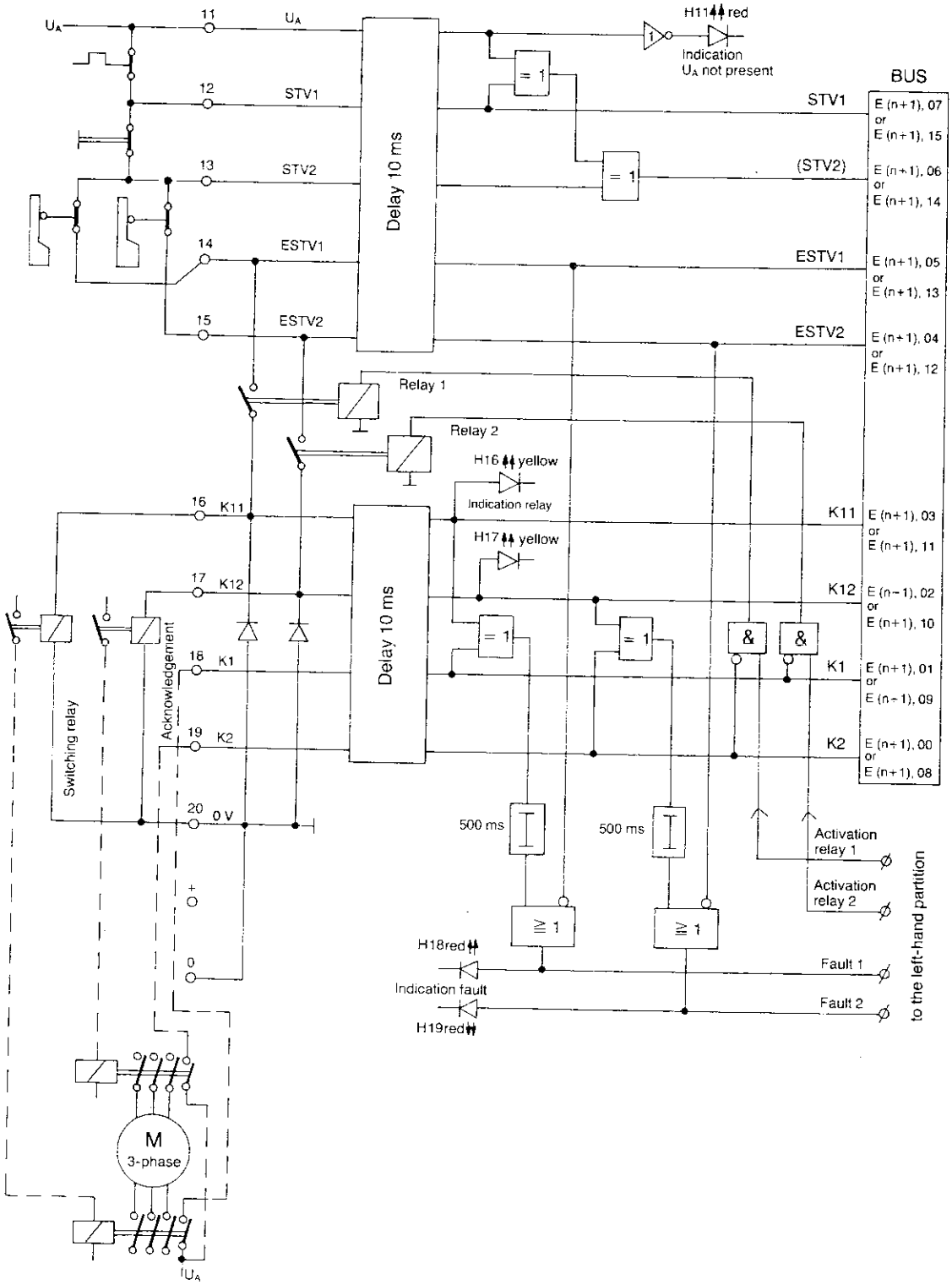
Connection and disconnection of the drive in manual operating mode may be effected with a single switch instead of the three momentary-contact keys ON1, ON2 and OFF. The circuitry can be seen from the diagrams below:





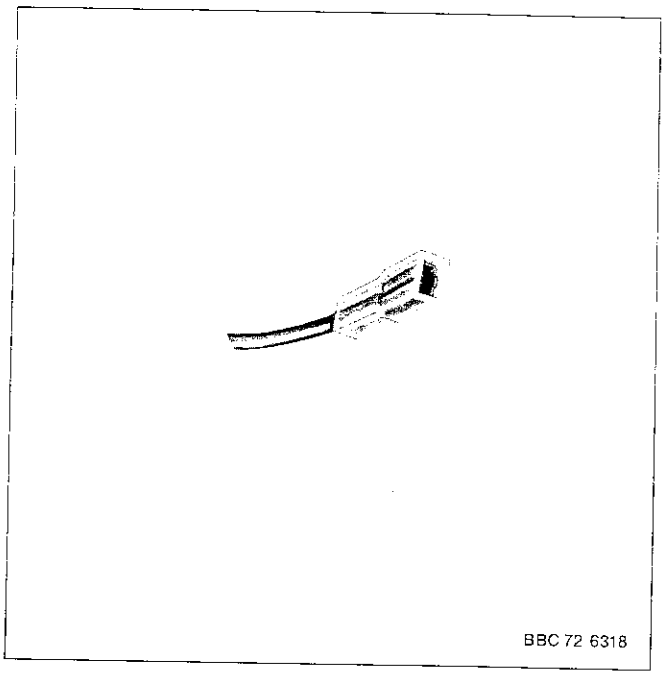

Block diagram, left hand partition




Block diagram, right hand partition

# 12 Appurtenances

## 12.1 Pre-assembled leads




**Technical data:**

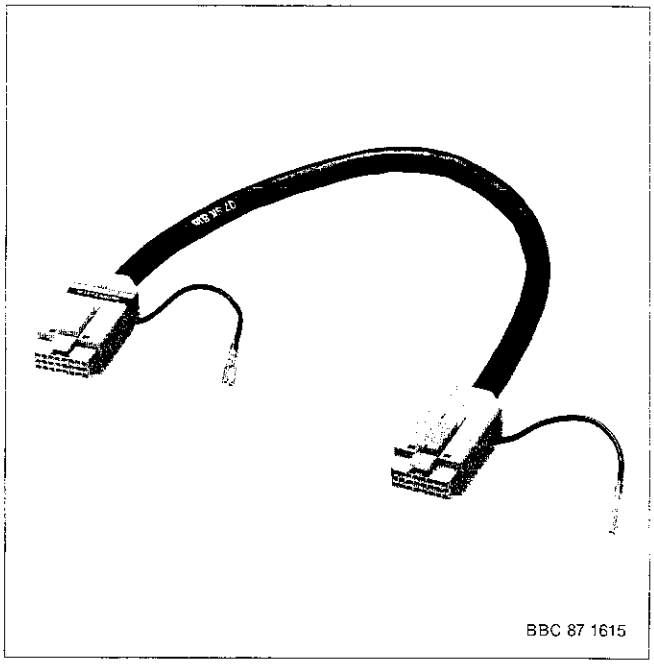
| | |
|---|---|
| Cable | 85 mm grey (Quantity per standard pack 50) |
| Order number | GHR7001201R7 |
| Cable | 125 mm grey (Quantity per standard pack 50) |
| Order number | GHR7001201R1 |
| Cable | 250 mm grey (Quantity per standard pack 50) |
| Order number | GHR7001201R2 |
| Cable | 500 mm grey (Quantity per standard pack |
| Order number | GHR7001201R3 |
| Cable | 750 mm grey (Quantity per standard pack 50) |
| Order number | GHR7001201R4 |
| Cable | 1000 mm grey (Quantity per standard pack 50) |
| Order number | GHR7001201R5 |
| Cable | 1500 mm grey (Quantity per standard pack 25) |
| Order number | GHR7001201R14 |
| Cable | 2000 mm grey (Quantity per standard pack 25) |
| Order number | GHR7001201R6 |

**Cable for supply voltage:**

| | |
|---|---|
| Cable | 85 mm red (Quantity per standard pack 50) |
| Order number | GHR7001201R8 |
| Cable | 85 mm blue (Quantity per standard pack 50) |
| Order number | GHR7001201R9 |
| Cable | 250 mm red (Quantity per standard pack 50) |
| Order number | GHR7001201R12 |
| Cable | 250 mm blue (Quantity per standard pack |
| Order number | GHR7001201R13 |
| Cable | 2000 mm red (Quantity per standard pack 50) |
| Order number | GHR7001201R10 |
| Cable | 2000 mm blue (Quantity per standard pack 50) |
| Order number | GHR7001201R11 |

For the electric connection of PROCONTIC b modules pre-assembled leads of different lengths are available. All cables are fitted at both ends with insulated push-on contacts B 2.8 x 1 as per DIN 46247 (dimensions 2.8 x 0.8 mm) with insulating sleeves. Cross section of the grey cables: 0.5 $mm^2$, of the red and blue cables: 0.75 $mm^2$.

## 12.2 System Cable 07 SK 81 R4



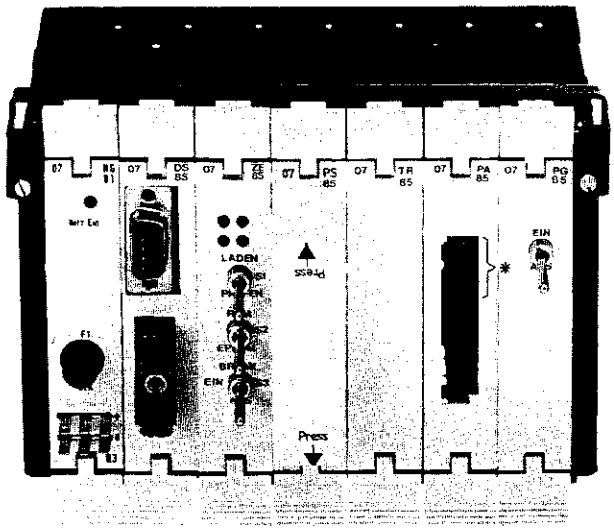
BBC 87 1615

**Technical data:**

| | |
|---|---|
| Weight | 0.04 kg |
| Order number | GJR523800R4 |

To establish electric connections between the commissioning unit 07 IE 82 resp. 07 IE 84 R201 and the control processor unit 07 ZE 82 of the PROCONTIC b the system cable 07 SK 81 R4 is supplied. When the system cable is being connected to a running control these points must be regarded:

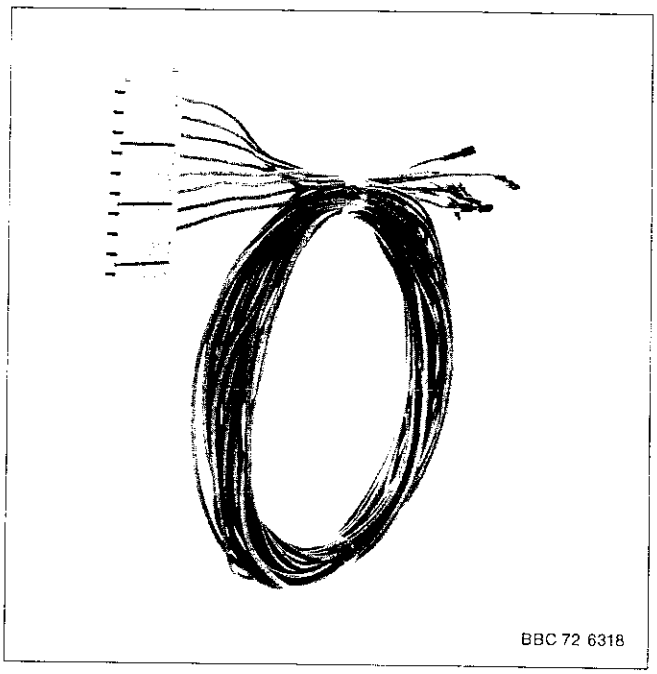
- the commissioning unit must already be connected to the same power supply as the PROCONTIC b
- the commissioning unit must be in the inactive status. The switch on the 07 ZE 85 R1 unit must be in "AUS" position.
- connect the both shields to the 0V-terminal before plugging the system cable
- the commissioning unit must be connected to a power outlet with the ground pin connected to the central ground point of the PROCONTIC b (cabinet outlet)
- the cable must be plugged into the upper part of the connector in case of the 07 IE 84 R201 respectively in the connector of the commissioning unit 07 IE 82




* Hier has the cable 07 SK 81 to be connected.

BBC 84 0413

## 12.3 System cables 07 SK 82 R*



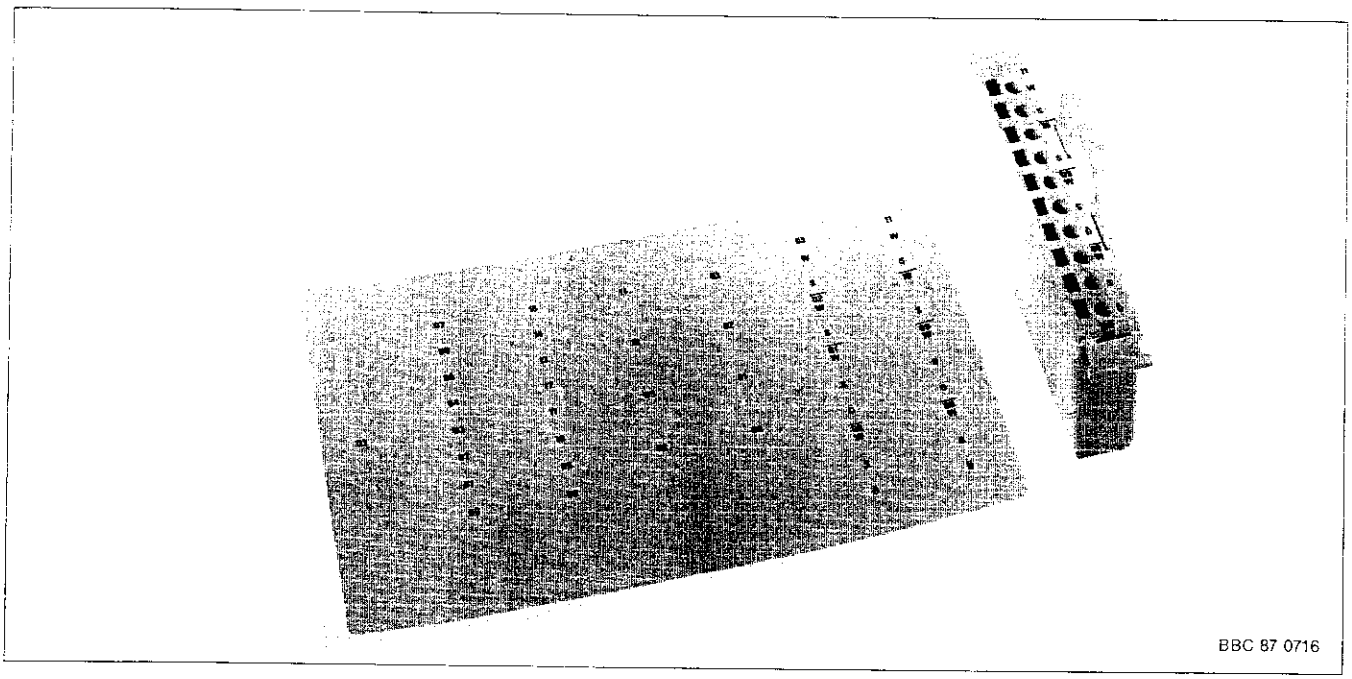

**Technical data:**

| | |
|---|---|
| System cable 07 SK 82 R11 | 750 mm grey (Quantity per standard pack 20) |
| Order number | GJR5214900R11 |
| System cable 07 SK 82 R13 | 1500 mm grey (quantity per standard pack |
| Order number | GJR5214900R13 |
| System cable 07 SK 82 R14 | 2000 mm grey (Quantity per standard pack 20) |
| Order number | GJR5214900R14 |
| Tool | Quantity per standard pack 1 |
| Order number | GJV4322000R1 |

To establish electric connections between PROCONTIC b input and output modules and further PROCONTIC b modules or external devices simply and rapidly system cables with attached connectors can be supplied. The system cables consist of an insulating body with 10 chambers, 8 of which are occupied by grey leads (cross section 0.5 $mm^2$). The insulating body is plugged onto the input and/or output contacts of the PROCONTIC b modules. At the other end the 8 leads are fitted with insulated push-on contacts B 2.8 x 1 as per DIN 46 247, and are marked with the channel numbers 00 . . . 07. A tag holder can be pushed onto the insulating body for equipment identification.

If not all the leads of the system cable are required they can be removed from the insulating body with a tool.

## 12.4 System Plug Connector 07 SK 84 R1




**Technical Data:**

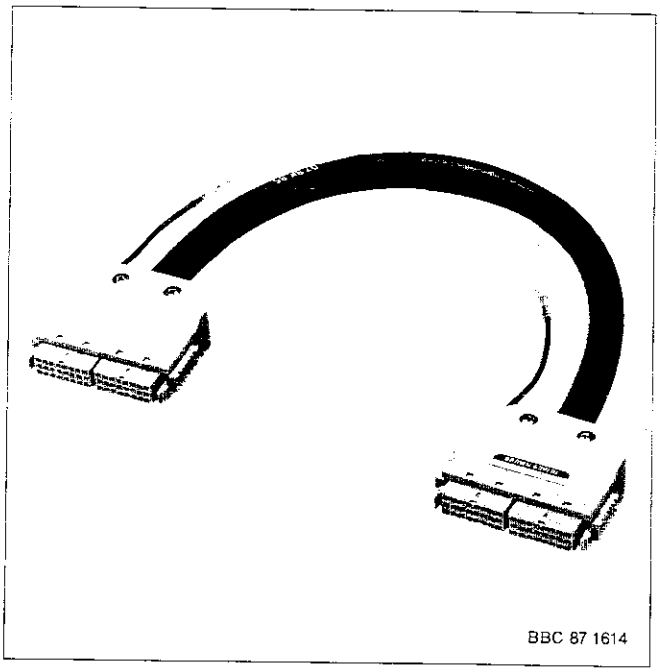
| | |
|---|---|
| Life time | 400 plugs |
| Tool for release | screw driver 3mm wide or pin with 1,5mm diameter |
| Applications class | DIN 40040 |
| Gas sealing of the terminal connections | DIN 50018 SWF 0,25 S environment |
| Plug/pull force for each pin | <= 1 N |
| Wire gauge permissible | 0.25 to 1.5 mm without shell<br>0.25 to 1.5mm with shell |
| Packaging quantity | 1 |
| Weight | 15 g |
| Order number | GJV3071902R1 |

The 10-pole non-screw plug connector is suited for direct plugging of wires by means of a clamping spring. The wire gauges must be in between 0.25 and 1.5 mm. The wire ends must be stripped 10 mm before plugging.

The plug connector may be used with all PROCONTIC b input and output modules, except the 07 A 83. With this connector no further touch protection of the contacts is needed.

As a kit stickers for various input and output units are included in the shipment (see picture above).

## 12.5 System Cable 07 SK 85 R1



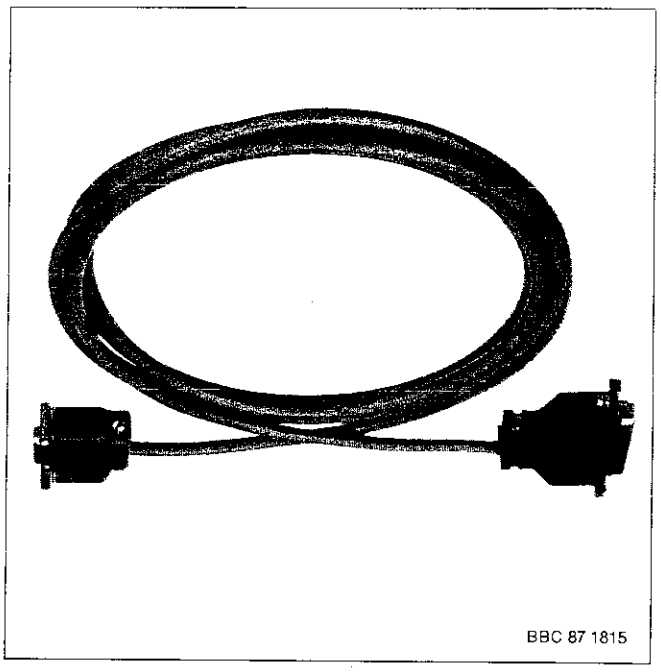

**Technical data:**

| | |
|---|---|
| Packaging quantity | 1 |
| Weight | 0.15 kg |
| Order number | GJR5219900R1 |

To establish electric connections between the commissioning unit 07 IE 82 resp. 07 IE 84 R201 and the control processor unit 07 ZE 82 of the PROCONTIC b the system cable 07 SK 81 R4 is supplied. When the system cable is being connected to a running control these points must be regarded:

- the commissioning unit must already be connected to the same power supply as the PROCONTIC b
- the commissioning unit must be in the inactive status. The switch on the 07 ZE 85 R1 unit must be in "AUS" position.
- connect the both shields to the 0V-terminal before plugging the system cable
- the commissioning unit must be connected to a power outlet with the ground pin connected to the central ground point of the PROCONTIC b (cabinet outlet)
- the cable must be plugged into the upper part of the connector in case of the 07 IE 84 R201 respectively in the connector of the commissioning unit 07 IE 82

## 12.6 System Cable 07 SK 87 R2




**Technical data:**

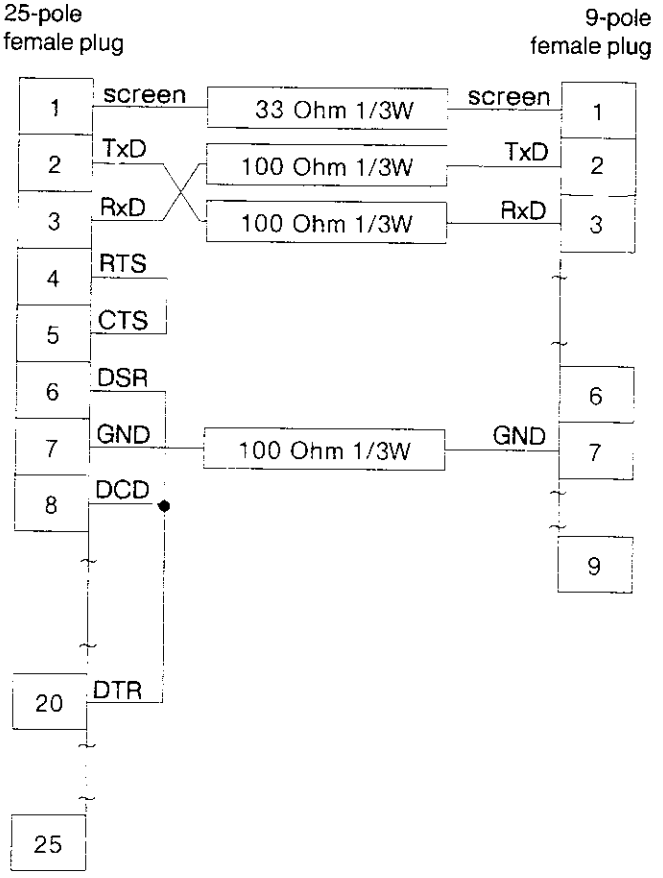
| | |
|---|---|
| Packaging quantity | 1 |
| Weight | 0.1 kg |
| Order number | GJR5230800R2 |

The system cable 07 SK 87 R2 with integrated resistors connects the serial interfaces of the commissioning unit 07 IE 84 respective the CPU 07 ZE 86 and the programming units 07 TD 12, 07 PC 30/PC 31 to each other for operation in programming mode.

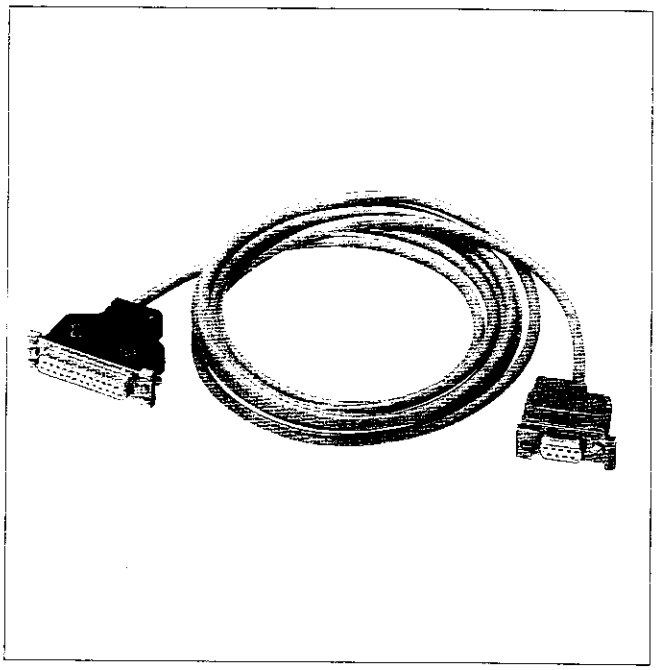
The connection via the 9-pole trapezoidal outlet of the individual unit allows the use of all functions by the programming unit.

These points must be regarded:

- use the system cable 07 SK 87 R2 (or a similar cable according to the circuit shown)
- connect the 0V terminals of the word processor 07 WP 84 and the digital timer 07 TZ 82 to the common 0V
- 0V of the PROCONTIC b to be earth grounded
- the programming unit must be connected to a power outlet with the ground pin connected to the central ground point of the PROCONTIC b (cabinet outlet)
- do not use an extension cord for the AC-power input of the programming unit
- if the measures spelled out before cannot be taken, an isolation transformer must be used for the AC-power input of the programming unit



## 12.7 System Cable 07 SK 88 R1



**Technical data:**

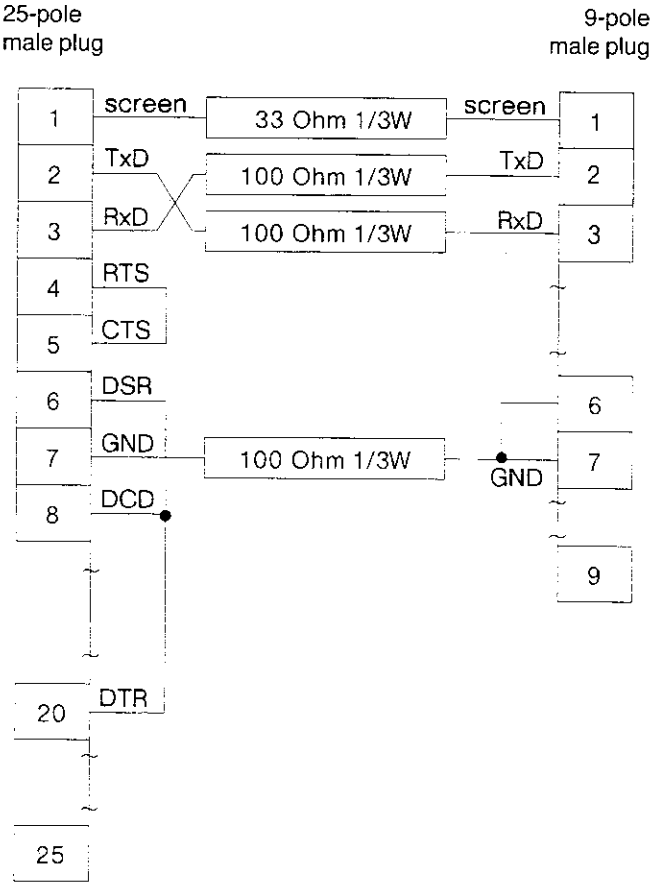
| | |
|---|---|
| Packaging quantity | 1 |
| Weight | 0.1 kg |
| Order number | GJR5231700R1 |

The system cable 07 SK 88 R1 with integrated resistors connects the serial interfaces of the CPU 07 ZE 86 resp. the digital timer 07 TZ 82 resp. word processor 07 WP 84 and a terminal (in TTY mode) of the 07 PM 11 or the 35 BS 93.

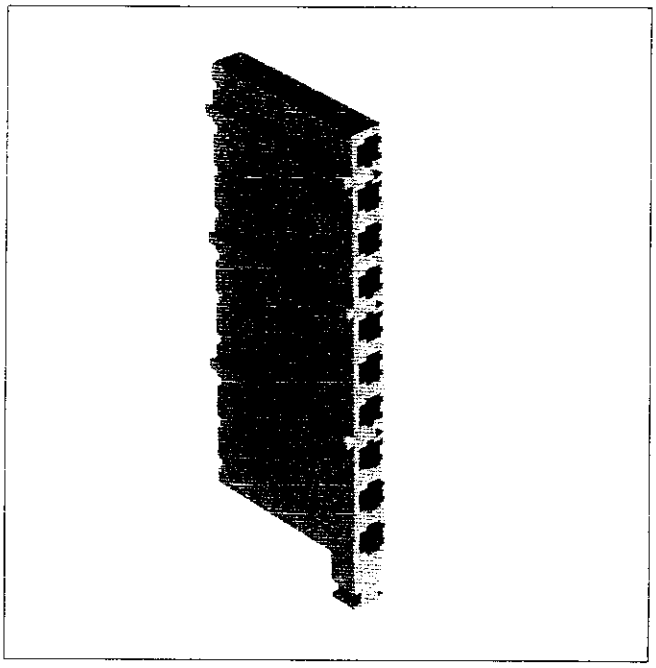
The connection via the 9-pole trapezoidal outlet of the individual unit allows the output of texts and error messages.

These points must be regarded:

- use the system cable 07 SK 88 R1 or a similar cable according to the circuit shown
- connect the 0 V terminals of the word processor 07 WP 84 and the digital timer 07 TZ 82 to the common 0V
- 0V of the PROCONTIC b to be earth grounded
- the terminal must be connected to a power outlet with the ground pin connected to the central ground point of the PROCONTIC b (cabinet outlet)
- do not use an extension cord for the AC-power input of the terminal
- if the measures spelled out before cannot be taken, an isolation transformer must be used for the AC-power input of the terminal



## 12.8 Protection Against Electric Shock

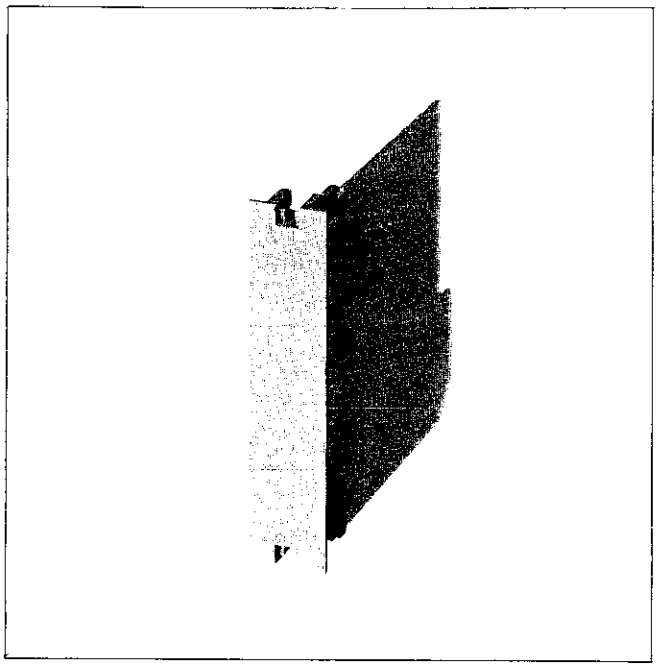


**Technical data:**

| | |
|---|---|
| Packaging quantity | 1 |
| Weight | 0.01 kg |
| Order number | GJR1948094P2 |

The empty connector housing is plugged next to the cable 07 SK 82 R* onto the input and output cards as a protection against electric shock.

## 12.9 Blanking cover 07 BA 80 R1

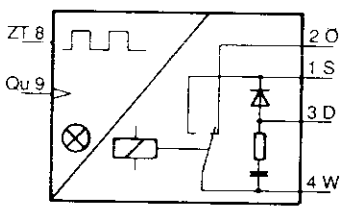


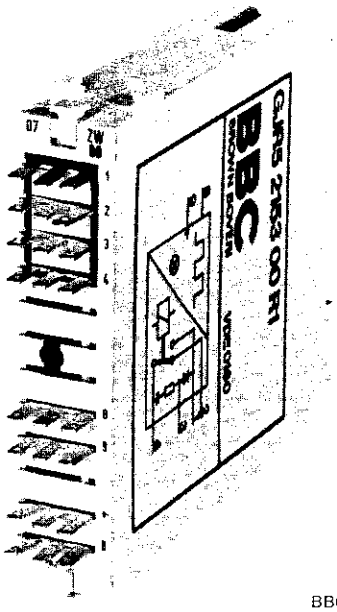
**Technical data:**

| | |
|---|---|
| Weight | 0.04 kg |
| Order number | GJR5214200R1 |

For unoccupied slots in the PROCONTIC b basic stage and extensions subracks the blanking cover 07 BA 80 is available. Each unit covers one slot

## 12.10 Cycle monitoring module 07 ZW 80




BBC 82 0295

**Technical data:**

| | |
|---|---|
| Make/break contact | |
| Max. allowable input voltage | 24 V d.c. +/− 30 % |
| Current input with energized relay and $U_s$ = 24 V | 40 mA |
| Input load at 24 V | approx. 5 mA |
| Cycle pulse identification for period durations = 2 cycles | between approx. 0.5 . . . 75 ms |
| Signal delay at ZT | approx. 0.2 ms |
| Signal delay at Qu | 6 ms |
| Closing delay $t_E$ of the relay after application of the supply voltage | approx. 400 ms + 8 cycles |
| Opening delay $t_A$ after cycle interruption | approx. 100 ms |
| Duration of the switching attempts after feed voltage application or 0–1 transition at the acknowledge input Qu | approx. 1 s, thereafter storage until renewed acknowledgement |
| Signalling | red LED comes on when relay has dropped |
| Alternating current make-break capacity at U = 250 V (with inductive load: jumper between D and S) | 1kVA only ohmic or lamp load 24 V, 15 W |
| D.C. make-break capacity at U = 30 V d.c. | 100 W |
| at U = 250 V d.c. with inductive load: + to W, – to D, load between D and S) | 50 W |
| Max. continuous current rating | 4 A 2 A |
| Max. switching voltage | 250 V 250 V |
| Contact service life, w/o load | approx. $10^7$ operating cycles |
| at 220 V/4 A | approx. $10^5$ operating cycles |
| Width of casing | 250 mm |
| Weight | approx. 150 g |
| Order number | GJR5215300R2 |

The cycle monitoring module 07 ZW 80 serves to monitor the regular cycle frequency of the PROCONTIC b system.

The relay picks up only when a regular cycle frequency has established itself (minimum duration 8 cycles). If the cycle frequency is interrupted due to disconnection of the PROCONTIC b system or because of a disturbance the relay drops out. By means of the make contact the output stages (07 YS . . .) of the PROCONTIC b and/or the additional switching stages (R . . .) can be supplied with the switching or operating voltage (see applications page 12-11 and 12-12). The break contact can be used for operating a control lamp (cycle interrupted and/or PROCONTIC not started). This ensures that the power level is triggered and/or supplied with power only when the cycle is operating perfectly. The interruption is stored and indicated by the built-in LED.

The cycle pulse ZT must be generated by appropriate programming and assignment to a A output (!N A . . , . .=A . . , . .). The pulse which is now present at A . . , . . is applied to input 8 of the cycle monitoring module.

It will be now checked, if the PROCONTIC-program has a cycle time smaller than 100 ms (tolerance 100 . . . 150 ms).

Is the monotoring time to short, it may be done longer through another way of programming. The maximal monitoring time may be enhanced to 200 ms (tolerance 200 . . . 300 ms).

Program:

```
W0000    !N   A . . , . .  =    A . . , . .
   .
   .
   .
W0200    !    A . . , . .  =  N A . . , . .
```

By way of a pulse (0-1 transition at acknowledge input Qu) the identified disturbance is acknowledged, and the cycle monitoring function is released again. The acknowledge pulse can be generated by means of an acknowledge key or by suitable programming of the control system.

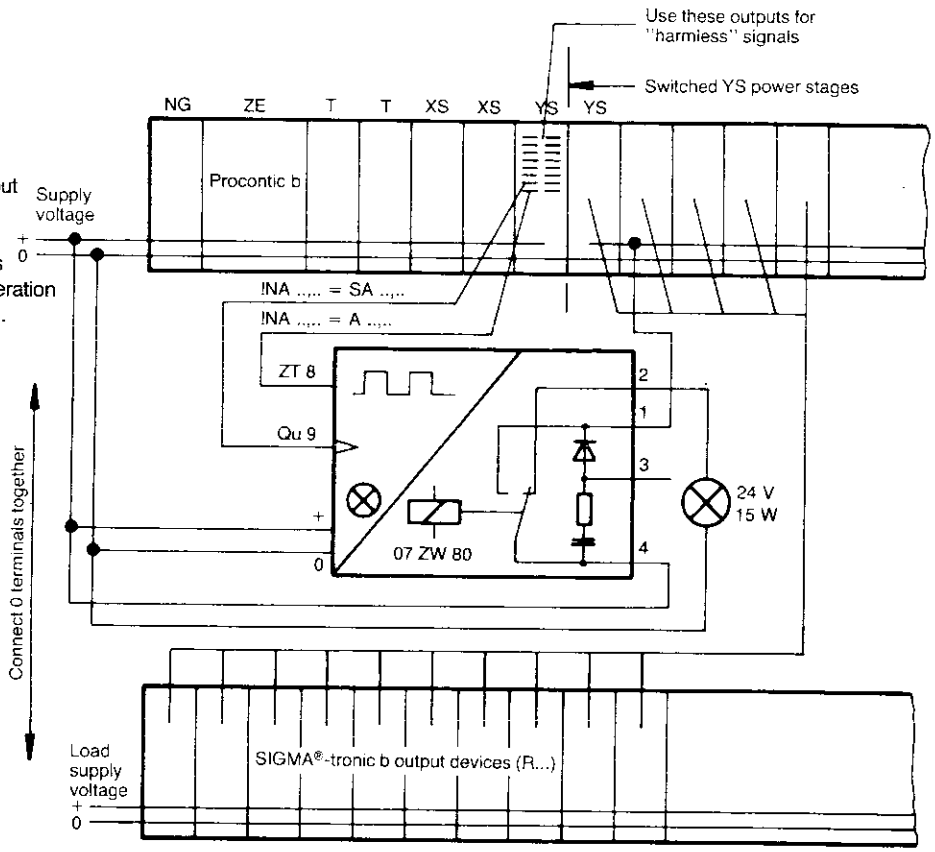
If a second output of the PROCONTIC b is programmed with !N A . . , . .=SA . . , . . it follows the switch position RUN. If this output is connected to the Qu of the cycle monitoring system, the monitoring system will automatically take over the reconnection attempts with the operation of the RUN switch. If no regular cycle is established after 1 s the relay remains in OFF position and this status is stored.

All the + and 0 terminals of the cycle monitoring module, the central unit, the input modules and the Ys stage for generating the Qu and ZT signal are connected to each other. The + terminals of the remaining YS stages and of the additional switching stages are optionally routed via the relay contact (see applications).

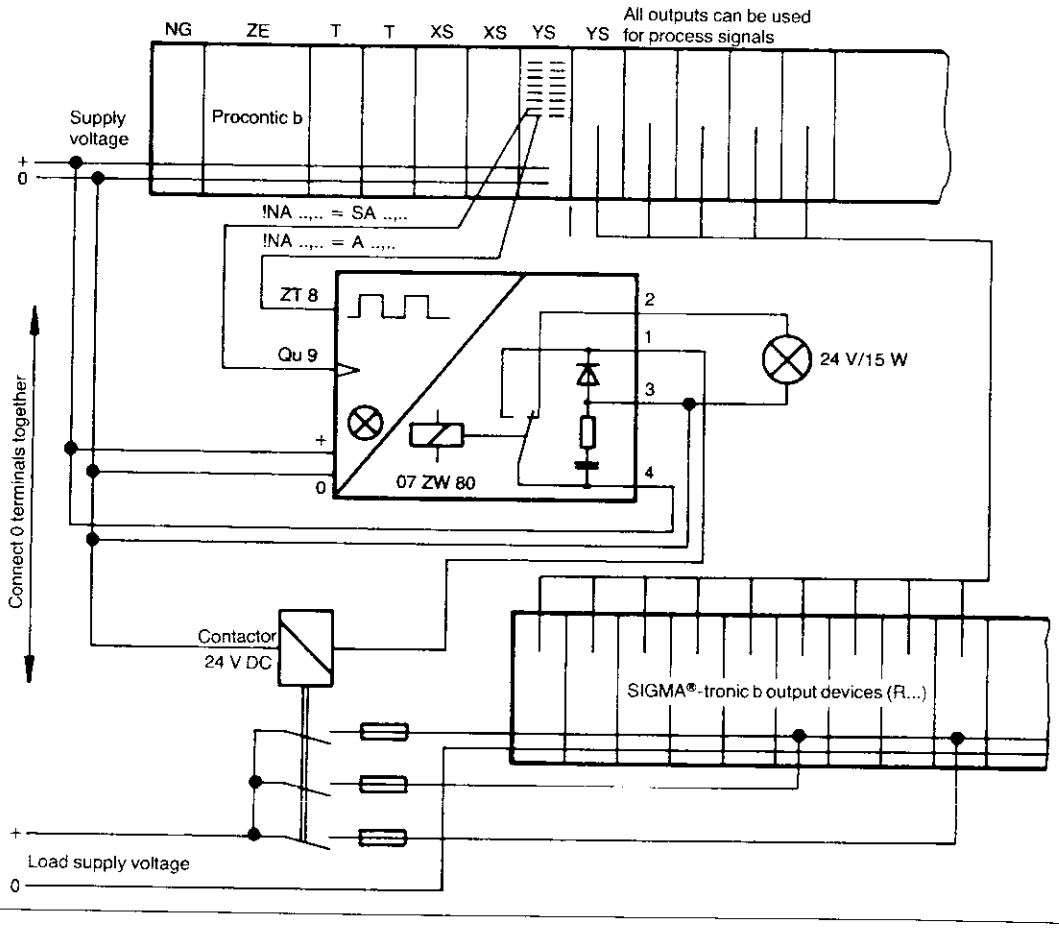
Two methods for installing the cycle monitoring module are possible:

1. in its housing beside the PROCONTIC b, snapped onto a support rail or
2. taken out of the housing and plugged into any free slot of the PROCONTIC b system.

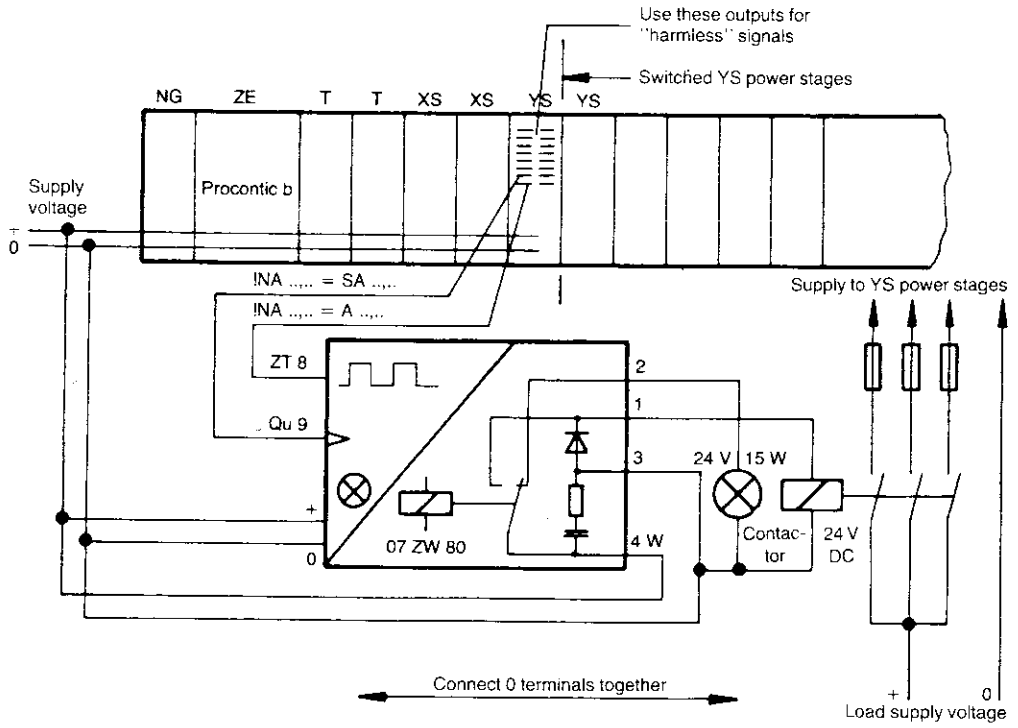
*Application Example 1:*
Procontic b with SIGMA®-tronic b output devices (R...).
The cycle monitoring unit switches the supply voltage of the YS output stages (except for the YS stage used for generation of the cycle clock and the RUN signal).




*Application Example 2:*
Procontic b with SIGMA®-tronic b output devices (R...).
The cycle monitoring unit switches the load supply voltage. All Procontic b signals are continuously available.



*Application Example 3:*
Procontic b with YS power output stages. The cycle monitoring unit switches the load supply voltage.




## 12.11 Battery 07 LB 20 R1


**Technical Data:**

| | |
|---|---|
| Storage temperature discharge | -50 . . . +75°C watch self |
| Ambient temperature during operation transportation | -50 . . . +75°C watch storage and transport |
| No-load voltage | 3.7 V |
| Rated voltage | 3.6 V/load = 1 mA |

| | |
|---|---|
| Temperature gradient of the rated voltage | approximately –1 mV/k |
| Temperature gradient of the capacity (load 10mA) | approximately –10% T = 75°C<br>approximately –15% T = 0°C<br>approximately – 5% T = –40°C |
| Self discharge | approximately 50% T = 40°C storage period 1.5 years |
| Order number | GJR5223500R1 |

The lithium battery is used in the CPU 07 ZE 86, in the digital timer 07 TZ 82, in the word processor 07 WP 84, in the register card 07 RK 80, in the main memory 07 AS 82 and in the commissioning unit 07 IE 84. The battery enables the RAM to store data (buffer) after the individual unit was disconnected from the line power.

The capacity of the battery is sufficient for a operating time of up to one year.

Handling notes for the battery 07 LB 20:

- prevent short circuits; the battery is damaged by a short circuit

- battery test: with a load of 3,9kOhm over 5 seconds the voltage must not drop below 2,9V

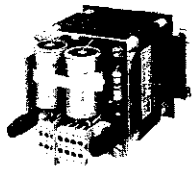
- commissioning: solder battery in before starting commissioning

- storage and transportation:
  storage time related to the date of manufacturing, 2 years maximum
  do not put battery on a metallic surface or into a metallic box
  watch transportation regulations (air lines)

  batteries, which were stored for a longer period of time show a voltage drop, depending on the load at –40°C a load of >10mA will lead to a voltage collapse

- replacement instructions:
  remove and install battery with a potential free solder station only:
  sequency for removing: 1. plus pole
  2. minus pole
  sequency for installing: 1. minus pole
  2. plus pole

## 12.12 Power supply unit R501 V0

BBC 72 7507

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range | 187 . . . 242 V |
| Mains system frequency range | 48 . . . 63 Hz |
| Current input, no-load | 50 mA |
| rated load | 200 mA |
| Dissipation at rated voltage and rated load | 8 W |
| Primary-side fuse (to be provided externally) | 0.25 A, slow |

**Output values:**

| | |
|---|---|
| Voltage range | 19 . . . 31 V |
| Rated current | 1 A |
| Max. ripple content $U_{SS}$ | 3 V |
| Secondary side fuse | DIN fuse-link 5 x 20 mm 1 A, fast |
| Mechanical design: | Metal baseplate to be screwed to the cabinet back panel |
| Weight: | approx. 1 kg |
| Order number for module: | GHR5010000V0 |

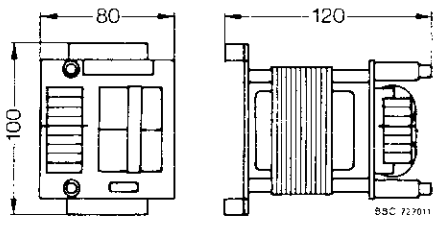
The power supply unit R 501/Vo supplies the 24 V d.c. supply voltage for PROCONTIC b and SIGMA®-tronic modules at a rated current of 1A.

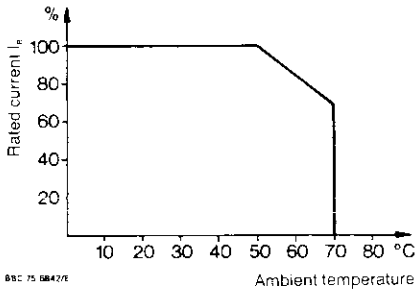
Mains system and feed voltage terminals are protected by built-in fusible links.

At ambient temperatures > 50 °C the attached reduction curve shall be observed.

The terminals for the 220 V system voltage are taken to screw terminals, the 24 V d.c. voltage is available at terminal sockets.

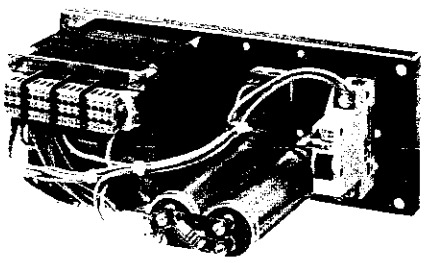
Dimensions in mm

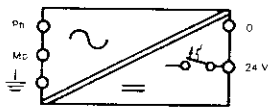



Reduction of output capacity

## 12.13 Power supply unit R503.1






BBC 79 0412

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range | 220 V + 10% - 15%<br>110 V |
| Mains system frequency range | 48 . . . 63 Hz |
| Current input at $U_N$ = 220 V, no load | approx. 150 mA |
| full load | approx. 900 mA |
| Current input at $U_N$ = 110 V, no load | approx. 300 mA |
| full load | approx. 1800 mA |
| Dissipation at rated voltage and rated load | approx. 30 W |
| Primary-side fuse (to be provided externally), medium time-lag or slower | 220 V approx. 1A<br>110 V approx. 2A |
| Secondary side fuse, Stotz m.c.b. | GHS1812061VO |

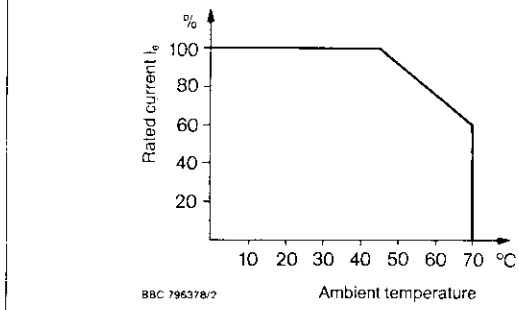
**Output values:**

| | |
|---|---|
| Rated voltage | 24 V d.c. |
| Voltage range | 19.5 . . . 31.2 V d.c. |
| Rated current | 5 A |
| Max. ripple content $U_{SS}$ | 3.5 V |
| Weight | approx. 5.2 kg |
| Order number for module: | GHR5030001R1 |

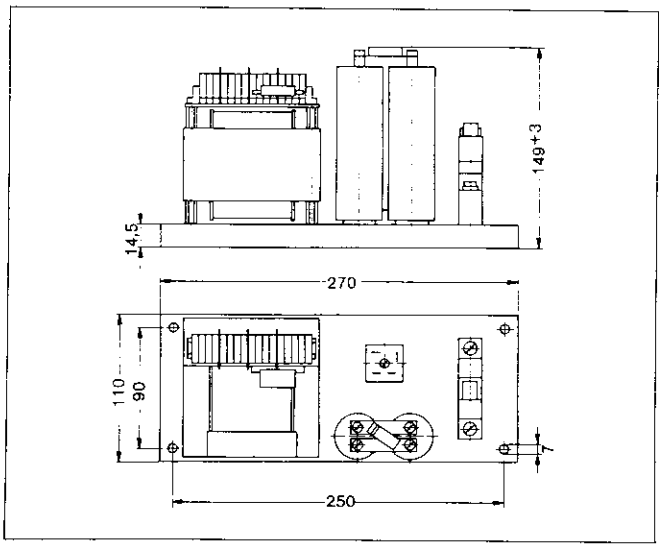
The power supply unit R 503.1 provides the 24 V d.c. supply voltage for PROCONTIC b and SIGMA®-tronic equipment at a rated current of 5 A.

The secondary circuit is protected by a miniature circuit breaker. The system voltage terminals 220 V or 110 V are taken to screw terminals. The feed voltage is available at plug and socket terminals.

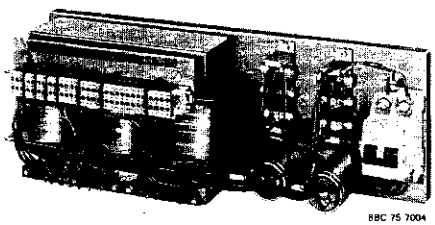
At ambient temperatures > 45°C the attached reduction curve shall be observed.

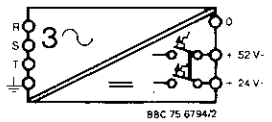



Reduction of output capacity




## 12.14 Power supply unit R505 V102




BBC 75 7004

**Technical data:**

| **Input values:** | |
|---|---|
| Mains system voltage range (three-phase) | 220 V -15 % + 10%<br>380 V |
| Mains system frequency range | 48 . . . 63 Hz |

| | |
|---|---|
| Current input, no load | approx. 100 mA |
| full load | approx. 750 mA |
| Dissipation at rated voltage and rated load | approx. 70 W |
| Primary-side fuses | externally provided 220 V: approx. 2 A, medium time-lag or slow<br>380 V: approx. 1.25 A, medium time-lag or slow |
| Secondary-side fuse Stotz m.c.b. | GHS1822101VO |

**Output values:**

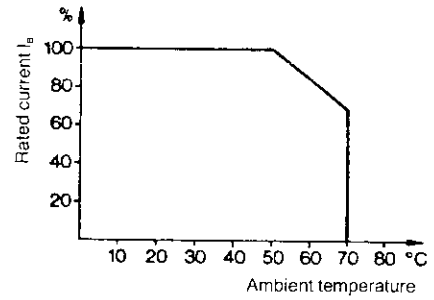
| | |
|---|---|
| Output 1: Rated voltage | 24 V d.c. |
| Voltage range | 19 V . . . 31 V d.c. |
| Rated current | 5 A |
| Max. ripple content U | 2.5 V |
| Output 2: Rated voltage | 52 V |
| Voltage range | 44 V . . . 65 V d.c. |
| Rated current | 5 A |
| Max. ripple content U | 5 V |
| Mechanical design | Metal baseplate to be screwed onto cabinet back panel |
| Weight: | approx. 17 kg |
| Order number for module: | GHR505000V102 |

The power supply unit provides the 24 V d.c. feed voltage for PROCONTIC b and SIGMA®-tronic equipment. In addition a 52 V voltage is available for input signals from mechanical sensors and for signal lamps.

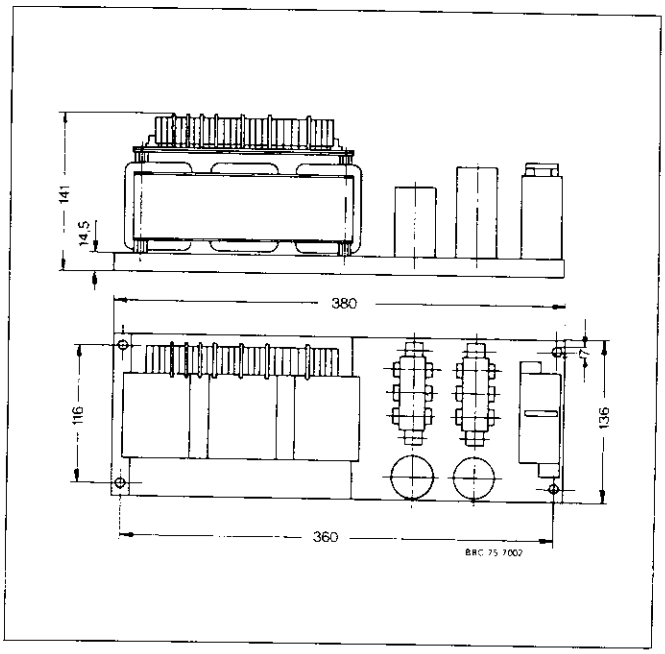
The outputs of both circuits are protected by built-in duplex m.c.b.'s. If the m.c.b. of one circuit is tripped because of a short circuit or overload the other circuit, too, is cut out.

At ambient temperatures > 50 °C the attached reduction curve shall be observed.

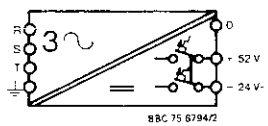
The mains system terminals are taken to screw terminals. Feed and signal input voltage are available at plug-and-socket terminals.

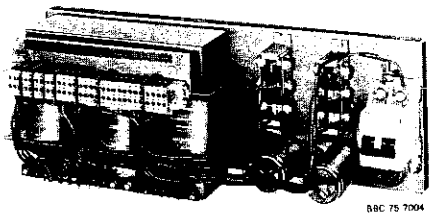



Reduction of output capacity
(24 V and 52 V)



## 12.15 Power supply unit R505 V103




BBC 75 7004

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range (3-phase) | 415/440/460/500 V<br>- 15% . . . + 10% |
| Mains system frequency range | 48 . . . 63 Hz |
| Current input, no load | approx. 55 mA |
| full load | approx. 675 mA |
| Dissipation at rated voltage and rated load | approx. 70 W |
| Primary-side fuses | 415 V/440 V: 1.25 A medium time-lag/slow<br>460 V/500 V: 1.0 A medium time- lag/slow |
| Secondary-side fuse, Stotz m.c.b. | GHS1822101VO |

**Output values:**

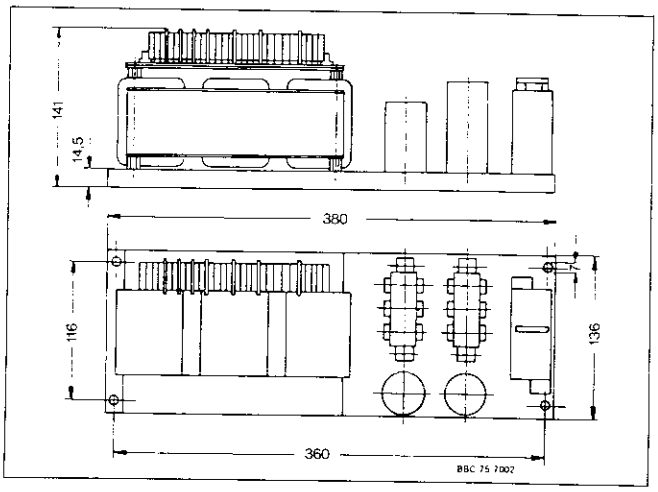
| | |
|---|---|
| Output 1: Rated voltage | 24 V d.c. |
| Voltage range | 19 V . . . 31 V d.c. |
| Rated current | 5 A |
| Max ripple content U | 2.5 V |
| Output 2: Rated voltage | 52 V |
| Voltage range | 44 V . . . 65 V d.c. |
| Rated current | 5 A |
| Max. ripple content U | 5 V |
| Mechanical design | Metal baseplate to be screwed onto cabinet back panel |
| Weight | ca. 17 kg |
| Order number for module: | GHR505000V103 |

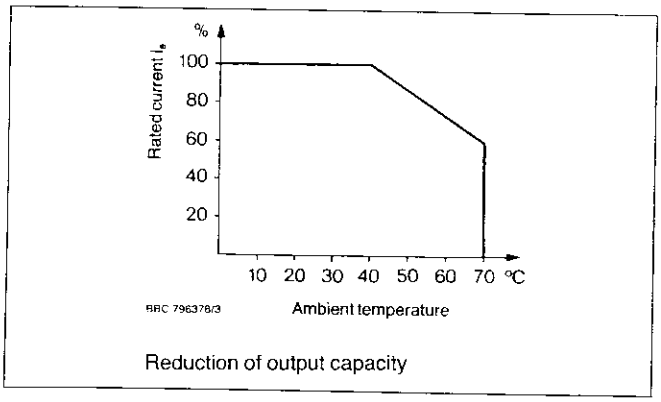
The power supply unit provides the 24 V d.c. feed voltage for PROCONTIC b and SIGMA ® –tronic equipment. In addition a 52 V voltage is available for input signals from mechanical sensors and for signal lamps.

The outputs of both circuits are protected by built-in duplex m.c.b.'s. If the m.c.b. of one circuit is tripped because of a short circuit or overload the other circuit, too, is cut out.

At ambient temperatures > 50 °C the attached reduction curve shall be observed.

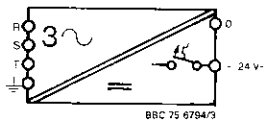
The mains system terminals are taken to screw terminals. Feed and signal input voltage are available at plug-and-socket terminals.

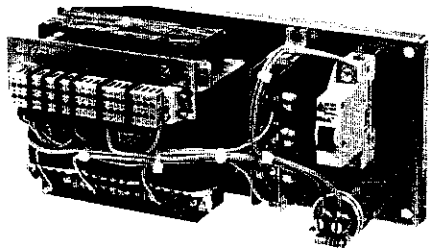



Reduction of output capacity

## 12.16 Power supply unit R506.1



BBC 79 0411

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range (3-phase) | 220 V + 15% + 10%<br>110 V |

| | |
|---|---|
| Mains system frequency range | 48 . . . 63 Hz |
| Current input at $U_N$ = 220 V, no load | approx. 160 mA |
| full load | approx. 950 mA |
| Current input at $U_N$ = 380 V, no load | approx. 80 mA |
| full load | approx. 550 mA |
| Dissipation at rated voltage and rated load | approx. 45 W |
| Primary-side fuse (to be provided externally), | 220 V approx. 2A |
| medium time-lag or slower | 380 V approx. 1.25A |
| Secondary-side fuse, Stotz m.c.b. | GHS1812101VO |

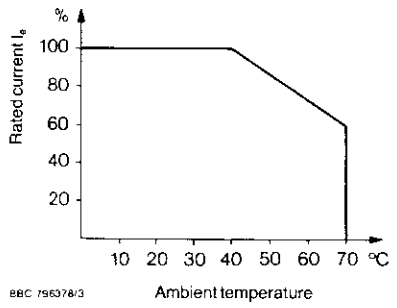
**Output values:**

| | |
|---|---|
| Rated voltage | 24 V d.c. |
| Voltage range | 19.5 . . . 31.2 V d.c. |
| Rated current | 10 A |
| Max. ripple content $U_{SS}$ | 3.5 V |
| Mechanical design: | Metal baseplate to be screwed onto the cabinet back panel |
| Weight: | approx. 5.2 kg |
| Order number for module: | GHR5060001R1 |

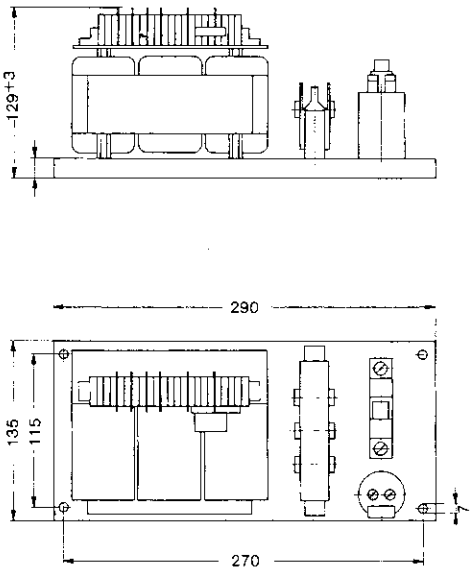
The power supply unit R 506.1 provides the 24 V d.c. supply voltage for PROCONTIC b and SIGMA ® –tronic equipment at a rated current of 10 A.

The secondary circuit is protected by a miniature circuit breaker. The system voltage terminals (three-phase a.c.) are taken to screw terminals. The feed voltage is available at plug and socket terminals.

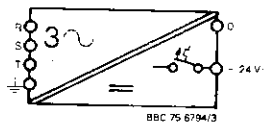
At ambient temperatures > 40°C the attached reduction curve shall be observed.

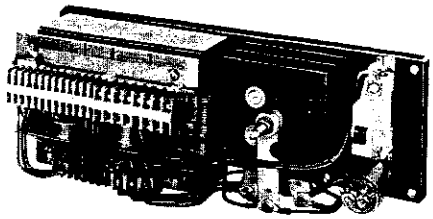



Reduction of output capacity



## 12.17 Power supply unit R507 V0



BBC 75 7005

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range (3-phase) | 220 V - 15% + 10%<br>380 V |
| Mains system frequency range | 48 . . . 63 Hz |
| Current input, no load | approx. 100 mA |
| full load | approx. 850 mA |
| Dissipation at rated voltage and rated load | approx. 80 W |
| Primary-side fuse<br>(to be provided externally),<br>medium time-lag or slow | 220 V: approx. 2 A<br>380 V: approx. 1.25 A |

**Output values:**

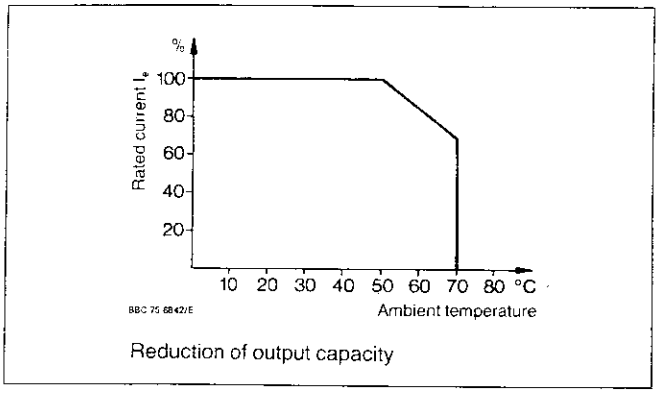
| | |
|---|---|
| Rated voltage | 24 V d.c. |
| Voltage range | 19 . . . 27 V |
| Rated current | 18 A |
| Max. ripple content $U_{SS}$ | 2.5 V |
| Secondary-side fuse, Stotz m.c.b. | GHS1812251VO |
| Mechanical design: | Metal base plate screwed onto the cabinet pack panel |
| Weight: | approx. 17 kg |
| Order number for module: | GHR5070000V0 |

The power supply unit provides the d.c. supply for PROCONTIC b and SIGMA®-tronic equipment incl. the associated actuators of extensive control systems.

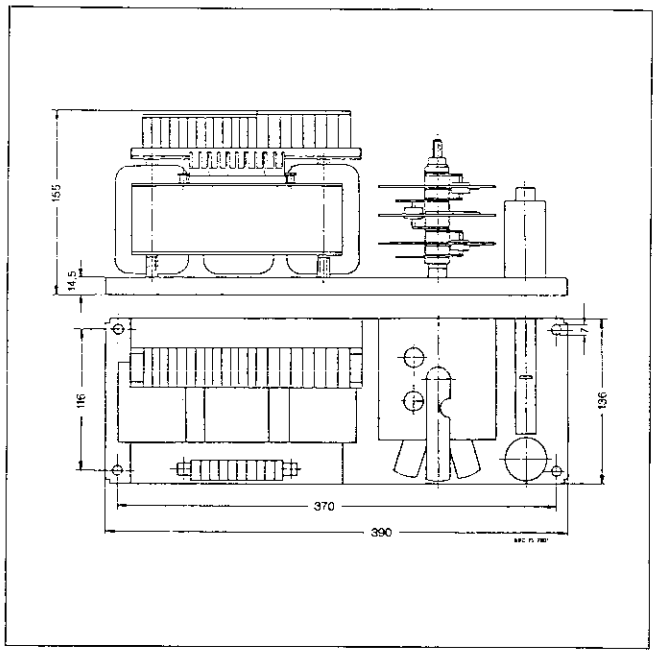
The primary side of the power supply unit is protected by a fuse to be provided externally, and the secondary side (24 V d.c.) by a built-in miniature circuit breaker.

The terminals of both primary and secondary side are taken to screw terminals.

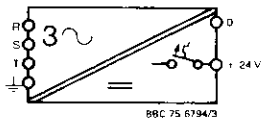
At ambient temperatures > 50°C the enclosed reduction curve shall be observed.

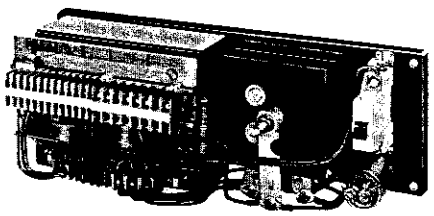


Reduction of output capacity




## 12.18 Power supply unit R507.2



BBC 75 7005

**Technical data:**

**Input values:**

| | |
|---|---|
| Mains system voltage range (3-phase) | 415/440/460/500 V<br>- 15% . . . + 10% |
| Mains system frequency range | 48 . . . 63 Hz |

| | |
|---|---|
| Current input, no load | 415 V: approx. 50 mA<br>440 V: approx. 48 mA<br>460 V: approx. 45 mA<br>500 V: approx. 43 mA |
| Current input, full load | 415 V: approx. 800 mA<br>440 V: approx. 780 mA<br>460 V: approx. 750 mA<br>500 V: approx. 700 mA |
| Dissipation at rated voltage and rated load | approx. 80 W |
| Primary-side fuse (to be provided externally), medium time-lag or slow | approx. 1.6 A |

**Output values:**

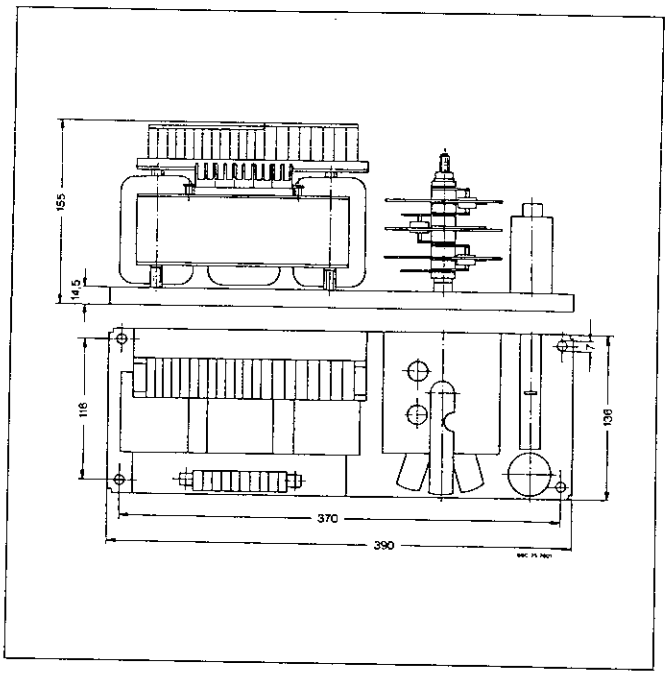
| | |
|---|---|
| Rated voltage | 24 V d.c. |
| Voltage range | 19 . . . 31.2 V |
| Rated current | 18 A |
| Max. ripple content $U_{ss}$ | 3 V |
| Secondary-side fuse, Stotz m.c.b. | GHS1812251VO |
| Mechanical design: | Metal base plate to be screwed onto cabinet back panel |
| Weight: | approx. 17 kg |
| Order number for module: | GHR5070002R1 |

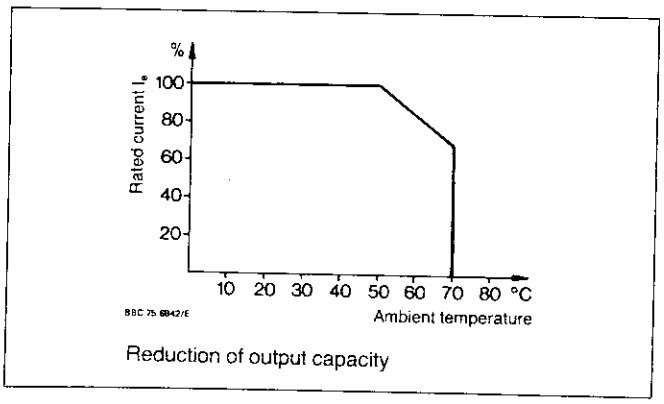
The power supply unit provides the d.c. supply for PROCONTIC b and SIGMA®-tronic equipment incl. the associated actuators of extensive control systems.

The primary side of the power supply unit is protected by a fuse to be provided externally, and the secondary side (24 V d.c.) by a built-in miniature circuit breaker.

The terminals of both primary and secondary side are taken to screw terminals.

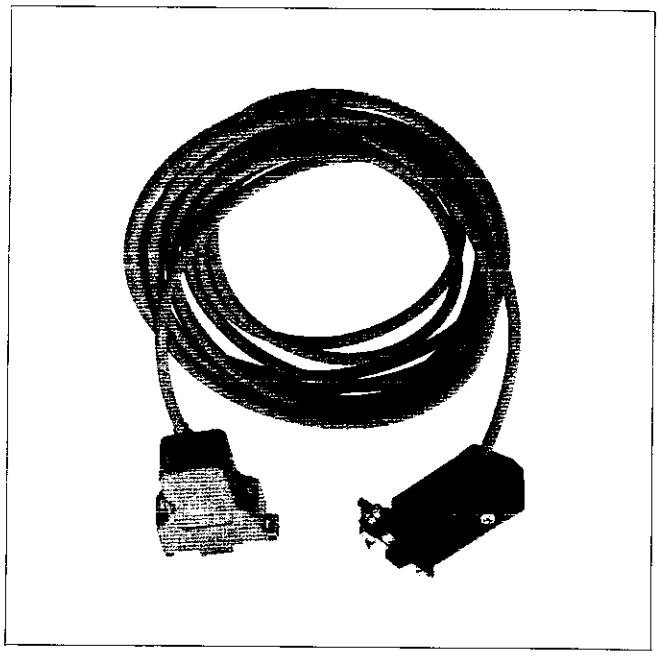
At ambient temperatures > 50°C the enclosed reduction curve shall be observed.




Reduction of output capacity

## 12.19 system cable 07 SK 89 R1



**Technical data:**

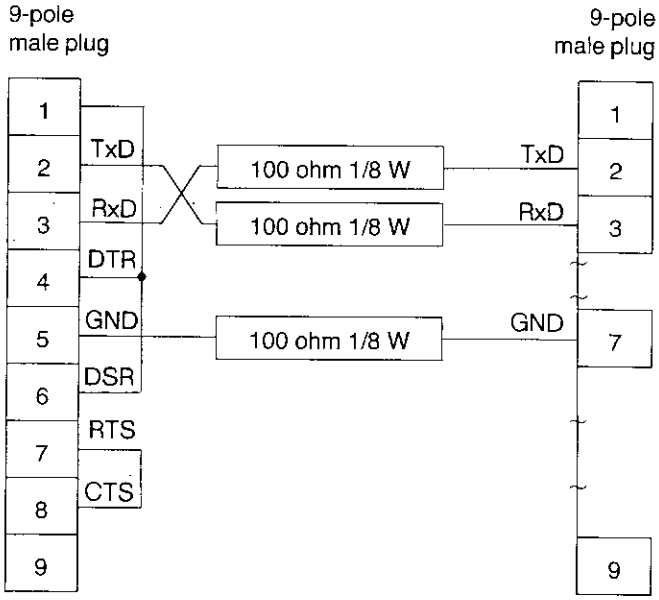
| | |
|---|---|
| Packaging quantity | 1 |
| Weight | 0.1 kg |
| Order number | GJV3073901R1 |

The system cable 07 SK 89 R1 with integrated resistors connects the serial interfaces of the commissioning unit 07 IE 84 respective the CPU 07 ZE 86, the digital timer 07 TZ 82, the wordprocessor 07 WP 84 and the programming units 07 PC 32 or 07 PH 31 to each other for operation in programming mode.

The connection via the 9-pole trapezoidal outlet of the individual unit allows the use of all functions by the programming unit.

These points must be regarded:

- use the system cable 07 SK 89 R1 (or a similar cable according to the circuit shown)
- connect the 0V terminals of the word processor 07 WP 84 and the digital timer 07 TZ 82 to the common 0V
- 0V of the PROCONTIC b to be earth grounded
- the programming unit must be connected to a power outlet with the ground pin connected to the central ground point of the PROCONTIC b (cabinet outlet)
- do not use an extension cord for the AC-power input of the programming unit
- if the measures spelled out before cannot be taken, an isolation transformer must be used for the AC-power input of the programming unit



## 12.20 Power supply unit 07 NG 31 R1
220 V AC / 24 V DC, 1 A

**Order number** GJV3075001R1

### Description

The power supply unit 07 NG 31 R1 provides the supply voltage of 24 V DC out of the 230 V AC single-phase mains. At its output it provides a 24 V DC voltage at a rated current of 1 A. The mains terminal and the supply voltage terminal are protected by built-in fuses. They are connected to screw-type terminals.

### Mechanical construction

Metal fixing angles to be screwd onto mounting plate

### Dimensions

| | |
|---|---|
| Basis area | 85 mm x 74 mm |
| Height | approx. 138 mm |

### Further data

| | |
|---|---|
| Weight | 2.2 kg |
| Environmental temperature | max. 55 °C (in case of 100 % load) |

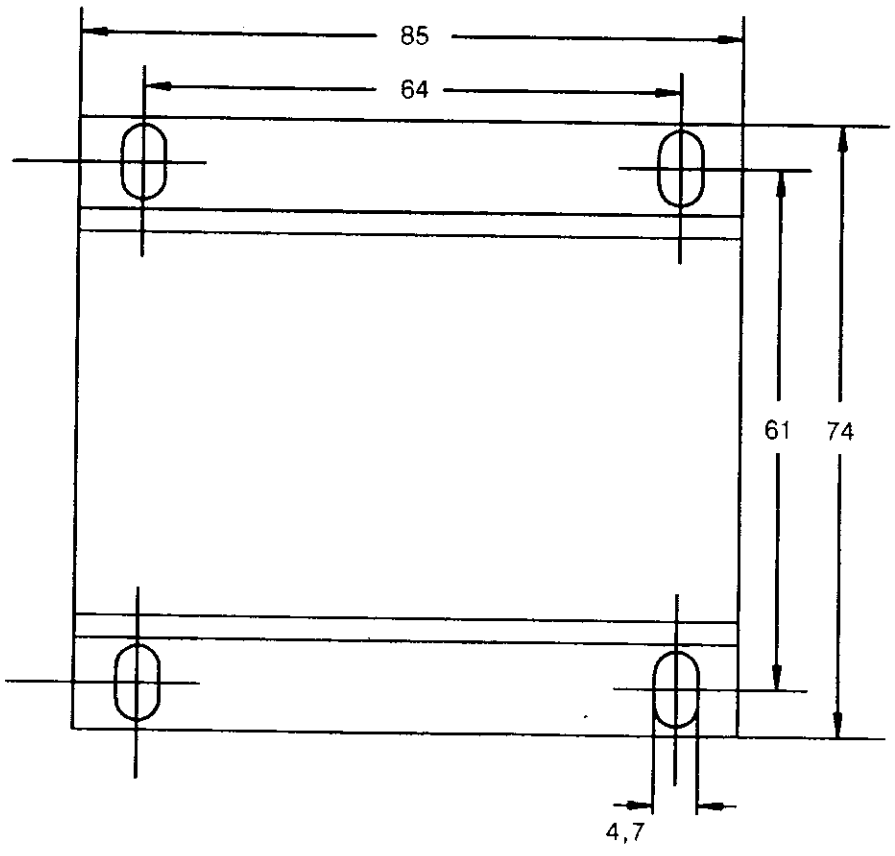
### Input values

| | |
|---|---|
| Mains voltage range | 187 - 244 V AC |
| Mains frequency range | 50 - 60 Hz |
| Current consumption, | |
| no-load operation | 180 mA |
| rated load | 270 mA |
| Primary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 1 A slow fuse |

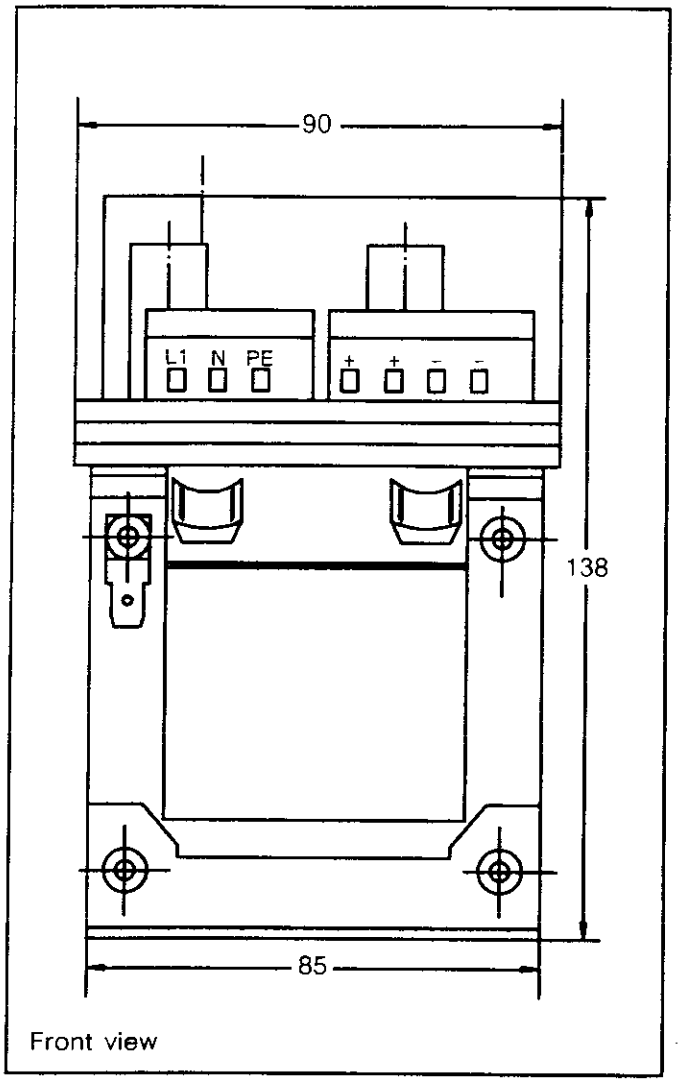
### Output values

| | |
|---|---|
| Voltage range | 19 - 31.2 V DC |
| Rated current | 1 A |
| max. ripple factor Upp | 1 V |
| Secondary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 1.25 A slow fuse |

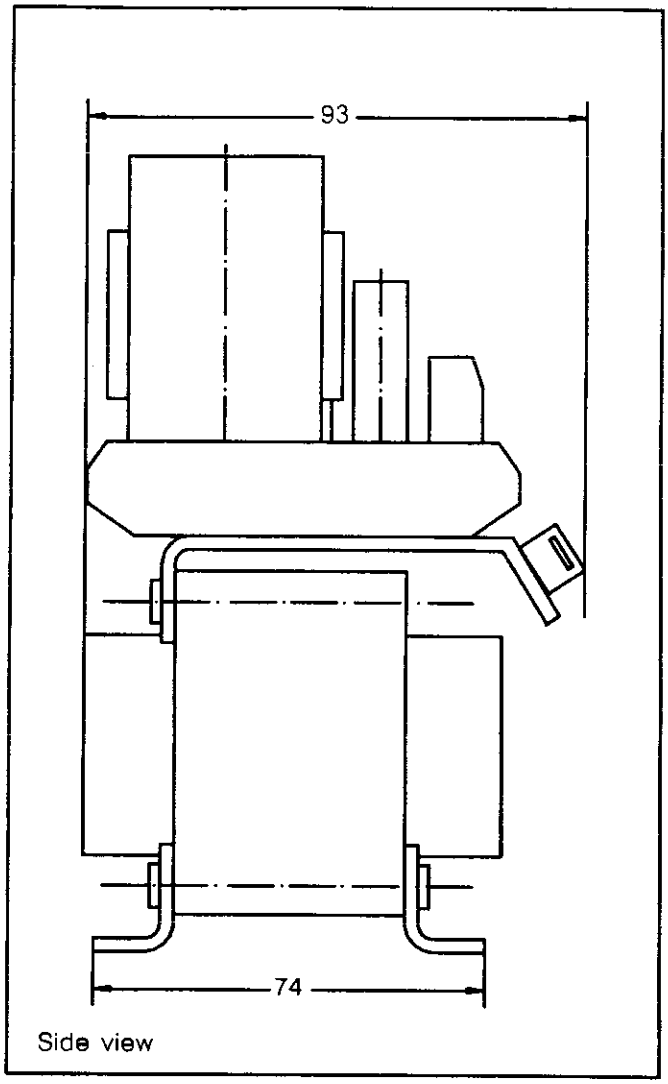
The power supply unit 07 NG 31 R1 conforms to the requirements of **VDE 0551** for the transformer and **VDE 0160** for the complete unit.




Drilling pattern



Front view



Side view

## 12.21 Power supply unit 07 NG 32 R1
220 V AC / 24 V DC, 2 A

**Order number** GJV3075002R1

### Description

The power supply unit 07 NG 32 R1 provides the supply voltage of 24 V DC out of the 230 V AC single-phase mains. At its output it provides a 24 V DC voltage at a rated current of 2 A. The mains terminal and the supply voltage terminal are protected by built-in fuses. They are connected to screw-type terminals.

### Mechanical construction

Metal fixing angles to be screwd onto mounting plate

### Dimensions

| | |
|---|---|
| Basis area | 85 mm x 74 mm |
| Height | approx. 148 mm |

### Further data

| | |
|---|---|
| Weight | 2.3 kg |
| Environmental temperature | max. 55 °C (in case of 100 % load) |

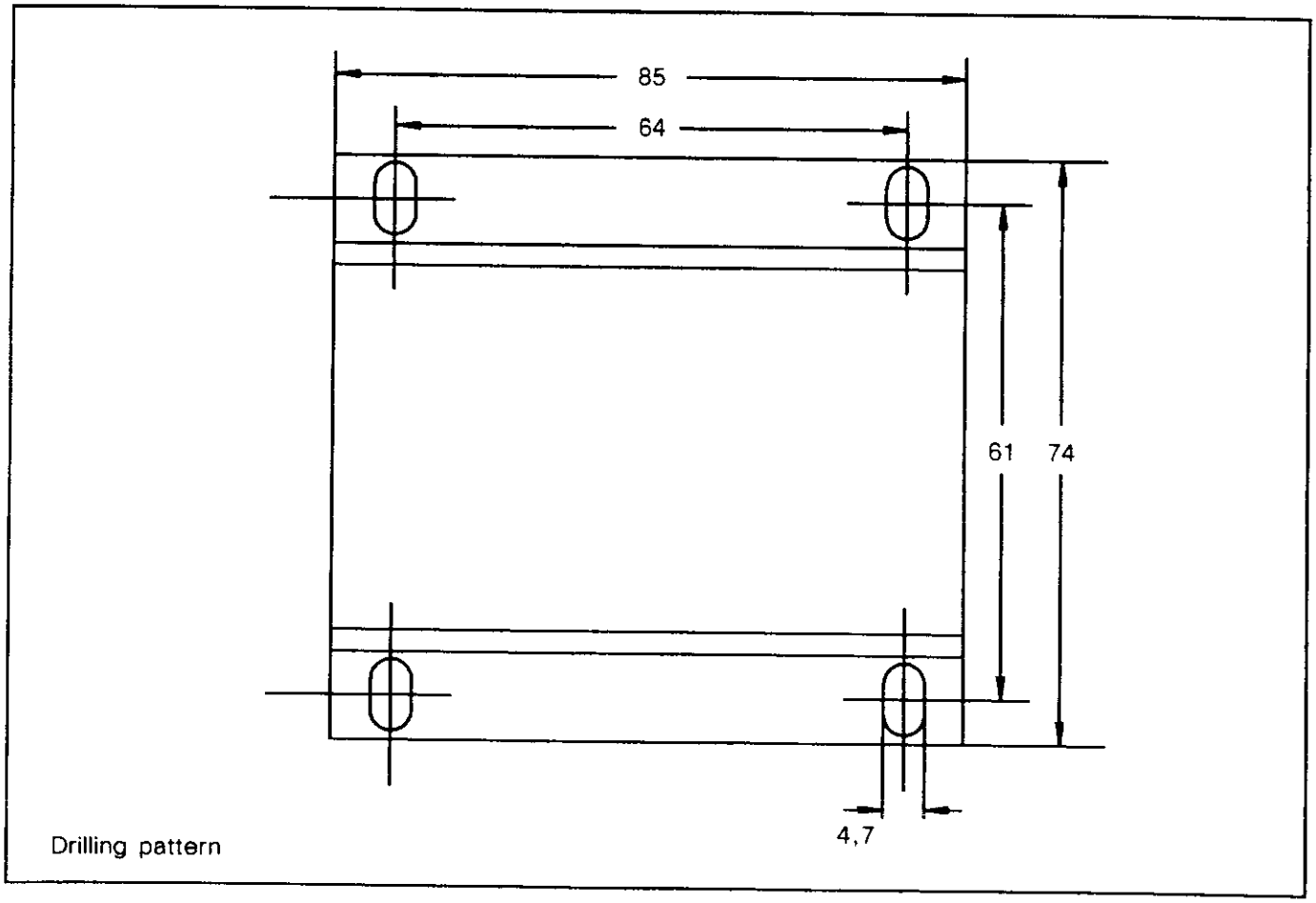
### Input values

| | |
|---|---|
| Mains voltage range | 187 - 244 V AC |
| Mains frequency range | 50 - 60 Hz |
| Current consumption, | |
| no-load operation | 180 mA |
| rated load | 400 mA |
| Primary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 1 A slow fuse |

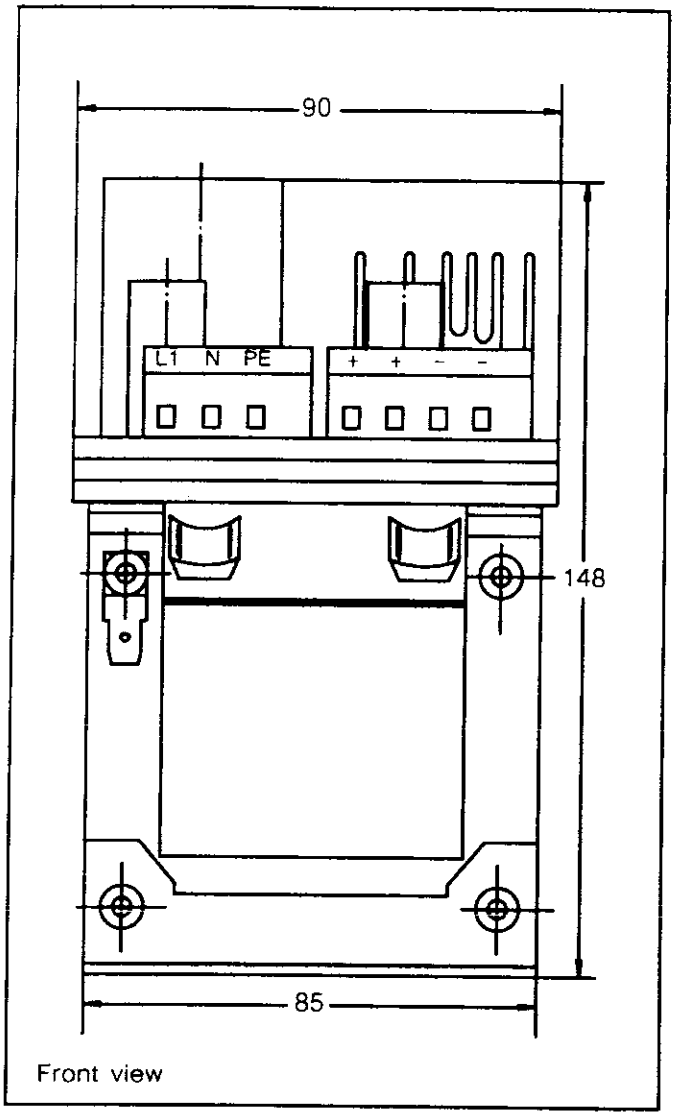
### Output values

| | |
|---|---|
| Voltage range | 18 - 31.2 V DC |
| Rated current | 2 A |
| max. ripple factor Upp | 0.8 V |
| Secondary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 2.5 A slow fuse |

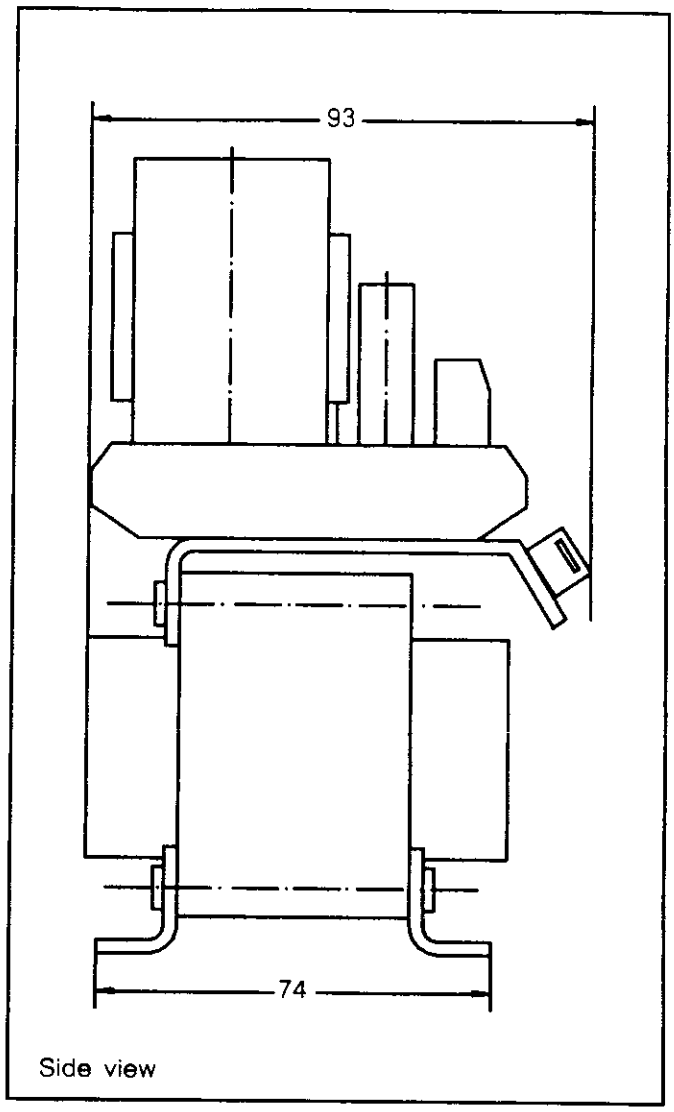
The power supply unit 07 NG 32 R1 conforms to the requirements of **VDE 0551** for the transformer and **VDE 0160** for the complete unit.




Drilling pattern



Front view



Side view

## 12.22 Power supply unit 07 NG 33 R1
220 V AC / 24 V DC, 3 A

**Order number** GJV3075003R1

**Description**

The power supply unit 07 NG 33 R1 provides the supply voltage of 24 V DC out of the 230 V AC single-phase mains. At its output it provides a 24 V DC voltage at a rated current of 3 A. The mains terminal and the supply voltage terminal are protected by built-in fuses. They are connected to screw-type terminals.

**Mechanical construction**

Metal fixing angles to be screwd onto mounting plate

**Dimensions**

| | |
|---|---|
| Basis area | 96 mm x 86 mm |
| Height | approx. 160 mm |

**Further data**

| | |
|---|---|
| Weight | 3.1 kg |
| Environmental temperature | max. 55 °C (in case of 100 % load) |

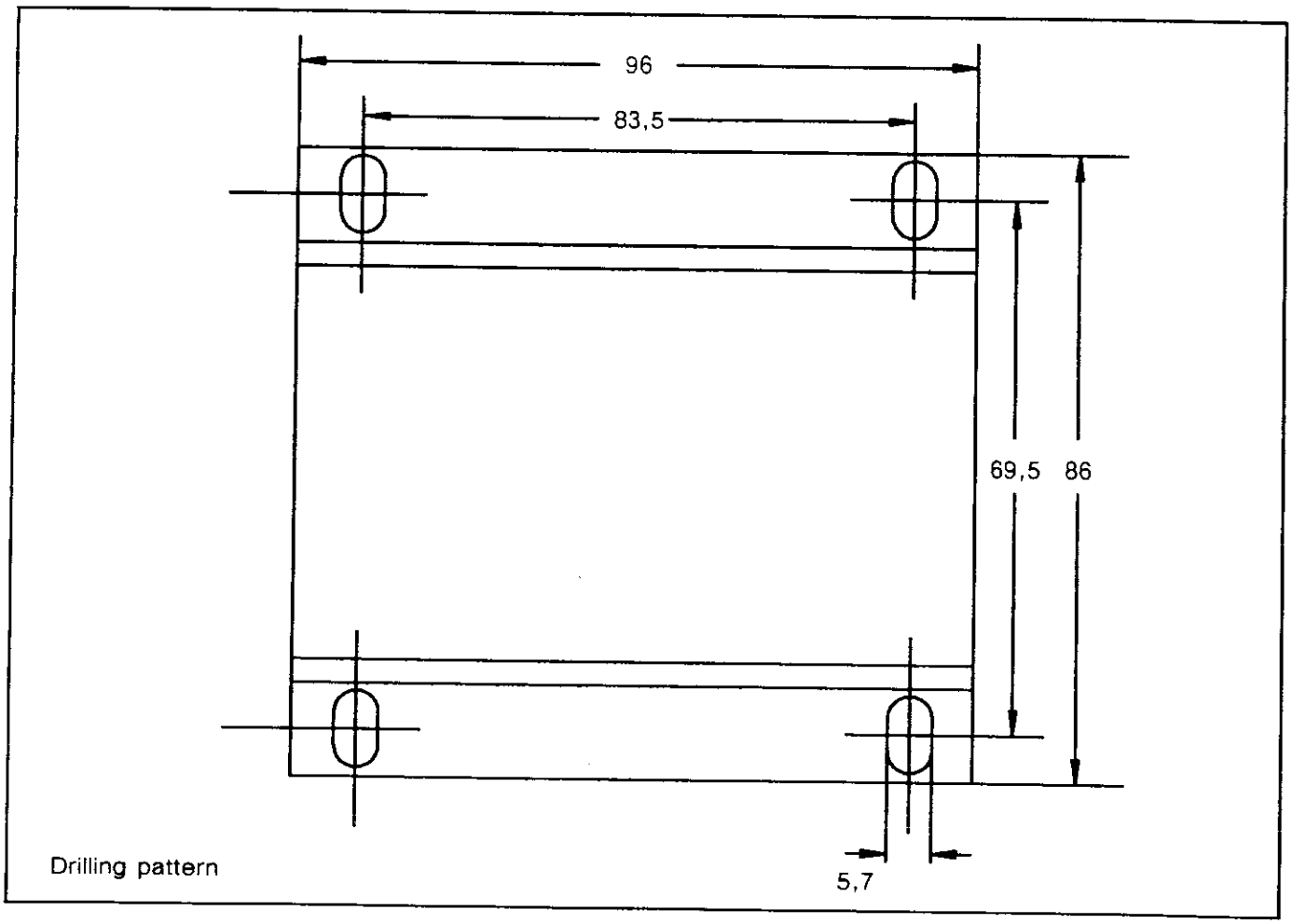
**Input values**

| | |
|---|---|
| Mains voltage range | 187 - 244 V AC |
| Mains frequency range | 50 - 60 Hz |
| Current consumption, | |
| no-load operation | 210 mA |
| rated load | 550 mA |
| Primary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 1.6 A slow fuse |

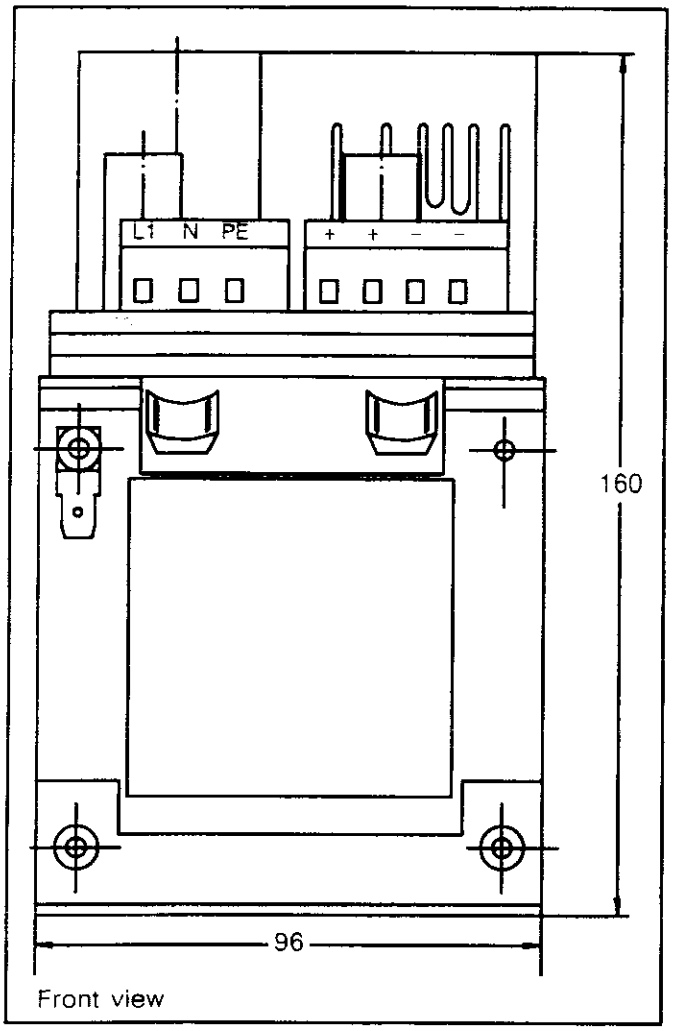
**Output values**

| | |
|---|---|
| Voltage range | 19 - 31.2 V DC |
| Rated current | 3 A |
| max. ripple factor Upp | 1.3 V |
| Secondary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 3.15 A slow fuse |

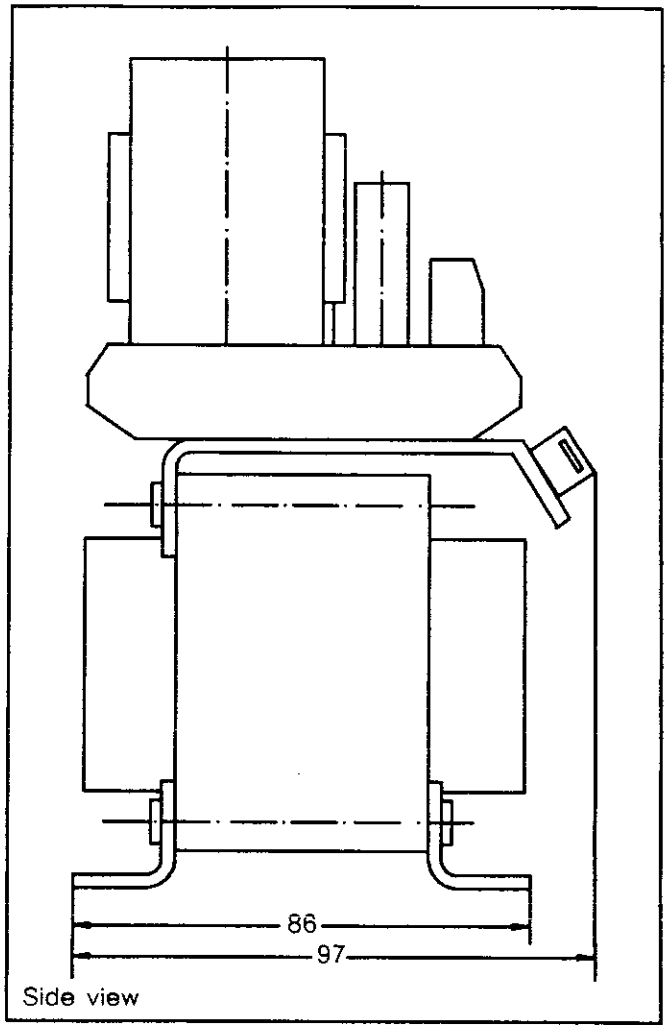
The power supply unit 07 NG 33 R1 conforms to the requirements of **VDE 0551** for the transformer and **VDE 0160** for the complete unit.




Drilling pattern



Front view



Side view

## 12.23 Power supply unit 07 NG 34 R1
220 V AC / 24 V DC, 5 A

**Order number** GJV3075004R1

**Description**

The power supply unit 07 NG 34 R1 provides the supply voltage of 24 V DC out of the 230 V AC single-phase mains. At its output it provides a 24 V DC voltage at a rated current of 5 A. The mains terminal and the supply voltage terminal are protected by built-in fuses. They are connected to screw-type terminals.

**Mechanical construction**

Metal fixing angles to be screwd onto mounting plate

**Dimensions**

| | |
|---|---|
| Basis area | 96 mm x 100 mm |
| Height | approx. 160 mm |

**Further data**

| | |
|---|---|
| Weight | 4.2 kg |
| Environmental temperature | max. 55 °C (in case of 100 % load) |

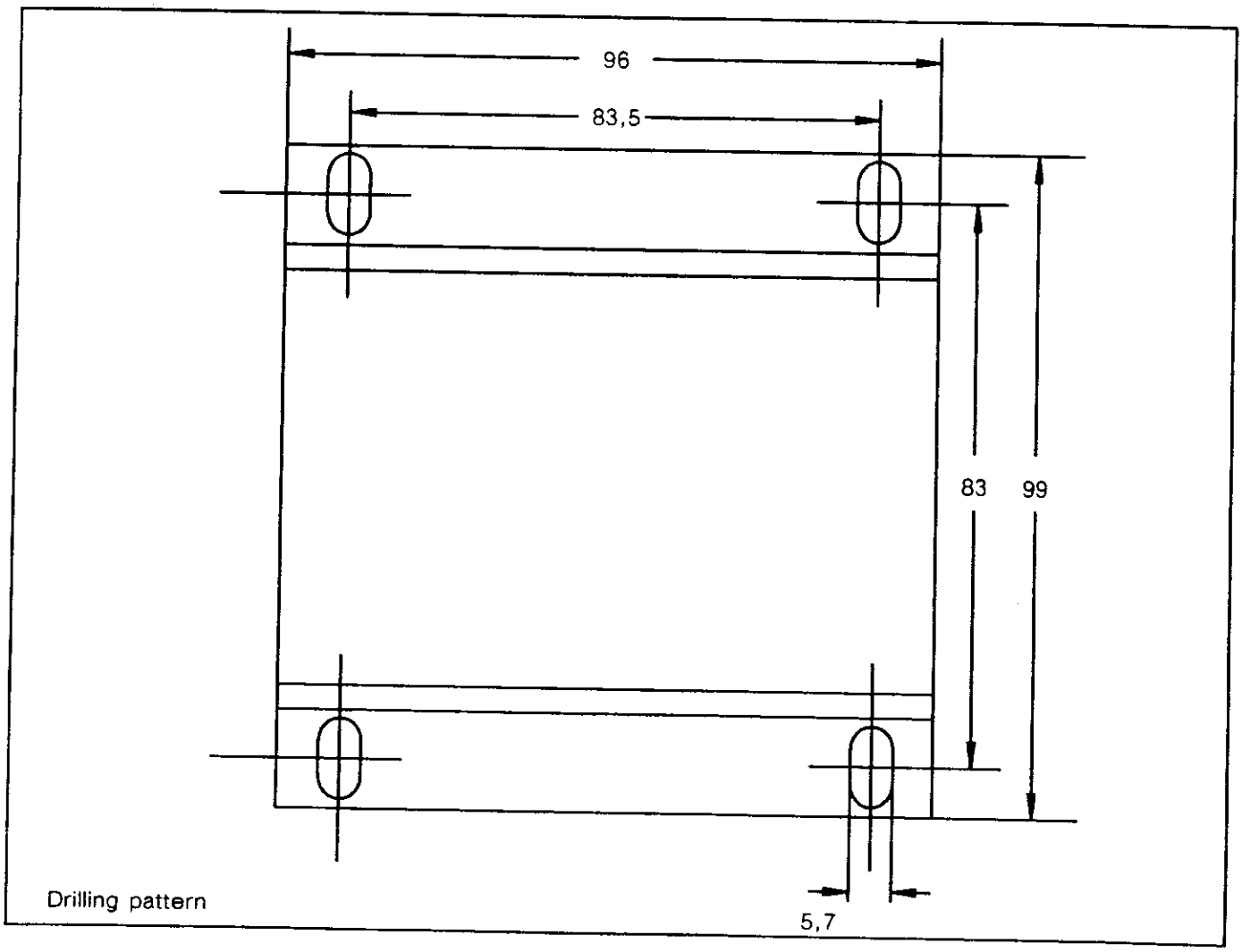
**Input values**

| | |
|---|---|
| Mains voltage range | 187 - 244 V AC |
| Mains frequency range | 50 - 60 Hz |
| Current consumption, | |
| no-load operation | 270 mA |
| rated load | 830 mA |
| Primary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 2 A slow fuse |

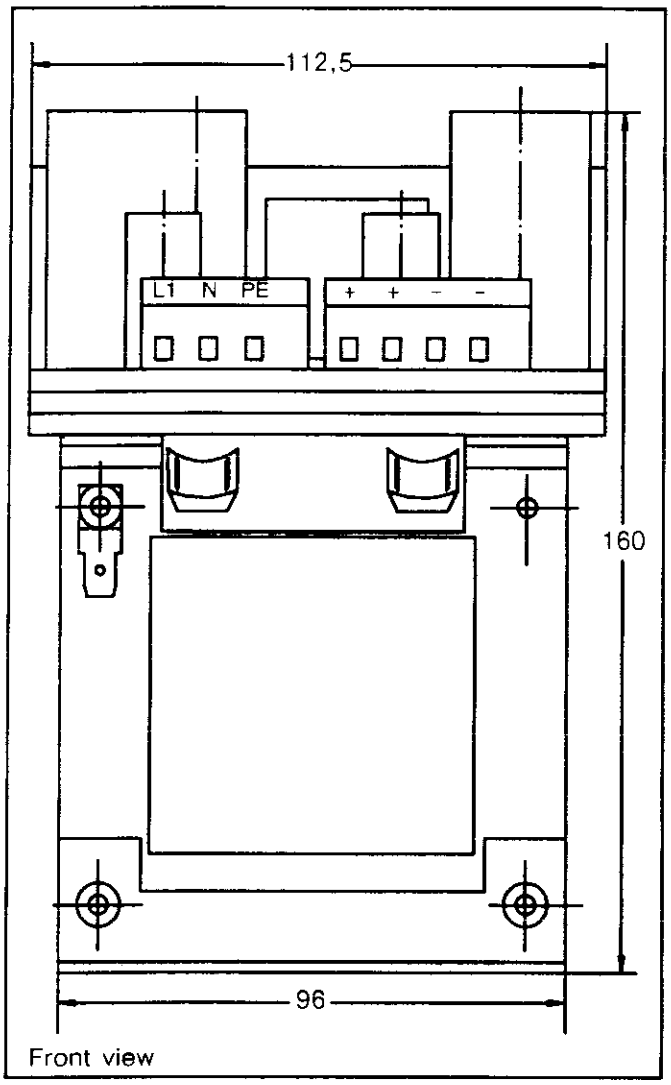
**Output values**

| | |
|---|---|
| Voltage range | 18 - 31.2 V DC |
| Rated current | 5 A |
| max. ripple factor Upp | 0.9 V |
| Secondary fuse (sand-filled fuse) DIN cartridge fuse-link 5 x 20 | 5 A slow fuse |

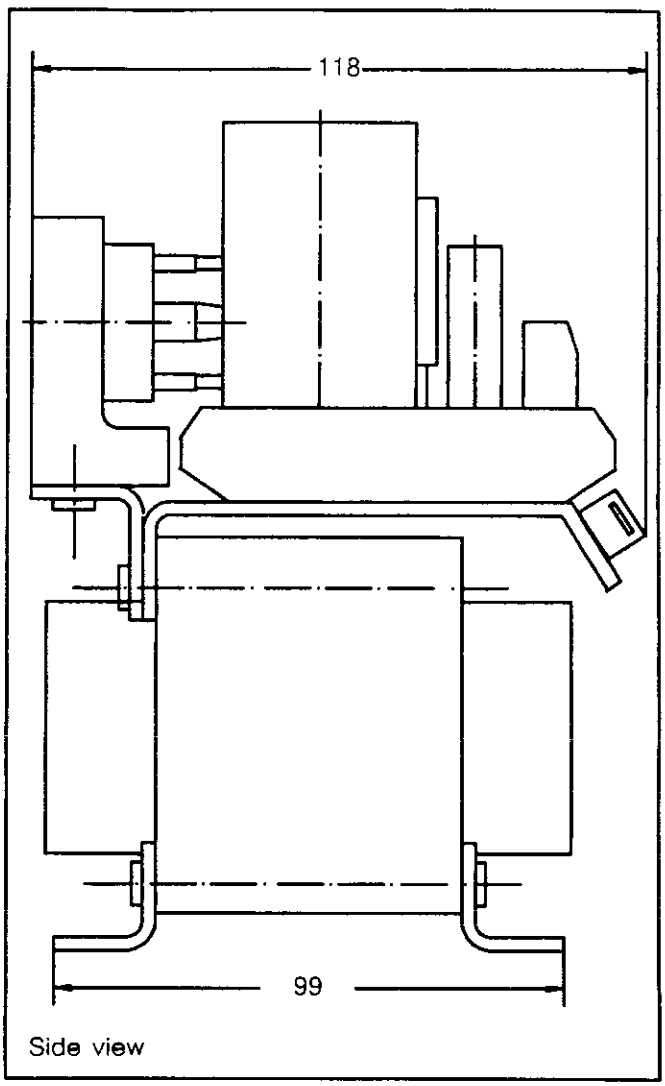
The power supply unit 07 NG 34 R1 conforms to the requirements of **VDE 0551** for the transformer and **VDE 0160** for the complete unit.




Drilling pattern



Front view



Side view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