System Description

ABB Procontic K200
Family of Compact
Programmable Controllers

Hardware

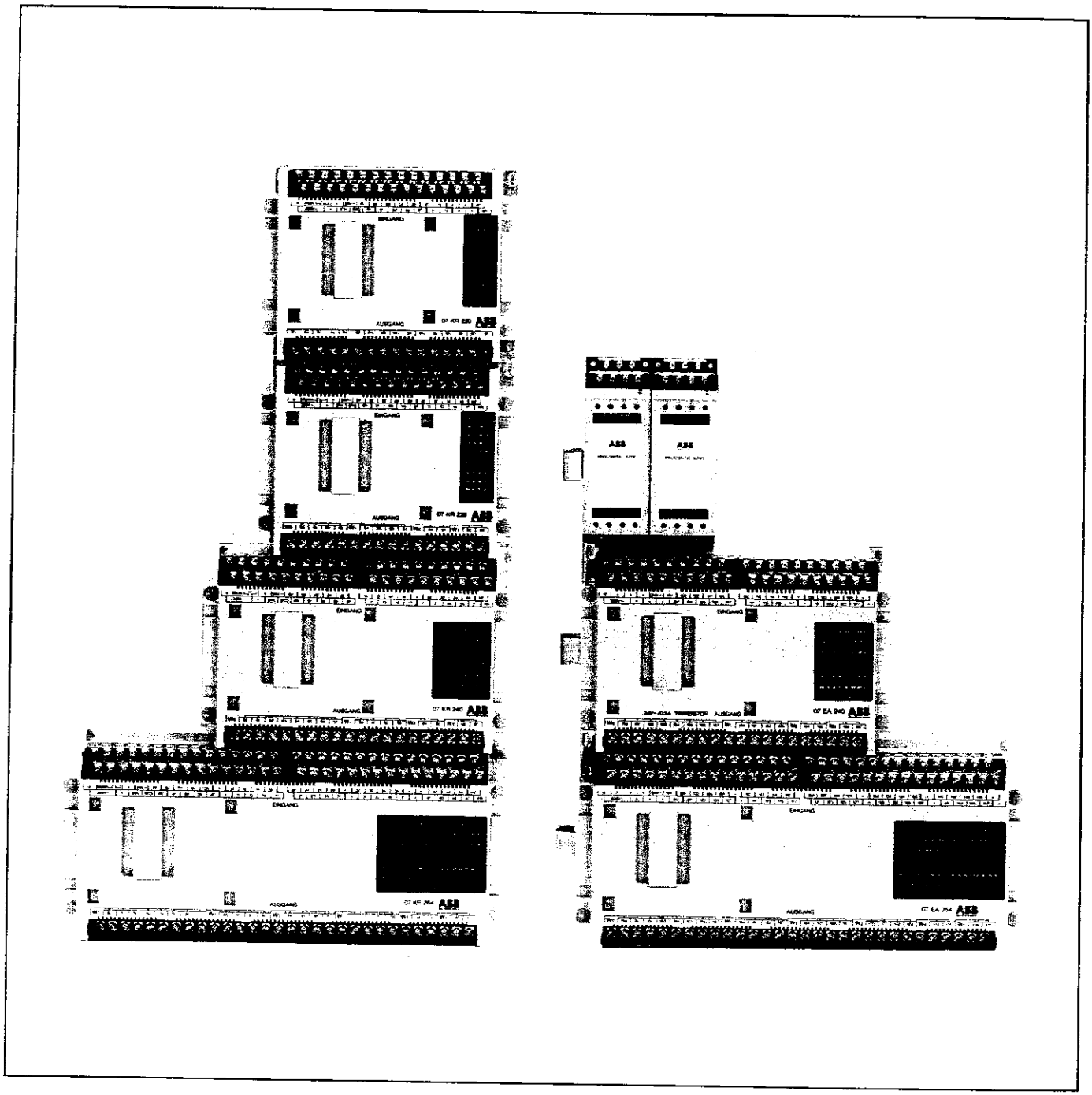


**ABB Schalt–
und Steuerungstechnik**

ABB

Regulations
Concerning the Setting up of Installations

Apart from the basic "Regulations for the Setting up of Power Installations" DIN VDE* 0100 and for "The Rating of Creepage Distances and Clearances" DIN VDE 0110 Part 1 and Part 2 the regulations "The Equipment of Power Installations with Electrical Components" DIN VDE 0160 in conjunction with DIN VDE 0660 Part 500 have to be taken into due consideration.

Further attention has to be paid to DIN VDE 0113 Part 1 and Part 200 in case of the control of working and processing machines. If operating elements are to be mounted near parts with dangerous contact voltage DIN VDE 0106 Part 100 is additionally relevant.

If the protection against direct contact according to DIN VDE 0160 is required, this has to be ensured by the user (e.g. by incorporating the elements in a switchgear cabinet). The devices are designed for pollution severity 2 in accordance with DIN VDE 0110 Part 1. If higher pollution is expected, the devices must be installed in appropriate housings.

The user has to guarantee that the devices and the components belonging to them are mounted following these regulations. For operating the machines and installations, other national and international relevant regulations, concerning prevention of accidents and using technical working means, also have to be met.

The ABB Procontic devices are designed according to IEC 1131 Part 2. Meeting this regulation, they are classified in overvoltage category II which is in conformance with DIN VDE 0110 Part 2.

For the direct connection of ABB Procontic devices, which are powered with or coupled to AC line voltages of overvoltage category III, appropriate protection measures corresponding to overvoltage category II according to IEC-Report 664/1980 and DIN VDE 0110 Part 1 are to install.

Equivalent standards:

DIN VDE 0110 Part 1 ≙ IEC 664
DIN VDE 0113 Part 1 ≙ EN 60204 Part 1
DIN VDE 0660 Part 500 ≙ EN 60439-1 ≙ IEC 439-1

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

ABB Schalt- und Steuerungstechnik GmbH Heidelberg

Table of contents

1 Introduction

1.1 General

The compact controllers of the system family ABB Procontic K200 are available in various basic configurations from 20 I/Os to 64 I/Os. The system can be extended up to a maximum of 128 I/Os with various input and/or output modules.

The system can
- execute binary logic functions (AND/OR ...)
- store
- generate times
- count.

Special function blocks such as
- Shift register (16 bit)
- memory with dynamic inputs
- jump commands
- comparators

are already installed.

The system is programmed by means of a high-performance miniature programming unit.

This provides the following functions:
- Setting of outputs
- Displaying the status of I/Os
- Changing the program to times and counter values during processing
- Continuity checking of wiring
- Storing of programs on cassette
- Diagnostic functions

Programming with an IBM Personal Computer or a compatible Personal Computer is also possible via a special interface.

Various program memory modules (EPROM, EEPROM) which are plugged in from the front permit rapid replacement of user programs. The use of EEPROMs makes buffer batteries unnecessary.

1.2 General overview address allocation

Designation	Number	Type
Inputs Basic configuration	000–007 010–013	KR220
	010–017	KR228 KT228
	020–027	KR240 KT240
	030–037 040–047	KR264

Designation	Number	Type	
Outputs Basic configuration	050–057	KR220	
	060–063	KR228	
	060–067	KR240	
	070–077	KR264	
Input expansions	100–107 110–117 120–127	EA240	
	130–137 140–147	EA264	①
Output expansions	150–157 160–167	EA240	
	170–177	EA264	
128 unbuffered flags	200–207 300–307 210–217 310–317 220–227 320–327 230–237 330–337 240–247 340–347 250–257 350–357 260–267 360–367 270–277 370–377		
248 buffered flags	400–407 600–607 410–417 610–617 420–427 620–627 430–437 630–637 440–447 640–647 450–457 650–657 460–467 660–667 470–477 670–677 500–507 700–707 510–517 710–717 520–527 720–727 530–537 730–737 540–547 740–747 550–557 750–757 560–567 760–767 570–577		②
8 special functions	770–777		
40 timers	T00–T07 T10–T17 T20–T27 T30–T37 T40–T47		
24 down counters	Z50–Z57 Z60–Z67 Z70–Z77		

Note: The maximum configuration of the system (80 I, 48 O) can only be achieved with use of the 07 KR 264 unit. If smaller basic configurations are used the number of input/output channels is reduced correspondingly.

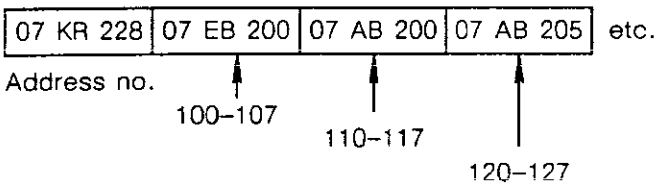
Example: Basic configuration 07 KR 228: 16 I, 12 O
Expansion module 07 EA 264: 40 I, 24 O
Total: 56 I, 36 O

Basic configuration 07 KR 220: 12 I, 8 O
and I/O modules, max. 40 I, 24 O
total max. 52 I, 32 O
Can be realized with one basic configuration (07 KR 220) plus 5 EB XXX and 3 AB XXX (XXX = 200 or 205).

Note ①:

If instead of the expansion modules 07 EA 240 or 07 EA 264 I/O modules of the types 07 EB 200, 07 EB 205, 07 AB 200 or 07 AB 205 are used the address numbers of the I/O channels are determined by the components used.

Example:



The first module in addition to the basic configuration occupies the address range 100–107, the second module 110–117, etc. regardless of whether it is an input or output module. The maximum configuration is 80 inputs/48 outputs. Output channels not occupied by hardware can be used in the program as additional flags.

Example: If the basic configuration 07 KR 228 is used the outputs 064 to 077 and 100 to 177 are available as unbuffered flags in addition.

Remark: Addressing of the ABB Procontic K200 follows an octal pattern. Only the numbers 0–7, 10–17, 20–27 etc. are allowable.

Note ②:

For buffering a built-in gold capacitor is used. The buffer time is approx. 2 weeks.

2 Basic configurations

In Section 2 the technical data of the ABB Procontic K200 basic configurations listed below are stated:

07 KR 220 R1
07 KR 220 R2
07 KR 220 R3
07 KR 228 R1
07 KR 228 R3
07 KT 228 R1
07 KR 240 R1
07 KR 240 R2
07 KR 240 R21
07 KR 240 R3
07 KT 240 R1
07 KR 264 R1
07 KR 264 R2
07 KR 264 R3

A schematic diagram explains the pin configuration.

DIN VDE 0160 §7.2.2 (mechanical resistance) applies to all ABB Procontic K200 basic configurations.

2.1 Basic configuration 07 KR 220 R1

2.1.1 Technical data

Number of inputs	12
Number of outputs	8
can be expanded with	max. 64 I/O points
integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, – 25 %) 50/60 Hz
Power consumption	22 VA without programming unit
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	Inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	190 L x 140 H x 102 W

2.1.2 Connection examples

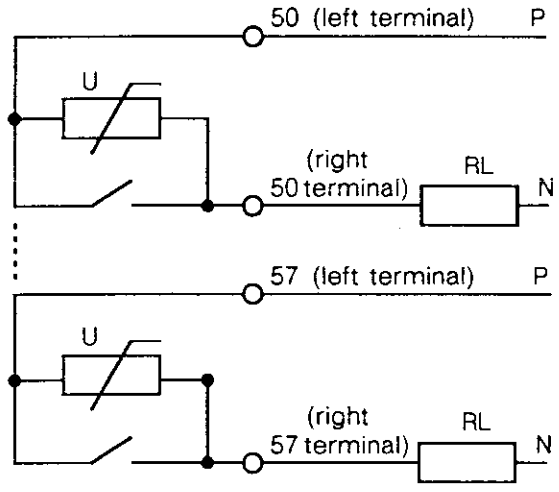


Figure 2.1: Alternating current loads

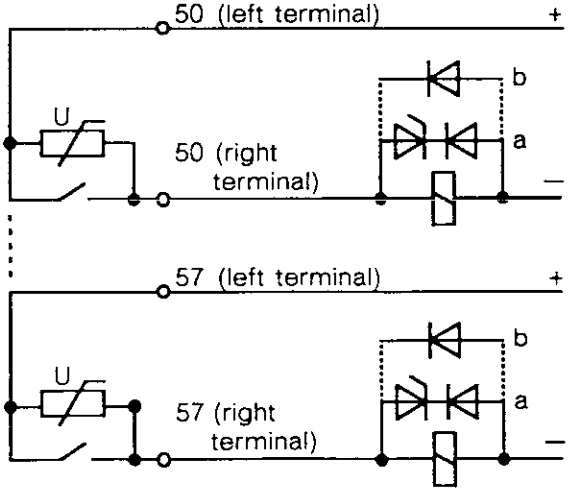


Figure 2.2: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.1.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 220 R1.

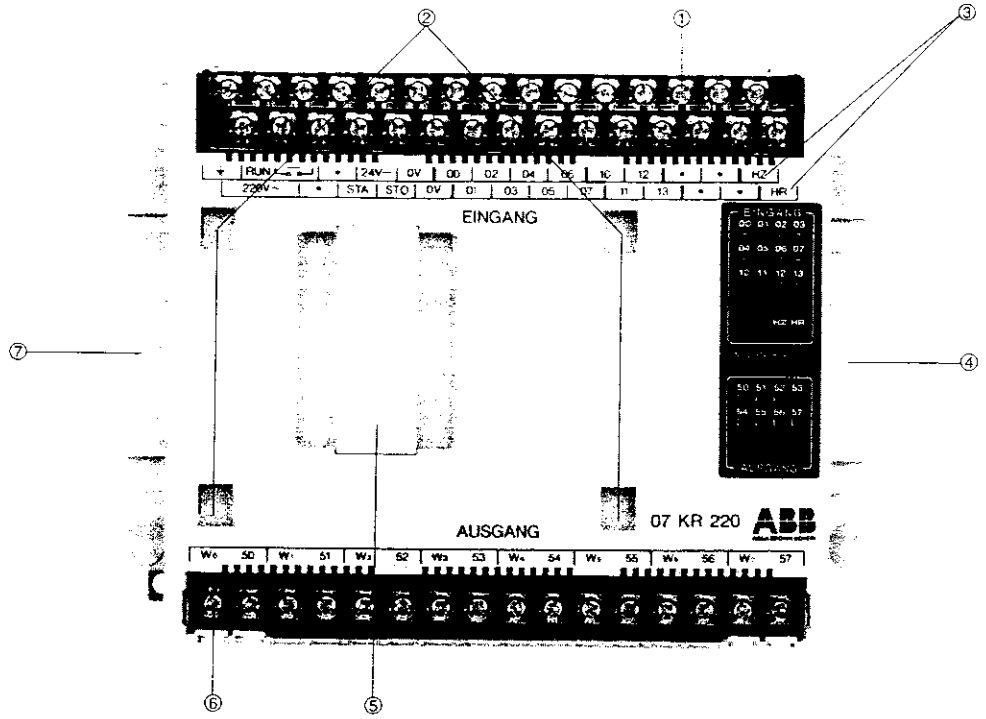


Figure 2.3: Basic configuration 07 KR 220 R1

90 01 48

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ... etc.)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌙o o⌙	= RUN contact
24 V DC, 0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00–13	= input terminals
•	= unused terminals
50–57	= output terminals (normally open) For every output channel the two terminals of the normally open contact are brought out to screw terminals.

LEDs

00–13	inputs
50–57	outputs
Mains	mains voltage available
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.1.4 High-speed counter, 4 decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 220 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.2 Basic configuration 07 KR 220 R2

2.2.1 Technical data

Number of inputs	12
Number of outputs	8
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, – 25 %) 50/60 Hz
Power consumption	22 VA without programming unit
Supply voltage of inputs	230 VAC, 1 signal min.170 VAC, 0 signal max.60 VAC
Input data	Inputs isolated via optocouplers Input delay typically 16 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi = 1$: $I_{max.} = 2$ A 230 V AC, $\cos\varphi = 0.4$: $I_{max.} = 1$ A 230 V DC/24 V DC: $I_{max.} = 1$ A 230 V AC/24 V AC, 230 V DC/24 V DC: $I_{min.} \geq 25$ mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades
Up/down counters	8, 4 decades each
High speed upward counter	1, 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and check sum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	190 L x 140 H x 102 W

Notes: The creepage distances and the clearances in air at the inputs met in accordance with DIN VDE 0160/5.88 and DIN VDE 0109/12.83 the conditions for 115 V AC.

2.2.2 Connection examples

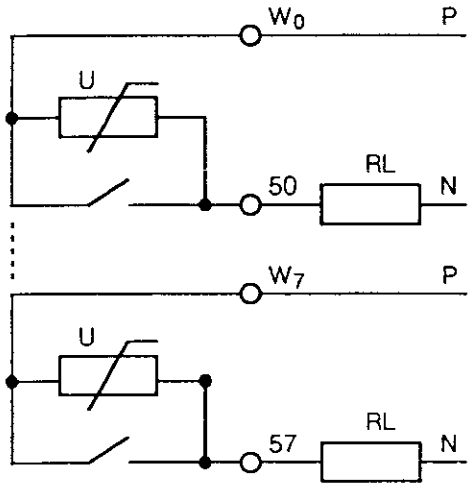


Figure 2.1: Alternating current loads

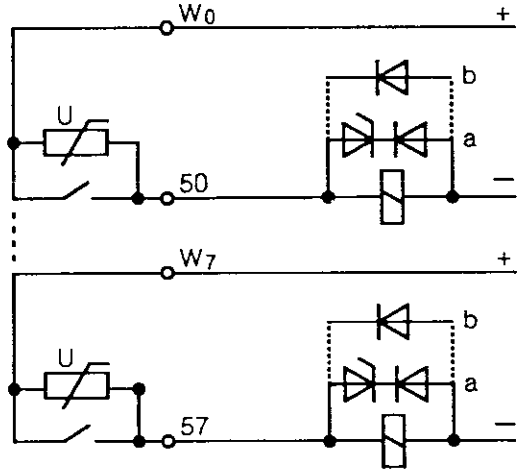


Figure 2.2: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.2.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 220 R2.

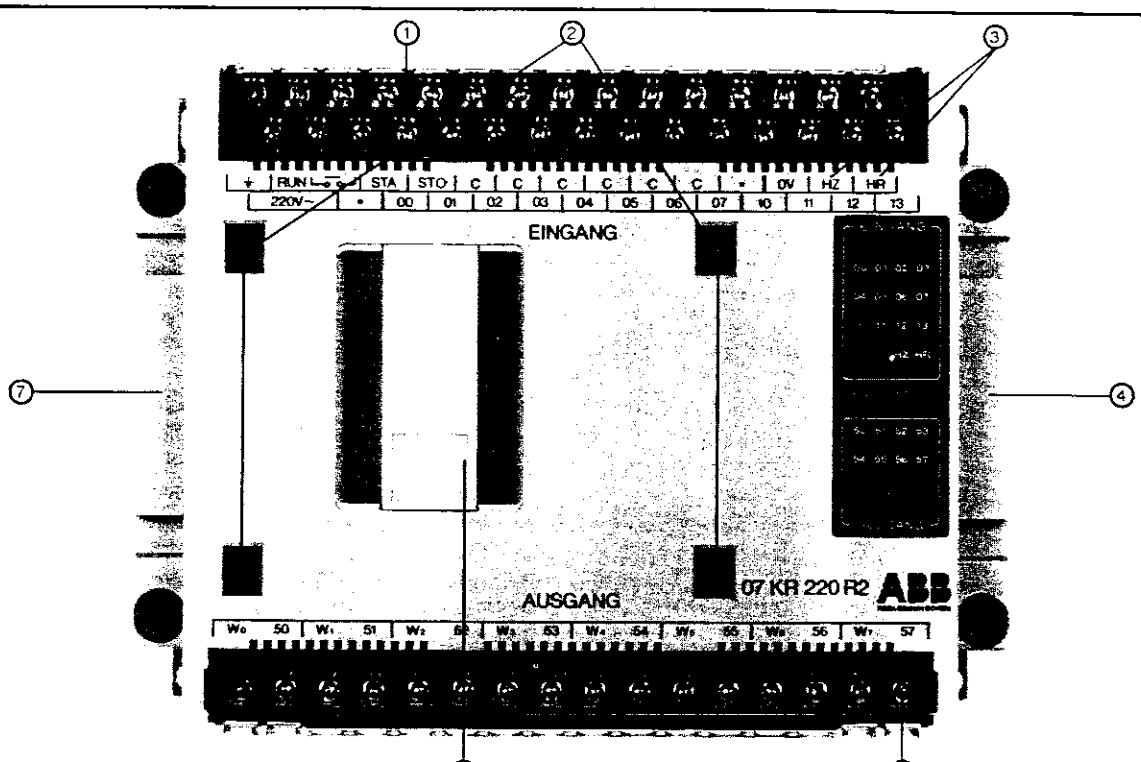


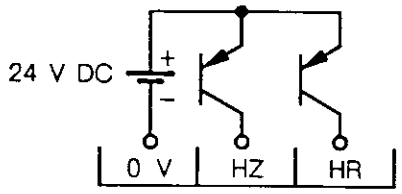
Figure 2.6: Basic configuration 07 KR 220 R2

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚ = Ground terminal
230 V AC = mains (phase, neutral)
STA = start input
STO = stop input
⌐o o¬ = RUN contact

0 V = supply voltage (24 V DC) for HZ, HR

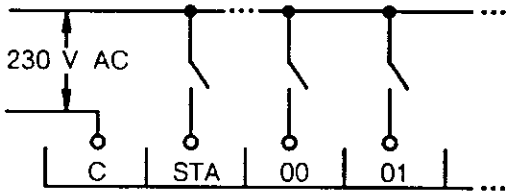
Drawing of connection:



HZ = counting input for high-speed counter
HR = reset input for high-speed counter

00–13 = input terminals

Drawing of connection:



C = neutral for 230 V AC inputs
• = unused terminal
W_0/50–W_7/57 = output terminals (normally open) For every output channel the two terminals of the normally open contact are brought out to screw terminals.

LEDs
00–13 Inputs
50–57 outputs
Mains mains voltage present
STA start signal
RUN system running
HZ high-speed counter counting
HR high-speed counter reset

2.2.4 High-speed counter, 4 decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 220 R2. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.3 Basic configuration 07 KR 228 R1

2.3.1 Technical data

Number of inputs	16
Number of outputs	12
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, - 25 %) 50/60 Hz
Power consumption	28 VA without programming unit
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2 A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 - 999 s
Down counters (24)	16, 3 decades each - 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades - 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation - 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	190 L x 140 H x 102 W

2.3.2 Connection examples

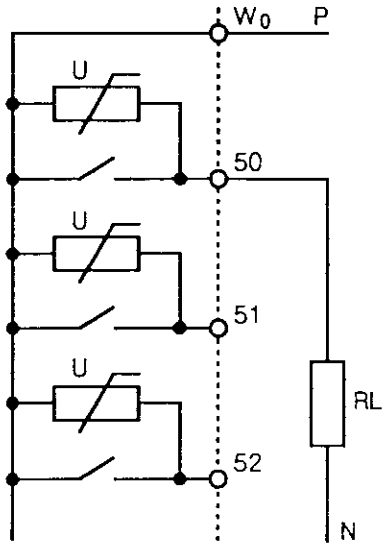


Figure 2.7: Alternating current loads

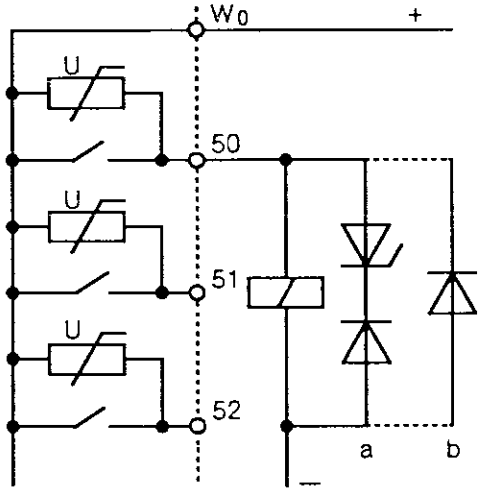


Figure 2.8: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.3.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 228 R1.

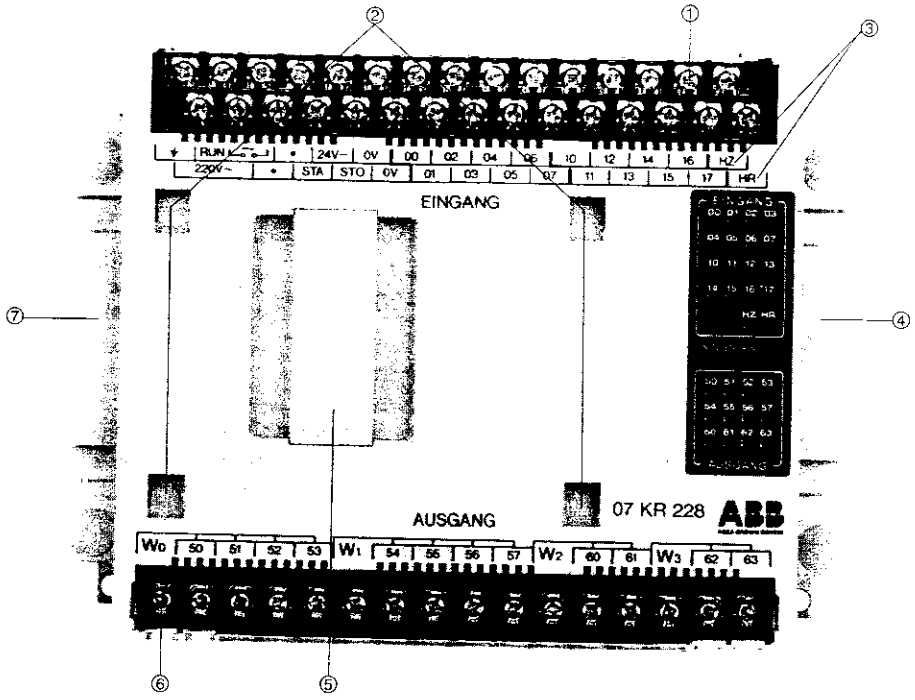


Figure 2.9: Basic configuration 07 KR 228 R1

90 01 49

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌐o o¬	= RUN contact
24 V DC,0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00–17	= Input terminals
•	= unused terminal
W_0–W_3	= center contents of relay
50–63	= Output terminals (normally open)

LEDs	
00–17	inputs
50–63	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.3.4 High-speed counter, 4 decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 228 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.4 Basic configuration 07 KT 228 R1

2.4.1 Technical data

Number of inputs	16
Number of outputs	12
Type of outputs	Transistor outputs
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, – 25 %) 50/60 Hz
Power consumption	28 VA without programming unit
Supply voltage of inputs	
– Rated value	24 V DC, (integrated max. 0.4 A)
– "0" signal range	0–7 V DC
– "1" signal range	19–26.4 V DC
	use only stabilized mains units with a max. tolerance of ± 10 % for external 24 V DC supply
Input current at "1" signal	
typ.	10 mA
max.	13 mA
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	
– rated value	0.5 mA
– allowable range	10 mA – 0.5 A
– lamps wattage	max. 5 W
– total current max.	6 A
– output delay	typically 1 ms
Insulation (VDE 160)	
– against frame	1500 V AC
– against internals	1500 V AC
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	190 L x 140 H x 102 W

2.4.2 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KT 228 R1.

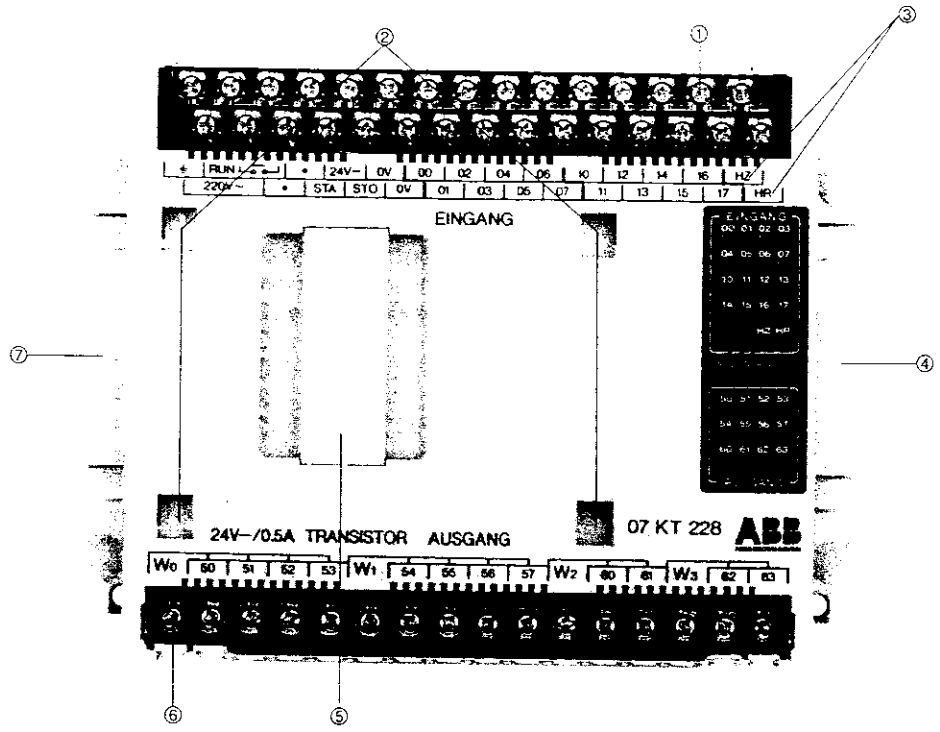


Figure 2.10: Basic configuration 07 KT 228 R1

90 01 50

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌐o o¬	= RUN contact
24 V DC,0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00–17	= Input terminals
•	= unused terminal
W_0–W_3	= potential reference of outputs
50–63	= Output terminals

LEDs

00–17	inputs
50–63	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.4.3 High-speed counter, 4 Decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KT 228 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.5 Basic configuration 07 KR 240 R1

2.5.1 Technical data

Number of inputs	24
Number of outputs	16
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V~ (+ 15 %, - 25 %) 50/60 Hz
Power consumption	31 VA without programming unit
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi = 1$: Imax. = 2 A 230 V AC, $\cos\varphi = 0.4$: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	230 L x 140 H x 102 W

2.5.2 Connection examples

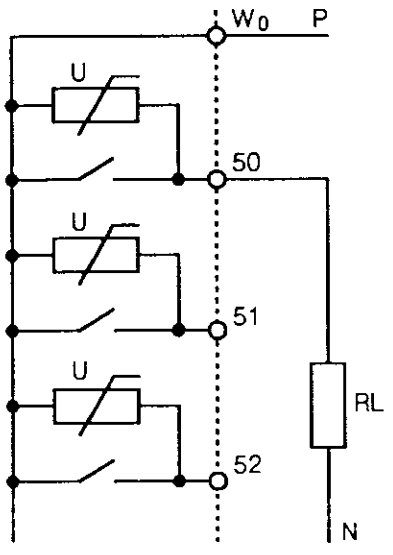


Figure 2.11: Alternating current loads

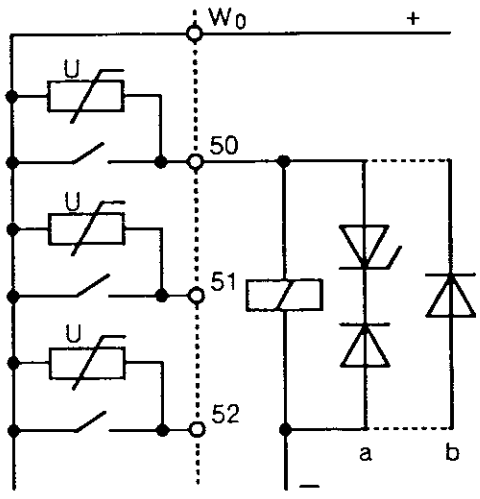


Figure 2.12: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.5.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 240 R1.

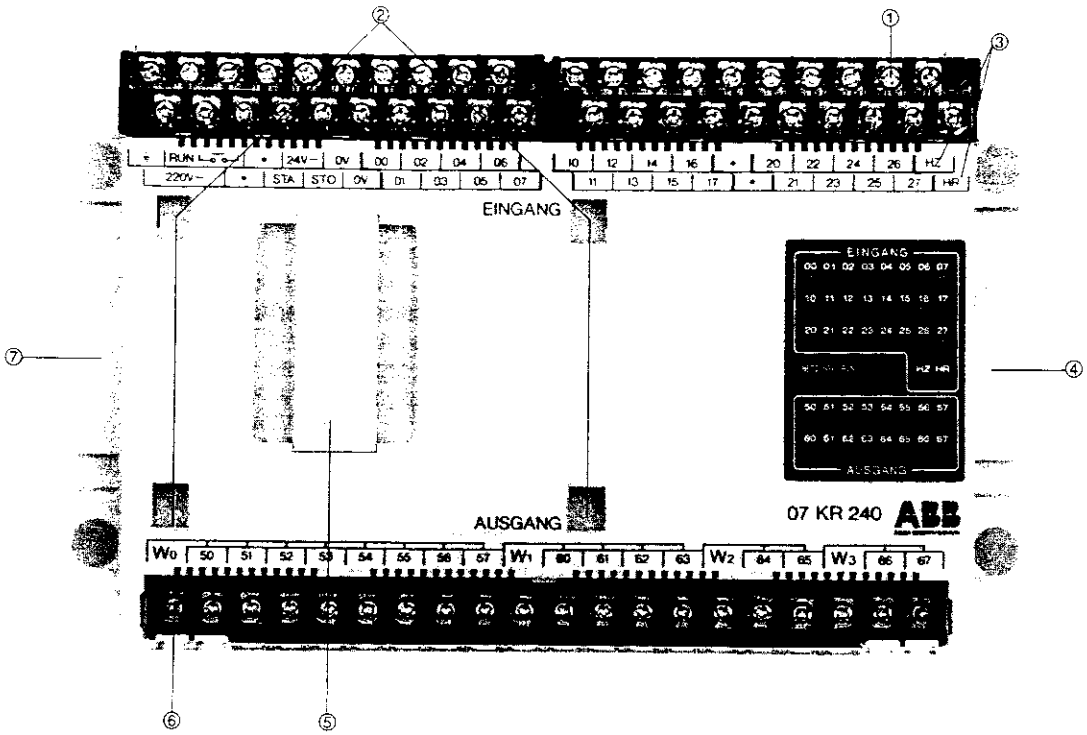


Figure 2.13: Basic configuration 07 KR 240 R1

90 01 45

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌙o o⌋	= RUN contact
24 V DC,0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00-27	= Input terminals
•	= unused terminal
W_0-W_3	= center contents of relay
50-67	= Output terminals (normally open)

LEDs	
00-27	inputs
50-67	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.5.4 High-speed counter, 4 Decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 240 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.6 Basic configuration 07 KR 240 R2

2.6.1 Technical data

Number of inputs	24
Number of outputs	16
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	24 V DC (+ 25 %, – 20 %)
Max. residual ripple of the supply voltage	1 V_{PP} at 50 Hz
Current consumption	< 1 A
Additional current consumption when using the	
07 PG 200	about 100 mA
07 PG 201	about 150 mA
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	230 L x 140 H x 102 W

2.6.2 Connection examples

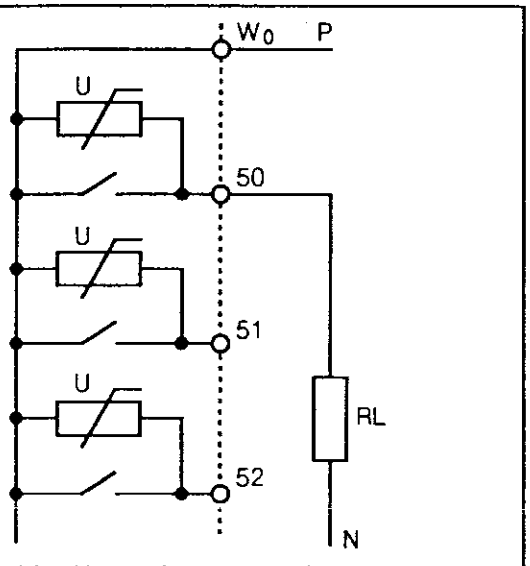


Figure 2.14: Alternating current loads

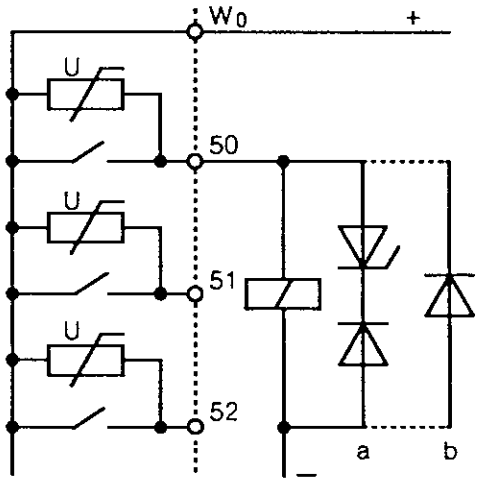


Figure 2.15: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.6.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 240 R2.

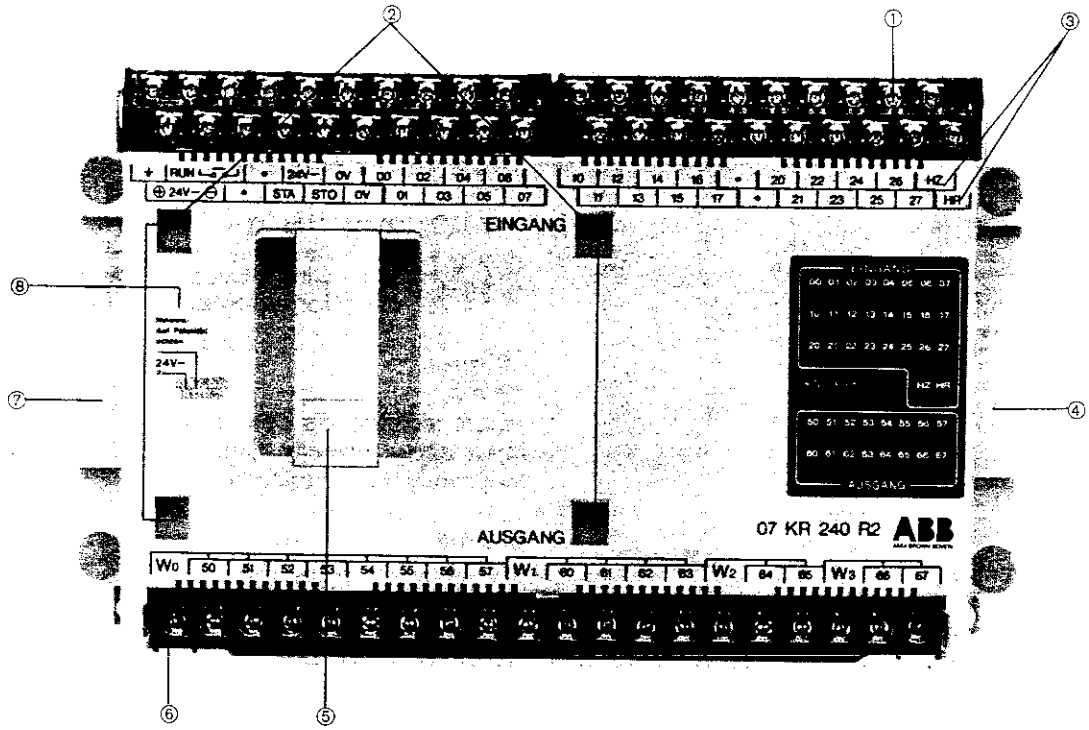


Figure 2.16: Basic configuration 07 KR 240 R2

88 11 55

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201
⑧ Note: Pay attention to polarity 24 V DC

⏚	= Ground terminal
⊕24 V-⊖	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌊o o⌋	= RUN contact
24 V- ,0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00-27	= Input terminals
•	= unused terminal
W_0-W_3	= center contents of relay
50-67	= Output terminals (normally open)

LEDs

00-27	inputs
50-67	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.6.4 High-speed counter, 4 Decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 240 R2. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.6.5 Version of the unit wiht improved vibration resistance

The basic configuration 07 KR 240 R2 can be delivered also in the version 07 KR 240 R21 with improved vibration resistance. Especially it fits for using in moving machines, e. g. building machines. Please contact your distributor before using the the 07 KR 240 R21, because the requirements for the unit vary depending on the kind of use.

2.7 Basic configuration 07 KT 240 R1

2.7.1 Technical data

Number of inputs	24
Number of outputs	16
Type of outputs	Transistor outputs
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, – 25 %) 50/60 Hz
Power consumption	31 VA without programming unit
Supply voltage of inputs	
– Rated value	24 V DC, (integrated max. 0.4 A)
– "0" signal range	0–7 V DC
– "1" signal range	19–26.4 V DC
	use only stabilized mains units with a max. tolerance of ± 10 % for external 24 V DC supply
Input current at "1" signal	
typ.	10 mA
max.	13 mA
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	
– rated value	0.5 mA
– allowable range	10 mA – 0.5 A
– lamps wattage	max. 5 W
– total current max.	6 A
– output delay	typically 1 ms
Insulation (VDE 160)	
– against frame	1500 V AC
– against internals	1500 V AC
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	230 L x 140 H x 102 W

2.7.2 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KT 240 R1.

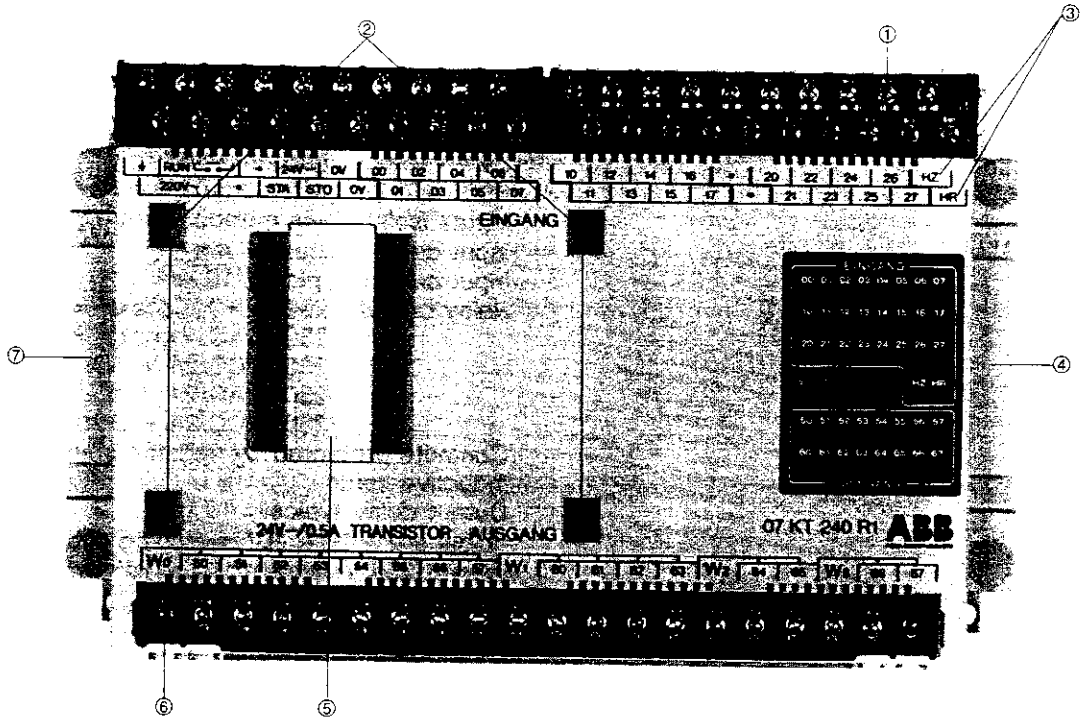


Figure 2.17: Basic configuration 07 KT 240 R1

90 00 17

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌊ ⌋	= RUN contact
24 V DC,0 V	= supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00–27	= Input terminals
•	= unused terminal
W_0–W_3	= potential reference of outputs
50–67	= Output terminals

LEDs

00–27	inputs
50–67	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.7.3 High-speed counter, 4 Decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KT 240 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.8 Basic configuration 07 KR 264 R1

2.8.1 Technical data

Number of inputs	40
Number of outputs	24
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	230 V AC (+ 15 %, - 25 %) 50/60 Hz
Power consumption	39 VA without programming unit
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi = 1$: Imax. = 2 A 230 V AC, $\cos\varphi = 0.4$: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 - 999 s
Down counters (24)	16, 3 decades each - 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades - 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation - 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	330 L x 140 H x 102 W

2.8.2 Connection examples

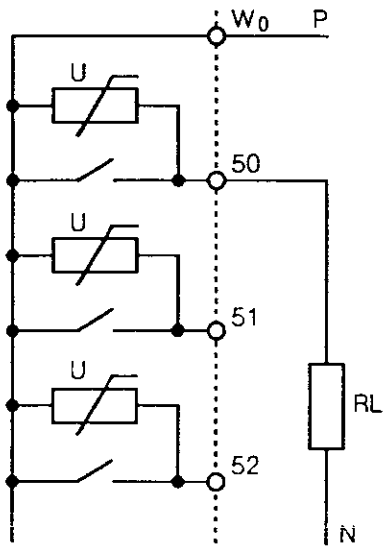


Figure 2.18: Alternating current loads

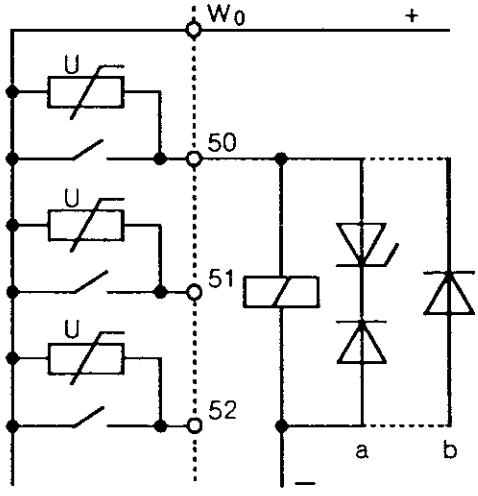


Figure 2.19: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.8.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 264 R1.

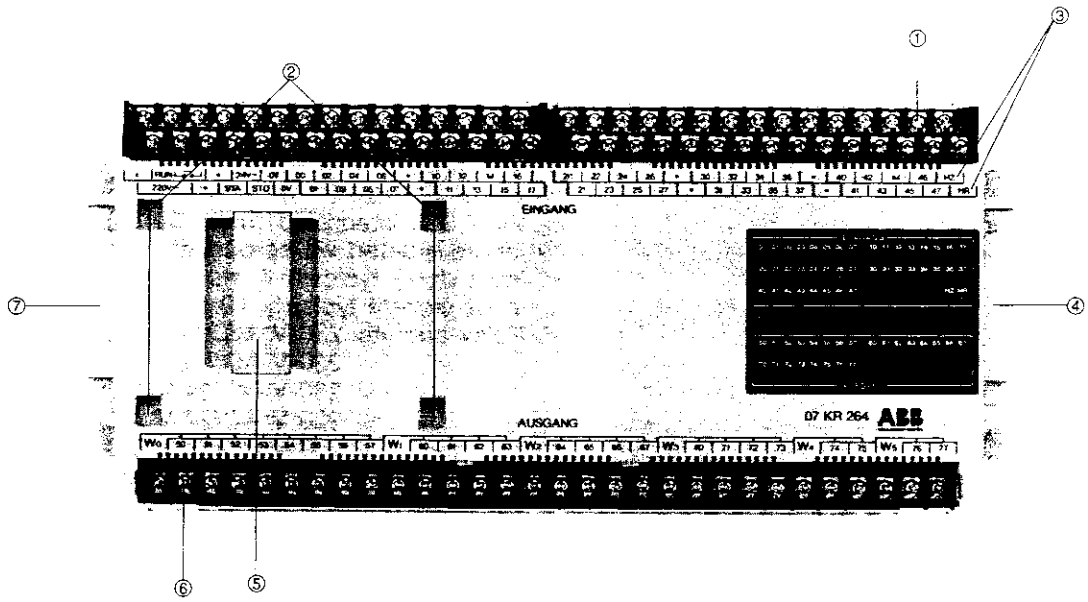


Figure 2.20: Basic configuration 07 KR 264 R1

90 01 47

① input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201

⏚	= Ground terminal
230 V AC	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌐o o¬	= RUN contact
24 V DC,0 V	= Supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00-47	= Input terminals
•	= unused terminal
Wo-Ws	= center contents of relay
50-77	= Output terminals (normally open)

LEDs

00-47	inputs
50-77	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.8.4 High-speed counter, 4 decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 264 R1. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.9 Basic configuration 07 KR 264 R2

2.9.1 Technical data

Number of inputs	40
Number of outputs	24
can be expanded with	max. 64 I/O points
Integrated user program memory	1 K EEPROM (950 words)
externally plugged for program storage	2 K EEPROM or 2 K EPROM (1970 words)
Cycle time (bit)	typically 5 ms/K instructions
Supply voltage	24 V– (+ 25 %, – 20 %)
Max. residual ripple of the supply voltage	1 V_{PP} at 50 Hz
Current consumption	< 1 A
Additional current consumption when using the	
07 PG 200	about 100 mA
07 PG 201	about 150 mA
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: · Imin. $\geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
Timers	40
Time range	0.01 – 999 s
Down counters (24)	16, 3 decades each – 8, 4 decades each
Up/down counters	8, 4 decades each
High-speed upward counter	1, with 4 decades – 10 kHz
LED display	for inputs/outputs and operating modes
Flags	376 (including 248 buffered flags)
Diagnosis	Cycle monitoring, programming error and checksum by means of programming unit
Programming	with miniature programming unit, with IBM PC or compatible PC via 07 PG 201
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	330 L x 140 H x 102 W

2.9.2 Connection examples

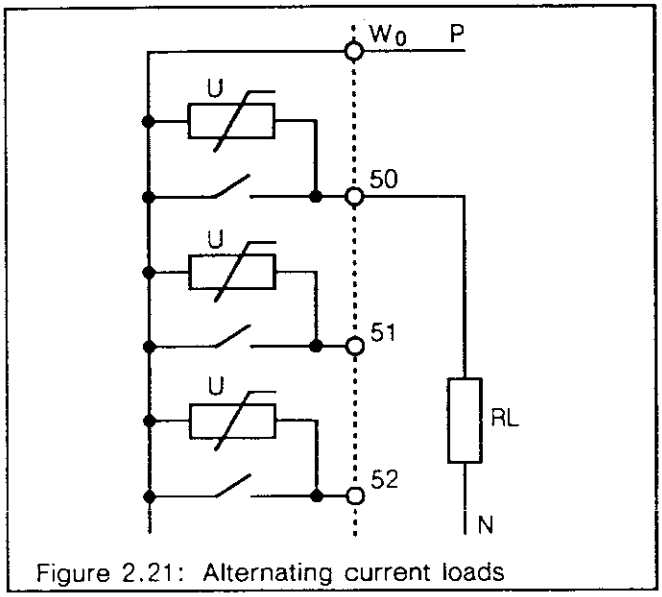


Figure 2.21: Alternating current loads

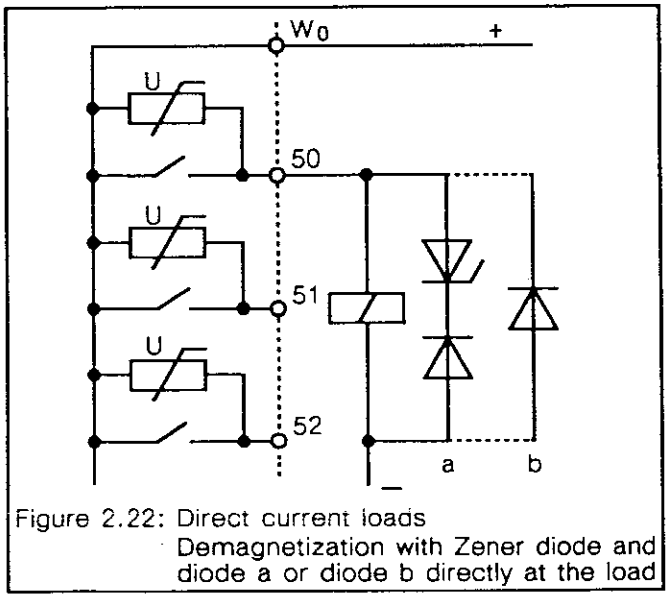


Figure 2.22: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

2.9.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the basic configuration 07 KR 264 R2.

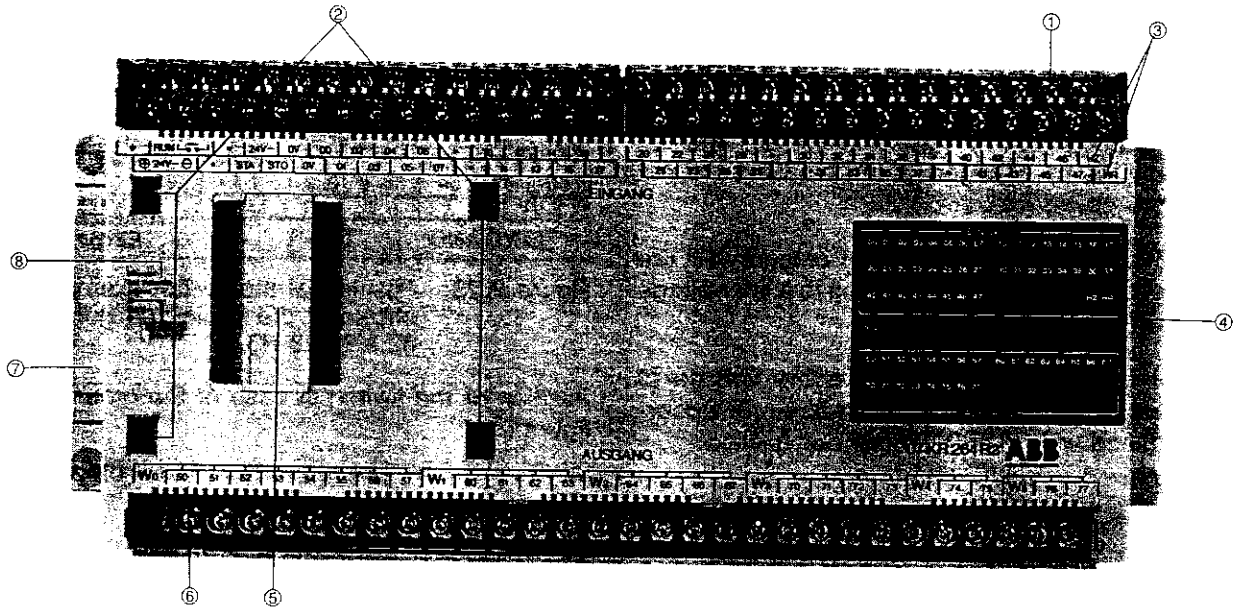


Figure 2.23: Basic configuration 07 KR 264 R2

SST 260 1992

① Input terminals
② Connection socket for programming unit 07 PG 200 or 07 PG 201
③ High-speed counter
④ Interface for expansion modules (07 EB 200, 07 AB 200, ...)
⑤ Connection socket for memory modules (07 PR 201/07 PR 210)
⑥ Output terminals
⑦ Interface for programming unit 07 PG 200 or 07 PG 201
⑧ Note: Pay attention to polarity 24 V DC

⊥	= Ground terminal
⊕24 V-⊖	= mains (phase, neutral)
STA	= start input
STO	= stop input
⌐o o¬	= RUN contact
24 V DC,0 V	= Supply voltage for inputs
HZ	= counting input for high-speed counter
HR	= reset input for high-speed counter
00-47	= Input terminals
•	= unused terminal
W0-Ws	= center contents of relay
50-77	= Output terminals (normally open)

LEDs

00-47	inputs
50-77	outputs
Mains	mains voltage present
STA	start signal
RUN	system running
HZ	high-speed counter counting
HR	high-speed counter reset

2.8.4 High-speed counter, 4 decades BCD, 10 kHz

A high-speed counter (10 kHz) is integrated in the hardware of the basic configuration 07 KR 264 R2. This BCD counter is limited to 4 decades (max. counting value 9999).

Both the counting input HZ and the resetting input HR are brought out to screw terminals.

The current value of the counter can be interrogated exclusively with FUN 36 (see section 12.4 of the ABB Procontic K200 software description).

2.10 Basic configurations of category R3

The following mentioned basic configurations allow to change the line voltage between 115 V AC and 230 V AC:

07 KR 220 R3
07 KR 228 R3
07 KR 240 R3
07 KR 264 R3

The line voltage is factory preset to 230 V AC. The line voltage is only to be changed, if the modules are not connected to power line.

Note: The basic configurations of category R3 are only intended for connection to a line voltage of 115 V AC.

If they are connected to a line voltage of 230 V AC the safety standards in accordance with VDE 0160 are **not** fulfilled.

Technical data

Supply voltage 115 V AC (can be changed to 230 V AC)

Pin assignments

115/230 V AC (AC) = mains (phase, neutral); can be changed

For all other data of the basic configurations of category R3 please refer to the description of the according basic configurations of category R1.

The arrow in figure 2.23 exemplary shows in the case of the basic configuration 07 KR 228 R3 the position of the switch for changing the line voltage. At this position the switch is available at the right top side of the module through the ventilation slits (s. figure 2.24).

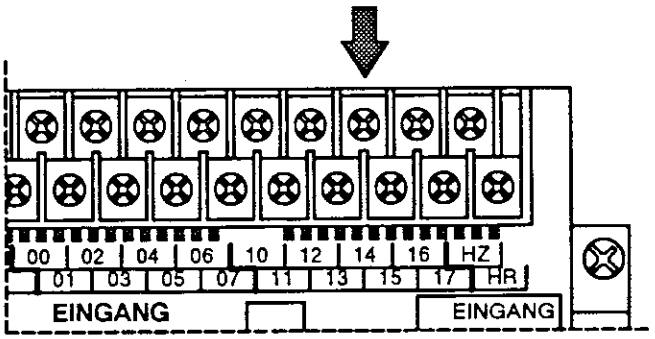


Figure 2.23: Position of the switch exemplary shown at the basic configuration 07 KR 228 R3

Position of the switch in case of the other basic configurations:

07 KR 220 R3: between terminal 13 and unused terminal •
07 KR 240 R3: at terminal 24
07 KR 264 R3: at terminal 44

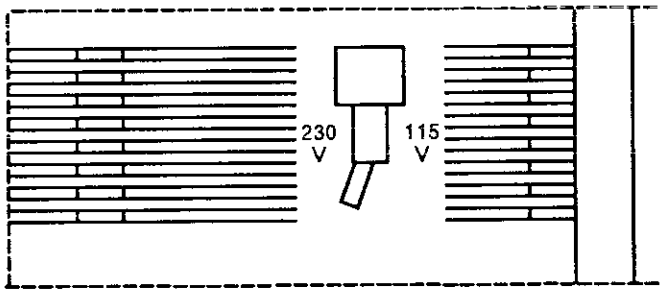


Figure 2.24: Switch available through the ventilation slits at the right top side of the module

3 Expansion modules

In Section 3 the technical data of the ABB Procontic K200 expansion modules listed below are stated. A schematic diagram explains the pin configuration.

Name		Description	
Binary input module	07 EB 200 R1	24 V input, 8 point module	8 I/O points are used
Binary input module	07 EB 205 R1	110 V/220 V, input, 8 point module	8 I/O points are used
Binary output module	07 AB 200 R1	Relais output, 8 point module	8 I/O points are used
Binary output module	07 AB 205 R1	Transistor output, 8 point module	8 I/O points are used
Expansion module	07 EA 240 R2	24 inputs, 16 transistor outputs	64 I/O points are used
Expansion module	07 EA 240 R4	24 inputs, 16 outputs	64 I/O points are used
Input/output module	07 EA 264 R1	40 inputs, 24 relay outputs	64 I/O points are used
Input/output module	07 EA 264 R3	40 inputs, 24 relay outputs	64 I/O points are used
Input/output module	07 EA 264 R5	40 inputs, 24 relay outputs	64 I/O points are used
Analog input module	07 EA 200 R1	Analog inputs, 2 channels	32 I/O points are used
Analog output module	07 AA 200 R1	Analog outputs, 2 channels	32 I/O points are used

Remarks:

- All ABB Procontic K200 basic configurations can be extended to 64 I/O points.
- DIN VDE 0160 §7.2.2 (mechanical resistance) applies to all ABB Procontic K200 expansion modules.

3.1 Binary Input Module 07 EB 200

3.1.1 Technical Data

Input voltage	24 V DC
Tolerance	21.5 -26.4 V DC
Input Current	typically 10 mA (24 V DC)
Signal ON	external contact closed, LED on
Signal OFF	external contact open, LED off
Voltage min. ON voltage	19 V
Voltage max. OFF voltage	7 V
Delay element ON -> OFF	typ. 4 ms
Delay element OFF -> ON	typ. 4 ms
Functions	8 per module
Potential isolation by	optocoupler
Indication	LED 0 - 7
Insulation resitance	20 megaohm min. between terminals and frame at 500 V DC

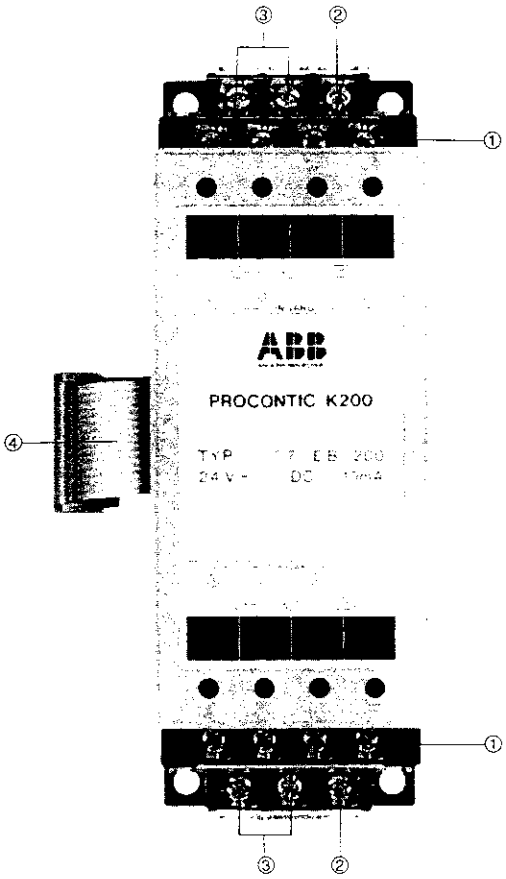


Figure 3.1: Input module 07 EB 200 90 01 52

① = Inputs 0-3, 4-7
② ⏚ = Ground terminal (protective ground)
③ ⊖⊖ = Reference potential (-) of the 24 V DC supply voltage. The two ⊖ are in each case internally connected (see Fig. 3.2).
④ = Interface cable for connection to the basic configuration

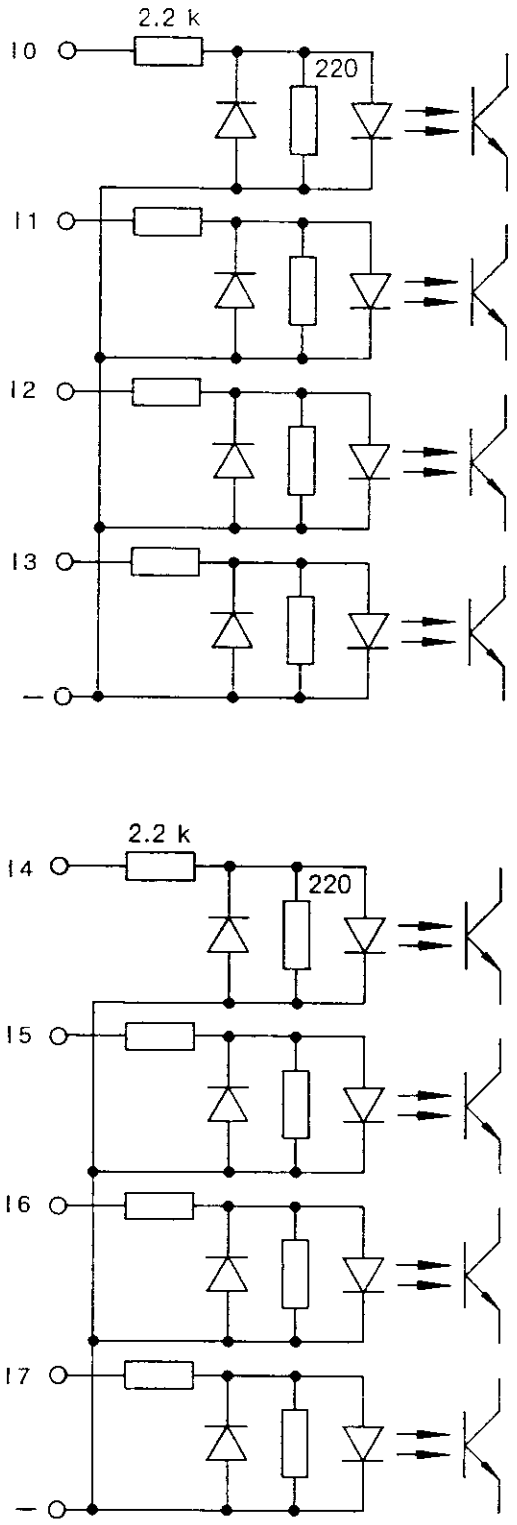


Figure 3.2: Internal circuit of the input module 07 EB 200

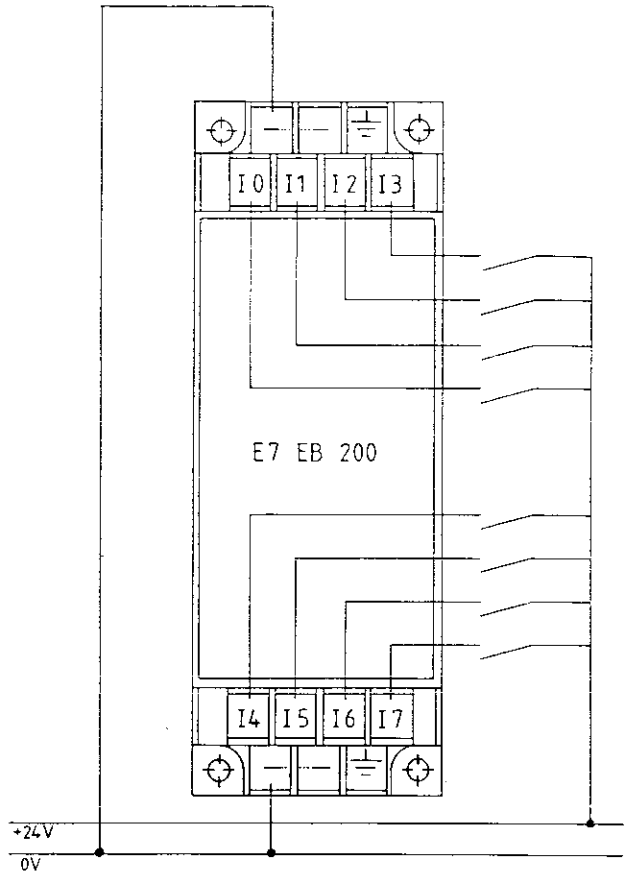


Figure 3.3: Pin assignment of the input module 07 EB 200

Note: In figures 3.2 and 3.3 IO...I7 stands for input terminal 0 to input terminal 7.

3.2 Binary Input Module 07 EB 205

3.2.1 Technical Data

Input voltage	115/230 V AC
Tolerance	85-250 V AC
Input Current	typically 10 mA (220 V AC, 50 Hz)
Signal ON	external contact closed, LED on
Signal OFF	external contact open, LED off
Voltage min. ON voltage	85 V
Voltage max. OFF voltage	30 V
Delay element ON -> OFF	typ. 14 ms
Delay element OFF -> ON	typ. 16 ms
Functions	8 per module
Potential isolation by	optocoupler
Indication	LED 0 - 7
Insulation resistance	20 megaohm min. between terminals and frame at 500 V DC

Note: The creepage distances and the clearances in air meet the VDE standards 0160 and 0110 only for 24 V DC and 115 V AC.

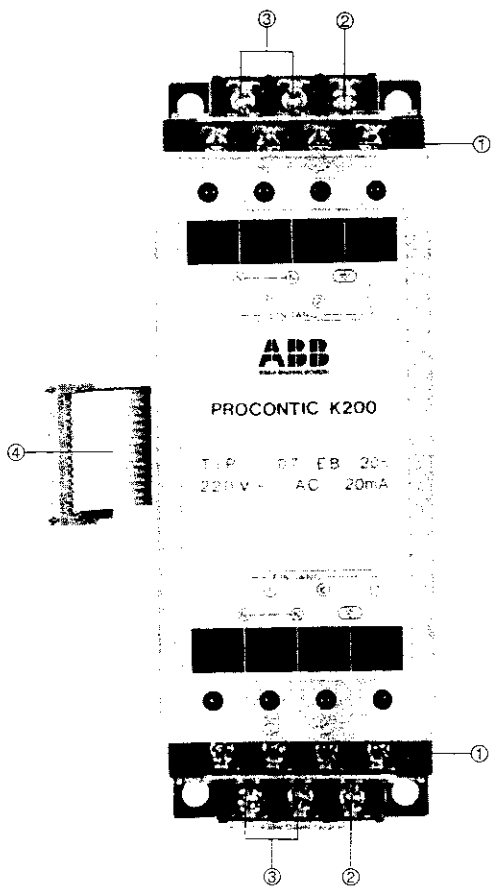


Figure 3.4: Input module 07 EB 205 90 01 43

① = Inputs 0-3, 4-7
② ⏚ = Ground terminal (protective ground)
③ Ⓝ—Ⓝ = Neutral conductors
The two Ⓝ are in each case internally connected (see Figure 3.5)
④ = Interface cable for connection to the basic configuration

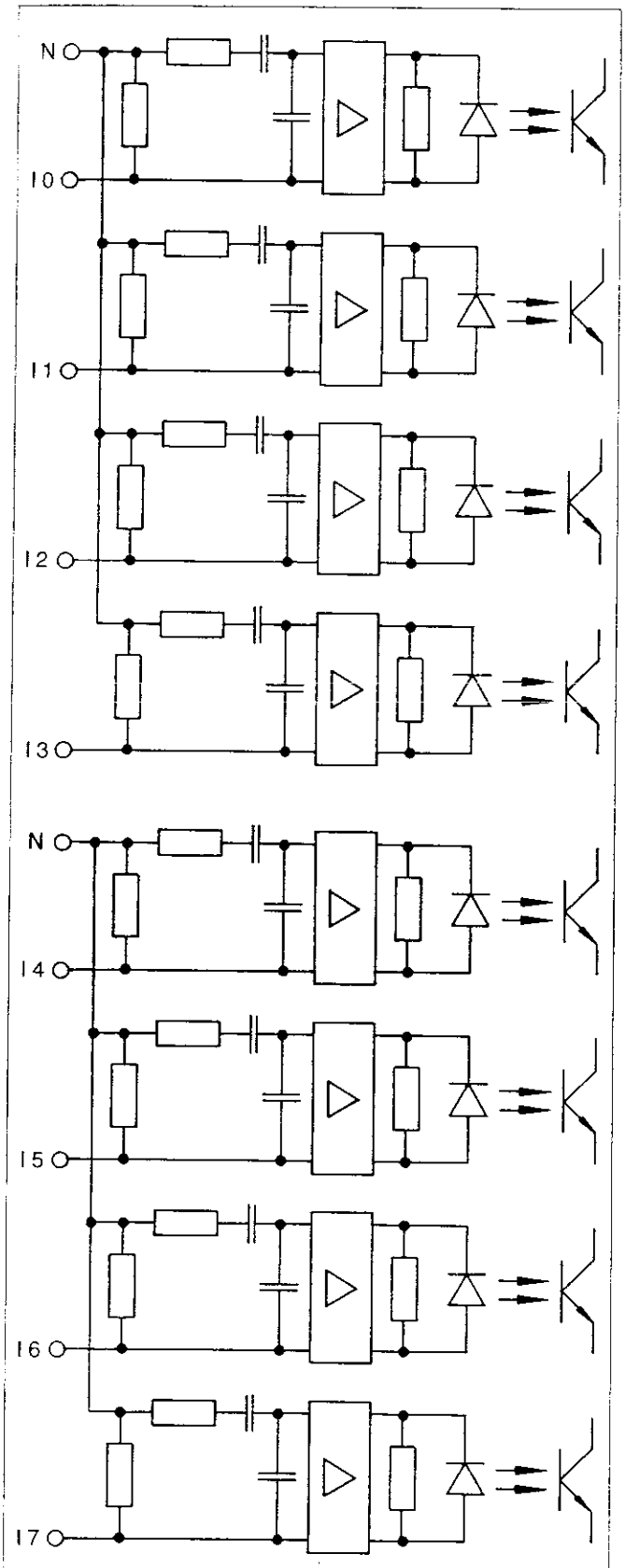


Figure 3.5: Internal circuit of the input module 07 EB 205

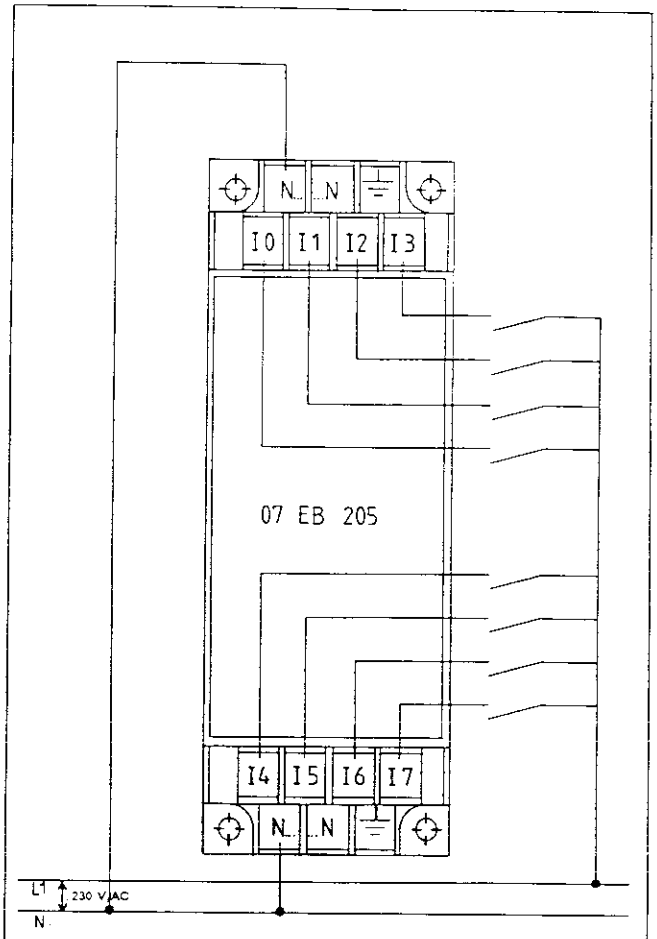


Figure 3.6: Pin assignment of the input module 07 EB 205

Note: In figures 3.5 and 3.6 I0...I7 stands for input terminal 0 to input terminal 7.

3.3 Binary output module 07 AB 200

3.3.1 Technical Data

Output	Relay (normally open)
Number of outputs	8
Switching voltage	115/230 V AC, 24 V DC
Tolerance	85–250 V AC, 21–27 V DC
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA
Simultaneous factor	0.5 for 4 functions
Indication	LED (0 - 7)
Leakage current	-
Output delay	typically 10 ms
Switching inductive loads	RC element via contact (33 nF, 120 ohm)
Potential isolation	yes, please refer to note
Short-time peak current	6 A $\leq$ 100 ms
Insulation resistance	unloaded: > 20 x 10^6 switching cycles
Contact service life	loaded 220 V AC/2 A: > 2 x 10^5 cycles

Note: The creepage distances and the clearances in air met the VDE standards 0160 and 0110 only for 24 V DC and 115 V AC.

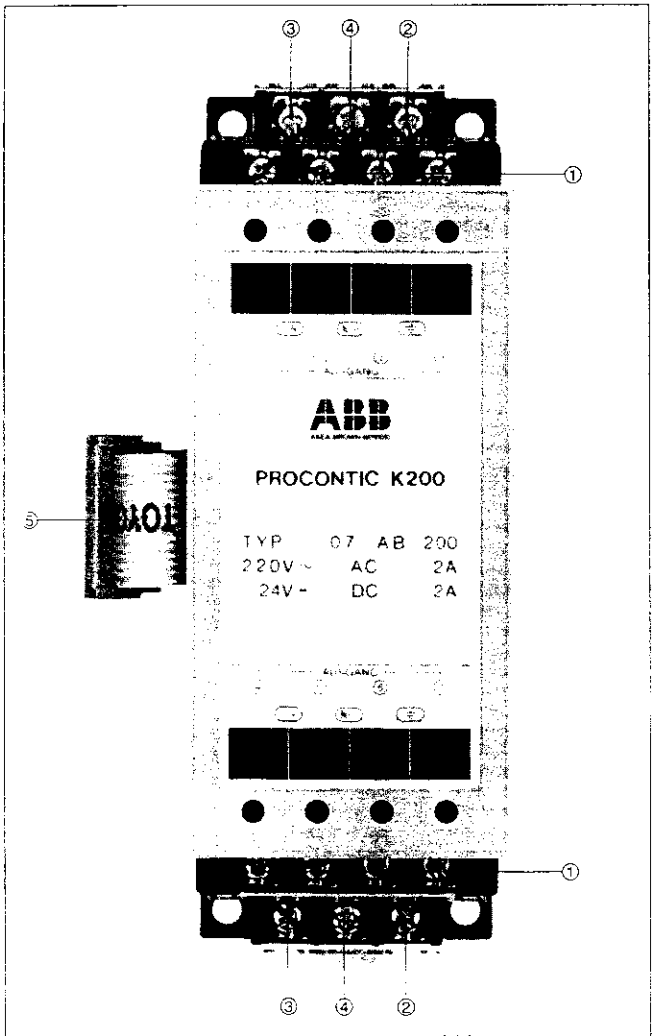


Figure 3.7: Output module 07 AB 200 90 01 53

① = Outputs 0-3, 4-7
② ⏚ = Ground terminal (protective ground)
③ L1/+ = Phase (230 V AC) or + supply voltage 24 V DC
④ N/- = Neutral conductor (230 V AC)
- reference potential of the 24 V DC supply voltage
⑤ = Interface cable for connection to the basic configuration.

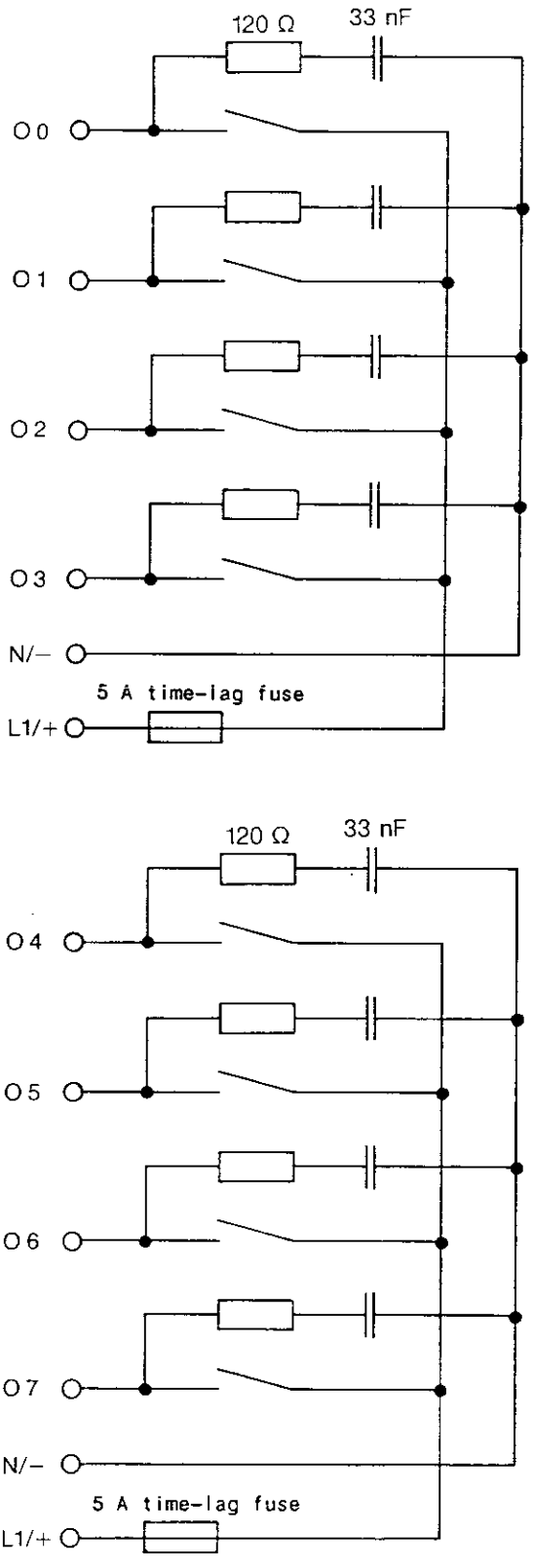


Figure 3.8: Internal circuit of the output module 07 AB 200

Note: In figures 3.8 and 3.9 O0 ... O7 stands for output terminal 0 to output terminal 7.

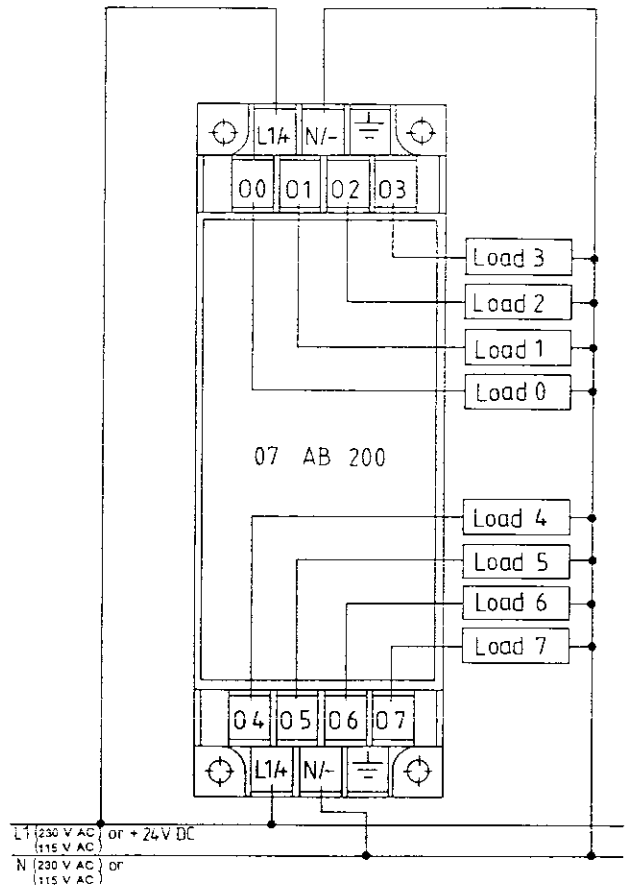


Figure 3.9: Pin assignment of the output module 07 AB 200

Note: L1/+ of the upper terminal board is electrically insulated against L1/+ of the lower terminal board.

3.4 Binary Output Module 07 AB 205

3.4.1 Technical Data

Type of output	transistor output
Number of outputs	8
Switching voltage	24 V DC
Tolerance	5 - 27 V DC
Maximum switched current	1 A for 40 °C
Simultaneous factor	0.5
Indication	LED (0 - 7)
Leakage current	1 mA
Output delay	typically 1 ms
Switching inductive loads	-
Potential isolation	optocoupler
Short-time peak current	6 A $\leq$ 20 ms

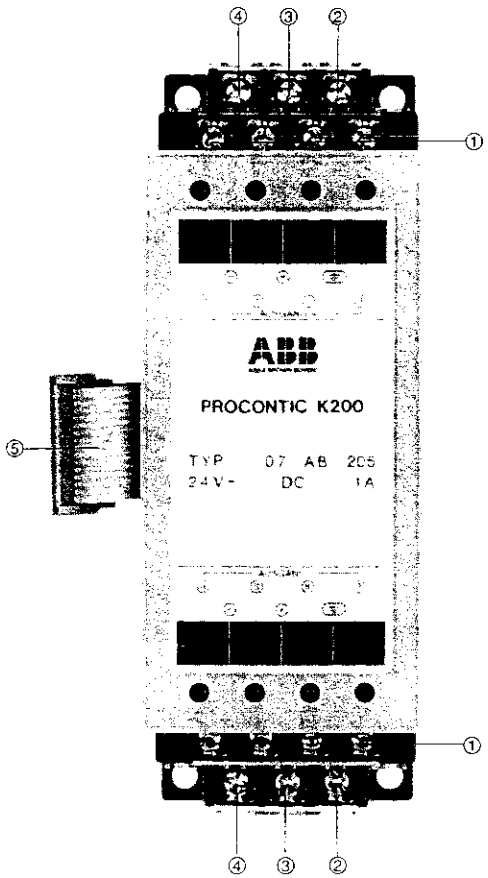


Figure 3.10: Output module 07 AB 205 90 01 54

① = Outputs 0-3, 4-7
② ⏚ = Ground terminal (protective ground)
③ ⊕ = Supply voltage 24 V DC
④ ⊖ = Reference potential (-) of the 24 V DC supply voltage
⑤ = Interface cable for connection to the basic configuration

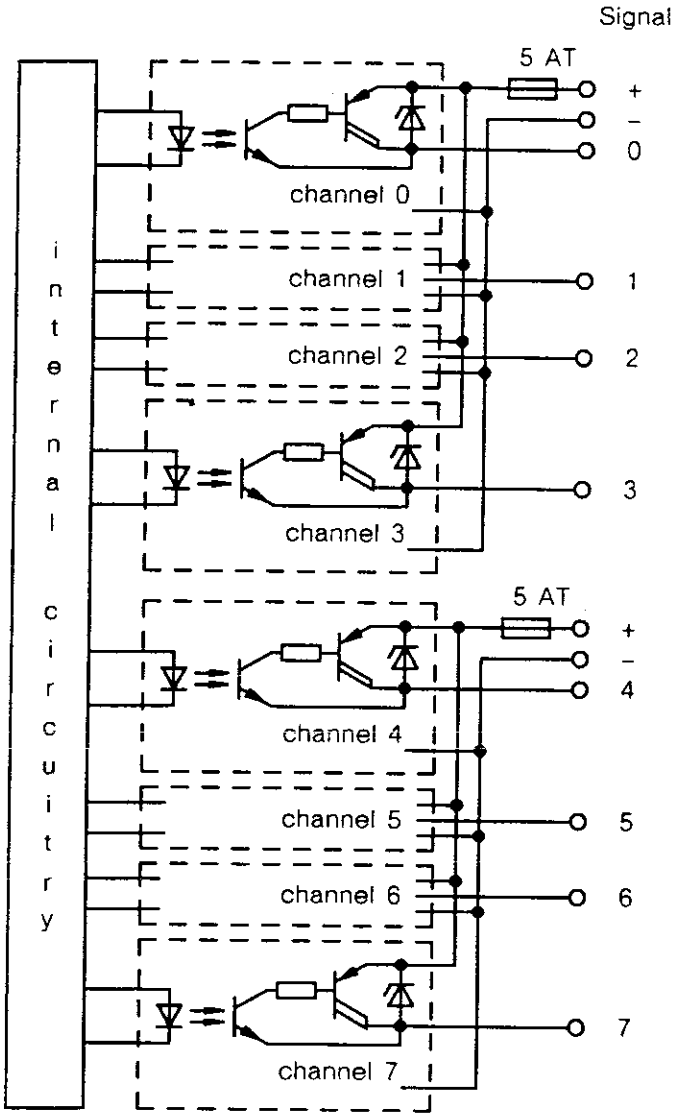


Figure 3.11: Internal circuit of the output module 07 AB 205

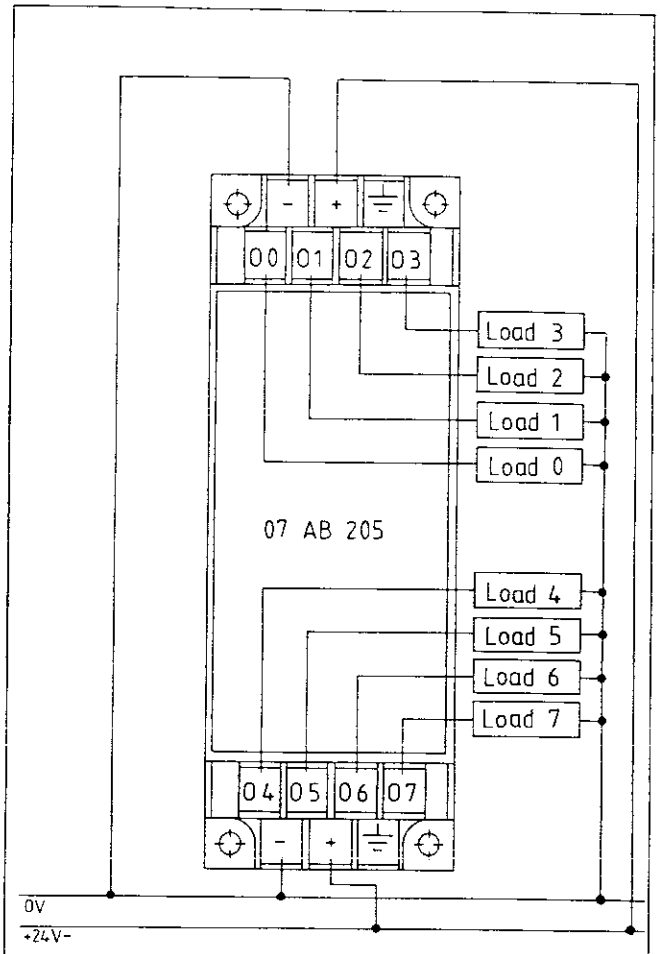


Figure 3.12: Pin assignment of the output module 07 AB 205

Note: In figures 3.11 and 3.12 O0...O7 stands for output terminal 0 to output terminal 7.

3.5 Expansion Module 07 EA 240 R2

3.5.1 Technical data

Number of inputs	24
Number of outputs	16
Type of outputs	Transistor outputs
Supply voltage	230 V~ (+ 15 %, - 25 %) 50/60 Hz
Power consumption	29 VA
Supply voltage of inputs	
– Rated value	24 V DC, (integrated max. 0.4 A)
– "0" signal range	0–7 V DC } use only stabilized mains units
– "1" signal range	19–26.4 V DC } with a max. tolerance of ± 10 % for external 24 V DC supply
Input current at "1" signal	
typ.	10 mA
max.	13 mA
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	
– rated value	0.5 mA
– allowable range	10 mA – 0.5 A
– lamps wattage	max. 5 W
– total current max.	6 A
– output delay	typically 1 ms
Insulation (VDE 160)	
– against frame	1500 V AC
– against internals	1500 V AC
Connections	Screw terminals
LED display	for inputs/outputs and mains
Permissible temperature range	0 °C ... 55 °C in operation – 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	230 L x 140 H x 102 W

3.5.2 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the expansion module 07 EA 240 R2.

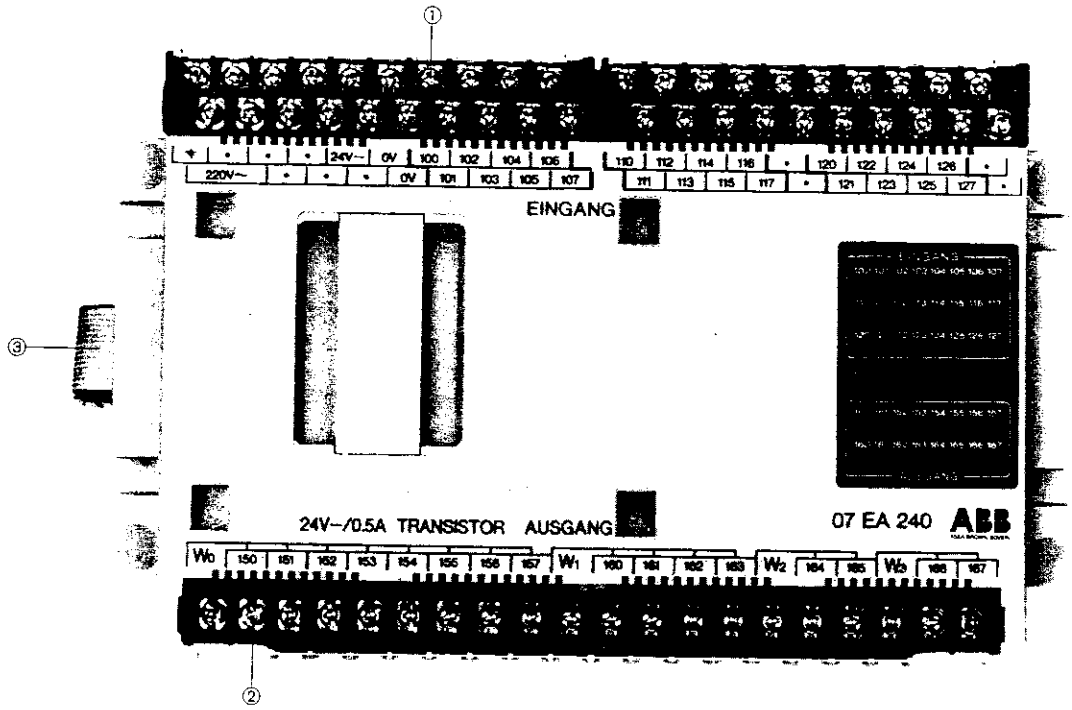


Figure 3.13: Expansion module 07 EA 240 R2

87 12 98

① Input terminals
② Output terminals
③ Interface for connection to the basic configuration

⏚ = Ground terminal
230 V AC = mains (phase, neutral)
24 V DC,0 V = supply voltage for inputs
100–127 = Input terminals
• = unused terminal
W_0–W_3 = potential reference of outputs
150–167 = Output terminals

LEDs
100–127 inputs
150–167 outputs
Mains mains voltage present

3.6 Expansion module 07 EA 240 R4

3.6.1 Technical data

Number of inputs	24
Number of outputs	16
Supply voltage	24 V DC (+ 25 %, - 20 %)
Max. residual ripple of the supply voltage	1 V_{PP} at 50 Hz
Current consumption	< 0.5 A
Supply voltage of inputs	24 V DC, integrated (max. 0.4 A)
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: $I_{max.}$ = 2 A 230 V AC, $\cos\varphi$ = 0.4: $I_{max.}$ = 1 A 230 V DC/24 V DC: $I_{max.}$ = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: $I_{min.} \geq$ 25 mA Contacts protected by varistor when switching inductive loads Output delay typically 10 ms
Contact service life	unloaded: > 20 x 10^6 switching cycles loaded 230 V AC/2A: > 2 x 10^5 switching cycles
Connections	Screw terminals
LED display	for inputs/outputs and mains
Permissible temperature range	0 °C ... 55 °C in operation - 10 °C ... 65 °C storage
Humidity class	90 % without condensation
Dimensions	230 L x 140 H x 102 W

3.6.2 Connection examples

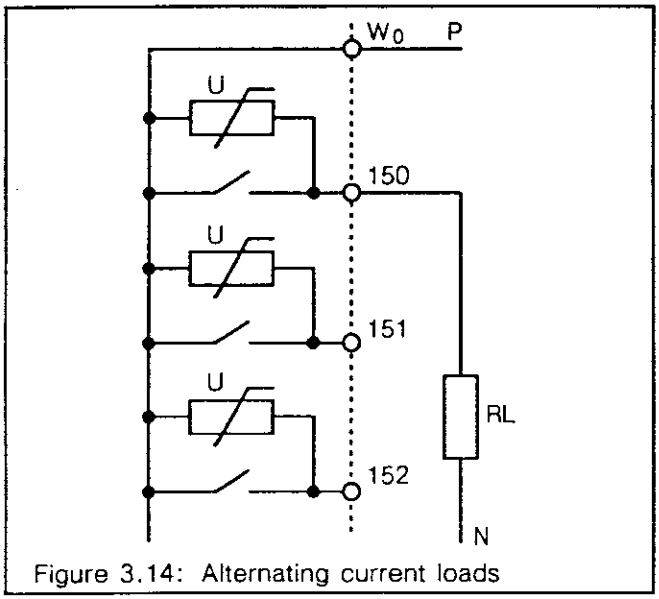


Figure 3.14: Alternating current loads

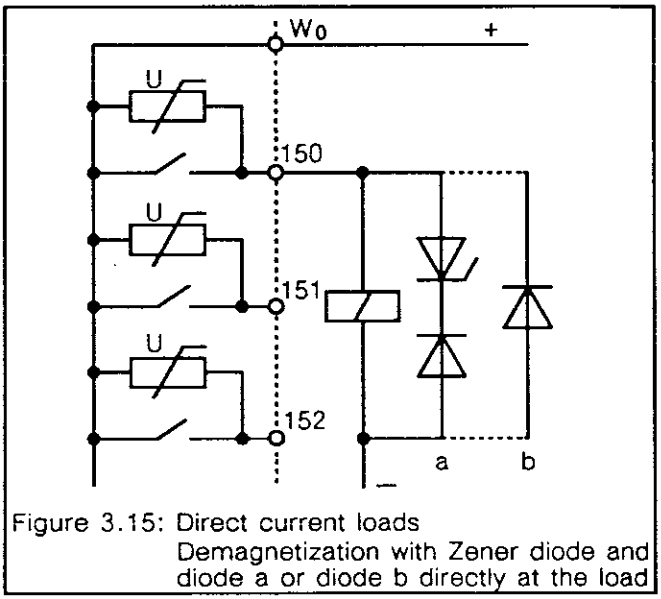


Figure 3.15: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

3.6.3 Pin assignments

The terminal assignments and the meaning of the individual LEDs are explained with the following drawing of the expansion module 07 EA 240 R4.

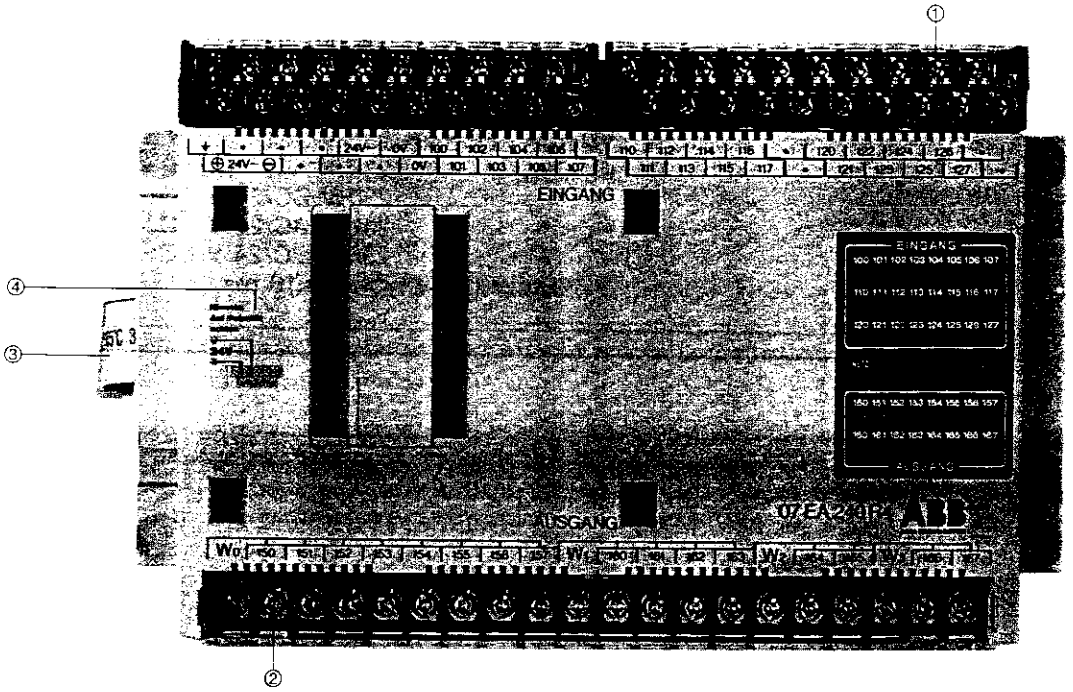


Figure 3.16: Expansion module 07 EA 240 R4

SST 258 1992

① Input terminals
② Output terminals
③ Interface for connection to the basic configuration
④ Note: Pay attention to polarity 24 V DC

⏚ = Ground terminal
⊕24 V-⊖ = mains (phase, neutral)
24 V- ,0 V = supply voltage for inputs
100–127 = Input terminals
• = unused terminal
W_0–W_3 = center contents of relay
150–167 = Output terminals (normally open)

LEDs
100–127 inputs
150–167 outputs
Mains mains voltage present

3.7 Combined input/output module 07 EA 264 R1

3.7.1 Technical data

Number of inputs	40
Number of outputs	24
Supply voltage	230 V AC (+ 15 %, - 25 %) 50/60 Hz
Power consumption	37 VA
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Output delay typically 10 ms

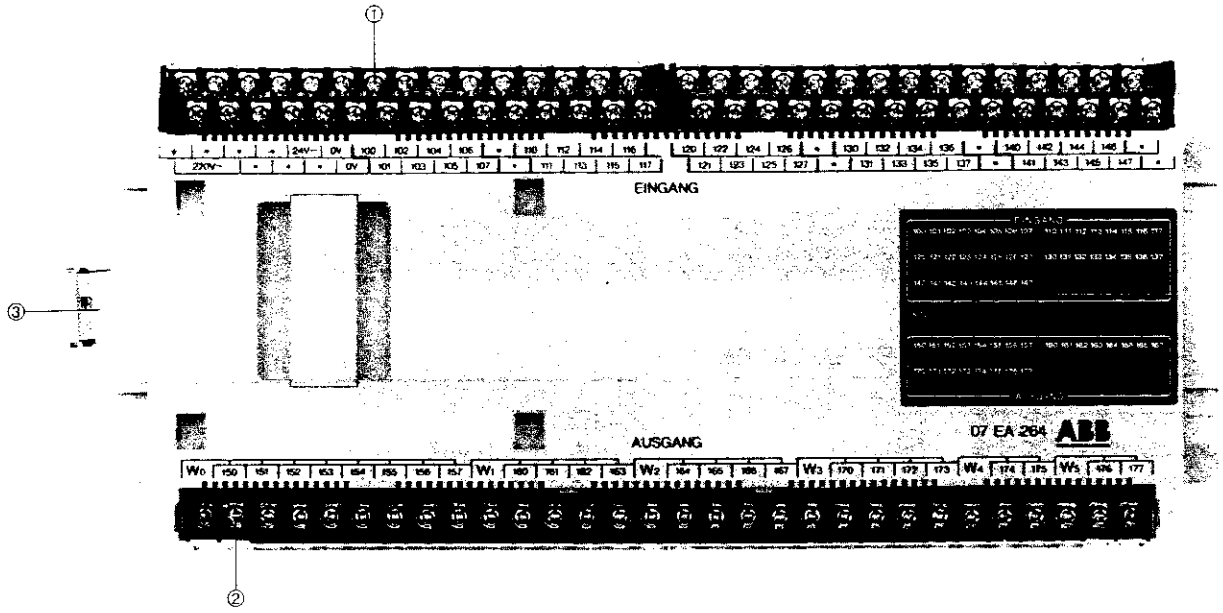


Figure 3.17: Input/output expansion module 07 EA 264 R1

90 01 46

⏚ = ground terminal
220 V AC = mains (phase, neutral)
24 V DC,0 V = supply voltage for inputs
100–147 = input terminals
• = unused terminal
W0–W5 = center contents of relay
150–177 = output terminals (normally open)

LEDs
100–147 inputs
150–177 outputs
Mains mains voltage available

① input terminals 100–147
② output terminals 150–177 (normally open)
③ interface cable for connection to the basic configuration

3.7.2 Connection examples

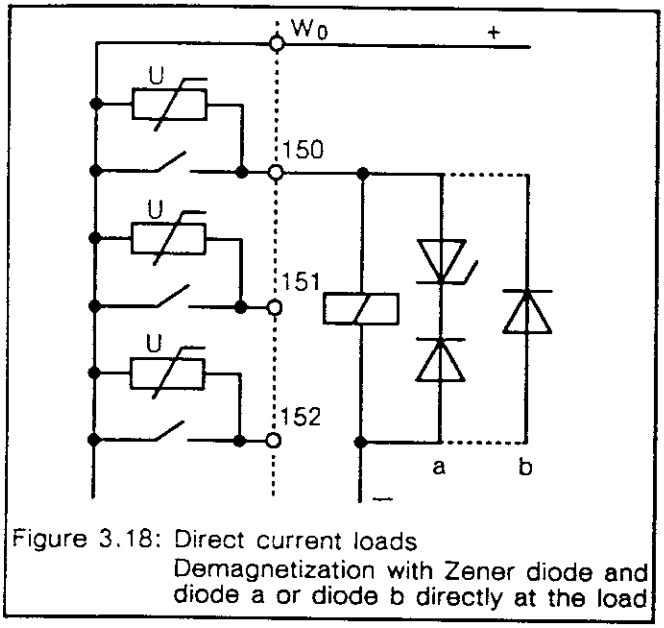


Figure 3.18: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

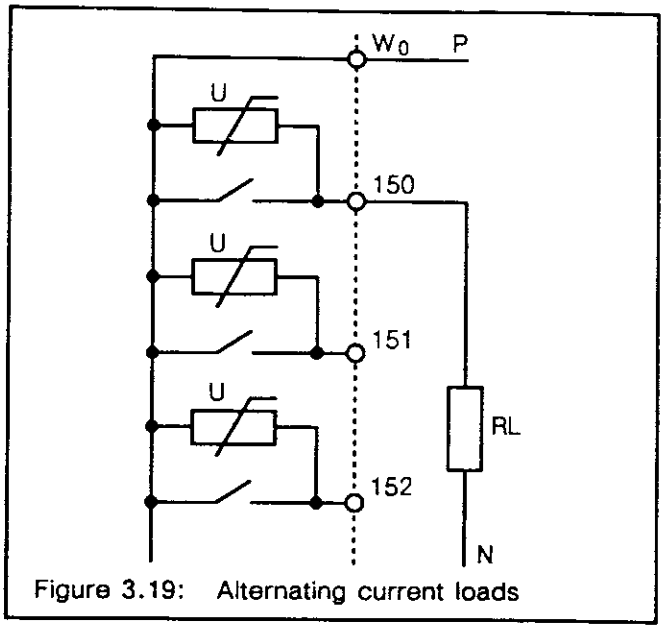


Figure 3.19: Alternating current loads

3.8 Combined input/output module 07 EA 264 R5

3.8.1 Technical data

Number of inputs	40
Number of outputs	24
Supply voltage	24 V DC (+ 25 %, – 20 %)
Max. residual ripple of the supply voltage	1 V_{PP} at 50 Hz
Current consumption	< 1 A
Input data	inputs isolated via optocouplers Input delay typically 4 ms Input current typically 10 mA
Output data	Relay outputs 230 V AC, $\cos\varphi$ = 1: Imax. = 2 A 230 V AC, $\cos\varphi$ = 0.4: Imax. = 1 A 230 V DC/24 V DC: Imax. = 1 A 230 V AC/24 V AC, 230 V DC/24 V DC: Imin. $\geq$ 25 mA Output delay typically 10 ms

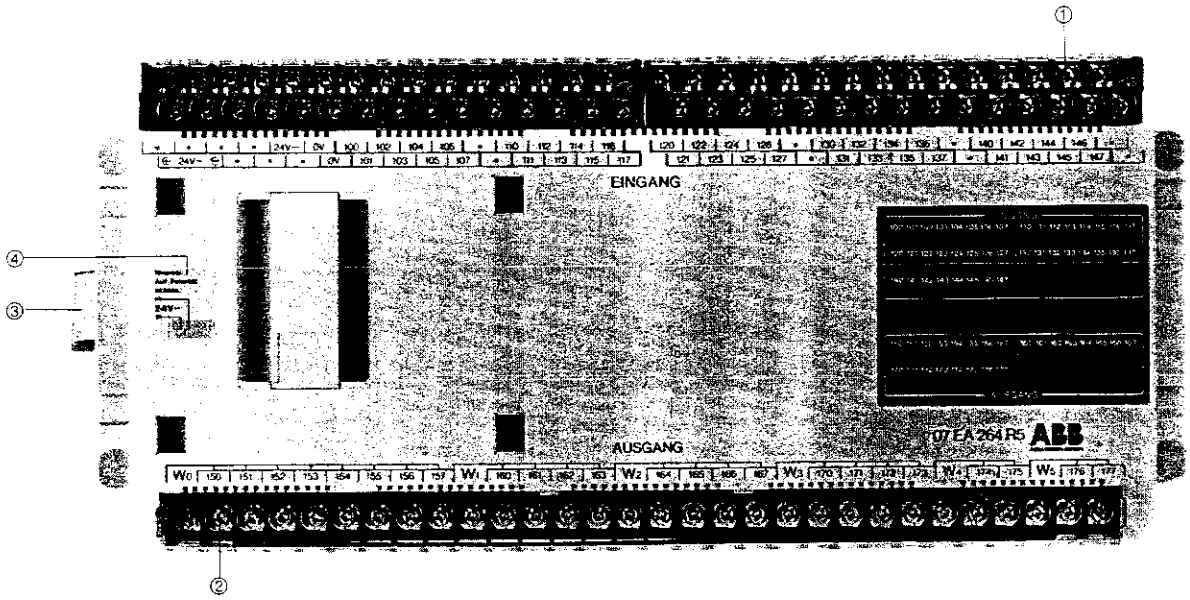


Figure 3.20: Input/output expansion module 07 EA 264 R5

SST 262 1992

⏚ = ground terminal
⊕24 V–⊖ = mains
24 V DC,0 V = supply voltage for inputs
100–147 = input terminals
• = unused terminal
W_0–W_5 = center contents of relay
150–177 = output terminals (normally open)

① input terminals 100–147
② output terminals 150–177 (normally open)
③ interface cable for connection to the basic configuration
④ Pay attention to polarity 24 V DC

LEDs

100–147	inputs
150–177	outputs
Mains	mains voltage available

3.8.2 Connection examples

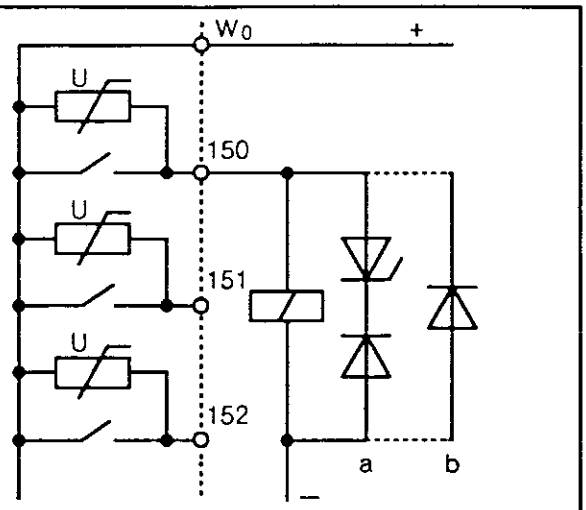


Figure 3.21: Direct current loads
Demagnetization with Zener diode and diode a or diode b directly at the load

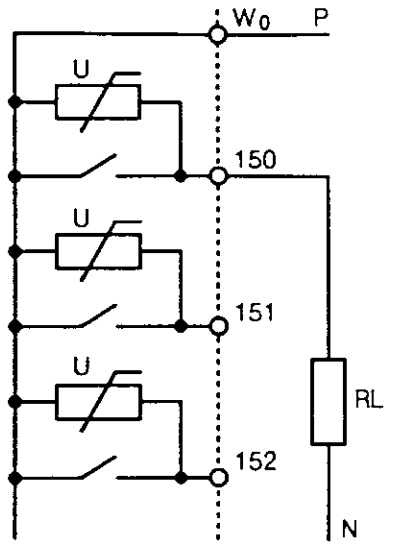


Figure 3.22: Alternating current loads

3.9 Analog modules

3.9.1 Generality

There is a total of 64 bits reserved for ABB Procontic K200 expansion modules. One analog module occupies an address zone of 32 bits. Only a max. of two analog modules can therefore be connected to a basic central unit. It means that it cannot be implemented more binary inputs and outputs than those of the basic central unit.

The analog modules process positive voltages ranging from 0 – 10 V, or respectively currents from 4 – 20 mA. In the 4 – 20 mA operation mode, with the 07 EA 200 analog inputs module, it is not possible to effect broken wire control, which means that not effected terminal connections will be interpreted as 0 signals.

Address assignation:

Analog modules occupy the same address zone (expansion modules 100 – 177) as the binary input/output modules. Every analog channel occupies a 16 bit address zone, it means thus that 2 channels occupy 32 address bits.

Channel No.	Address No.	Terminal	Remark
1 2	100–117 120–137	V0, I0 V1, I1	1st analog expansion module (32 bits)
3 4	140–157 160–177	V0, I0 V1, I1	2nd analog expansion module (32 bits)

Word processing:

Data format of CPU (basic unit):

16 bits, BCD coded, without sign

Value range:

0–9999
It is not possible to show negative numbers.

Data format of analog input and analog output:

Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	0	0	*	*	*	*	*	*	*	*
	not used								0 – 255							

The analog modules 07 EA 200 and 07 AA 200 work on a confidence level of 8 bits.

Resolution: ± 19.5 mV or ± 31 µA resp.

For further processing (e. g. addition) the analog value is to be converted in BCD format. In case of the output of analog values a BCD/Binary conversion is necessary accordingly.

3.9.2 Analog input module 07 EA 200

3.9.2.1 Technical data

Number of channels	2
Current consumption	130 mA
Input working range (rated value)	Current input: 4–20 mA, Voltage input: 0–10 V
Digital resolution	8 bits
Potential isolation via	Optocouplers, nevertheless not between channels
Input resistance	Current input: 220 Ω, voltage input: 10 MΩ
Max. analog error related to output value	± (1 % + 1 bit)
Temperature coefficient	± 50 ppm/K
Data format	BIN (8 bits)
Conversion time of whole input circuit	1 ms
Interaction between channels	No mutual interaction. Channels are related to same potential.
Linearity errors	1 % + 1 bit
Destruction limit	Max. input current: 30 mA
Ambient temperature	0 – 55 °C
Humidity class	≤ 90 % without condensation
Weight	0.5 kg

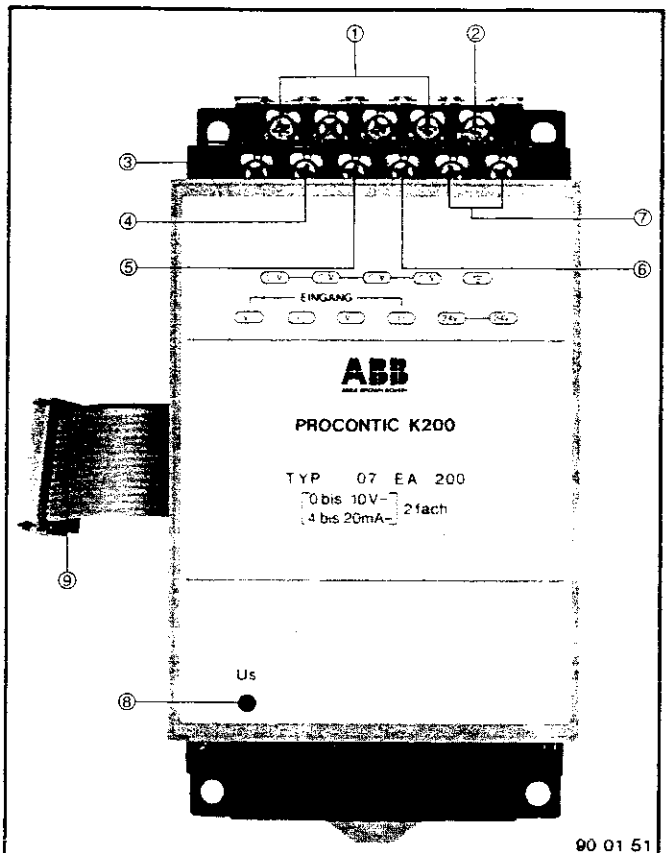


Figure 3.23: 07 EA 200 Analog input module

① (0V)—(0V)—(0V)—(0V): Here connect 0 V with at least 2.5 mm² wire.

② Shield terminal: The metal shield protection plates, provided side wards inside the unit, for screening radiation, are connected to a terminal.

③ V0: Voltage input operation mode, channel 1, address 100–117, when it is used as 1st analog module, or respectively, channel 3, address 140–157, when used as 2nd analog module.

④ I0: Current input operation mode; see ③ for channel and address.

⑤ V1: Voltage input operation mode, channel 2, address 120–137, when it is used as 1st analog module, or respectively, channel 4, address 160–177, when used as 2nd analog module.

⑥ I1: Current input operation mode; see ⑤ for channel and address.

⑦ (24 V)—(24 V): Connect here + 24 V DC with at least 2.5 mm² wire.

⑧ LED: It indicates that it is available the + 15 V from the DC/DC converter.

⑨ Interface connection cable for connection to the basic expandable unit.

3.9.2.2 External wiring

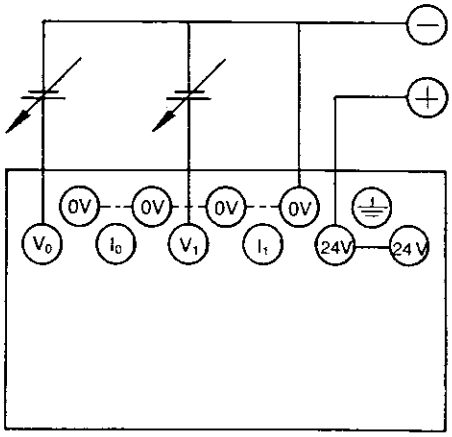


Figure 3.24: External wiring (voltage input)

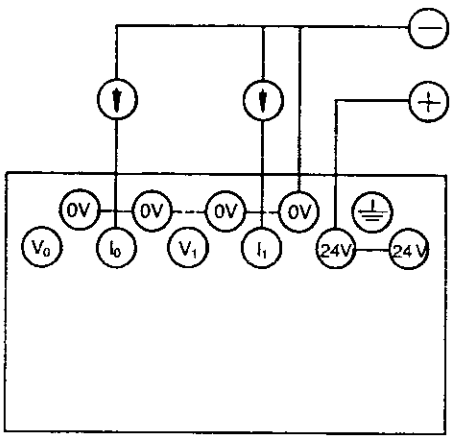


Figure 3.25: External wiring (current input)

3.9.2.3 Block connection diagram

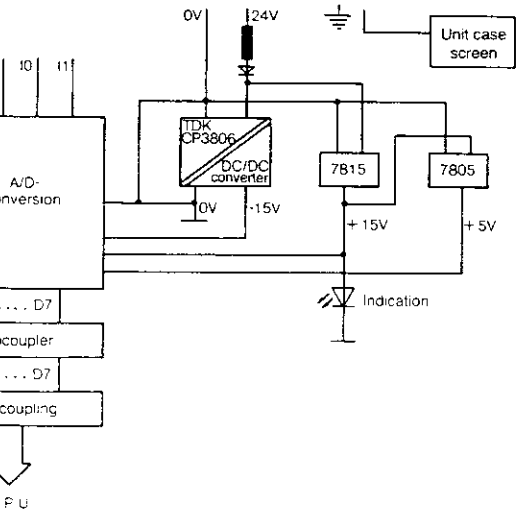


Figure 3.26: 07 EA 200 block connection diagram

3.9.3 Analog output module 07 AA 200

3.9.3.1 Technical data

Number of channels	2
Current consumption	180 mA
Output working range (rated value)	Current output: 4–20 mA, voltage output: 0–10 V
Digital resolution	8 bits
Potential isolation via	Optocouplers, nevertheless not between channels
Output resistance	Current output: 0–500 Ω, voltage output: > 10 kΩ
Max. analog error related to the end value	± 1 %
Temperature coefficient	± 50 ppm/K
Data format	BIN (8 bits)
Conversion time of the whole output circuit	1 ms
Interaction between channels	No mutual interaction. Channels are related to same potential.
Linearity error	1 % + 1 bit
Destruction error	Max. input voltage: 15 V
Ambient temperature	0 – 55 °C
Humidity class	≤ 90 % without condensation
Weight	0.5 kg

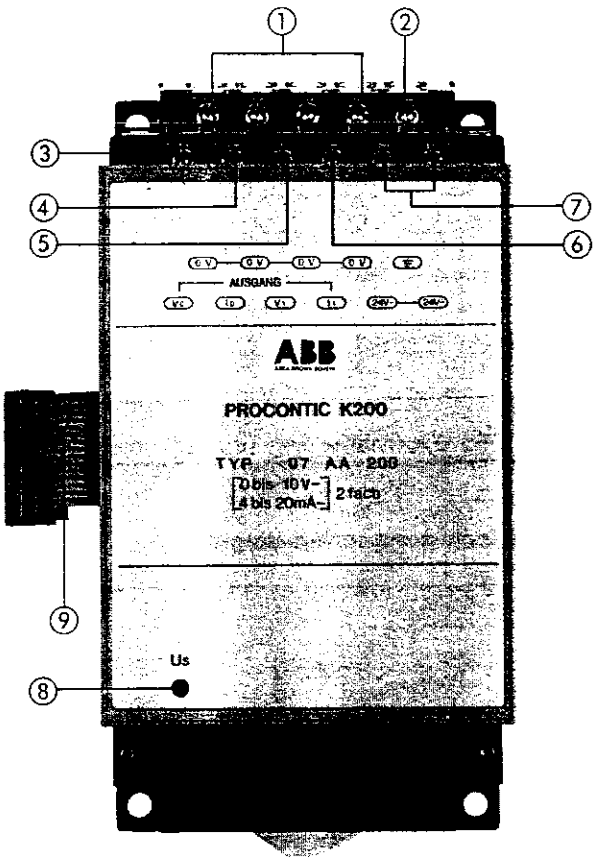


Bild 3.27: 07 AA 200 Analog output module 88 00 53

(1) (0V)–(0V)–(0V)–(0V): Here connect 0 V with at least 2.5 mm² wire.

(2) Shield terminal: The metal shield protection plates, provided side wards inside the unit, for screening radiation, are connected to a terminal.

(3) V0: Voltage input operation mode, channel 1, address 100–117, when it is used as 1st analog module, or respectively, channel 3, address 140–157, when used as 2nd analog module.

(4) I0: Current input operation mode; see (3) for channel and address.

(5) V1: Voltage input operation mode, channel 2, address 120–137, when it is used as 1st analog module, or respectively, channel 4, address 160–177, when used as 2nd analog module.

(6) I1: Current input operation mode; see (5) for channel and address.

(7) (24 V)–(24 V): Connect here + 24 V DC with at least 2.5 mm² wire.

(8) LED: It indicates that it is available the + 15 V from the DC/DC converter.

(9) Interface connection cable for connection to the basic expandable unit.

3.9.3.2 External wiring

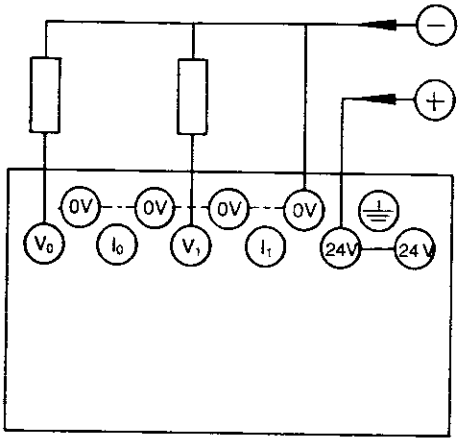


Figure 3.28: External wiring (voltage output)

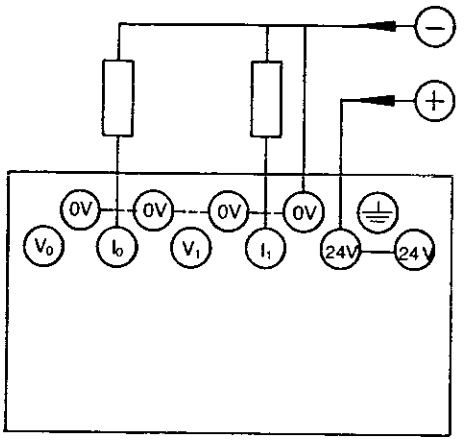


Figure 3.29: External wiring (current output)

3.9.3.3 Block connection diagram

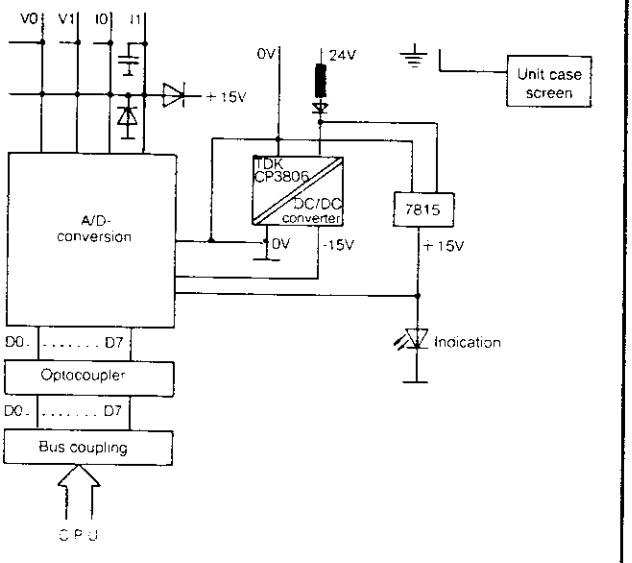


Figure 3.30: 07 AA 200 block connection diagram

3.9.3.4 Avoiding undefined states of output channels

The analog channels adopt an undefined state, from the power turn on instant until run operation mode (approx. 300 ms). It means that the output level will be between 0 and + 10 V, or respectively, 4 and 20 mA, for approx. 300 ms.

Possibilities for avoiding undefined states:

a. The supply voltage for the analog output units will be connected after system initialization, over the RUN contacts of the basic expandable unit, to the 07 AA 200 analog output unit (see Figures 3.31 – 3.33).

a.

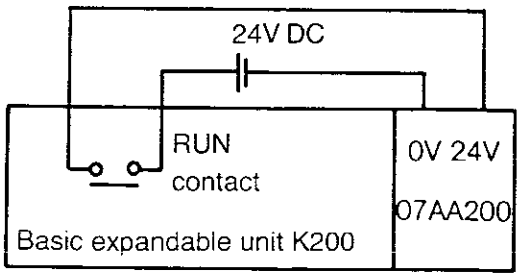


Figure 3.31

b.

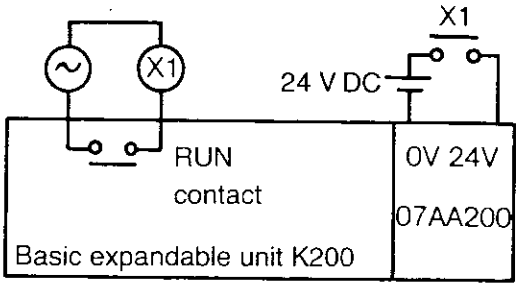


Figure 3.32

c.

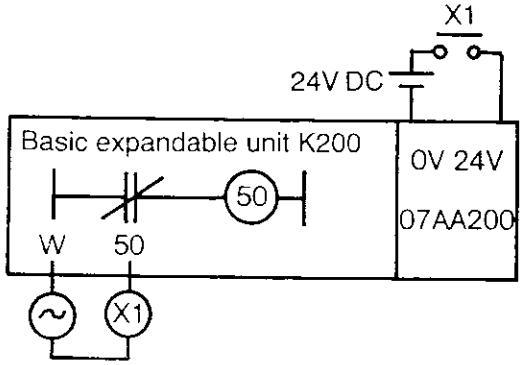


Figure 3.33

3.9.4 Configuration possibilities

Every ABB Procontic K200 basic configuration can be expanded with analog modules. It will be shown in the next examples how to connect analog modules to the basic configuration.

Example 1:

Figure 3.34 illustrates following possible configuration: A basic configuration unit will be expanded with one analog input and one analog output module.

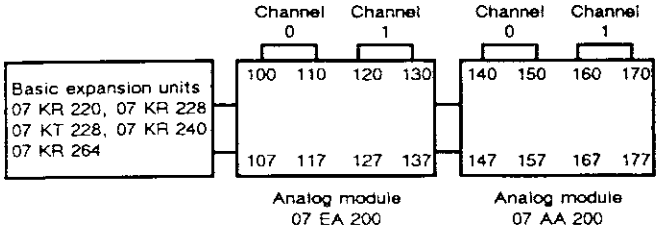


Figure 3.34

Remark: A basic expansion unit can be expanded up to a maximum of two analog modules, which in turn means that it can be reached a maximum of 4 analog channels. An additional binary expansion is **not** possible.

Example 2:

Figure 3.35 illustrates following configuration possibility: A basic expansion unit will be expanded with two analog modules.

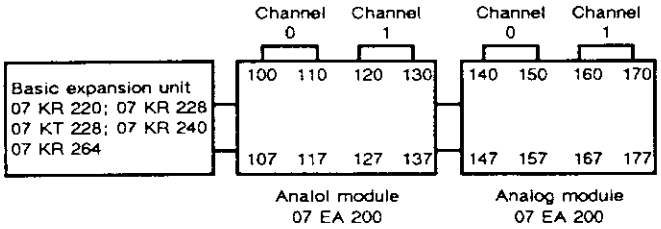


Figure 3.35

It is also reached the maximum expansion possibility in this configuration (see remark in example 1).

Example 3:

Figure 3.36 illustrates following configuration possibility: A basic expansion module will be expanded with two analog output modules.

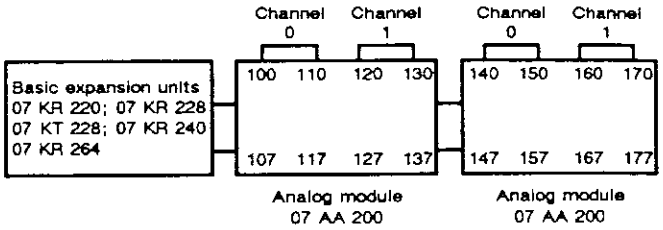


Figure 3.36

It is also reached the maximum expansion possibility in this configuration (see remark in example 1).

Example 4:

Figure 3.37 illustrates following configuration possibility: A basic expansion unit will be expanded with one analog output module (1st expansion module). It will additionally be made an expansion with an analog input module (2nd expansion module).

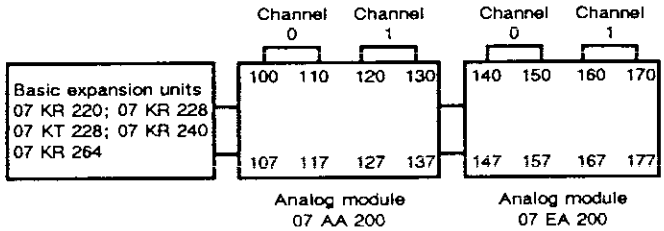


Figure 3.37

Compared to the example 1, the first expansion module is interchanged with the second in this configuration, which means that the analog modules can be used at desired addresses. Addressing will be determined by its relative position.

Caution: By modules change (for instance for service purposes) the modules must be fitted again into their original positions).

Example 5:

Figure 3.38 illustrates following configuration possibility: A basic expansion unit will be expanded with a binary 8 I/O module (for instance 07 EB 200). An analog module will be additionally connected to them and then also a second binary 8 I/O module.

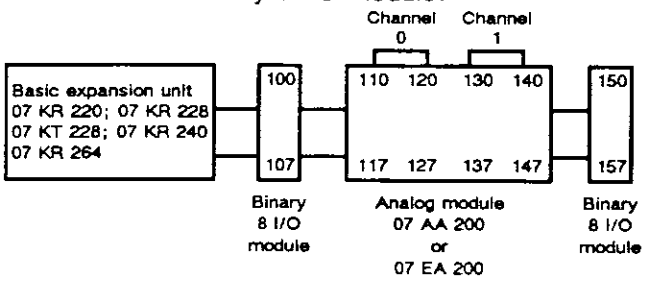


Figure 3.38

This configuration shows that a basic expansion unit may be expanded with one analog module and with binary input/output modules at the same time. A system may be still expanded with a max. of 32 binary inputs/outputs, when a basic expandable unit is expanded with one analog module.

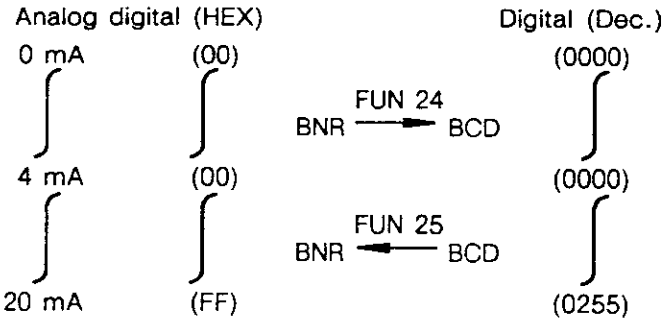
Analog module:

The lower 8 bits of channel 0 and of channel 1 will be occupied by the analog data. The upper 8 bits will not be used.

3.9.5 Correlation between analog and digital data

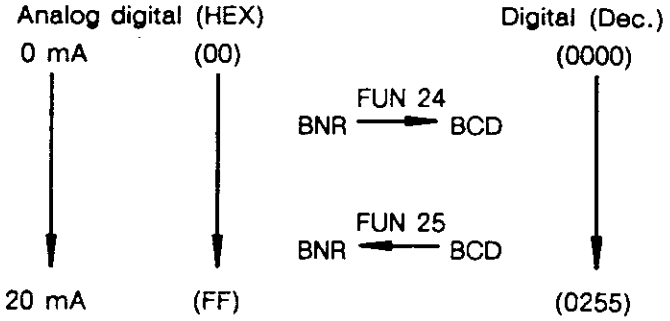
3.9.5.1 Current input/output

The analog current signal ranges from 4 – 20 mA and corresponds to the digital data as follows:



3.9.5.2 Voltage input/output

The analog voltage signal ranges from 0 – 10 V and corresponds to the digital data as follows:



An analog signal will be converted in binary (digital) data (BNR) with the analog module. Since the numerical process will be carried out in BCD format at ABB Procontic K200, the binary data must be converted in BCD data by means of FUN 24.

The result will be available after the conversion with FUN 25 in BNR format at the analog inputs.

3.10 Combined input/output module 07 EA 264 R3

The combined input/output module 07 EA 264 R3 allows to change the line voltage between 115 V AC and 230 V AC:

The line voltage is factory preset to 230 V AC. The line voltage is only to be changed, if the module is not connected to power line.

Note: The combined input/output module 07 EA 264 R3 is only intended for connection to a line voltage of 115 V AC.

If it is connected to a line voltage of 230 V AC the safety standards in accordance with VDE 0160 are **not** fulfilled.

Technical data

Supply voltage	115 V AC (can be changed to 230 V AC)

Pin assignments

115/230 V~ (AC)	= mains (phase, neutral); can be changed

For all other data of the combined input/output module 07 EA 264 R3 please refer to the description of the combined input/output module 07 EA 264 R1.

The arrow in figure 3.39 shows the position of the switch for changing the line voltage. At this position the switch is available at the right top side of the module through the ventilation slits (s. figure 3.40).

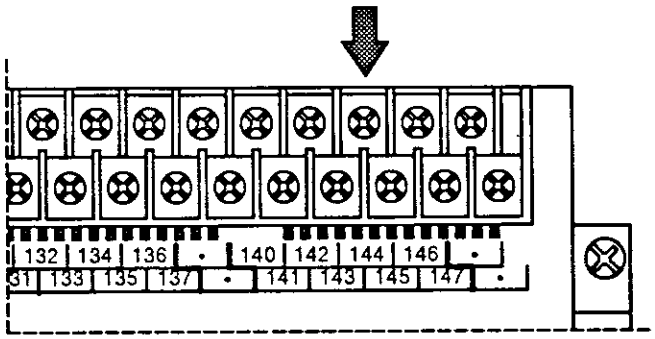


Figure 3.39: Position of the switch

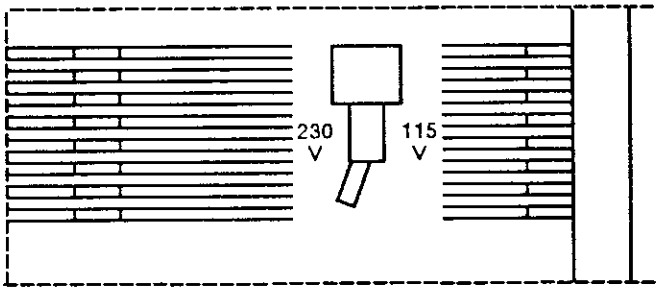


Figure 3.40: Switch available through the ventilation slits at the right top side of the module

4 Serviceability test of the ABB Procontic K200 basic configurations with 07 PG 200 by means of an internal test program

4.1 Testing of the basic configuration

The ABB Procontic K200 is equipped with a test program by means of which the system and the programming unit 07 PG 200 can be subjected in situ at the plant or in the workshop to a self-test. The test program is filed in the EEPROM memory.

The operation mode switch is set to position PROG. In the left column of table 1 the necessary input data are listed which will produce the respective displays (on the right-hand side in the display CPU. After approx. 17 s the display changes and 950 or 1970 resp. will appear.

Input	Display
CLR SET	8
SET	8 8
ENT	A - -
FUN RES	A - - E
7 SET MON	SELF 0
MON	C - - P
CLR	SELF 1
MON	C - - H
CLR	SELF 2
MON	CPU
Completed after about 17 s	950 or 1970 *)

Table 1

*) 950 is displayed, if no program memory module is plugged in. 1970 is displayed, if the program memory module 07 PR 201 or 07 PR 210 is plugged in.

If the operating mode switch is now set to position RUN and the control system is started up by a "1" signal at input STA the activation of certain input channels with 24 V signals will cause the switching of certain output channels to "1" signal.

Table 2 shows which output will be switched to "1" signal when a "1" signal is present at a specific input.

After completion of the I/O tests the high-speed 10 kHz counter can be tested with "1" signals at the counter inputs HZ (counting) and HR (resetting). The counter reading is projected in the program via FUN 36 to the output channels 50 to 67. For explanations of function FUN 36 see section 12.4 of the ABB Procontic K200 software description.

No. input \ No. output	50	51	52	53	54	55	56	57	60	61	62	63	64	65	66	67	70	71	72	73	74	75	76	77
00	○																							
01		○																						
02			○																					
03				○																				
04					○																			
05						○																		
06							○																	
07								○																
10	○																							
11		○																						
12			○																					
13				○																				
14									○															
15										○														
16											○													
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23																○								
24													○											
25														○										
26															○									
27																○								
30																	○							
31																		○						
32																			○					
33																				○				
34																		○						
35																			○					
36																				○				
37																					○			
40																						○		
41																							○	
42																								○
43																								
44																					○			
45																						○		
46																							○	
47																								○

○ indicates that the outputs are enabled

Table 2

4.2 Testing of the Basic Configuration and of the Miniature Programming Unit 07 PG 200

The operating mode switch is set to position PROG. If the self-test is performed in the sequence listed in Table 3, a test program for the input/output channels is written into the integrated or plugged-in EEPROM.

Attention: User programs in the EEPROM memory are erased by this procedure.

Table 3 shows the sequence of input data for testing the basic configurations and the programming unit as well as the running times of the test.

Function	Mode of operation	System status
System test	PROG	STOP

Input via keyboard and display

Input	Display: Test OK	Display: Error	Remark
CLR SET SET ENT	A---		
FUN 9 7 8	A--E		
MON	SELF 0	SELF 3E	Sum check in PG 200
Press any key exept MON	See table 4		Test of PG 200 Keyboard a. display
Storage (Transm. K 200 / Micro Rec.)	C--P		Testing of cassette recorders for proper functioning (storage)
MON			
Completed after appr. 30 s	SELF 1		
Charg. (Receiver K 200 / Head ph. Rec.)			(Charging)
MON	C--H		
	C--P		
Completed after appr. 33 s	SELF 2	SELF 7E	Comparison error
		SELF 8E	Format error
MON	CPU	3E	Sum check in K 200
	CPU	2E	Read / write check of RAM
	CPU	1E	Read / write chrck of EEPROM
Complete after appr. 100 s	950 /1970		Check OK after appr. 100 s

Table 3

For the self-test of the cassette recorder interface a recorder is required. Without it this test cannot be performed.

If this test is to be passed over the procedure shall be as described in Table 1.

Table 4 shows the response of the display at the programming unit 07 PG 200 to the keyboard input.

No.	Input	Display
1	1	111111 DATA
2	STR	222222 STEP
3	&	444444 RUN
4	-	------
5	N	000000
6	T/Z	0.0.0.0.0.0.
7	STEP	PPPPPP STR & FUN / STEP RUN PROG
8	DCLR	HHHHHH FUN / PROG TEST
9	CLR	CCCCCC & / TEST RUN
10	SET	888888
11	FUN	FFFFFF Fun / PROG
12	=	888888 TEST
13	0	000000
14	1	111111 DATA
15	2	222222 STR / STEP
16	3	333333 STR / DATA STEP
17	INS	FFFFFF FUN / PROG
18	STEP -	EEEEEE FUN / DATA PROG
19	STEP +	000000 STR FUN / STEP PROG
20	4	444444 & / RUN
21	5	555555 DATA RUN
22	6	666666 STR & / STEP RUN
23	7	777777 STR & / DATA STEP RUN
24	8	888888 TEST
25	9	999999 DATA TEST
26	ENT	nnnnnn STR FUN / DATA PROG STEP
27	DEL	uuuuuu & FUN / PROG RUN
28	FIND	000000 & FUN / DATA PROG RUN

Table 4

After completion of the test referred to in Table 3 the input and output channels during RUN operation (set operating mode switch to position RUN) can be tested.

The high-speed counter can also be tested with the counter input HZ and the resetting input HR. The counter reading shall be taken at the outputs (see Sect. 3.1).

5.1 Interface Connection Cables 07 SK 200 and 07 SK 201

With the interface connection cables 07 SK 200 (length: 0.6 m) and 07 SK 201 (length: 1.5 m) the connection between basic unit and extension modules is established.

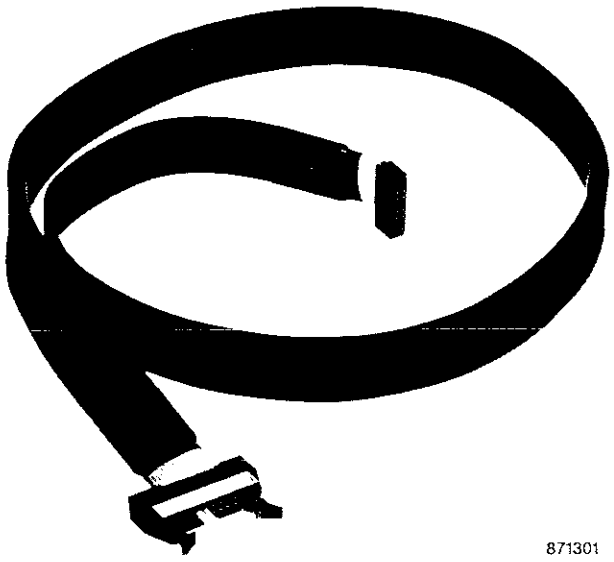


Fig. 5.1: Interface connection cable 07 SK 201

5.2 System Cable 07 SK 202 R2

The system cable 07 SK 202 (length: 2 m) is a RS-232-C cable required for connecting the programming unit 07 PG 201 with the PC 07 PC 31/32.

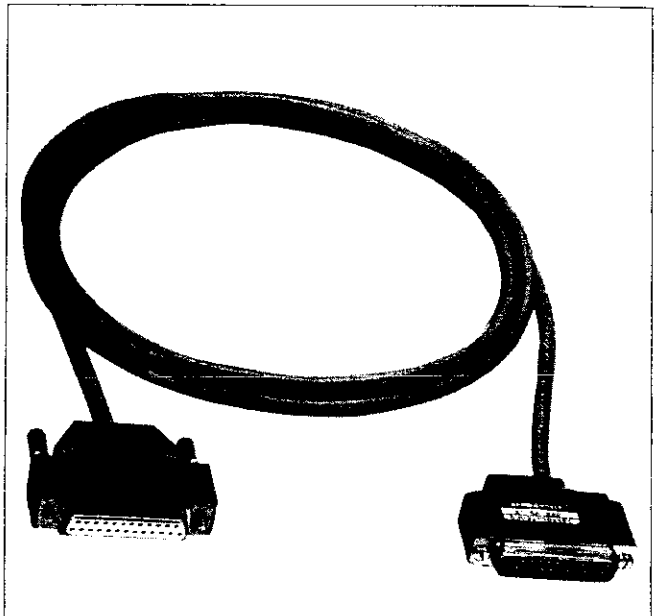


Fig. 5.2: System cable 07 SK 202 R2 871303

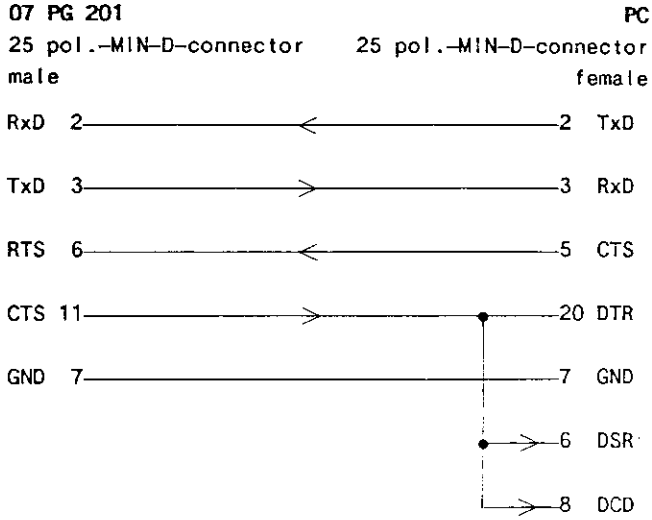


Fig. 5.4: Terminal assignment 07 SK 202 R2

Signal names	
RxD Receive Data	GND Ground
TxD Transmit Data	DSR Data set ready
CTS Clear to send	DCD Data carrier detect
DTR Data terminal ready	RTS Request to send

5.3 System Cable 07 SK 203 R1

The system cable 07 SK 203 R1 (length: 2 m) is a RS-232-C cable required for connecting the programming unit 07 PG 201 with the printer 07 DR 11 (RS-232-C interface).

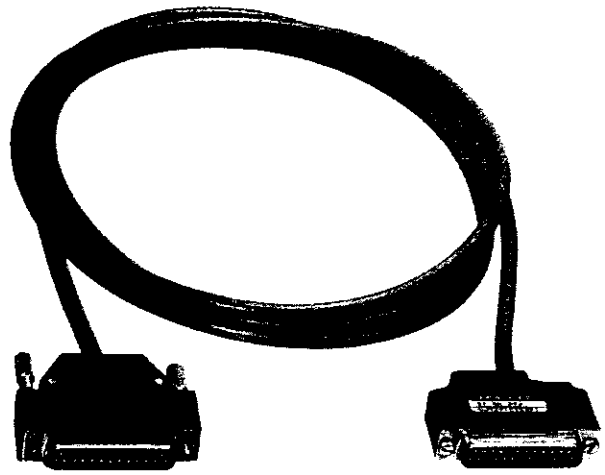


Fig. 5.5: System cable 07 SK 203 R1 BBC 871302

07 PG 201 25 pol.-MIN-D-connector male		printer 07 DR 11 25 pol.-MIN-D-connector male
RxD 2	←	2 TxD
TxD 3	→	3 RxD
RTS 6	→	5 CTS
GND 7	—	7 GND
CTS 11	←	4 RTS

Fig. 5.5: Terminal assignment 07 SK 203 R1

Signal names	
RxD Receive Data	GND Ground
TxD Transmit Data	CTS Clear to send
RTS Request to send	

5.4 System Cable 07 SK 203 R2

The system cable 07 SK 203 R2 (length: 3 m) is a RS-232-C cable required for connecting the programming unit 07 PG 201 with the printer 07 DR 12 (RS-232-C interface).

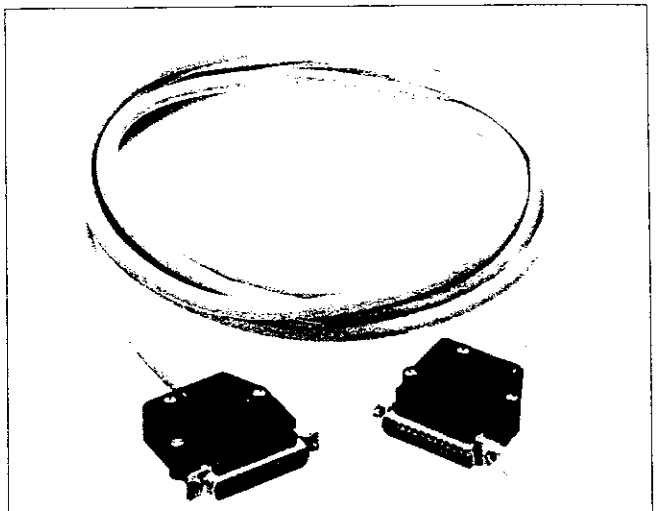


Fig. 5.6: System cable 07 SK 203 R2 881157

07 PG 201 25 pol.-MIN-D-connector male		printer 07 DR 12 25 pol.-MIN-D-connector male
TxD 3	→	3 RxD
RTS 6	→	6 DSR
RxD 2	←	2 TxD
CTS 11	←	11 RevCH 2nd=RTS
GND 7	—	7 GND
PGND 1	—	1 PGND

Bild 5.7: Terminal assignment 07 SK 203 R2

Signal names	
TxD Transmit Data	DSR Data set ready
RxD Receive Data	GND Ground
RTS Request to send	PGND Protective Ground
CTS Clear to send	

5.5 Memory modules 07 PR 201 and 07 PR 210

By using the memory module 07 PR 201 (EEPROM) or the memory module 07 PR 210 (EPROM) user programs can be quickly exchanged. Both memory modules are designed for 2 K instructions (1970 words). Buffer batteries are not required when EEPROMs or EPROMs are used.

Notes: Don't plug in or remove when supply voltage is on.

To avoid damages please use a coin to remove the cover from the basic configuration.

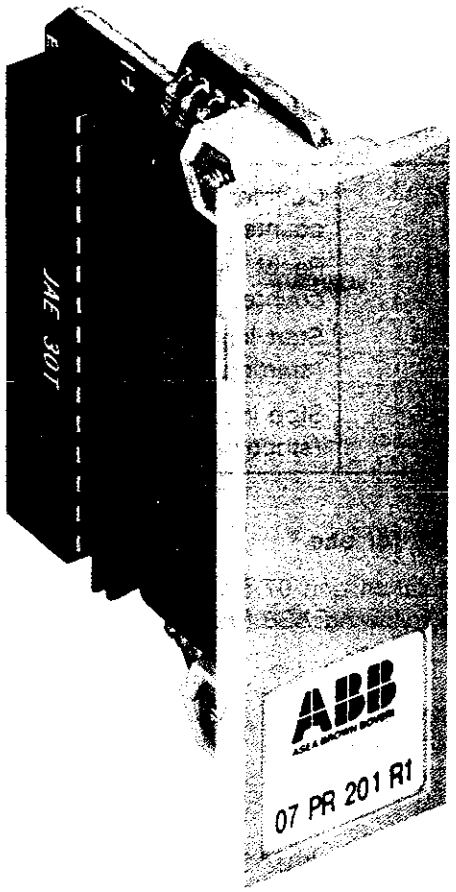


Figure 5.8: Memory module 07 PR 201 89 10 04

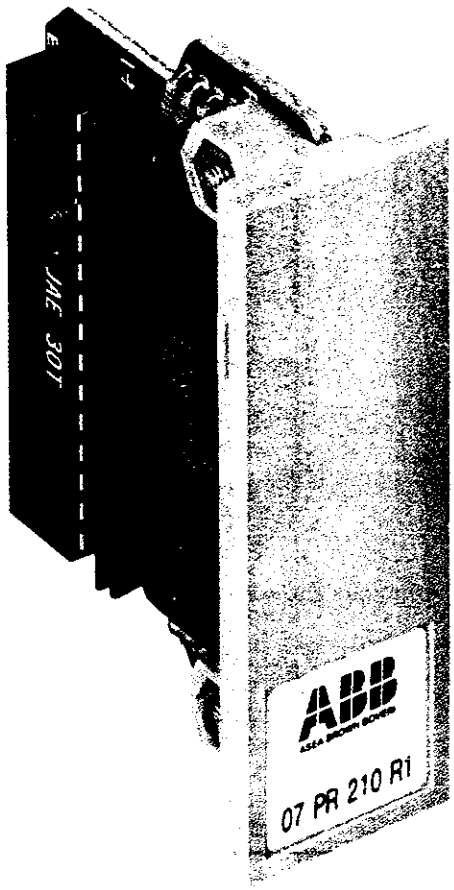


Figure 5.9: Memory module 07 PR 210 89 10 04

5.6 DIN rail adapter 07 HA 200

Figure 5.10: DIN rail adapter 07 HA 200 87 10 33

Max. length of the screws: M 4 x 4

5.7 Simulation units 07 SG 228 and 07 SG 240

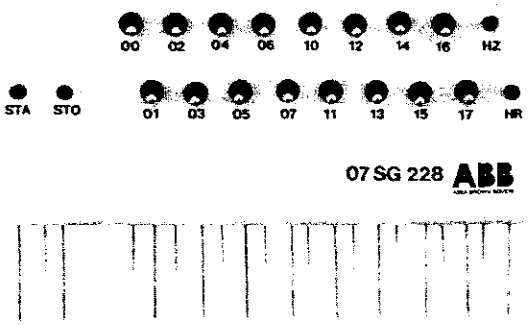


Figure 5.11: Simulation unit 07 SG 228 87 13 32

By means of the simulation units 07 SG 228 and 07 SG 240 the existing peripherals (position switches, initiators etc.) can be simulated on the input side.

Values for program designators may be assigned and their effect on the program prepared can be tested.

Supply voltage

The simulation units receive their supply voltage (24 V DC) from the basic configuration of the ABB Procontic K200 system.

Momentary-contact pushbuttons

The simulation units are equipped with 4 pushbuttons each.

No.	Designation	Effect
1	HZ	Counter input of the high-speed counter
2	HR	Reset input of the high-speed counter
3	STA	Start input (starting of the program)
4	STO	Stop input (stopping of the program)

Possibility for use

The simulation unit 07 SG 228 can be used together with the following ABB Procontic K200 basic configurations:

07 KR 220 R1
07 KR 228 R1
07 KR 228 R3
07 KT 228 R1.

The simulation unit 07 SG 240 can be used together with the following ABB Procontic K200 basic configurations:

07 KR 240 R1
07 KR 240 R2
07 KR 240 R3
07 KT 240 R1.

5.8 Power Supply Unit 07 NG 32 R1
primary voltage: 115/230 V AC, secondary voltage: 24 V DC, 2.5 A

The 07 NG 32 power supply unit generates a 24 V DC voltage from a single-phase mains voltage of 115 V AC or 230 V AC. For applications in electronic control systems, the output voltage is smoothed by electrolytic capacitors. The power supply unit has a load capability of 2.5 A. A green LED indicates that the 24 V DC is present.

The primary and the secondary voltage are protected by built-in miniature fuses (5 x 20 mm). The electrical connections are made over screw-type terminals (see Fig. 5.8-1, Top view with circuit diagram imprint and terminal assignment). Cable grips fasten the cables. There is an electrical isolation between the primary and the secondary voltage according to VDE 0551 (safety electrical isolation).

The power supply unit has a mounting base which allows the user to snap the unit onto a DIN rail (EN 50022). If this mounting base is removed, the unit can be fastened by 4 screws M4 (see Fig. 5.8-2, drilling pattern).

The power supply unit must be mounted so that the convection air current is not disturbed.

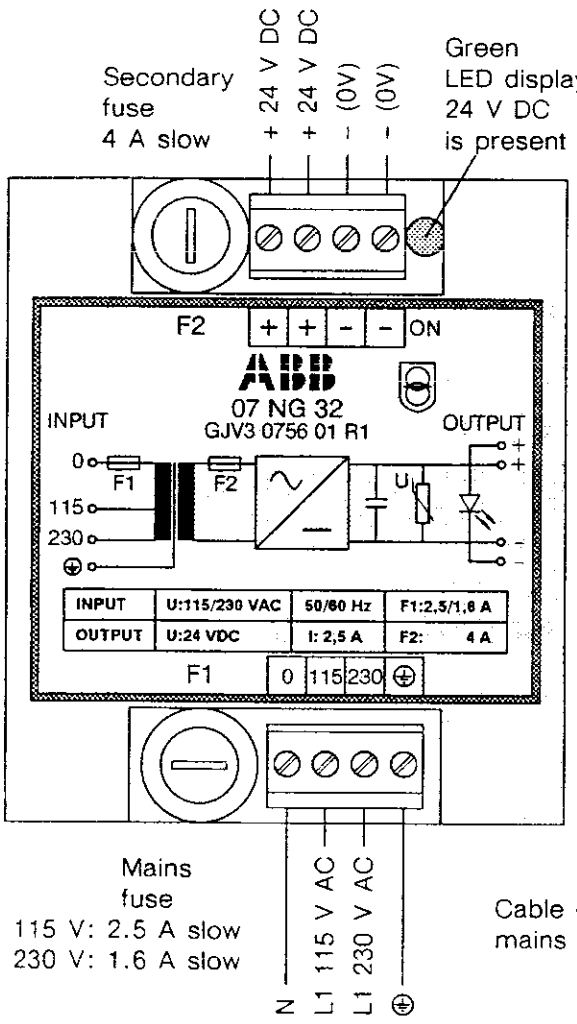


Fig. 5.8-1: Top view with circuit diagram imprint and terminal assignment

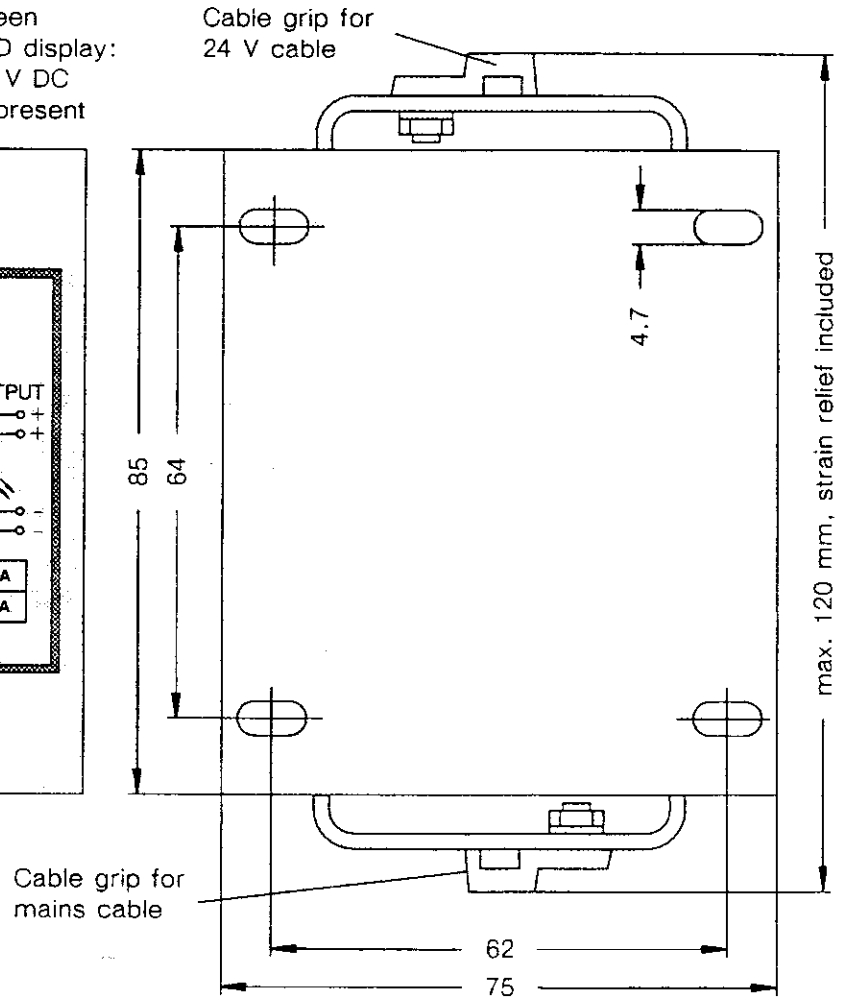


Fig. 5.8-2: Drilling pattern and outline dimensions of the power supply unit

The power supply unit has a height (depth if mounted on rear panel) of ca. 145 mm.

Technical data

Electrical data, input specifications

Primary voltage **115 V AC**		
Rated voltage		115 V AC
Limiting values		103.5...126.5 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 180 mA
	with rated load	ca. 900 mA
Miniature fuse	primary	2.5 A slow, sand-filled, 5 x 20 mm
Primary voltage **230 V AC**		
Rated voltage		230 V AC
Limiting values		207...253 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 90 mA
	with rated load	ca. 450 mA
Miniature fuse	primary	1.6 A slow, sand-filled, 5 x 20 mm, (this fuse is inserted by the factory)
Max. conductor cross section of the terminals		2.5 mm^2

Electrical data, output specifications

Secondary voltage (output voltage)	
Rated voltage	24 V DC
Limiting values	19.2...30 V DC
Max. ripple content	≤ 5 %
Display of the present voltage	with green LED
Output load capability	
Rated current (permitted continuous load)	2.5 A
Miniature fuse, secondary	4.0 A medium time-lag, sand-filled
Max. conductor cross section of the terminals	2.5 mm^2, plus and minus poles are assigned to two terminals each

Mechanical data

Mounting	onto a DIN rail or with 4 screws M4
Mechanical dimensions	
Mounting base	85 x 75 mm (120 mm), see Fig. 5.8-2, Drilling pattern
Height (depth if mounted on rear panel)	145 mm
Weight	2.2 kg
Cooling	The power supply unit must be mounted so that the convection air current is not disturbed.
Ambient temperature	max. 55 °C (with 100 % load)
Standards, regulations	VDE 0160, transformer according to VDE 0551

Ordering data

Order number	07 NG 32 R1	GJV3 0756 01 R1

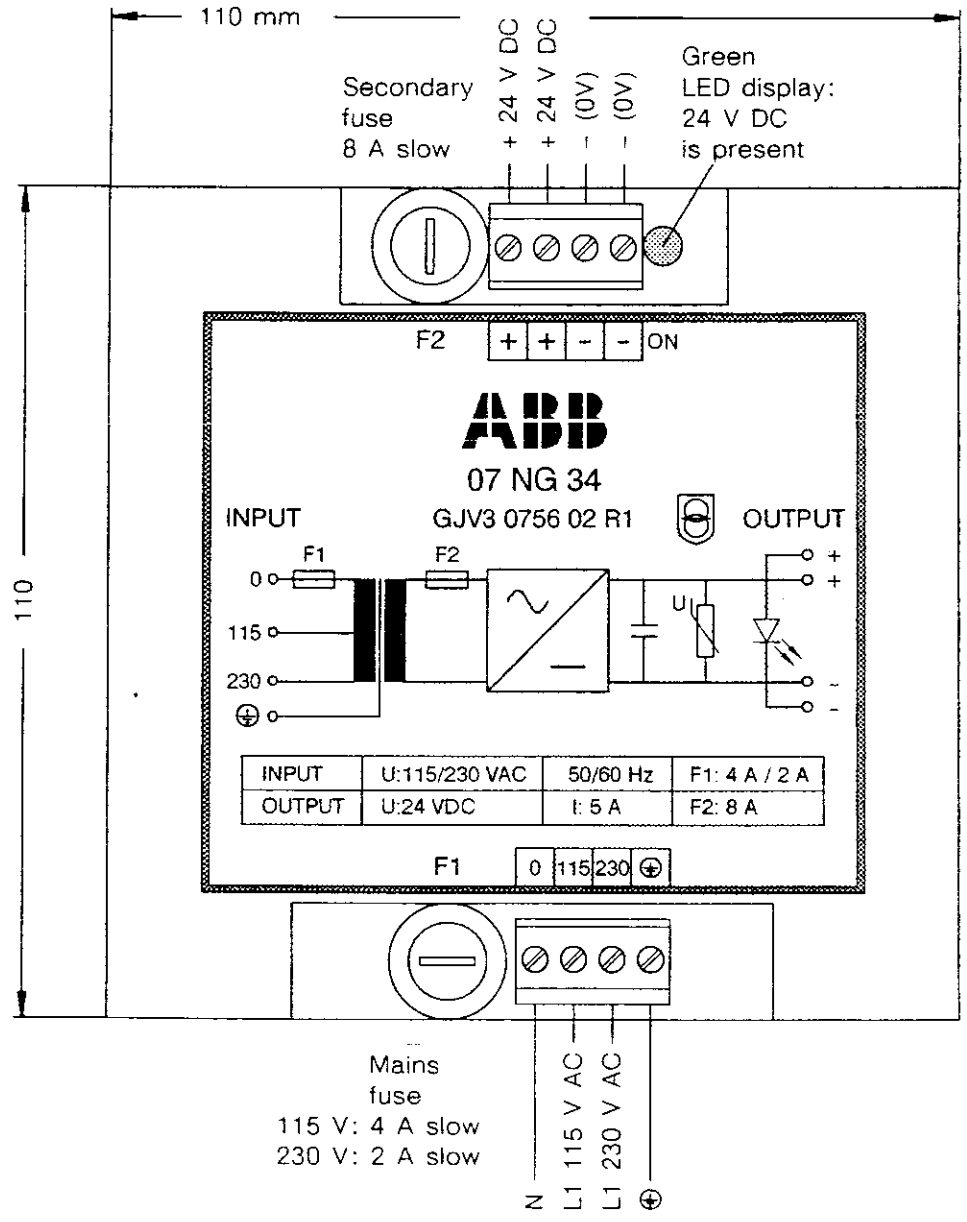
5.9 Power Supply Unit 07 NG 34 R1
primary voltage: 115/230 V AC, secondary voltage: 24 V DC, 5 A

The 07 NG 34 power supply unit generates a 24 V DC voltage from a single-phase mains voltage of 115 V AC or 230 V AC. For applications in electronic control systems, the output voltage is smoothed by electrolytic capacitors. The power supply unit has a load capability of 5 A. A green LED indicates that the 24 V DC is present.

The primary and the secondary voltage are protected by built-in miniature fuses (5 x 20 mm). The electrical connections are made over screw-type terminals (see Fig. 5.9-1, Top view with circuit diagram imprint and terminal assignment). Cable grips fasten the cables. There is an electrical isolation between the primary and the secondary voltage according to VDE 0551 (safety electrical isolation).

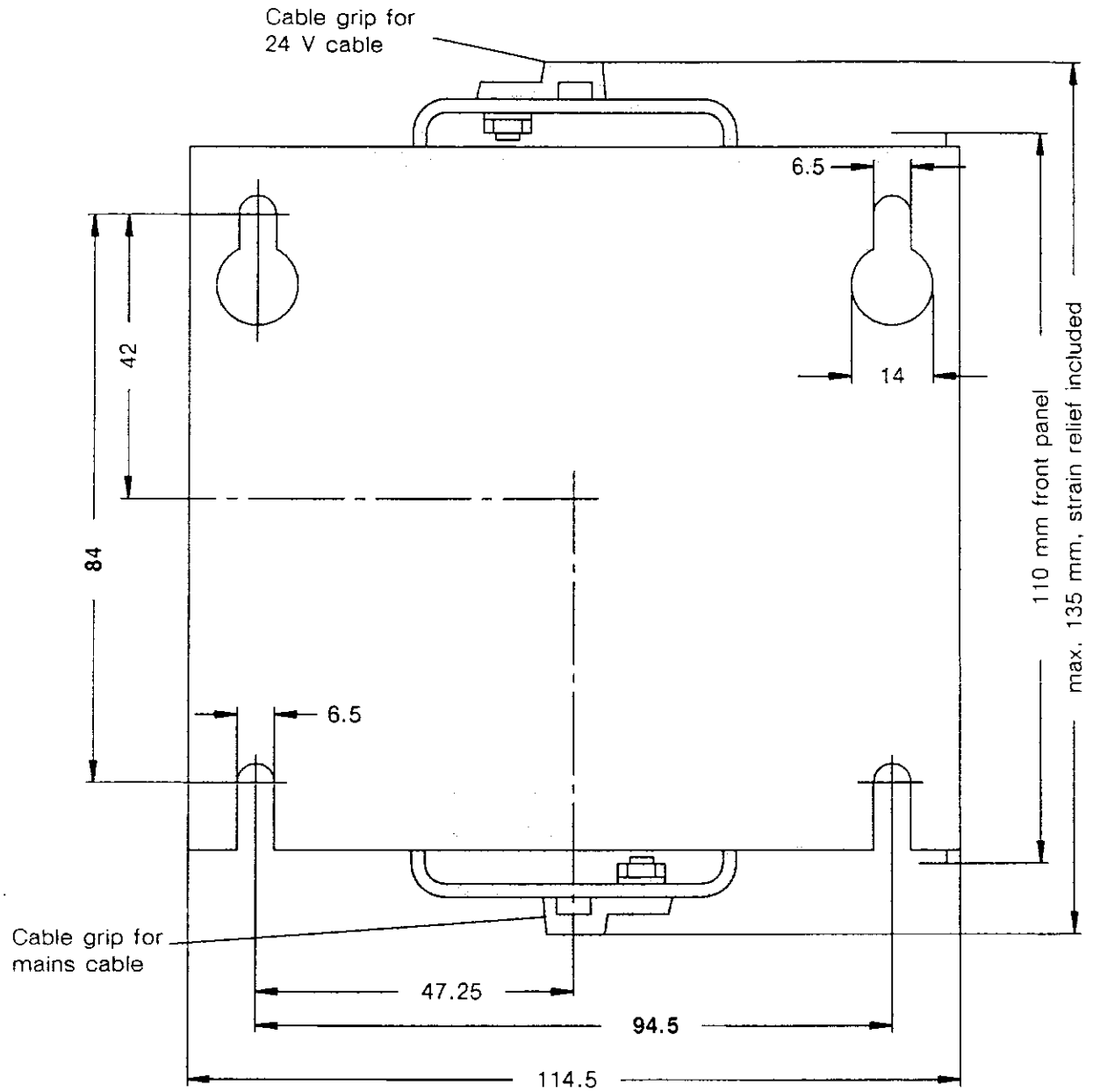
The power supply is fastened by 4 screws M5 (see Fig. 5.9-2, drilling pattern).

The power supply unit must be mounted so that the convection air current is not disturbed.



The power supply unit has a height (depth if mounted on rear panel) of ca. 145 mm.

Fig. 5.9-1: Top view with circuit diagram imprint and terminal assignment



The power supply unit has a height (depth if mounted on rear panel) of ca. 145 mm.

Fig. 5.9-2: Drilling pattern and outline dimensions of the power supply unit

Technical data

Electrical data, input specifications

Primary voltage **115 V AC**		
Rated voltage		115 V AC
Limiting values		103.5...126.5 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.35 A
	with rated load	ca. 1.60 A
Miniature fuse	primary	4 A slow, sand-filled, 5 x 20 mm
Primary voltage **230 V AC**		
Rated voltage		230 V AC
Limiting values		207...253 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.17 A
	with rated load	ca. 0.85 A
Miniature fuse	primary	2 A slow, sand-filled, 5 x 20 mm, (this fuse is inserted by the factory)
Max. conductor cross section of the terminals		2.5 mm^2

Electrical data, output specifications

Secondary voltage (output voltage)	
Rated voltage	24 V DC
Limiting values	19.2...30 V DC
Max. ripple content	≤ 5 %
Display of the present voltage	with green LED
Output load capability	
Rated current (permitted continuous load)	5 A
Miniature fuse, secondary	8.0 A medium time-lag, sand-filled
Max. conductor cross section of the terminals	2.5 mm^2, plus and minus poles are assigned to two terminals each

Mechanical data

Mounting	with 4 screws M5
Mechanical dimensions	
Mounting base	110 x 110 mm (135 mm), see Fig. 5.9-2, Drilling pattern
Height (depth if mounted on rear panel)	145 mm
Weight	4 kg
Cooling	The power supply unit must be mounted so that the convection air current is not disturbed.
Ambient temperature	max. 55 °C (with 100 % load)
Standards, regulations	VDE 0160, transformer according to VDE 0551

Ordering data

Order number	07 NG 34 R1	GJV3 0756 02 R1

5.10 Power Supply Unit 07 NG 35 R1

primary voltage: 230/400 V 3-phase AC, secondary voltage: 24 V DC, 10 A

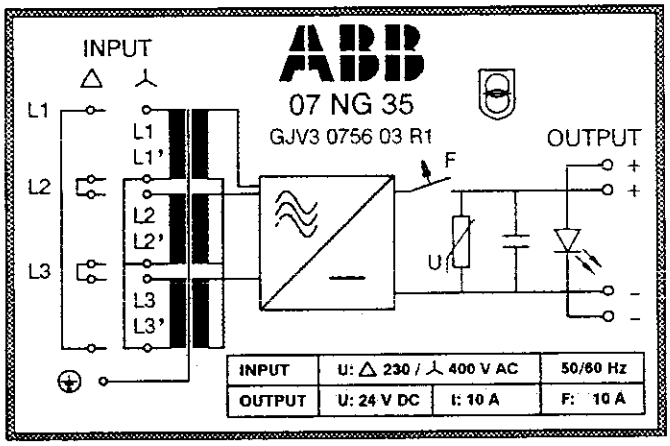
The 07 NG 35 power supply unit generates a 24 V DC voltage from a three-phase mains voltage of 230 V AC or 400 V AC. The output voltage is gained by using a 3-phase bridge-connected rectifier. Together with a filter capacitor, this guarantees a small ripple content of the voltage. The power supply unit has a load capability of 10 A. It is suitable for applications in electronic control systems. A green LED indicates that the 24 V DC is present.

The secondary voltage is protected by a built-in B-type automatic circuit-breaker. The primary voltage (mains) has to be protected by external fuses.

The electrical connections are made over screw-type terminals. With 3-phase mains voltage of 230 V, the primary windings of the transformer are delta-connected, with 3-phase mains voltage of 400 V, the windings are star-connected (see Fig. 5.10-1). The cables are strain-reliefed by cable ties. There is an electrical isolation between the primary and the secondary voltage according to VDE 0551 (safety electrical isolation).

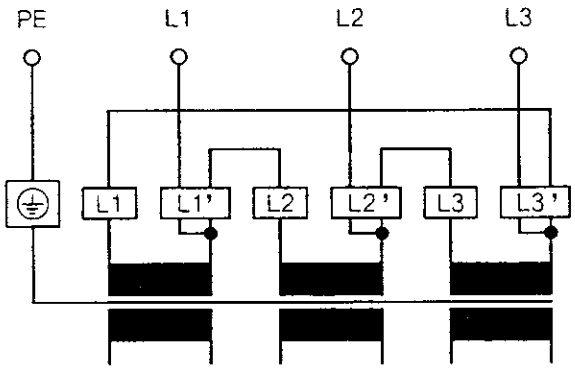
The power supply is fastened by 4 screws M5 (see Fig. 5.10-2, drilling pattern).

The power supply unit must be mounted so that the convection air current is not disturbed.



Configuration set by the factory:

230 V 3-phase AC △



400 V 3-phase AC ⅄

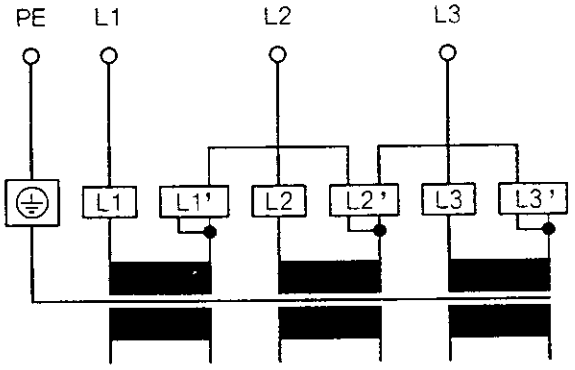
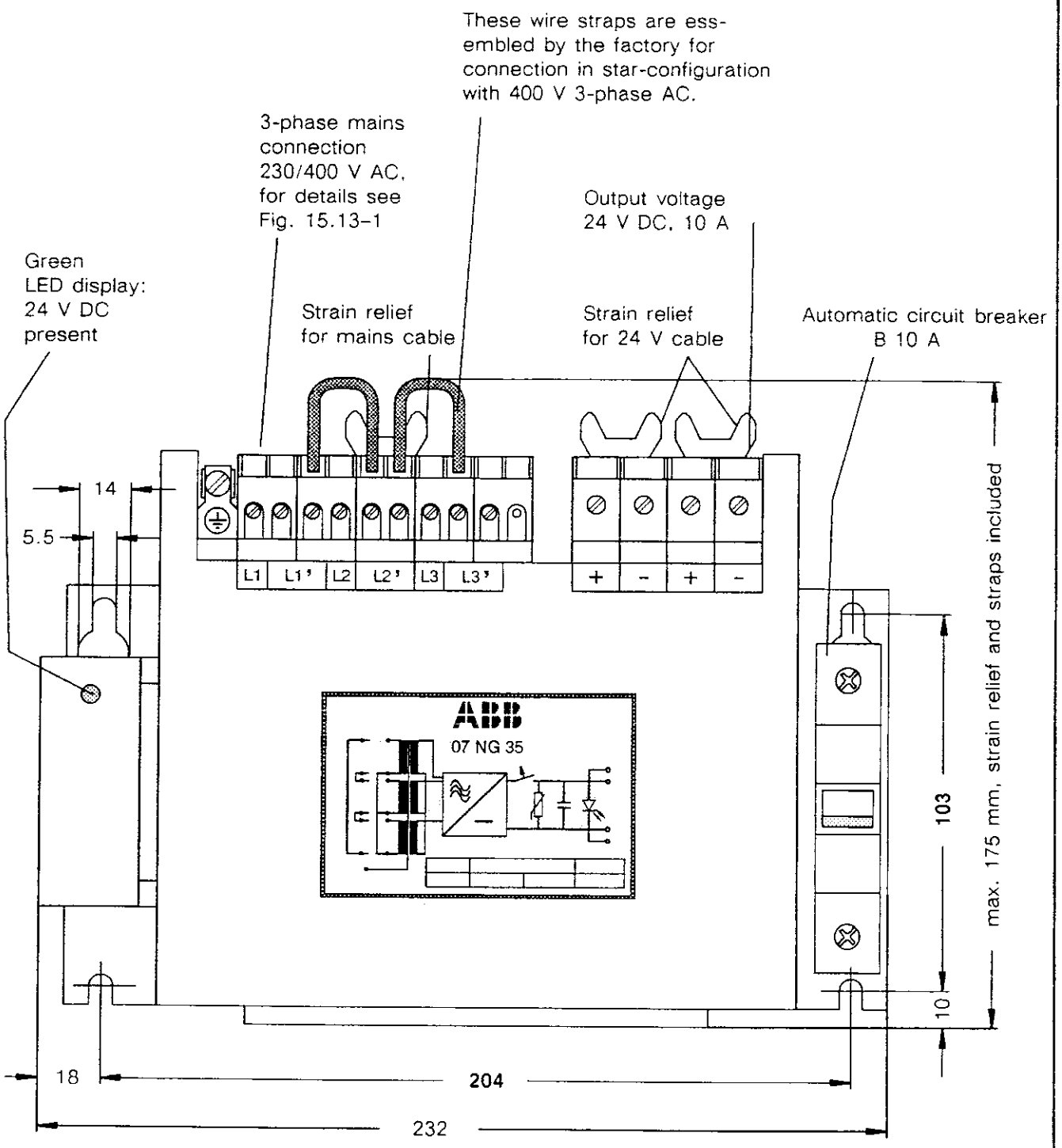


Fig. 5.10-1: Imprinted circuit diagram and terminal diagrams for 230 V and 400 V 3-phase AC



The power supply unit has a height (depth if mounted on rear panel) of ca. 125 mm

Fig. 5.10-2: Drilling pattern and outline dimensions of the power supply unit

Technical data

Electrical data, input specifications

Primary voltage **230 V 3-phase AC**		
Rated voltage		230 V 3-phase AC
Limiting values		207...253 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.22 A
	with rated load	ca. 0.85 A
Fusing	primary	external
Primary voltage **400 V 3-phase AC**		
Rated voltage		400 V 3-phase AC
Limiting values		360...440 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.15 A
	with rated load	ca. 0.50 A
Fusing	primary	external
Max. conductor cross section of the terminals		2 x 1.5 mm^2

Electrical data, output specifications

Secondary voltage (output voltage)	
Rated voltage	24 V DC
Limiting values	19.2...30 V DC
Max. ripple content	$\leq$ 2 %
Display of the present voltage	with green LED
Output load capability	
Rated current (permitted continuous load)	10 A
Fusing, secondary	automatic circuit-breaker B 10 A
Max. conductor cross section of the terminals	2 x 4 mm^2, plus and minus poles are assigned to two terminals each

Mechanical data

Mounting	with 4 screws M5
Mechanical dimensions	
Mounting base	232 x 175 mm, see Fig. 5.10-2, Drilling pattern
Height (depth if mounted on rear panel)	125 mm
Weight	6 kg
Cooling	The power supply unit must be mounted so that the convection air current is not disturbed.
Ambient temperature	max. 55 °C (with 100 % load)
Standards, regulations	VDE 0160, transformer according to VDE 0551

Ordering data

Order number	07 NG 35 R1	GJV3 0756 03 R1

5.11 Power Supply Unit 07 NG 36 R1

primary voltage: 230/400 V 3-phase AC, secondary voltage: 24 V DC, 20 A

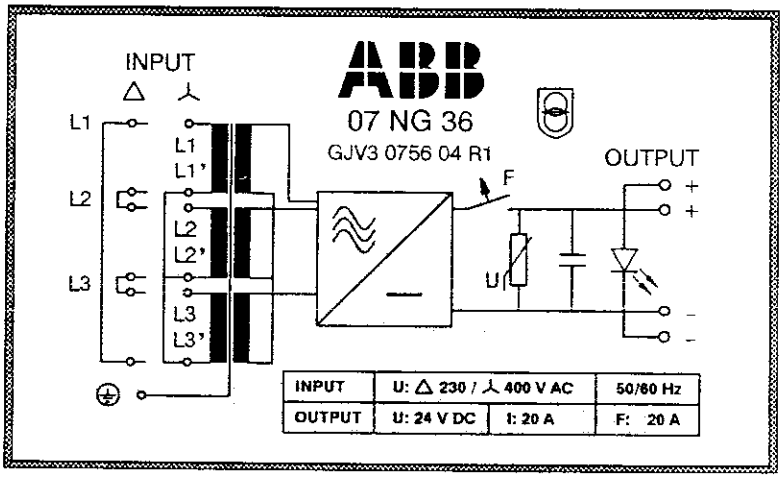
The 07 NG 36 power supply unit generates a 24 V DC voltage from a three-phase mains voltage of 230 V AC or 400 V AC. The output voltage is gained by using a 3-phase bridge-connected rectifier. Together with a filter capacitor, this guarantees a small ripple content of the voltage. The power supply unit has a load capability of 20 A. It is suitable for applications in electronic control systems. A green LED indicates that the 24 V DC is present.

The secondary voltage is protected by a built-in B-type automatic circuit-breaker. The primary voltage (mains) has to be protected by external fuses.

The electrical connections are made over screw-type terminals. With 3-phase mains voltage of 230 V, the primary windings of the transformer are delta-connected, with 3-phase mains voltage of 400 V, the windings are star-connected (see Fig. 5.11-1). The cables are strain-reliefed by cable ties. There is an electrical isolation between the primary and the secondary voltage according to VDE 0551 (safety electrical isolation).

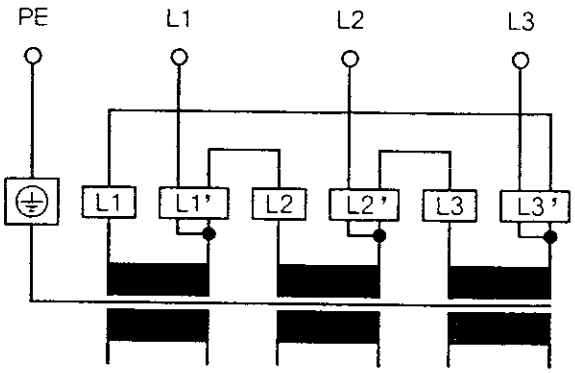
The power supply is fastened by 4 screws M6 (see Fig. 5.11-2, drilling pattern).

The power supply unit must be mounted so that the convection air current is not disturbed.



Configuration set by the factory:

230 V 3-phase AC △



400 V 3-phase AC 人

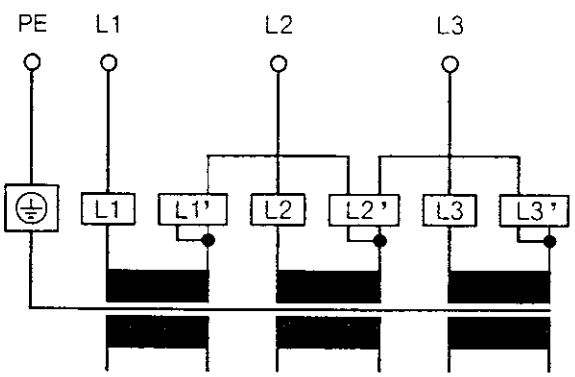
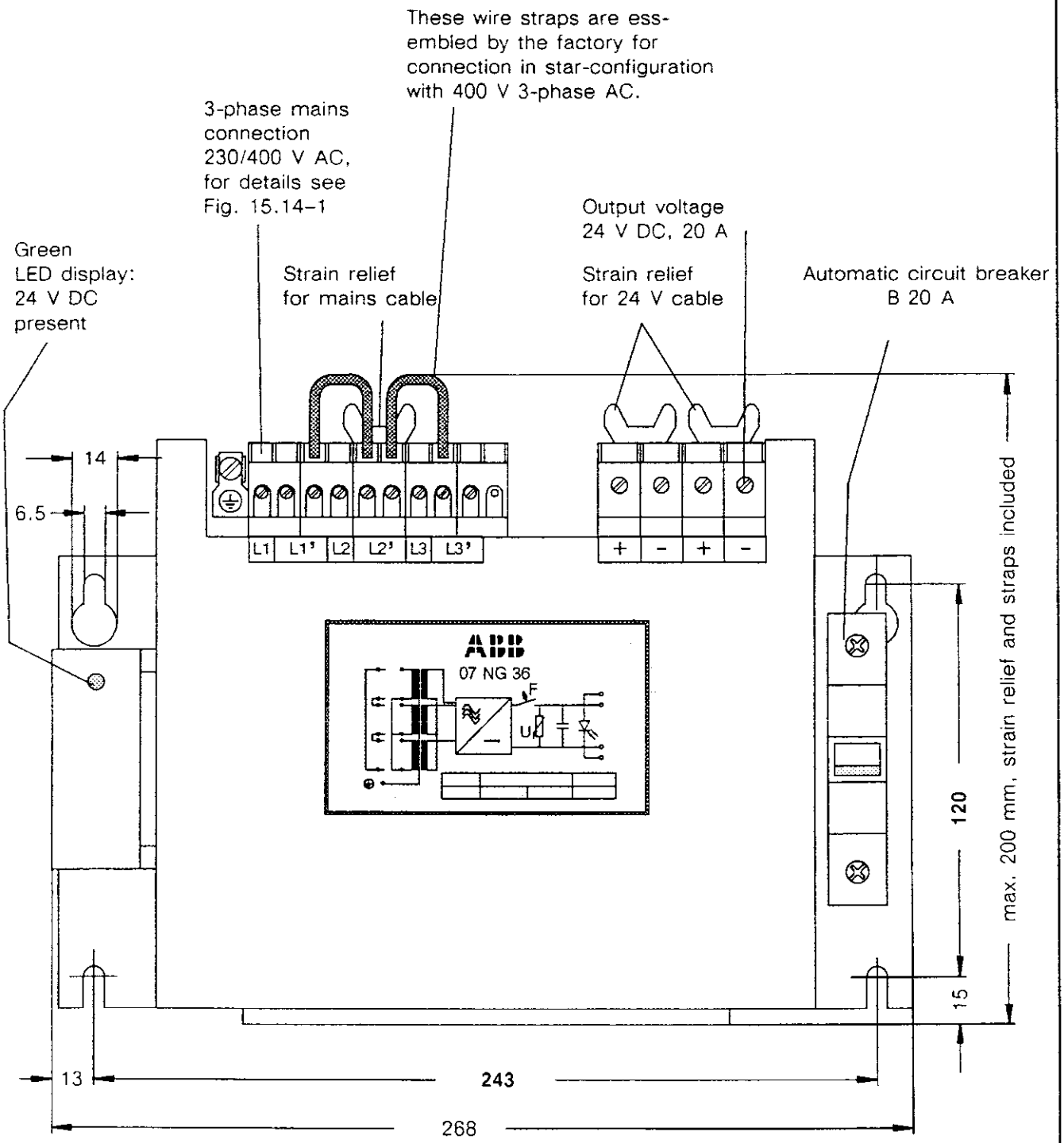


Fig. 5.11-1: Imprinted circuit diagram and terminal diagrams for 230 V and 400 V 3-phase AC



The power supply unit has a height (depth if mounted on rear panel) of ca. 136 mm

Fig. 5.11-2: Drilling pattern and outline dimensions of the power supply unit

Technical data

Electrical data, input specifications

Primary voltage **230 V 3-phase AC**		
Rated voltage		230 V 3-phase AC
Limiting values		207...253 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.35 A
	with rated load	ca. 1.70 A
Fusing	primary	external
Primary voltage **400 V 3-phase AC**		
Rated voltage		400 V 3-phase AC
Limiting values		360...440 V AC
Mains frequency		50 or 60 Hz
Current consumption	with no load	ca. 0.25 A
	with rated load	ca. 1.00 A
Fusing	primary	external
Max. conductor cross section of the terminals		2 x 1.5 mm^2

Electrical data, output specifications

Secondary voltage (output voltage)	
Rated voltage	24 V DC
Limiting values	19.2...30 V DC
Max. ripple content	≤ 2 %
Display of the present voltage	with green LED
Output load capability	
Rated current (permitted continuous load)	20 A
Fusing, secondary	automatic circuit-breaker B 20 A
Max. conductor cross section of the terminals	2 x 4 mm^2, plus and minus poles are assigned to two terminals each

Mechanical data

Mounting	with 4 screws M6
Mechanical dimensions	
Mounting base	268 x 200 mm, see Fig. 5.11-2, Drilling pattern
Height (depth if mounted on rear panel)	136 mm
Weight	15 kg
Cooling	The power supply unit must be mounted so that the convection air current is not disturbed.
Ambient temperature	max. 55 °C (with 100 % load)
Standards, regulations	VDE 0160, transformer according to VDE 0551

Ordering data

Order number	07 NG 36 R1	GJV3 0756 04 R1

6.1 Dimensions of Basic Configuration and Extension Modules

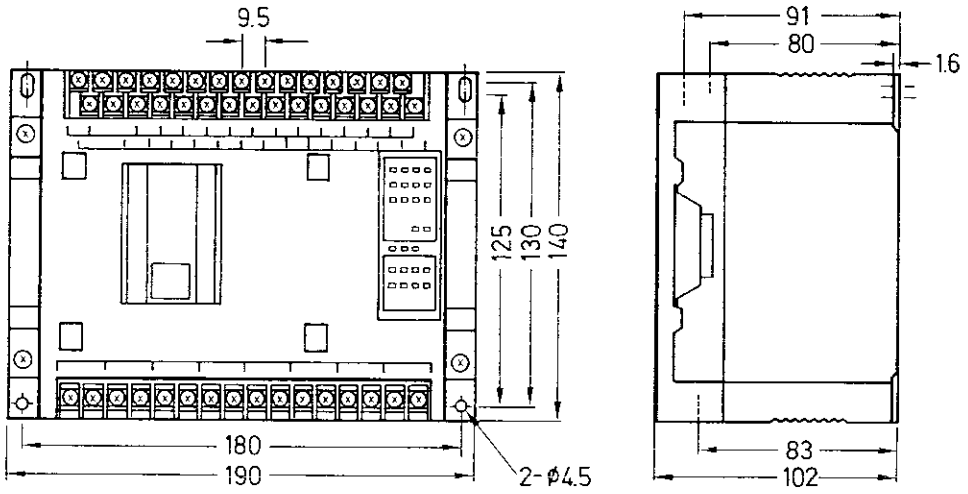


Fig. 6.1: 07 KR 220, 07 KR 228 and 07 KT 228

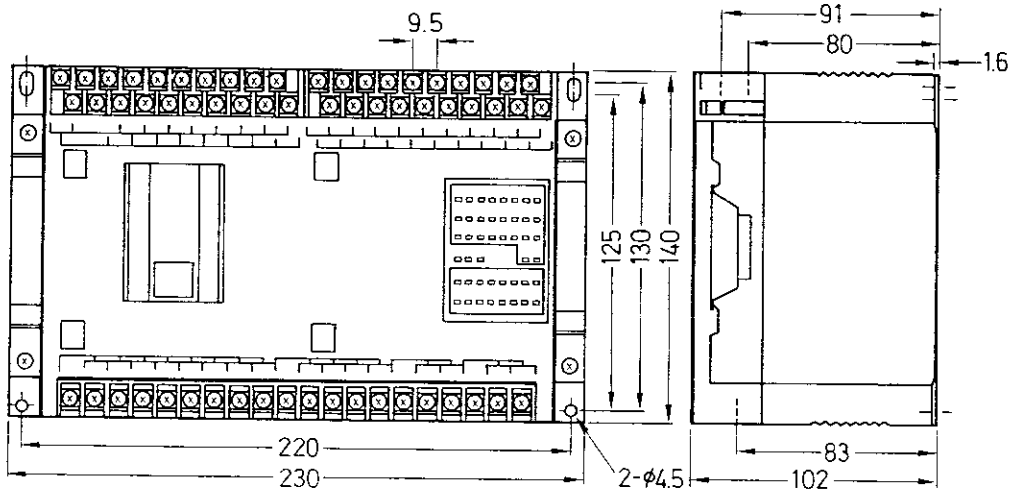


Figure 6.2: 07 KR 240, 07 KT 240 and 07 EA 240

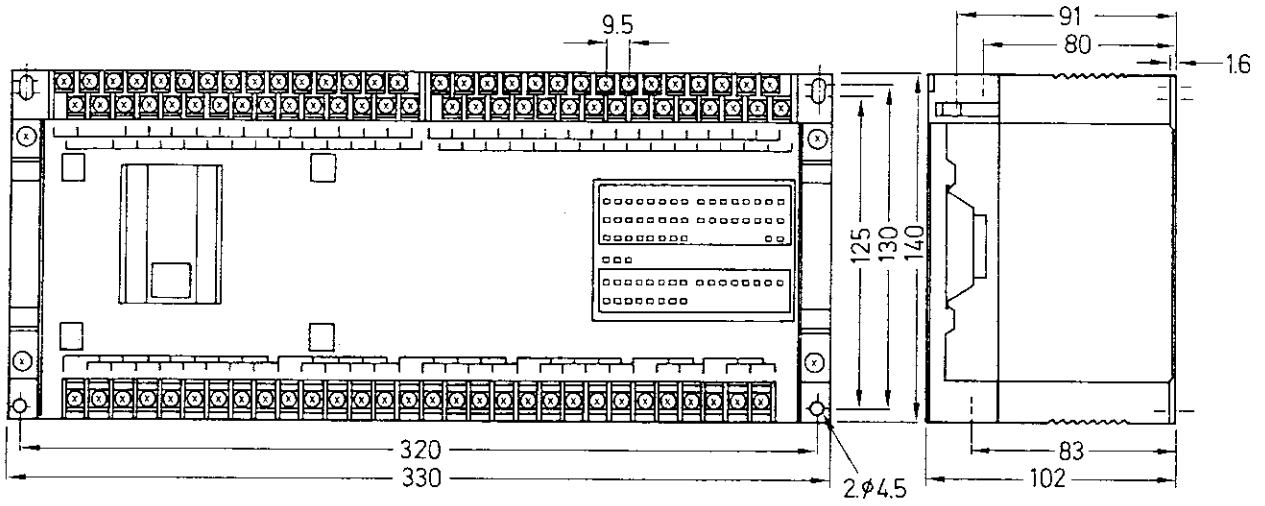


Fig. 6.3: 07 KR 264 and 07 EA 264

6.2 Dimensions of the Input/Output Modules

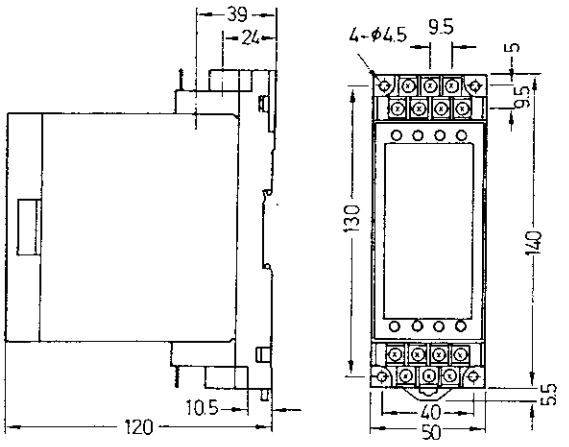


Fig. 6.4: 07 EB 200, 07 EB 205, 07 AB 200 and 07 AB 205

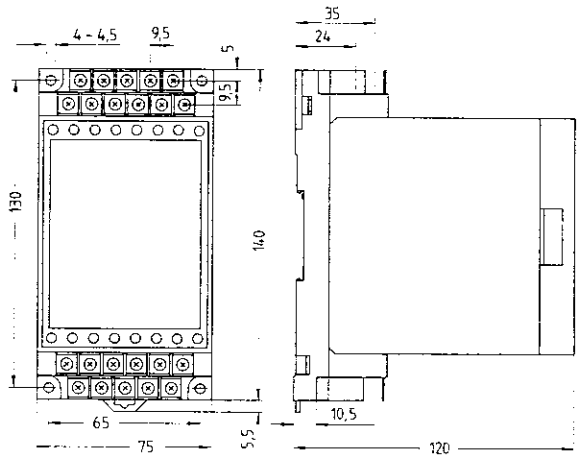


Fig. 6.5: 07 EA 200 und 07 AA 200

6.3 Dimensions of the programming units

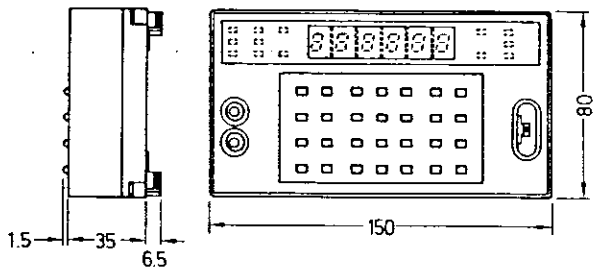


Fig. 6.6: 07 PG 200 small programming unit

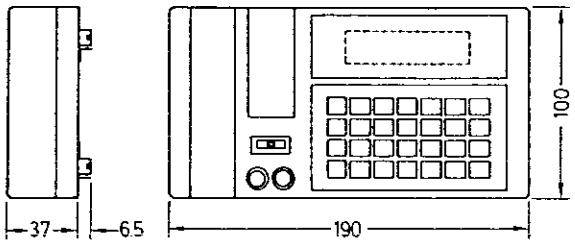


Fig. 6.7: 07 PG 201 universal programming unit

7 Installation and wiring of the system

7.1 Voltage supply (mains)

Supply voltage with the following data are necessary for the various system configurations:

Number of I/Os Features	20	28	40	64	92	104	128
Supply voltage	170 V AC 264 V AC 50 - 60 Hz						
Capacity (VA)	max. 30	max. 35	max. 40	max. 45	max. 75	max. 80	max. 85
Rush current, peak value (A)	3	3.5	4	4.5	7.4	8	8.5

Supply voltage dropouts less than 20 ms have no effects on the system.
Supply voltage dropouts greater than 60 ms stop a system which is running (RUN contact open). When the supply voltage returns, the system must be restarted with a new start pulse.
All unbuffered flags are returned to the off state, but the buffered flags retain their existing state.

7.2 Voltage supplies for inputs/outputs

7.2.1 DC voltage supply (24 V DC)

This is not required for the basic configurations 07 KR 228 to 07 KR 264. The 24 V DC/0.4 A power supply unit is in each case integrated. If, however, the input modules 07 EB 200 are also used, then an external supply voltage is necessary if there are more than 40 inputs (24 V DC in accordance with system data).
Please note that each input has a capacity of 10 mA.

7.2.2 AC voltage supply (115/230 V AC)

The system does not contain a supply voltage for the input module 07 EB 205. If this module is used, an AC supply voltage should be provided which complies with the system data.

7.2.3 Voltage supplies of the outputs

Please provide a power supply unit which complies with the system data.

Caution: If external power supply units are used, care must be taken that the 0 V terminals of the ABB Procontic K200 and the power supply unit are connected together.

7.3 Ambient conditions

Please select a location in which the following conditions are guaranteed:

a. Ambient temperatures - 0°...+ 55° C

b. The temperature should not vary widely, as this can cause condensation

c. The environment should be free of corrosive and flammable gases. It should also be free of conductive dust or air containing iron

d. Relative humitiy from 30 % to 90 %, without condensation

e. The PLC should not be exposed to direct sunlight.

7.4 Installation of the system

Please install the PLC on the basis of the following points:

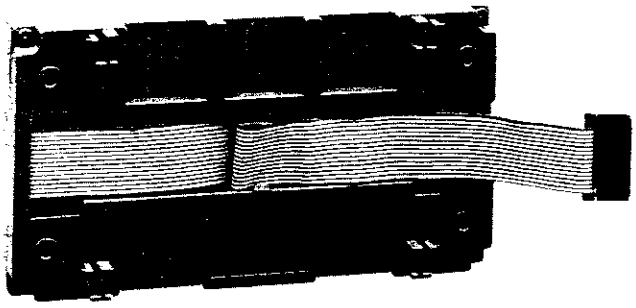
a. Ensure that there is sufficient ventilation space.

b. Do not install the PLC above devices which generate large amounts of heat.

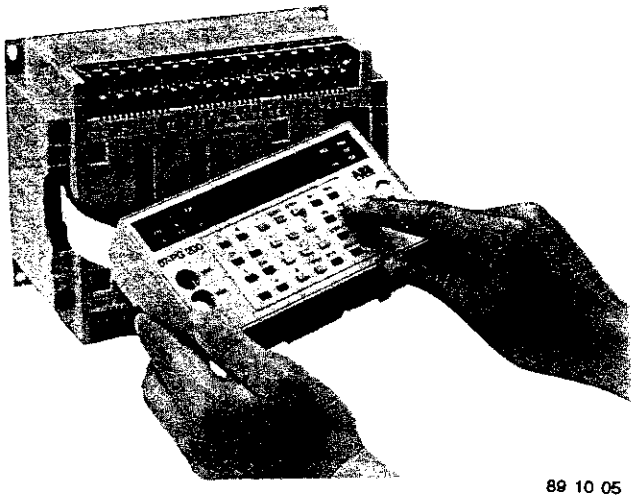
c. Keep the system sufficiently far (greater than 200 mm) from interference sources and power current lines.

7.5 Mounting the programming unit 07 PG 200 or 07 PG 201 resp.

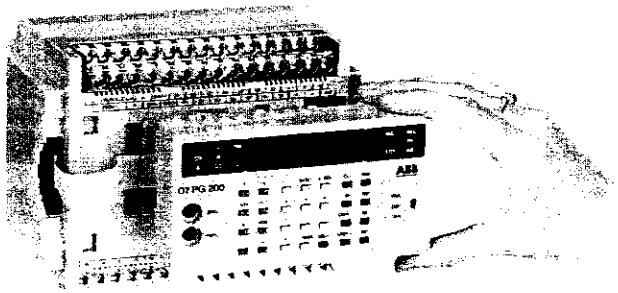
The programming unit 07 PG 200 or 07 PG 201 resp. can be snapped onto the basic units, held in the hand, or mounted on the front panel (please refer to the figures).



86 14 16



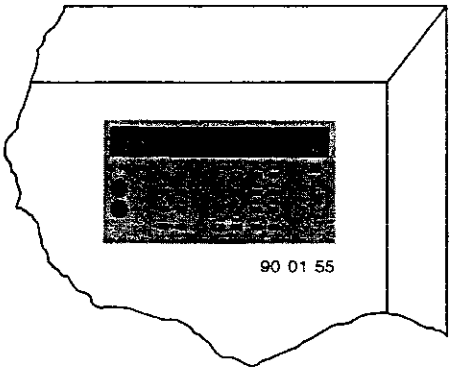
89 10 05



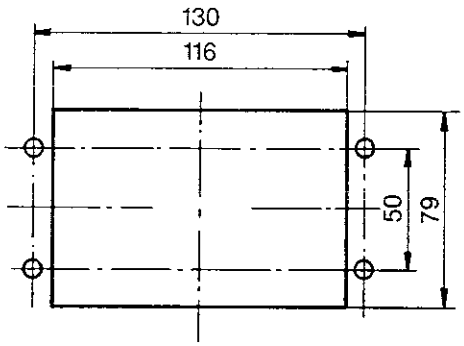
90 01 44

a. The flat connection cable is 250 mm long and is plugged into the left side of the basic units 07 KR 220 to 07 KR 264.

b) For mounting on the front panel of a cabinet, the following holes must be drilled:



90 01 55



M4 Taptite screws (self–cutting) are required

7.6 Wiring the 230 V AC supply voltage and system grounding

a. If the mains voltage is subject to major spikes, an isolation transformer should be used.

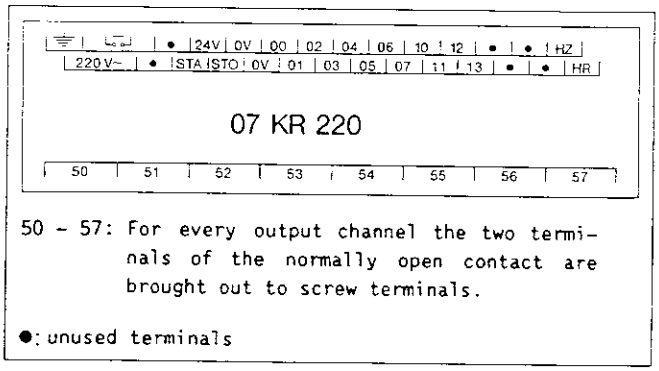
b. The connecting wires for the mains voltage should be thicker than 1.5 mm^2 and flexible, in order to reduce voltage losses.

c. Connect the ground terminal of the ABB Procontic K200 to the ground terminal of your cabinet with a flexible wire greater than 1.5 mm^2. Ensure that all modules are grounded in order to guarantee good EMC compatibility.

d. The grounding wire should not be longer than 20 m.

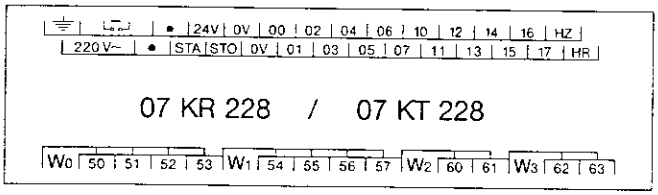
e. Each component of the ABB Procontic K200 system should be at least 200 mm in all directions from devices which generates magnetic fields (e. g. solenoid valves, contactors, etc.).

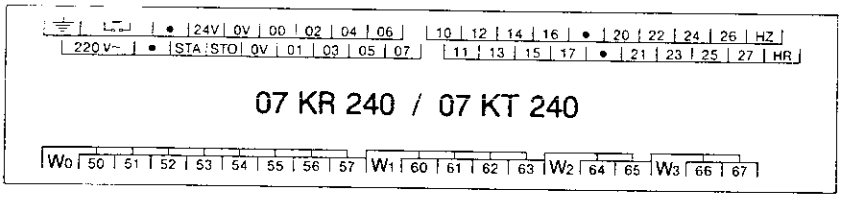
7.7 Terminal Assignment of System PROCONTIC K200

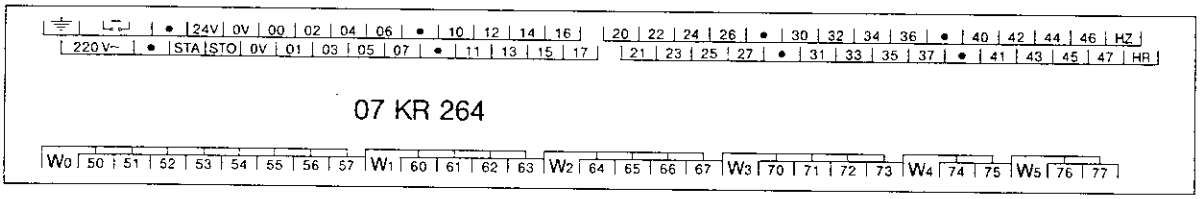


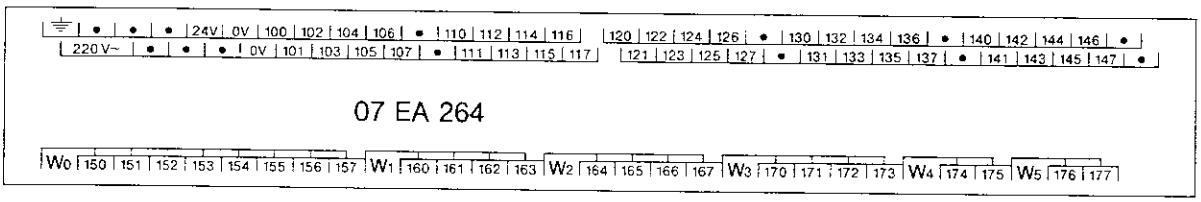
50 - 57: For every output channel the two terminals of the normally open contact are brought out to screw terminals.

●: unused terminals









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