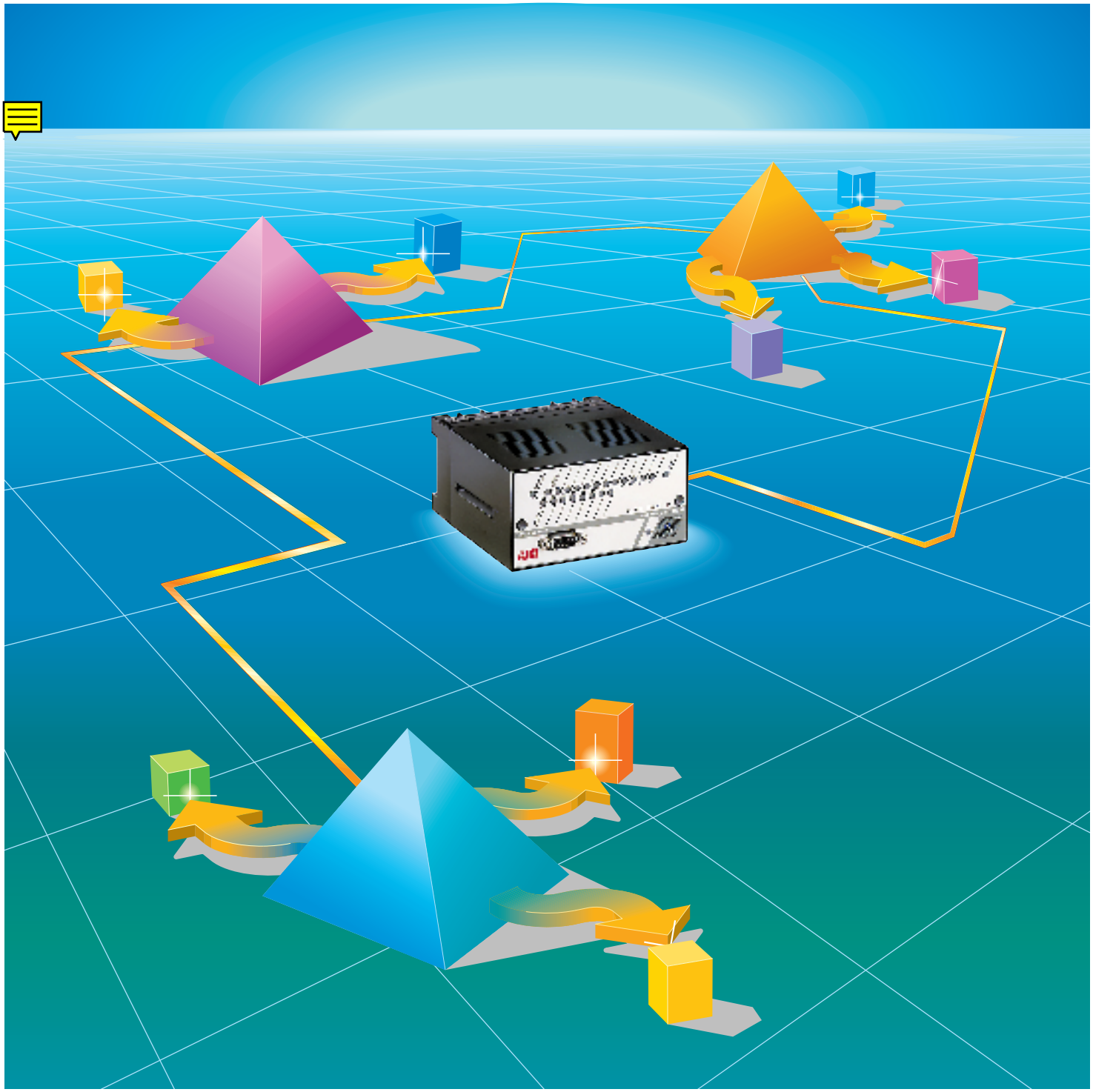
ABB Procontic CS 31

Intelligent decentralized automation system

FPTN 440 004 R2001 - d



2.7 ABB Procontic CS 31 equipment

Central processing units - CPU

Type	Description	Order code
07 KR 31	CPU - 2 K word user memory (EEPROM), twelve 24 VDC inputs Eight 2A relay outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PI data handling, etc... Master/Slave MODBUS built-in	
	24 VDC power supply	**FPR 360 0227 R1202**
	120 VAC power supply	**FPR 360 0227 R0204**
	230 VAC power supply	**FPR 360 0227 R0206**
07 KT 31	CPU - 2 K word user program (EEPROM), twelve 24 VDC inputs Eight 24 VDC/0.5A transistor outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PI data handling, etc... Master/Slave MODBUS built-in	
	24 VDC power supply	**FPR 360 0228 R1202**
	120 VAC power supply	**FPR 360 0228 R0204**
	230 VAC power supply	**FPR 360 0228 R0206**
07 KR 91	CPU - 7 K FLASH EPROM, twenty 24 VDC inputs Twelve 2A relay outputs Programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PID data handling, etc...	
	24 VDC power supply	**GJR 525 0000 R0252**
	120 or 230 VAC power supply	**GJR 525 0000 R0202**
07 KT 92	CPU - 14 K FLASH EPROM, twelve 24 VDC inputs Eight 24 VDC/ 0.5A transistor outputs 4 analogue inputs 12 bits resolution 2 analogue output 12 bits resolution 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 50 kHz high order functions PID data handling, etc...	
	24 VDC power supply	**GJR 525 0500 R0202**
07 KT 92	CPU - 14 K FLASH EPROM, twelve 24 VDC inputs Eight 24 VDC/ 0.5A transistor outputs 4 analogue inputs 12 bits resolution 2 analogue output 12 bits resolution 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 50 kHz high order functions PID data handling, etc... ARCNET built-in	
	24 VDC power supply	**GJR 525 0500 R0262**

Central processing units - CPU (cont.)

Type	Description	Order code
07 KT 93	CPU - 14 K flash EPROM, twenty four 24 VDC inputs Sixteen 24 VDC/ 0.5A transistor outputs 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PID data handling, etc... 24 VDC power supply	**GJR 525 1300 R0101**
07 KT 93	CPU - 14 K flash EPROM, twenty four 24 VDC inputs Sixteen 24 VDC/ 0.5A transistor outputs 2 programmable RS 232 port RS 485 system bus real time clock high speed counter 10 kHz high order functions PID data handling, etc... ARCNET built-in 24 VDC power supply	**GJR 525 1300 R0171**

Plug-in base

Type	Description	Order code
ECZ	Plug-in base for I/O units 07 KR 31/07 KT 31 DIN rail or screw fixing	**FPR 370 0001 R0001**

Analogue input units

Type	Description	Order code
ICSE 08 A6	Eight analogue inputs 0 ...+ 10V, 0 ...20mA, 4 ...20mA 8 bits resolution	
	24 VDC power supply	**FPR 334 5601 R1012**
	120 VAC power supply	**FPR 334 5601 R0014**
	230 VAC power supply	**FPR 334 5601 R0016**
ICST 08 A8	Eight analogue inputs PT100 8 bits resolution range of temperature : -50 °C ... +150 °C (-58 °F ... +302 °F)	
	24 VDC power supply	**FPR 333 5801 R1012**
	120 VAC power supply	**FPR 333 5801 R0014**
	230 VAC power supply	**FPR 333 5801 R0016**
ICST 08 A9	Eight analogue inputs PT100 8 bits resolution range of temperature : 0 °C ... +300 °C (-32 °F ... +572 °F)	
	24 VDC power supply	**FPR 333 5901 R1012**
	120 VAC power supply	**FPR 333 5901 R0014**
	230 VAC power supply	**FPR 333 5901 R0016**
ICSE 08 B5	Eight analogue inputs -10V ...+10V, -20 ...+20mA, 4 ...20mA 12 bits resolution	
	24 VDC power supply	**FPR 334 6501 R1012**
	120 VAC power supply	**FPR 334 6501 R0014**
	230 VAC power supply	**FPR 334 6501 R0016**
ICDT 08 B5	Eight analogue inputs -10V ...+10 V, -5 ...+5 V, -500... + 500 mV, -50 ...+50 mV 0...20 mA, 4 ...20 mA 12 bits resolution configurable for temperature sensors or as voltage inputs	
	24 VDC power supply	**GJR 525 1666 R1001**

Analogue output unit

ICSA 04 B5	Four analogue outputs -10V ...+10V, 0 ...+20mA, 4 ...20mA 12 bits resolution	
	24 VDC power supply	**FPR 334 1501 R1042**
	120 VAC power supply	**FPR 334 1501 R0044**
	230 VAC power supply	**FPR 334 1501 R0046**

Analogue input/output units

ICSM 06 A6	Input/output unit, four inputs for 0 ...+ 10V, 0...20mA, 4...20mA signals 8 bits resolution, non-isolated two outputs for -10V ...+10V, 0...20mA, 4 ...20mA signals 8 bits resolution, non-isolated	
	24 VDC power supply	**FPR 335 0601 R1062**
	120 VAC power supply	**FPR 335 0601 R0064**
	230 VAC power supply	**FPR 335 0601 R0066**

2 Central unit 07 KT 92

Central unit with max. 56 kB user program + 30 kB user data

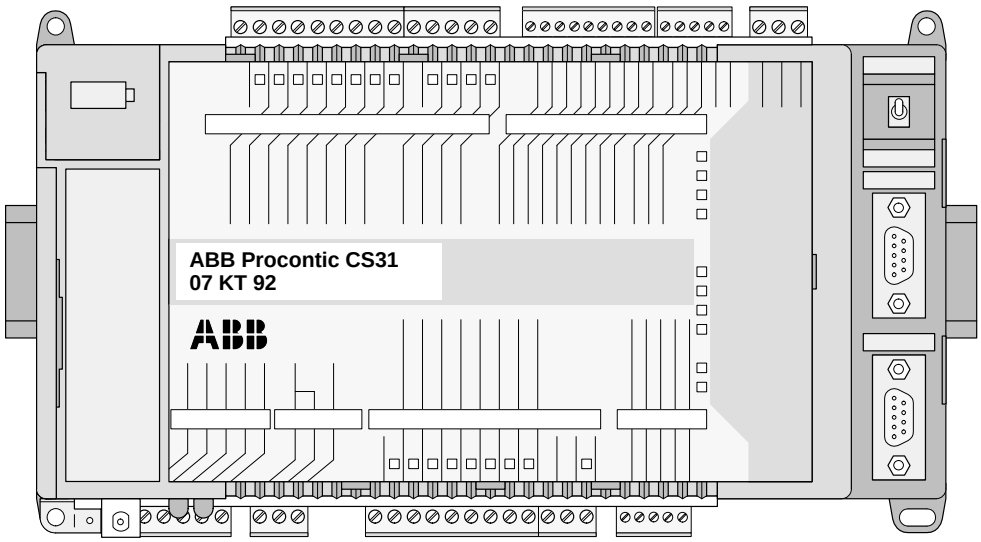


Fig. 2–1: Central unit 07 KT 92

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2.1 Brief description

The central unit 07 KT 92 works either as

- bus master in the decentralized automation system ABB Procontic CS31 or as
- slave (remote processor) in the decentralized automation system ABB Procontic CS31 or as
- stand–alone central unit.

The device has a 24 V DC power supply voltage. It is provided with an additional interface for connecting communication modules (e.g. 07 KP 90).

The central unit 07 KT 92 **R262** is equipped with **an integrated ARCnet coupler** (and an ARCnet interface).

2.1.1 Main features

- 12 binary inputs
- 8 binary transistor outputs
- 4 analog inputs
- 2 analog outputs
- 1 counting input for counting frequencies up to 50 kHz
- 1 CS31 system bus interface for system expansion
- Serial interface COM1
  – is set as programming interface
  – can be set as an ASCII interface for connecting peripheral devices (e.g. MMC devices)
- Serial interface COM2 as an MMC interface
- Real–time clock
- LEDs for displaying the binary input and output signals as well as operating conditions and error messages
- Detachable screw–type terminal blocks
- Detachable plastic sheet on the front side of the device; can be labelled with the signal names in order to have the inputs and outputs directly assigned
- Fastening by screws or by snapping the device onto a DIN rail
- The lithium battery 07 LE 90 can be put into the battery compartment in order to
  – store and back-up the user program in the RAM
  – store and back-up data which is additionally contained in the RAM, e.g. the status of flags
  – back-up the time and date (real–time clock)
- RUN/STOP switch for starting and aborting the program execution
- Extensive diagnosis functions
  – Self–diagnosis of the central unit
  – Diagnosis of the ABB Procontic CS31 system bus and the connected modules

2.1.2 Project planning / start–up

The following has to be observed for project planning and start–up:

- Programming
  is performed using ABB Procontic programming software, which can be run on commercially available IBM compatible PCs (see documentation for the programming system 907 PC 331)
- Diagnosis and service device TCZ (terminal mode) (see volume 7.3, see chapter A5 (Appendix), Programming and test, see 2.3.14 Serial interface COM1)
- The processor processes the user program contained in the RAM. It is loaded into the RAM via the serial interface COM1 and can also be changed there. An additional save command is used to save the program in the Flash EPROM.

  Note: In the course of the following operations

  – Power 'ON'
  – RUN/STOP switch from STOP —> RUN
  – Program start-up with programming system
  – Cold start of the PLC

  the RAM is overwritten by the contents of the Flash EPROM, if a user program is contained in the Flash EPROM.

Important note:

If a PLC is used with an ARCnet interface, a certain section of the PLC TURBO program memory No. 2 is reserved for ARCnet.

If programs with more than 2 k instructions are executed, the system-dependent capacity utilization can possibly be increased by reason of the reduced TURBO memory No. 2 when *changes* are made *to a running program.*

There are *no* problems, if
– the capacity utilization is less than 80 % *before* making changes to a running program or if
– the program length is less than 2 k instructions.

- On-line program modification
  The two existing RAMs allow a quick modification of the user program to be performed without interrupting the operation (see ABB programming system 907 PC 331).
- Change-over between the application modes
  – Stand–alone central unit
  – Bus master central unit and
  – Slave central unit

The central unit is set to ”Stand-alone” upon delivery. Changing the application mode is carried out in the following three steps:

1. Change the system constant KW 00,00 in the PLC, see chapter A7.3 (Appendix), System constants
2. Save the user program in the Flash EPROM
3. Activate new application mode by:
   – calling up the menu item of ”Enable PLC mode” in the ABB programming and test system or
   – performing a warm start or
   – performing a cold start.

- Setting the cycle time
  see chapter A1 (Appendix), Processing times
- Addressing when remote modules are connected
  see chapter A2 (Appendix), Addressing
- Back-up of data areas
  Back-up of data areas, i.e. saving of data during power OFF/ON, is only feasible with built-in battery. The following data can be backed, completely or partly:
  – Binary flags
  – Word flags
  – Double word flags
  – Step chains
  – Historical values

  In order to back-up certain data, they have to be excluded from initialization to 0.

- Initialization of data areas
  During *program start,* that data areas are initialized to 0 partly or completely, that are defined by system constants, see chapter A7.3 (Appendix), System constants.

  If no battery is effective or if the system constants are in their default values (factory settings), all of the above mentioned data areas are completely set to 0 after power OFF/ON.

- Reactions on errors of error class 3
  The user can configure whether or not the user program is to be aborted automatically, if an class 3 error occurs, see chapter A7.3 (Appendix), System constants.

- Starting-up the CS31 system after power ON

  The user can enter a number of *n* remote modules in KW 00,09. The user program starts only, i.e. it handles process inputs and outputs only, if at least *n* remote modules have been adopted into the CS31 system bus cycle, see chapter A7.3 (Appendix), System constants.

2.2 Structure of the front panel

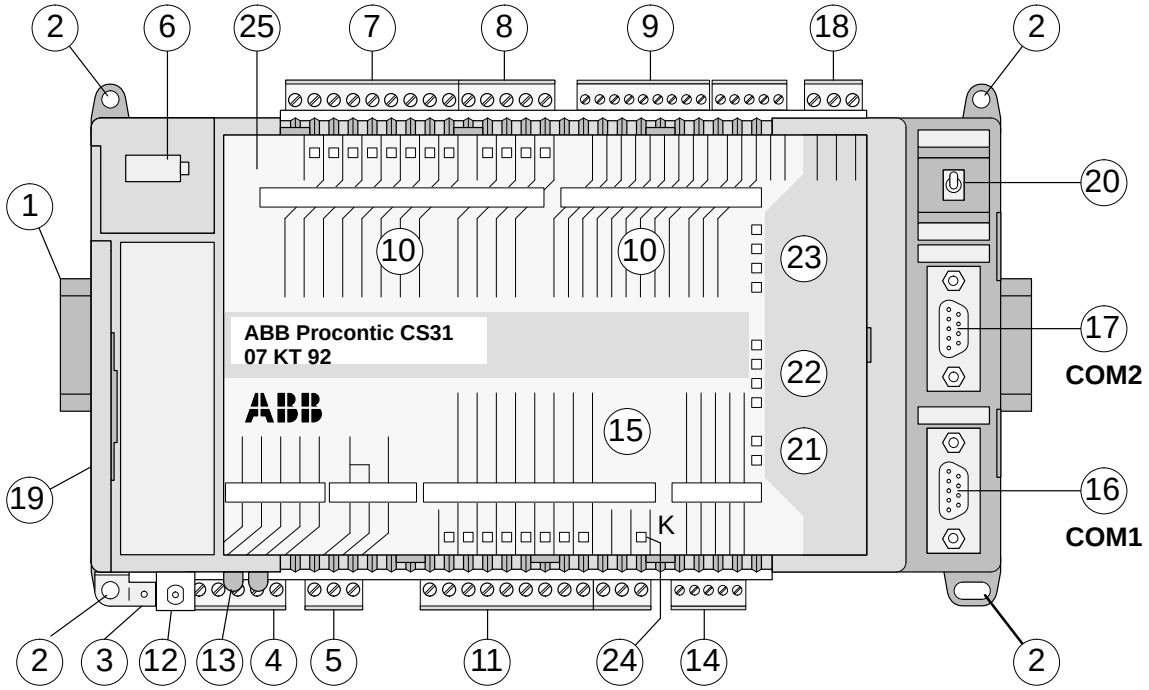


Fig. 2–2: Central unit 07 KT 92 with reference points

(1) Fastening of the device on DIN rail
(2) Fastening of the device by screws
(3) Faston earthing terminal 6.3 mm
(4) Supply voltage connection 24 V DC
(5) 24 V output voltage for input supply
(6) Battery compartment
(7) – (8) 12 binary inputs in two groups
(9) 4 analog inputs in one group
(10) Assignment of the identifiers for the inputs
(11) 8 binary transistor outputs in one group
(12) ARCnet BNC connector (version R262 only)
(13) 2 LEDs for ARCnet operation (version R262)
(14) 2 analog outputs ±10 V
(15) Assignment of the identifiers for the outputs
(16) Serial interface COM1 (programming, MMC)
(17) Serial interface COM2 (MMC)
(18) Connection for ABB Procontic CS31 system bus
(19) Cover of the interface for the connection of communication modules (may only be removed for connecting communication modules)
(20) Switch for RUN/STOP operation
(21) LEDs for supply voltage and battery
(22) LEDs for RUN and error class
(–) LEDs for CS31 system bus
(.) LED for overload/short-circuit (LED K)

(0) Plastic sheet (detachable for labelling)1

(23)

green	**BA**	Bus active
red	**BE**	Bus error
red	**RE**	Remote unit error
red	**SE**	Serial unit error

(22)

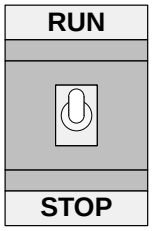
green	**RUN**	User program is running
red	**FK1**	Fatal error
red	**FK2**	Serious error
red	**FK3**	Light error

(21)

green	**Supply**	Supply voltage available
red	**Battery**	Battery not effective

For further information see chapter A4.3 (App.) Troubleshooting by means of LED displays on the central unit

(20)



The RUN/STOP switch is used to start or abort the processing of the user program.

2.2.1 Terminal assignment overview

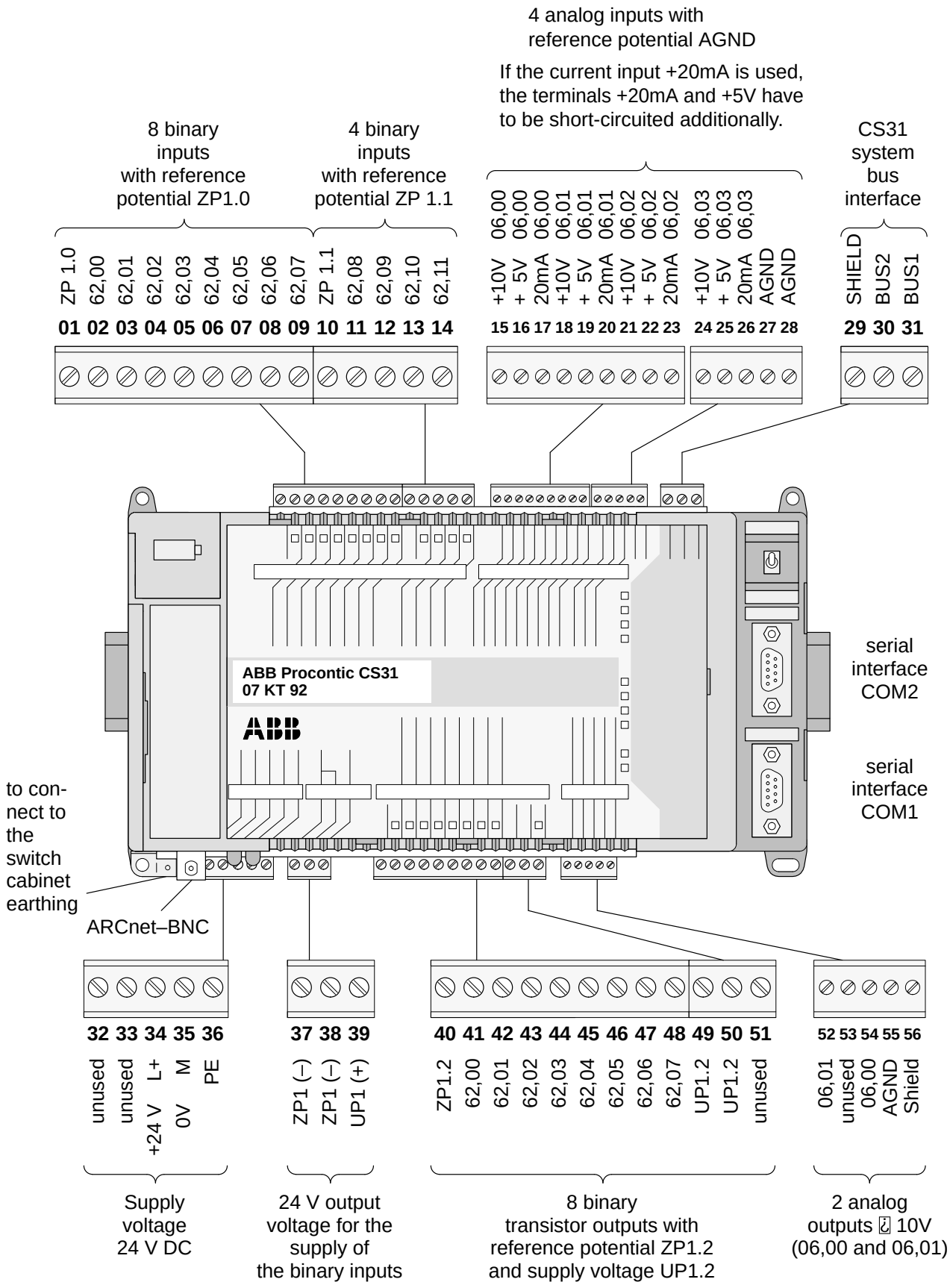


Fig. 2–2a: Central unit 07 KT 92, terminal assignment

2.3 Electrical connection

2.3.1 Application examples for input and output wiring

The following illustration shows an application example in which different possibilities for wiring inputs and outputs are used.

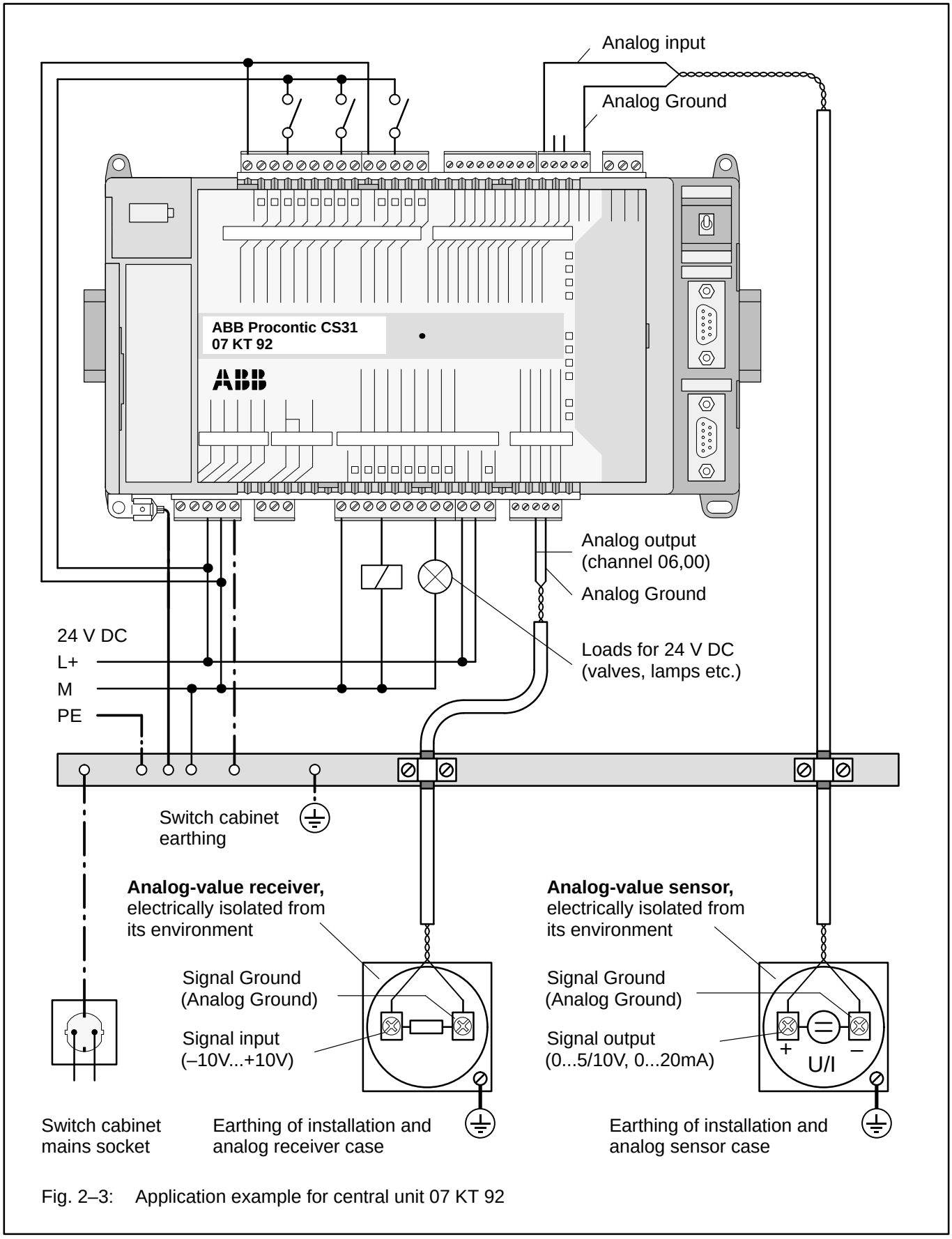


Fig. 2–3: Application example for central unit 07 KT 92

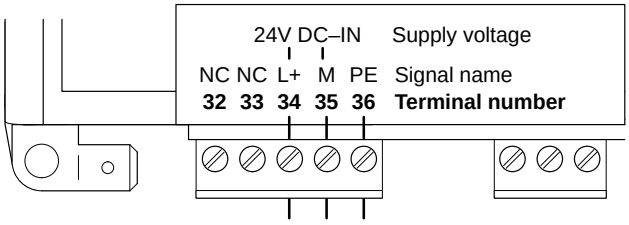
Please observe in particular:

- The earthing measures
- The handling of the electrically isolated input groups
- The handling of the electrically isolated output group
- The connection of analog-value receiver and analog-value sensor
- The earthing of the switch cabinet mains socket

2.3.2 Connecting the supply voltage

The 24 V DC supply voltage is connected via a 5-pole detachable terminal block.

Attention: Plug and unplug terminal block only with power is off!



Terminal assignment:

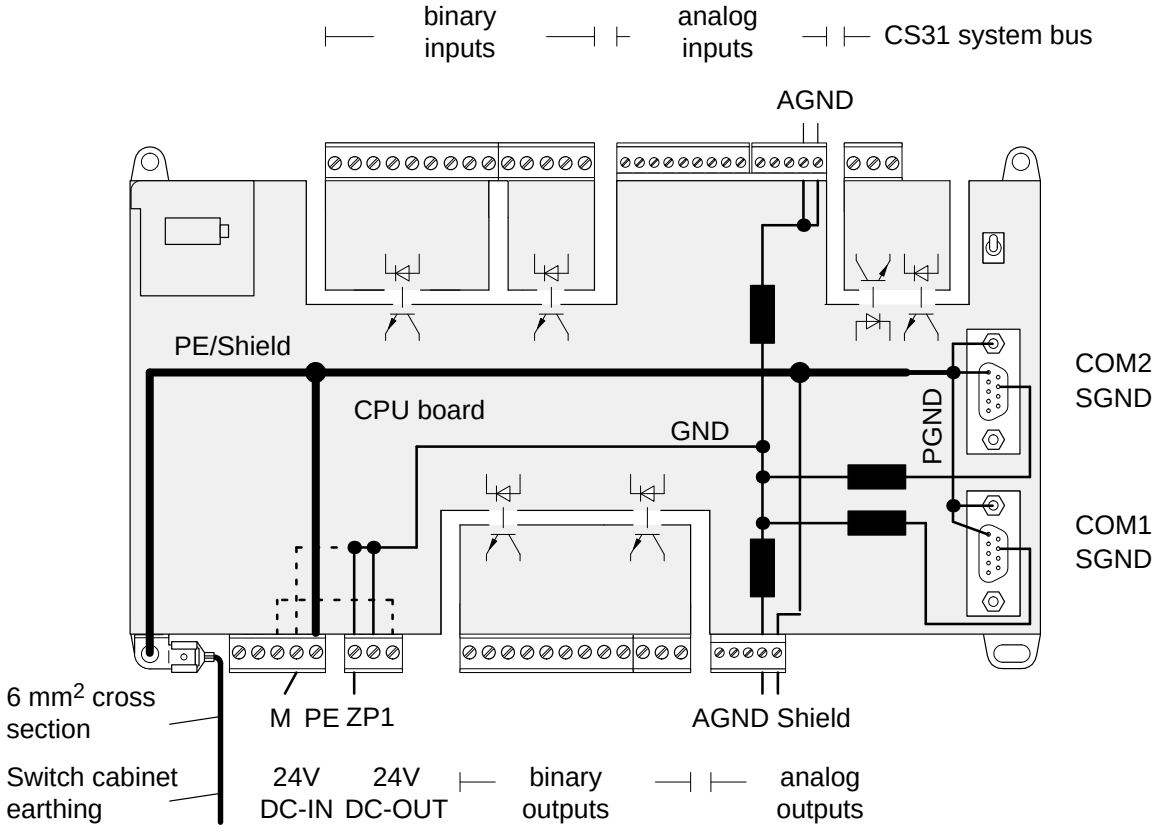
32	NC	This terminal is not used. (NC = Not connected)
33	NC	This terminal is not used. (NC = Not connected)
34	L+	Supply voltage + 24 V DC
35	M	Reference potential (0V)
36	PE	Protective Earth terminal, connected with the Faston terminal inside the device. Do not cause earth loops! Connect PE and Faston to the same earthing potential!

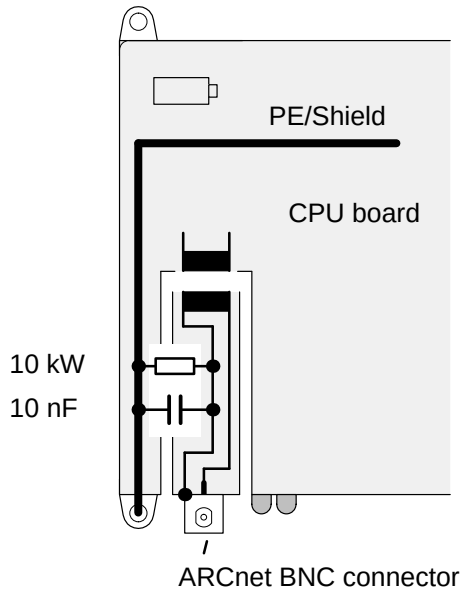
Fig. 2–4: Assignment of the terminal block for the *24 V DC–IN* supply voltage

2.3.3 Electrical isolation and notes on earthing

The following illustration shows the parts of the device's circuit which are electrically isolated from each other as well as the internal connections which exist. Both the creepage distances and clearances as well as the test voltages used correspond to DIN/VDE 0160.

The 6.3 mm Faston terminal in the lower left corner has to be connected directly and on the shortest possible way to the switch cabinet earthing using a wire with a cross section of 6 mm^2 in order to ensure safe earthing and as an EMC measure.





Electrical isolation of the ARCnet interface (07 KT 92 **R262** only)

Fig. 2–5: Electrical isolation and connections inside the central unit 07 KT 92

2.3.4 ARCnet interface,
see also chapter A8 (Appendix)

- The ARCnet coupler is integrated in the central unit 07 KT 92 **R262**. The DIL switch for setting the ARCnet address is accessible through the cutout of the external networking interface.

- The ARCnet coupler is supplied from the internal 24 V DC power supply.

Important note:
If a PLC is used with an ARCnet interface, a certain section of the PLC TURBO program memory No. 2 is reserved for ARCnet.
If programs with more than 2 k instructions are executed, the system-dependent capacity utilization can possibly be increased by reason of the reduced TURBO memory No. 2 when *changes* are made *to a running program.*
There are *no* problems, if

- the capacity utilization is less than 80 % *before* making changes to a running program or if
- the program length is less than 2 k instructions.

- The function blocks AINIT, ASEND, AREC and APOLL are available for the ARCnet coupling.

- The data packages are read from the ARCnet controller interrupt-controlled. The interrupt routine stores the data package in the storage buffer. The APOLL block serves for the sending direction. It transfers data packages from the storage buffer to the ARCnet controller for sending them off.

- The ARCnet coupler interface is designed as a bus with BNC connector for coaxial cable. The ARCnet bus is earthed inside the module via a capacitor. As an EMC measure and for protection against dangerous contact voltages, the bus has to be earthed directly at a central place.

- Using the simplest configuration, called Linear ARCnet, a coaxial cable (RG62, 93 W) is layed from station to station and connected with T plugs at all stations. At both ends of the cable, termination resistors with 93 W each have to be installed, for more information see chapter A8.1 (Appendix). In a Linear ARCnet, a maximum of 8 stations is possible at a cable length of 300 m.

- The parallel networking interface is used for the ARCnet coupler inside the module. However, it is still available from outside as an external networking interface. The serial interface module 07 KP 92 can be connected here, for instance.

Setting the ARCnet Node Number (station address) of the central unit

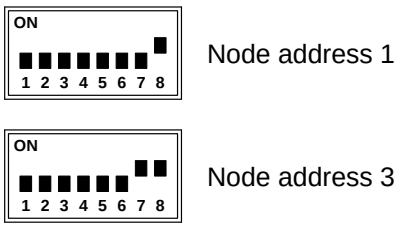
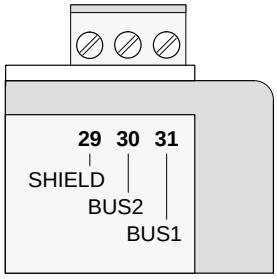


Fig. 2–5a: Setting the ARCnet Node Number (station address) of the central unit 07 KT 92 R262

2.3.5 Connection for ABB Procontic CS31 system bus



Terminal assignment

29 SHIELD
30 BUS2
31 BUS1

Fig. 2–6: Assignment of the ABB Procontic CS31 system bus interface

The connection to the ABB Procontic CS31 system bus is made by means of a 3-pole detachable terminal block. Please observe:

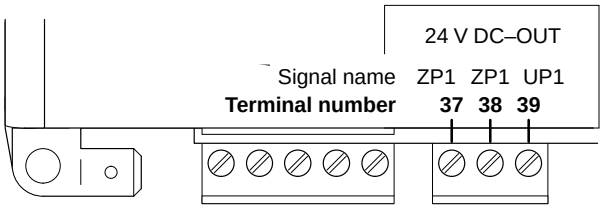
- All of the CS31 devices, no matter whether they are master or slave devices, are connected with the twisted-pair bus line as follows:
  - One core of the bus line is looped through via the BUS1 terminals of all devices to be connected to the CS31 system bus.
  - The other core of the bus line is looped through via the BUS2 terminals of all devices to be connected to the CS31 system bus.
- If the central unit 07 KT 92 is located at the beginning or at the end of the bus line, the bus terminating resistor (120 W) has to be connected additionally between the BUS1 and BUS2 terminals.
- The shield of the twisted-pair bus line is looped through via the SHIELD terminals of all the devices to be connected to the CS31 system bus.
- The handling of the CS31 system bus is described in detail in volume 2, System data.

2.3.6 24 V output voltage for the signal supply of the inputs

The central unit 07 KT 92 provides a separate 24 V DC voltage output for the supply of the 12 binary input signals (for this purpose only).

This 24 V output voltage is used only if an external 24 V DC power supply unit is not available.

The internal 24 V power supply is overload-proof. The 24 V output voltage is ready for operation again approx. 2 minutes after an overload has been eliminated.



Terminal assignment:

37	ZP1	Reference potential (OV), negative pole of the power source
38	ZP1	identical to terminal 37 (internally shorted)
39	UP1	+24 V, positive pole of power source

Fig. 2–7: Assignment of the terminal block for the output voltage

2.3.7 Connection of the binary inputs

The following illustration shows the circuit configuration of the binary inputs of the first group as an example.

Features:

– The 12 binary inputs are arranged in two groups.
– The two groups E 62,00...E 62,07 and E 62,08...E 62,11 are electrically isolated from each other (see Fig. 2–5).
– The inputs use 24 V signals in positive logic (1 ≙ +24 V).

Input signals at the terminals 2 and 3

Terminal 2

– **Use as normal input signal:**

  The signal is available in the user program in the operand E 62,00. The signal delay time is 7 ms.

  The updating of the operand E 62,00 is performed before the start of each program cycle.

– **Use as high-speed input signal:**

  The signal is available in the user program in the operand E 63,14. The signal delay time is 8 ms.

  The updating of the operand E 63,14 is performed before the start of each program cycle.

  In the Dual Port RAM (DPR) this signal is updated after each CS31 bus telegram. With the aid of the function block WOL this signal can be read in the Dual Port RAM (word address C000:1FE$_H$, Bit 14).

– **Use for the high-speed counter:**

  The signal is used as counting input (50 kHz) for the high-speed counter.

Terminal 3

– **Use as normal input signal:**

  The signal is available in the user program in the operand E 62,01. The signal delay time is 7 ms.

  The updating of the operand E 62,01 is performed before the start of each program cycle.

– **Use as high-speed input signal:**

  The signal is available in the user program in the operand E 63,15. The signal delay time is 8 ms.

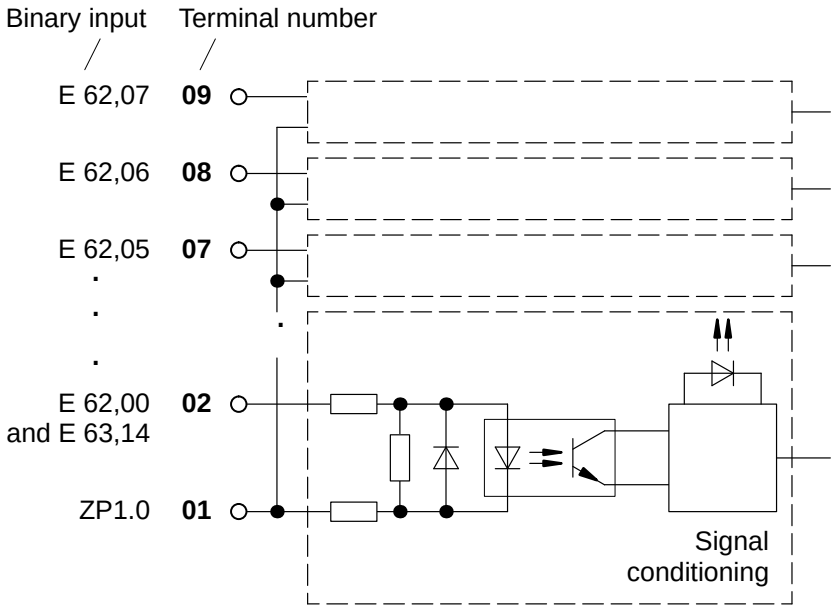
  The updating of the operand E 63,15 is performed before the start of each program cycle.

  In the Dual Port RAM (DPR) this signal is updated after each CS31 bus telegram. With the aid of the function block WOL this signal can be read in the Dual Port RAM (word address C000:1FE$_H$, Bit 15).

– **Use for the high-speed counter:**

  The signal is used as enable input for the high-speed counter.

Circuit configuration of the binary inputs of the first group as an example (E62,00...E 62,07)



The two groups are electrically isolated from each other. ZP1.0 and ZP1.1 are *not* connected with each other internally.

The input signals have a delay time of typ. 7 ms.

Fig. 2–8: Circuit configuration of the binary inputs of the first group as an example

2.3.8 Connection of the analog inputs,

with signal ranges either 0...10 V, 0...5 V or 0...20 mA

The following illustration shows the circuit configuration of the analog inputs of the first channel as an example.

Features:

– The 4 analog inputs are not separated electrically.

– The A/D converter has a resolution of 12 bits.

– The analog inputs are able to evaluate the following signal ranges each as required:

0...10 V	resolution ca. 2.5 mV
0... 5 V	resolution ca. 1.25 mV
0...20 mA	resolution ca. 5 µA

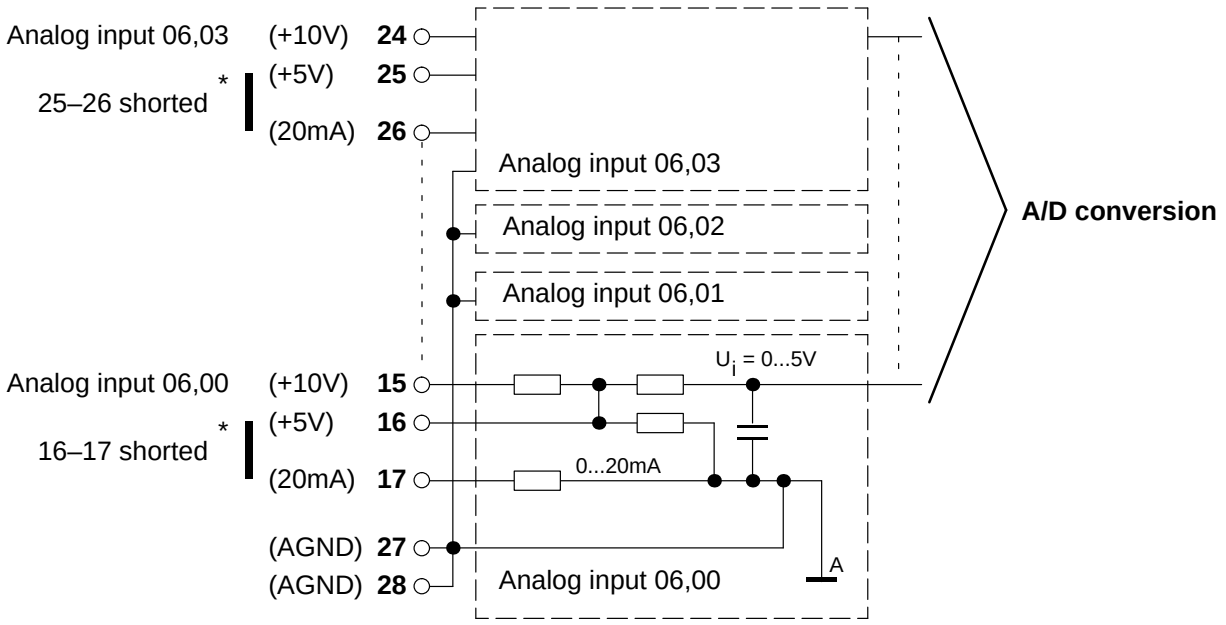
– Resolution in the PLC:
The smallest detectable changes on the analog side (2.5 mV, 1.25 mV, 5 µA) cause the numerical value in the PLC program to be changed by the amount of 8.

– Relationship between the analog value at the analog input and the numerical value in the PLC program:

selected range	numerical values
0...10 V	$0...32760_D$ or $0000...7FF8_H$
0... 5 V	$0...32760_D$ or $0000...7FF8_H$
0...20 mA	$0...32760_D$ or $0000...7FF8_H$

For further information see volume 2, chapter 5.1 General information on using the analog input and output modules.
For 07 KT 92 ”Assignment **b**” is valid.

Circuit configuration of the analog inputs of the first channel as an example



* Connection is required for 20mA operation only

Fig. 2–9: Circuit configuration of the analog inputs

2.3.9 Identifier assignment for binary and analog inputs

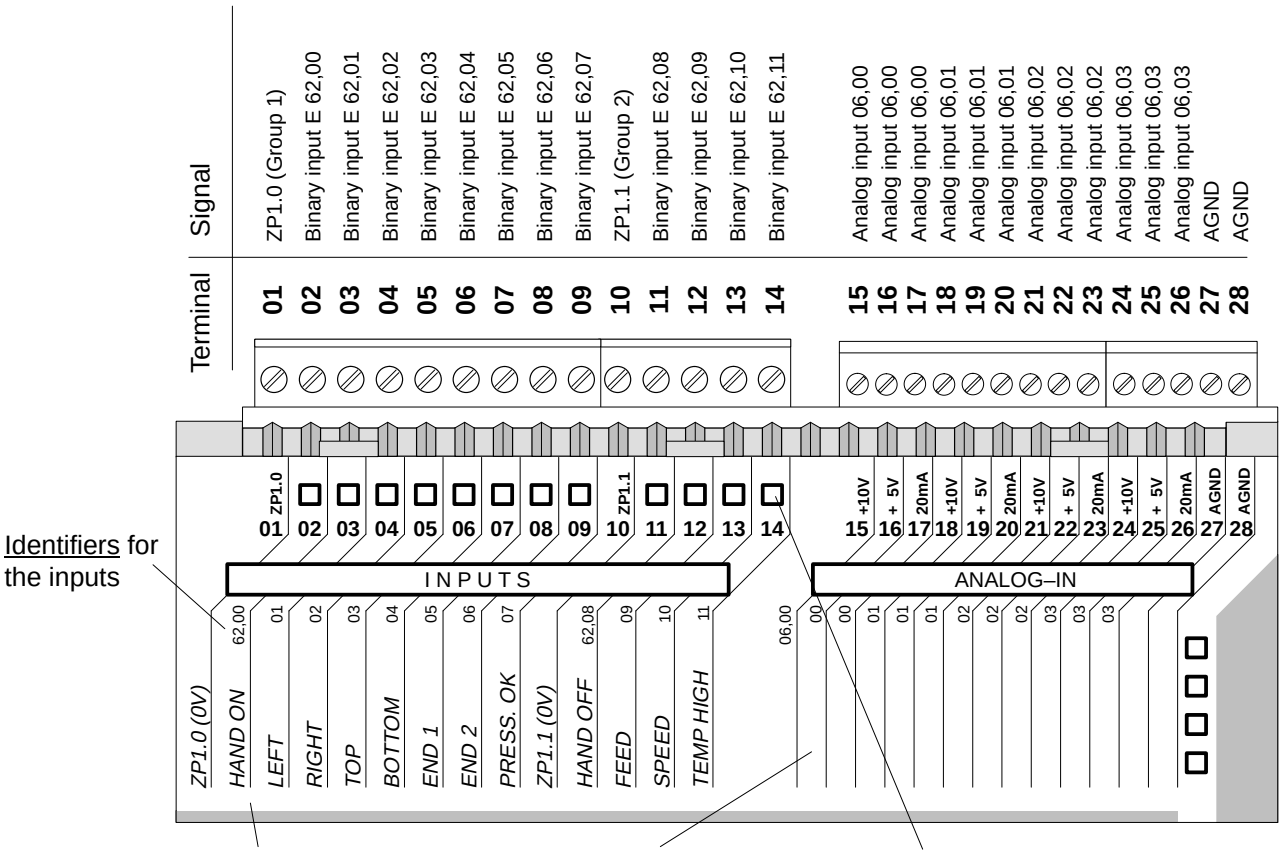


Fig. 2–10: Terminals and assignments of binary and analog inputs

2.3.10 Connection of the binary outputs

The following illustration shows the circuit configuration of the binary outputs.

Features of the outputs:

– The 8 outputs are arranged in one group and are electrically connected with each other.

– The outputs can be loaded with a rated current of 500 mA.

– The group as a whole is electrically isolated from the rest of the device.

– The outputs use transistors and are short-circuit-proof.

– The eight transistors of the group have a common power supply.

– The outputs are automatically switched off in case of overload or short-circuit.

– A overall error message indicates a short-circuit or an overload which has occurred on one or on several outputs.

– An overload is displayed by the red LED K and via error flags in the PLC.

– The user can set by means of a system constant whether the overloaded output is to be switched on again automatically by the PLC or whether it is to be switched on again by configuring within the PLC program, e.g. by means of the function blocks CS31QU or CS31CO. The default setting is the automatic reset of the outputs.

– The red LED K goes out when the overloaded output is switched on again after eliminating the overload.

– The acknowledgement of the error message, i.e. the resetting of the error flags, is done in correspondence with chapter A4.8 (Appendix), Acknowledgement of error messages in the central unit.

Circuit configuration of the binary outputs A 62,00...A 62,07

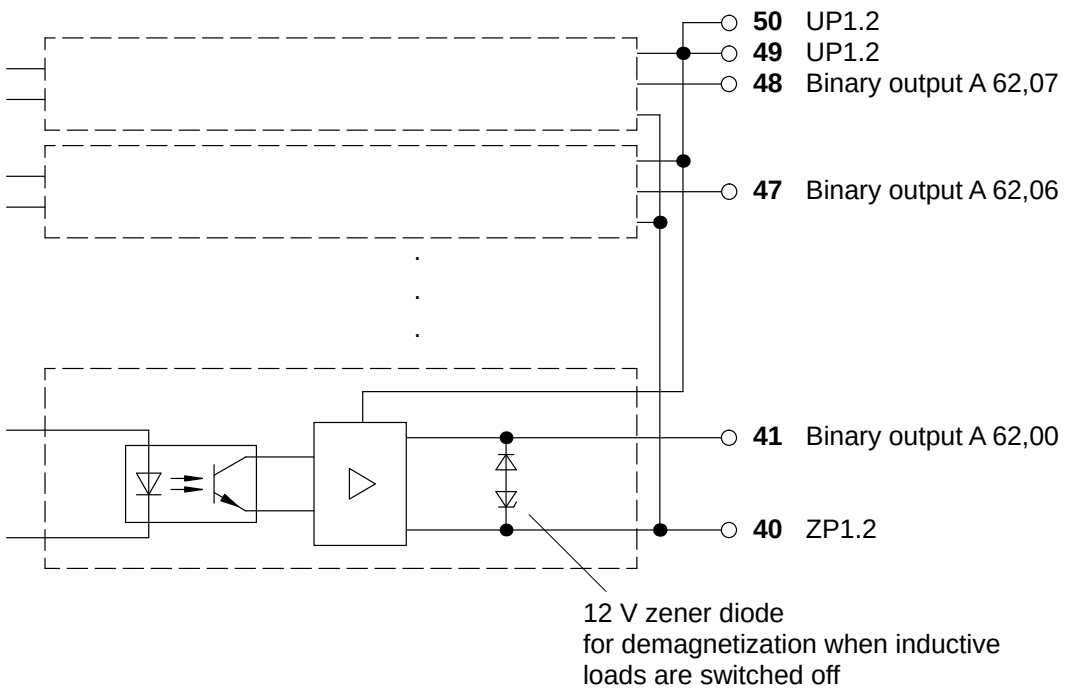


Fig. 2–11: Circuit configuration of the 8 transistor outputs

2.3.11 Connection of the analog outputs

The following illustration shows the circuit configuration of the analog outputs.

Features of the analog outputs:

- The analog outputs are not separated electrically.
- Load capability of the outputs max. ± 5 mA
- Resolution of the D/A converter: 12 bits
- Range of conversion: –10 V ... +10 V
- Resolution 5 mV
- If the numerical value in the PLC is changed by the amount of 16, the voltage at the outputs is changed by 5 mV.
- Relationship between the numerical value in the PLC program and the analog value at the analog outputs:

  –32768 (8000_H) ... –32761 ($800F_H$) –>–10 V
  –00016 ($FFF0_H$) ... –00001 ($FFFF_H$) –>–5 mV
  00000 (0000_H) ... +00015 ($000F_H$) –> 0 V
  +32752 ($7FF0_H$) ... +32767 ($7FFF_H$) –>+10 V

For further information see volume 2, chapter 5.1 General information on using the analog input and output modules.
For 07 KT 92 "Assignment **b**" is valid.

Output 06,01 (analog output instead of the calibrated 10 V output)

With the module 07 KT 92 **R101,** the terminal 52 was assigned with a fixed and calibrated output voltage of +10 V. Instead of this fixed voltage, the terminal 52 of the module 07 KT 92 **R202/262** is assigned with a second analog output (channel No. 06,01). It has the same specifications as channel No. 06,00.

If the output 06,01 must have a voltage of +10 V, the user program has to be added by the following instruction:

```
!KW XX,YY = AW 06,01
```

with

```
KW XX,YY = 32767
```

When replacing older modules with newer ones it has to be kept in mind that the output AW 06,01 only provides the +10 V voltage while the program is running.

Circuit configuration of the analog outputs AW 06,00 and AW 06,01

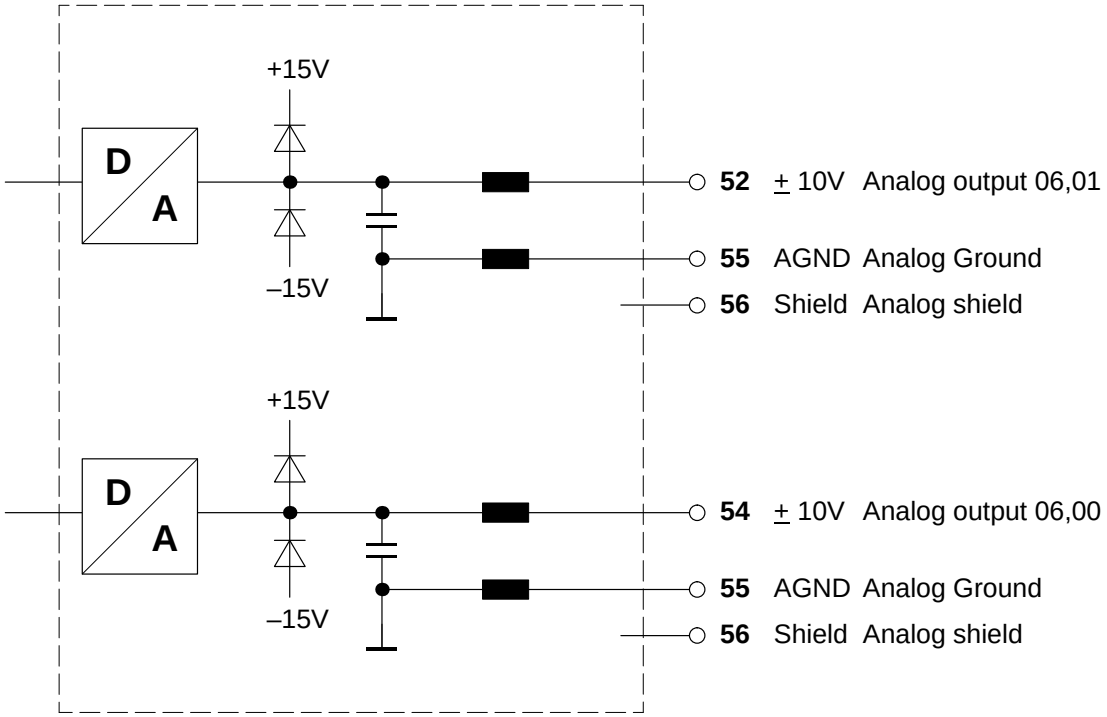


Fig. 2–12: Circuit configuration of the analog outputs

2.3.12 Identifier assignment for the outputs (binary and analog)

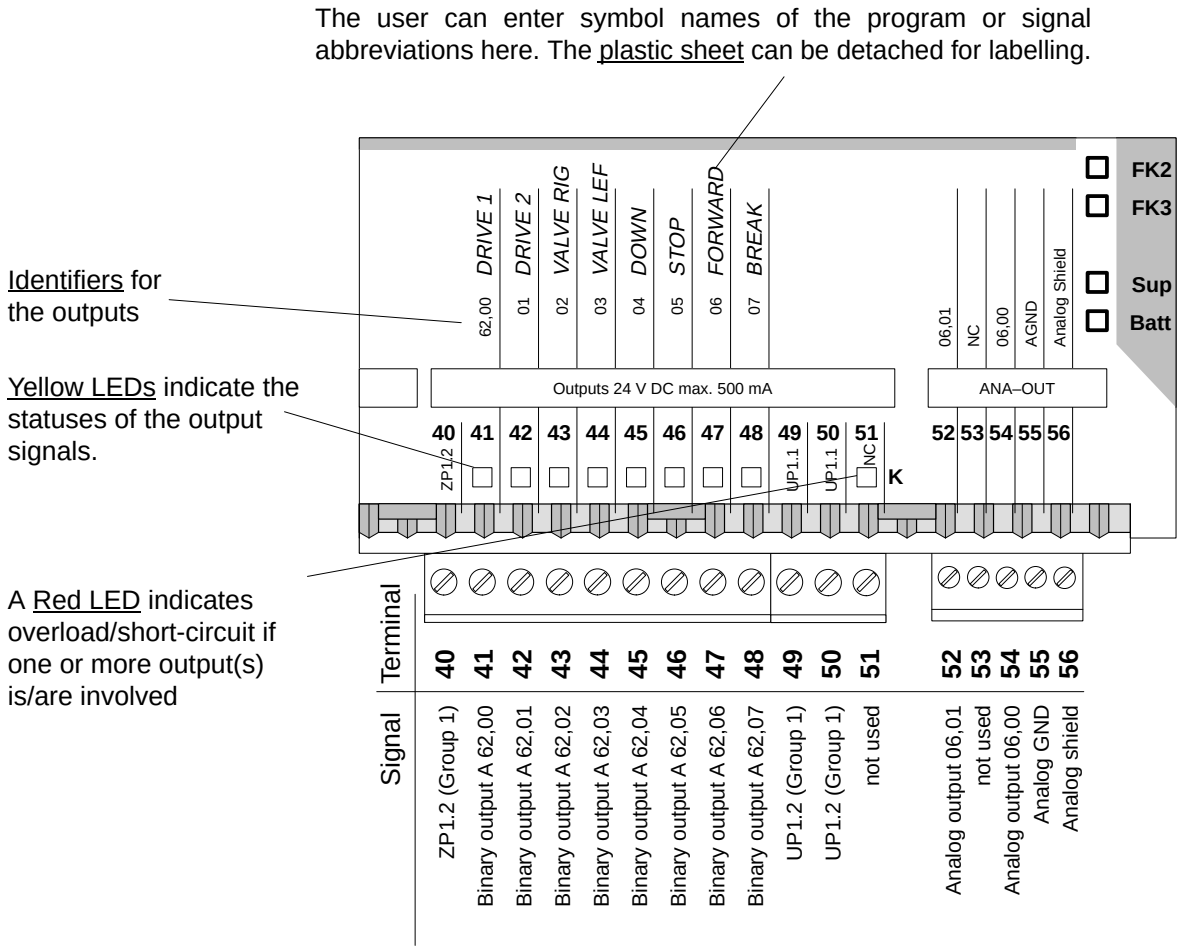
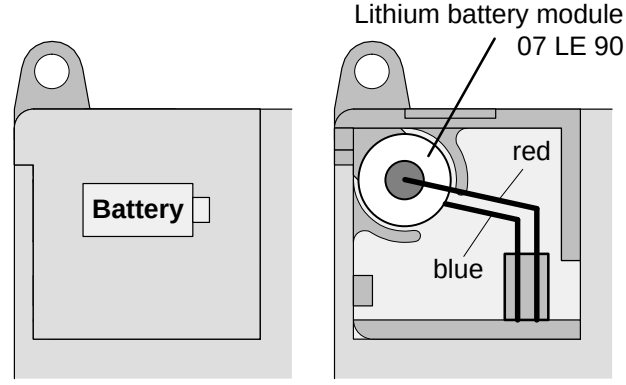


Fig. 2–13: Terminals and assignments of the outputs

2.3.13 Battery and battery replacement

- The lithium battery 07 LE 90 can be inserted into the battery compartment in order to
  - backup data of user program in RAM
  - backup data of additionally in RAM contained information, e.g. flag statuses
  - backup of time and date (real-time clock).

The battery lifetime is 1.5 years at 25°C (typ. 3 years). The battery lifetime is the time during which the device remains operable in order to backup data while the supply voltage of the central unit is switched off. As long as there is a supply voltage available, there is no more load on the battery other than its own leakage current.



Battery compartment closed

Built-in battery module (cover of the battery compartment is open)

Fig. 2–14: Battery and battery replacement

The following handling notes have to be observed:

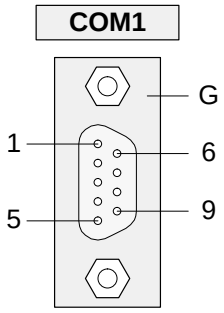
- Use only lithium batteries approved by ABB.
- Replace the battery by a new one at the end of its life.
- **Never short-circuit the battery!**
  There is danger of overheating and explosion. Avoid accidental short-circuits, therefore do not store batteries in metallic containers or boxes and do not bring it into contact with metallic surfaces.
- **Never try to charge the battery!**
  Danger of overheating and explosion!
- **Replace the battery only with the supply voltage switched on!**
  Otherwise you risk data being lost.
- **Dispose of battery environmentally consciously!**
- If no battery is built-in or if the battery is exhausted, the red LED 'Battery' lights up.

2.3.14 Serial interface COM 1

Interface standard: EIA–232

Assignment of the serial interface COM1

The serial interface has the following pin assignment:



G	Housing	Protective Ground	(Shield)
1	PGND	Protective Ground	(Shield)
2	TxD	Transmit Data	(Output)
3	RxD	Receive Data	(Input)
4	RTS	Request To Send	(Output)
5	CTS	Clear To Send	(Input)
6	PROG *		(Input)
7	SGND	Signal Ground	(0V)
8	0V out		(0V)
9	+5 V out	Supply for the TCZ service device **	

***** 1 = Active mode (Programming/test), Pin 6 open
0 = Passive mode (DRUCK/EMAS applications), Pin 6 shorted to 0V out

****** 5V output (only for supplying the TCZ service device):
The connected service device receives its voltage supply via the interface cable.

Fig. 2–15: Assignment of the serial interface COM1

Operating modes of the serial interface COM1

The operating mode of the interface has to be set according to the application in each case:

– Programming and test or
– Man–machine–communication MMC

Active mode: The active mode is used for programming and testing the central unit, i.e. it gives the user access to all the programming and test functions of the central unit.

Passive mode: The passive mode is used to perform a communication configured with the DRUCK and EMAS blocks between the user program and a device connected to the serial interface.

Conditions for setting the operating modes of the interface COM1

RUN/ STOP switch	System constant KW00,06	System cable/ device	Mode set by this
STOP	x	x	Active
RUN	1	x	Active
	2	x	Passive
	0, <0, >2	07 SK 90	Active
		07 SK 91, TCZ	Passive

x: without effect

Temporary interruption of the passive mode

While a communication between the DRUCK or EMAS blocks and a device connected to COM1 is being executed, it may be come necessary to modify the program, for example. For this purpose, you must switch over COM1 from the passive mode into the active mode.

Switch-over: Passive mode –––> Active mode

There are three possibilities for switching over:

- Set the RUN/STOP switch to the ”STOP” position
- Replace cable 07 SK 91 by cable 07 SK 90 (if KW 00,06 is set to ≤0 or >2)
- Send the following special command to the PLC: <DEL><DEL><DEL>

The latter option has the advantage that the switch-over can also be controlled remotely, e.g. via telephone line and suitable dial-up modems. The ASCII character <DEL> has the decimal code of 127 and the hexadecimal code of $7F_H$. You can generate this character by simultaneously pressing the control key <CTRL> and the delete key <—.

Notes:

On German keyboards, the control key is labelled by <Strg> instead of <CTRL>.

If the switch-over to the active mode was performed using the special command <DEL><DEL><DEL>, please observe the following:

During the execution of the PLC program, the system constant KW 00,06 must **not** be sent to the PLC because this would cause the system to be switched back to the passive mode.

The special command assigns the value of ”1” to the image of the system constant KW 00,06 located in the operand memory. The PLC evaluates the value of this image and sets the kind of application of COM1 correspondingly.

Switching back: Active mode –––> Passive mode

There are three possibilities for switching back:

- Return RUN/STOP switch to the ”RUN” position
- Replace cable 07 SK 90 by cable 07 SK 91 again.
- Cancel the special command <DEL><DEL><DEL> as follows:

– If the PLC program is in the ”aborted” condition:

Start the PLC program.

– If the PLC program is in the ”running” condition:

send the original value of the system constant KW 00,06 to the PLC again
(907 PC 33 menu item ”Send constants”)

or

overwrite the system constant KW 00,06 by the original value
(907 PC 33 menu item ”overwriting”)

Interface parameters

Active mode: The settings of the interface parameters cannot be changed

Data bits:	8
Stop bits:	1
Parity bits:	none
Baud rate:	9600
Synchronization:	RTS/CTS

Passive mode: Default setting

Synchronization:	RTS/CTS
Interface identifier COM1:	1
Baud rate:	9600
Stop bits	1
Data bits:	8
Parity bits:	none
Echo:	off
Send Break Character:	0
Enabling End-of-text character for sending direction:	no [1])
Sending End-of-text character:	<CR> [1])
Receiving End-of-text character:	<CR> [2])

[1]) The default End-of-text character for the sending direction (CR) is not sent. Nevertheless, this default End-of-text character (CR) must not appear in the message text of the assigned DRUCK block.

[2]) For the direction of reception, an End-of-text character is always necessary. This default End-of-text character (CR) must not appear neither in the message text nor in the user data of the assigned EMAS block.

For the passive mode of COM1, the interface parameters can be changed using the SINIT function block. If the changed values are not plausible, the COM1 interface uses the default values.

The interface is newly initialized each time the operating mode is switched over.

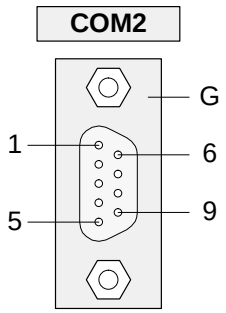
The active-mode parameters are set in the active mode, whereas in the passive mode the parameters established by the SINIT block or the default values are set.

2.3.15 Serial interface COM 2

Interface standard: EIA–232

Assignment of the serial interface COM2

The serial interface has the following pin assignment:



G	Housing	Protective Ground	(Shield)
1	PGND	Protective Ground	(Shield)
2	TxD	Transmit Data	(Output)
3	RxD	Receive Data	(Input)
4	RTS	Request To Send	(Output)
5	CTS	Clear To Send	(Input)
6	NC		(unused)
7	SGND	Signal Ground	(0V)
8	0V out		(0V)
9	+5 V out	Supply for the TCZ service device **	

** 5V output (only for supplying the TCZ service device):
The connected service device receives its voltage supply via the interface cable.

Fig. 2–16: Assignment of the serial interface COM2

Operating modes of the COM2 interface

The serial interface COM2 is fixedly set to the **passive mode** (MMC interface).

The passive mode is used to perform a communication configured with the aid of the DRUCK and EMAS blocks between the user program and a device connected to the serial interface.

The application-specific initialization of COM2 can be performed using the SINIT function block.

Interface parameter

Passive mode: Default setting

Synchronization:	RTS/CTS
Interface identifier COM2:	2
Baud rate:	9600
Stop bits	1
Data bits:	8
Parity bits:	none
Echo:	off
Send Break Character:	0
Enabling End-of-text character for sending direction:	no [1])
Sending End-of-text character:	<CR> [1])
Receiving End-of-text character:	<CR> [2])

[1]) The default End-of-text character for the sending direction (CR) is not sent. Nevertheless, this default End-of-text character (CR) must not appear in the message text of the assigned DRUCK block.

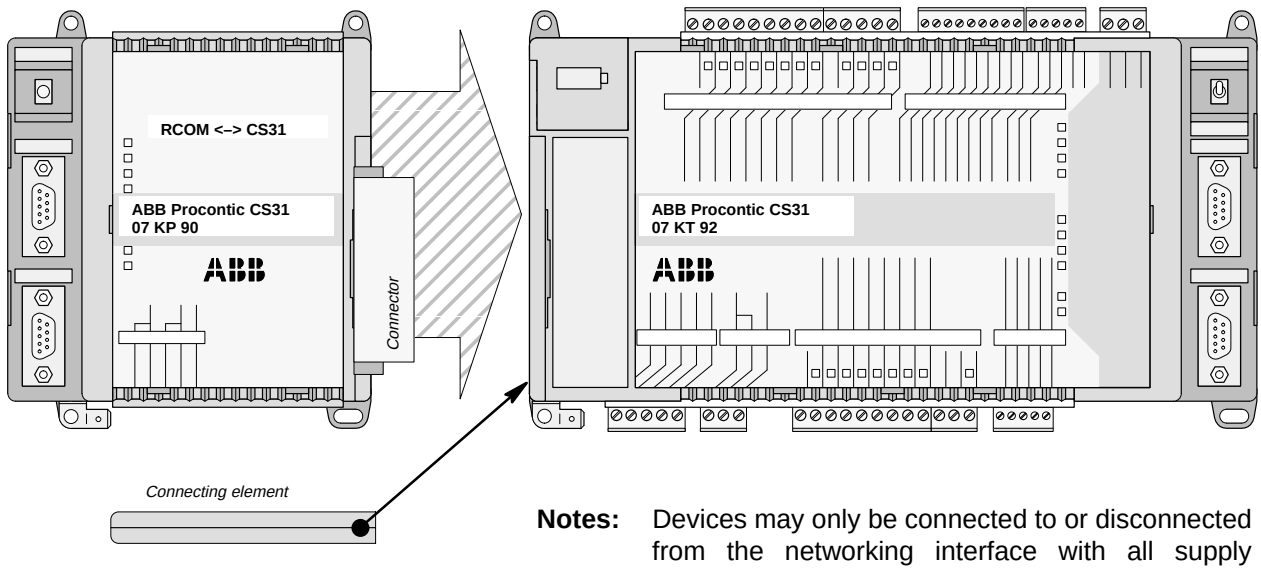
[2]) For the direction of reception, an End-of-text character is always necessary. This default End-of-text character (CR) must not appear neither in the message text nor in the user data of the assigned EMAS block.

For the passive mode of COM2, the interface parameters can be changed using the SINIT function block. If the changed values are not plausible, the COM2 interface uses the default values.

In the passive mode the parameters established by the SINIT block or the default values are set.

2.3.16 Networking interface

The 07 KT 92 central unit is equipped with a special parallel interface. It is thus possible to network it with another bus system using an additional communication processor module. The additional communication processor has its own housing. Both housings (of the 07 KT 92 and of the communication processor) are assembled by means of a snap-on connection.



Notes: Devices may only be connected to or disconnected from the networking interface with all supply voltages switched off.

In order to assemble the two devices with each other, they must be put together on a level ground and then be fastened using the connecting element.

Fig. 2–17: Mounting of 07 KT 92 with expansion (e.g. communication processor 07 KP 90)

2.4 High-speed counter

Features

The high-speed counter used in the central units 07 KR 91, 07 KT 92 and 07 KT 93 works independently of the user program and is therefore able to response quickly to external signals. Its features are as follows:

- The counting frequency is max. 50 kHz. The counter counts the 0–>1 edges at terminal 02 (also designated as E 62,00).
- The counter counts upwards from –32768 to +32767 (8000_H...$7FFF_H$). If +32767 is exceeded, the counter skips to –32768.

  Sequence of the counting procedure:

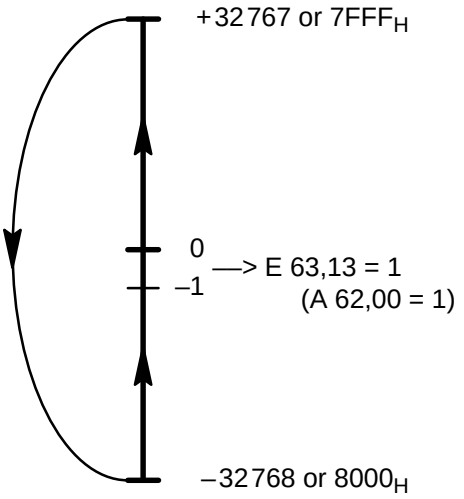


Fig. 2–18:
Sequence of the counting procedure

- Enabling/disabling of the counting procedure using the internal variable A 63,14 in the user program:
  - A 63,14 = 0:
    The internal variable A 63,13 = 1 enables the counting procedure, whereas A 63,13 = 0 disables it.
  - A 63,14 = 1:
    Signal 1 at terminal 03 (also designated as E 62,01) enables the counting procedure, whereas signal 0 disables it. A 63,13 is without effect.
    Note: The dead time may be 0...1.5 ms.
- Setting the counter in the user program:
  - to the value contained in the internal word variable AW 06,15
  - using the internal variable A 63,15 = 1.

  Note: If the internal variable A 63,15 = 1 is present during several processing cycles, the processor sets the counter at the program end in each case.
  During the remaining time of the processing cycle, the counter counts pulses at terminal 02.
- The counter content can be read via the internal variable EW 06,15.
- Zero-crossing message (signal changes from 0 to 1 when the counter contents changes from –1 to 0):
  - always via the internal variable E 63,13,
  - at the terminal 41 (also designated as A 62,00) only, if the internal variable A 63,14 = 1 is set.
    Note: The reaction time may be 0...1.5 ms. The direct control of the output A 62,00 from the user program is disabled by A 63,14 = 1.

  The zero-crossing message is cancelled when the counter is set.
- Fast input of binary signals into the user program with a delay of 8 ms:
  - Terminal 02 (also designated as E 62,00):
    Internal variable E 63,14
  - Terminal 03 (also designated as E 62,01):
    Internal variable E 63,15

Block diagram

see next page

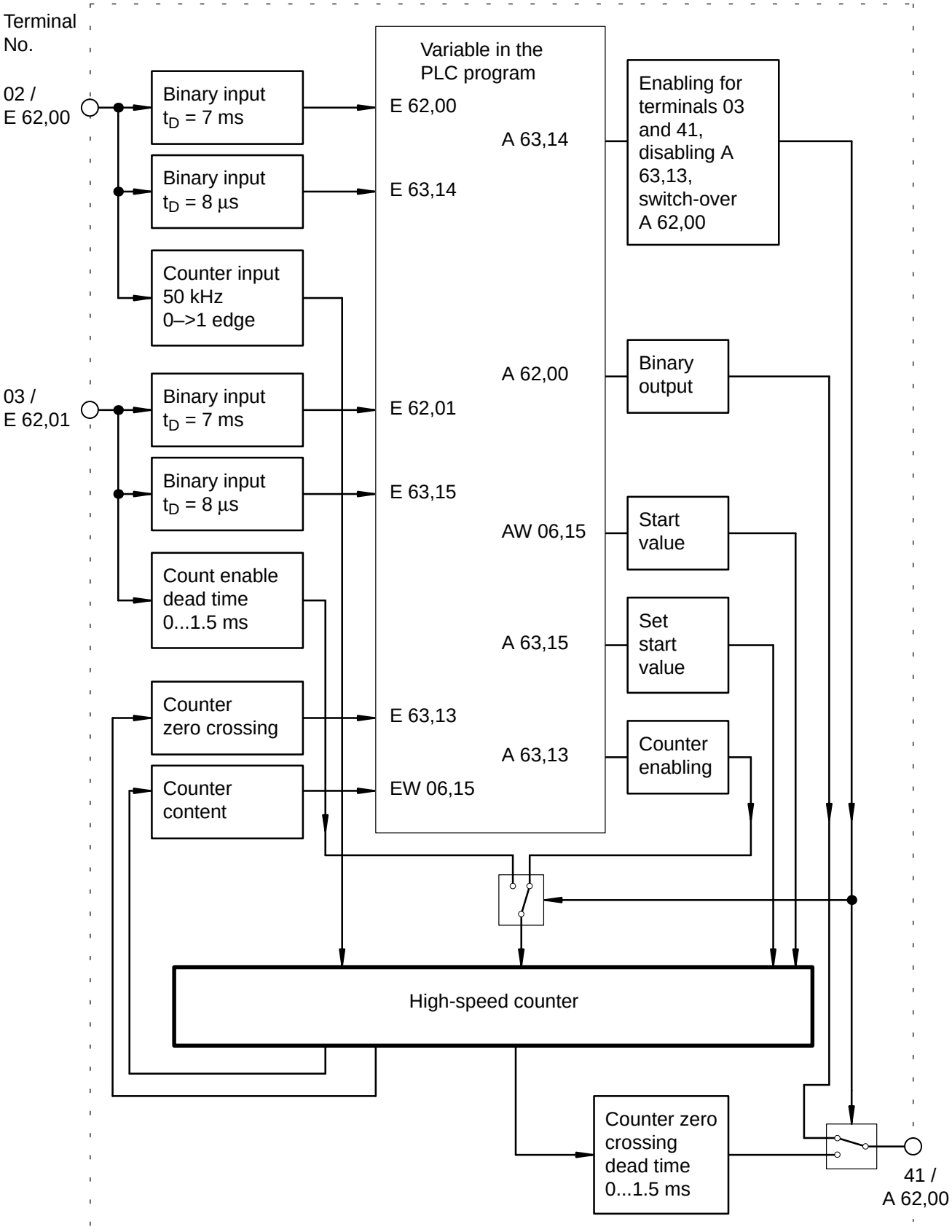


Fig. 2–19: 07 KT 92, High-speed counter, block diagram

Configuration example

- **Task:**
  - 180 pieces each of a unit load have to be filled into a packing.
  - Each filled-in piece generates one pulse.
  - When the packing is full, the counter is immediately prepared for the next filling operation.
  - The enabling signal for the filling operation is sent by the packaging machine.
  - The end of the counting operation has to be signalled to the packaging machine immediately.
- **Wiring**
  - Connect the signal line for the counting pulses to terminal 02.
  - Connect the signal line for the enabling of the counting operation to terminal 03.
  - Connect the signal line for ”zero crossing” of the counter to terminal 41.
- **Configuration steps: PLC program**

1) Activate terminals 03 and 41

- The terminals 03 and 41 are activated using the operand A 63,14.

IL (instruction list):
! K 00,01
= A 63,14 (with K 00,01 = 1)

2) Preset start value for the counter

The start value (AW 06,15) is set to the value of –180. The counter will then count starting from –180 in positive direction. The transition from –1 to 0 will be signalled.

IL (instruction list):
! KW 01,00
= AW 06,15 (with KW 01,00 = –180)

3) Adopt start value into the counter

After each counting operation, the start value is immediately set again into the counter by means of the ”zero crossing” signal (E 63,13). Operand A 63,15 = 1 has to be set for this purpose. At program start, the start value is loaded once into the counter by means of the initialization flag M 255,15 (M 255,15 has the value of 0 after program start).

IL (instruction list):
! NM 255,15
/ E 63,13
= A 63,15
:
:
other PLC program parts
:
:
! K 00,01
= M 255,15 (set M 255,15 = 1)
! PE (program end)

Preset start values

You can preset both *positive* and *negative* start values for the counter.
The counting operation starts at the start value and is continued in correspondence with the arrows in the diagram until the enabling is stopped or a start value is loaded again.

Negative start value

The minimum negative start value is
–32768 (8000_H).
By presetting a negative start value it is thus possible to count a maximum of 32768 pulses up to the zero crossing of the counter.

Positive start value

If a positive start value is preset, the counter counts up to the value of +32767 ($7FFF_H$), continues the counting operation at the value of–32768 (8000_H) and then signals the zero crossing when reaching the transition from –1 to 0.
The minimum positive start value is 1. If you preset this value, 65535 pulses will be counted up to the zero crossing.

In order to count more than 32767 pulses up to the zero crossing, the start value has to be calculated according to the following equation:

Start value = 32767 – (number of pulses – 32768)

Example:
40 000 pulses are to be counted.
The start value is in the positive range, because more than 32768 pulses have to be counted.

Calculation:

Start value = 32767 – (number of pulses – 32768)
= 32767 – (40 000 – 32768)
= 25535

2.5 Technical data 07 KT 92

In general, the technical system data listed in volume 2 of the system description ABB Procontic CS31 are valid for all modules and central units. Additional data or data which are different from the system data are listed as follows.

2.5.1 General data

Number of binary inputs	12
Number of binary transistor outputs	8
Number of analog inputs	4
Number of analog outputs	1
I/O expansion via CS31 system bus by up to	744 binary inputs 496 binary outputs 96 analog input channels 48 analog output channels max. 31 remote modules altogether
Number of serial interfaces	2 (for programming or connection to man-machine communication)
Number of parallel interfaces	1 special interface for connection of a communication processor (for networking with other bus systems)
Integrated memory, **07 KT 92 R202 / R262:**	Flash EPROM 128 kB (60 kB program + 60 kB user data) RAM 256 kB (30 kB program with online programming or 60 kB program without online programming)
Resolution of the integrated real-time clock	1 second
Data of the integrated high-speed hardware counter	
counting range 0...65,535 (16 bits)	
counting frequency	max. 50 kHz
Processing time, binary operation	typ. 0.4...0.6 ms/kB program
65 % bits, 35 % words	typ. 0.7 ms/kB program
Number of software timers	any (max. 80 simultaneously active)
delay time of the timers	5 ms...24.8 days
Number of up/down counter SW blocks	any
Number of bit flags	4096
Number of word flags	4096
Number of double word flags	512
Diagnosis	cycle time monitoring, battery monitoring, detection of syntax errors and checksum monitoring
Indication of operating statuses and errors	31 LEDs altogether

2.5.2 Power supply

Rated supply voltage	24 V DC
Current consumption	max. 0.3 A (R202), max. 0.35 A (R262), plus output current through terminal 39 (output voltage for the supply of the binary inputs)
Protection against reversed terminal connection	yes

2.5.3 24V output voltage for the supply of inputs

Rated voltage	24 V DC
Load capability	max. 120 mA
Protection against overload	with a PTC resistor
Conductor cross section of the removable 3-pole terminal block	max. 2.5 mm^2

2.5.4 Lithium battery

Battery for back-up of RAM contents	07 LE 90 battery module
Lifetime at 25°C	1.5 years (typ. 3 years)

2.5.5 Binary inputs

Number of channels per module	12
Distribution of channels into groups	1 group of 8 channels, 1 group of 4 channels
Common reference potential	
for group 1 (8 channels)	ZP1.0 (channels 62,00...62,07)
for group 2 (4 channels)	ZP1.1 (channels 62,08...62,11)
Electrical isolation	between the groups, between groups and other circuitry (see also Fig. 2–5)
Signal coupling of input signals	with optocoupler
Input signal delay of	
channels E 62,00...E 62,11	typ. 7 ms
channels E 63,14 and 63,15	typ. 8 µs
for counter control	typ. 8 µs
Signalling of input statuses	one green LED per channel, the LEDs correspond functionally to the input signals
Input signal voltage	
signal 0	–30 V...+ 5 V
signal 1	+13 V...+30 V
ripple when signal 0 within –30 V...+ 5 V	
when signal 1	within +13 V...+30 V
Allowed input overvoltage	± 36 V, for 100 ms only
Input current per channel	
input voltage = +24 V	typ. 8.0 mA
input voltage = + 5 V	≥ 0.2 mA
input voltage = +13 V	≥ 2.0 mA
input voltage = +30 V	≤ 10.0 mA
Labelling for the inputs	symbol names or short signal designations can be labelled on the removeable front panel foil
Max. cable length unshielded	600 m
Max. cable length shielded	1000 m
Conductor cross section of the removable terminal blocks	max. 2.5 mm^2

2.5.6 Binary outputs

Number of channels per module	8 transistor outputs
Distribution of channels into groups	1 group of 8 channels
Common supply voltage for group 1	UP1.2 (channels 62,00...62,07)
Electrical isolation	between the group and other circuitry, (see also Fig. 2–5)
Signalling of output statuses	one yellow LED per channel, the LEDs correspond functionally to the output signals
Output current	
rated value	500 mA with UP1.2 = 24 V
maximum value	625 mA with UP1.2 = 24 V + 25 %
leakage current with signal 0	< 0.5 mA
Demagnetization of inductive loads	internally with free-wheeling diode and Z-diode (Z-diode voltage is 12 V)
Switching frequency with inductive loads	max. 0.5 Hz
Switching frequency with lamp load	max. 11 Hz with max. 5 W
Max. cable length	400 m (pay attention to voltage drop)
Short-circuit-proof/overload-proof reset can be carried out	yes, – automatically or – by configuration.
Total load (via UP1.2)	max. 4 A
Labelling for the outputs	symbol names or short signal designations can be labelled on the removeable front panel foil
Conductor cross section of the removable terminal blocks	max. 2.5 mm^2

2.5.7 Analog inputs

Number of channels per module		4
Distribution of channels into groups		1 group of 4 channels
Common reference potential for group 1 (4 channels)		AGND (channels 06,00...06,03)
Electrical isolation		no (see also Fig. 2–5)
Signalling of input statuses		none
Input signal ranges (selectable at each channel)		0...10 V 0... 5 V 0...20 mA
Input resistance per channel (voltage input)		ca. 100 kΩ (0...10 V range) ca. 50 kΩ (0...5 V range)
Input resistance per channel (current input)		250 Ω
Time constant of the input filter		100 µs
Conversion time		20 µs per channel
Resolution		12 bits
Resolution (1 LSB)	range 0...10 V	2.5 mV
	range 0... 5 V	1.25 mV
	range 0...20 mA	5.0 µA

Relationship between input signal and hex-code	0...100 % = 0000_H...$7FF8_H$ (0...32760 decimal)
Conversion inaccuracy caused by nonlinearity, adjustment error on delivery and resolution	< 1 %
Labelling for the inputs	symbol names or short signal designations can be labelled on the removeable front panel foil
Max. cable length shielded, 2-core shielded and cross section $\geq$ 0.5 mm^2	100 m
Conductor cross section of the removable terminal blocks	max. 1.5 mm^2

2.5.8 Analog outputs

Number of channels per module	2
Reference potential	AGND (channels 06,00 and 06,01)
Electrical isolation	no (see also Fig. 2–5)
Signalling of output statuses	none
Output signal range	–10 V...0...+10 V
Output load capability	max. $\pm$ 5 mA
Resolution	12 bits
Resolution (1 LSB) range –10 V...0...+10 V	5 mV

Relationship between output signal and hex-code

–32768...–32761 (8000_H...$800F_H$)	$\triangleq$ –10 V
–00016...–00001 ($FFF0_H$...$FFFF_H$)	$\triangleq$ – 5 mV
00000...+00015 (0000_H...$000F_H$)	$\triangleq$ 0 V
+32752...+32767 ($7FF0_H$...$7FFF_H$)	$\triangleq$ +10 V

Conversion inaccuracy caused by nonlinearity, adjustment error on delivery and resolution	< 1 %
Labelling for the outputs	symbol names or short signal designations can be labelled on the removeable front panel foil
Max. cable length shielded, 2-core shielded and cross section $\geq$ 0,5 mm^2	100 m
Conductor cross section of the removable terminal block	max. 1.5 mm^2

2.5.9 Connection of serial interface COM1

Interface standard	EIA RS–232
Programming with 907 PC 33	by means of IBM PC (or compatible)
Man–machine communication	yes, e.g. with ABB Procontic Operating Station 35 BS 40
Display and updating of timers, counters and parameters	yes, e.g. with TCZ Service Device
Electrical isolation	versus binary inputs and outputs, versus CS31 system bus interface (see also Fig. 2–5)

Potential differences	In order to avoid potential differences between the 07 KT 92 central unit and the peripheral device connected to the COM1 interface, this device is supplied from the switch cabinet socket (see also the earthing connections in Fig. 2–3).
Pin configuration and description of the COM1 interface	see chapter 2.3.14

2.5.10 Connection of serial interface COM2

Interface standard	EIA RS–232
Man–machine communication	yes, e.g. with ABB Procontic Operating Station 35 BS 40
Electrical isolation	versus binary inputs and outputs, versus CS31 system bus interface (see also Fig. 2–5)
Potential differences	see text of COM1 (above)
Pin configuration and description of the COM2 interface	see chapter 2.3.15

2.5.11 Connection to the ABB Procontic CS31 system bus

Interface standard		EIA RS–485
Connection	as a Master PLC	yes, transmitting and receiving area are configurable
	as a Slave PLC	yes, see chapter ”system constants”, A7.3 (Appendix)
Setting of the CS31 module address		yes, by system constant, stored in the Flash EPROM of the Slave PLC
Electrical isolation		versus supply voltage, inputs/outputs, versus COM1/COM2 interfaces (see also Fig. 2–5)
Terminal assignment and description of the CS31 bus interface		see chapter 2.3.5
Conductor cross section of the removable 3-pole terminal block		max. 2.5 mm^2

2.5.12 Connection to ARCnet (07 KT 92 **R262** only), see also chapter A8 (Appendix)

ARCnet interface		1 channel for connection to COAX cable
Connector X4		BNC connector
Recommended system cable		COAX cable Type RG–62/U (characteristic impedance 93 Ω)
Cable length		305 m with ARCnet bus with 8 stations. Further information see SMC TECHNICAL NOTE TN7–1.
LED displays	green LED (BS)	Operating mode ”controller active”, i.e. the PLC performs read and write operations
	green LED (TX)	Operating mode ”transmit active”, i.e. the PLC sends data on the ARCnet bus
Electrical isolation		versus supply voltage, inputs/outputs, versus COM1/COM2 interfaces (see also Fig. 2–5)

2.5.13 LED displays

LEDs for indication of:

– statuses of binary inputs	1 green LED per channel
– statuses of binary outputs	1 yellow LED per channel
– power supply exists 1 green LED	
– battery	1 red LED
– program runs (RUN)	1 green LED
– error classes (FK1, FK2, FK3)	1 red LED per error class
– CS31 system bus runs (BA)	1 green LED
– bus specific errors (BE, RE, SE)	3 red LEDs
– overload/short-circuit of the direct binary outputs	1 red LED

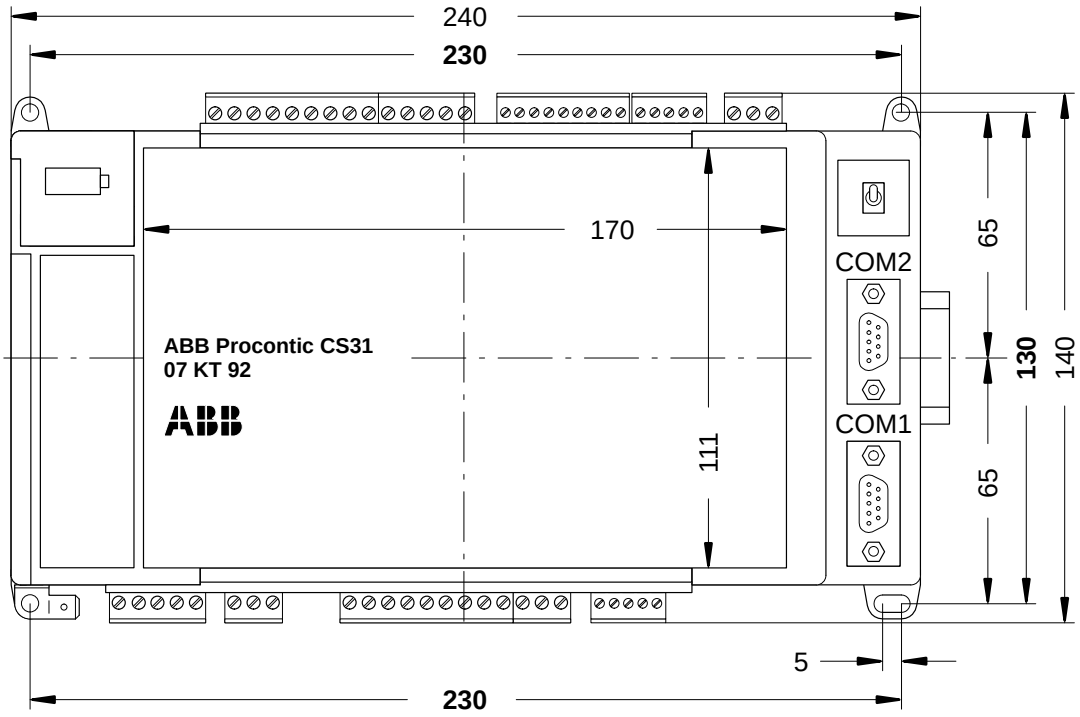
2.5.14 High speed hardware counter

Data of the integrated high–speed hardware counter

counting range	0...65,535 (16 bits)
counting frequency	max. 50 kHz
used inputs	62,00 and 62,01 (the signal delay of these inputs is set to 8 µs for the counter)
used outputs	62,00

2.5.15 Mechanical data

Mounting on DIN rail	according to DIN EN 50022–35, 15 mm deep. The DIN rail is located in the middle between the upper and the lower edges of the module.
Fastening by screws	using 4 M4 screws.
Width x height x depth	240 x 140 x 85 mm
Wiring method	by removable terminal blocks with screw-type terminals, conductor cross section max. 2.5 mm^2
Weight	1.6 kg
Dimensions (for mounting)	see the following drawing



All dimensions in mm.

The device is 85 mm deep. The interface connectors COM1 and COM2 are set deeper so that the mounting depth required does not become any larger even with detachable interface cables. If, however, a DIN rail is used, the mounting depth is increased by the overall depth of the rail.

The dimensions for assembly bore holes are printed in bold.

2.5.16 Mounting hints

Mounting position	vertical, terminals above and below
Cooling	The natural convection cooling must not hindered by cable ducts or other material mounted in the switch cabinet.

2.5.17 Ordering data

Central unit 07 KT 92 R202		Order No. GJR5 2505 00 R202
Central unit 07 KT 92 R262	(with ARCnet)	Order No. GJR5 2505 00 R262
Scope of delivery		Central unit 07 KT 92 R202 or R262 2 9–pole terminal blocks (5.08 mm raster) 2 5–pole terminal blocks (5.08 mm raster) 3 3–pole terminal blocks (5.08 mm raster) 1 9–pole terminal block (3.81 mm raster) 2 5–pole terminal blocks (3.81 mm raster) Safety and mounting instructions

Accessories

System cable 07 SK 90	Order No. GJR5 2502 00 R1
System cable 07 SK 91	Order No. GJR5 2503 00 R1
System cable 07 SK 92	Order No. GJR5 2504 00 R1
Battery module 07 LE 90	Order No. GJR5 2507 00 R1
Bus termination resistor	
Simulation device 07 SG 90 (includes a number of switches and push-buttons to enter binary input signals)	Order No. GJR5 2506 00 R1

Programming and test software and operating manual

(both 907 PC 33 **and** 907 PC 331 are required)

907 PC 33	German	[1])	Order No. GJP5 2039 00 R202
907 PC 33	English	[1])	Order No. GJP5 2040 00 R202
907 PC 331	German	[2])	Order No. GJP5 2045 00 R202
907 PC 331	English	[2])	Order No. GJP5 2046 00 R202

Further Literature

System description ABB Procontic CS31	English	Order No. FPTN 440 004 R2001
System description ABB Procontic T200	English	Order No. GATS 1314 99 R2001
System description ABB Procontic T300	English	Order No. GATS 1315 99 R2002
System description ABB Procontic CS31	German	Order No. GATS 1316 99 R1002
System description ABB Procontic T200	German	Order No. GATS 1314 99 R1001
System description ABB Procontic T300	German	Order No. GATS 1315 99 R1002

[1]) Description General Part
[2]) Description 07 KR 91 / 07 KT 92 / 07 KT 93 Specific Part + software diskettes