2.1 Basic Unit 07 KT 97
Basic unit with max. 480 kB user program
+ 256 kB user data, CS31 system bus

The basic unit **07 KT 97 R200** is the standard device for all applications. In addition, there are basic units with reduced performance (e.g. **07 KT 95** or **07 KT 96)** as well as ones with extended performance (e.g. 07 KT 97 R260 with ARCNET connection, 07 KT 97 R0220 with PROFIBUS connection and 07 KT 97 R0262 with both ARCNET **and** PROFIBUS connection). A comparison table is given on page 3. This document describes the basic unit 07 KT 97 R200 and then adds the data sheets of the other devices which only show the differences.
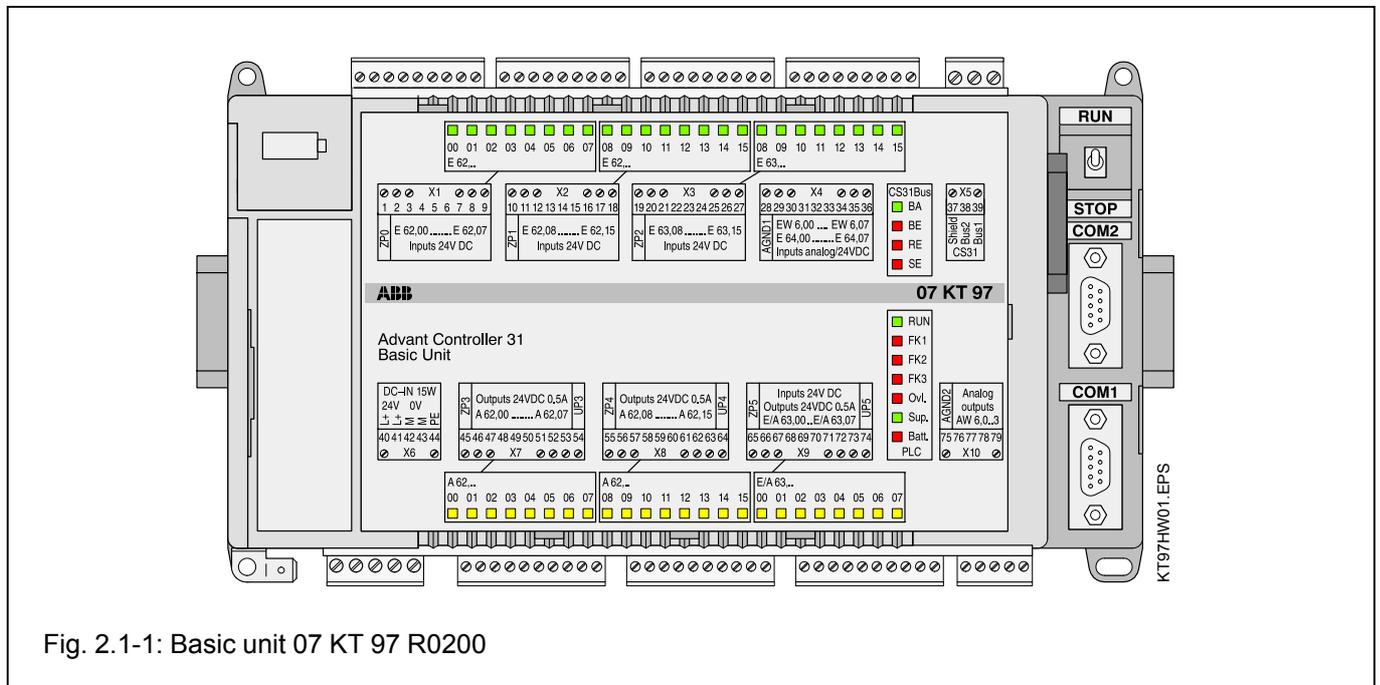

Fig. 2.1-1: Basic unit 07 KT 97 R0200

Contents

2.1.7 Technical Data 07 KT 97

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

2.1.7.1 General data

Number of digital inputs	24
Number of digital transistor outputs	16
Number of digital inputs/outputs	8
Number of analog inputs	8
Number of analog outputs	4

I/O expansion via CS31 system bus by up to	992 digital inputs
	992 digital outputs
	224 analog input channels
	224 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	Flash EPROM 512 kB (480 kB program + configuration data) RAM 2 MB (480 kB program with on-line programming + 256 kB variables)
Resolution of the integrated real-time clock	1 second

Data of the integrated high-speed hardware counter
Number of operating modes	7
Counting range	-32768...+32767 (16 bits signed integer)
Counting frequency	max. 50 kHz

Processing time, 65 % bits, 35 % words	typ. 0.3 ms/kB program

Number of software timers	any (max. 80 simultaneously active)
delay time of the timers	1 ms...24.8 days

Number of up/down counter software blocks	any

Number of bit flags	in the addressable flag area	8192
Number of word flags	"	8192
Number of double word flags	"	1024
Number of step chains	"	256
Number of constants KW	"	1440
Number of constants KD	"	384

Indication of operating statuses and errors	60 LEDs altogether

Wiring method	removable screw-type terminal blocks
Power supply, CS31 system bus	max. 1 x 2.5 mm^2 or max. 2 x 1.5 mm^2 (see also page 2.1-9)
all other terminals	max. 1 x 1.5 mm^2

2.1.7.2 Power supply

Rated supply voltage	24 V DC
Current consumption	max. 0.35 A
Protection against reversed polarity	yes

2.1.7.3 Lithium battery

Battery for backup of RAM contents   Battery module 07 LE 90

Lifetime at 25°C   typ. 5 years

2.1.7.4 Digital inputs

Number of channels per module   24

Distribution of channels into groups   3 groups of 8 channels each

Common reference potential
for group 1 (8 channels)   ZP0 (channels 62,00...62,07)
for group 2 (8 channels)   ZP1 (channels 62,08...62,15)
for group 3 (8 channels)   ZP2 (channels 63,08...63,15)

Electrical isolation   between the groups,
between groups and other circuitry
(see also Fig. 2.1–4)

Signal coupling of input signals   with optocoupler

Configuration possibilities of the inputs
Input signal delay   typ. 7 ms (configurable to 1 ms)
Channels E 62,00 and 62,01   configurable for the high-speed counter

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

Input current per channel
Input voltage = +24 V   typ. 7.0 mA
Input voltage = + 5 V   > 0.2 mA
Input voltage = +13 V   > 2.0 mA
Input voltage = +30 V   < 9.0 mA

Max. cable length, unshielded   600 m
Max. cable length, shielded   1000 m

2.1.7.5 Digital outputs

Number of channels per module   16 transistor outputs

Distribution of channels into groups   2 groups of 8 channels each

Common supply voltage
for group 1   UP3 (channels 62,00...62,07)
for group 2   UP4 (channels 62,08...62,15)

Electrical isolation   between the groups,
between groups and other circuitry
(see also Fig. 2.1–4)

Signalling of output statuses   one yellow LED per channel,
the LEDs correspond functionally to the output signals

Output current
Rated value   500 mA with UP3/4 = 24 V
Maximum value   625 mA with UP3/4 = 24 V + 25%
Leakage current with signal 0   < 0.5 mA

Demagnitization of inductive loads   internally with a varistor

Switching frequency with inductive loads   max. 0.5 Hz

Switching frequency with lamp loads   max. 11 Hz with max. 5 W

Max. cable length	400 m (pay attention to voltage drops)
Short-circuit proof / overload proof	yes
Protection of the outputs against reversed polarity	yes
Forcing of 24 V DC at the outputs possible	yes
Total load (via UP3 or UP4)	max. 4 A

2.1.7.6 Digital inputs/outputs

Number of channels per module	8 inputs/outputs
Distribution of channels into groups	1 group with 8 channels
Common reference potential Common voltage supply	ZP5 (channels E/A 63,00...E/A 63,07) UP5 (channels E/A 63,00...E/A 63,07)
Electrical isolation	between the group and other circuitry (see Fig. 2.1-4)
Signal coupling of the input signals	with optocoupler
Configuration possibilities of the inputs Input signal delay, channels E 63,00...E 63,07	typ. 7 ms (configurable to 1 ms)
Signalling of input/output statuses	one yellow LED per channel, the LEDs correspond functionally to the I/O signals

Input signal voltage (if used as inputs)
 	
    Signal 0
    Signal 1
	for details see Fig. 2.1-13 as well as the chapter
	    "Circuit configuration of the digital inputs/outputs"
	-6 V...+ 5 V
	+13 V...+ 30 V

Input current per channel	see Digital inputs
Output current / switching frequency / inductive loads	see Digital outputs
Max. cable length	see Digital inputs/outputs

2.1.7.7 Analog inputs

Number of channels per module	8
Distribution of channels into groups	1 group with 8 channels
Common reference potential for group 1 (8 channels)	AGND1 (channels 06,00...06,07)
Electrical isolation	none (see also Fig. 2.1–4).
Max. permissible potential difference between Terminal M (minus pole of the power supply voltage) and terminal AGND (analog I/O minus pole)	± 1 V
Signalling of input statuses	none
Configuration possibilities (each channel), see 2.1.4.7	0...10 V, 0...5 V, ±10 V, ±5 V (also with differential signal) 0...20 mA, 4...20 mA Pt100 -50...+400°C and -50...+70°C (2-wire and 3-wire configuration) digital input

Input impedance per channel,   voltage input
                                                     current input
                                                     digital input
	> 100 kΩ
	ca. 330 Ω
	ca. 4 kΩ

The current input has a self-protecting mechanism. If the input current gets too high, the shunt is switched off and the value for range overflow is generated. About every second, the unit tries to switch on the shunt again. In this way the correct measurement will succeed after the current has reached a normal value again.

Time constant of the input filter	470 μs with voltage, 100 μs with current
Conversion cycle of current and voltage channels	Each configured input channel (U, I, Pt100) increases the conversion cycle of the U/I channels by typ. 1 ms.
Conversion cycle (by filtering time) of Pt100 channels	Each configured input channel (U, I, Pt100) increases the conversion cycle of the Pt100 channels by typ. 50 ms.
Conversion cycle of unused input channels	Input channels configured as "unused" are skipped, i.e. they do not need any conversion time.

Examples for the conversion cycle

Example No.	1	2	3	4	5	6
Channels configured for U/I	1	8 *	-	-	2	4
Channels configured for Pt100	-	-	4	8	2	4
Channels configured as "unused"	7	-	4	-	4	-
Conversion cycle of U/I channels	1 ms	8 ms	-	-	4 ms	8 ms
Conversion cycle of Pt100 channels	-	-	200 ms	400 ms	200 ms	400 ms

* Factory setting

Resolution in bits	ranges ±10 V, 0...10 V	11 bits plus sign
	ranges ±5 V, 0...5 V	10 bits plus sign
	ranges 0...20 mA, 4...20 mA	12 bits without sign
	range -50 °C...+70 °C	10 bits plus sign
	range -50 °C...+400 °C	11 bits plus sign
Resolution in mV, μA	range ±10 V	ca. 5 mV
	range 0...10 V	ca. 5 mV
	range 0...20 mA	ca. 5 μA
	range 4...20 mA	ca. 4 μA

Relationship between input signal and hex code   -100 %...0...+100 % = 8008_H...0000_H...$7FF8_H$
                                                                                      (-32760...0...32760 decimal)

Conversion inaccuracy caused by non-linearity, temperature sensitivity, ageing, adjustment error on delivery and resolution: U, I	typ. 0.5 %, max. 1 %
Pt100	typ. 1 °C, max. 2 °C
Threshold, if analog input is configured as digital input	ca. 7 V
Max. cable length, 2-core shielded and cross section $\geq$ 0,5 mm^2	100 m

2.1.7.8   Analog outputs

Number of channels per module	4
Reference potential	AGND2 (channels 06,00...06,03)
Electrical isolation	none (see also Fig. 2.1–4).
Max. permissible potential difference between Terminal M (minus pole of the power supply voltage) and terminal AGND (analog I/O minus pole)	± 1 V

Signalling of output statuses	none
Output signal ranges (configurable)	-10 V...0...+10 V 0...20 mA 4...20 mA
Output load capability of the voltage outputs	max. ±3 mA
Resolution	12 bits
Resolution (1 LSB), range –10 V...0...+10 V	5 mV
Relationship between output signal and hex code	-100 %...0...+100 % = 8008_H...0000_H...$7FF8_H$ (-32760...0...32760 decimal)
Conversion cycle for outputs	typ. 1 ms for each configured output channel
Conversion inaccuracy caused by non-linearity, temperature sensitivity, ageing, adjustment error on delivery and resolution	typ. 0.5 %, max. 1 %
Max. cable length, 2-core shielded and cross section $\geq 0,5$ mm^2	100 m

2.1.7.9 Connection of serial interfaces COM1 and COM2

Interface standard	EIA RS-232
Programming with 907 AC 1131	with IBM PC (or compatible)
Program modifications with 907 AC 1131	with IBM PC (or compatible)
Man-machine communication	yes, e.g. with an operating station
Electrical isolation	versus digital inputs and outputs, versus CS31 system bus interface (see also Fig. 2.1–4)
Potential differences	In order to avoid potential differences between the 07 KT 97 basic unit and the peripheral devices connected to the COM1/COM2 interfaces, these devices are supplied from the switch-gear cabinet socket (see also the earthing connections in Fig. 2.1-5).
Pin configuration and description of the COM1/COM2 interfaces	see chapters 2.1.4.10 and 2.1.4.11

2.1.7.10 Connection to the CS31 system bus

Interface standard	EIA RS-485
Connection as a Master PLC as a Slave PLC	yes, transmitting and receiving areas are configurable yes, see "System constants"
Setting of the CS31 module address	yes, by system constant, stored in Flash EPROM of the Slave PLC
Electrical isolation	versus supply voltage, inputs and outputs, versus interfaces COM1/COM2 (see also Fig. 2.1-4)
Terminal assignment and description of the CS31 bus interface	see chapter 2.1.4.3

2.1.7.11 LED displays

LEDs for indication of:

– Statuses of digital inputs	1 green LED per channel
– Statuses of digital outputs	1 yellow LED per channel
– Statuses of digital inputs/outputs	1 yellow LED per channel
– Power supply on	1 green LED
– Battery	1 red LED
– Program is running (RUN)	1 green LED
– Error classes (FK1, FK2, FK3)	1 red LED per error class
– CS31 system bus is running (BA)	1 green LED
– bus-specific errors (BE, RE, SE)	3 red LEDs
– Overload/short-circuit of digital outputs	1 red LED

2.1.7.12 High-speed hardware counter

Data of the integrated high-speed hardware counter:

Configurable	in 7 operating modes
Counting range	-32768...+32767 (16 bits)
Counting frequency	max. 50 kHz
Used inputs	E 62,00 and E 62,01
Used outputs	A 62,00