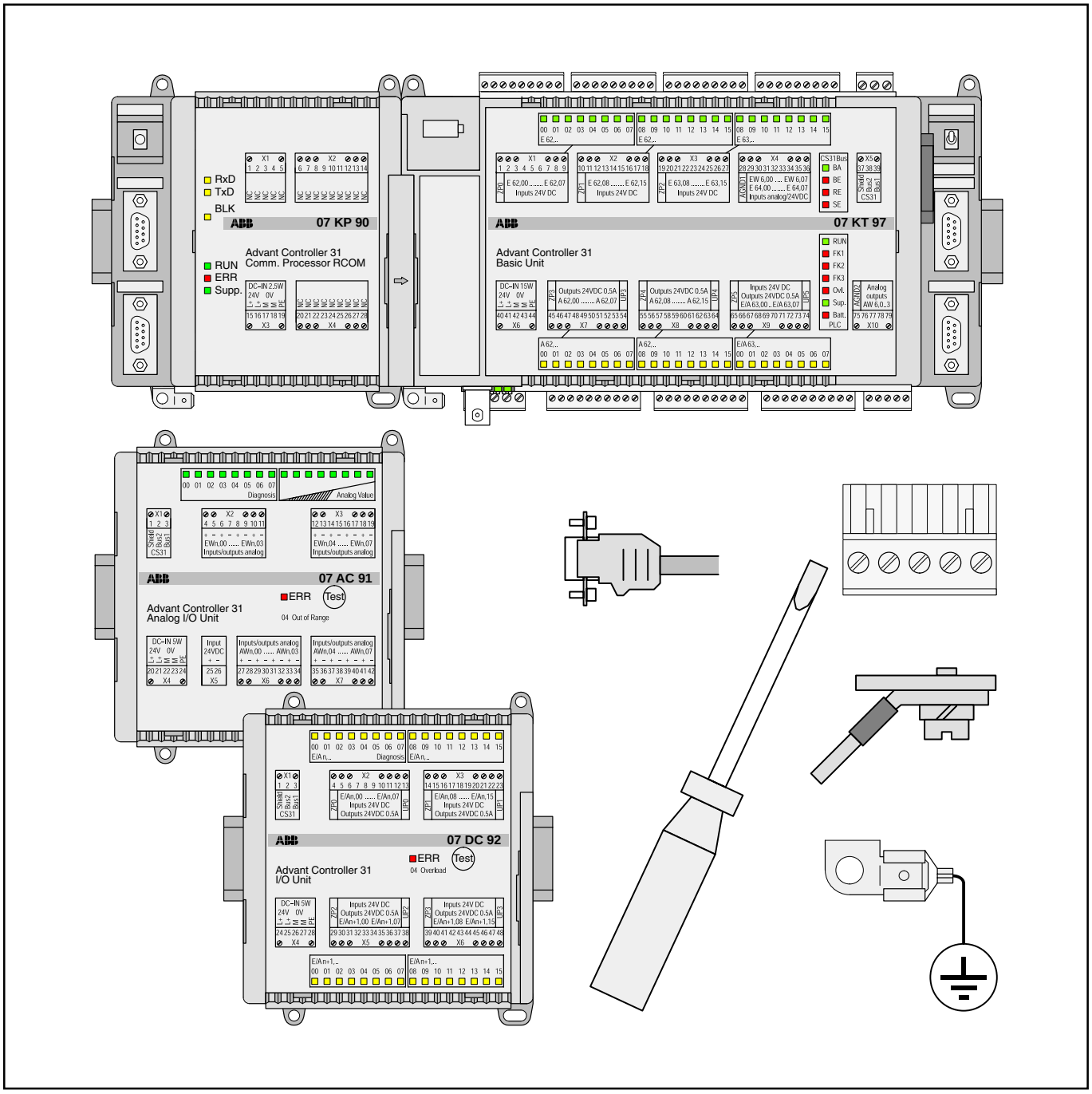
System Description

# Advant Controller 31

Intelligent Decentralized Automation System

## Hardware 90 Series



# Table of Contents (Hardware)


**1 System data and system configuration** ... 1- 1
1.1 System data ... 1- 1
1.2 CS31 system bus ... 1- 3
1.3 General instructions for EMC-compatible installation ... 1- 7
1.4 Check list for project planning and installation ... 1- 7
1.5 Bus cycle time and data security ... 1-10
1.6 Replcacing modules on the CS31-system bus ... 1-12
1.7 Number of user data ... 1-12

**2 Basic units**
2.1 Basic unit 07 KT 97 (with 07 KT 96 and 07 KT 95) ... 2.1-1
2.2 Basic unit 07 KT 98 ... 2.2-1
2.3 Basic unit 07 SL 97 ... 2.3-1

**3 Plug-in bases**
Plug-in base ECZ ... 3.1-1

**4 Digital input and output modules**
4.1 Digital input module 07 DI 92 ... 4.1-1
4.2 Digital input module ICSI 08 E4 ... 4.2-1
4.4 Digital output module ICSO 08 R1 ... 4.4-1
4.5 Digital output module ICSO 08 Y1 ... 4.5-1
4.7 Digital I/O-module 07 DC 91 ... 4.7-1
4.8 Digital I/O-module 07 DC 92 ... 4.8-1
4.10 Keyboard controller 07 TC 91 ... 4.10-1
4.12 Digital input module 07 DI 93-I ... 4.12-1
4.13 Digital output module 07 DO 93-I ... 4.13-1
4.14 Digital input/output module 07 DK 93-I ... 4.14-1

**5 Analog modules** ... 5- 1
5.1 General information for the use of analog modules ... 5.1-1
5.2 Analog input module 07 AI 91 ... 5.2-1
5.4 Analog I/O module 07 AC 91 ... 5.4-1

**6 Special modules** ... 6- 1
6.1

**7 Communication modules**
7.1 Communication module 07 KP 90 ... 7.1-1
7.2 Communication module 07 MK 92 ... 7.2-1
7.3 Communication module 07 KP 93 ... 7.3-1
7.4
7.5

**8** unused
**9** unused

**10 Interface cables** ... 10- 1
10.1 Survey table 07 SK 90...92 ... 10- 3
10.2 Interface cable 07 SK 90 ... 10- 4
10.3 Interface cable 07 SK 91 ... 10- 5
10.4 Interface cable 07 SK 92 ... 10- 6

**11 Accessories** ... 11- 1
11.1 Power supply unit 07 NG 32 ... 11- 3
11.2 Power supply unit 07 NG 34 ... 11- 5
11.3 Power supply unit 07 NG 35 ... 11- 8
11.4 Power supply unit 07 NG 36 ... 11-11
11.5 Lithium battery module 07 LE 90 ... 11-14
11.6 SmartMedia Card 07 MC 90 ... 11-15

**12 Spare parts** ... 12- 1

**Hardware description 40/50 series**

## 1.5 Bus cycle time and data security

**Bus cycle time**

In the following, the bus cycle time $t_B$ is introduced. The reaction time from terminal to terminal is the sum of several delays and is described with the basic units. The bus cycle time consist of:

- Base time 2 ms
  During this time the basic unit performs a diagnosis and looks for new remote modules.
- Bus transmission time per module, depends on the type of module (see next page).
- Equation for the bus cycle time of the AC31 modules:

  Bus cycle time $t_B$ = sum of the bus transmission times of the modules + base time (2 ms)

| Module | Bus transmission time in µs |
|---|---|
| Digital input modules | |
| ICSI 08 D1 | 323 |
| ICSI 08 E1 | 323 |
| ICSI 08 E3 | 323 |
| ICSI 08 E4 | 323 |
| ICSI 16 D1 | 387 |
| ICSI 16 E1 | 387 |
| Digital output modules | |
| ICSO 08 R1 | 260 |
| ICSO 08 Y1 | 260 |
| ICSO 16 N1 | 340 |
| Digital input/output modules | |
| ICSC 08 L1 | 387 |
| ICFC 16 L1 | 516 |
| ICSK 20 F1 | 452 |
| ICSK 20 N1 | 452 |
| 07 DC 91 / ICDG 32 L1 | 516/590 (depending on configuration) |
| 07 DI 92 | 516 |
| 07 DC 92 | 750/516 (depending on configuration) |
| IP65-I/O modules | |
| 07 DK 93-I | 387 |
| 07 DO 93-I | 260 |
| 07 DI 93-I | 387 |
| Analog modules | |
| ICSM 06 A6 | 1162 |
| ICSE 08 A6 | 1355 |
| ICSE 08 B5 | 1355 |
| ICSA 04 B5 | 700 |
| ICST 08 A8 | 1355 |
| ICST 08 A9 | 1355 |
| 07 AI 91 / ICDT 08 B5 | 1355 |
| 07 AC 91 | 2500 |
| Couplers | |
| ICBG32L7 | 516 |
| ICBG64L7 | 750 |
| High-speed counter | |
| ICSF 08 D1 | 1300 |
| Safety-related modules | |
| 07 DI 90-S / 07 EB 90-S | 590 |
| 07 DO 90-S / 07 AB 90-S | 750 |
| 07 AI 90-S / 07 EA 90-S | 1050 |

| Module | Bus transmission time in µs |
|---|---|
| Keyboard/LED controller module | |
| 07 TC 90/91, TCK 64 16 E/A | 387 |
| 32 E/A | 750 |
| Basic units as slaves | |
| 07 KR 31 / 07 KT 31 | 516 * 1) |
| 07 KR 91 / KT 92 bis KT 98 | 750 * 2) |
| | * = default |
| Typ. settings | |
| 1) Send 2 bytes + receive 2 bytes (1 word) | 516 |
| 2) Send 4 bytes + receive 4 bytes (2 words) | 750 |
| Send 8 bytes + receive 8 bytes (4 words) | 1300 |
| Send 12 bytes + receive 12 bytes (6 words) | 1850 |
| Send 8 words + receive 8 words | 2500 |

For system bus-compatible modules from other companies, the bus cycle times are provided with the modules.

Example: 8 modules of 07 DI 92 are used. For one 07 DI 92 a bus transmission time of 516 µs is given in the table. The bus cycle time is now calculated as
$t_B$ = 8 • 516 µs + 2 ms = 6.1 ms.

**Data security**

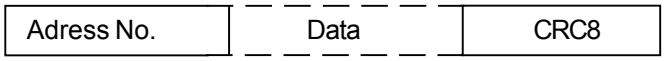
The transmission protocol serves for max. 31 slaves (remote I/O modules) plus one master - the basic unit.

During the initialization cycle the bus master searches for all the slaves and gets in this way the number and types of the found modules.

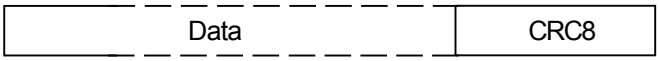
All telegrams terminate with a CRC8 check word. Error security of the bus is Hamming distance 4.

All the messages have the following format:

Request of the basic unit:




Answer of an I/O module:




In every cycle, the bus master addresses all existing modules one after the other, performs diagnostic functions and checks for new installed modules. In this way diagnosis is carried out continuously, the networking is always checked for correct function and new installed modules are detected quickly.

If a basic unit or a module detects a difference between a received CRC and its self-calculated CRC, the concerned telegram is ignored.

A bus error exists when 10 messages are wrong in sequence. For reactions see the descriptions of the the basic units and the couplers.

## 1.6 Replacing modules on the CS31 system bus

- Check the DIL switch settings.
- After replacing a module, the new module will be adopted into the bus cycle by the basic unit or by the coupler automatically. If a module is replaced while the system is running, some error flags may remain set. They can, for instance, be reset with power off/on of the basic unit.

## 1.7 Number of user data

The following table shows, how many user data (in **bytes**) the modules **send to the master** or r**eceive from the master**.

| **Module** | | sends | receives | type |
|---|---|---|---|---|
| ICSI 08... | | 1 | 0 | 0 |
| ICSI 16... | | 2 | 0 | 0 |
| ICSO 08... | | 0 | 1 | 2 |
| ICSO 16... | | 0 | 2 | 2 |
| ICSC 08... | | 1 | 1 | 4 |
| ICSC 16... | | 2 | 2 | 4 |
| ICSK 20... | | 2 | 1 | 4 |
| 07 DC 91 (ICDG 32 L1) | * | 2 | 2 | 4 |
| | | 3 | 2 | 4 |
| 07 DI 92 | | 4 | 0 | 0 |
| 07 DC 92 | * | 4 | 4 | 4 |
| | | 0 | 4 | 2 |
| 07 DK 93 -I | | 1 | 1 | 4 |
| 07 DO 93 -I | | 0 | 1 | 2 |
| 07 DI 93 -I | | 2 | 0 | 0 |
| 07 TC 91 / 07 TC 90 (TCK 64) | * | 2 | 2 | 4 |
| | | 4 | 4 | 4 |
| ICSE 08... | | 16 | 0 | 1 |
| ICST 08... | | 16 | 0 | 1 |
| 07 AI 91 (ICDT 08 B5) | | 16 | 0 | 1 |
| ICSA 04 B5 | | 0 | 8 | 3 |
| ICSM 06 A6 | | 8 | 4 | 5 |
| 07 AC 91 12 bits | * | 16 | 16 | 5 |
| 8 bits | | 16 | 16 | 5 |
| | | 16 | 0 | 1 |
| | | 0 | 16 | 3 |
| ICSF 08 D1 | | 10 | 6 | 5 |
| 07 AI 90-S (07 EA 90-S) | | 12 | 0 | 1 |
| 07 DO 90-S (07 AB 90-S) | | 4 | 4 | 4 |
| 07 DI 90-S (07 EB 90-S) | | 5 | 0 | 0 |

* depends on configuration

Types: 0 = Digital input
1 = Analog input word
2 = Digital output
3 = Analog output word
4 = Digital input/output
5 = Analog input/output word

# 4 Digital input and output modules


| | | | |
|---|---|---|---|
| **4.1** | **07 DI 92:** | Digital input module, 32 inputs 24 V DC, electrically isolated in groups | 4.1-1 |
| **4.2** | **ICSI 08 E4:** | Digital input module, 8 inputs 230 V AC, electrically isolated | 4.2-1 |
| **4.4** | **ICSO 08 R1:** | Digital output module, 8 relay outputs 2 A, electrically isolated | 4.4-1 |
| **4.5** | **ICSO 08 Y1:** | Digital output module, 8 outputs 24 V DC, 2 A, electrically isolated | 4.5-1 |
| **4.7** | **07 DC 91:** | Digital I/O module, 16 inputs, 8 outputs, 8 configurable I/Os, 24 V DC | 4.7-1 |
| **4.8** | **07 DC 92:** | Digital I/O module, 32 configurable I/Os, 24 V DC, output load max. 500 mA | 4.8-1 |
| **4.10** | **07 TC 91:** | Keyboard controller 07 TC 91, 32 switches/keys and 32 LEDs controllable | 4.10-1 |
| **4.12** | **07 DI 93-I:** | Digital input module, 16 channels 24 V DC, degree of protection IP67 | 4.12-1 |
| **4.13** | **07 DO 93-I:** | Digital output module, 8 channels 24 V DC, 2 A, degree of protection IP67 | 4.13-1 |
| **4.14** | **07 DK 93-I:** | Digital I/O module, 8 input channels 24 V DC, 4 output channels 24 V DC/2 A, degree of protection IP67 | 4.14-1 |