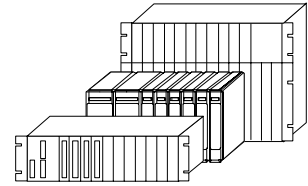


**Ax 1703**



## **Firmware Description**

# **UMPS01**

**Field Bus Slave according to IEC 60870-5-101**

**HW-Type: 2541 / FW-Type: 2504**

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**This document is applicable to the following product(s):**

UMPS01

Rev. 00 and higher

<b>Version</b>	<b>Revision</b>	<b>Date</b>	<b>Change</b>
A, 1	00	11.01.02	first issue

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## 1. System Overview

### 1.1. Short Description

The UMPS01 firmware is used for the serial coupling of two Ax 1703 components in accordance with IEC 60 870-5-101.

The functions supported by IEC 60 870-5-101 are laid down in the interoperability list of Ax 1703.

The message formats used correspond to the IEC 60 870-5-101 standard and the Ax 1703 Data Formats description.

The data communication control used for this firmware is an unbalanced secondary multi-point traffic slave.

The data communication control is done at a fixed baud rate of 38400 bit/s.

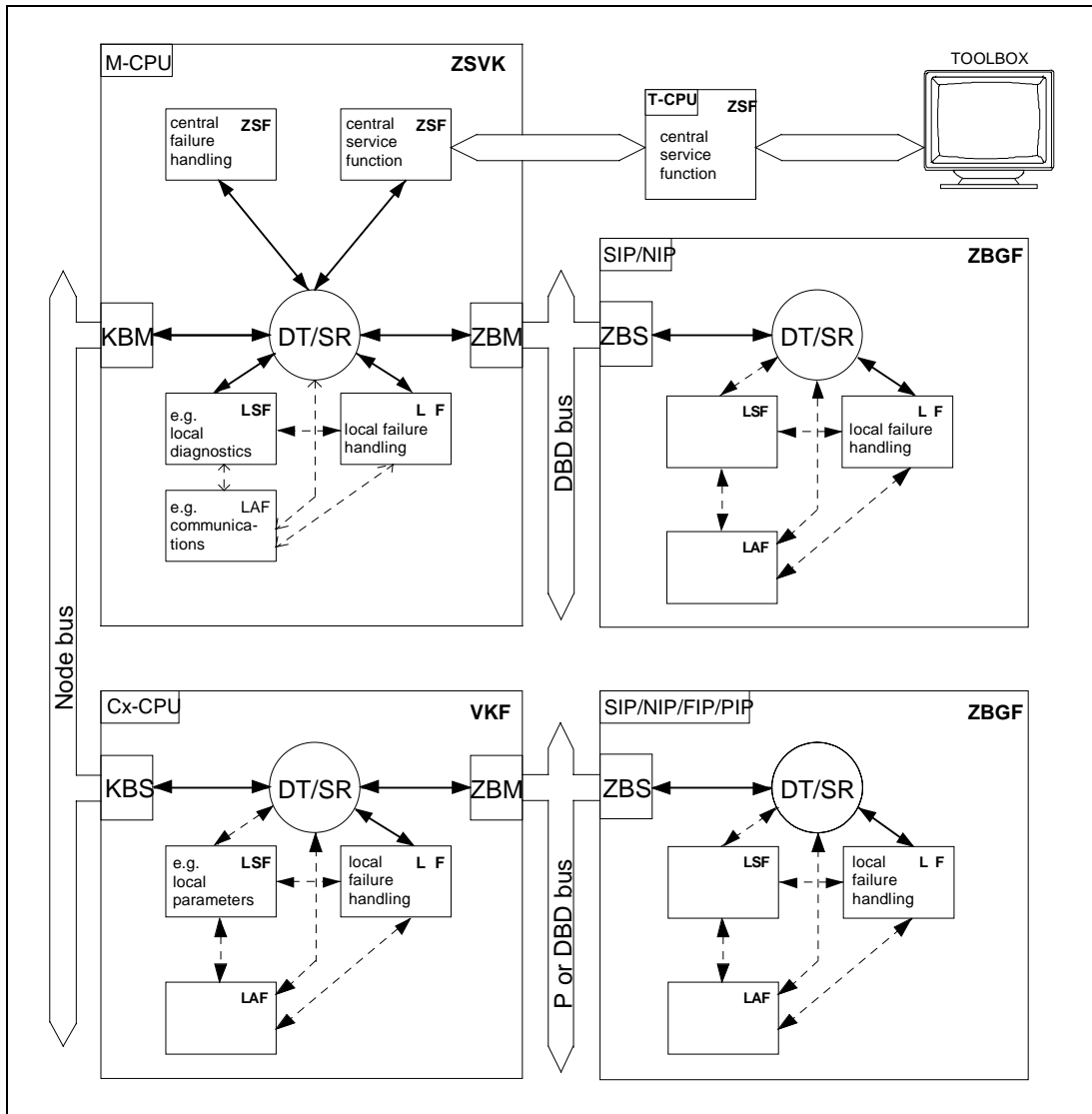
Physical interfaces:

- RS232 (V.24/V.28)
- RS422 (V.11)
- RS485 (V.11)

### 1.2. Interfaces

The communication to the superordinate BSE is done via messages in the Ax 1703 format.

### 1.3. Embedding in the Environment



## 2. Protocol-specific Functions

### 2.1. Interface Fault (Call timeout)

The failure of the central station can be detected in the RTU by the "Call Monitoring" function. If the RTU detects the failure of the central station, an interface fault is displayed.

After an interface fault has been detected, a communications fault is signalled and all further data which are presented for the master station by the BSE are acknowledged negatively.

### 2.2. Redundancy

There is no redundancy function implemented in the UMPS01 firmware at the moment.

### 2.3. Time Synchronization

In order to achieve a time precision of 1 ms in the RTUs via the fieldbus, the UMPM01 master firmware sends a time synchronization message every 5 seconds (TK 103 always at the 3<sup>rd</sup> and 8<sup>th</sup> seconds) "broadcast" to all slaves.

The slave corrects the time contained in the message by the message runtime and inserts the entry time in units of 1ms. For this purpose, the firmware subdivides the 10ms ticker provided by the system into a 1ms clock pulse. In addition, the time synchronization message (FC = 156) is specially marked for the time server in the system (Bit# 5 of the migration status). Based on this identifier, the time server carries out a synchronization of the system time every 10<sup>th</sup> second.

Caution: The 1ms precision is currently only provided in the AM 1703 system because only the time server in the AM 1703 supports this functionality.





## A. Appendix: Diagnostic

Overview:

```

legend category: I ... internal
                  E ... external
                  C ... communication
                  T ... test
                  W ... warning
                  B ... board/module failure
                  S ... startup

```

category	record (rel.)	record (abs.)	meaning
I	0	0	Internal error in the operating system
	2	2	SIP parameter error
	3	3	SIP format conversion error
C	2	42	Communication error
T	0	50	Test mode of the operating and base systems

```
category:    I
record:      0
meaning:     Internal error in the operating system

Bit 00 ... RAM error
Bit 01 ... STACK error
             The defined stack range has been exceeded;
             Replace system element or notify SAT.
Bit 02 ... Firmware shut down
             Diagnosis:
             - Read out system diagnostic ring (command ID R) in ST
               emulation (possibly store to file)
Bit 03 ... Too little free space
             There is not enough free RAM memory available
             for the dynamic memory management;
             Diagnosis:
             - Change parameterization of size definitions
               (e.g. realtime rings, pool size)
             - Notify SAT.

Bit 04 ...
Bit 05 ...
Bit 06 ...
Bit 07 ...
Bit 08 ... CPU 80186 error
Bit 09 ...
Bit 10 ...
Bit 11 ...
Bit 12 ...
Bit 13 ...
Bit 14 ...
Bit 15 ...
```

```
category:    I
record:      2
meaning:     SIP parameter error
```

```
Bit 00 ... Parameter error detected by SIP
Bit 01 ... Parameter error of the LOCAL parameter block no. 06
Bit 02 ... Parameter error ZSE general
Bit 03 ... Parameter setting with invalid stationnumber.
           Diagnosis: Selected stationnumber is greater than 100 and
                   also not a broadcast-station number.

Bit 04 ... Parameter setting with invalid station number.
           Diagnosis: Same station number is used more then once.

Bit 05 ...
Bit 06 ...
Bit 07 ...
Bit 08 ...
Bit 09 ...
Bit 10 ...
Bit 11 ...
Bit 12 ...
Bit 13 ...
Bit 14 ...
Bit 15 ...
```

```
category:    I
record:      3
meaning:     SIP format conversion error
```

```
Bit 00 ... Format conversion error in the transmit direction
Bit 01 ...
Bit 02 ... Format conversion error in the receive direction
Bit 03 ...
Bit 04 ...
Bit 05 ...
Bit 06 ...
Bit 07 ...
Bit 08 ...
Bit 09 ...
Bit 10 ...
Bit 11 ...
Bit 12 ...
Bit 13 ...
Bit 14 ...
Bit 15 ...
```

```
category:    C
record:      2
meaning:     Communication error
```

```
Bit 00 ... Communication failure to the master
Bit 01 ...
Bit 02 ...
Bit 03 ...
Bit 04 ...
Bit 05 ...
Bit 06 ...
Bit 07 ...
Bit 08 ...
Bit 09 ...
Bit 10 ...
Bit 11 ...
Bit 12 ...
Bit 13 ...
Bit 14 ...
Bit 15 ...
```

```
category:    T
record:      0
meaning:     Test mode of the operating and base systems
```

```
Bit 00 ... Memory test disabled
Bit 01 ...
Bit 02 ...
Bit 03 ...
Bit 04 ...
Bit 05 ...
Bit 06 ...
Bit 07 ...
Bit 08 ...
Bit 09 ...
Bit 10 ...
Bit 11 ...
Bit 12 ...
Bit 13 ...
Bit 14 ...
Bit 15 ...
```

## B. Appendix: Bibliography

The following documents are recommended to supplement the "UMPS01" description:

*IEC 870-5-1, "Transmission Frame Formats"*  
(1<sup>st</sup> issue, February 1990)

*DIN EN 60870-5-101 "Fernwirkeinrichtungen und Fernwirksysteme" [Telecommunications equipment and telecommunications systems]*  
Part 5: Transmission protocol  
Main section 101: Application-related standards for basic telecommunications tasks  
(IEC 870-5-101: 1995) German version EN 870-5-101: 1995

*DIN EN 60870-5-5 "Fernwirkeinrichtungen und Fernwirksysteme" [Telecommunications equipment and telecommunications systems]*  
Part 5: Transmission protocol  
Main section 5: Fundamental application functions  
(IEC 870-5-5: 1995) German version EN 870-5-5: 1995

*SAT Description: "Ax 1703 Data Formats"*  
Item number: MA0-000-x.xx

*SAT Description: "IEC 60870-5-101 and 104 Interoperability"*  
Item number: DA0-040-x.xx

*DIN 19244 "Fernwirkeinrichtungen und Fernwirksysteme" [Telecommunications equipment and telecommunications systems]*  
Part 10: Message Formats

*DIN 19244 "Fernwirkeinrichtungen und Fernwirksysteme" [Telecommunications equipment and telecommunications systems]*  
Part 52: Transmission Procedures of the Connection Layer

*DIN 19244 "Fernwirkeinrichtungen und Fernwirksysteme" [Telecommunications equipment and telecommunications systems]*  
Part 53: Transmission Protocol  
Main section 3: General Structure of the Application Data





## C. Appendix: Parameter Documentation

The firmware parameters are described in so-called **PD forms** (parameter documentation forms).

- The parameters described in the PD form are available for parameterization with the PSR Configuring and Service Computer of a SAT TOOLBOX
  - The PD Form describes
    - all parameters that are available for a given firmware and as of which firmware revision they are effective
    - parameter functions and their value ranges
- This appendix documents the parameters for the firmware set forth in the present document in the shape of a blank form filled with default values
- The current state of parameters of a firmware of a certain system element can be documented with the PSR Configuring and Service Computer of a SAT TOOLBOX

Parameterizing with PD forms is supported by both SAT TOOLBOX (PSR) and SAT TOOLBOX II (PSR II).

-----  
 REVISION PARAMETER DOCUMENTATION FORM

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on	by	on	by	on	by
06-10-99	ENT-SW/FR	06-10-99	ENT-SW/FR	31-07-00	ENT-SW/FR

PHYSICAL INTERFACE (\*)

Electrical interface:

-----  
 Possible: 0 = RS232 (V.24/V.28)  
 1 = RS422 (V.11)  
 2 = RS485 (V.11)

Electrical interface: RS232 (V.24/V.28)                      CT command: SPH 002/0C (/C)

STATION NUMBER

Own station number:

-----  
 Possible: 0-99

Station number: 1    CT command: SPS 019 (/D)

=====

c o n t i n u i n g   p a r a m e t e r s

=====

MONITORING TIMES

Station call monitoring time: (call timeout)

-----  
 If the station call monitoring time expires (SLAVE is no longer called from the MASTER), a failure of the interface is signalled.  
 Possible: 0-65535[secs] = 0-18,2[h]

Call monitoring time: 5 [secs]                              CT command: SPS 011/7FFF(/D)

Retrigger call timeout on receiving "REQUEST STATUS of LINK":

-----  
 This message is transmitted by the MASTER only in the initialization phase.  
 With this, in the SLAVE, a communications fault which may exist is only reset if a message transmitted from the SLAVE is answered by the MASTER.  
 With the function enabled, the call timeout must be set longer!  
 Possible: 0=yes; 255=no

Retrigger call timeout: no                                      CT command: SPL 042 (/D)