

AmsCPU



Data Sheet

Description

The AmsCPU module is the central processing unit in the Amplex Module System. Equipped with a powerful ARM9 processor and a Linux kernel, the module monitors and controls all other modules in the Amplex Module System. Direct communication and power supply between the modules are handled by means of an A-Bus interface, which is based on the industrially proven RS-485 technology.

The AmsCPU module serves as a WAN communications and data concentrator module. Two-way communication with the central server takes place via GPRS, SMS or Ethernet. The module has the ability to automatically switch between different available communication carriers in order to provide stable and reliable communication. New carrier types like, e.g. WIFI and WIMAX can be implemented later (using the USB or the Ethernet port on the module) to obtain the best, most reliable and cheapest communication in the future.

Data are either delivered to the server immediately or stored locally in the built-in flash memory of the AmsCPU module until scheduled delivery. Software and configurations are updated remotely from the server and stored on the AmsCPU module enabling it to autonomously execute tasks. Voltage values on all three phases of the main supply are monitored by the AmsCPU module. If the module is installed together with an AmsBattery module, the AmsCPU will be supplied with backup power via the A-Bus in the event of power failure. This enables the AmsCPU module to store data and send a main power failure alarm to the central server before it shuts down safely.



Functionality

| Topic | Comments |
|------------------------|--|
| Monitoring | Battery shutdown Battery low Communication class availability Over/under voltage (every phase) Main power failure Phase fault (every phase) Extra phase, for example cabinet door |
| Communications | The Amplex Communication Framework (AmpCom) enables two-way multi-carrier communication. AmpCom uses communication classes to define the priority of the data. One or more carriers are assigned to each class. If one carrier is not available, another carrier is used instead. Supported carriers: GPRS, SMS, Ethernet |
| Autodiscovery | All modules and meters connected to the AmsCPU module are automatically discovered by the system. In case a module/meter is disconnected from the AmsCPU, this is reported to the server application and the module/meter is listed as missing. If the module/meter is reconnected to the AmsCPU or another AmsCPU, it will be rediscovered by the system. |
| Real-time clock | The AmsCPU module has a calendar and a real-time clock with an absolute maximum deviation of ± 7 seconds per 24 hours in the full temperature range. This is without synchronization with external units. Under normal conditions, clock deviation is automatically adjusted according to the Network Time Protocol (NTP) which gives a maximum deviation of ± 1 second. |

Technical Specifications

Operational specifications

| | |
|-------------------------------------|------------------------------|
| Storage temp. | -40°C to +85°C |
| Operating temp. | -20°C to +65°C |
| Max humidity | 90% (non-condensing) |
| IP grade | IP20 |
| Input voltage | 190 to 250 V AC (3P + N) |
| Power consumption | Typical < 2 W |
| Current consumption (A-Bus powered) | Typical 100 mA Max 300 mA |

Standards and approvals

2006/95/EC, Low Voltage Directive (LVD)
2004/108/EC, EMC Directive
1999/5/EC, R&TTE Directive
2002/95/EC, RoHS Directive



Functionality

| Topic | Comments |
|-----------------------|---|
| Local storage of data | The collected data are stored in non-volatile memory which holds the values until they are sent to the server. The AmsCPU module has the capacity to store data for at least 150,000 historical measurements, depending on the data size of the values. |
| PAK System | A software management system designed to maintain the software on AmsCPU modules remotely. Enables installation, removal, and upgrade of software through a web user interface on one or more selected AmsCPU modules. It also allows on-site upgrades with an authenticated USB memory stick. |
| Sub system software | Sub system software, e.g. AmLight logic etc. can be downloaded from the Data Centre application for installation and upgrade. |
| Battery | Internal backup battery for clock and tampering monitoring |
| Configuration data | From the server application, AmsCPU configuration data can be changed, as required. The configuration data include: Communication classes Surveillance of communication classes MeterMind™ features (an advanced metering infrastructure (AMI) system) StartGrid features (a low-voltage power network monitoring and control system) |
| LEDs | CPU LED (red): indicates whether the AmsCPU module is up and running. Communication status LED (green): indicates whether a GPRS or an Ethernet connection has been established with the server. AMS Status LED (green): indicates whether the A-Bus is up and running. |

Connections

| I/O | Comments |
|------------------------------------|--|
| RS232 interface | Max data transfer rate 115.2 kbps |
| Service port | For use with Amplex service tools |
| A-Bus | 12 V DC supply to client modules, 10 W (max) In case of power failure, the A-Bus also serves as backup power supply for the AmsCPU module. |
| Phase voltage | Phase voltage measure ($\pm 2\%$ FSD in 190-250 V range, $\pm 5\%$ FSD outside this range) on three-phase supply and one extra phase (230 V AC analog input). This phase may be used for, e.g. cabinet door monitoring. |
| Power supply | The AmsCPU module can be powered by one, two or three phases + neutral. Nominal voltage: 230 V AC, Nominal frequency: 50/60 Hz. When powered by three phases, the AmsCPU module will be able to detect phase faults on the main power supply. If a fault occurs on one or two phases, the AmsCPU module will still be powered by the remaining phase(s). In this case, the AmsCPU module will send an alarm to the central server. |
| USB | USB 2.0 (12 MB/s) for additional devices, host port, max 250 mA, 5 V |
| Analog inputs | Analog input 0-10 V, 4-20 mA (0-20 mA): Impedance = 510 Ohms (DC) Accuracy = $\pm 2\%$ FSD Can also be used as digital input: Threshold of approximately 1 V Max input voltage = 12 V (A-Bus voltage can be used.) |
| Digital input/ Tamper detection | One digital input with 1 MOhm internal pull-up. Off resistance less than 100 kOhms. It is intended for use with a relay contact or an NPN open collector device on input connections 6 and 5. In addition to digital input, it can for example be used for tampering detection using the internal backup battery. |
| Ethernet | RJ45 connector, 100 Mbps/10 Mbps, half & full duplex |
| GSM/GPRS | SMA connector for external GSM antenna. GSM900, GSM1800, GSM1900 |
| SIM Card | SIM card is inserted behind top part of the cabinet. |
| Power consumption | If the AmsCPU module is connected to the maximum number of client modules possible, the setup consumes max 18 W. In an average installation consisting of the AmsCPU module and three AMS modules, the AmsCPU module typically consumes less than 2 W. |

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Technical Specifications

Processor Details

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|-------------|----------|
| Family | ARM9 |
| Performance | 200 MIPS |

Operating System Details

| | |
|----|-------------------------|
| OS | Linux® operating system |
|----|-------------------------|

GSM/GPRS Details

| | |
|-------------------|--|
| Bands | Tri band GSM900/EGSM900, GSM1800, 1900 MHz. Compliant to GSM Phase 2/2+ |
| Transmit power | Class 4 (2 W) at EGSM900 Class 1 (1 W) at GSM1800/1900 |
| GPRS connectivity | GPRS multi-slot class 10 GPRS mobile station class B |
| GPRS | GPRS data downlink transfer: max 21.4 kbps Coding scheme: CS-1, CS-2, CS-3 and CS-4 PPP: Two protocols PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) Support of Packet Switched Broadcast Control Channel (PBCCH) |
| SMS | MT, MO, CB, Text and PDU SMS storage: SIM card plus. Transmission of SMS can alternatively be user-defined |
| SIM interface | Supported SIM card: 3 V |

Reliability & Maintainability

Topic Comments

| | |
|------------------------------|---|
| Software upgrade | The software on the AmsCPU module can be updated remotely from the central server. |
| Multi-layer system health | Various internal processes ensure that the system is up and running at all times. In case a process is stalled, it is restarted without disturbing other processes. |
| Installation of new software | New software is transferred without interrupting the normal functionality of the AmsCPU module. When the software has been transferred, the integrity of the software is checked and the software is installed. |
| Self-test | A built-in self-test (BIST) is performed after power-up. |

AmsCPU

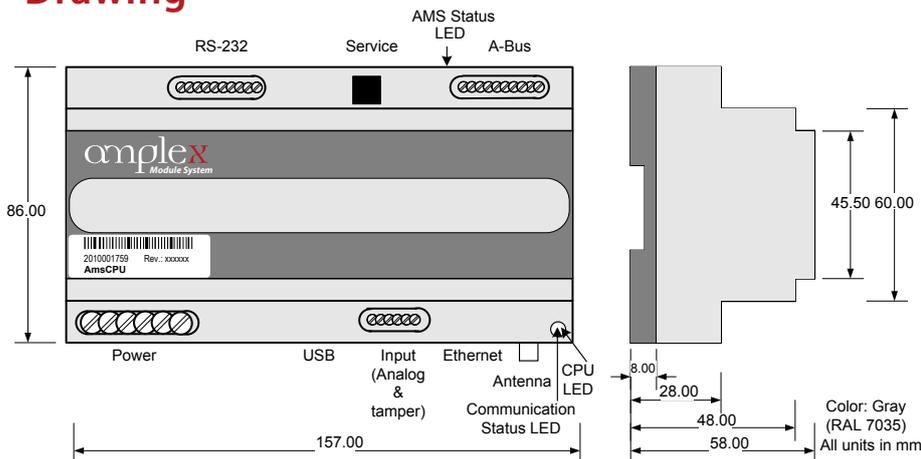
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Installation Guide

The AmsCPU module can be connected to any client module in the Amplex Module System, e.g. AmsRS485, AmsSwitch. The A-Bus connections are internally daisy-chained for easy installation.

| Topic | Comments |
|-------------------------------|---|
| A-Bus cable | Use shielded twisted pair cable. |
| A-Bus cable length | < 3 m |
| Input cable length | < 3 m |
| USB cable length | < 3 m |
| RS-232 cable length | < 3 m |
| Ethernet cable length | < 3 m |
| 0.5 mm ² terminals | Use a 2 mm slotted screwdriver to loosen/tighten the terminal screws. |
| Functional earth | It is recommended that the A-Bus connection 1 or 6 is connected to functional earth. This is not for safety protection as the AmsCPU module is protection class II equipment. |
| Enclosure | The AmsCPU module must be installed in an enclosure of protection degree IP65 or installed at a location that provides the module with the same level of protection. |
| Antenna | Insert the antenna in the antenna socket of the AmsCPU module and tighten it gently with your fingers. Do not use tools. |

Drawing



Ordering Information

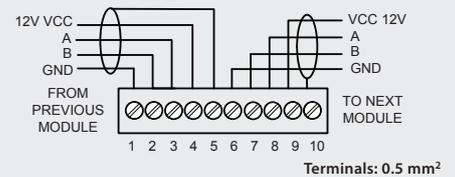
| Product | Order number | Product | Order number |
|--------------------------|--------------|---------------------|--------------|
| AmsCPU | 100-10-001 | Amplex SIM Mini | 260-10-000 |
| Vandal resistant antenna | 230-20-000 | Analog light sensor | 250-40-000 |
| Mini-PT Dual antenna | 230-30-000 | | |
| Mini-PT Dual antenna 90° | 230-30-001 | | |
| Wifi USB Module | 250-50-000 | | |

Physical Specifications

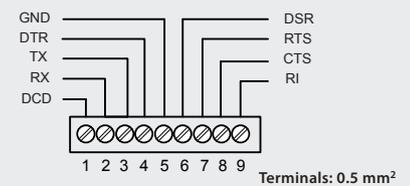
| | |
|------------------|--|
| Weight | 262 g |
| Top part | Gray (RAL 7035) Lexan 940 |
| Base part | Black (RAL 7021) Noryl VO 1550 |
| Coating | Conformal coated |
| A-Bus connector | 0.14 - 0.5 mm ² (AWG 26-20) |
| RS-232 connector | 0.14 - 0.5 mm ² (AWG 26-20) |
| Power connector | 0.14 - 1.5 mm ² (AWG 26-16) |
| Input connector | 0.14 - 0.5 mm ² (AWG 26-20) |
| Mounting | DIN-rail (EN50022) |

I/O Schematic

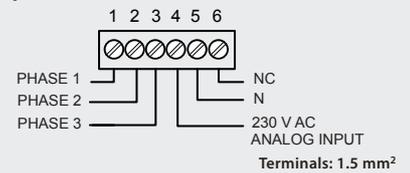
A-Bus connection



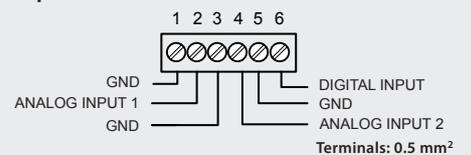
RS-232 connection



Main power connection



Input connection



amplex

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