Doc. Code: 6116-100.0 Revision: F

# 1. Product Description

The CPUs QK800 and QK801 are two models of Quark PLC Series. They can control up to 256 or 512 I/O respectively, including digital and analog. Typical applications are to process and machine control.

With extreme compact design, they have integrated in only one plastic casing the CPU and power supply. They support a structured programming language using ladder diagram organized in modules.

They use ALNET I Versions 1.00 and 2.00 network for programming and remote control.

The main features differences between them are as follow:

| Product | QK800 | QK801 |
|---|---|---|
| Maximum I/O cards capacity | 16 | 32 |
| Maximum I/O capacity | 256 | 512 |
| Maximum memory | 32K RAM<br>32K FLASH | 128K RAM<br>128K FLASH<br>(with expansion) |
| Default memory | 32K RAM<br>32K FLASH | 32K RAM<br>64K FLASH |
| Real time clock | - | Yes |
| Serial interface | 1 | 2 |

# 2. Integrating Parts

The following parts integrate the product:

- QK800 or QK801: programmable controller for 256 or 512 digital I/O points
- QK2691: lithium battery ½ AA size
  Spare parts are available upon ordering.

# 3. Optional Parts

The following parts do not integrate the product and can be order in separate:

- QK1500/4: mounting rail to CPU and 4 I/O cards
- QK1500/8: mounting rail to CPU and 8 I/O cards
- QK1500/12: mounting rail to CPU and 12 I/O cards
- QK1500/16: mounting rail to CPU and 16 I/O cards
- AL-2650: 128 Kbytes RAM memory for application program
- AL-2652: 128 Kbytes FLASH EPROM memory for application program

| Cables | Equipment to connect | |
|---|---|---|
| QK1304 | QK800/QK801 | Up to 4 I/O cards |
| QK1308 | QK800/QK801 | Up to 8 I/O cards |
| QK1312 | QK800/QK801 | Up to 12 I/O cards |
| QK1316 | QK800/QK801 | Up to 16 I/O cards |
| AL-1363 | QK801 | QK2512 power supply |
| AL-1342 | QK800/QK801 | IBM-PC® with RS-232C (DB9)<br>or AL-3902 |
| AL-1343 | QK800/QK801 | IBM-PC® with RS-232C (DB25) |
| AL-1397 | QK800/QK801 | AL-1413 RS-232C/RS-485 converter |
| AL-1397 | QK800/QK801 | AL-1414 Modem |

# 4. Specifications

## 4.1. General

- Maximum number of digital I/O: 256 (QK800), 512 (QK801)
- Maximum number of I/O cards: 16 (QK800), 32 (QK801)
- Maximum number of analog I/O: limited to the maximum number or I/O cards available for each configuration
- RS-232C serial interface with ALNET I Versions 1.00 (partial) and 2.00 network protocol. It allows long distance connections using modems.
- EIA 485 serial interface (only QK801)
- Real time clock with calendar (only QK801)
- CPU Status LEDs on the frontal panel
- Program and operand memory retentive by lithium battery with automatic and periodic self-test
- FLASH EPROM memory to application program
- Intel® 80C32 microcontroller
- Clock frequency: 14,7456 MHz
- Watch-dog-timer
- Operating temperature: 0 to 60°C (32 to 140°F)
  exceed IEC 1131 Norm
- Storage temperature: -25 a 75°C (-13 to 167°F)
  according to IEC 1131 Norm
- Operating air relative humidity: 5 to 95% without condensation
  according to IEC 1131 Norm Level RH2
- Weight:
  without packing: 1100 g (2.4lb)
  with packing: 1300 g (2.9lb)
- MTBF: 23.100 hours @ 40°C (104°F)
  calculated according to MIL-HDBK-217E Norm
- Protection: IP20, against accidental finger access and without water protection
  according to IEC Pub. 144 (1963) Norm, with product mounted

## 4.2. Electrical

- Operating voltage:
  93,5 to 253 VAC
  or
  95 to 250 VDC
- Operating frequency:
  47 to 63 Hz
- Input surge current:
  25 A (half cycle or 10 ms)
- Maximum Input Power Requirements:
  50 VA
- Power factor:
  75% (typical), with 127 VAC, nominal load
- Efficiency:
  65% (minimum), with 127 VAC, maximum load
- Fuse:
  2 A (intern)
- Dielectric Withstand Voltage:
  2500 VDC / 1500 VAC between supply lines (L1 and L2) and protection ground (GND) and bus output
- Continuous operating up to 10 ms without power supply
- Maximum dissipation:
  4,2 W (1,7 W CPU + 2,5 W power supply)

■ Battery life:

| Memory Configuration | Operating Temperature | Life (years) |
|---|---|---|
| Standard RAM (32K) | 0 to 40°C (32 to 104°F) | 5 |
| Standard RAM (32K) | 0 to 60°C (32 to 140°F) | 2 |
| With RAM expansion AL-2650 | 0 to 40°C (32 to 104°F) | 2,5 |
| With RAM expansion AL-2650 | 0 to 60°C (32 to 140°F) | 2 |

■ Battery self-discharge time:
5 years

■ Static Discharge Protection (ESD):
according to IEC Norm Level 4

■ Electrical noise immunity (oscillating wave):
according to IEC1131 Norm Severity Level A, and IEEE C37.90.1 (SWC)

■ Irradiated electrical field immunity:10 V/m @ 140 MHz
according to IEC 1131 Norm

■ Protection against electrical shock:
according to IEC 536 (1976) Norm, Class I

### *I/O Bus power supply:*

■ Voltages:
+5V @ 0,3A
+12V @ 1,2A

■ Line regulation:
5%

■ Oscillation:
50 mVpp

■ Noise:
100 mVpp

■ Protections:
over-voltage and short-circuit, with intermittent power supply blocking

## *4.3. Software*

■ Programming language: ladder diagram structured in modules with functions and sub-routines

■ Programming tools: AL-3830, AL-3832 and AL3840 MASTERTOOL (programming tool for WINDOWS®), for IBM-PC® microcomputers

■ Total application program memory capacity for QK800 CPU: 64 Kbytes:
RAM: 32 Kbytes
FLASH EPROM: 32 Kbytes

■ Total application program memory capacity for QK801 CPU: 256 Kbytes:
RAM: 32 or 128 Kbytes
FLASH EPROM: 64 or 128 Kbytes

32 Kbytes RAM and 64 Kbytes FLASH EPROM (32 Kbytes on QK800 CPU) are standard with the product. It is possible to use any RAM and FLASH EPROM configuration inside the maximum limits to each CPU.

■ On-line software module loading

■ Functions and sub-routines can be created

■ Operands for digital processing (QK800 CPU):
– input (I): up to 256 I/O
– output (O): up to 256 I/O
– flag (F): up to 768 flags

■ Operands for digital processing (QK801 CPU):
– input (I): up to 512 I/O
– output (O): up to 512 I/O
– flag (F): up to 768 flags

The total number of 256 or 512 I/O include input and output simultaneously, that is, the sum of input and output points must be always smaller or equal to this limit.

■ Operands for numerical processing:
– memory constant (KM): 16 bits, format complement of 2
– decimal constant (KD): 32 bits, format BCD with signal
– memory simple (M): up to 4096 operands, 16 bits, format complement of 2
– decimal simple (D): up to 2048 operands, 32 bits, format BCD with signal
– memory table (TM): up to 255 operands with 255 positions
– decimal table (TD): up to 255 operands with 255 positions

To the O, F, M and D operands can be retentive by programming configuration. The retentive operands have their values preserved when the PLC is turned off. By then the none-retentive ones are reset. The table operands (TM and TD) are retentive by default.

All numeric operands (KM, KD, M, D, TM and TD) can have arithmetic signal. The total amount of simple (M and D) and table (TM and TD) numeric operands is configurable for each application. The limit is the PLC available operand memory (15,5 Kbytes).

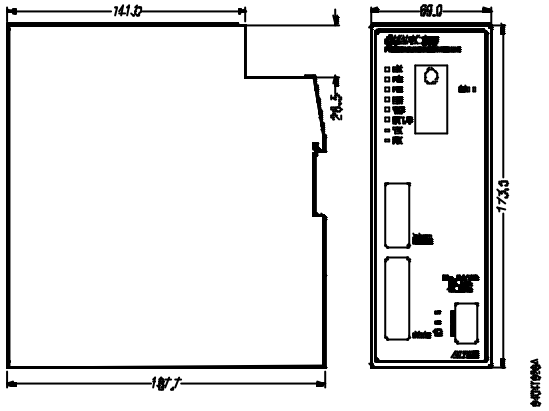
■ Memory available to simple and table operands: 15,5 Kbytes

■ Average execution time to a contact instruction: 5 µs

■ Average memory allocation to a contact instruction: 8 bytes

## 5. Physical Dimensions

The two CPUs have the same physical dimensions as shown:




## 6. EIA 485 Serial Interface

The EIA 485 serial channel can be used to connect various PLCs on a ALNET-I network. It is available as the second port in the QK801 CPUs.

- Available only on QK801 CPU
- Physical interface:
  EIA 485 with galvanic isolation
- Bus topology
- Maximum distance:
  2 km
- Programmable speed up to 9600 bauds
- Connection to supervisory softwares already developed to ALNET I network or programming software
- Up to 32 stations
- Application software interface by means of F-ALNET1.062 function

## 7. Handbooks

For detailed information the following handbooks should be consulted:

- Series Quark CPUs Utilization Handbook
- Programming Software AL-3830 Utilization Handbook
- Programming Software AL-3840 Mastertool Utilization Handbook

## 8. Revisions

The revision of this document is shown at the right upper corner, indicating changes.

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The following historic shows changes to each revision:

| | |
|---|---|
| Revision: A | Date: 09/14/94 |
| Approval: Júlio Sieczkowski - R&D | |
| Author: Ronald Luís Benvenutti - R&D | |

Observations:

- Initial revision of this document

| | |
|---|---|
| Revision: B | Date: 12/20/94 |
| Approval: Júlio Sieczkowski - R&D | |
| Author: Andreas Ch. Hasenack - R&D | |

Observations:

- MTBF characteristic change

| | |
|---|---|
| Revision: C | Date: 06/06/95 |
| Approval: Júlio Sieczkowski - R&D | |
| Author: José Dirceu G. Ramos - R&D | |

Observations:

- Document format revision

| | |
|---|---|
| Revision: D | Date: 09/24/95 |
| Approval: Júlio Sieczkowski - R&D | |
| Author: Parceria Ltda. | |

Observations:

- WINWORD 6.0 document conversion

| | |
|---|---|
| Revision: E | Date: 12/11/95 |
| Approval: Júlio Sieczkowski - R&D | |
| Author: Cláudio Haussen - R&D | |

Observations:

- Fuse value changed

| | |
|---|---|
| Revision: F | Date: 04/03/96 |
| Aproval: Júlio Sieczkowski - R&D | |
| Author: José Dirceu G. Ramos - R&D | |

Observations:

- Modem characteristic included