The DA-820's main operating system is based on the Intel quad-core i7-3612QE CPU and QM77 chipset, which supports standard x86, 2 VGA ports, 6 USB port, 4 gigabit LAN ports, and 2 3-in-1 RS-232/422/485 serial ports. The DA-820 is equipped with a 4 SATA disk interface and supports RAID 0/1/5/10 functionality. The DA-820 is specifically designed for substation applications that require precise time synchronization and adherence to the IEC 61850-3 standards. The flexible design makes the DA-820 suitable for local SCADA, environmental monitoring, video surveillance, protocol conversion, and PRP/HSR redundancy applications. In addition, the cybersecurity function makes the DA-820 an ideal solution for secure network communication applications.

The DA-820 complies with the IEC 60255 standards to enable the protection of electrical relays in a smart substation. IEC 60255 is one of the most widely used standards for testing relays and protection equipment, and compliance ensures that the DA-820 will work reliably and seamlessly with IEDs (intelligent electronic devices) as a part of the robust substation automation system.

The housing is a standard 3U, 19-inch wide, rack-mounted rugged enclosure. This robust, rack-mountable design provides the hardened protection needed for industrial environment applications.
Hardware Specifications

Computer
CPU:
- DA-820-C7: Intel dual-core i7-3555LE 2.5 GHz processor
- DA-820-C8: Intel quad-core i7-3612QE 2.1 GHz processor
OS (Optional):
- 64-bit Debian 7
- 64-bit Windows Embedded Standard 7
- 64-bit Windows 7 Professional for embedded systems
Note: The OS is optional; you may purchase Windows 7 Embedded Standard 7 or Windows 7 Professional for embedded systems via CTOS, or download Debian 7 from our website.

System Chipset: QM77
BIOS: SPI Flash 64 Mbit BIOS, PCI Plug & Play, ACPI function support

System Memory:
Max. 16 GB capacity (204-pin SO-DIMM x 2, each supporting un-buffered ECC DDR3 memory at 1333 and 1600 MT/s, 8 GB Max.)

USB:
- Rear panel: USB 2.0 hosts x 4, Type A connector
- Front panel: USB 2.0 hosts x 2, Type A connector

Storage
Built-in: CFast socket: Optional Cfast card to store OS
Storage Expansion:
- 4 SATA 2.0 interfaces, supporting RAID 0, 1, 5, 10, hot-swappable

Display
Graphics Controller: Intel® HD Graphics 4000
Display Interface: 2 VGA outputs (DB9 female connector)
Resolution: CRT display mode with pixel resolution up to 2048 x 1536 at 75 Hz

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports x 4
- Ethernet 1 to 3: Intel 82574 gigabit Ethernet controller
- Ethernet 4: Intel 82579 gigabit Ethernet controller supporting Intel AMT technology

Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface
Serial Standards:
- 2 RS-232/422/485 ports (DB9 male)

Serial Signals
- RS-232: Tu, Rx, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: Tu+, Tu-, Rx+, Rx-, GND
- RS-485-4w: Tu+, Tu-, Rx+, Rx-, GND
- RS-485-2w: Tu+, Tu-, Data+, Data-, GND

LEDs
System: Power, Storage
Gigabit LAN: 100M x 4, 1000M x 4
Serial: TX/RX
Programmable: LED x 8

Switches and Buttons
Power Switch: on/off (on rear panel)

Physical Characteristics
Housing: SECC sheet metal (1 mm)
Weight: 14 kg (31.11 lb)
Dimensions: 361 x 440 x 133 mm (14.23 x 17.32 x 5.24 in) (without rackmount ears)
Mounting: Standard 19-inch rackmount

Environmental Limits
Operating Temperature:
- DA-820-C8: -40 to 60°C (-40 to 140°F)
- DA-820-C7: -40 to 75 °C (-40 to 167°F)

Storage Temperature:
-40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-Vibration: 2 Grms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis

Anti-Shock: 20 g @ IEC-68-2-27, half sine wave, 11 ms

Power Requirements
Input Voltage:
- High Voltage: 100 to 240 VAC/VDC, 50/60 Hz, 1 A
- Low Voltage: 24 to 110 VDC, 4.7 A

Multiple Power Supplies:
- SP: Single power supply
- DP: Dual power supplies

Power Consumption: 60 W

Standards and Certifications
Safety:
- LVD, UL, cUL

Electrical Substation:
- IEC 61850-3, IEC 60255, IEEE 1613

Protection Relay:
- IEC 60255

EMC:
- EN 61000-6-2/6-4
- CISPR 22, FCC Part 15B Class A
- IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV
- IEC 61000-4-3: EFT: Power: 4 kV; Signal: 4 kV
- IEC 61000-4-5 Surge: Power 4 kV; Signal 4 kV
- IEC 61000-4-6 CS: Signal: 10 V
- IEC 61000-4-8: 20 A/m
- IEC 61000-4-9: 300 A/m
- IEC 61000-4-11: (AC models only)

Green Product:
- RoHS, CRoHS, WEEE

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock) with lithium backup battery
Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable
**Software Specifications**

### Linux
OS: 64-bit Linux Debian 7

**Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML

**File System:** EXT 4

**Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE

**Internet Security:** OpenVPN, Netfilter/iptables

**Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network

**Dial-up Networking:** PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with 'chat', 'dip', and 'diald', among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).

**File Server:** Enables remote clients to access files and other resources over the network

**Watchdog:** A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- GNU C/C++ cross-compiler
- GNU C library
- Perl

**Software Package:**
- SNMP
- SafeGuard technology

### Windows Embedded Standard 7

**Core OS:**
- 64-bit support
- Remote Client
- Remote Procedure Call

**Applications and Services Development:**
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services:**
- Internet Explorer 8.0
- IIS 7.0

**File Systems and Data Storage:**
- Windows Data Access Components
- Windows Backup and Restore

**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:** Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

### Graphics and Multimedia:
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12
- Create and Play DVDs
- Photo Viewer
- Remote media streaming
- Windows Media Center

### International:
- IME Simplified Chinese Support
- IME Traditional Chinese Support
- IME Japanese Support
- IME Korean Support

### Management:
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

### Networking:
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

### Security:
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)
- MS AntiMalware
- Windows Defender
- Bitlocker Secure Startup
- Applocker

### Enterprise Features:
- Enterprise Search Scopes
- BranchCache
- DirectAccess
- Windows XP Mode

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**MTBF** (mean time between failures)

**Time:**
- DA-820-C7-DP-HV-T: 138,503 hrs
- DA-820-C7-SP-HV-T: 191,570 hrs
- DA-820-C8-DP-HV: 128,077 hrs
- DA-820-C8-SP-HV: 172,182 hrs
- DA-820-C7-DP-LV-T: 240,015 hrs
- DA-820-C7-DP-LV: 221,019 hrs
- DA-820-C7-SP-LV-T: 240,015 hrs
- DA-820-C8-SP-LV: 221,019 hrs

**Standard:** Telcordia (Bellcore) Standard TR/SR

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**Warranty**

**Warranty Period:** 3 years

**Details:** See www.moxa.com/warranty
Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

Windows 7 Professional for Embedded Systems

Core OS:
- 64-bit support
- Remote Client
- Remote Procedure Call

Applications and Services Development:
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:
- Internet Explorer 8.0
- IIS 7.0

File Systems and Data Storage:
- Windows Data Access Components
- Windows Backup and Restore

Diagnostics:
- Common Diagnostic Tools
- Problem Reports and Solutions

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- Active Directory Rights Management
- Security Base
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- MS AntiMalware
- Windows Defender

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

### Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA-820-C7-SP-HV</td>
<td>i7-3555LE, dual-core 2.5 GHz, 100 to 240 VAC/VDC, -40 to 60°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C7-SP-HV-T</td>
<td>i7-3555LE, dual-core 2.5 GHz, 100 to 240 VAC/VDC, -40 to 75°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C7-SP-LV-T</td>
<td>i7-3555LE, dual-core 2.5 GHz, 24 to 110 VDC, -40 to 75°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C7-DP-HV</td>
<td>i7-3555LE, dual-core 2.5 GHz, 100 to 240 VAC/VDC x 2, -40 to 60°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C7-DP-HV-T</td>
<td>i7-3555LE, dual-core 2.5 GHz, 100 to 240 VAC/VDC x 2, -40 to 75°C, w/o CFast/RAM/OS</td>
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<tr>
<td>DA-820-C7-DP-LV-T</td>
<td>i7-3555LE, dual-core 2.5 GHz, 24 to 110 VDC x 2, -40 to 75°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C8-SP-HV</td>
<td>i7-3612QE, quad-core 2.1 GHz, 100 to 240 VAC/VDC, -60 to 60°C, w/o CFast/RAM/OS</td>
</tr>
<tr>
<td>DA-820-C8-SP-LV</td>
<td>i7-3612QE, quad-core 2.1 GHz, 24 to 110 VDC, -40 to 60°C, w/o CFast/RAM/OS</td>
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<tr>
<td>DA-820-C8-DP-HV</td>
<td>i7-3612QE, quad-core 2.1 GHz, 100 to 240 VAC/VDC x 2, -40 to 60°C, w/o CFast/RAM/OS</td>
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<tr>
<td>DA-820-C8-DP-LV</td>
<td>i7-3612QE, quad-core 2.1 GHz, 24 to 110 VDC x 2, -40 to 60°C, w/o CFast/RAM/OS</td>
</tr>
</tbody>
</table>

To order a DA-820 system with a pre-installed OS, please contact a Moxa sales representative.

### Recommended Configuration

<table>
<thead>
<tr>
<th>Operating System</th>
<th>System Memory</th>
<th>CFast Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-bit Linux Debian 7</td>
<td>≥ 2 GB</td>
<td>≥ 2 GB</td>
</tr>
<tr>
<td>Windows Embedded Standard 7</td>
<td>≥ 4 GB</td>
<td>≥ 16 GB</td>
</tr>
</tbody>
</table>

### Optional DA-820 Expansion Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA-IRIG-B-S-02-T</td>
<td>IRIG-B expansion module, PCI interface, 1 fiber IRIG-B in, 1 DB9M in/out, 1 DB9M out</td>
</tr>
<tr>
<td>DA-IRIG-B-S-04-T</td>
<td>IRIG-B expansion module, PCI interface, 1 fiber IRIG-B in, 1 DB9M in/out, 3 DB9M out</td>
</tr>
<tr>
<td>DA-PRP-HSR</td>
<td>PRP, HSR expansion module, PCIe interface</td>
</tr>
<tr>
<td>DE-GX02-SFP-T</td>
<td>2-port 1000 Mbps fiber card, SFP slot x 2, PCIe interface (SFP module excluded)</td>
</tr>
<tr>
<td>DE-FX02-SFP-T</td>
<td>2-port 100 Mbps fiber card, SFP slot x 2, PCIe interface (SFP module excluded)</td>
</tr>
</tbody>
</table>
## Optional Accessories

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini DB9F-to-TB</td>
<td>DB9 female to terminal block adapter</td>
<td>For IRIG-B card</td>
</tr>
<tr>
<td>DDR3-THERMAL-KIT-82001</td>
<td>DDR3 SDRAM Thermal Kit</td>
<td>For non-DDR3L SDRAM</td>
</tr>
<tr>
<td>FAN-KIT-82001</td>
<td>Fan kit without lock</td>
<td>Fan Kit for when using a 3rd party high performance graphics accelerator card in the PCIe x 16 slot.</td>
</tr>
<tr>
<td>FAN-KIT-82002</td>
<td>Fan kit with lock</td>
<td>Fan Kit for when using a 3rd party high performance graphics accelerator card in the PCIe x 16 slot.</td>
</tr>
<tr>
<td>HDD-DOOR-LOCK-82001</td>
<td>HDD kit with thermal hole</td>
<td>For heat dissipation</td>
</tr>
</tbody>
</table>

## Expansion Card Table

<table>
<thead>
<tr>
<th>Slot</th>
<th>No.</th>
<th>Expansion Card</th>
<th>Application</th>
<th>Moxa Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCIe x 16</td>
<td>1</td>
<td>Video Card</td>
<td>Video surveillance</td>
<td>(purchase from another vendor)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RAID Card</td>
<td>Data storage</td>
<td>(purchase from another vendor)</td>
</tr>
<tr>
<td>PCIe x 1</td>
<td>3</td>
<td>PRP/HSR Card</td>
<td>Communication redundancy</td>
<td>DA-PRP-HSR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LAN Card/Fiber Card</td>
<td>Data transmission</td>
<td>DE-GX02-SFP-T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-232</td>
<td>Device control or data acquisition</td>
<td>CP-116E-A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-422</td>
<td>Device control or data acquisition</td>
<td>CP-138E-A-I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-485</td>
<td>Device control or data acquisition</td>
<td>CP-134EL-A-I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAN</td>
<td>Device control or data acquisition</td>
<td>CP-602E-I (CAN Card)</td>
</tr>
<tr>
<td>PCI</td>
<td>2</td>
<td>IRIG-B</td>
<td>Time synchronization</td>
<td>DA-IRIG-B-S-02-T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-232</td>
<td>Device control or data acquisition</td>
<td>CP-118U/CP-118U-I</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-422</td>
<td>Device control or data acquisition</td>
<td>CP-168U</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS-485</td>
<td>Device control or data acquisition</td>
<td>CP-104UL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAN</td>
<td>Device control or data acquisition</td>
<td>CP-602U-I (CAN Card)</td>
</tr>
</tbody>
</table>