Compact Remote Terminal Unit

CTU800 Product Line Overview
Target Market
- Primary: Water / waste water
- Opportunity: distribution networks like Gas, Electric, Telecommunication

Business Drivers
- Low-end and low-cost RTU, missing in ABB offering
- Price competitive
- Compatibility and configurability with other ABB product used in SCADA systems
  - PGP
  - AC800M
  - AC870P
Product Line: Technology

- Technology Drivers
  - Compact Size
  - Simplicity
    - Minimal I/O
  - High Versatility in terms of
    - Communication protocol
    - Power supply
  - State-of-the-art technology in broadband communication
Product Line: PRU Portfolio

- PSP-PRU Product
  - Portfolio Automation products
    - Communication Processor – RTU

PTSP-PRU Products

- Power Generation Portal
- PG Information Manager
- Procontrol P13 / P14
- DCS Add-Ons
- Combustion Instruments
- Rotating Machinery Equipment
- Performance Optimization
CTU800 Product Line Overview

- **CTU800-CPX02** (base version)
  - 4 serial ports
  - I/O: 8DI, 4DO, 2AI

- **CTU800-CPX03**
  - Based on CPX02
  - Expanded I/O: 16 DI, 8 DO, 6 AI, 2AO

- **CTU800-CPE**
  - Based on CPX03
  - 1 Ethernet port, 2 USB ports
  - Up to 8 serial ports

- **CTU800-CPE02**
  - Based on CPE
  - GPS

- **Options**
  - /H versions
  - GPS version (CPE only)
CTU800

General features - Hardware

- **Power supply:**
  - 24 VDC
  - Other supplies available (via external converter – not included)
    - 110 / 220 VAC
    - 110 / 48 VDC
  - Power consumption < 300 mA

- **Environmental condition:**
  - Operating Temperature range: -20 +70 C;
  - Harsh environment (/H versions):
    - H2S tolerance
    - Vibration and shock resistance

- **Other characteristics**
  - DIN-rail mounting, metallic enclosure
  - IP30
  - LEDs on the faceplate
  - CE Marked: EMC Immunity and EMI Emissions
CTU800

General features – Communication

- SCADA communication through standard protocols
  - IEC 60870-5-104 (CPE only)
    - Direct (or through router) LAN connection
    - GPRS based connection
    - Possibility to act as a PPP client/server, that is to call and to be called from a SCADA.
  - IEC 60870-5-101

- Supported modems
  - PSTN modems
  - GSM modems
  - Four-wire leased-line modems

- Fully integrated with Power Generation Portal (PGP).

- Easily connectible to third-party SCADA’s
  - Interoperability Check-List (ICL) is provided for both 101 and 104 protocols

- Web server available when the LAN port is used as SCADA communication port (CPE only)
General features – CPUs

Main hardware features

Communication CPU:
- PXA255 from Intel
- 64 Mbyte of Flash Eprom
- 16 Mbyte of RAM

I/O handling CPU
- 68LC302 from Freescale
- 512 Kbyte of Flash Eprom
- 2 Mbytes of RAM

Operating Systems

Real time operating systems
- I/O handling CPU: ROS by Bailey
- Communication CPU: Linux (CPE only)

High-speed link between the two CPUs (CPE only)
IEC 60870-5-104 is configured as point-to-point, meaning one client at a time can be connected to the CPE.

A protection method is implemented so that the CPE can accept connection requests only from pre-defined (and known) IP addresses.

File transfer is supported, allowing fast transfer of log and configuration files.

Log files can also be uploaded using FTP protocol with a standard FTP client application.
IEC60870-5-101 can be configured

- As a point to point or multipoint connection on a direct line
- As a point to point connection on a telephone network, either wired or wireless (PSTN or GSM modems).
  - When connected to a public network, an authentication procedure is executed in order to avoid unwanted callers to connect to the CPE.

Also for this protocol, full file transfer support is provided.
The CPE can be configured to collect and maintain daily or weekly log files for:

- Analog Input values (stored every 5, 10, 15, 30, 60 seconds)
- Events (any digital input status change, analog input threshold alarms)

A log file can also be collected for the mean values of Analog Inputs, averaged every 5, 10, 15, 30 or 60 minutes and maintained for as long as 15 days.

An analog input totalizer function is available, with the related log file (January 2008).
Log files can be used in a variety of ways

- Direct upload using IEC870-5-10x file transfer
- FTP using any FTP client
- Files are automatically stored (at midnight) on a USB memory stick, if this is plugged into one of the CPE’s USB ports
- Using the local tool the files can be stored into a USB memory stick at any time
General features – Third party protocols

- Possibility to configure two of the serial lines to operate as a masters for external devices like ABB AC31 or third-party IEDs using a wide range of protocols such as:
  - Modbus RTU
  - IEC 61107
  - Vestas-IWT (wind turbine controller)
  - Neg-Micon (wind turbine controller)
  - Hydran GE
- Conversion of the acquired data into IEC 870-5-10x format to be sent to the SCADA.
- Possibility to send commands to the IED
- Possibility to easily add other protocols on request
General features – Modbus RTU protocol

- The number of Modbus registers that can be acquired depends on the number of devices present in the configuration.

<table>
<thead>
<tr>
<th>Number of devices</th>
<th>Digital</th>
<th>Analog</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>512</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>256</td>
<td>64</td>
</tr>
<tr>
<td>3</td>
<td>128</td>
<td>32</td>
</tr>
<tr>
<td>4</td>
<td>128</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>64</td>
<td>16</td>
</tr>
<tr>
<td>7</td>
<td>64</td>
<td>16</td>
</tr>
<tr>
<td>8</td>
<td>64</td>
<td>16</td>
</tr>
</tbody>
</table>

- Commands can also be sent to Modbus devices; both coil and register write is allowed, with no limitation in number and position.
CTU800

Configuration tool

- Configuration Tool
  - Easy to use
  - Available in English and Italian
- Local monitor for installation, maintenance and troubleshooting
- Firmware and configuration download
  - Locally
  - Remotely (no need to get to the module to modify its configuration)
CTU800 Configuration Tool

- General configuration
  - Communication path
  - Device parameters
- Dedicated configuration mask for each I/O signal
  - Event-driven spontaneous reporting
  - Debounce time (for digital inputs)
  - Activation duration (for digital outputs)
    - Unlimited time
    - Limited time
  - High and low threshold alarms (for analog inputs)
- Easy configuration of all external protocols parameters
- Guided firmware update procedure
The local browser function provides at-a-glance status for:

- Communication
- Diagnostics
- All digital inputs / outputs
- All analog inputs/ outputs
- Communication path
- Device parameters

Same information displayed by the local web server (CPE)
CTU800 Architecture

Redundant PGP or third-party SCADA

LAN connection with IEC 870-5-104 protocol

Modem connection through PSTN or GSM modems with IEC 870-5-101 protocol

LAN / WAN

CTU800-CPX03

CTU800-CPX02

CTU800-CPE

CTU800-CPE

CTU800-CPE
CTU800 Architecture

Redundant PGP or third-party SCADA

Modem connection through PSTN or GSM modems with IEC 60870-5-101 protocol
Modem connection through GPRS modem with IEC 60870-5-104 protocol

LAN connection with IEC 870-5-104 protocol

CTU800-CPE
CTU800-CPE
CTU800-CPE

LAN / WAN
# Communication ports

<table>
<thead>
<tr>
<th>Number</th>
<th>Connector</th>
<th>CTU800-CPE</th>
<th>CTU800-CPX03</th>
<th>CTU800-CPX02</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>RJ45</td>
<td>Not Used</td>
<td>to Local SW Tool</td>
<td>to Local SW Tool</td>
</tr>
<tr>
<td>P2 (*)</td>
<td>D-shell</td>
<td>Not Available</td>
<td>to NCC</td>
<td>to NCC</td>
</tr>
<tr>
<td>P3 (*)</td>
<td>D-shell</td>
<td>to Field Instr.</td>
<td>to Field Instr.</td>
<td>to Field Instr.</td>
</tr>
<tr>
<td>P4</td>
<td>RJ45</td>
<td>to Field Instr.</td>
<td>to Field Instr.</td>
<td>to Field Instr.</td>
</tr>
<tr>
<td>P5</td>
<td>RJ45</td>
<td>to Local SW Tool</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>P6</td>
<td>RJ45</td>
<td>Not Used</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>P7</td>
<td>D-shell</td>
<td>to NCC</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>P8</td>
<td>D-shell</td>
<td>Restricted (debugging)</td>
<td>Not available</td>
<td></td>
</tr>
<tr>
<td>LAN</td>
<td></td>
<td>Active</td>
<td>Not available</td>
<td></td>
</tr>
</tbody>
</table>
## I/O data point

<table>
<thead>
<tr>
<th></th>
<th>CTU800-CPE</th>
<th>CTU800-CPX03</th>
<th>CTU800-CPX02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I/O datapoints</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Input</td>
<td>16</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>(isolated)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Output</td>
<td>8</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>(isolated – solid state)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog Input</td>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>(non isolated; 4÷20mA or 0÷5V)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog Output</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>(non isolated; 4÷20mA or -20÷20mA)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CTU800

Conceptual Block Diagram

CTU800-CPX02

#2-DO

#2-AI

#8-DI

24V_{DC}

BASE05 + CPU12

DC / DC

#4 SERIAL Ports
CTU800 Conceptual Block Diagram
CTU800

Conceptual Block Diagram

CTU800-CPE02

BASE05 + CPU12
DC / DC
GPS LEADTEK 9543LP

BASE06 + CPU03
Extension Module: IO8642

24V_{DC}

External ANTENNA

#2-DO
#2-AI
#8-DI
#4 SERIAL Ports
#1 ETHERNET PORT
#2 USB

serial
Internal bus XBUS

#4 SERIAL Ports
#2-AO #6-DO

#8-DI
#4-AI
CPX02 at a glance

- CPX02 - a compact RTU unique in ABB’s product line for its features and small dimensions (40x115x124 mm)
- I/O datapoints
  - 8 DI
  - 2 DO
  - 2 AI
- Communication ports
  - Up to 4 Serial ports
- Power supply
  - 24VDC
  - Low power consumption, < 300 mA max;
- Operating temperature range
  - –20 ÷ +70 °C
- Harsh environment versions available (/H)
- Other
  - DIN rail mounting metallic enclosure.
  - LED on faceplate
CPX03 at a glance

- CPX03 - a compact RTU unique in ABB’s product line for its features and small dimensions (98x115x124 mm).

- I/O datapoints
  - 16 DI
  - 8 DO
  - 6 AI
  - 2 AO

- Communication ports
  - 4 Serial ports

- Power supply
  - 24VDC
  - Low power consumption, < 300 mA max;

- Operating temperature range
  - –20 ÷ +70 C

- Harsh environment versions available (/H);

- Other
  - DIN rail mounting metallic enclosure
  - LED on faceplate
CTU800

CPE at a glance

- CPE - a compact RTU unique in ABB’s product line for its features and small dimensions (98x115x124 mm)
- I/O datapoints
  - 16 DI
  - 8 DO
  - 6 AI
  - 2 AO
- Communication ports
  - 8 Serial ports (2 for field instrumentation)
  - 1 Ethernet port
  - 2 USB ports
- Power supply
  - 24VDC
  - Low power consumption, < 300 mA max;
- Operating temperature range
  - –20 °C to +70 °C
- Harsh environment versions available (/H);
- Other
  - DIN rail mounting metallic enclosure
  - LED on faceplate
CPE02 at a glance

CPE - a compact RTU unique in ABB’s product line for its features and small dimensions (98x115x124 mm)

I/O datapoints
- 16 DI
- 8 DO
- 6 AI
- 2 AO

Communication ports
- 8 Serial ports (2 for field instrumentation)
- 1 Ethernet port
- 2 USB ports
- GPS

Power supply
- 24VDC
- Low power consumption, < 300 mA max;

Operating temperature range
- –20 ÷ +70 C

Harsh environment versions available (/H);

Other
- DIN rail mounting metallic enclosure
- LED on faceplate
CTU800

CPE Block diagram

- Communication Processor (Intel PXA255)
- I/O Processor (Motorola 68302LC)
- High-speed Serial bus
- GPS (CPE02)
- IEC870-5-104 protocol Slave (LAN)
- IEC870-5-101 protocol Slave (RS-232)
- Local configuration and monitor port
- Foreign Device Protocols
- I/O lines (DI, DO, AI, AO)
CTU800

CPE SW Block diagram

- Core Processing
- Log files
- Diagnostics
- Local config and monitoring

- High-speed comm.

- High-speed comm.
- Core processing

- Communication with External devices
- I/O Acquisition

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- Filename -