

## **I/A Series® Remote Terminal Unit (RTU)**

### **RTU 20 for Oil, Gas, and Water SCADA Applications**



#### **RTU 20 OVERVIEW**

The I/A Series RTU 20 is an Intelligent Remote Device capable of performing a full range of control and data acquisition functions in all industrial SCADA applications.

The RTU 20 has been designed to remotely operate in harsh environments and to be easily configured for applications ranging from gas/water/power/heating distribution networks, well control, pipelines, oil and gas production and transportation facilities, and offshore platforms to water/wastewater treatment plants.

In order to match all customer needs, several modular plug-and-play options are available; for example, low-density or high-density I/O cards, redundant CPU/analog-to-digital converter/power supply/communication lines, interfaces with the most

typical communication media, local control sequences and PLC functionality, and optimized transmission techniques for low-speed data lines.

Based on a 16 MHz, 16-bit (or a 25 MHz, 32-bit) Motorola® Microcontrollers, the RTU 20 performs a wide range of control functions, from simple data acquisition to sophisticated, closed-loop algorithms, through a user-friendly Sequence configurator (graphic and literal programming languages compliant to IEC 61131-3).

The smallest RTU 20 configuration is available in a compact chassis, installed within an IP65/NEMA4 certified enclosure, suitable for outdoor/indoor field mounting (wall, frame structure or pole).

**FEATURES**

Key features include:

- Heavy duty RTU for hostile environments
- High reliability, modularity and accuracy
- Redundancy (optional) of CPU (with relevant analog-to-digital converter), power supply and communication lines
- Flexible hardware configuration
- Easy installation
- Auto-configuration at power on (traditional RTU configurator is not required)
- Self-fault detection and auto-diagnostic (local and remote)
- IEC 61131-3 compliant user-friendly "Sequence" configurator for RTU-resident automatic sequence and control functions
- 16-bit CPU, 16 MHz clock (or 32-bit CPU, 25 MHz clock)
- 256 KB RAM plus 256 KB EPROM plus 256 KB FLASH memory (1 MB RAM and 1 MB FLASH memory for 32-bit CPU)
- Up to 4 serial communication interfaces
- Low or high I/O density per cards
- Low power consumption (typically 6 W)
- Power supply modules with built-in battery back-up charger
- 1,500 VRMS isolation for all I/O
- Certification for industrial environments (according to CE)
- Battery back-up for all RTU functions (full operativity)
- Photo voltaic Solar power package (optional)
- Optional use of industrial components on the electronic boards
- Wall/pole and floor mounted cabinets size (HxWxD):
  - 500 x 400 x 250 mm (19.7 x 15.7 x 9.8 in),
  - 800 x 600 x 320 mm (31.5 x 23.6 x 12.6 in),
  - 2000 x 800 x 800 mm (78.8 x 31.5 x 31.5 in).

**RTU 20 Typical Functions**

Typical functions of the RTU 20 include:

- I/O data validation
- Local/remote auto-diagnostics
- Digital inputs periodic acquisition
- Analog inputs periodic acquisition and digital conversion, with alarm threshold function
- Pulse inputs acquisition, counting and freezing
- Pulse or permanent digital and analog outputs with check-before-operate security
- Programmable Sequence Control functions through user-friendly package
- I/O signals driven by local Sequences
- Sequence-programs remote loading/unloading
- Store and Forward communication technique for time-stamped digital/analog chronological archives
- "Report by Exception" scanning
- Broadcast addressing
- RTU master/slave connections (up to 63 RTUs per communication channel)
- Dial-up, unsolicited and spontaneous calls from RTU to control centers on switched telephone lines
- Interface to local operator workstation or diagnostic terminal
- Sequence of Events (SOE) with 1 ms resolution (optional)
- Powerful RTU and/or PLC using local and remote I/O (optional)
- Flow calculation (optional): AGA3, AGA5, AGA7, AGA8, NX19
- Management of PID algorithms (optional).

## ARCHITECTURE

The RTU 20 architecture is based on a passive bus structure sharing all RTU functional blocks: CPU, analog-to-digital converter module, I/O cards, communication lines interfaces.

Each I/O card can be easily installed or removed, through standard DIN 41612 connectors. All cards are equipped with front-mounted diagnostic and indication LEDs.

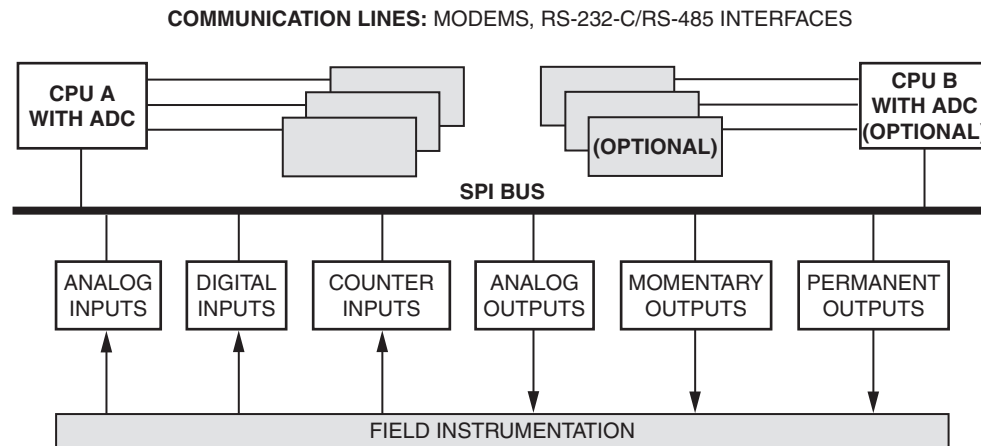


Figure 1. Architecture

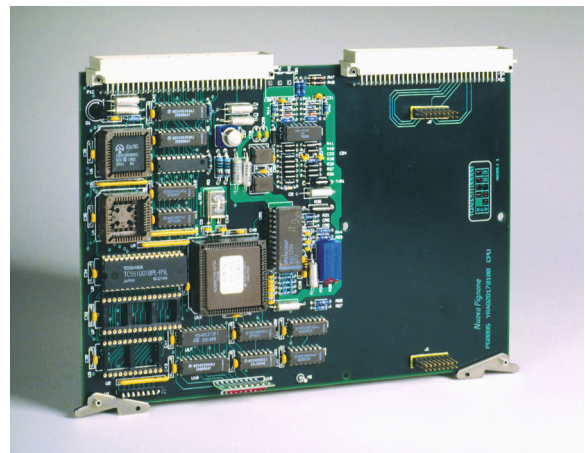
## 16-Bit CPU

The 16-bit CPU consists of:

- 16-bit Motorola MC68HC812A4

A microcontroller composed of standard on-chip peripheral modules connected by an intermodule bus. It includes a 16-bit central processing unit, a system integration module, and a serial peripheral interface.

- Two asynchronous serial communications interfaces (one port RS-232-C and one port RS-485-C)
- Real-time calendar clock
- HCMOS technology
- 16 MHz clock (125 ns machine cycle)
- RAM, EPROM, FLASH (256 KB, 256 KB, 256 KB)
- 12-bit analog-to-digital converter

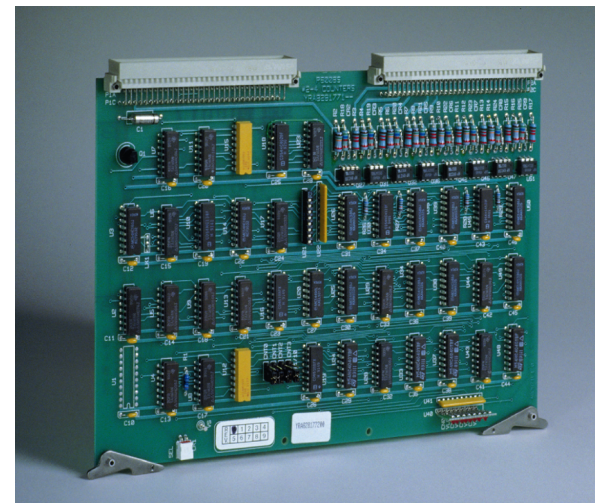
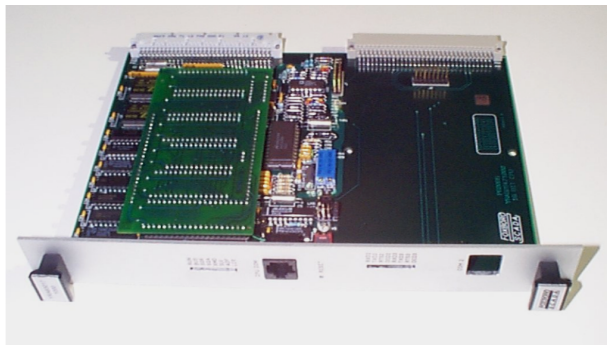
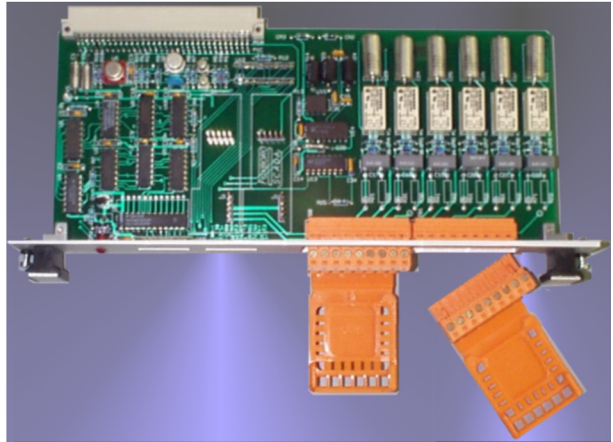


- Two on-board analog inputs for:
  - battery voltage
  - cabinet internal temperature
- Up to nine mixed I/O modules
- AT-HAYES compatible firmware protocol to drive modem, radio, GSM external devices.

**32-Bit CPU**

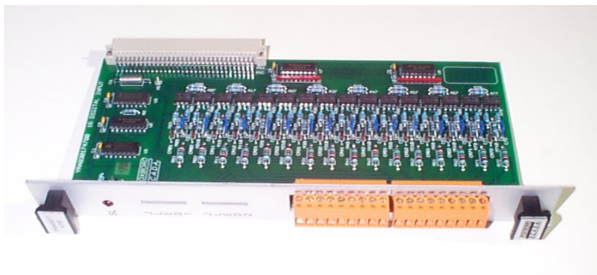
The 32-bit CPU consists of:

- 32-bit Motorola MC68332  
A highly integrated 32-bit microcontroller that combines high performance data manipulation capabilities with powerful peripheral subsystems. It incorporates a 32-bit CPU, a system integration module, an enhanced serial communication interface subsystem, a time processing unit, a queued serial peripheral interface subsystem, 2 KB static RAM module (with time processing unit emulation capability).
- Five asynchronous serial communications interfaces (RS-232-C or opt-isolated RS-485-C).
- Real time clock, synchronizable through an optional GPS interface
- HCMOS technology
- 25 MHz clock
- RAM, FLASH EPROM (1 MB, 1 MB)
- 13-bit plus sign analog-to-digital converter
- Two analog inputs for:
  - battery voltage
  - cabinet internal temperature
- Up to 36 mixed I/O modules
- AT-HAYES compatible firmware protocol to drive modem, radio, GSM external devices.

**I/O CARDS**

Common characteristics include:

- HCMOS technology
- Galvanic isolation
- Address free
- Front-mounted diagnostic LED and indication LED
- Quick disconnect I/O terminations.



## I/O Cards Sizing

The following list the sizing information for I/O cards:

### *8 or 16 Channel Analog Inputs*

- Galvanic isolation through flying capacitor
- 4 to 20 mA current signals
- 0 to 2 V dc; 0 to 5 V dc; 0 to 10 V dc voltage signals
- Low voltage signals (T/C type J or RTD PT100)
- 12-bit resolution (14-bit for 32-bit CPU)
- 0.1% accuracy

### *16 or 32 Channel Digital Inputs*

- Opt-isolated inputs for 24 V dc contacts

### *2 or 4 Channel Counter Inputs*

- Opt-isolated pulse inputs for 24 V dc contacts
- 15-bit/counter resolution or 30-bit (two counters in cascade configuration)
- Up to 5 kHz input frequency

### *8 or 16 Channel Permanent Digital Outputs*

- SPDT/SPST relays contacts
- 60 W output (maximum) for each contact
- Check-before-operate with time-out (12 s)

### *8 or 16 Channel Momentary Digital Outputs*

- SPDT/SPST relays contacts
- 60 W output (maximum) for each contact
- 0.1 to 20 s (0.1 s step) execution time
- Check-before-operate with time-out (12 s)

### *2 or 4 Channel Analog Outputs*

- 0 to 20 mA outputs
- 12-bit digital-to-analog converter resolution
- 0.1% accuracy

## Serial Communications

The following are specifications for serial communications:

- Modbus protocol interface (RS-232-C /RS-485-C, ASCII and binary)
- DNP 3.0 (slave)
- IEC 870-5-101 (slave)
- P6008 high-performance proprietary protocol (ASCII and binary)
- Four serial communication ports with RS-232-C or RS-485-C interface
- Asynchronous communication
- Automatic dialing/answer in switched network mode
- Master/slave RTUs dial
- Transmission rate from 300 to 19,200 bps
- V23 multi-drop modem (1,200 bps) or RS-485-C – up to 32 nodes
- V 32 is point-to-point
- Interface with radio link, optic fiber, power line carrier, GSM, satellite systems.



**Power Supply Modules**

All modules with the battery charger can be equipped (optionally) with one or two sealed, maintenance-free, battery back-up for up to 8 hours of power recovery RTUs (full functionality and operations). The following power supply models are available:

- 110 V ac input, from 48 to 62 Hz, with/without battery charger
- 220 V ac input, from 48 to 62 Hz, with/without battery charger
- 24 V dc input, positive/negative/floating grounded.

Designed to be a low consumption equipment, a typical RTU 20 configuration for small and medium applications requires no more than 6 W.

**Isolation Tests Performed**

The following are isolation tests performed:

- High voltage isolation, common mode: 1,500 V – single pulse 1.2  $\mu$ s/50  $\mu$ s
- High voltage isolation, differential mode: 1,500 V – single pulse 1.2  $\mu$ s/50  $\mu$ s
- Isolation resistance: > 100 M $\Omega$



**ENVIRONMENTAL SPECIFICATIONS (ACCORDING TO IEC 870-2-1 CLASS D1)**

<b>Ambient Temperature</b>	<b>Humidity</b>
–25 to +70°C	5 to 95% (noncondensing) at 40°C

**CERTIFICATIONS AND CONFORMITY**

<b>Certifications</b>	<b>Conformity</b>
DEGREE OF PROTECTION	IEC 870-2-1
EN 60529 and NEMA	IEC 870-4
ELECTROMAGNETIC COMPATIBILITY	IEC 870-5-1
EN 50081-2 and EN 50082-2	IEC 61131-2
LOW VOLTAGE	IEC 61131-3
EN 60439-1	EIA RS-232-C/RS-485-C
	CCITT V.23/V.24/V.28

## OPTIONS

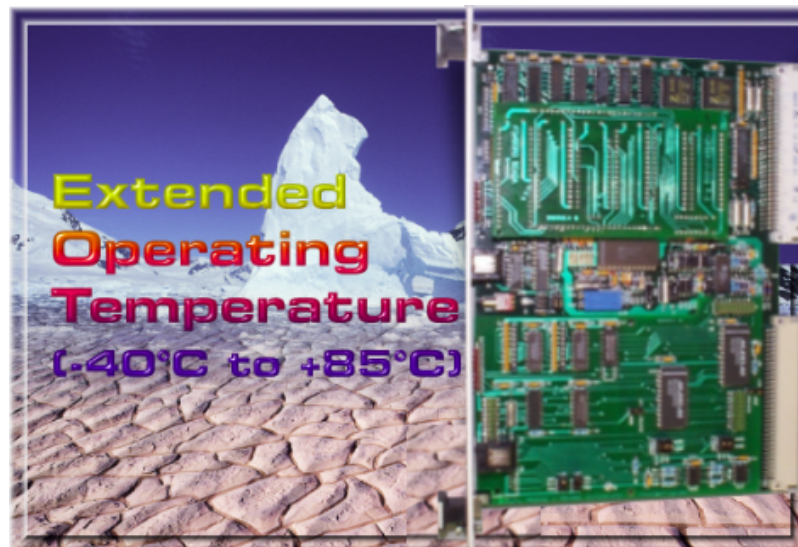
The following are options for the RTU 20:

- Foxboro I/A Series distributed control system (DCS) interface
- CPU, analog-to-digital converter, power supply, communication lines redundancy
- Back-up battery kit
- Solar power package
- Mounting pole kit.

## I/A Series RTU 20 Key Features

The following are key features for the RTU 20:

- General-purpose, heavy duty, really compact RTU specially designed for outdoor harsh ice-to-desert environments
- Very competitive in price with a very low life-cycle cost
- Extremely low power consumption (few watts) with powerful communication support toward Master/Slave RTUs, flow computers, IED remote connections
- Equipped with enhanced PLC functionality and auto-diagnostics for a safe local and remote mixed-control of unmanned critical process
- Redundancy (optional), with automatic switchover, of CPU, power supply and communication I/F.



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