

Technical Information

RTU2020 Remote Terminal Unit
Specification



SC03-300-101

Release 101

October 2014, Version 1.0

Revision History

Revision	Date	Description
1.0	October 2014	Release version

Table of Contents

1. Introduction 4

1.1. RTU2020 Remote Terminal Unit Overview 4

1.2. Document Scope 4

1.3. Definitions 5

2. Specifications 5

2.1. RTU2020 Controller 5

2.1.1. Performance 6

2.1.2. Datalog Support 6

2.1.3. Communication Capabilities 6

2.1.4. Watchdog & Monitors 9

2.2. Onboard I/O 9

2.2.1. Analog Input Channel Parameters 9

2.2.2. Analog Output Channel Parameters 10

2.2.3. Digital Input Channel Parameters 11

2.2.4. Digital Output Channel Parameters 11

2.2.5. Pulse Input Channel Parameters 12

2.3. RTU Builder 12

2.3.1. IEC 61131-3 Capabilities 12

2.3.2. RTU Builder Hardware Requirements 14

2.4. General 14

3. Model Numbers 16

3.1. Hardware Related 16

3.2. Software 16

1. Introduction

This document provides technical information for the Honeywell RTU2020 Remote Terminal Unit (RTU). Further product descriptions can be found the Product Information Note. Detailed planning, installation and configuration information is available in the product user guides.

1.1. RTU2020 Remote Terminal Unit Overview

The RTU2020 is a modular, powerful and scalable controller capable of all remote automation and control applications. It is designed to communicate with any SCADA system but when combined with Experion[®] PKS and its radically simplified SCADA configuration with superior operator experience, it solves the most challenging remote automation requirements for the Oil & Gas industry.

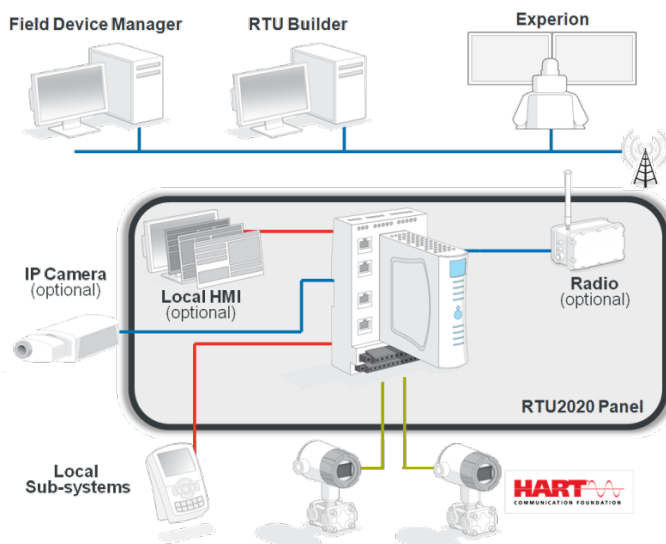


Figure 1 – Sample RTU2020 System Architecture

The key features of the RTU2020 include:

- Lowest power consumption in its category at a typical 1.8W
- Temperature range -40 to 75°C (-40 to 167°F). Up to 75°C, not 70°C like other units
- High reliability with well designed thermal paths
- HART enabled onboard I/O onboard. No extra hardware required. Digital HART data & diagnostics are available locally for use in RTU program & remote alarming
- HART IP allowing remote asset management of HART devices via Honeywell's Field Device Manager
- Efficient wiring & configuration saving installation and maintenance time
- Modern, powerful CPU
- Transient Suppression on every I/O channel & every communication port
- RTU Builder: A powerful IEC 61131-3 programming environment
- Liquids & Gas calculations in the same controller
- Flexible communication options
- Industry standard protocols of Modbus & DNP3 both as master and slave

1.2. Document Scope

This document provides specifications for the following RTU2020 related components:

- RTU2020 Controller

- RTU2020 I/O
- RTU Builder

1.3. Definitions

- **IOTA, Input Output Termination Assembly:** An assembly that holds the IOM and the connections for field wiring
- **IOM, Input Output Module:** A device that contains most of the electronics required to perform a specific I/O function. The IOM plugs onto the IOTA.
- **CPM, Control Processor Module:** A device that contains most of the electronics required to perform the function of an RTU controller. A CPM plugs onto an IOTA designed for the CPM. The CPM may optionally include the functionality of an IOM.

2. Specifications

2.1. RTU2020 Controller

The RTU2020 family has an innovative modular hardware design with processor modules that plug onto IOTAs that contain only passive devices such as cable connectors and an I/O link expansion port allowing expansion I/O modules to connect in without any further infrastructure.

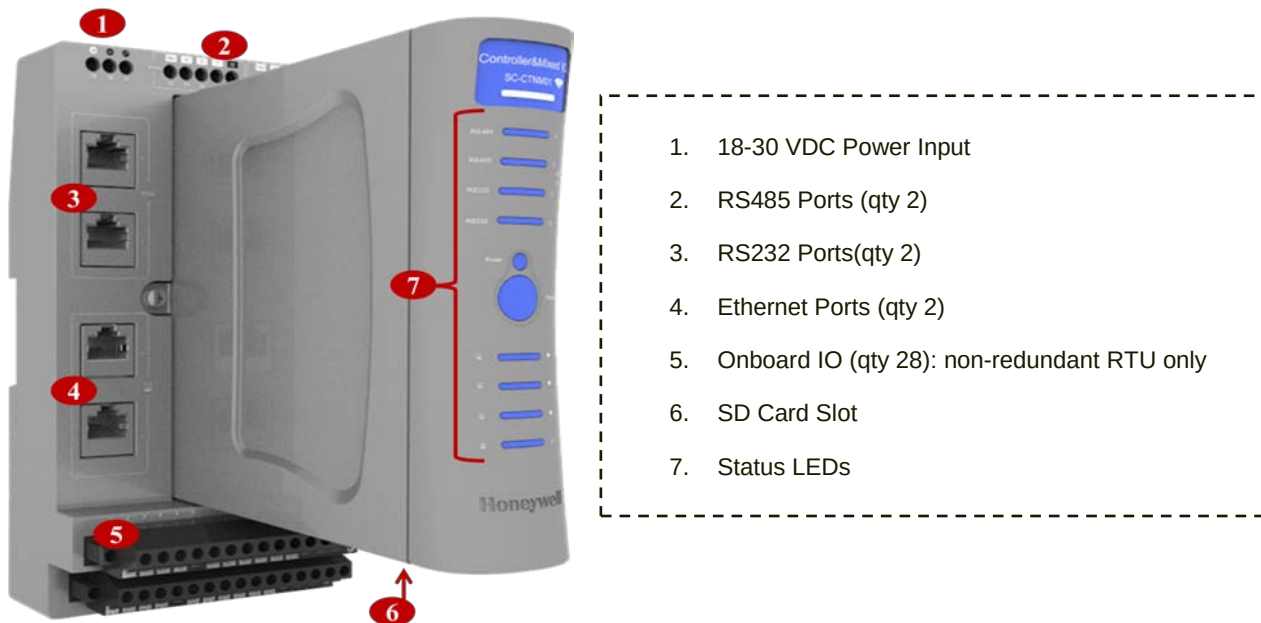


Figure 2 –RTU2020 Hardware Summary

2.1.1. Performance

With a modern dual core 667MHz processor, RTU2020 has the power for today's applications and spare reserve to meet tomorrow's needs.

Item	Specification
Processor	Dual Core ARM® Cortex™-A9 Core (32 bit data bus) 667 MHz
Dynamic memory (RAM)	128 Megabytes
Program memory (Flash)	32 Megabytes
Nonvolatile memory	4Mbits
Nonvolatile memory data life	20+ years (without battery)
Real-time clock resolution	1 ms
Execution cycle time	<= 100 ms
Time Synchronization	Simple Network Time Protocol (SNTP)
Programming port	Ethernet port
SD Card Slot supported cards	32GB Class 6 / Class 10 industry standard

2.1.2. Datalog Support

Item	Specification
Datalog Media	Flash memory or optional SD Card
Datalog rate	Configurable: 1 second, 5 seconds, 10 seconds, 1 minute, 5 minutes, 10 minutes and 1 hour
Datalog Timestamp resolution	1 ms

2.1.3. Communication Capabilities

RTUs need to efficiently manage unreliable, low bandwidth networks. They need to communicate as a slave device to a remote SCADA system, usually over a redundant link which is on two different mediums; but also as a master to local subsystems like gas chromatographs and smart drives. RTU2020 covers all the scenarios by supporting SCADA protocols such as Modbus and DNP3 over two Ethernet ports and four serial ports.

Ethernet

Item	Specification
Number of ports	2, ANSI/IEEE 802.3
Independent networks	2. Can be on same or different Subnets
Network connection	shielded RJ45 connector, auto-crossover
Network port speed	10/100BaseTx, auto-detecting
Isolation	1500 Volts RMS 1 minute, 60 Hz
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%
Message response time (typical)	100ms
Diagnostic LEDs on each port	Yes
Concurrent connections	64
Distance supported	100m
Protocols	TCP/IP, ARP, UDP, ICMP, DHCP, Modbus TCP, DNP3 TCP, HART-IP,

Serial

Item	Specification
Number of Ports	2 x RS232 ports and 2 x RS485 ports
Baud rate supported	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
RS232 Port 1 and 2	RJ45 (TD, RD, CTS, RTS, CD, DTR, DSR/RI, GND), full duplex
RS232 distance	15m
RS485 Port 1 and 2	Screw terminals (GND, 485+, 485-, termination, chassis), 2-wire half-duplex
Maximum number of slaves connected to RS485 network	32
RS485 distance	1200m
RS485 termination	120ohm
Protocols	Modbus RTU Master, Modbus RTU Slave, Modbus ASCII Master, Modbus ASCII Slave, DNP3 Slave
Diagnostic LEDs on each port	Transmit Data (TD) & Receive Data (RD)

Item	Specification
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%

DNP3 Protocol

Item	Specification
Device Function	Outstation (Slave)
Protocol Compliance Level ¹	Level 3+
Capacity of events buffered	Flash memory: 80,000 events or Optional SD Card: 500,000 events
Data monitoring by multiple DNP3 Masters	Yes, on separate ports
Report by Exception Capability	Yes
Ethernet support	Yes
Serial support	No
Check Before Operate (CBO) support	Yes
Note 1 – See RTU2020 DNP Device Profile Document (DPD) for complete details	

Modbus Protocol

Item	Specification
Device Function	Master and Slave
Multi-Master support	Yes, data monitoring by multiple Modbus Masters
Ethernet support	Modbus TCP
Serial support	Modbus RTU/ASCII

HART-IP Protocol

Used by Honeywell's Field Device Manager for instrument asset management of RTU2020 connected HART devices.

Item	Specification
Device Function	Read system capacity of RTU Read RTU and HART devices identity information HART command pass through to the connected HART devices HART delayed response mechanism to maximize system performance
Ethernet support	HART-IP protocol, Version 7, based on TCP/IP Configurable TCP port number, (default 5094) Support single Honeywell Field Device Manager connection
Serial support	No

2.1.4. Watchdog & Monitors

Item	Specification
CPU Watchdog	CPU automatically resets if error is detected; status LED flashes error code
Communications watchdog	Settable timeout and output action: force off or freeze

2.2. Onboard I/O

RTU2020's non-redundant controller with 28 mixed onboard I/O supports the following mix of I/O points

- Analog Input (HART) 8
- Analog Output (HART) 2
- Digital Input 10
- Digital Output 6
- Pulse Input (High Speed) or Digital Input 2

Details of each type of I/O are listed in tables below.

2.2.1. Analog Input Channel Parameters

Item	Specification
Number of Channels	8
Standard Input Range	4~20mA or 1-5VDC, software configurable
Input Type	Single end
Short circuit protection	Yes

Item	Specification
Isolation	No
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%
A/D resolution	16bit
Full scale accuracy	± 0.1% at 25°C ±0.2% from -40°C to 75°C
Repeatability	+/-0.05%
Temperature Coefficient	0.005% per Deg C
Differential Non Linearity	< 1 L.S.B
Normal Mode Rejection Ratio (NMRR)	Greater than 49dB at 60Hz
Input impedance (voltage mode)	1Mohm
Max HART Multi-drop Connection	One device per channel
Supported Device Wiring	2 Wire Devices

2.2.2. Analog Output Channel Parameters

Item	Specification
Number of Channels	2
Output Range	4-20mA
Output Type	Source
D/A resolution	12bit
Full scale accuracy	± 0.2% at 25°C ± 0.3% from -40°C to 75°C
Repeatability	± 0.1% of full scale
Temperature Coefficient	0.01% per Deg C of FSD
Differential Non Linearity	< 1 L.S.B
Load resistance (@ 24 V)	50-600ohm
Max HART Multi-drop Connection	One device per channel

Item	Specification
Short circuit protection	Yes
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%

2.2.3. Digital Input Channel Parameters

Item	Specification
Number of Channels	10
Input type	Sink (dry contact)
Input Isolation	No
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%
Input Voltage range	24VDC, +/-10%, external power supply
Guaranteed ON voltage	12VDC
Guaranteed OFF voltage	4VDC
Short Circuit Protection	Yes
Filter	Yes

2.2.4. Digital Output Channel Parameters

Item	Specification
Number of Channels	6
Maximum Output Power	24 VDC, 80 mA load per channel, external power supply
Output Type	Sink (voltage free)
Isolation	No
Output voltage range	24 VDC, +/-10%
On-State Voltage	Max 1 VDC, load current @ 80mA max
Off-State Voltage	24 V, typical
Max. off state leakage	100uA, maximum

Item	Specification
Short circuit protection	Yes
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%
Typical on resistance	0.8 ohm

2.2.5. Pulse Input Channel Parameters

Item	Specification
Number of Channels	2
Input Isolation	No
Transient Voltage Suppression	600W peak pulse power capability at 10×1000µs waveform, repetition rate:0.01%
Input Type	Sink
Input Voltage range	5 ~10Volt peak to peak
Input frequency	0 to 10kHz
Input Impedance	97 kohm
Minimum high level single width	40us
Guaranteed ON voltage	4.5V
Guaranteed OFF voltage	1.5V
PI configuration	As pulse input or digital input
Accumulator rate	Accumulator and rate functions
Filter	Configurable
Short Circuit Protection	Yes

2.3. RTU Builder

RTU Builder is RTU2020's integrated configuration tool to design, configure, program and maintain your RTU investment.

2.3.1. IEC 61131-3 Capabilities

RTU Builder is compliant to IEC 61131-3 programming languages.

Item	Specification	
IEC 61131-3 programming	Yes	
Languages Supported	Ladder Diagram (LD) Function Block Diagram (FBD) Structured Text (ST) Instruction List (IL) Sequential Function Chart (SFC)	
Function Block Libraries ¹	Standard IEC61131-3 Metering Calculation Honeywell Control HART Modbus Unit Conversion Utility	
HART Function Codes Supported	Command 03 Command 48	Read Dynamic Variables And Loop Current Read Additional Device Status
Metering Calculation Library	AGA 3 AGA 5 AGA 7 AGA 8 AGA 9 AGA 11 API 11.1	Orifice Meter Volume to Energy Calculation Turbine Meter Gas Compressibility Ultrasonic Meter Coriolis Meter Volume Correction Factor
Communication Medium to RTU	Ethernet	
Bulk Replication of Program	Yes	
Remote Download of Program	Yes	
Remote Reboot	Cold or Warm start	
Remote Firmware Upgrade	Yes	
Remote Diagnostics	Yes	
Remote Data Log File Capture	Yes	
Note 1 – See RTU2020 User's Guide (RTDOC-X283) Appendix for complete Function Block Library details		

2.3.2. RTU Builder Hardware Requirements

Item	Specification
Typical Processor	Pentium or compatible processor
RAM	1 GB
Hard Drive	5 GB available space
Communication Medium to RTU	Ethernet
Operating System	Windows 7 Professional SP1, 32-bit or 64-bit Windows 2008 Server R2, 32 bit or 64 bit
Installation Media	Via CD-ROM drive

2.4. General

Unless specified separately, all RTU2020 hardware meets the following common specifications.

Item	Specification
	SC-UCMX01
Dimensions mm L x W x H	190 x 99 x141
Weight	700g
Mounting	DIN rail (TH35-7.5)
Input voltage	18VDC - 30VDC
Input power: With field power ¹ Full Load ² Minimum ³	4.6W 2.8W 1.6W
Operating Temperature	-40 to 75°C (-40 to 85°C storage)
Humidity	5% to 95% RH (non-condensing)

Item	Specification
	SC-UCMX01
Standards & Certifications	Flammability - UL 94V-0 materials EN61010-1:1993;CE EN61326-1; CE EN61326 CE Certificate ANSI/ISA S71.04 Class G2 (Standard) (ANSI/ISA S71.04 Class G3, option)) Vibration, IEC 60068-2-6: 1.0 g acceleration over 10–150 Hz; 0.5 g acceleration over 150–2000 Hz Hazardous locations: a. FM Nonincendive for Class I, Division 2, Groups A, B, C and D, temperature class T4 hazardous (classified) locations and as AEx nA IIC T4 for Class I, Zone 2 hazardous (classified) locations in an ambient temperature range of -40°C to 75°C b. CSA Nonincendive for Class I, Division 2, Groups A, B, C and D, temperature class T4 hazardous locations and as Ex nA IIC T4 for Class I, Zone 2 hazardous locations in an ambient temperature range of -40°C to 75°C c. ATEX II 3 G Ex nA IIC T4 Gc Ta = -40°C to +75°C
Note 1 – Full load including field power consumption: Each channel is loaded as detailed below. AI-CH0~CH7:: Current Mode-20mA Input (external supply) AO-CH0~CH1: 20mA Output, external load 50Ω. DI-CH0~CH9: 26.4Vdc input (external supply) DO-CH0~CH5: 26.4Vdc external power supply. 300Ω load resistor (external supply) PI-CH0~CH1: 10V/10kHz pulse input (external supply) RS232-Port1~Port2: Running RS485-Port1~Port2: Baud Rate: 115200, 8, N, 1 Ethernet Port1~Port2: Running Input Voltage : 30VDC Note 2 – Same as note 1 except not including field power consumption and at input voltage 24VDC. Note 3 – Same as note 1 except not including field power consumption, input voltage 24VDC, no active serial ports and only 1 active Ethernet port (port 2).	

3. Model Numbers

3.1. Hardware Related

To simplify the ordering process, RTU2020 has a limited number of model numbers to provide complete RTUs. For example, for one complete non-redundant RTU with 28 onboard I/O, only 1 model number is required, SC-UCMX01.

Model Number	Description
SC-UCMX01 ¹	RTU2020 Non-redundant Controller with 28 mixed onboard I/O
SP-IHARTP ²	HART Protocol Enabler License
Note 1 – Includes a complete RTU: CPM and IOTA	
Note 2 – HART enabler license required for each I/O module (onboard or expansion) where HART digital access is required	

3.2. Software

Model Number	Description
SP-EBLDR1 ¹	RTU Builder, client license
SP-MCALC1 ²	Metering Calculation Library, site license
Note 1 – One required for each computer (physical or virtual) RTU Builder is to be installed on. Can run both online and offline.	
Note 2 – One required per site. The library can be used with all instances of RTU Builder on the same site.	

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