

RTU2020 Remote Terminal Unit
Specification



SC03-300-100

Release 100

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Revision History

Revision	Date	Description
0.1	August 2013	Preliminary version
0.2	November 2013	Added more content
1.0	January 2014	Incorporated review comments

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	11
2.3. RTU Builder	12
2.3.1. IEC 61131 Capabilities	12
2.3.2. RTU Builder Hardware Requirements	13
2.4. General	13
3. Model Numbers	15
3.1. Hardware Related	15
3.2. Software	15
3.3. Spare Parts	15

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.

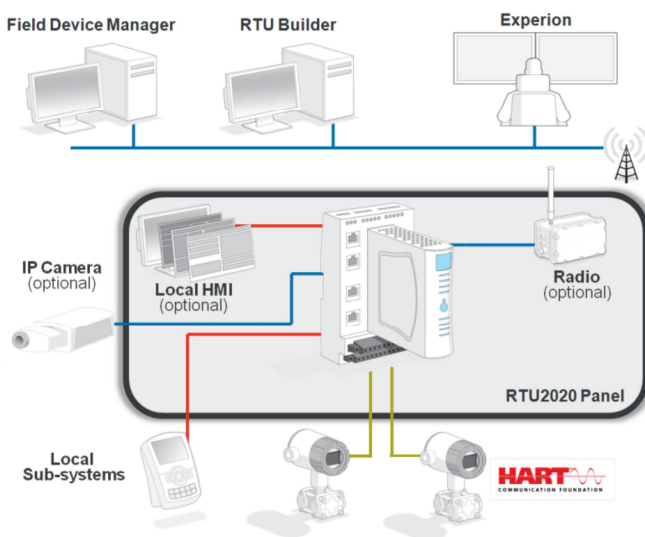


Figure 1 – Sample RTU2020 System Architecture

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.

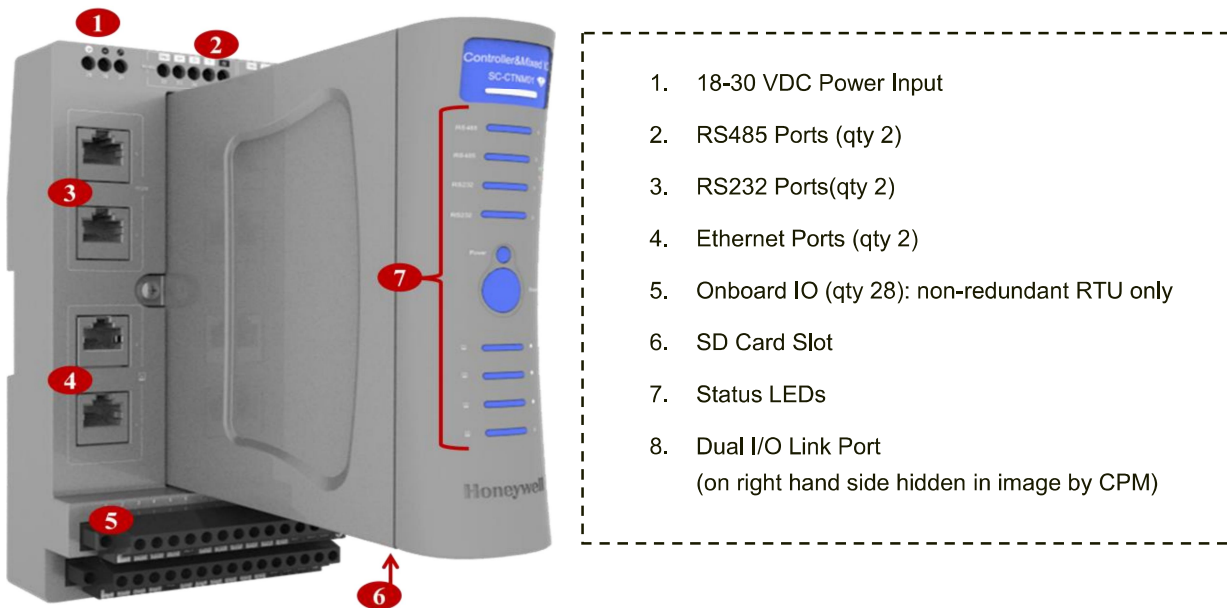


Figure 2 –RTU2020 Hardware Summary

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
Real-time clock resolution	1 ms
Execution cycle time	<= 100 ms
Programming port	Ethernet port or serial port
SD Card Slot supported cards	32GB Class 6 / Class 10 industry standard

2.1.2. Datalog Support

Item	Specification
Datalog Media	Flash memory (8MB) or the optional SD Card (8GB, 16GB, 32GB)
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
Independent networks	2
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 connection	64
Distance supported	100m
Protocols	TCP/IP, ARP, UDP, ICMP, DHCP, Modbus TCP, DNP3 TCP, HON, HART-IP
Subnet selection	Different Network ports must be on separate subnets

Serial

Item	Specification
Number of Ports	4: RS232 port x 2 and RS485 ports x 2
Baud rate supported	300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
RS232 Port A	RJ45 (TD, RD, CTS, RTS, CD, DTR, DSR/RI, GND)
RS232 Port B	RJ45 (TD, RD, CTS, RTS, CD, DTR, DSR/RI, GND)
RS232 distance	15m
RS485 Port C	Screws (GND, 485+, 485-, termination) (2-wire half-duplex)
RS485 Port D	Screws (GND, 485+, 485-, termination) (2-wire half-duplex)
Maximum number of slaves connected to RS485 network	32
RS485 distance	1200m

Item	Specification
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)
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	Level 3+
Capacity of events buffered	Nonvolatile memory (320kB)
Data monitoring by multiple DNP3 Masters	Yes
Report by Exception Capability	Yes
Ethernet support	Yes
Serial support	Yes
Check Before Operate (CBO) support	Yes

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 to manage RTU2020 connected HART devices.

Item	Specification
Device Function	Read the system capacity of RTU Read RTU and HART devices identity information Pass through any kind of HART commands to the connected HART devices Support HART delayed response mechanism to maximize the system performance
Ethernet support	HART-IP protocol based on TCP/IP Configure TCP port number (default 5094) Support single Honeywell Field Device Manager
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

Item	Specification
Standard Input Range	4~20mA/1-5VDC software configurable
Short circuit protection	Yes
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%
NMRR (NORMAL mode)	19dB at 50/60Hz
Input impedance (voltage mode)	1M ohm
Max HART Multi-drop Connection	One device/channel
Supported Wire Devices Type	2 Wire Devices

2.2.2. Analog Output Channel Parameters

Item	Specification
Number of Channels	2
Output Range	4-20mA
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
Load resistance (@ 24 V)	50-600ohm
Max HART Multi-drop Connection	One device/channel
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 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

2.2.4. Digital Output Channel Parameters

Item	Specification
Number of Channels	6
Maximum Output Power	24 VDC, 80 mA (external power supply) load for per point
Isolation	No
Output voltage range	24 VDC (+/-10%)
On-State Voltage	Max 1 VDC (load current @ 80mA max)
Off-State Voltage	24 V (typ)
Max. off state leakage	100uA (max)
Short circuit protection	Yes
Transient Voltage Suppression	600W peak pulse power capability at 10×1000μs waveform, repetition rate:0.01%
Typical on resistance	1.2ohm

2.2.5. Pulse Input Channel Parameters

Item	Specification
Number of Channels	2

Item	Specification
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
Minimum high level single width	40us
Guaranteed ON voltage	4.5V
Guaranteed OFF voltage	1.5V
PI configuration	As pulse input or digital input
Accumator and 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 Capabilities

RTU Builder is fully compliant to IEC 61131-3 supporting all five 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)
HART Function Codes Supported	Command 3 Read Dynamic Variables And Loop Current Command 48 Read Additional Device Status
Communication Medium to RTU	Ethernet or Serial

Item	Specification
Bulk Replication of Program	Yes
Remote Download of Program	Yes
Remote Firmware Upgrade	Yes
Remote Diagnostics	Yes
Remote Data Log File Capture	Yes

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 or Serial
Operating System	Windows 7 Professional SP1(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	184.0 x 98.5 x140.5
Weight	700g
Mounting	DIN rail (TH35-7.5)
Input voltage	18VDC - 30VDC

Item	Specification																		
	SC-UCMX01																		
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)																		
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 1.0 g acceleration over 10–150 Hz; 0.5 g acceleration over 150–2000 Hz Hazardous locations																		
<p>Note 1 – Full load including field power consumption: Each channel is loaded as detailed below.</p> <table border="0"> <tr> <td>AI-CH0~CH7::</td> <td>Current Mode-20mA Input (external supply)</td> </tr> <tr> <td>AO-CH0~CH1:</td> <td>20mA Output, external load 50Ω.</td> </tr> <tr> <td>DI-CH0~CH9:</td> <td>26.4Vdc input (external supply)</td> </tr> <tr> <td>DO-CH0~CH5:</td> <td>26.4Vdc external power supply. 300Ω load resistor (external supply)</td> </tr> <tr> <td>PI-CH0~CH1:</td> <td>10V/10kHz pulse input (external supply)</td> </tr> <tr> <td>RS232-Port1~Port2:</td> <td>Running</td> </tr> <tr> <td>RS485-Port1~Port2:</td> <td>Baud Rate: 115200, 8, N, 1</td> </tr> <tr> <td>Ethernet Port1~Port2:</td> <td>Running</td> </tr> <tr> <td>Input Voltage :</td> <td>30VDC</td> </tr> </table> <p>Note 2 – Same as note 1 except not including field power consumption and at input voltage 24VDC.</p> <p>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).</p>		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
AI-CH0~CH7::	Current Mode-20mA Input (external supply)																		
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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																		

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: 1 x SC-PCMX01 and 1 x SC-TCMX01	
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
Note 1 – One required for each computer (physical or virtual) RTU Builder is to be installed on. Can run both online and offline.	

3.3. Spare Parts

In the event spare parts are to be ordered, the following individual modules that make up complete RTUs can be ordered.

Model Number	Description
SC-PCMX01	RTU2020 controller CPM, 28 mixed onboard I/O
SC-TCMX01	RTU2020 controller IOTA, 28 mixed I/O