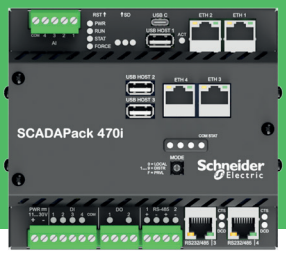
Green Premium™

Life Is On Schneider Electric

SCADAPack 470i | 474i

Remote Smart RTU and Controller with Integrated Edge Platform



Product at a glance

The SCADAPack™ 470i and 474i combine the SCADAPack x70 Smart RTU platform with a Linux-based application processor. Having cybersecurity at their core, they provide the full functionality of a Smart RTU, an edge controller, and an embedded Linux computer; all in one rugged industrial device.

The SCADAPack 470i and 474i are configured using RemoteConnect, include a web server, and are designed for solution development by users employing the large ecosystem of tools, forums, and libraries available for rapid development on embedded Linux devices. Tools such as Node-RED® can be used to support communications protocols such as MQTT®, Sparkplug® B, and OPC® UA. A software development kit is available to support C/C++ development and containers can be used for development in languages such as Python™.

Industrial-hardened hardware supports operating temperatures of -40...70 °C (-40...158 °F), has robust vibration ratings, and cULus Class I, Division 2 and ATEX/IECEx Zone 2 hazardous area certifications. The SCADAPack x70 uses components that will be available in the long term, making them the remote IoT edge platform of choice for many years to come.

Green Premium™ ecolabel product – Sustainable performance, by design

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Remote Smart RTU and Controller with Integrated Edge Platform

Product Highlights:

Edge Solutions

- Use Linux as a rapid development environment for solutions using higher level programming languages such as C/C++ or Python, providing a low-power open computing platform and Smart RTU in a single box
- Employ USB devices with Linux driver support such as cameras, microphones, WiFi dongles and more, to extend the capability of the RTU
- Provide toolless user interfaces for operators to monitor and control sites by developing secure custom web applications to oversee the RTU's operations
- Develop and deploy edge analytics solutions using Python
- Add ready-made solutions directly, or by using containers

Flexible Communications

- Employ open-standard telemetry protocols such as Modbus™, IEC 60870-5-104, and DNP3 level 4 Secure Authentication
- Bridge communications using DNP3 or IEC 60870-5-104 routing and Modbus Store and Forward
- Use tools such as Node-RED[1] to support IoT protocols such as OPC UA, MQTT, and Sparkplug B
- Included web server provides access to remote operation status using PC or mobile web browser
- Develop custom web applications
- Develop custom communication protocol drivers using the Linux rapid development environment

Powerful, Smart RTU

- Tagged (named) object databases allows I/O, configuration, logic, and application information to be communicated using open standard telemetry protocols such as Modbus, IEC 60870-5-104, and DNP3 and exchanged with Linux applications and IoT protocols
- Create IEC 61131-3 logic, with 5-language support, and password protection using the SCADAPack x70 Logic Editor
- Leverage experience and personnel training across remote (RTU) and in-plant (PLC) projects by sharing IEC 61131-3 logic between SCADAPack x70 RTUs and Modicon™ PLCs
- Update firmware, load/update logic, load configurations, and view diagnostics remotely or locally with RemoteConnect configuration software
- Available applications including the Realflo™ Oil, Gas, liquids, and CO_2 flow computer, and Realift™ pump off controller

Security at the Edge

- Control IP communications using included IP firewall and Network Address Translation (NAT) for RTU communications and Linux applications
- Ruggedized IP communications and RTU operations tested to comply with Achilles® Level 2 and Synopsis Defensics™
- Includes DNP3 Secure Authentication Level 2 support
- Planned compliance with IEC 62443 SL1 industry cybersecurity standard
- Use tools such as Node-RED[1] to employ secure IoT protocols
- SDK and other features help to support secure development of Linux applications
- Password-protection for access to SCADAPack configuration

1. Node-RED is a flow-based programming tool maintained and authored by the OpenJS Foundation & Contributors, and which can be used on a SCADAPack 470i and SCADAPack 474i.

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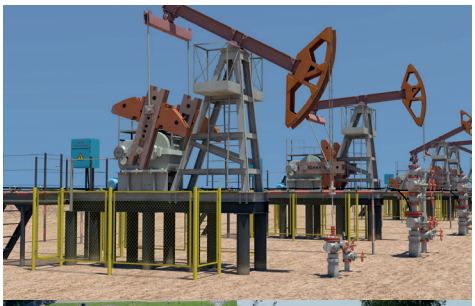
Remote Smart RTU and Controller with Integrated Edge Platform

Product Highlights cont'd:

Rugged Hardware Optimized for Remote Deployment

- 11...30 Vdc Input Power with input voltage monitor
- Low power consumption
- Wide operating temperature -40...70 °C (-40...158 °F)
- G3 conformal-coated circuit boards
- Certified for use in hazardous locations (cULus Class I, Division 2 and ATEX/IECEx Zone 2)



Typical Applications

Oil and Gas

- Production automation and optimization
- Wellhead, pipeline, battery, and tank automation
- Leak detection/negative wave pressure calculation
- Protocol gateway (e.g. MQTT, Sparkplug B, OPC UA)
- Production and wellhead edge analytics

Water & Wastewater

- Web application monitoring and control of remote sites
- Potable Water Distribution Networks
- Wastewater Collection Networks
- Lift Stations
- Water wells
- Irrigation systems
- Leakage detection
- Potable water and wastewater analytics

Wind and Solar

- Substation control and monitoring
- Wind, solar, and radiation monitoring
- Meteorological analytics
- Device-positioning optimization

Configuring and Programming

RemoteConnect configuration software

RemoteConnect configuration software facilitates configuration, diagnostics, logic development, and device management:

- Locally through any of the communication ports (default: USB device port)
- Remotely through serial or TCP/IP networks and modems

Configuration

- Use descriptive naming of objects to enhance development, debugging, and translation to host systems
- Import or export configurations for templating and bulk editing externally in Microsoft® Excel
- Group, filter, and sort objects for easy editing and viewing with RemoteConnect configuration software object browsers

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Linux Development

- SCADAPack 470i and 474i SDK supports the development of applications using C/C++
- Develop solutions in languages such as Python using Docker containers
- Deploy solutions directly to Linux using Docker containers
- Develop and debug on a Linux environment offline, in conjunction with live connection to SCADAPack 470i/474i Linux database, or online
- Leverage skills, training, and code by exploiting the large online ecosystem of libraries, forums, sample code to develop solutions quickly and easily with standard Linux and Raspberry PI®-style development environments

Logic Development (SCADAPack x70 Logic Editor)

- Employ all five IEC 61131-3 languages
- Uses compiled run-time code for fast execution
- Import and export logic code segments for use in other SCADAPack projects or sharing with Modicon PLC projects
- Perform online debugging and logic modifications from the SCADAPack x70 Logic Editor
- Develop and write logic to a running system without interruption to the logic

Web Application Development

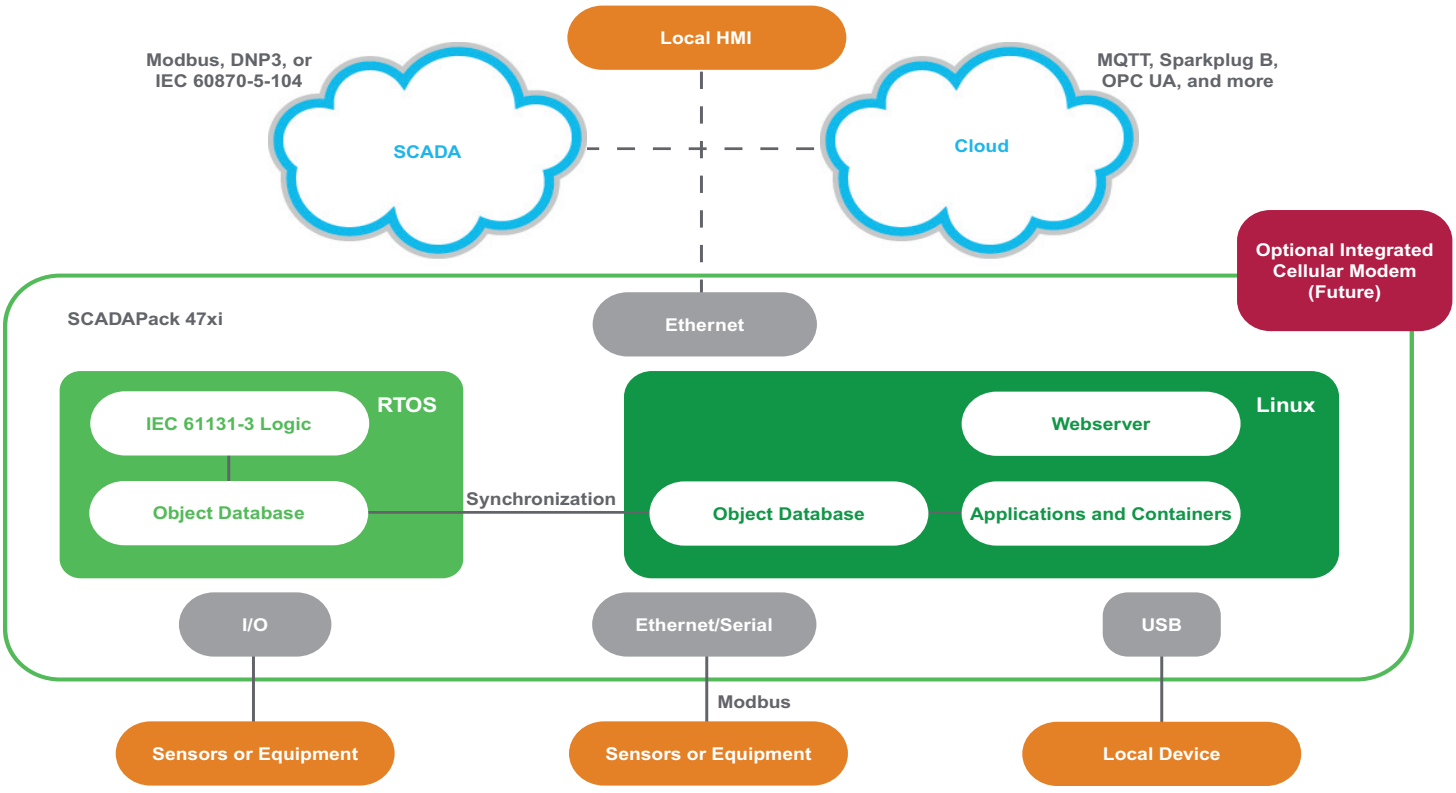
- Develop custom web applications using EcoStruxture™ RTU Operations Expert and Node-RED[1]
- Develop custom web applications using included NGINX web server
- Create web applications using Role Based Access Control with LDAP support available in Ecostruxture RTU Operations Expert

Diagnostics

- View system information and status from object browsers within RemoteConnect configuration software
- View advanced diagnostics using the Telnet command line interface, including built-in protocol analyzers for DNP3, IEC 60870-5-104 and Modbus
- View system information and status from a web browser

Device Management

- Upgrade of SCADAPack and I/O expansion firmware
- Deploy custom device drivers and custom extensions using Linux application environment



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Remote Smart RTU and Controller with Integrated Edge Platform

Specifications

Architecture	
Processors	RTU Real-time processor: • Dual ARM® Cortex® A7; 500M Hz, plus ARM Cortex M3 • 32-bit low power consumption CPU Linux Edge Application processor: • Dual ARM Cortex A7; 500 MHz • 32-bit low power consumption CPU
Memory	RTU Real-time processor: • SRAM – 4 MB, battery backed static RAM • DDR3 RAM – 256 MB, dynamic RAM • NAND Flash – 256 MB, flash memory Linux Edge Application processor: • DDR3 RAM – 1 GB, dynamic RAM • NAND Flash – 1 GB, flash memory
File System Storage	RTU Real-time processor: • Approximately 70 MB user storage • Single-partition plug-in USB mass storage devices up to 32 GB FAT32 • Single-partition plug-in MicroSD card up to 32 GB mass storage Linux Edge Application processor: • Dual internal NAND Flash operating system image for robustness • Approximately 500 MB internal user application and storage • MicroSD card up to 1 TB mass storage • USB mass storage devices up to 1 TB

Data Capacity	RTU Real-time operating system:
	• Maximum DNP3 and IEC60870-5-104 events: 100,000[2]
	• Data Logging Capacity:
	  • Up to 1 million datalog events in internal memory
	  • Up to 250 million datalog events in external media
	• Database Capacity
	  • Maximum number of database objects: Typically 15,000
	  • Maximum number of database objects linked with logic programming: Typically 6,000
	  • Object memory:
	  • Typical 2,600,000 bytes (event buffer at 5000 events)
	  • Maximum: 2,756,800 bytes (event buffer at 100 events)
	  • Minimum: 1,480,000 bytes (event buffer at 40,000 events)
	  • Maximum DNP3 Outstation devices[3]: Approximately 90
	  • Maximum DNP3 Outstation objects[3]: Approximately 15,000 across DNP3 Outstation devices
	  • Maximum Modbus Server Devices when polled using the configurable Modbus Scanner: 150
	  • Maximum objects mapped from Modbus devices: 3,000

Serial Ports: 1, 2	RS-485: 2-wire half-duplex operation. 4-pin removable terminal block, maximum baud rate 115,200 bps
Serial Ports: 3, 4	• RS-232: TxD, RxD, CTS, RTS, DCD, DTR • RS-485: 2-wire half-duplex operation • 8-pin modular RJ45 jack, maximum baud rate 115,200 bps
Serial Protocols	DNP3 subset level 4 outstation with DNP3 client and peer-to-peer, Modbus RTU server/client. Custom protocols can be developed
Ethernet Ports: 1, 2, 3, 4	8-pin modular RJ45 jack, 10/100 Mbps UTP (10/100 Base-T), transformer-isolated, independent ports
IP Protocols	• DNP3 subset level 4 in TCP or in UDP outstation with DNP3 client and peer-to-peer capability • Modbus/TCP Server, Modbus/TCP Client • IEC 60870-5-104 controlled station • Secure SSH server, Secure HTTPS Web server, Telnet Server, FTP Server
USB Device Port	USB 2.0-compliant C-type receptacle
USB Host Ports	• Port 1: USB 2.0-compliant A-type receptacle, supports USB mass storage devices up to 32 GB • Ports 2, 3: USB 2.0-compliant A-type receptacle, available to Linux

2. Reduced if database objects exceed approximately 2,000 objects
3. Polled by the SCADAPack when it is operating as a DNP3 Controlling Station

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Remote Smart RTU and Controller with Integrated Edge Platform

Specifications – cont'd

General

Logic Control	RemoteConnect software (SCADAPack x70 Logic with five IEC 61131-3 languages)
I/O Terminations	3.3...0.08 mm^2 (12...28 AWG), solid or stranded
Dimensions	• SCADAPack 470i: 142 mm W x 126 mm H x 68 mm D (5.6 in. x 4.9 in. x 2.7 in.) • SCADAPack 474i: 142 mm W x 167 mm H x 89 mm D (5.6 in. x 6.6 in. x 3.5 in.)
Packaging	• Corrosion-resistant; zinc-plated steel base and stainless steel cover with black enamel paint • Conformal-coated circuit boards
Environment	• -40…70 °C (-40…158 °F) operating temperature when the unit is mounted horizontally on a vertical surface • -40…65 °C (-40…149 °F) operating temperature when the unit is mounted in any other position • -40…85 °C (-40…185 °F) storage temperature • 5...95% relative humidity, non-condensing • Pollution Degree 2, Installation Category I, Indoor use
Shock	IEC 61131-2 ½ sine, 15 ms, 15 g
Vibration	• IEC 61131-2 • 5...8.4 Hz: Amplitude controlled, 7.0 mm (0.28 in) peak-to-peak • 8.4...150 Hz: Acceleration controlled, 1.0 g peak

Power Supply

Input voltage	• Rated Voltage 14…29 Vdc • Turn-on 10…11.5 Vdc • Turn-off 9…10 Vdc
Power requirements	• 4.8 W (SCADAPack 470i) • 6 W (SCADAPack 474i)
Maximum power input to controller (excluding modem)	10.5 W

Certifications

Industrial Standards	Requirements specific to the SCADAPack functional characteristics, immunity, robustness, and safety: • IEC/EN 61131-2 • CAN/CSA 22.2 No. 61010-1-12 and CAN/CSA 22.2 No. 61010-2-201 • UL 61010-1 and UL 61010-2-201
CE Marking Compliance	• For the latest information regarding product compliance with European Directives for CE marking, refer to the EU Declaration of Conformity issued for your product at se.com • For the latest information regarding product compliance with RoHS, WEEE directives and REACH regulation, visit the Schneider Electric Check a Product portal at https://checkaproduct.se.com/
Installation in Classified Ex Area	• North America: Hazardous locations Class I, Division 2, groups A, B, C, and D, T4 and Class I, Zone 2, T4, -40 °C ≤ Tamb ≤ 70 °C (-40 °F ≤ Tamb ≤ 158 °F) and Class I, Zone 2, IIC T4 according to CSA C22.2 No. 213-17, UL 12.12.01 • ATEX, UKEX: Zone 2, II 3G, Ex ec nC IIC T4 Gc according to EN IEC 60079- 0, EN IEC 60079-7 and EN IEC 60079-15 • IECEx: Zone 2, Ex ec nC IIC T4 Gc according to IEC 60079- 0, IEC 60079-7 and IEC 60079-15 • For Eurasian Economic Union: EAC
Specific Countries	• For Australia and New Zealand: ACMA requirements for RCM marking • For United States: FCC Part 15 Subpart B Class A

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Remote Smart RTU and Controller with Integrated Edge Platform

Specifications – cont'd

Digital and Analog Inputs/Outputs

SCADAPack Smart RTU	Digital inputs 12...24 Vdc		Digital outputs		Pulse counter inputs (shared with DIs)		Analog inputs		Analog outputs
	DI 1...4	DI 5...20	DO 1...2	DO 3...12	DI 1...4	DI 5...12	AI 1...4	AI 5...12	AO 1...2
470i	4	-	2	-	4	-	4	-	-
474i	4	16	2	10	4	8	4	8	2

Digital Inputs	• DI 1...4
	  • 12...24 Vdc
	• DI 5...20 (SCADAPack 474i only)
	  • 12…24 Vdc

Pulse Counter Inputs	• DI 1...4
	  • Max. 10 kHz (@ 50% duty cycle)
	  • Built-in turbine preamplifier[4] for direct connection to turbine coils using short, shielded cable only.
	• DI 5...8 (SCADAPack 474i only)
	  • Max. 1.5 kHz (@ 50% duty cycle)
	  • Shared with first 8 digital input channels on lower I/O board
	• DI 9...12 (SCADAPack 474i only)
	  • Max. 150 Hz (@ 50% duty cycle)

Digital Outputs	• DO 1...2
	  • Form A, NO (Normally Open) relays, 2 A @ 30 Vdc,
	• DO 3...12 (SCADAPack 474i only)
	  • Form A, NO (Normally Open) relays, 2 A @ 30 Vdc

Analog Inputs	• AI 1...4
	  • 0…20 mA, 4…20 mA, 0…5 Vdc, 1…5 Vdc, 12-bit resolution, unipolar, non-isolated, voltage/current selectable by software,
	  • configurable for 30 mSec high speed update rate
	• AI 5...12 (SCADAPack 474i only)
	  • 0…20 mA, 4…20 mA, 0…5 Vdc, 1…5 Vdc, 24-bit resolution, single-ended, isolated from logic and chassis.
	  • Filtering configuration 'none' results in fast sampling @100 mSec total for all 8 channels, '50/60Hz' filter configuration results in sampling @ 500mSec for all 8 channels

Analog Outputs	• AO 1...2 (SCADAPack 474i only) • 0…20 mA, 4…20 mA (voltage output with external resistor), 12-bit resolution over 0…20 mA range, single-ended, isolated from logic and chassis
Internal (System) Analog Inputs	• Input power supply voltage monitor, 36 Vdc full scale • Memory/RTC battery voltage monitor • Internal temperature monitor, measurement range -40…75 °C (-40...167 °F)
Clock calendar	±15 seconds per month at -40…70 °C (-40...158 °F)

Additional I/O

Supported Modules	• 5304, 5410, 5414, 5415, 5505, 5506, 5606, 5607, 6601, 6607 • When SCADAPack 47xi controller is used with 5000-series I/O Expansion modules, order one Inter Module Cable (IMC) adaptor cable (ref. TBUM297138), to adapt from 20 signal lines (used by SCADAPack x70 Smart RTUs) to 16 signal lines (used by 5000-series IO modules) • Maximum number of external expansion modules per unit: 15 [5]
I/O Expansion Limits[5]	• Refer to the SCADAPack x70 Documentation Set > Hardware Manuals for further details. • Maximum intermodule cable length (not including the short cables that come with each module) is 1.82 m (75 in.)

4. Applies to inputs 1 and 2 only. Cabling 10 ft (3 m) maximum in low noise environments
5. Additional power supply modules (model 6103) may be required for additional bus power, depending on how many expansion modules are included on the bus.

Refer to the SCADAPack x70 Documentation Set for further details.

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Model Code

TBUP474I-IA50-BB03S is an example of a SCADAPack 474i part number using the model codes below

Code	Select: Hardware platform
TBUP470I	SCADAPack 470i, 32-bit controller, Dual Core
TBUP474I	SCADAPack 474i, 32-bit controller, Dual Core, comes with additional I/O

Code	Select: Firmware platform
I	SCADAPack x70i RemoteConnect with IEC 61131-3 programming software, Linux Application Processor included

Code	Select: SCADA Security
A	Standard security features (including DNP3 Secure Authentication)

Code	Select: Protocol Option
5	DNP3 Serial/IP client/outstation/peer-to-peer[6], Modbus RTU/TCP client/server, TCP/IP

Code	Select: License Option
0	None

Code	Select: Analog Inputs /Outputs
A	P470i: 4 Analog Inputs, selectable as 0…20 mA, 4…20 mA, 0…5 Vdc, 1…5 Vdc
B	P474i: adds 8 Analog Inputs, factory-shipped selectable as 0…20 mA, 4…20 mA, 0…5 Vdc, 1…5 Vdc, and 2 Analog Outputs, selectable as 0...20 or 4...20 mA

Code	Select: Digital Inputs/Outputs
A	P470i: 4 Digital Inputs (12...24 Vdc), 2 Digital Outputs Form A, NO (Normally Open) relays
B	P474i: adds 16 Digital Inputs (12...24 Vdc) and 10 Digital Outputs Form A NO (Normally Open) relays

6. Including DNP3 Data Concentrator Client License – allows collection of DNP3 events and data from multiple outstations

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Remote Smart RTU and Controller with Integrated Edge Platform

Model Code cont'd

TBUP474I-IA50-BB03S is an example of a SCADAPack 474i part number using the model codes below

Code	Future Option
0	None

Code	Select: Realflo Flow Computer - Flow Run License Options
0	None
3	3 Runs - any combination of gas, liquid or water totaling 3 runs (gas runs include gas transmission option)
6	6 Runs - any combination of gas, liquid or water totaling 6 runs (gas runs include gas transmission option)
T	10 Runs - any combination of gas, liquid or water totaling 10 runs (gas runs include gas transmission option)
V	20 Runs - any combination of gas, liquid or water totaling 20 runs[7]

Code	Select: Certifications
S	• FCC 47 CFR Part 15, Subpart B; ICES-003; CE and RCM markings, cULus Hazardous Location Class I, Division 2, Groups A, B, C and D, T4; and Class I, Zone 2, IIC • ATEX: EU Directive 2014/34/EU) in defined atmosphere Zone 2 ATEX II 3G, Ex ec nC IIC T4 Gc according to EN IEC 60079- 0, EN IEC 60079-7 and EN IEC 60079-15 • For Eurasian Economic Union: EAC

Accessories

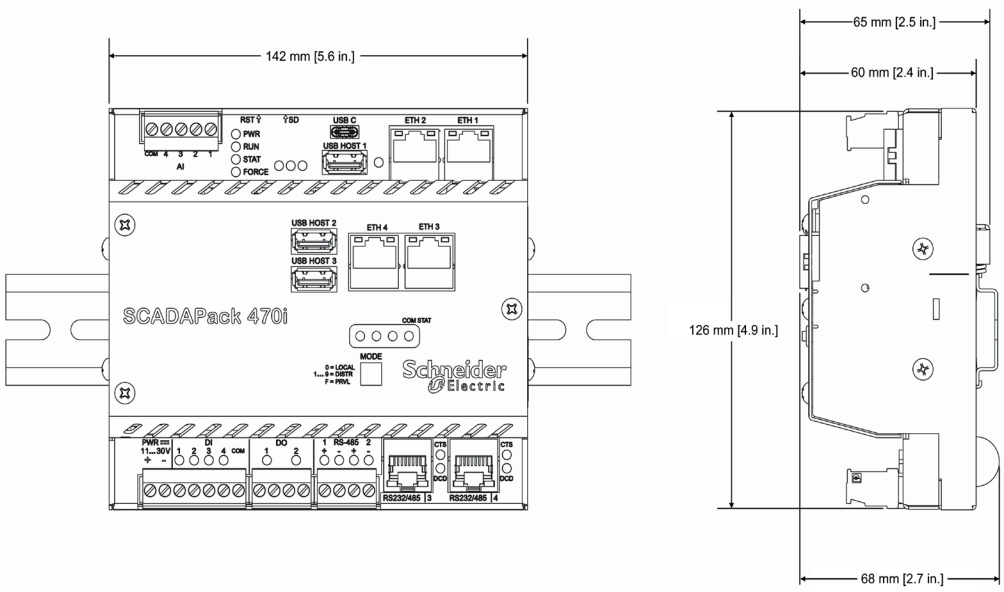
Part Number	Description
TBUM297310	SCADAPack 47x Connector Kit - five complete sets of spare connectors for SCADAPack 470i and 474i RTUs, and 6607 I/O expansion module
TBUM297147	SCADAPack Rod Pump Controller, Factory
TBUM297148	SCADAPack Rod Pump Controller, Field Upgrade

7. Gas transmission option is a standard feature of all SCADAPack x70 Smart RTUs with an active flow run license

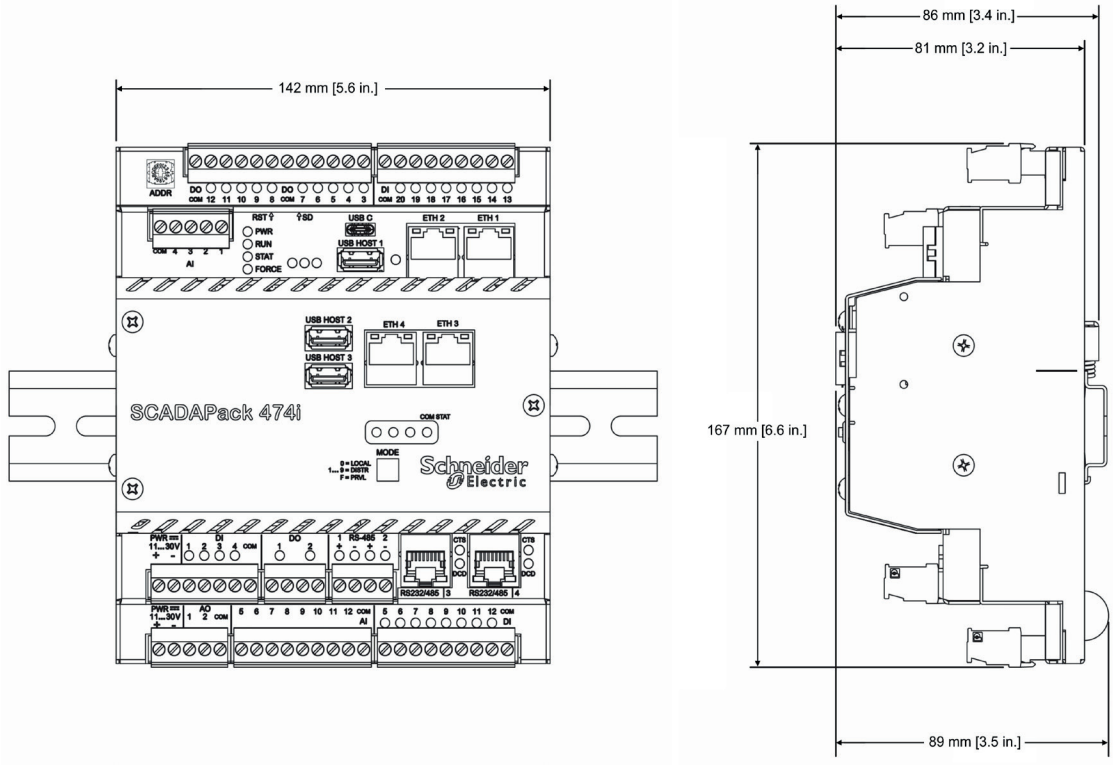
SCADAPack 470i | 474i

Remote Smart RTU and Controller with Integrated Edge Platform

Dimensions - SCADAPack 470i



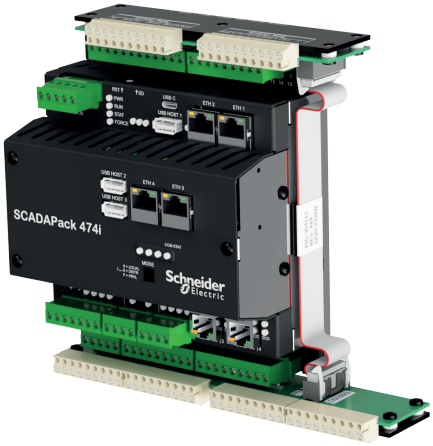
Dimensions - SCADAPack 474i



SCADAPack 470i | 474i

Remote Smart RTU and Controller with Integrated Edge Platform

Terminal Adaptors



Optional terminal adaptors provide the possibility for drop-in wiring replacement of existing SCADAPack P1, or SCADAPack P4 RTUs. This approach can save substantial time and costs when upgrading existing panels to SCADAPack 474i.

The terminal adaptors provide pin headers that accept the older style ‘gray’ plug-in terminal blocks. The adaptors position the terminal headers to approximately the same physical position as they are on the existing SCADAPacks. If panel space allows, and the wiring scheme is compatible with the terminal adaptors, the SCADAPack 474i can be placed into the existing panel, and existing wiring to the lower I/O board can be plugged onto the terminal adaptors without removing the wires from the terminal blocks.

For further details on the TBUM297915 terminal adaptor kit, refer to its data sheet (TBULM08038-10).

Refer to the SCADAPack x70 Documentation Set for further details.

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Part Number: TBULM08030-07 v04

Green Premium™

Schneider Electric's commitment to deliver products with best-in-class environmental performance.

Green Premium™

More than 75% of our product sales offer superior transparency on the material content, regulatory information and environmental impact of our products:

- RoHS compliance
- REACH substance information
- Industry leading # of PEP's*
- Circularity instructions

Learn more about Green Premium

Green Premium promises compliance with the latest regulations, transparency on environmental impacts as well as circular and low-CO_2 products.

CO2 and P&L impact through… Resource Performance

Green Premium brings improved resource efficiency throughout an asset's lifecycle. This includes efficient use of energy and natural resources, along with the minimization of CO_2 emissions.

Cost of ownership optimization through… Circular Performance

We're helping our customers optimize the total cost of ownership of their assets. To do this, we provide IoT-enabled solutions, as well as upgrade, repair, retrofit, and remanufacture services.

Peace of mind through… Well-being Performance

Green Premium products are RoHS and REACH-compliant. We're going beyond regulatory compliance with step-by-step substitution of certain materials and substances from our products.

Improved sales through… Differentiation

Green Premium delivers strong value propositions through third-party labels and services. By collaborating with third-party organizations we can support our customers in meeting their sustainability goals such as green building certifications.

*PEP: Product Environmental Profile (i.e. Environmental Product Declaration)