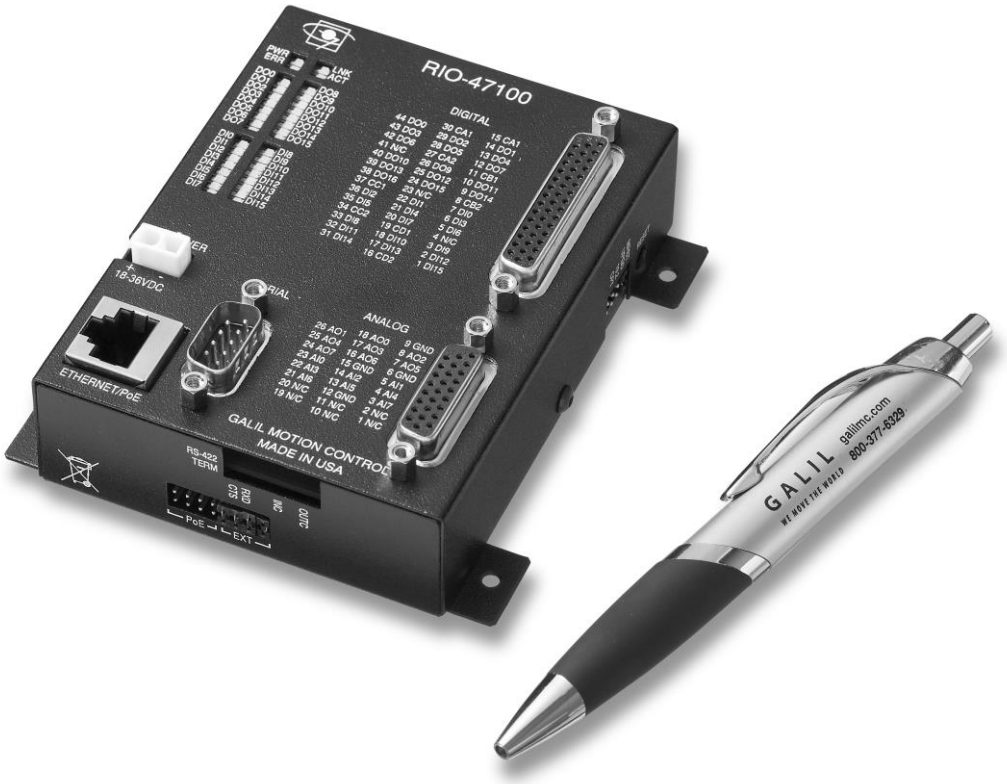
Galil Motion Control



RIO – 47xxx

Datasheet

Product Description

The RIO-47xxx is a compact PLC with Ethernet that is smart, easy-to-use, and cost-effective. The RIO contains a fast RISC processor for handling I/O logic and is programmed using Galil's intuitive command language or using Galil's Ladder Interface software.

Each RIO unit is self-contained with numerous analog and digital I/O including: 8 analog inputs, 8 analog outputs, 16 optically isolated inputs, 8 high-power isolated outputs and 8 low-power isolated outputs. The RIO-4710x provides 0-5V analog I/O and the RIO-4712x provides configurable +/-10V, +/-5V, 0-5V, or 0-10V analog I/O. The RIO can be configured to operate as a Modbus TCP master or slave, and multiple RIO units can be distributed on an Ethernet network allowing I/O expansion.

The RIO-471x0 and RIO-47200 contains 200 lines of program space, 126 variables, 400 array elements, 2 PID loops, and 3 Ethernet handles. The RIO-471x2, RIO-47202 and RIO-47300 have expanded memory containing 400 lines of program space, 254 variables, 1000 array elements, 6 PID loops, and 5 Ethernet handles.

The RIO-47142/-47162/-47300 models have an internal switch with two Ethernet ports which allows daisy chaining of RIO units without an external switch. It can also easily communicate with other devices including Galil's DMC-40x0, DMC-41x3 and DMC-30000 Ethernet motion controllers.

(RIO-47122)

Features

- Programmable logic controller (PLC) that is smart, compact and cost-effective
- (1) 10/100 Base-T Ethernet port (2 port options available) and (1) RS232 port up to 115/19.2 kbaud or USB (47162).
- Modbus/TCP master or slave
- Lots of I/O - Model comparison
  - 8 analog inputs
  - 8 analog outputs
  - 16 optically isolated inputs (24 for -47300, 40 for -47162)
  - 16 optically isolated outputs (24 for -47300 and -47162 (non-isolated))
- Analog PID Process Control Loops
- Multitasking for concurrent execution of up to four application programs.
- LED indicators for all digital I/O points
- Contains RISC processor and memory for programming I/O events
- Easy-to-use, 2-letter Galil programming language
- Expanded variables, memory, and control loops for RIO-471x2, RIO-47202 and RIO-47300
- Web interface and email capability for sending messages
- Powered by Power-Over-Ethernet (PoE), external 18-36 V_{DC} input, and 9-48 V_{DC} input options available
- Small Size:
  - RIO-471xx: 3.88" x 4.25" x 1.30" with Metal Enclosure; D-sub connectors (4.65” for -47162)
  - RIO-472xx: 7.19” x 3.52” with DIN tray; Screw Terminals
  - RIO-47300: 10.8” x 4.7” with DIN tray: Screw Terminals
  - Interface to RTD or Thermocouple temperature sensors with SCB-48x06
- Galil's Ladder Interface Software is available for converting Relay Ladder Logic programs into deterministic code
- Custom hardware and firmware options available

Programmable Logic Controller	
Processor	RISC-based clock multiplying processor with DSP functions
Communication	(1) 10/100 Base-T Ethernet port (2 port option available) (1) RS232 port – 19.2 kbaud, 115 kbaud, USB (RIO-47162)

Power and Mechanical	
Power requirements	• 18-36 V_{DC} or PoE Power- over- Ethernet. • RIO-47142, RIO-47162, and 47300 use 9-48 V_{DC} (no PoE)
Power Consumption	2.5 Watts typical, 4 Watts max
Operational temperature	0 – 70º C
Humidity	20 – 95 % RH, non-condensing
Dimensions	
RIO-471xx	3.88" x 4.25" x 1.30" box
RIO-47162	3.88" x 4.65" x 1.30" box
RIO-472xx	7.19" x 3.52" with DIN
RIO-47300	10.8" x 4.7" with DIN

Inputs and Outputs	
Digital Outputs	
RIO-4710x, RIO-4712x	• Outputs 0-7 optoisolated sourcing high-power • 12-24 $V_{DC,}$ 500 mA
	• Outputs 8-15 optoisolated sinking low-power • 5-24 $V_{DC,}$ 25 mA
RIO-47162	• Outputs 0-23 sourcing high-power • 5-24 $V_{DC,}$ 300 mA (built in over current protection)
RIO-472xx, RIO-47142	• Outputs 0-15 optoisolated sourcing high-power • 12-24 $V_{DC,}$ 500 mA
RIO-47300	• Outputs 0-23 optoisolated sourcing high-power • 12-24 $V_{DC,}$ 500 mA
Digital Inputs	
RIO-471xx, RIO-472xx	• Inputs 0-15 optoisolated. 2.2 kΩ series resistor for 5-24 V_{DC} input.
RIO-47162	• Inputs 0-39 optoisolated • 2.2 kΩ series resistor for 5-24 V_{DC} input
RIO-47300	• Inputs 0-23 optoisolated • 2.2 kΩ series resistor for 5-24 V_{DC} input
Analog Inputs	
RIO-4710x	• 0-5 V_{DC} • 100 k input impedance • 12-bit ADC
RIO-4712x, RIO-47142, RIO-47162, RIO-47300	• User configurable ±10 V_{DC}, ±5 V_{DC}, 0-10 V_{DC}, 0-5 V_{DC} • 12-bit ADC standard, 16-bit optional • **Unipolar:** 42 k input impedance. • **Bipolar:** 31 k input impedance
RIO-472xx	• 0-5 V_{DC} 12-bit ADC • ±10 V_{DC} 12-bit ADC standard, 16-bit optional
Analog Outputs	
RIO-4710x0	• 0-5 V_{DC}; Source/Sink up to 4 mA • 12-bit DAC
RIO-4712x, RIO-47142, RIO-47162, RIO-47300	• User configurable +/-10 V_{DC}, +/-5 V_{DC}, 0-10 V_{DC}, 0-5 V_{DC} • Source/Sink up to 4mA • 12-bit DAC standard, 16-bit optional
RIO-4720x	• Optional with SCB-48608 • 12-bit or 16-bit DAC

Standard vs. Expanded Memory		
Feature	**Standard**	**Expanded**
# of array elements	400	1000
# of program lines	200	400
# of variables	126	256
# of labels	62	126
# of control loops	2	6
# of Ethernet handles	3	5
Auto MDIX	NO	YES
10/100 Mbits/s	100 Mbit/s Standard (10 Mbit/s with jumper added)	Auto-negotiated
Real-time Clock	NO	Yes (See-RTC for extra capabilities)

Ordering Options

The RIO-47xxx has three distinct packaging types, the RIO-471xx, RIO-472xx, and RIO-473xx. Each packaging type has its "base" model for which different variations (xx) and additional – yyy Standard Options can be ordered. For instance a full part number would follow the format RIO-47xxx-yyy, such as RIO-47122-422-HS. Note, multiple – yyy Standard Options can be ordered per RIO.

RIO-47162 model (left); RIO-47122 (right)

RIO-471xx - yyy

Model 471xx	Features	Available Options -yyy
4 7 1 0 0	• 8 0-5 V_{DC} Analog Inputs • 8 0-5 V_{DC} Analog Outputs • 8 optoisolated 500mA sourcing digital outputs • 8 optoisolated 25mA sinking digital outputs • 16 optoisolated digital inputs • Memory - 200 Lines program space, 126 variables, 400 array elements, 2 PID loops, 3 Ethernet Handles	-422 -DIN
4 7 1 0 2	• 8 0-5 V_{DC} Analog Inputs • 8 0-5 V_{DC} Analog Outputs • 8 optoisolated 500mA sourcing digital outputs • 8 optoisolated 25mA sinking digital outputs • 16 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-(4-20mA) -422 -HS -RTC -2LSRC -DIN
4 7 1 2 0	• 8 ±10 V_{DC} configurable Analog Inputs • 8 ±10 V_{DC} configurable Analog Outputs • 8 optoisolated 500mA sourcing digital outputs • 8 optoisolated 25mA sinking digital outputs • 16 optoisolated digital inputs • Memory - 200 Lines program space, 126 variables, 400 array elements, 2 PID loops, 3 Ethernet Handles	-16Bit -422 -DIN
4 7 1 2 2	• 8 ±10 V_{DC} configurable Analog Inputs • 8 ±10 V_{DC} configurable Analog Outputs • 8 optoisolated 500mA sourcing digital outputs • 8 optoisolated 25mA sinking digital outputs • 16 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-16Bit -SSI -(4-20 mA) -2LSRC -422 -DIN -BiSS -HS -PWM -QUAD -RTC

4 7 1 4 2	• Dual Ethernet ports, no PoE • 8 ±10 V_{DC} configurable Analog Inputs • 8 ±10 V_{DC} configurable Analog Outputs • 16 optoisolated 500mA sourcing digital outputs • 16 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-16Bit -SSI -(4-20 mA) -DIN -422 -BiSS -HS -PWM -QUAD -RTC
4 7 1 6 2	• Dual Ethernet ports, no PoE • 8 ±10 V_{DC} configurable Analog Inputs • 8 ±10 V_{DC} configurable Analog Outputs • 24 300mA sourcing digital outputs (current protected) • 40 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-16Bit -(4-20 mA) -BiSS -HS -PWM -QUAD -RTC -SSI -DIN

The table above describes the RIO and its options. For in depth details regarding the – yyy Standard Options, please see the Orderable Options section in the Appendix of the DMC-47xxx User Manual for details.

RIO-47202 *RIO-47300* *RIO-47300-24EXOUT*

RIO-47200/-47202/-47300 - yyy		
Base Model	**Features**	**Available Options -yyy**
47200	• Screw-terminal connectors • Din-rail mount with metal cover • 8 0-5 V_{DC} Analog inputs • 16 optoisolated 500mA sourcing digital outputs • 16 optoisolated digital inputs • Memory - 200 Lines program space, 126 variables, 400 array elements, 2 PID loops, 3 Ethernet Handles	-422 -NO DIN
47202	• Screw-terminal connectors • Din-rail mount with metal cover • 8 0-5 V_{DC} Analog inputs • 16 optoisolated 500mA sourcing digital outputs • 16 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-(4-20mA) -1LSRC -422 -1LSNK -BISS -2LSRC -HS -2LSNK -NO DIN -8AO_10v12bit -PWM -8AO_10v16bit -QUAD -8AI_10v12bit -RTC -8AI_10v16bit -SSI
47300	• Screw-terminal connectors • Din-rail mount with metal cover • Dual Ethernet ports, no PoE • 8 ±10 V_{DC} Analog inputs • 8 ±10 V_{DC} Analog outputs • 24 optoisolated 500mA sourcing digital outputs • 24 optoisolated digital inputs • Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles	-16Bit -(4-20mA) -422 -HS -NO DIN -PWM -RTC
Add-on Board for RIO-47300	*Addition to the RIO-47300 functions, this add-on board offers: (select only one)* 24 optoisolated digital inputs 24 optoisolated 500 mA sourcing digital outputs QUAD, SSI or BiSS Encoder inputs	-QUAD -SSI -BISS -24EXIN -24EXOUT

Use the Part Number Generator for building your RIO-47xxx
http://www.galil.com/products/rio-47xxx-part-number.php

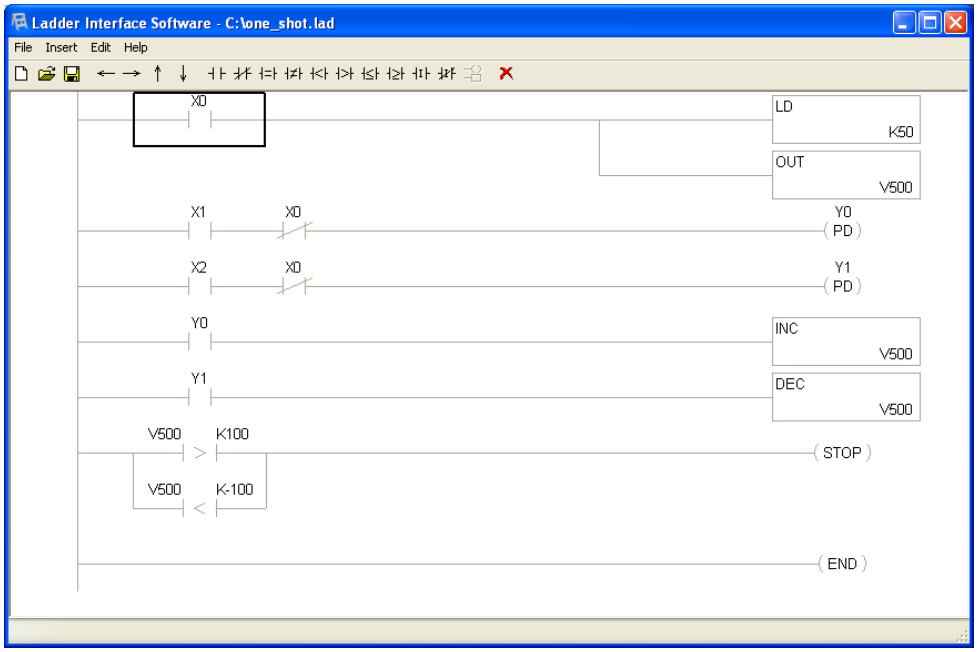
Example Part Numbers	
Part Number	**Description**
RIO-47100	Metal Case Ethernet 10/100BaseT & RS-232 Communication 8 high power optoisolated digital outputs 0-7 (sourcing only) 8 low power optoisolated digital outputs 8-15 (default: sinking) 16 optoisolated digital inputs 8 Analog Inputs, 12bit 0-5 V_{DC} 8 Analog Outputs 12bit 0-5 V_{DC} Memory - 200 Lines program space, 126 variables, 400 array elements, 2 PID loops, 3 Ethernet Handles
RIO-47102-(4-20mA)-422	Metal Case Ethernet 10/100BaseT & RS-232 Communication 8 high power optoisolated digital outputs 00-07 (sourcing only) 8 low power optoisolated digital outputs 08-15 (default: sinking) 16 optoisolated digital inputs 8 12bit 0-5 V_{DC} Analog Inputs 8 12bit 0-5 V_{DC} Analog Outputs Expanded Memory - 400 Lines program space, 254 variables, 1000 array elements, 6 PID loops, 5 Ethernet Handles **Options** All analog inputs converted to 4-20mA analog inputs. RS-422 on Serial Port

RIO-47xxx

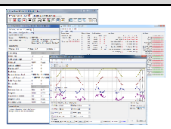
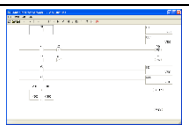
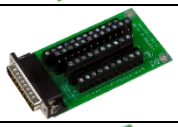
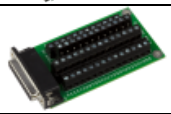
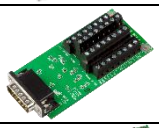
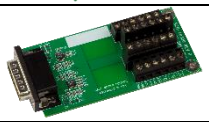
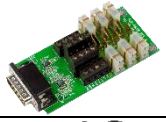
Ladder Logic Interface software for the RIO Pocket PLC:

Galil's Ladder Interface Software is a software tool for the RIO-47xxx Pocket PLC. The software converts a relay Ladder Logic program into code for input into the RIO- controller. Ladder Logic is often used by programmable logic controller (PLC) programmers to graphically input I/O logic. While direct RIO programming using Galil's two-letter text instructions allows for flexible coding, it is sometimes easier to determine the I/O logic visually with Ladder Logic.

The Ladder Interface Software provides an easy-to-use graphical interface that allows standard mathematical and logical operators, and object types for: contact, coils, control relays, boxes (including timers, counters, and data manipulation) and analog I/O. The software generates an RIO program from the specified objects in the flow diagram. In addition to generating optimized code, Galil's Ladder Interface Software automatically adds determinism to the program.



Example: Ladder Logic Interface software for the RIO Pocket PLC

Accessories		
Part Number		**Description**
	GDK	GDK is the development software for Galil's controllers. It includes, multiple tuning methods, real-time scopes, multiple device management, configuration tools, and much more.
	LADDER INTERFACE SOFTWARE	Ladder Logic Interface software for the RIO Pocket PLC
	CABLE-26-1M	26-pin HD male D-sub to discrete wires, 1 meter
	CABLE-44M-1M	44-pin HD male D-sub to discrete wires, 1 meter
	CABLE-44F-1M	44-pin HD female D-sub to discrete wires, 1 meter
	CABLE-44-2M	44-pin HD male D-sub to discrete wires, 2 meter
	CABLE-9-PIN-D	RS232 female to female straight through cable
	ICS-48026-M	26-pin D-sub HD male to screw terminal break out
	ICS-48044-M	44-pin D-sub HD male to screw terminal break out
	ICS-48044-F	44-pin D-sub HD female to screw terminal break out
	SCB-48206	Signal conditioning board for RTDs
	SCB-48306	Signal conditioning board for K thermocouples with screw terminals
	SCB-48316	Signal conditioning board for K thermocouples with thermocouple terminal
	PS-2.50-24	60 Watt Power Supply (2.5Amps at 24V)