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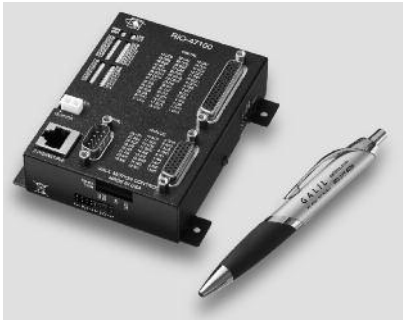
Pocket PLC with Ethernet/RS232

RIO-47xxx

Product Description

The RIO-47xxx is a programmable logic controller (PLC) that is smart, compact, cost-effective, and packed with I/O. Each RIO unit is self-contained with 16 analog I/O and up to 48 optically isolated digital I/O. The RIO contains a powerful RISC processor for fast I/O handling. Intelligent features include non-volatile program memory, variables, arrays, multitasking, PID process control loops, timers, pulse counters, web interface, e-mail alerts, and data logging. Options for interfacing to RTDs and thermocouples and reading position sensors are available.

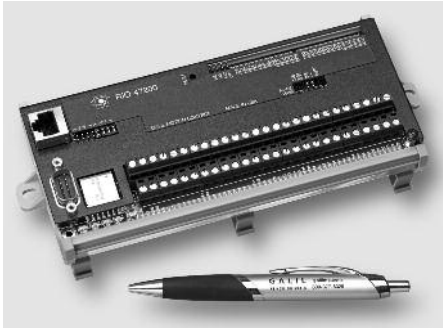
RIO-471xx Pocket PLC



An Ethernet and RS232 port are standard features on the RIO. 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-47142 and -47300 model has an internal switch with two Ethernet ports which allow daisy chaining of RIO units without an external switch. The RIO can also easily communicate with Galil Ethernet motion controllers including the DMC-4000 Accelera motion controllers, DMC-41x3 Econo motion controllers, and DMC-30000 Pocket motion controllers.

RIO controllers are easily programmed using Galil's intuitive 2-letter command language. Software is available for converting Relay Ladder Logic programs into deterministic code for the RIO.

RIO-472xx provides DIN tray and screw terminals



Measuring 3.88" x 4.26" x 1.30", the RIO-471xx is packaged in a compact metal enclosure and provides D-type connectors. The RIO-472xx measures 7.19" x 3.52" with a DIN tray and screw terminals.

The RIO-47300 is an expanded unit with more memory, two Ethernet ports, additional I/O and screw terminals.

Features

- *Programmable logic controller (PLC) that is smart, compact and cost-effective*
- *Ethernet Port standard; (2) daisy-chainable Ethernet ports with RIO-47142 and RIO-47300*
- *RS232 Port—115 kb/19.2 kb*
- *16 optically isolated digital inputs (24 for -47300)*
- *16 optically isolated digital outputs (24 for -47300)*
- *8 analog inputs*
- *8 analog outputs*
- *LED indicators for all digital I/O*
- *2 PWM outputs—optional*
- *Non-volatile program memory, variables, arrays and control loops. Expanded memory option with RIO-47xx2, -47300*
- *Multitasking for concurrent execution of up to four programs*
- *Uses Galil's intuitive 2-letter programming language. Software available for converting Relay Ladder Logic programs.*
- *Analog PID process control loops, pulse counters, web interface and email capability for sending messages*
- *Modbus/TCP master or slave. Modbus/RTU available*
- *Thermocouple and RTD interface options for temperature control*
- *Option to read position sensors at 8 Mhz at 25 msec intervals*
- *Small size:*
  RIO-471xx: 3.88" x 4.26" x 1.30" Box; D-type
  RIO-472xx: 7.19" x 3.52" with DIN tray; screw terminals
  RIO-47300: 10.8" x 4.7" with DIN tray; screw terminals
- *Uses external 18–36 VDC supply or internal Power-over-Ethernet. RIO-47142 and -47300 use 9–48 VDC (no PoE)*
- *Custom firmware and hardware options available*

Pocket PLC Controller

RIO-47xxx

Specifications

System Processor

- RISC-based clock multiplying processor with DSP functions

Communications Interface

- 10/100Base-T Ethernet port (2 ports for RIO-47142)
- RS232 port — 19.2 kbaud, 115 kbaud

Memory (RIO-47xx0)

- Program memory size: 200 lines x 40 characters
- 126 variables
- 400 array elements in up to 6 arrays
- 2 PID control loops
- 3 Ethernet handles

Expanded Memory (RIO-47xx2, -47300)

- Program memory size: 400 lines x 40 characters
- 254 variables
- 1000 array elements in up to 6 arrays
- 6 PID control loops
- 5 Ethernet handles

Digital Outputs

- RIO-4710x, RIO-4712x:
  Outputs 0–7 optoisolated sourcing high-power. 12–24 VDC, 500 mA
  Outputs 8–15 optoislated sinking low-power. 5–24 VDC, 25 mA
- RIO-472xx, RIO-47142:
  Outputs 0–15 optoisolated sourcing high-power. 12–24 VDC, 500 mA
- RIO-47300:
  Outputs 0–23 optoisolated sourcing high-power. 12–24 VDC, 500 mA

Digital Inputs

- All RIO models: Inputs 0–15 optoisolated. 2.2 K series resistor for 5–24 V input. Inputs 0–23 for -47300

Analog Inputs

- RIO-4710x: 0–5 V; 100 K impedance; 12-bit ADC
- RIO-4712x, RIO-47142, RIO-47300:
  User configurable +/-10 V, +/-5 V, 0–10 V, 0–5 V; 12-bit ADC standard, 16-bit option
  Unipolar: 42 K input impedance. Bipolar: 31 K input impedance
- RIO-472xx: 0–5 V; 12-bit ADC; +/-10 V; 16-bit ADC option

Analog Outputs

- RIO-4710x: 0–5 V; source/sink up to 4 mA; 12-bit DAC
- RIO-4712x, RIO-47142, RIO-47300: User configurable +/-10 V, +/-5 V, 0–10 V, 0–5 V
  Source/sink up to 4mA; 12-bit DAC standard, 16-bit option
- RIO-4720x: Optional with SCB-48608; 12-bit or 16-bit DAC

Power

- External input 18–36 VDC or PoE Power-over-Ethernet.
  RIO-47142 and -47300 use 9 – 48 VDC (no PoE)
- Power consumption is 2.5 Watts typical, 4 Watts max

Mechanical

- RIO-471xx: 3.88" × 4.26"× 1.30" Box
  RIO-472xx: 7.19" × 3.52" with DIN tray
  RIO-47300: 7.19" × 3.52" with DIN tray

Environmental

- Operating Temperature: 0 –70 °C

Connectors for RIO-471xx

Serial

9-pin; Male connector and cable

1 NC
2 Transmit data-output
3 Receive data-input
4 NC
5 Ground
6 NC
7 Clear to Send-input
8 Request to Send-output
9 NC

Analog I/O

26-pin HD Female D-sub

1 NC
2 NC
3 Analog input 7
4 Analog input 4
5 Analog input 1
6 Analog Ground
7 Analog output 5
8 Analog output 2
9 Analog Ground
10 NC
11 NC
12 Analog Ground
13 Analog input 5
14 Analog input 2
15 Analog Ground
16 Analog output 6
17 Analog output 3
18 Analog output 0
19 NC
20 NC
21 Analog input 6
22 Analog input 3
23 Analog input 0
24 Analog output 7
25 Analog output 4
26 Analog output 1

External Power

1 Ground
2 18-36VDC

Digital I/O

44-pin HD Female D-sub

1 Digital Input 15
2 Digital Input 12
3 Digital Input 9
4 NC
5 Digital Input 6
6 Digital Input 3
7 Digital Input 0
8 Output Common OP1B–Power (Outputs 8-15)
9 Digital Output 13
10 Digital Output 10
11 Output Common OP1A–Ground (Outputs 8-15)
12 Digital Output 7
13 Digital Output 4
14 Digital Output 1
15 Output Common OP0A–Power (Outputs 0-7)
16 NC
17 Digital Input 13
18 Digital Input 10
19 Input Common 1 (Inputs 8-15)
20 Digital Input 7
21 Digital Input 4
22 Digital Input 1
23 NC
24 Digital Output 14
25 Digital Output 11
26 Digital Output 8
27 Output Common OP0B–Ground (Outputs 0-7)
28 Digital Output 5
29 Digital Output 2
30 Output Common OP0A–Power (Outputs 0-7)
31 Digital Input 14
32 Digital Input 11
33 Digital Input 8
34 NC
35 Digital Input 5
36 Digital Input 2
37 Input Common 0 (Inputs 0-7)
38 Digital Output 15
39 Digital Output 12
40 Digital Output 9
41 NC
42 Digital Output 6
43 Digital Output 3
44 Digital Output 0

Pocket PLC Controller

RIO-47xxx

Instruction Set

Ethernet

DH	DHCP enable
HS	Handle assignment switch
IA	Set IP address
IH	Internet handle
MA	Email server IP address
MB	Modbus
MD	Email destination address
MI	Modbus Integer
MS	Email source address
MV	Modbus Reversal
MW	Modbus wait
SA	Send command
SM	Subnet mask

I/O

AO	Analog output voltage
AQ	Analog configuration
CB	Clear bit
DY	Sets PWM duty cycle
FQ	Sets PWM frequency
II	Input interrupt
IQ	Input configuration
OB	Define output bit
OP	Output port
PC	Pulse counter enable
PM	PWM output enable
SB	Set bit
@AN[x]	Value of analog input x
@AO[x]	State of analog output x
@IN[x]	State of digital input x
@OUT[x]	State of digital output x

Interrogation

ID	Identify
LA	List arrays
LL	List labels
LS	List program
LV	List variables
MG	Message command
QR	Data record
QU	Upload array
QZ	Return data record information
^R^V	Revision
TB	Tell status byte
TC	Tell error code
TE	Tell Error
TH	Tell Ethernet handles
TI	Tell input
TIME	Time operand, internal clock
TR	Trace program
TZ	Tell I/O configuration
WH	Ethernet handle

Math Functions

@SIN[x]	Sine of x
@COS[x]	Cosine of x
@COM[x]	1's complement of x
@ASIN[x]	Arc sine of x
@ACOS[x]	Arc cosine of x
@ATAN[x]	Arc tangent of x
@ABS[x]	Absolute value of x
@FRAC[x]	Fraction portion of x
@INT[x]	Integer portion of x
@RND[x]	Round of x
@SQR[x]	Square root of x
@TAN[x]	Tangent of x
$	Hexadecimal
( )	Parenthesis
+, - , *, /, %	Arithmetic commands
>,<,=,>=,<=,<>	Logical operators
&	Logical AND
\| | Logical OR

Control Loop

AF	Analog feedback select
AZ	Analog output select
CL	Control loop update rate
DB	Deadband
IL	Integrator limit
KD	Derivative constant
KI	Integrator constant
KP	Proportional constant
OF	Offset
PS	Control set point

Programming

`	Continuation character
'	Comments
#	Label
#AUTO	Auto subroutine on power-up
#AUTOERR	Auto subroutine on EEPROM error
#TCPERR	Auto subroutine on Ethernet error
#CMDERR	Auto subroutine on command error
#COMINT	Auto subroutine on communication interrupt
#ININT	Auto subroutine on input interrupt
[ ]	Array index operator
;	Command delimiter
AB	Abort program
BK	Breakpoint
CI	Communication interrupt
DA	Deallocate variables/arrays
DL	Download program
DM	Dimension arrays
ED	Edit program
ELSE	Conditional statement
EN	End program

Programming (cont.)

ENDIF	End of conditional statement
HX	Halt execution
IF	If statement
IN	Input variable
JP	Jump
JS	Jump to subroutine
NO	No-operation — for comments
RA	Record array, automatic data capture
RC	Record interval for RA
RD	Record data for RA
RE	Return from error
REM	Remark
RI	Return from interrupt routine
SA	Send command
SL	Single step
UL	Upload program
XQ	Execute program
ZC	User variable
ZD	User variable
ZS	Zero stack

System Configuration

BN	Burn parameters
BP	Burn program
BV	Burn variables and arrays
CC	Configure communication port
CF	Configure default port
CI	Configure communication interrupt
CW	Data adjustment bit
DR	Configure I/O data record
EO	Echo off
IK	Ethernet port blocking
^L^K	Lock program
LZ	Leading zeros format
PW	Password
QD	Download array
QU	Upload array
RS	Reset
^R^S	Master reset
VF	Variable format

Trippoint

AA	After analog input
AI	After input
AT	At time
WT	Wait for time

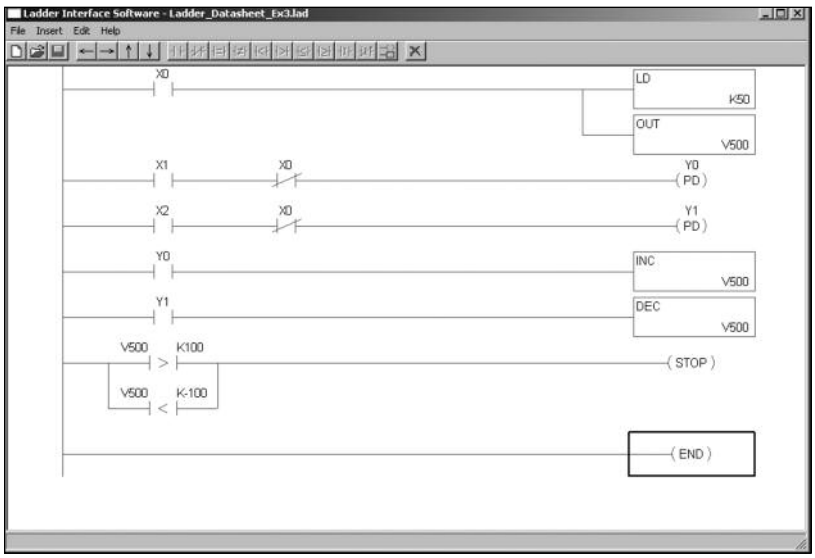
Pocket PLC Controller

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Ladder Interface Software

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: contacts, 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 RIO program.



One-shot output (PD) and variable manipulation example

POCKET PLC

RIO Options

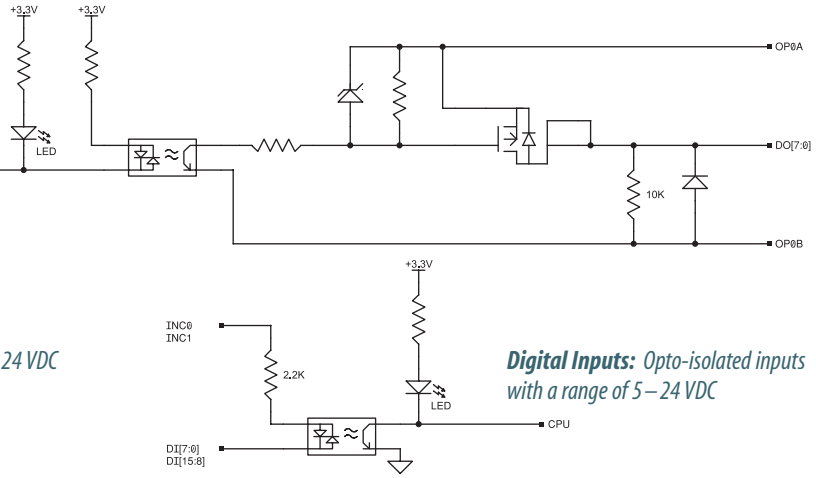
Feature	47100	47120	47102	47122	47142	47200	47202	47300
# of Ethernet ports	1	1	1	1	2	1	1	2
Power-Over-Ethernet PoE	yes	yes	yes	yes	no	yes	yes	no
External Supply (VDC)	18–36	18–36	18–36	18–36	9–48	18–36	18–36	9–48
# RS232 ports	1	1	1	1	1	1	1	1
Expanded Memory	no	no	yes	yes	yes	no	yes	yes
Digital inputs optoisolated	16	16	16	16	16	16	16	24
25 mA digital outputs optoisolated	8	8	8	8	0	0	0	0
500 mA digital outputs optoisolated	8	8	8	8	16	16	16	24
Analog inputs unipolar/bipolar*	8 unipolar	8 bipolar	8 unipolar	8 bipolar	8 bipolar	8 unipolar	8 unipolar	8 bipolar
Analog outputs unipolar/bipolar	8 unipolar	8 bipolar	8 unipolar	8 bipolar	8 bipolar	SCB-48608	SCB-48608	8 bipolar
16-bit ADC/DAC option	no	yes	no	yes	yes	yes	yes	yes
Position sensor option	no	no	no	yes	yes	no	yes	yes
BOX. d-type connectors	yes	yes	yes	yes	yes	no	no	no
DIN tray. screw terminals	no	no	no	no	no	yes	yes	yes

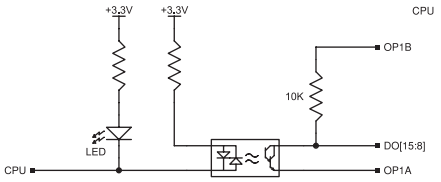
** Unipolar: 0–5 V; Bipolar: +/-10 V, +/-5 V, 0-10 V, 0–5 V*

Pocket PLC Controller

RIO-47xxx

High Power Sourcing Outputs *Opto-isolated sourcing power outputs. 12 – 24 VDC with 500 mA of current capability per output*





Low Power Sinking Outputs *Opto-isolated sinking outputs. 5 – 24 VDC with 25 mA of current capability in a sinking configuration*

Digital Inputs: *Opto-isolated inputs with a range of 5 – 24 VDC*

Ordering Information

PART NUMBER	DESCRIPTION	QUANTITY 1	QUANTITY 100
RIO-47100	PLC with 0–5 V analog I/O; 12-bit ADC/DAC	$ 295	$ 195
RIO-47120	PLC with ±10 V analog I/O; 12-bit ADC/DAC	$ 345	$ 245
RIO-47300-16	RIO-47300 also has a 16-bit option	add $ 50	add $ 50
RIO-47102	RIO-47100 with expanded memory	$ 345	$ 245
RIO-47122	RIO-47120 with expanded memory	$ 395	$ 295
RIO-47142	Two Ethernet ports. No Power-Over-Ethernet. Expanded memory. Bipolar analog I/O	$ 415	$ 305
-DIN	DIN-rail mounting option for RIO-471xx	$ 25	$ 25
RIO-47200	RIO with screw terminals and DIN. 12-bit, 0–5 VDC analog inputs.	$ 345	$ 245
RIO-47202	RIO-47200 with expanded memory	$ 395	$ 295
RIO-47300	PLC with 48 digital I/O. 16 analog I/O. Screw terminals. Two Ethernet ports. Expanded memory	$ 495	$ 360
SCB-48608-5V12bit	-47200 Option for 8 analog outputs. 12-bit DAC; 0-5 V. Specify RIO-47200- 8AO_5v12bit	add $ 50	add $ 30
SCB-48608-10V12bit	-47200 Option for 8 analog outputs. 12-bit DAC; 0-5 V, 0-10 V, ±10 V. Specify RIO-47200-8AO_10v12bit	add $ 75	add $ 45
SCB-48608-10V16bit	-47200 Option for 8 analog outputs. 16-bit DAC; 0-5 V, 0-10 V, ±10 V. Specify RIO-47200-8AO_10v16bit	add $ 120	add $ 80
SCB-48206	Signal conditioning board for interface to 6 RTDs	$ 175	$ 125
SCB-48306	Signal conditioning board for interface to 6 thermocouples	$ 175	$ 125
SCB-48316	Above with thermocouple connectors	$ 225	$ 175
CABLE-44-1M	44-pin D HD male cable to discrete wires	$ 35	$ 24
CABLE-26-1M	26-pin D HD male cable to discrete wires	$ 25	$ 17
ICS-48026-M	26-pin D HD male to screw terminals	$ 75	$ 50
ICS-48044-M	44-pin D HD male to screw terminals	$ 75	$ 50
-HS	High-speed counter option, 3 MHz	$ 25	$ 0
-422	RS422 option	$ 25	$ 0
-QUAD, -BiSS, -SSI	Position sensor option for RIO-47122 or RIO-47142	$ 75	$ 35
-PWM	Option for pulse-width-modulation	$ 25	
4-20mA	For 4-20mA analog inputs	add $ 10	
PS-0.25-24	24 V, 6-watt power supply for RIO	$ 50	$ 35
PS-2.50-24	24 V, 60-watt power supply for RIO	$ 85	$ 60
Ladder Interface Software	Converts Relay Ladder logic into deterministic code for RIO	$ 195	
GalilSuite-Lite	Launcher, Editor, Viewer, Configuration & Watch Software Tools	Free download	

Galil offers additional quantity discounts for purchases between 1 and 100. Consult Galil for a quotation.

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