MODULUS

Combo Input/Output Modules

with 8 Process Analog Inputs

Modulus Combo Input/Output modules extend the I/O capacity of Modulus SCADA controllers, providing a combination of 8 optically isolated discrete inputs, 4 relay outputs, 8 analog inputs and the option of an additional 4 analog inputs or outputs. The discrete inputs can be ordered as 12/24V or 120/240V. Both AC and DC signals are supported. The analog inputs are process type, individually software configurable for current or voltage sensor signals.

Modulus Combo Input/Output modules have two serial ports (bus port plus a general purpose port), supporting industry standard protocols such as Modbus, DF1, SDX (AES-128 encryption), and SDI-12. The modules also have an Ethernet port supporting Modbus, Ethernet IP, MQTT, and SDX protocols, as well as Ethernet-Serial bridging and Ethernet Routing.

Modulus Combo I/O modules have built-in web pages for configuration, programming, monitoring and manuals. No application software is needed; just a web browser. Custom user documentation can also be loaded into the module, so that drawings, datasheets, etc. are always available for site support and maintenance.

Combo 12/24V Input/Output Modules
8x-3002 8DI, 4DO, 8AI
8x-3003 8DI, 4DO, 12AI
8x-3012 8DI, 4DO, 8AI, 4AO (20mA)
8x-3013 8DI, 4DO, 8AI, 4AO (10V)

Combo 120/240V Input/Output Modules
8x-3102 8DI, 4DO, 8AI
8x-3103 8DI, 4DO, 12AI
8x-3112 8DI, 4DO, 8AI, 4AO (20mA)
8x-3113 8DI, 4DO, 8AI, 4AO (10V)

Optional Field Wiring Panel

Modulus Combo I/O Module

- **8 DISCRETE INPUTS (OPTICALLY ISOLATED)**
- **4 DISCRETE OUTPUTS (RELAY)**
- **8 ANALOG INPUTS (PROCESS)**
- **4 OPTIONAL ADDITIONAL ANALOG INPUTS OR OUTPUTS**
- **1 ETHERNET PORT**
- **2 SERIAL PORTS (BUS PORT PLUS 1 GENERAL PURPOSE PORT)**

STANDALONE OPERATION

Modulus Combo I/O modules can serve as standalone devices with SCADA communications, local and web human machine interfaces (HMIs), trending and data logging, alarming, reporting, and programmable logic control.

COMMUNICATIONS

Combo I/O modules have an Ethernet port and up to two serial ports to communicate with Modbus devices and Allen Bradley PLCs. They can serve as communications concentrators or master controllers, as well as providing web and data access to any other Modulus modules on the high-speed bus. They support Ethernet to Serial bridging, and routing through Ethernet ports in other Modulus modules on the bus.

GRAPHICAL, MOBILE, AND LOCAL HMIs

Configurable graphical and mobile device web interfaces, including the tools and libraries to build custom screens, are built in. The front panel display can also be customized to show live process values and states, and make setting changes.

HISTORICAL TRENDING AND EVENT LOGGING

Combo I/O modules have an internal flash disk, as well as a micro SD memory card slot to record over 100 years of data! Use built-in web tools to retrieve and display historical trend and event data and extract it as spreadsheet files.

REPORTING

Reports with custom graphics and logos can be created in minutes, showing live values, totals, trend/event data, alarm summaries, etc. They can be called up on demand, or sent out automatically.

ALARMING

A Combo I/O module can manage alarm conditions on any of it's local inputs, as well as over 500 conditions monitored by communications with other devices. Alarms conditions can be displayed locally and annunciated with a discrete output, as well as by text message and e-mail alerts over the Internet via its Ethernet port. The module maintains a journal spreadsheet file of when alarms occurred, when they were acknowledged, by whom, and when the alarm conditions cleared.

PROGRAMMABLE LOGIC

Combo I/O modules support programmable logic written in ladder logic, function block and text languages; all with 32-bit integer and floating point math. Programmable logic can supplement the built-in functions of the module.

PID AND PUMP CONTROL

Combo I/O modules have a quad PID controller and a triplex pump controller (float or level control) with error detection and alarming. The module is an ideal solution for SCADA operation of wells, lift stations, and booster pump stations.

REDUNDANCY

Combo I/O modules support redundancy for enhanced reliability. If a module goes off-line, a designated backup can take over automatically.

ICL

www.iclinks.com

Modulus Combo (8 Process Analog Inputs) I/O Module Specifications

FIELD I/O

Digital Inputs:	**8**	Optically Isolated, bipolar (AC/DC, not polarity sensitive)
I/O Range:		**[8x-3002, 8x-3003, 8x-3012, 8x-3013]** 0 to 30V (OFF < 6V, ON>9V)
		[81-3102, 81-3103, 81-3112, 81-3113] 0 to 240V (OFF < 60V, ON>90V)
		[82-3102, 82-3103, 82-3112, 82-3113] 0 to 120V (OFF < 60V, ON>90V)
I/O Current:		**[8x-3002, 8x-3003, 8x-3012, 8x-3013]** 1.2mA @ 12V, 3mA @ 24V **[8x-3102, 8x-3103, 8x-3112, 8x-3113]** 1.2mA @ 120V, 3mA @ 240V
Filtering		Individually configurable: 5Hz, 10Hz, 20Hz, 50Hz, 100Hz, 500Hz, 1KHz, 2KHz+
Digital Outputs:	**4**	Relay contacts, Form A (normally open)
Contact Output Rating:		240/277 Vac, 30Vdc, 3A maximum per output (resistive load). Do not exceed 8A total of all 4 outputs.
		A snubber diode (DC) or RC snubber (AC) must be used across the relay contacts or load connections for **any** inductive load.
Analog Inputs:	**8**	16-bit, Delta Sigma, individually selectable input ranges
Input Ranges:		• 20mA (minimum input for full accuracy is 0.5mA)
		• 5V and +/- 5V, 10V and +/- 10V, 30V
Maximum signal level		35Vdc on any range

OPTIONAL FIELD I/O

Either one of the options below can be added to the base configuration

Analog Inputs (option)	**4**	16-bit, Delta Sigma, individually selectable input ranges
Input Ranges:		• 20mA (minimum input for full accuracy is 0.5mA)
		• 5V and +/- 5V, 10V and +/- 10V, 30V
		• +/- 250mV
		• 65K ohms
		• J, K, T, E, R, S thermocouple (ungrounded type)
		• 2.2K, 10K (type II, II and 11.K shunt)
		• 1KΩ RTD (2 wire)
Analog Outputs (option)	**4**	12-bit
Output Ranges:		• 20mA **[8x-3012]** or 10V **[8x-3013]**

COMMUNICATIONS

Ethernet:	**1**	10/100mb/s (10/100 Base-T)
SCADA Protocols		Modbus TCP & UDP (master/slave), Ethernet IP (master/slave PLC5 & SLC5/05 emulation), SDX (AES-128 Encryption), MQTT, Ethernet to Serial bridging
Internet Protocols		HTTP (server), FTP (server & client), E-mail (SMTP and POP3), ICMP (ping; server & client), NTP (client), DHCP (server & client), DNS, DDNS
Serial:	**1**	RS-485 (This port is available if not used for bus communications with other modules.)
	1	RS-232, RS-485, RS-422, SDI-12 (This port is always available for general purpose communications.)
Baud Rates		115K, 38.4K, 19.2K, 9600, 4800, 2400, 1200 baud
Protocols		Modbus RTU (master/slave), DF1 (slave), SDI-12 (general purpose port only)

HMIs

Local:	128x32 graphical, wide temperature range yellow OLED and single pushbutton
Graphical:	Web based, graphic library included. Compatible with most browsers, including Internet Explorer, Firefox, Chrome, Safari, Android
Mobile:	Web based, text only, up to 50 registers. Compatible with most browsers, including Internet Explorer, Firefox, Chrome, Safari, Android

PROGRAMMING

Languages:	Ladder Logic, Function Block, Text—built-in web based graphical and text editor and debugger
Capacity:	64KB logic, 2MB source code, 32-bit integer and floating point math

STORAGE

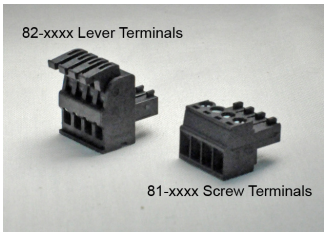
Registers:	504 Numeric registers, 504 Boolean registers
Internal Flash disk:	32MB

CLOCK

Real Time Clock:	Temperature compensated with 3-day super-capacitor auto-recharge backup power
Stability	+/- 3ppm from –30°C to 70°C

GENERAL

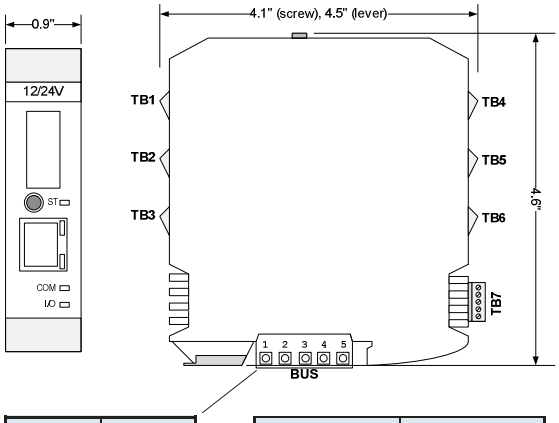
I/O Power:	10Vdc to 30Vdc,
Power Consumption (average)	
Not using Ethernet, relays OFF	18mA @ 12Vdc / 13mA @ 24Vdc (Ethernet power saver enabled)
Using Ethernet, relays OFF	78mA @ 12Vdc / 43mA @ 24Vdc
Additional current per relay ON	10mA @ 12Vdc / 5mA @ 24Vdc
Additional with AI option	10mA @ 12Vdc / 5mA @ 24Vdc
Additional with AO option	Loop current from I/O power (20mA @ 12Vdc / 20mA @ 24Vdc per output used)
Field Wiring Termination:	**[81-3xxx]** screw terminal blocks **[82-3xxx]** lever terminal blocks, 3.5mm, 22 to 14GA wires
Temperature:	-40°C to 70°C (operating), -40°C to 85°C (storage)
Humidity:	<95% RH (non-condensing)
Enclosure:	Polyamide, light gray (RAL 7035)
Mounting:	35mm DIN rail with bus connector block



Specifications subject to change without notice. Consult factory to ensure that you are working with current information.

  Industrial Control Links, Inc., Roseville, CA **530.888.1800**

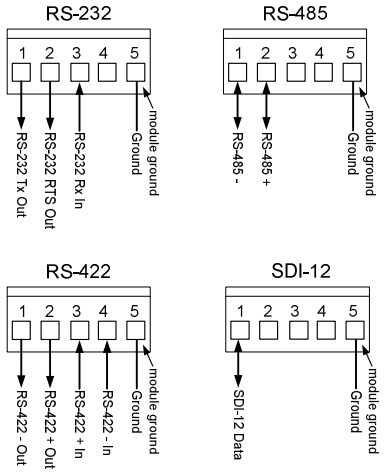
Modulus Combo (8 Process Analog Inputs) I/O Module DIMENSIONS and WIRING



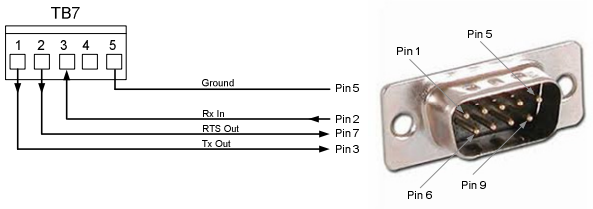
Terminal	Function
1	-485
2	+485
3	RESET#
4	GND
5	+V

Terminal Block	Inputs/Outputs
TB1	DI1 - DI4
TB2	DI5 - DI8
TB3	DO1 - DO4
TB4	AI1 - AI4
TB5	AI5 - AI8
TB6	optional AI/AO

General Purpose Communications Port TB-7
(modes are software configured)



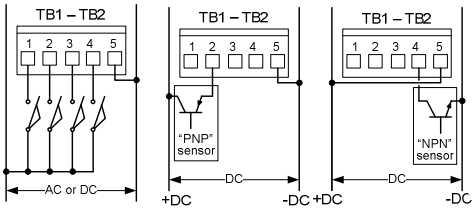
Typical RS-232 Wiring to Modem/Radio



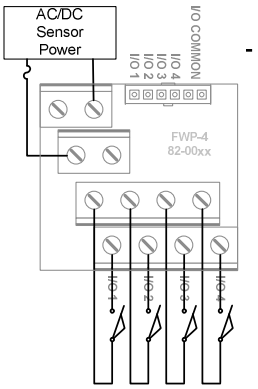
Refer to the installation manual for additional installation details and precautions.

OPTICALLY ISOLATED DISCRETE INPUTS

The discrete inputs on a terminal block share a common with only the inputs on that same block and are isolated from all other I/O points. All inputs are bipolar (not polarity sensitive).



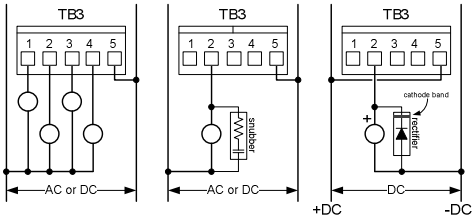
82-00xx Field Wiring Panel



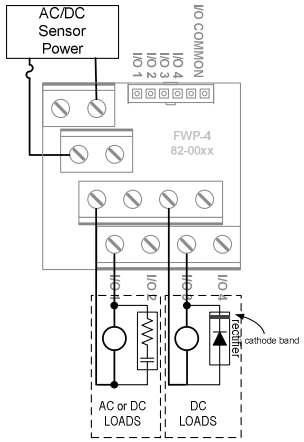
RELAY OUTPUTS

The relay outputs on a terminal block share a common with only the other outputs on that same block and are isolated from all other I/O points.

A snubber diode (DC) or RC snubber (AC) must be used across the relay contacts or load connections for **any** inductive load.

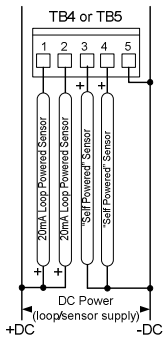


82-00xx Field Wiring Panel

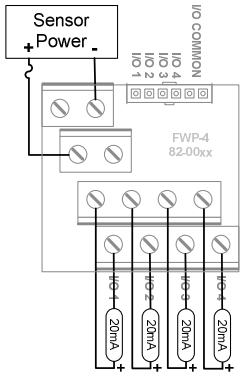


PROCESS ANALOG INPUTS

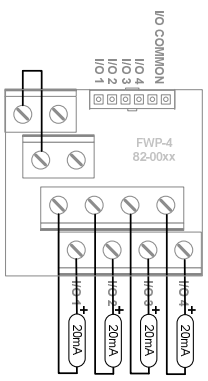
The analog inputs on terminal blocks 4 and 5 share a common that is isolated from all other I/O points.



82-00xx Field Wiring Panel Loop Powered Sensor Wiring



82-00xx Field Wiring Panel "Self" Powered Sensor Wiring



Note: Groups of 4 sensors should be of the same type (loop powered or "self" powered / 3-wire) when using field wiring panels.

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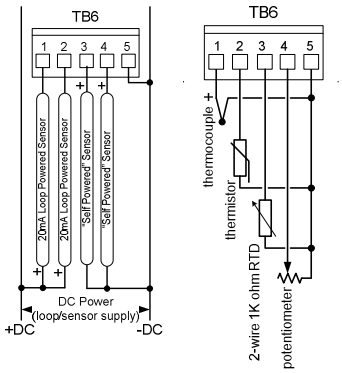
Modulus Combo (8 Process Analog Inputs) I/O Module — OPTIONAL I/O WIRING

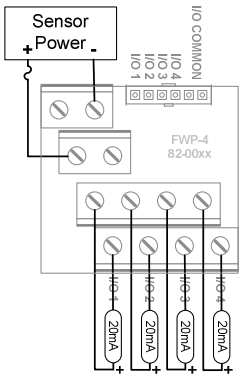
⚠ Refer to the installation manual for additional installation details and precautions.

OPTIONAL ADDITIONAL ANALOG INPUTS on TB6 (8x-3003 / 8x-3103)

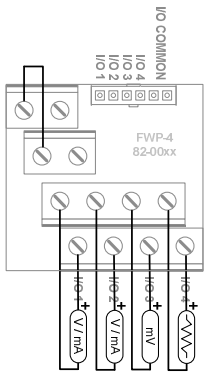
The optional 4 analog inputs on terminal block 6 (model numbers 8x-3003 and 8x-3103) share a common that is isolated from all other I/O points. These inputs support 20mA and voltage signals, as well as resistance and 2-wire sensors (3-wire RTDs are not supported).



82-00xx Field Wiring Panel
Loop Powered Sensor Wiring



82-00xx Field Wiring Panel
Self Powered and 2-wire Sensor Wiring

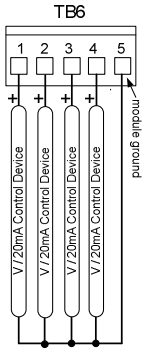


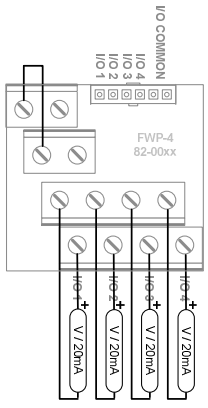
Note: Groups of 4 sensors should be of the same type (loop powered or "self" powered / 2-wire / 3-wire) when using 82-00xx field wiring panels.

OPTIONAL ANALOG OUTPUTS on TB6 (8x-3012/3013 and 8x-3112/3113)

The optional 4 analog outputs on terminal block 6 (model numbers 8x-3012/3013 and 8x-3112/3113) share a common with the module main input power. The main input power is also utilized as the source for analog output power (>16Vdc is recommended).

82-00xx Field Wiring Panel
V / 20 mA Control Wiring





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