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# I/O Series

## FGR2-IO-IOE Industrial 900 MHz Radio

The FGR2-IO-IOE radio with embedded I/O functions is available in expansion plastics. It can operate in one of two modes: Expandable Modbus or Wire Replacement. In Modbus mode the FGR2-IO-IOE can provide wireless I/O to a SCADA network. For wire replacement (wireless signal replication), the FGR2-IO-IOE can operate as a slave linked to an FGRIO-M (master) radio. The FGR2-IOE is Class 1, Division 2 approved. All Radios are designed, manufactured and tested in Boulder, CO.

### Features - Modbus:

- Expandable, Wireless I/O - Stack Expansion Modules for 186 I/O points at one Modbus address.
- Up to 65,535 slave radios linked to one Modbus Master.
- Millions of AI's, DI's, AO's and DO's on a single network.
- User Configurable IO - Digital & analog.
- Modbus Master can be any FGR family of radios - i.e., FGRSR, FGRM, FGR09CSU, FGRIO-M, FGR2-IOE or FGR115RC. All radios are UL approved except the FGR115RC.
- Extends range and coverage to other FGR-family radios by slave/repeater operation.
- Supply rated from 6V to 30V.
- All AI's reported as 16-bit integers or 32-bit floating points.
- Voltage and temperature monitoring reduces surprise outages.
- Pulse counting (32 bit) DI's allow detection of 500 usec. pulses and count to 1000 Hz.
- Active data port allows extension by adding external devices.
- Single register access to 16 bit a/d; 2 register access for full 20 bits.
- Enhance proportional control by 4-20mA AO's with programmable offsets and comm-loss set points.
- DO's control up to 60 Watts each and have optional pulse-output to protect intermittent-rated loads.

### Features - Wire Replacement:

- Conveys the AI and DI states of 4 inputs to an FGRIO-M radio for signal replication.
- Replicates the states of the DI's and sensor power inputs of the FGRIO-M as DO's. The DO's are protected and have optional pulse-output to protect intermittent-rated loads.



Stackable Expansion  
Modules w/FGR2-IO-IOE

# I/O Series

## FGR2-IO-IOE Industrial 900 MHz Technical Specifications

Transmitter				Receiver						
Frequency Range		902-928 MHz (FHSS)			Sensitivity		-108 dBm for BER 10 <sup>-6</sup> , -110 dBm for BER 10 <sup>-4</sup>			
Output Power		1 Watt			Selectivity		20 dB at fc +/- 115 kHz, 60 dB at fc +/- 145 kHz			
Range - Line of Sight (LOS)		60 miles with clear LOS			System Gain		140 dB			
Modulation		2 level GFSK, 115.2 Kbps			Data Transmission <sup>(1)</sup>					
Occupied Bandwidth		230 kHz			Error Detection		32 bit CRC, retransmit on error			
Hopping Patterns		15 per Band, 105 total, user selectable			Link Throughput		115.2 Kbps			
Hopping Channels		50 to 112, user selectable			Data Interface		Serial			
Hopping Bands		7, user selectable			Protocol		RS232/485/422, 1200 baud - 115.2 Kbaud			
RF Connector		Type SMA, TNC (Female connectors)			Data Connector		10 pin header with locking ramp 0.1 inch spacing, power/data connector			
Input					Modbus		Wire Repl			
2: Precision AI's (20 bits, 0-5.625 V, 0.1% FS Accuracy), also act as exact-threshold DI's					x		x			
2: DI's with counters (32 bits, 1000 Hz), also act as aux. AI's (10 bits, 0-3.5 V, 0.25% FS Accuracy)					x		(2)			
1: DI with pull down resistor (5 Kohm)					x					
1: DI with pulsed 50 mA pull-up for long-lines or high noise					x					
Output										
2: High Current (2 A sink to GND) DO's with current sensing and self-resetting protection					x		x <sup>(3)</sup>			
1: AO - 15 bits, 4-22mA, 0.1% FS Accuracy, also acts as 50mA sensor power or DI					x					
1: AO - 16 bits, 4-22mA, 0.1% FS Accuracy					x					
Internal										
1: Battery/Supply Voltage - 10 bits, 0-30 V, 1% FS Accuracy					x					
1: Radio Temperature - 1°C units, -40° C to +70° C, 4° C accuracy					x					
Expandable I/O Stack up to 15 Expansion Modules					x					
Diagnostics Interface										
Connector: Separate 20-pin PCB header					x		x			
Power Requirement										
Operating Voltage: 6 to 30 VDC					*Currents shown w/no AO connections made		x		x	
Average Current Update [mA]	Mode	6 VDC	12 VDC	30 VDC	Example Modbus Configurations					
	Transmit	800 mA	380 mA	170 mA		Als	DIs	AOs	DOs	
	Receive	90 mA	55 mA	40 mA	#1	2	2	2	2	
	Idle	24 mA	16 mA	8 mA	#2	0	4	2	2	
	Modbus Linked Lowpower = 4	10 mA	7 mA	5 mA	#3	4	0	2	2	
					#4	3	1	2	2	
	Wire Replacement Linked	30 mA	15 ma	8 mA	#5	1	3	2	2	
General Information										
Operating Temperature Range		-40 °C to +75 °C. Every radio 100% factory tested over this range.								
Dimensions		Enclosure: 181 L x 80 W x 38 H (mm)								
Weight		Enclosure:163 g								
Humidity		0 to 95% non-condensing								
Notes: (1) Data port not operative in wire replacement mode. (2) DI's operative, but there are no counters in wire replacement mode. (3) No current sensing in wire										

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