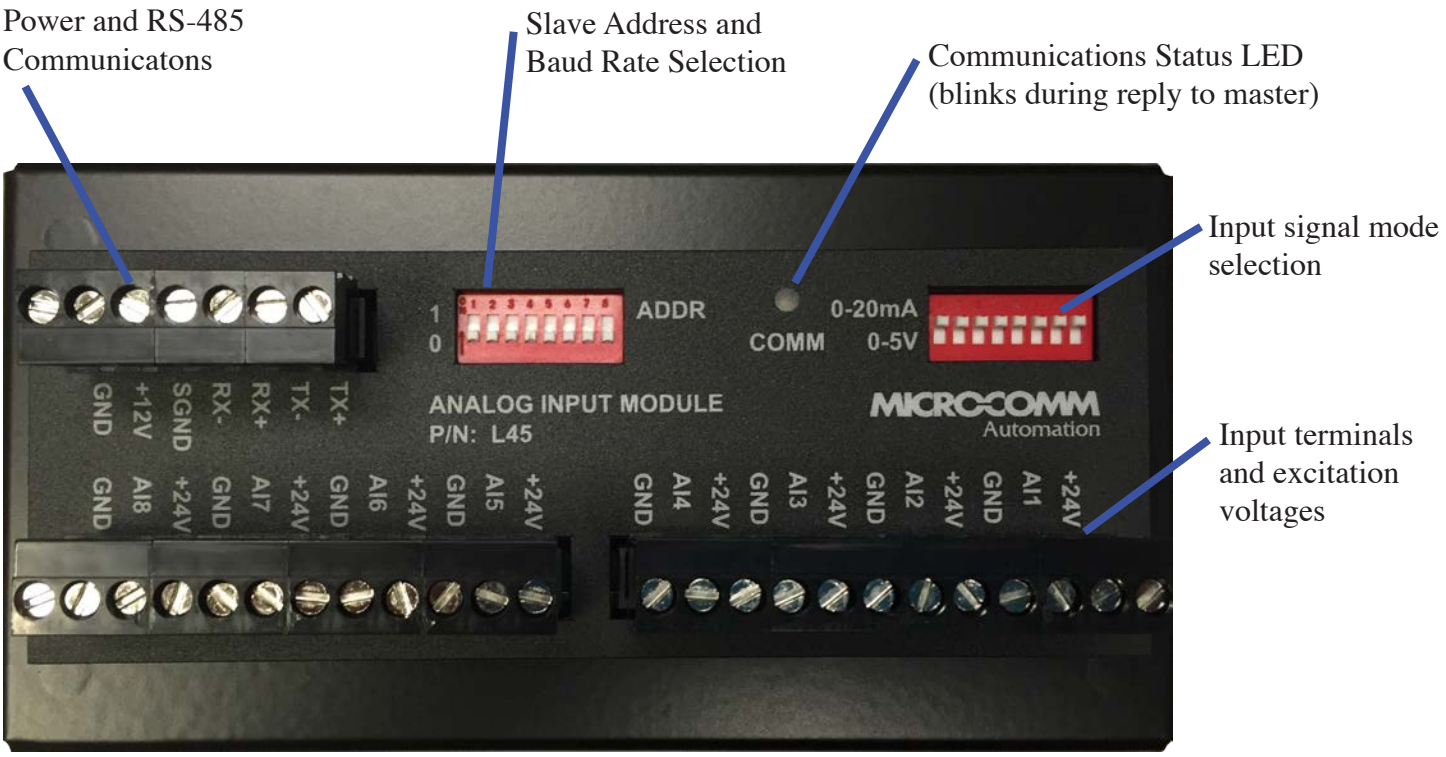
EXPANSION ANALOG INPUT MODULE
MODEL EAI8



APPLICATION NOTES:

The EAI8 module provides (8) 16-bit analog inputs, either 4-20ma signals or 0-5volt, as measured between the AI and GND terminals. Each input signal mode is switch selectable (0-20mA/0-5V switches). Excitation voltages are also provided to power the current loop for transducers (24volts, 80mA per group, 160mA total).

Data is read from the module over RS-485 using Modbus RTU protocol, 8 data bits, no parity, 1 stop bit and at 9600 or 19200 baud (ADDR switch #8 selects the baud rate, 0=9600, 1=19200). The Modbus master must use a type 3 (Read Holding Registers) message beginning with 4x0001 and requesting from 1 to 8 words. Values in these holding registers will be unsigned integers in the range of 0 to 65535 for 0-5volt or 0-20mA (13108 to 65535 for 4-20mA signals).

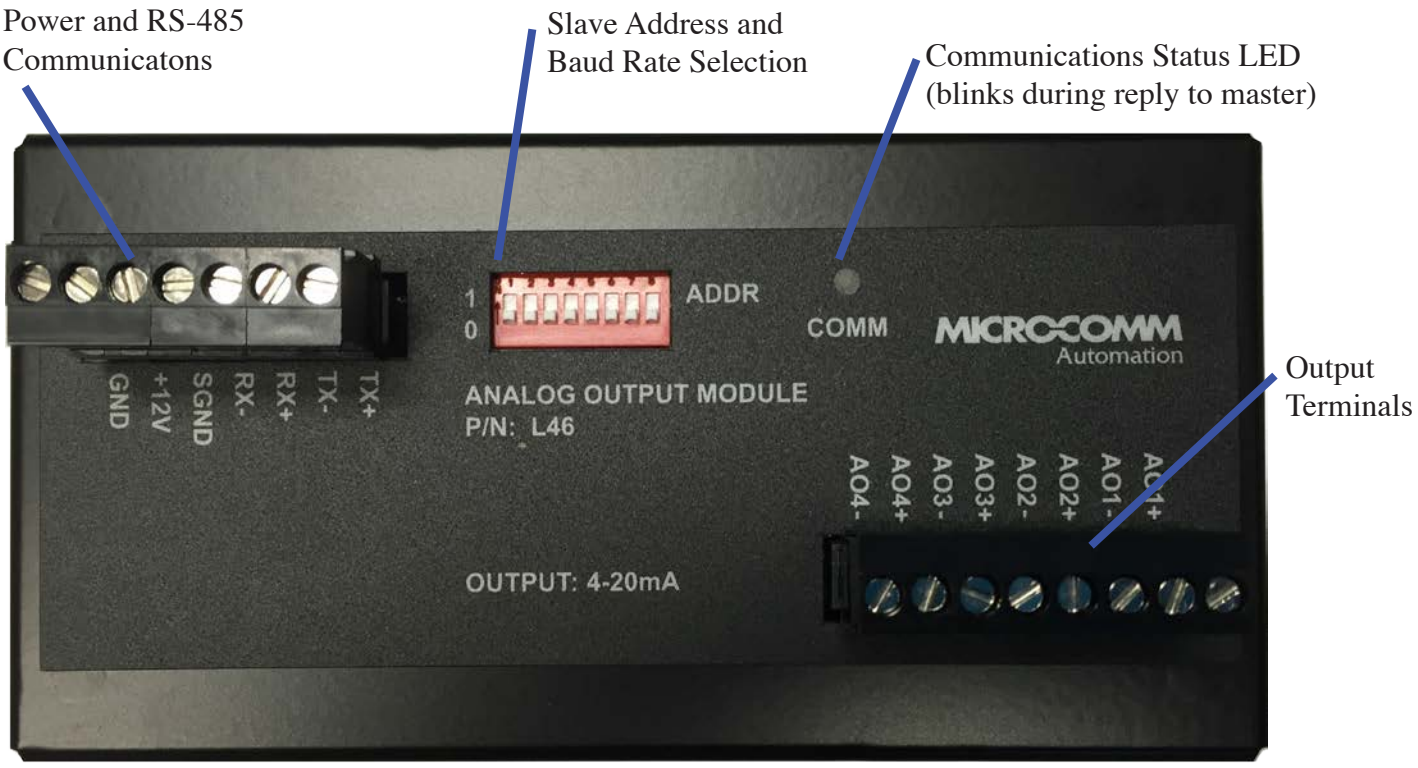
Modbus holding registers 4x0001-4x0008 correspond to the 8 input channels. The Modbus slave address is set using ADDR switches #1-#7. These switches set a binary address (least significant bit first) from 0 to 127.

Data sampling occurs every 40msec and the last 4 readings are averaged to help smooth out noise.

The COMM LED will blink whenever a valid master message has been received and the reply is sent.

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

EXPANSION ANALOG OUTPUT MODULE
MODEL EAO4



APPLICATION NOTES:

The EAO4 module provides (4) 12-bit analog outputs using 4-20mA signals.

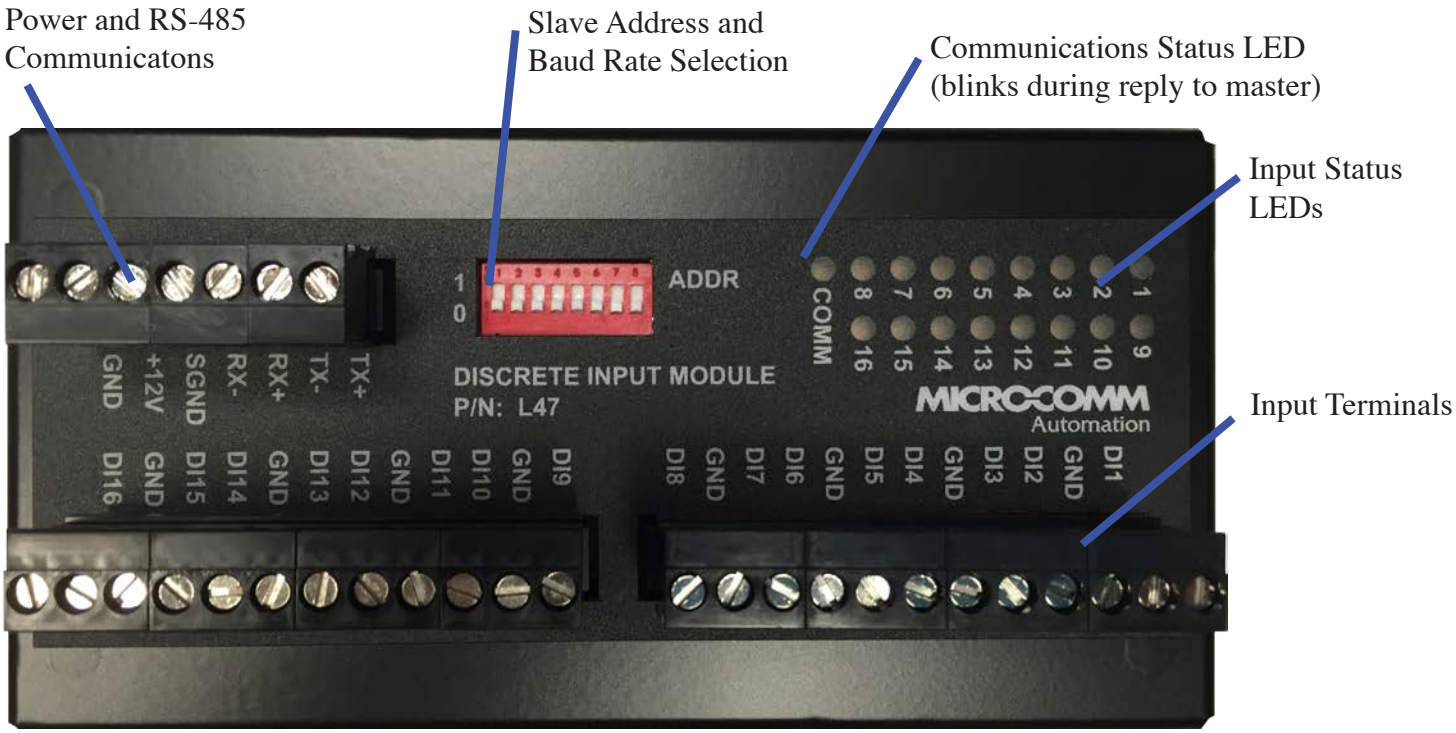
Data is written to the module over RS-485 using Modbus RTU protocol, 8 data bits, no parity, 1 stop bit and at 9600 or 19200 baud (ADDR switch #8 selects the baud rate, 0=9600, 1=19200). The Modbus master must use a type 16 (Preset Multiple Registers) message beginning with 4x1025 and writing all 4 words. Values in these holding registers are unsigned integers in the range of 0 to 4095 for 4-20mA.

Modbus holding registers 4x1025-4x1028 correspond to the 4 output channels. The Modbus slave address is set using ADDR switches #1-#7. These switches set a binary address (least significant bit first) of 0-127 which in turn sets the Modbus slave address to 1-128 (slave address = 1+ADDR).

The COMM LED will blink whenever a valid master message has been received and the reply is sent.

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

EXPANSION DISCRETE INPUT MODULE
MODEL EDI16



APPLICATION NOTES:

The EDI16 module provides (16) discrete optically isolated dry contact inputs. Status LEDs are provided for each input.

Data is read from the module over RS-485 using Modbus RTU protocol, 8 data bits, no parity, 1 stop bit and at 9600 or 19200 baud (ADDR switch #8 selects the baud rate, 0=9600, 1=19200). The Modbus master must use a type 3 (Read Holding Registers) message beginning with 4x1029 or 4x1030 and read 1 word. The values in this holding register will be 0-65535 depending on the input states (least significant bit is input #1, most significant bit is input #16). A bit value of "1" will mean that an input is "ON".

The Modbus holding register used (4x1029 or 4x1030) and the Modbus slave address are based on the ADDR switch settings as shown below: (ADDR switches are shown in order 1-7)

ADDR 0000000 = Slave Address 1, Register 4x1029
ADDR 1000000 = Slave Address 1, Register 4x1030
ADDR 0100000 = Slave Address 2, Register 4x1029
ADDR 1100000 = Slave Address 2, Register 4x1030
(continues up to ADDR 1111111 for Slave Address 65, Register 4x1030)

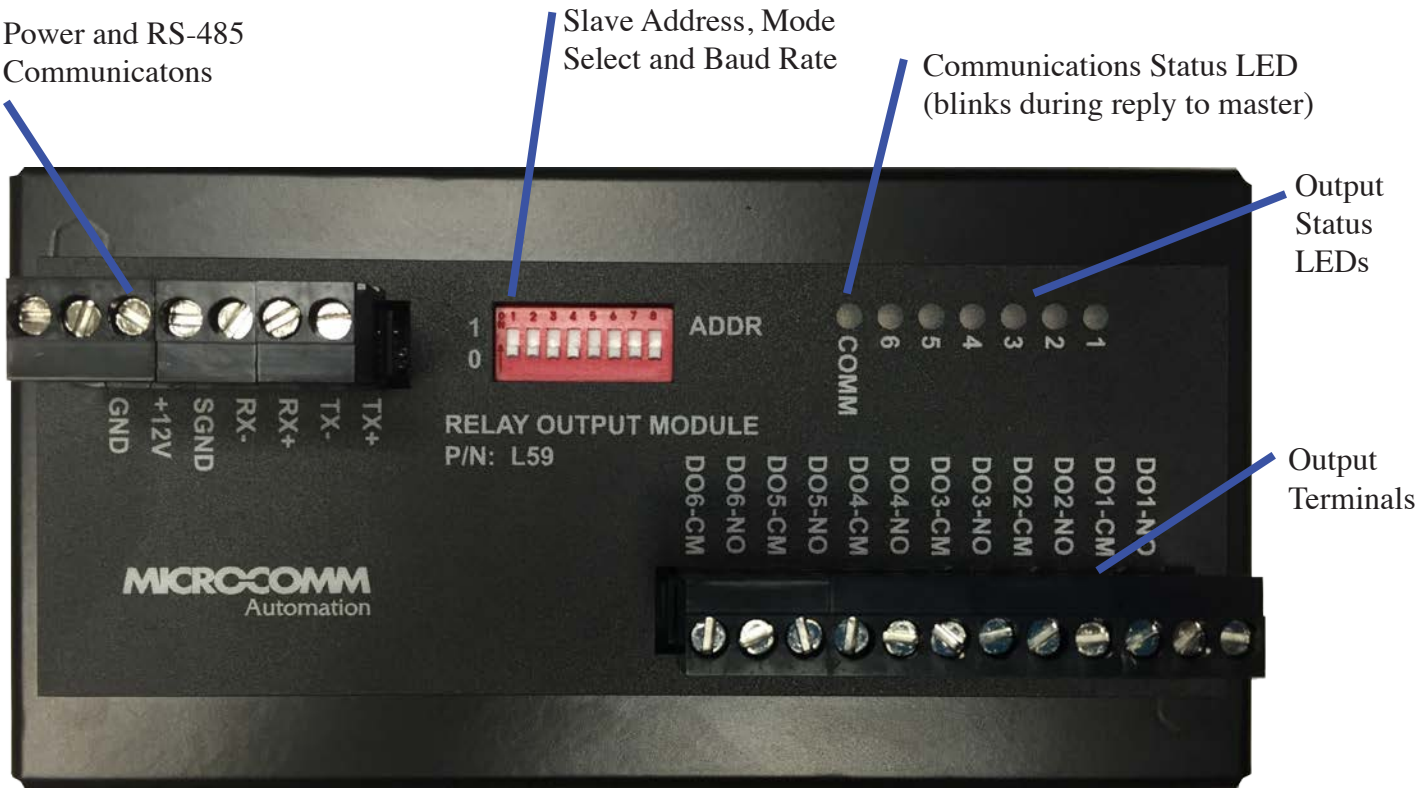
Pulse input counters are also available (50Hz max) for each input. They show up in registers 4x1031-4x1046. The Modbus master must use a type 3 message beginning with 4x1031 and read from 1 to 16 words.

The COMM LED will blink whenever a valid master message has been received and the reply is sent.

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

EXPANSION DISCRETE OUTPUT MODULE

MODEL EDO6R



APPLICATION NOTES:

The EDO6R module provides (6) relay outputs. These relays are: Form-A (normally open), 250VAC, 1A General Use / Resistive, 30VDC, 1A General Use / Resistive, D150 Pilot Duty (120VAC, 1A Continuous, 3.6A Make, 0.6A Break 432VA Make, 72VA Break).

Data is written to the module over RS-485 using Modbus RTU protocol, 8 data bits, no parity, 1 stop bit and at 9600 or 19200 baud (ADDR switch #8 selects the baud rate, 0=9600, 1=19200). The Modbus master must use a type 16 (Preset Multiple Registers) message beginning with 4x1035 and writing 4 words (up to 10 modules are written with 1 message when using Micro-Comm I/O mode). The values written to the holding registers should be 0-65535 depending on the output states. A bit value of "1" will mean that an output is "ON".

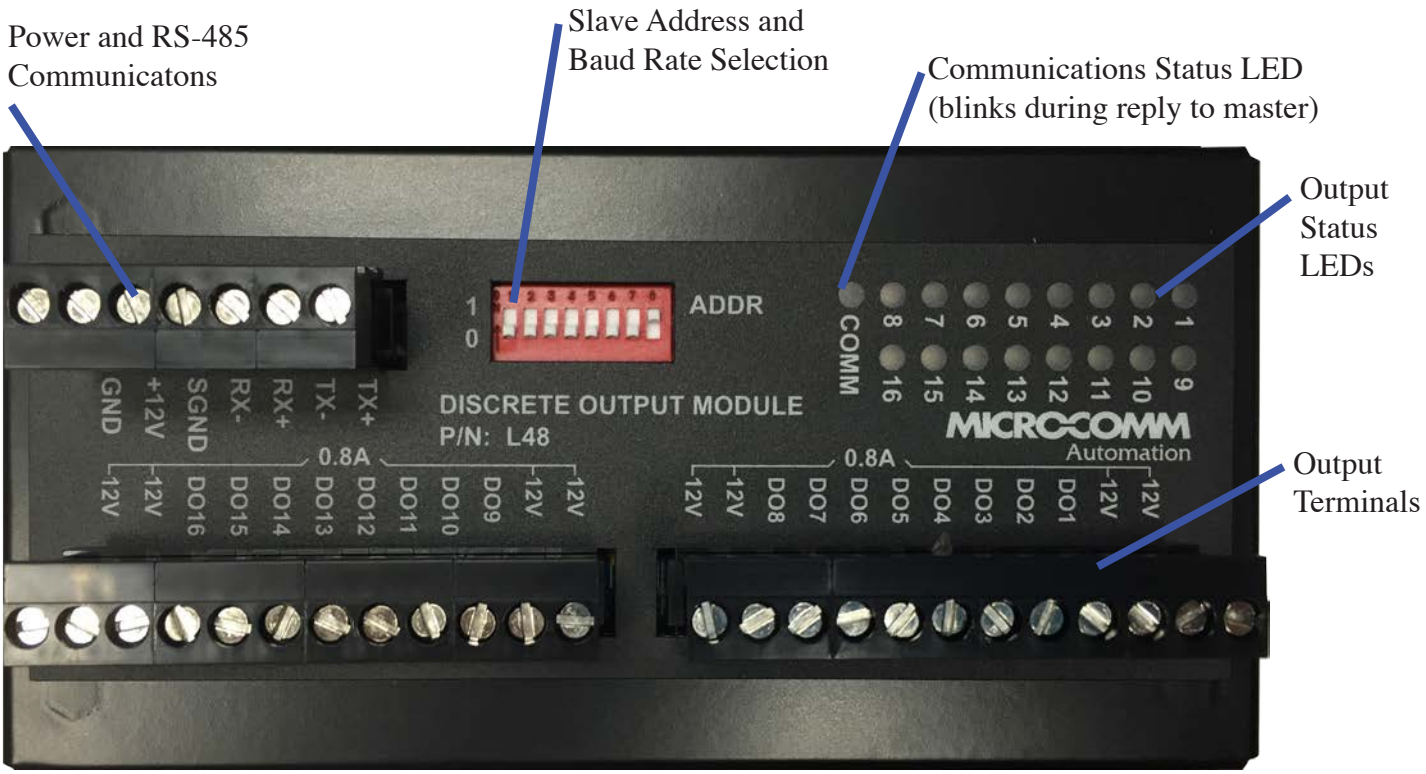
If ADDR switch #7 is set to "0", Micro-Comm I/O addressing mode is selected. In Micro-Comm mode, Modbus holding registers 4x1035-4x1038 correspond to 10 seperate relay output modules (all has slave address of 1).

If ADDR switch #7 is set to "1", Modbus addressing mode is selected. In Modbus mode, ADDR switch #1-#6 just set the slave address (0 to 63). Holding register 4x1035 is then written using a type 16 message with 1 word of data containing the output value for the 6 relays (bits 0-5, other bits are ignored).

The COMM LED will blink whenever a valid master message has been received and the reply is sent.

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

EXPANSION DISCRETE OUTPUT MODULE
MODEL EDO16



APPLICATION NOTES:

The EDO16 module provides (16) open-collector outputs (100mA max per output).

Data is written to the module over RS-485 using Modbus RTU protocol, 8 data bits, no parity, 1 stop bit and at 9600 or 19200 baud (ADDR switch #8 selects the baud rate, 0=9600, 1=19200). The Modbus master must use a type 16 (Preset Multiple Registers) message beginning with 4x1035 and writing 4 words (up to 4 modules are written with 1 message). The values written to the holding registers should be 0-65535 depending on the output states (least significant bit is output #1, most significant bit is output #16). A bit value of "1" will mean that an output is "ON".

Modbus holding registers 4x1035-4x1038 correspond to 4 seperate modules (all with the same slave address). Both the register and Modbus slave address are set using ADDR switches #1-#7 as follows:

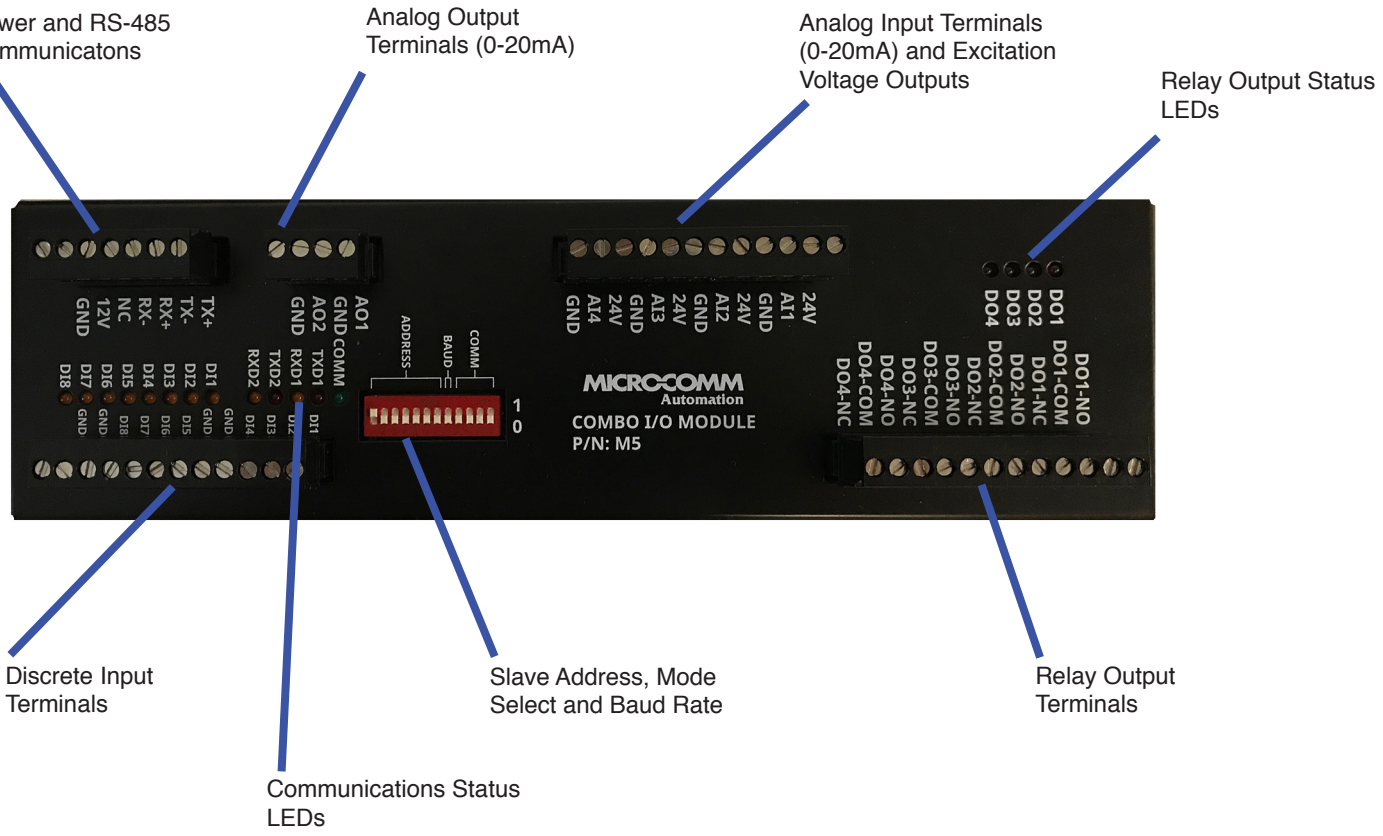
ADDR 0000000 = Slave Address 1, Register 4x1035
ADDR 1000000 = Slave Address 1, Register 4x1036
ADDR 0100000 = Slave Address 1, Register 4x1037
ADDR 1100000 = Slave Address 1, Register 4x1038
ADDR 0010000 = Slave Address 2, Register 4x1035
ADDR 1010000 = Slave Address 2, Register 4x1036
ADDR 0110000 = Slave Address 2, Register 4x1037
ADDR 1110000 = Slave Address 2, Register 4x1038
(this continues up to ADDR 1111111 for Slave Address 33, Register 4x1038)

The COMM LED will blink whenever a valid master message has been received and the reply is sent.

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

EXPANSION COMBO I/O MODULE

APPLICATION NOTES



Modbus RTU Protocol
Modbus RTU Read/Write Message (function code 23)
(Note: Also supports Modbus function codes 6,16 and 3 for writing and reading holding registers)
Address switches 1-7 set the Modbus address
Example: Using our MESSAGE: MESSAGE(3,27,1000,1,40100,0,30,3900,40200,0,3,4000,0,4)
Example: Using our MIOMSG: MIOMSG(3,27,50,1,40100,0,30,3900,40200,0,3,4000,4)
Inputs start at 40100
40100 = DI1-DI8
40101-40105 = AI1-AI5 (0-4095 = 0-20mA, AI5=Battery Voltage 0-25.5 volts)
40106-40113 = Pulse Counters for DI1-DI8
40114-40121 = Pulse Frequency for DI1-DI8 (x 10) Hz
40122-40129 = Runtimes for DI1-DI8 (x .1) Hours
40130-40137 = Pulses Per Minute for DI1-DI8
(see data table for floating points)
40196-40199 = AITOPI Pulse Counters for AI1-AI4 (4-20mA = 0-64PPS)
Outputs start at 40200
40200 = DO1-DO4
40201-40202 = AO1-AO2 (0-4095 = 0-20mA)
40203 = Output Timer (seconds) normally set to 600 seconds after amy valid communication (10 minute LOS timer)
Special Modbus write to calibrate the analog input offset = 4x32769 (saves it to FLASH, default=10)

Micro-Comm, Inc. • 15895 S Pflumm Rd • Olathe, KS 66062 • (913) 390-4500 • fax: (913) 390-4550 • www.micro-comm-inc.com

DF1 Radio Modem Protocol
N9:0 = Discrete Inputs
N9:1-N9:5 = Analog Inputs AI1-AI5 (0-4095 = 0-20mA, AI5=Battery Voltage 0-25.5 volts)
N9:6-N9:13 = Pulse Counters for DI1-DI8
N9:14-N9:21 = Pulse Frequency for DI1-DI8 (x 10 Hz)
N9:22-N9:29 = Runtimes for DI1-DI8 (x .1) Hours
N9:30-N9:37 = Pulses Per Minute for DI1-DI8
N9:38-N9:41 = AITOPI Pulse Counters for AI1-AI4 (4-20mA = 0-64PPS)
N10:0 = Discrete Outputs DO1-DO4
N10:1-N10:2 = Analog Outputs AO1-AO2 (0-4095 = 0-20mA)
N10:3 = Output Timer (seconds) normally set to 600 seconds after valid communication
(see data table for floating point)

Micro-Comm RTU32 Protocol
Address switches 1-7 set Micro-Comm address (HH-OW)
Use Type 9 or Type 24 messages for reading/writing: MESSAGE(3,24,1000,@HI,0,0,0,0,0,0,3900,4,2,0)
Flow Rates = Pulses Per Minute, Flow Totals = Pulse Counters (32-bit)

Dataswap Mode
Dip switch 9 turns on dataswap automote transmission and listens to addresses as shown below:

HH <---> HI	HI listens to HH and sets AO1=AI1, AO2=AI2 and DO1-DO4=DI1-DI4
	HH listens to HI and sets AO1=AI1, AO2=AI2 and DO1-DO4=DI1-DI4
HJ <---> HK	HK listens to HJ and sets AO1=AI1, AO2=AI2 and DO1-DO4=DI1-DI4
	HJ listens to HK and sets AO1=AI1, AO2=AI2 and DO1-DO4=DI1-DI4

And so on for all other addresses up to KW (64 total). RTU32p protocol (Type 25 message with MR type 2) is used for the automote transmission. Automote transmit timing is based on the address starting with 10 seconds for HH and going up to 62 sec for KW. Setting dip switch 7 to on will change to listening and setting AO1=AI3, AO2=AI4 and DO1-DO4=DI5-DI8 as well as turn off his automote transmit.

Micro-Comm I/O Protocol
Legacy Support: Responds like 4 modules using Micro-Comm I/O loop if address switches set to all zero
Discrete Outputs: DO1-DO4 = 41035
Analog Outputs: AO1-AO2 = 41025-41026
Discrete Inputs: DI1-DI8 = 41029
Analog Inputs: AI1-AI5 = 40001-40005 (fake 16-bit to match EAI8 module)
Pulse Counters for DI1-DI8: 41031-41038

Dip Switches
1-7 = address 0-127, HH-OW
8 = baud rate (on=19200, off=9600)
9 = dataswap mode (on)
10-12 = future use

Notes:
The COMM LED will blink whenever a valid master message has been received and the reply is sent.

DATA TABLE

Modbus	DF1	Old MC I/O	Combo I/O
40100	N9:0	41029	Discrete Inputs DI1-DI8
40101	N9:1	40001	Analog Input AI1 (0-4095=0-20mA)
40102	N9:2	40002	Analog Input AI2
40103	N9:3	40003	Analog Input AI3
40104	N9:4	40004	Analog Input AI4
40105	N9:5	40005	Battery Voltage (0-4095=0-25.5 volts)
40106	N9:6	41031	Pulse Counter 1 (0-65535)
40107	N9:7	41032	Pulse Counter 2
40108	N9:8	41033	Pulse Counter 3
40109	N9:9	41034	Pulse Counter 4
40110	N9:10	41035	Pulse Counter 5
40111	N9:11	41036	Pulse Counter 6
40112	N9:12	41037	Pulse Counter 7
40113	N9:13	41038	Pulse Counter 8
40114	N9:14		DI1 Frequency (x 10 Hz)
40115	N9:15		DI2 Frequency
40116	N9:16		DI3 Frequency
40117	N9:17		DI4 Frequency
40118	N9:18		DI5 Frequency
40119	N9:19		DI6 Frequency
40120	N9:20		DI7 Frequency
40121	N9:21		DI8 Frequency
40122	N9:22		DI1 Runtime (x 0.1 Hours)
40123	N9:23		DI2 Runtime
40124	N9:24		DI3 Runtime
40125	N9:25		DI4 Runtime
40126	N9:26		DI5 Runtime
40127	N9:27		DI6 Runtime
40128	N9:28		DI7 Runtime
40129	N9:29		DI8 Runtime
40130	N9:30		DI1 Pulses Per Minute
40131	N9:31		DI2 Pulses Per Minute
40132	N9:32		DI3 Pulses Per Minute
40133	N9:33		DI4 Pulses Per Minute
40134	N9:34		DI5 Pulses Per Minute
40135	N9:35		DI6 Pulses Per Minute
40136	N9:36		DI7 Pulses Per Minute
40137	N9:37		DI8 Pulses Per Minute
40196	N9:38		AITOPI for AI1 (4-20mA = 0-64 PPS)
40197	N9:39		AITOPI for AI2
40198	N9:40		AITOPI for AI3
40199	N9:41		AITOPI for AI4
40200	N10:0	41035	Discrete Outputs DO1-DO4
40201	N10:1	41025	Analog Output 1 (0-4095=0-20mA)
40202	N10:2	41026	Analog Output 2

Floating Point Registers

Modbus	DF1	Combo I/O
40138	F11:0	AI1 (0-20.0 mA)
40140	F11:1	AI2
40142	F11:2	AI3
40144	F11:3	AI4
40146	F11:4	Battery Voltage (0-25.5 volts)
40148	F12:0	DI1 Frequency (Hz)
40150	F12:1	DI2 Frequency
40152	F12:2	DI3 Frequency
40154	F12:3	DI4 Frequency
40156	F12:4	DI5 Frequency
40158	F12:5	DI6 Frequency
40160	F12:6	DI7 Frequency
40162	F12:7	DI8 Frequency
40164	F13:0	DI1 Runtime (Hours)
40166	F13:1	DI2 Runtime
40168	F13:2	DI3 Runtime
40170	F13:3	DI4 Runtime
40172	F13:4	DI5 Runtime
40174	F13:5	DI6 Runtime
40176	F13:6	DI7 Runtime
40178	F13:7	DI8 Runtime
40180	F14:0	DI1 Pulses Per Minute
40182	F14:1	DI2 Pulses Per Minute
40184	F14:2	DI3 Pulses Per Minute
40186	F14:3	DI4 Pulses Per Minute
40188	F14:4	DI5 Pulses Per Minute
40190	F14:5	DI6 Pulses Per Minute
40192	F14:6	DI7 Pulses Per Minute
40194	F14:7	DI8 Pulses Per Minute