

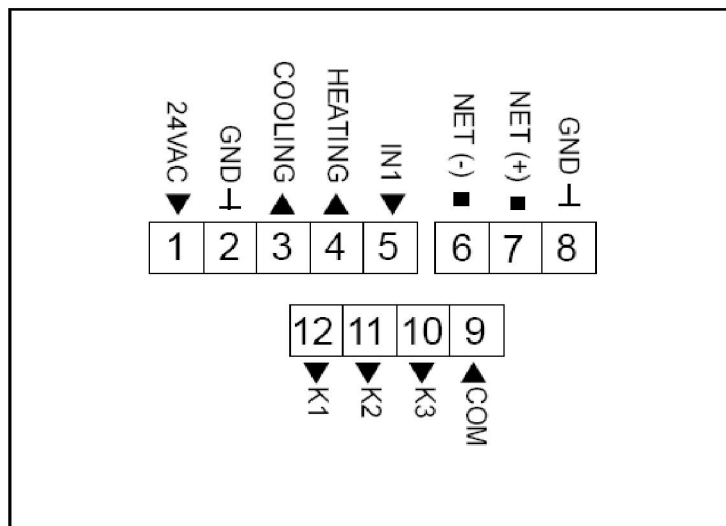
MBUS_IO3 User Guide

Features:

- Network RS485 Communication via Modbus RTU
- Two 0-10V outputs, 3 Relay Outs (10A@110/220VAC: 10A@30VDC), 1 Universal Input, 1 Built-in Thermistor
- Built-in Temperature sensor as well as ability to connect external temperature sensor.
- Highly configurable for standalone control in various applications. (Fan Coil, Heat pump, VAV, Radiant Heat, etc)
- High Impact Plastic Enclosure provides durability in Industrial & Commercial Environments

Terminal Block Connections

1.....	24VAC live
2.....	Measurement neutral
3.....	Cooling output 0-10V
4.....	Heating output 0-10V
5.....	External sensor input
6,7,8.....	Network communication
9.....	Common 220VAC
10,11,12.....	Outputs 220VAC



Supply voltage	24VAC +/- 20%, 50-60Hz: 12VDC +/- 20%
Power consumption	100mA at 12Vdc
Operation	-5C to 50°C (23-122°F)
Ambient humidity range	5-95%Rh non condensing
Material, enclosure	Flame proof plastic
Enclosure rating	IP31
Temperature sensor	10K thermistor (± 0.5°C Accuracy)
Color	White/Off-white
Weight	200g

The controller monitors temperature conditions in the space using a built-in thermistor sensor. It is located in such a way that it is not affected by the temperature of the wall or by internal heat created in the device cavity.

External wiring is connected to a terminal block on the back of the sensor.

Using the Modbus registers, the MBUS_IO3 and MBUS_IO5 modules can be configured as:

- Generic Modbus I/O boards with built-in and/or external temperature sensors
- 0-10V temperature transducers
- Tstat controller for Fan Coils, Heat Pumps, Radiant heat, VAV control, etc.
- Please contact DataNab for application specific questions.

MODBUS Registers for MBUS_IO3 and MBUS_IO5 modules.

- Default Communication Settings: RS485 at 19200, 8, None, 1: Default Address 254

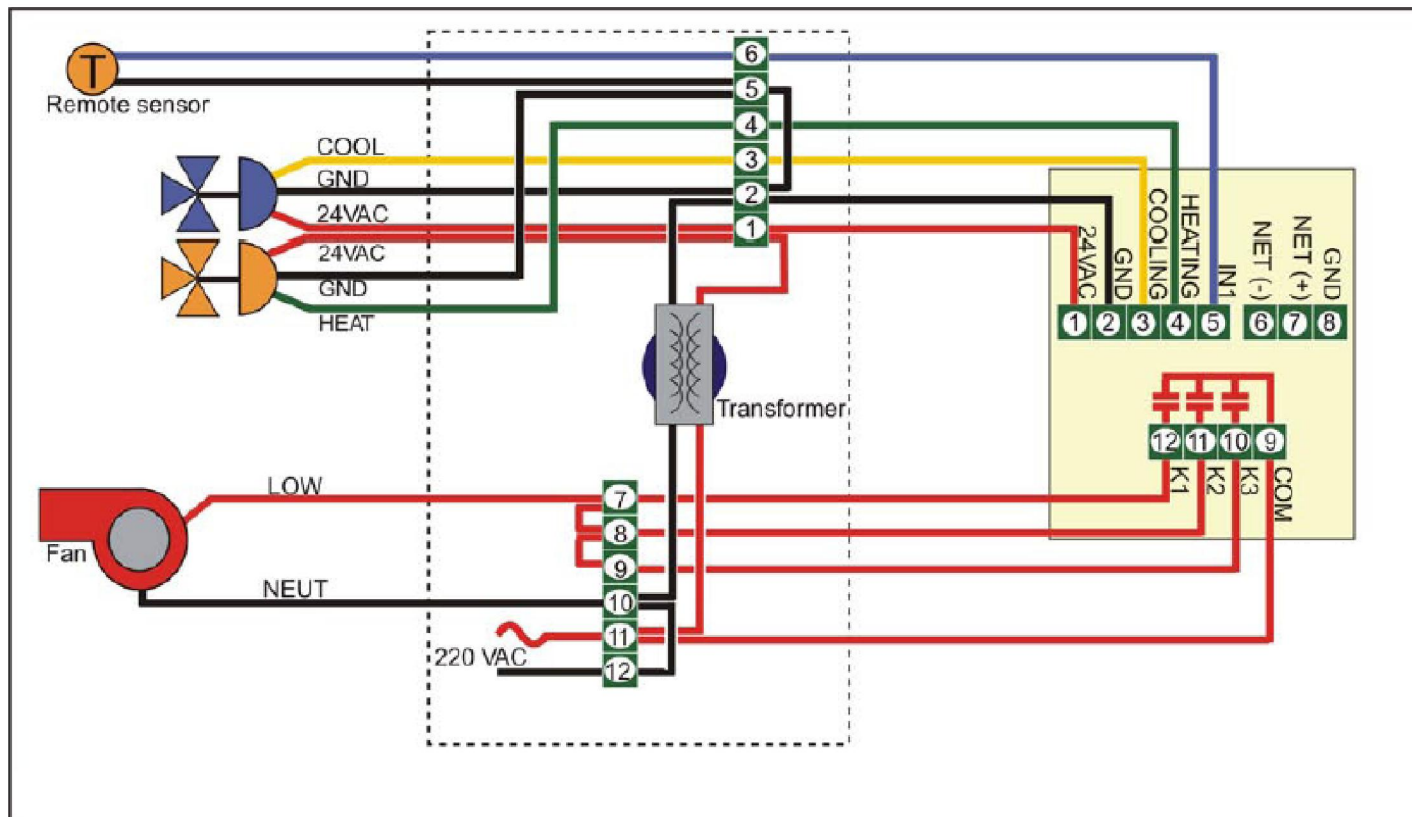
Reg #	Description	Default	Notes
6	SERIAL Address / Modbus RS485 Address / Modbus Device ID #	254	
101	Room Temp: built in Therm temp value or Ui1/Temp value; see Reg 111		
102	AO1 (Clg) output status in Volt x 100	-	If manual control bits in R310 is set, this register can be used to control AO1 via modbus
103	AO2 (Htg) output status in Volt x 100	-	If manual control bits in R310 is set, this register can be used to control AO2 via modbus
104	PID1 Current output Value	-	outputs the current PID1 calculation in 0-100%
106	PID1 Current heat/cool mode	-	1=cooling, 2=heating (writable if R128 is set to 5, readable only if R128 is set to 1)
107	PID1 Current Stage	-	0=coasting, {1-2-3=cooling 1,2,3}, {4-5-6=heating 1,2,3}
108	Relay Output Status Byte:	-	bit 0-4 = Relay 1-5
110	Calibration factor for external thermistor on ui1/temp input	500	use this to add an offset calibration factor to the value coming from the Ui1/temp input
111	PID1 Sensor Select Byte	2	1=ext thermistor on ui1/temp input, 2=int thermistor, 3=avg of both ext therm and int therm
112	Calibration factor for the Analog outputs.	100	use to calibrate the analog output values
114	PID1 Proportional Term	60	this is the value x 10. so 60 means a 6Deg proportional term.
115	PID1 Integral Term	50	this is the value x 10. so 50 means a 5%/DegErr/Minute Integral term
118	Sequence Select:	1	1=Standard Mode, 2=Transducer Mode:
119	PID1 Cooling Deadband: offset from setpoint before cooling begins	10	this is x 10 so 10 = 1deg
120	PID1 Heating Deadband: offset from setpoint before heating begins	10	this is x 10 so 10 = 1deg
121	Units: DegF (1) or DegC (0): default DegC (0)	0	
122	PID1 Define number of manual fan speeds	3	0=off/auto, 1=off/1/auto, 2=off/1/2/auto, 3=off/1/2/3/auto

123	Night Htg Deadband	10	used when APP in Reg 125 is set to 1 for Hotel / Residential mode.
124	Night Clb Deadband	10	used when APP in Reg 125 is set to 1 for Hotel / Residential mode.
125	App Mode	0	0=Office, 1=Hotel/Residential Mode
126	Powerup Setpoint	20C / 68F	only used if Powerup Mode in Reg 127 is set to 1
127	Powerup Mode	2	0=poweroff, 1=poweron, 2=last value, 3=auto
128	PID1 heat/cool select: determines how heat/cool mode is selected	1	5=mbus control, 1=determined by PID1 (if output > 52 then heat, if output < 48 then cool)
129	FAN Auto Only Mode	0	0=Manual Fan Modes allowed (depending on R122), 1=Auto Mode Only, 2=DDC Mode
131	PID1 Max Setpoint	50C/ 99F	
132	PID1 Min Setpoint	15C/ 55F	
134	Reset all parameters to factory defaults by writing a 1 to this register.	0	when unit resets, this register will go back to 0
135	PID1 Setpoint	20C/ 68F	limited by max & min in Reg 131 & Reg 132
137	PID1 Current Fan Speed	-	0=off, 1=man1, 2=man2, 3=man3, 4=auto: use with multiple relay configuration tables
138-144	relay config bytes for each of the 7 PID1 stages at Fan Speed 0 (off)		contact DataNab for more details
145-151	relay config bytes for each of the 7 PID1 stages at Fan Speed 1 (man1)		contact DataNab for more details
152-158	relay config bytes for each of the 7 PID1 stages at Fan Speed 2 (man2)		contact DataNab for more details
159-165	relay config bytes for each of the 7 PID1 stages at Fan Speed 3 (man3)		contact DataNab for more details
166-172	relay config bytes for each of the 7 PID1 stages at Fan Speed 4 (auto)		contact DataNab for more details
173-179	analog out config bytes for each of the 7 PID1 stages in occupied mode		AO's operate independently of fan speed, so only one table for occ mode - contact DataNab
180	Ui1/Temp input value	-	If Ui1 is set to manual with bit0 of R309, then this register is writable
181	Ui2/Analog2 value	-	If Ui2 is set to manual with bit1 of R309, then this register is writable
182	PID1 Night Heating Setpoint	15C/ 65F	used if App in Reg 125 is set to 0 for Office mode
183	PID1 Night Cooling Setpoint	30C/ 80F	used if App in Reg 125 is set to 0 for Office mode
184	Bit0 determines occupancy status.	-	0=unocc, 1=occ: don't worry about the other bits; only write a 1 or a 0 to this register.
185	SERIAL Baud Rate	1	0=9600 baud, 1=19200 baud
186	determines AO1 output scale	1	0=on/off, 1=0-10V, 2=0-5V, 3=2-10V, 4=10-0V
187	determines AO2 output scale	1	0=on/off, 1=0-10V, 2=0-5V, 3=2-10V, 4=10-0V
188	determines Ui1/temp input type	1	0=10bit raw, 1=10K therm, 2=0-100%, 3=on/off, 4=custom by table in reg 219-229
189	determines Ui2/Analog2 input type	1	0=10bit raw, 1=10K therm, 2=0-100%, 3=on/off, 4=custom by table in reg 230-240

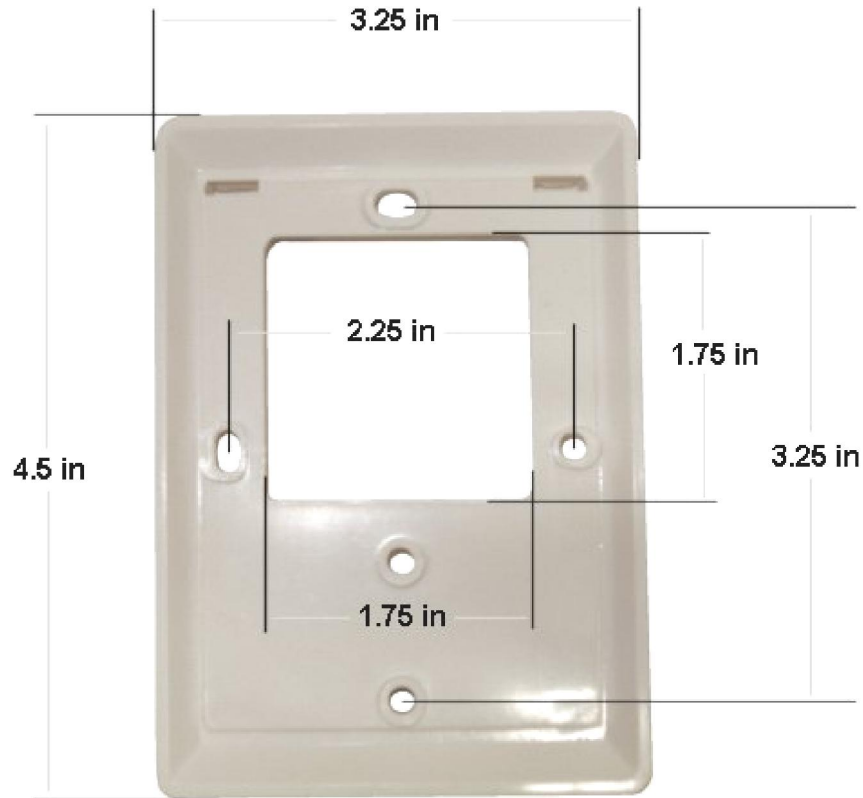
216	Internal thermistor current value	-	
217	Calibration factor for internal thermistor	500	
218	Calibration factor for ui2/Analog2	500	
219-229	defines custom lookup table for Ui1/Temp input		contact DataNab for more details
230-240	defines custom lookup table for Ui2/Analog2 input (Mbus_io5 only)		contact DataNab for more details
241	PID2 Sensor to use for control.	0	0=none, 1=Ui1, 2=Ui2: Ui2 is only available on Mbus_IO5
242	PID2 upper deadband	10	Deg x 10, so a value of 5 = 0.5Deg
243	PID2 lower deadband	10	Deg x 10, so a value of 5 = 0.5Deg
244	PID2 Proportional Term	100	recommended value is 100 for temp control. this is Deg x 10 so 100 is actually 10Deg
245	PID2 Integral Term	10	recommended value is 10 for temp control. this is x 10 so 10 is actually 1%/DegErr/Minute
246	PID2 Setpoint	-	Deg x 10
247	Relay1: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
248	Relay2: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
249	Relay3: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
250	Relay4: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
251	Relay5: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
252	AO1: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
253	AO2: define which PID that this output will be controlled by	0	0=PID1, 1=PID2, 2=Max PID1/2, 3=Min PID1/2
254-260	contain the relay configuration bytes for each of the 7 stages of PID2.	-	PID2 is independent of fan speed, so only one relay table for PID2 - contact DataNab
261-267	contain the analog output config bytes for each of the 7 PID2 stages.	-	The AO's operate independently of fan speed, so only one table - contact DataNab f
268	Define the number of heating stages for PID2	3	Max number of combined htg & clg stages is 6
269	Define the number of cooling stages for PID2	3	Max number of combined htg & clg stages is 6
270	PID2 Current Output Value	-	outputs the current PID2 calculation in 0-100%
275	PID2 Night Setpoint	-	Deg x 10
276	Define the number of heating stages for PID1	3	Max number of combined htg & clg stages is 6
277	Define the number of cooling stages for PID1	3	Max number of combined htg & clg stages is 6
278	PID2 Current Stage	-	0=coast, 1=clg1, 2=clg2, 3=clg3, 4=htg1, 5=htg2, 6=htg3
309	Input Auto/Manual Enable Mode.	0	Bit0=Ui1/R180, Bit1=Ui2/R181, Bit2=Di1/R311
310	Output Auto/Manual Enable Mode.	0	Bit 0-4 = Relay 1-5. Bit 5,6 = Analog Output 1 (clg) & 2 (htg): 0=auto, 1=manual
311	Digital Input 1 status (Mbus_io5 only)	-	If Di1 is set to manual with bit2 of R309, then this register is writable
312-316	Relay 1-5 Manual Control registers	-	manually control relays using these registers if proper bits are set in Reg310: 0=off, 1=on
351-357	analog output config bytes for the 7 PID1 stages in unoccupied mode		AO's operate independently of fan speed, so only one table per stage - contact DataNab

Wiring Example for MBUS_IO3 control of a Fan Coil with modulating Heating & Cooling valves

24VAC Modulating Valves, 1-Speed Fan



Backplate



Backview

