KELE ASSOCIATES™

MULTI-OUTPUT PROGRAMMABLE CONTROLLERS

20/20 Interface Products

MODELS UMX-4 & UMX-8

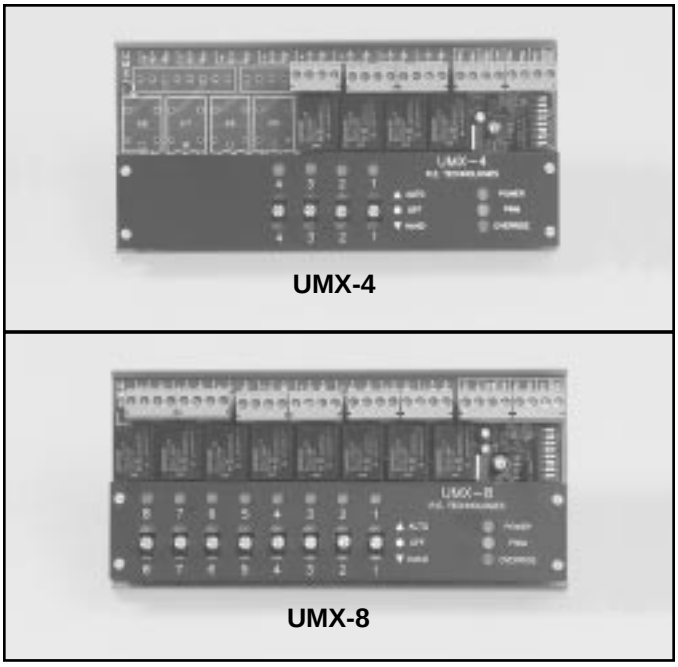
DESCRIPTION

The **UMX-8** is a **Multi-output Programmable Controller** which expands the input or output capability of building automation controllers. The **UMX-8** has 8 SPDT output relays that provide ON/OFF control from a jumper-selectable PWM or analog (current or voltage) input signal. The sequence of operation can be easily selected by DIP switches. A "Dual" mode allows two (2) **UMXs** to be controlled in sequence from a single input signal. HOA switches allow for manual override of each relay output. Feedback and LEDs provide status indication of the **UMX-8.**

The **UMX-4** provides 4 SPDT output relays. All jumper positions and DIP switch settings are identical to the **UMX-8.** The operation of the **UMX-4** is identical to relays 1-4 on the **UMX-8.** Feedback and LEDs provide status indication of the **UMX-4.**

Standard control sequences include:

- Multiplexed 4 or 8 relay output expander - provides standard 4 or 8 output expansion from one BAS output.
- Multiplexed 4 or 8 input expander - provides standard 4 or 8 input expansion from one BAS output and one BAS input.
- RTU or AHU controller - provides multi-stage heating and cooling sequences with economizer.
- Sequencer - 4 or 8 stages of sequential control.
- Custom sequences are available - consult Kele engineering for details.



UMX-4

UMX-8

FEATURES

- ***Four (4) or eight (8) SPDT relay outputs***
- ***HOA switches***
- ***LED status indication***
- ***Field-selectable programs***
- ***Output status feedback***
- ***Override indication***
- ***Field-selectable PWM or analog current or voltage input***
- ***Pull-apart terminal blocks***

SPECIFICATIONS

Supply voltage	**UMX-4:** 24 VDC ±10% @ 90 mA max 24 VAC ±10% @ 210 mA max **UMX-8:** 24 VDC ±10% @ 150 mA max 24 VAC ±10% @ 350 mA max
Input signal*	PWM, 0-20 mA, 0-5V, 0-10V, 0-15V, jumper-selectable
Input impedance	Current: 250 Ω Voltage: 46.4 kΩ min
Output relays	**UMX-4:** 4 SPDT, 5A @ 24 VDC/24 VAC **UMX-8:** 8 SPDT, 5A @ 24 VDC/24 VAC
Override output status	Transistor switch, 30 VDC @ 100 mA max
Status feedback	**UMX-4:** 1 output, 1-5V for relays 1-4 **UMX-8:** 2 outputs, 1-5V for relays 1-4 and 1-5V for relays 5-8
Feedback load current	3 mA max per output
Operating temp	32° to 158°F (0 to 70°C)
Humidity	95% noncondensing
Dimensions (UMX-4 & UMX-8)	7"W x 3.25"H x 1.56"D 17.78 cm x 8.25 cm x 3.96 cm

*Each input command signal (as listed in the control sequence tables) may vary up to 35% of the change to the next highest or lowest command signal (as shown in tables) and still be considered valid.

KELE & ASSOCIATES • P O Box 34817 • Memphis, TN 38184 • 901-382-4300 • FAX 901-372-2531

OPERATION

Single and Dual UMX Control - The **UMX** can be operated in both a single and dual operating mode. In the single mode, one **UMX** is controlled from a single analog or PWM signal. In the dual mode, 2 **UMXs** are controlled in sequence, providing 16 relay outputs from a single analog or PWM signal. This dual **UMX** control is not available with all control sequences. Refer to the control sequence tables for availability. If single **UMX** control is to be used, refer to Table 1 for DIP switch settings. For dual **UMX** control, refer to Table 2.

Pulse Width Modulation (PWM)
To control the **UMX** from a PWM signal, put the input selection jumper on the **UMX** in the "PW" position. Set the operating mode DIP switches (Table 1 or Table 2) as required. Refer to the control sequence tables for time base and control sequence information.

Analog Input (ANA)
The **UMX** can be controlled from an analog current or voltage input. To operate in this mode, set the input selection jumpers on the **UMX** as shown in this table:

Analog Input Jumpers				
Analog input	0-20 mA	0-5V	0-10V	0-15V
AN	MA	5V	10V	15V

OPERATING MODE (DIP SWITCHES 1, 2, 3, & 4)

Table 1 Single Unit UMX Control

PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	DIP SWITCHES 1	2	3	4
X								0	0	0	1
	X			X		X		0	1	0	0
	X			X			X	0	1	0	1
	X				X	X		0	1	1	0
	X				X		X	0	1	1	1

PWM = PWM Input Signal
ANA = Analog Input Signal
L1 = Level 1 UMX (Dual UMX Mode)
L2 = Level 2 UMX (Dual UMX Mode)
HSL = Hold Outputs on Signal Loss (Analog Input Mode)
CSL = Clear Outputs on Signal Loss (Analog Input Mode)
SVT = Short Signal Validation Time (Analog Input Mode)
LVT = Long Signal Validation Time (Analog Input Mode)

Table 2 Dual UMX Control

PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	DIP SWITCHES 1	2	3	4
X		X						0	0	1	0
X			X					0	0	1	1
	X	X		X		X		1	0	0	0
	X	X		X			X	1	0	0	1
	X	X			X	X		1	0	1	0
	X	X			X		X	1	0	1	1
	X		X	X		X		1	1	0	0
	X		X	X			X	1	1	0	1
	X		X		X	X		1	1	1	0
	X		X		X		X	1	1	1	1

DIP Switches:
0 = OFF
1 = ON

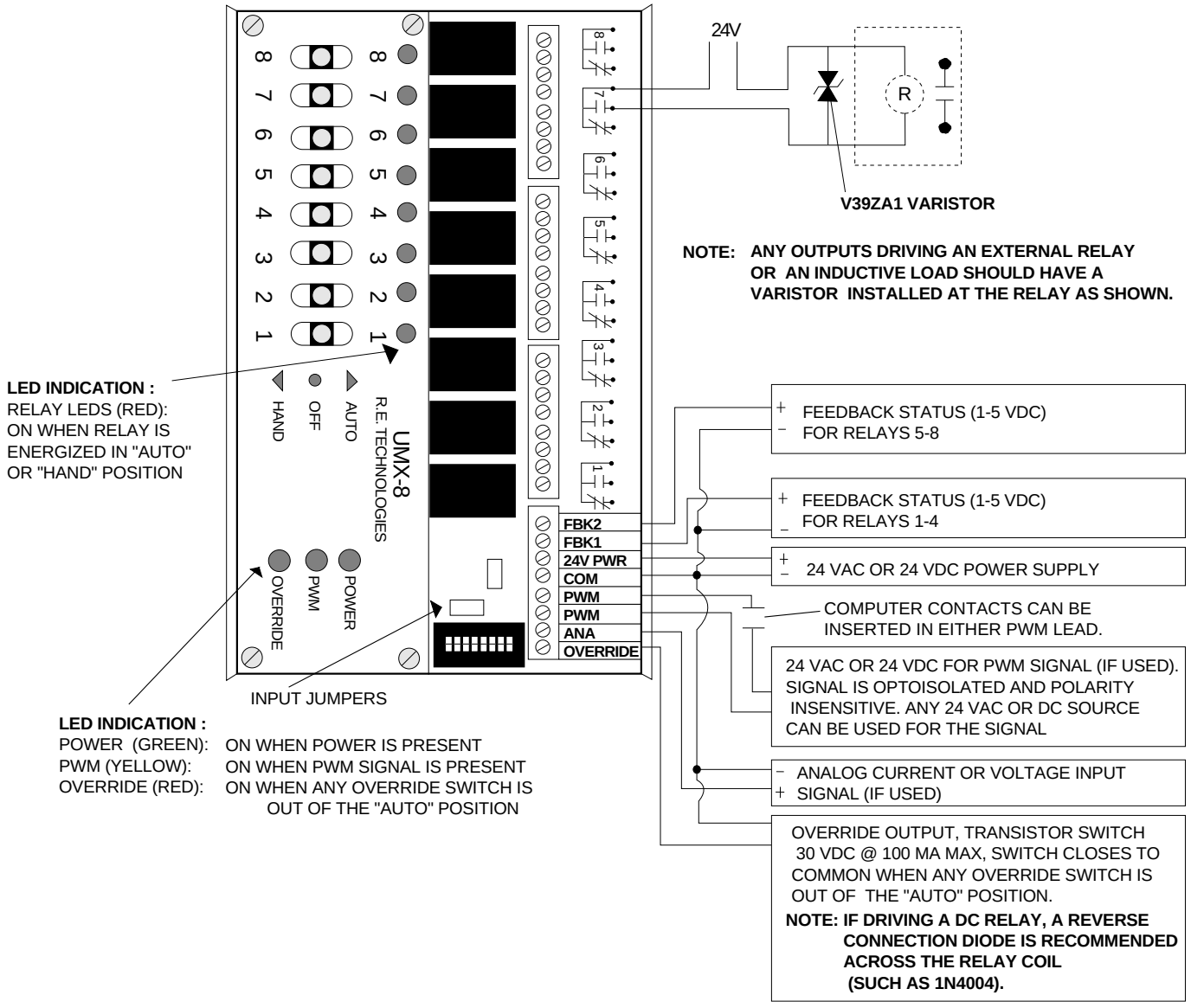
L1, L2 - **UMX Levels - Dual UMX Mode Only -** In the **"Dual UMX"** mode, two (2) **UMXs** respond in sequence to a single input signal. Using the DIP switch settings shown in Table 2, assign the first **UMX** to Level 1(L1) and the second **UMX** to Level 2 (L2). **"Dual UMX**" control is available in most analog and PWM modes. PWM time base doubles in **"Dua**l **UMX**" mode.

HSL, CSL - Signal Loss Hold - Analog Input Mode Only - When using an analog input, the **UMX** can be programmed to either hold all relays in their current state (HSL) or turn all relays off (CSL) upon a loss of the input signal. Use DIP switch settings shown in Table 1 or Table 2 to program this feature.

SVT, LVT - Signal Validation Time - Analog Input Mode Only - When varying an analog input signal to the **UMX**, it is necessary for the input signal to remain at the desired value for a set length of time. This prevents other relays on the **UMX** from energizing while the input signal is changing values. This set length of time, or validation time, can be programmed to either 1 second (SVT) or 3 seconds (LVT). Use the DIP switch settings in Table 1 or Table 2 to select the validation time.

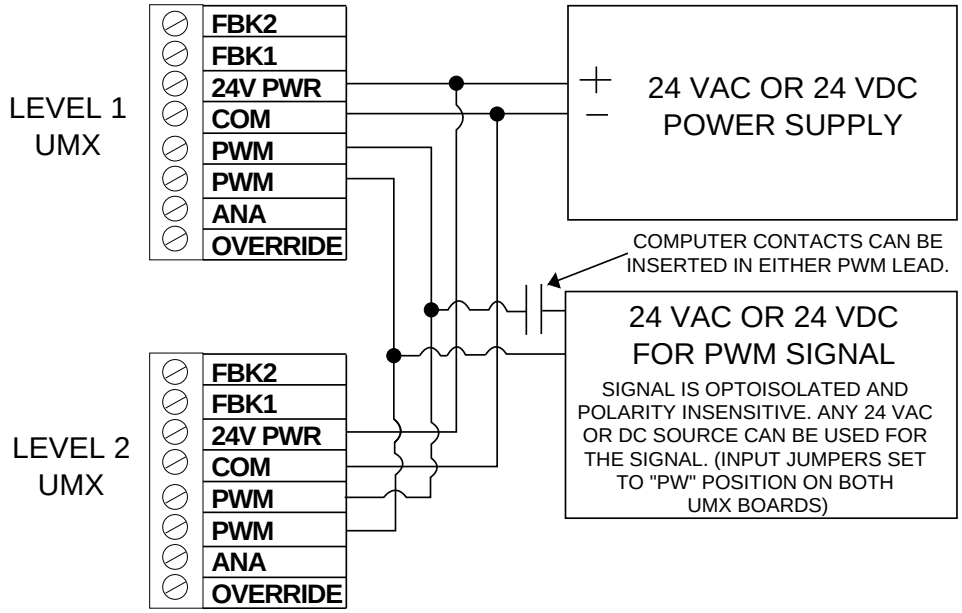
CONTROL SEQUENCE TABLES

WIRING - SINGLE UMX

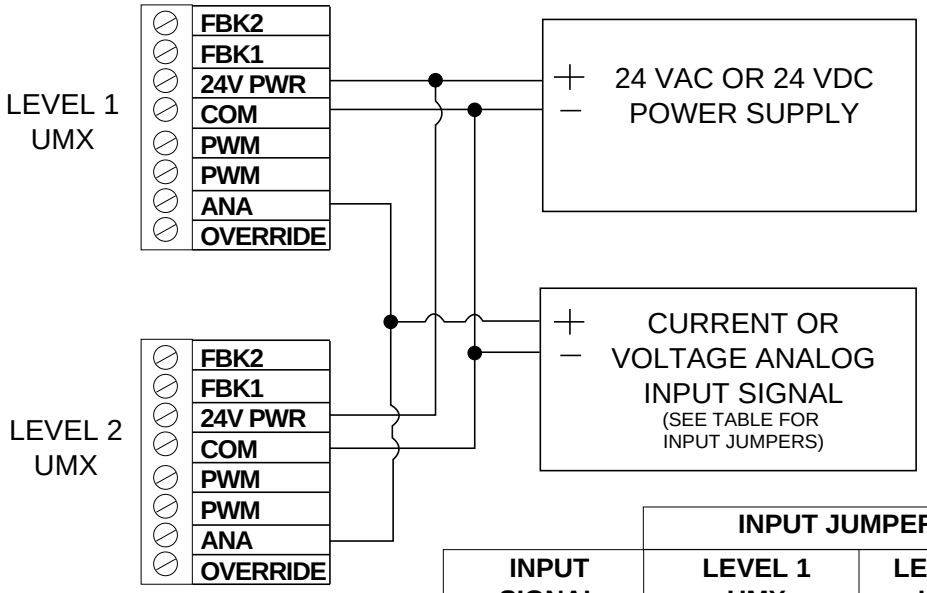


WIRING - DUAL UMX

PWM INPUT SIGNAL



ANALOG INPUT SIGNAL



	INPUT JUMPERS	
INPUT SIGNAL	**LEVEL 1 UMX**	**LEVEL 2 UMX**
0-5 V	AN/5V	AN/5V
0-10V	AN/10V	AN/10V
0-15V	AN/15V	AN/15V
0-20 MA	AN/MA	AN/5V

Table 3 Control Sequences

OUTPUT EXPANDER WITH PWM INPUT - Provides 4, 8, 12, or 16 relay outputs controlled from a single BAS pulse-width modulated output. A time base of 9, 18, or 36 seconds is available.

Relay status
***0** = Command OFF*
***1** = Command ON*
***X** = No change of state*

DIP switches 5,6,7,8 OFF,OFF,OFF,OFF PWM (sec)	DIP switches 5,6,7,8 OFF,OFF,OFF,ON PWM (sec)	Single UMX Relays UMX-8 8 7 6 5	Single UMX Relays UMX-8 UMX-4 4 3 2 1	Level 2 Dual UMX Relays UMX-8 8 7 6 5	Level 2 Dual UMX Relays UMX-8 UMX-4 4 3 2 1	Level 1 Dual UMX Relays UMX-8 8 7 6 5	Level 1 Dual UMX Relays UMX-8 UMX-4 4 3 2 1
0.5	1.0	0 0 0 0	0 0 0 0	X X X X	X X X X	0 0 0 0	0 0 0 0
1.0	2.0	X X X X	X X X 1	X X X X	X X X X	X X X X	X X X 1
1.5	3.0	X X X X	X X X 0	X X X X	X X X X	X X X X	X X X 0
2.0	4.0	X X X X	X X 1 X	X X X X	X X X X	X X X X	X X 1 X
2.5	5.0	X X X X	X X 0 X	X X X X	X X X X	X X X X	X X 0 X
3.0	6.0	X X X X	X 1 X X	X X X X	X X X X	X X X X	X 1 X X
3.5	7.0	X X X X	X 0 X X	X X X X	X X X X	X X X X	X 0 X X
4.0	8.0	X X X X	1 X X X	X X X X	X X X X	X X X X	1 X X X
4.5	9.0	X X X X	0 X X X	X X X X	X X X X	X X X X	0 X X X
5.0	10.0	X X X 1	X X X X	X X X X	X X X X	X X X 1	X X X X
5.5	11.0	X X X 0	X X X X	X X X X	X X X X	X X X 0	X X X X
6.0	12.0	X X 1 X	X X X X	X X X X	X X X X	X X 1 X	X X X X
6.5	13.0	X X 0 X	X X X X	X X X X	X X X X	X X 0 X	X X X X
7.0	14.0	X 1 X X	X X X X	X X X X	X X X X	X 1 X X	X X X X
7.5	15.0	X 0 X X	X X X X	X X X X	X X X X	X 0 X X	X X X X
8.0	16.0	1 X X X	X X X X	X X X X	X X X X	1 X X X	X X X X
8.5	17.0	0 X X X	X X X X	X X X X	X X X X	0 X X X	X X X X
9.0	18.0	1 1 1 1	1 1 1 1	X X X X	X X X X	1 1 1 1	1 1 1 1
9.5	19.0	1 1 1 1	1 1 1 1	0 0 0 0	0 0 0 0	X X X X	X X X X
10.0	20.0	1 1 1 1	1 1 1 1	X X X X	X X X 1	X X X X	X X X X
10.5	21.0	1 1 1 1	1 1 1 1	X X X X	X X X 0	X X X X	X X X X
11.0	22.0	1 1 1 1	1 1 1 1	X X X X	X X 1 X	X X X X	X X X X
11.5	23.0	1 1 1 1	1 1 1 1	X X X X	X X 0 X	X X X X	X X X X
12.0	24.0	1 1 1 1	1 1 1 1	X X X X	X 1 X X	X X X X	X X X X
12.5	25.0	1 1 1 1	1 1 1 1	X X X X	X 0 X X	X X X X	X X X X
13.0	26.0	1 1 1 1	1 1 1 1	X X X X	1 X X X	X X X X	X X X X
13.5	27.0	1 1 1 1	1 1 1 1	X X X X	0 X X X	X X X X	X X X X
14.0	28.0	1 1 1 1	1 1 1 1	X X X 1	X X X X	X X X X	X X X X
14.5	29.0	1 1 1 1	1 1 1 1	X X X 0	X X X X	X X X X	X X X X
15.0	30.0	1 1 1 1	1 1 1 1	X X 1 X	X X X X	X X X X	X X X X
15.5	31.0	1 1 1 1	1 1 1 1	X X 0 X	X X X X	X X X X	X X X X
16.0	32.0	1 1 1 1	1 1 1 1	X 1 X X	X X X X	X X X X	X X X X
16.5	33.0	1 1 1 1	1 1 1 1	X 0 X X	X X X X	X X X X	X X X X
17.0	34.0	1 1 1 1	1 1 1 1	1 X X X	X X X X	X X X X	X X X X
17.5	35.0	1 1 1 1	1 1 1 1	0 X X X	X X X X	X X X X	X X X X
18.0	36.0	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 1	X X X X	X X X X

Table 4 Control Sequences

OUTPUT EXPANDER WITH ANALOG INPUT - Provides 4 or 8 relay outputs controlled from a single BAS analog voltage or current output. "Dual" UMX control is not available with this sequence.

Relay status
0 = *Command OFF*
1 = *Command ON*
X = *No change of state*

DIP switches 5,6,7,8 OFF, OFF, ON, OFF				DIP switches 5,6,7,8 OFF, OFF, ON, ON				Single UMX Relays U M X - 8	
mA SIG	5 V SIG	10 V SIG	15 V SIG	mA SIG	5 V SIG	10 V SIG	15 V SIG	8 7 6 5	U M X - 4 4 3 2 1
3.5	0.75	1.5	2.25	4.0	1.00	2.00	3.00	0 0 0 0	0 0 0 0
4.0	1.00	2.00	3.00	4.9	1.24	2.47	3.71	X X X X	X X X 1
5.0	1.25	2.50	3.75	5.9	1.47	2.94	4.41	X X X X	X X X 0
6.0	1.50	3.00	4.50	6.8	1.71	3.41	5.12	X X X X	X X 1 X
7.0	1.75	3.50	5.25	7.8	1.94	3.88	5.82	X X X X	X X 0 X
8.0	2.00	4.00	6.00	8.7	2.18	4.35	6.53	X X X X	X 1 X X
9.0	2.25	4.50	6.75	9.7	2.41	4.82	7.24	X X X X	X 0 X X
10.0	2.50	5.00	7.50	10.6	2.65	5.29	7.94	X X X X	1 X X X
11.0	2.75	5.50	8.25	11.5	2.88	5.76	8.65	X X X X	0 X X X
12.0	3.00	6.00	9.00	12.5	3.12	6.24	9.35	X X X 1	X X X X
13.0	3.25	6.50	9.75	13.4	3.35	6.71	10.06	X X X 0	X X X X
14.0	3.50	7.00	10.50	14.4	3.59	7.18	10.76	X X 1 X	X X X X
15.0	3.75	7.50	11.25	15.3	3.82	7.65	11.47	X X 0 X	X X X X
16.0	4.00	8.00	12.00	16.2	4.06	8.12	12.18	X 1 X X	X X X X
17.0	4.25	8.50	12.75	17.2	4.29	8.59	12.88	X 0 X X	X X X X
18.0	4.50	9.00	13.50	18.1	4.53	9.06	13.59	1 X X X	X X X X
19.0	4.75	9.50	14.25	19.1	4.76	9.53	14.29	0 X X X	X X X X
20.0	5.00	10.00	15.00	20.0	5.00	10.00	15.00	1 1 1 1	1 1 1 1

DIP switches 5,6,7,8 OFF, OFF, OFF, ON				DIP switches 5,6,7,8 OFF, OFF, OFF, OFF				Single UMX Relays U M X - 8	
mA SIG	5 V SIG	10 V SIG	15 V SIG	mA SIG	5 V SIG	10 V SIG	15 V SIG	8 7 6 5	U M X - 4 4 3 2 1
—	—	—	—	4.0	1.00	2.00	3.00	0 0 0 0	0 0 0 0
4.0	1.00	2.00	3.00	5.0	1.25	2.50	3.75	X X X X	X X X 1
5.0	1.25	2.50	3.75	6.0	1.50	3.00	4.50	X X X X	X X X 0
6.0	1.50	3.00	4.50	7.0	1.75	3.50	5.25	X X X X	X X 1 X
7.0	1.75	3.50	5.25	8.0	2.00	4.00	6.00	X X X X	X X 0 X
8.0	2.00	4.00	6.00	9.0	2.25	4.50	6.75	X X X X	X 1 X X
9.0	2.25	4.50	6.75	10.0	2.50	5.00	7.50	X X X X	X 0 X X
10.0	2.50	5.00	7.50	11.0	2.75	5.50	8.25	X X X X	1 X X X
11.0	2.75	5.50	8.25	12.0	3.00	6.00	9.00	X X X X	0 X X X
12.0	3.00	6.00	9.00	13.0	3.25	6.50	9.75	X X X 1	X X X X
13.0	3.25	6.50	9.75	14.0	3.50	7.00	10.50	X X X 0	X X X X
14.0	3.50	7.00	10.50	15.0	3.75	7.50	11.25	X X 1 X	X X X X
15.0	3.75	7.50	11.25	16.0	4.00	8.00	12.00	X X 0 X	X X X X
16.0	4.00	8.00	12.00	17.0	4.25	8.50	12.75	X 1 X X	X X X X
17.0	4.25	8.50	12.75	18.0	4.50	9.00	13.50	X 0 X X	X X X X
18.0	4.50	9.00	13.50	19.0	4.75	9.50	14.25	1 X X X	X X X X
19.0	4.75	9.50	14.25	20.0	5.00	10.00	15.00	0 X X X	X X X X
20.0	5.00	10.00	15.00	—	—	—	—	1 1 1 1	1 1 1 1

Table 5 Control Sequences

INPUT EXPANDER WITH PWM OR ANALOG INPUT - Provides 4, 8, 12, or 16 relay outputs controlled from a single BAS pulse-width modulated output or a single BAS analog voltage or current output. This control sequence allows a single BAS input to sequentially monitor up to 16 input devices. "Single" or "Dual" UMX control is available.

Relay status
0 = *Command OFF*
1 = *Command ON*
X = *No change of state*

SINGLE UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, OFF, ON				DIP switches 5,6,7,8 OFF, OFF, ON, ON	Single UMX Relays UMX - 8	
						UMX - 4
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5	4 3 2 1
4.0	1.00	2.00	3.00	—	0 0 0 0	0 0 0 0
6.0	1.50	3.00	4.50	1.0	0 0 0 0	0 0 0 1
8.0	2.00	4.00	6.00	2.0	0 0 0 0	0 0 1 0
10.0	2.50	5.00	7.50	3.0	0 0 0 0	0 1 0 0
12.0	3.00	6.00	9.00	4.0	0 0 0 0	1 0 0 0
14.0	3.50	7.00	10.50	5.0	0 0 0 1	0 0 0 0
16.0	4.00	8.00	12.00	6.0	0 0 1 0	0 0 0 0
18.0	4.50	9.00	13.50	7.0	0 1 0 0	0 0 0 0
20.0	5.00	10.00	15.00	8.0	1 0 0 0	0 0 0 0

DUAL UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, OFF, ON				DIP switches 5,6,7,8 OFF, OFF, ON, ON	Level 2 Dual UMX Relays UMX - 8		Level 1 Dual UMX Relays UMX - 8	
						UMX - 4		UMX - 4
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5	4 3 2 1	8 7 6 5	4 3 2 1
4.0	1.00	2.00	3.00	—	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0
5.0	1.25	2.50	3.75	1.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 1
6.0	1.50	3.00	4.50	2.0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 1 0
7.0	1.75	3.50	5.25	3.0	0 0 0 0	0 0 0 0	0 0 0 0	0 1 0 0
8.0	2.00	4.00	6.00	4.0	0 0 0 0	0 0 0 0	0 0 0 0	1 0 0 0
9.0	2.25	4.50	6.75	5.0	0 0 0 0	0 0 0 0	0 0 0 1	0 0 0 0
10.0	2.50	5.00	7.50	6.0	0 0 0 0	0 0 0 0	0 0 1 0	0 0 0 0
11.0	2.75	5.50	8.25	7.0	0 0 0 0	0 0 0 0	0 1 0 0	0 0 0 0
12.0	3.00	6.00	9.00	8.0	0 0 0 0	0 0 0 0	1 0 0 0	0 0 0 0
13.0	3.25	6.50	9.75	9.0	0 0 0 0	0 0 0 1	0 0 0 0	0 0 0 0
14.0	3.50	7.00	10.50	10.0	0 0 0 0	0 0 1 0	0 0 0 0	0 0 0 0
15.0	3.75	7.50	11.25	11.0	0 0 0 0	0 1 0 0	0 0 0 0	0 0 0 0
16.0	4.00	8.00	12.00	12.0	0 0 0 0	1 0 0 0	0 0 0 0	0 0 0 0
17.0	4.25	8.50	12.75	13.0	0 0 0 1	0 0 0 0	0 0 0 0	0 0 0 0
18.0	4.50	9.00	13.50	14.0	0 0 1 0	0 0 0 0	0 0 0 0	0 0 0 0
19.0	4.75	9.50	14.25	15.0	0 1 0 0	0 0 0 0	0 0 0 0	0 0 0 0
20.0	5.00	10.00	15.00	16.0	1 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0

Table 6 Control Sequences

MULTI-STAGE SEQUENCER WITH PWM OR ANALOG INPUT - Provides 4, 8, 12, or 16 sequenced relay stages from a single BAS pulse-width modulated output or a single BAS analog voltage or current output. "Single" or "Dual" UMX control is available.

Relay status
***0** = Command OFF*
***1** = Command ON*
***X** = No change of state*

SINGLE UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, OFF, OFF				DIP switches 5,6,7,8 OFF, OFF, ON, OFF	Single UMX Relays UMX-8							
									UMX-4			
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8	7	6	5	4	3	2	1
4.0	1.00	2.00	3.00	0.5	0	0	0	0	0	0	0	0
6.0	1.50	3.00	4.50	1.0	0	0	0	0	0	0	0	1
8.0	2.00	4.00	6.00	2.0	0	0	0	0	0	0	1	1
10.0	2.50	5.00	7.50	3.0	0	0	0	0	0	1	1	1
12.0	3.00	6.00	9.00	4.0	0	0	0	0	1	1	1	1
14.0	3.50	7.00	10.50	5.0	0	0	0	1	1	1	1	1
16.0	4.00	8.00	12.00	6.0	0	0	1	1	1	1	1	1
18.0	4.50	9.00	13.50	7.0	0	1	1	1	1	1	1	1
20.0	5.00	10.00	15.00	8.0	1	1	1	1	1	1	1	1

DUAL UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, OFF, OFF				DIP switches 5,6,7,8 OFF, OFF, ON, OFF	Level 2 Dual UMX Relays UMX-8								Level 1 Dual UMX Relays UMX-8							
									UMX-4								UMX-4			
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
4.0	1.00	2.00	3.00	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0	1.25	2.50	3.75	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6.0	1.50	3.00	4.50	2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
7.0	1.75	3.50	5.25	3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
8.0	2.00	4.00	6.00	4.0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
9.0	2.25	4.50	6.75	5.0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
10.0	2.50	5.00	7.50	6.0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
11.0	2.75	5.50	8.25	7.0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
12.0	3.00	6.00	9.00	8.0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
13.0	3.25	6.50	9.75	9.0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
14.0	3.50	7.00	10.50	10.0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
15.0	3.75	7.50	11.25	11.0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
16.0	4.00	8.00	12.00	12.0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
17.0	4.25	8.50	12.75	13.0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
18.0	4.50	9.00	13.50	14.0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19.0	4.75	9.50	14.25	15.0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20.0	5.00	10.00	15.00	16.0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 7 Control Sequences

ROOFTOP UNIT OR AHU CONTROLLER WITH PWM OR ANALOG INPUT

- Provides control of RTU or AHU fan, 2 cooling stages, 2 heating stages, and economizer from a single BAS pulse-width modulated output or a single BAS analog voltage or current output. "Single" or "Dual" UMX control is available.

Relay status
0 = *Command OFF*
1 = *Command ON*
X = *No change of state*

SINGLE UMX CONTROL

DIP switches 5,6,7,8 ON, OFF, OFF, OFF				DIP switches 5,6,7,8 OFF, ON, ON, OFF	Single UMX Relays	Output Description
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	
4.0	1.00	2.00	3.00	1.0	0 0 0 0 0 0 0 0	Off
6.0	1.50	3.00	4.50	2.0	0 0 0 0 0 0 0 1	Fan
8.0	2.00	4.00	6.00	3.0	0 0 0 0 0 0 1 1	Cool 1, fan
10.0	2.50	5.00	7.50	4.0	0 0 0 0 0 1 1 1	Cool 2, cool 1, fan
12.0	3.00	6.00	9.00	5.0	0 0 0 0 1 0 0 1	Heat 1, fan
14.0	3.50	7.00	10.50	6.0	0 0 0 1 1 0 0 1	Heat 2, heat 1, fan
16.0	4.00	8.00	12.00	7.0	0 0 1 0 0 0 0 1	Economizer, fan
18.0	4.50	9.00	13.50	8.0	0 0 1 0 0 0 1 1	Economizer, cool 1, fan
20.0	5.00	10.00	15.00	9.0	0 0 1 0 0 1 1 1	Economizer, cool 2, cool 1, fan

DUAL UMX CONTROL

DIP switches 5,6,7,8 ON, OFF, OFF, OFF				DIP switches 5,6,7,8 OFF, ON, ON, OFF	Level 2 Dual UMX Relays	Level 1 Dual UMX Relays
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1
4.0	1.00	2.00	3.00	1.0	X X X X X X X X	0 0 0 0 0 0 0 0
4.9	1.24	2.47	3.71	2.0	X X X X X X X X	0 0 0 0 0 0 0 1
5.9	1.47	2.94	4.41	3.0	X X X X X X X X	0 0 0 0 0 0 1 1
6.8	1.71	3.41	5.12	4.0	X X X X X X X X	0 0 0 0 0 1 1 1
7.8	1.94	3.88	5.82	5.0	X X X X X X X X	0 0 0 0 1 0 0 1
8.7	2.18	4.35	6.53	6.0	X X X X X X X X	0 0 0 1 1 0 0 1
9.7	2.41	4.82	7.24	7.0	X X X X X X X X	0 0 1 0 0 0 0 1
10.6	2.65	5.29	7.94	8.0	X X X X X X X X	0 0 1 0 0 0 1 1
11.5	2.88	5.76	8.65	9.0	X X X X X X X X	0 0 1 0 0 1 1 1
12.5	3.12	6.24	9.35	10.0	0 0 0 0 0 0 0 0	X X X X X X X X
13.4	3.35	6.71	10.06	11.0	0 0 0 0 0 0 0 1	X X X X X X X X
14.4	3.59	7.18	10.76	12.0	0 0 0 0 0 0 1 1	X X X X X X X X
15.3	3.82	7.65	11.47	13.0	0 0 0 0 0 1 1 1	X X X X X X X X
16.2	4.06	8.12	12.18	14.0	0 0 0 0 1 0 0 1	X X X X X X X X
17.2	4.29	8.59	12.88	15.0	0 0 0 1 1 0 0 1	X X X X X X X X
18.1	4.53	9.06	13.59	16.0	0 0 1 0 0 0 0 1	X X X X X X X X
19.1	4.76	9.53	14.29	17.0	0 0 1 0 0 0 1 1	X X X X X X X X
20.0	5.00	10.00	15.00	18.0	0 0 1 0 0 1 1 1	X X X X X X X X

Table 8 Control Sequences

ROOFTOP UNIT OR AHU CONTROLLER WITH PWM OR ANALOG INPUT

- Provides control of RTU or AHU fan, 3 cooling stages, 3 heating stages, and economizer from a single BAS pulse-width modulated output or a single BAS analog voltage or current output. "Single" or "Dual" UMX control is available.

Relay status
0 = *Command OFF*
1 = *Command ON*
X = *No change of state*

SINGLE UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, ON, OFF				DIP switches 5,6,7,8 OFF, ON, OFF, OFF	Single UMX Relays	Output Description
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	
4.0	1.00	2.00	3.00	1.0	0 0 0 0 0 0 0 0	Off
6.0	1.50	3.00	4.50	2.0	0 0 0 0 0 0 0 1	Fan
8.0	2.00	4.00	6.00	3.0	0 0 0 0 0 0 1 1	Cool 1, fan
10.0	2.50	5.00	7.50	4.0	0 0 0 0 0 1 1 1	Cool 2, cool 1, fan
12.0	3.00	6.00	9.00	5.0	0 0 0 0 1 1 1 1	Cool 3, cool 2, cool 1, fan
14.0	3.50	7.00	10.50	6.0	0 0 0 1 0 0 0 1	Heat 1, fan
16.0	4.00	8.00	12.00	7.0	0 0 1 1 0 0 0 1	Heat 2, heat 1, fan
18.0	4.50	9.00	13.50	8.0	0 1 1 1 0 0 0 1	Heat 3, heat 2, heat 1, fan
20.0	5.00	10.00	15.00	9.0	1 0 0 0 0 0 0 1	Economizer, fan

DUAL UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, ON, OFF				DIP switches 5,6,7,8 OFF,ON,OFF,OFF	Level 2 Dual UMX Relays	Level 1 Dual UMX Relays
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1
4.0	1.00	2.00	3.00	1.0	X X X X X X X X	0 0 0 0 0 0 0 0
4.9	1.24	2.47	3.71	2.0	X X X X X X X X	0 0 0 0 0 0 0 1
5.9	1.47	2.94	4.41	3.0	X X X X X X X X	0 0 0 0 0 0 1 1
6.8	1.71	3.41	5.12	4.0	X X X X X X X X	0 0 0 0 0 1 1 1
7.8	1.94	3.88	5.82	5.0	X X X X X X X X	0 0 0 0 1 1 1 1
8.7	2.18	4.35	6.53	6.0	X X X X X X X X	0 0 0 1 0 0 0 1
9.7	2.41	4.82	7.24	7.0	X X X X X X X X	0 0 1 1 0 0 0 1
10.6	2.65	5.29	7.94	8.0	X X X X X X X X	0 1 1 1 0 0 0 1
11.5	2.88	5.76	8.65	9.0	X X X X X X X X	1 0 0 0 0 0 0 1
12.5	3.12	6.24	9.35	10.0	0 0 0 0 0 0 0 0	X X X X X X X X
13.4	3.35	6.71	10.06	11.0	0 0 0 0 0 0 0 1	X X X X X X X X
14.4	3.59	7.18	10.76	12.0	0 0 0 0 0 0 1 1	X X X X X X X X
15.3	3.82	7.65	11.47	13.0	0 0 0 0 0 1 1 1	X X X X X X X X
16.2	4.06	8.12	12.18	14.0	0 0 0 0 1 1 1 1	X X X X X X X X
17.2	4.29	8.59	12.88	15.0	0 0 0 1 0 0 0 1	X X X X X X X X
18.1	4.53	9.06	13.59	16.0	0 0 1 1 0 0 0 1	X X X X X X X X
19.1	4.76	9.53	14.29	17.0	0 1 1 1 0 0 1 1	X X X X X X X X
20.0	5.00	10.00	15.00	18.0	1 0 0 0 0 0 0 1	X X X X X X X X

Table 9 Control Sequences

ROOFTOP UNIT OR AHU CONTROLLER WITH PWM OR ANALOG INPUT

Provides control of RTU or AHU fan, 3 cooling stages, 3 heating stages, and economizer from a single BAS pulse-width modulated output or a single BAS analog voltage or current output. "Single" or "Dual" UMX control is available.

Relay status
0 = *Command OFF*
1 = *Command ON*
X = *No change of state*

SINGLE UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, ON, ON				DIP switches 5,6,7,8 OFF, ON, OFF, ON	Single UMX Relays	Output Description
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	
4.0	1.00	2.00	3.00	—	0 0 0 0 1 1 1 1	Heat 3, heat 2, heat 1, fan
6.0	1.50	3.00	4.50	1.0	0 0 0 0 1 1 1 1	Heat 3, heat 2, heat 1, fan
8.0	2.00	4.00	6.00	2.0	0 0 0 0 0 1 1 1	Heat 2, heat 1, fan
10.0	2.50	5.00	7.50	3.0	0 0 0 0 0 0 1 1	Heat 1, fan
12.0	3.00	6.00	9.00	4.0	0 0 0 0 0 0 0 0	Off
14.0	3.50	7.00	10.50	5.0	0 0 0 1 0 0 0 1	Economizer, fan
16.0	4.00	8.00	12.00	6.0	0 0 1 0 0 0 0 1	Cool 1, fan
18.0	4.50	9.00	13.50	7.0	0 1 1 0 0 0 0 1	Cool 2, cool 1, fan
20.0	5.00	10.00	15.00	8.0	1 1 1 0 0 0 0 1	Cool 3, cool 2, cool 1, fan

DUAL UMX CONTROL

DIP switches 5,6,7,8 OFF, ON, ON, ON				DIP switches 5,6,7,8 OFF, ON, OFF, ON	Level 2 Dual UMX Relays	Level 1 Dual UMX Relays
mA SIG	5 V SIG	10 V SIG	15 V SIG	PWM (sec)	8 7 6 5 4 3 2 1	8 7 6 5 4 3 2 1
4.0	1.00	2.00	3.00	—	X X X X X X X X	0 0 0 0 1 1 1 1
4.9	1.24	2.47	3.71	1.0	X X X X X X X X	0 0 0 0 1 1 1 1
5.9	1.47	2.94	4.41	2.0	X X X X X X X X	0 0 0 0 0 1 1 1
6.8	1.71	3.41	5.12	3.0	X X X X X X X X	0 0 0 0 0 0 1 1
7.8	1.94	3.88	5.82	4.0	X X X X X X X X	0 0 0 0 0 0 0 0
8.7	2.18	4.35	6.53	5.0	X X X X X X X X	0 0 0 1 0 0 0 1
9.7	2.41	4.82	7.24	6.0	X X X X X X X X	0 0 1 0 0 0 0 1
10.6	2.65	5.29	7.94	7.0	X X X X X X X X	0 1 1 0 0 0 0 1
11.5	2.88	5.76	8.65	8.0	X X X X X X X X	1 1 1 0 0 0 0 1
12.5	3.12	6.24	9.35	—	0 0 0 0 1 1 1 1	X X X X X X X X
13.4	3.35	6.71	10.06	9.0	0 0 0 0 1 1 1 1	X X X X X X X X
14.4	3.59	7.18	10.76	10.0	0 0 0 0 0 1 1 1	X X X X X X X X
15.3	3.82	7.65	11.47	11.0	0 0 0 0 0 0 1 1	X X X X X X X X
16.2	4.06	8.12	12.18	12.0	0 0 0 0 0 0 0 0	X X X X X X X X
17.2	4.29	8.59	12.88	13.0	0 0 0 1 0 0 0 1	X X X X X X X X
18.1	4.53	9.06	13.59	14.0	0 0 1 0 0 0 0 1	X X X X X X X X
19.1	4.76	9.53	14.29	15.0	0 1 1 0 0 0 0 1	X X X X X X X X
20.0	5.00	10.00	15.00	16.0	1 1 1 0 0 0 0 1	X X X X X X X X

FEEDBACK

The **UMX-8** has *two* feedback voltage output circuits labeled FBK1 (relay outputs 1-4) and FBK2 (relay outputs 5-8). The **UMX-4** has *one* feedback voltage output circuit labeled FBK1 (relay outputs 1-4). When a relay output is energized, the following voltage is added to the feedback output.

FBK1 - Feedback Circuit #1		
Relays 1,2,3,4	OFF	1.0V
Relay 1	ON	ADD 0.27V
Relay 2	ON	ADD 0.53V
Relay 3	ON	ADD 1.07V
Relay 4	ON	ADD 2.13V

FBK2 - Feedback Circuit #2		
Relays 5,6,7,8	OFF	1.0V
Relay 5	ON	ADD 0.27V
Relay 6	ON	ADD 0.53V
Relay 7	ON	ADD 1.07V
Relay 8	ON	ADD 2.13V

Example: If outputs 1 and 3 are energized and 2 and 4 are de-energized, the voltage output on FBK1 will be 2.34V (1V + 0.27V +1.07V = 2.34V). The same would be true for FBK2 if relay outputs 5 and 7 were energized, and 6 and 8 were de-energized.

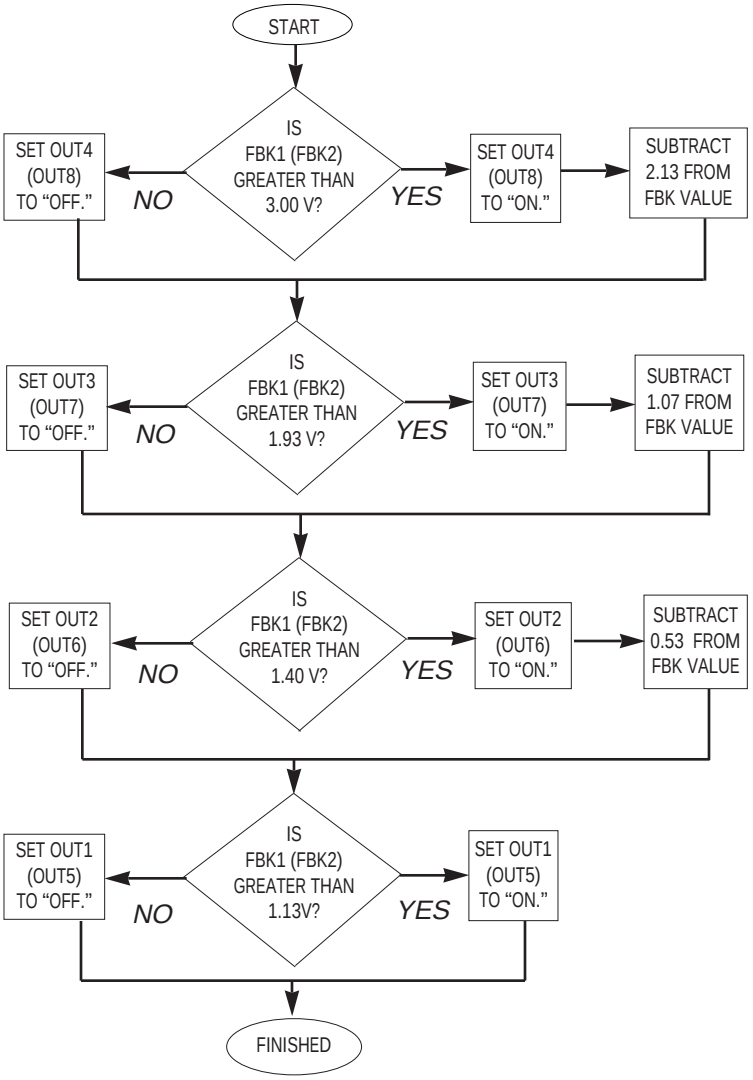
FEEDBACK DECODING FLOWCHART

This flowchart represents the program logic that allows an automation system to determine the state of each UMX output. The logic shown decodes the states of outputs 1-4 using the FBK1 signal. Outputs 5-8 are decoded exactly the same way using the FBK2 signal.

1. In your program, create the variables FBK1, OUT1, OUT2, OUT3, OUT4.
   •The FBK variables must be able to hold analog values.
   •The OUT variables can be binary (OFF/ON) variables.

2. Read the value of the UMX FBK1 signal into the FBK1 variable.

3. Then, beginning at START, work your way down the flow chart to determine the status of each output relay.



ORDERING INFORMATION

Model UMX-4	**4 Stage Multiplexer with HOA Switches**
Model UMX-8	**8 Stage Multiplexer with HOA Switches**

KELE & ASSOCIATES • P O Box 34817 • Memphis, TN 38184 • 901-382-4300 • FAX 901-372-2531