TRANSDUCERS

MULTIFUNCTION INPUT / OUTPUT EXPANDER

MODELS UMX-4, UMX-8

DESCRIPTION

The **Model UMX-8** is a unique microcomputer-based multifunction interface that expands the input or output capability of building automation controllers. It has eight SPDT output relays that provide on/off control from a jumper-selectable PWM current or voltage input signal. The sequence of operation can be easily selected by DIP switches. A dual mode allows two **Model UMX-8s** 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 **Model UMX-8.**

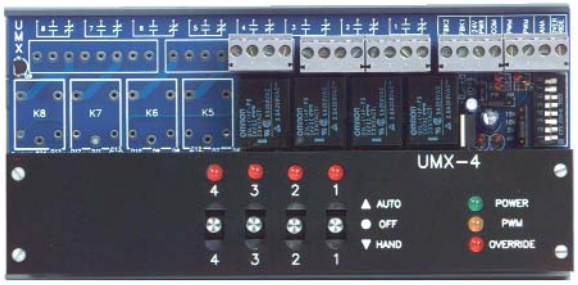
The **Model UMX-4** provides four SPDT output relays. All jumper positions and DIP switch settings are identical to the **Model UMX-8.** The operation of the **Model UMX-4** is identical to relays 1-4 on the **Model UMX-8.** Feedback and LEDs provide status indication.

STANDARD CONTROL SEQUENCE FUNCTIONS

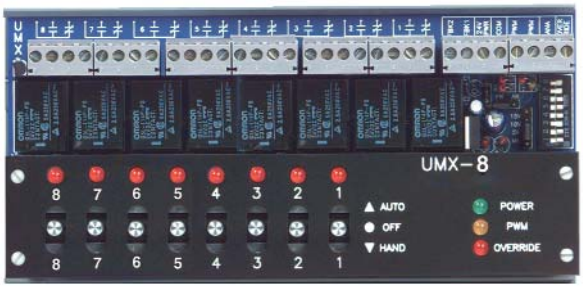
Multiplexed Relay Output Expander - Provides up to 16 relay outputs expansion from one BAS output
Multiplexed Input Expander - Provides up to 16 inputs expansion from one BAS output and one BAS input
RTU or AHU Controller - Provides multistage heating and cooling sequences with economizer
Sequencer - Up to 16 stages of sequential control
Custom Sequences - Consult Kele for details

APPLICATION

The **Model UMX** is recommended for use only with BAS controllers programmable to issue discrete PWM, current, or voltage signal commands. For sequential relay control from a varying analog current or voltage signal, use a UCS sequencer module.



UMX-4



UMX-8

FEATURES

- ***Four or eight SPDT relay outputs***
- ***HOA switches***
- ***LED status indication***
- ***Field-selectable functions***
- ***Output status feedback***
- ***Override indication***
- ***Field-selectable PWM current or voltage inputs***
- ***Pull-apart terminal blocks***

SPECIFICATIONS

Supply voltage	
UMX-4	24 VAC ±10% @ 210 mA max (half-wave) 24 VDC ±10% @ 90 mA max
UMX-8	24 VAC ±10% @ 350 mA max (half-wave) 24 VDC ±10% @ 150 mA max
Input signal	PWM, 0-20 mA, 0-5V, 0-10V, 0-15V, jumper selectable
Input impedance	
Current	250Ω
Voltage	46.4 kΩ min
Output relays	
UMX-4	4 SPDT, 5A @ 24 VAC/VDC
UMX-8	8 SPDT, 5A @ 24 VAC/VDC
Override output status	Transistor switch, 30 VDC @ 100 mA max
Status feedback	
UMX-4	One output, 1-5V for relays 1-4
UMX-8	Two 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	5% to 95% RH non-condensing
Dimensions (UMX-4 and UMX-8)	3.25"H x 7"W x 1.56"D (8.25 x 17.78 x 3.96 cm)
Weight	1.1 lb max (0.5 kg)
Warranty	18 months

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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 current/voltage or PWM signal. In the dual mode, two **UMXs** are controlled in sequence, providing up to 16 relay outputs from a single current/voltage or PWM input. This dual **UMX** control is not available with all control sequences. Refer to the control sequences in Tables 2 and 3 for availability. If single **UMX** control is used, refer to Table 2 for DIP switch settings. For dual **UMX** control, refer to Table 3.

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 (Tables 2 or 3) as required. Refer to the control sequence in Tables 4 through 7 for time base and control sequence information.

Current/Voltage Input (ANA)

The **UMX** can be controlled from a current or voltage input. To operate in this mode, set the input selection jumpers on the **UMX** as shown in Table 1. Set the operating mode DIP switches (See Tables 2 or 3) as required. Refer to the Control Sequence Tables 4 through 7 for time base and control sequence information.

TABLE 1. CURRENT/VOLTAGE INPUT JUMPERS

Current/Voltage input	0-20 mA	0-5V	0-10V	0-15V
AN	MA	5V	10V	15V

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

TABLE 2. SINGLE UNIT UMX CONTROL

								DIP SWITCHES			
PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	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

TABLE 3. DUAL UMX CONTROL

								DIP SWITCHES			
PWM	ANA	L1	L2	HSL	CSL	SVT	LVT	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

PWM *Pulse-Width-Modulated Input Signal*
ANA *Current/Voltage Input Signal*
L1 *Level 1 UMX (Dual UMX Mode)*
L2 *Level 2 UMX (Dual UMX Mode)*
HSL *Hold Outputs on Signal Loss (Current/Voltage)*
CSL *Clear Outputs on Signal Loss (Current/Voltage)*
SVT *Short Signal Validation Time (Current/Voltage)*
LVT *Long Signal Validation Time ((Current/Voltage)*

DIP Switches
0 Off
1 On

L1, L2 - UMX Levels - Dual UMX Mode Only

In the **Dual UMX** mode, two **UMXs** respond in sequence to a single input signal. Using the DIP switch settings shown in Table 3, assign the first **UMX** to Level 1 (L1) and the second **UMX** to Level 2 (L2). **Dual UMX** control is available in most current/voltage and PWM modes. PWM time base doubles in **Dual UMX** mode.

HSL, CSL - Signal Loss Hold - Current/Voltage Input Mode Only

When using a current/voltage 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 2 or Table 3 to program this feature.

SVT, LVT - Signal Validation Time - Current/Voltage Input Mode Only

When varying a current/voltage 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 selected for either 1 second (SVT) or 3 seconds (LVT). Use the DIP switch settings in Table 2 or 3 to select the validation time.

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MULTIFUNCTION INPUT / OUTPUT EXPANDER

MODELS UMX-4, UMX-8

CONTROL SEQUENCES (DIP SWITCHES 5, 6, 7, AND 8)

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

DISCRETE CURRENT AND VOLTAGE COMMANDS

mA	5V	10V	15V
3.5	0.75	1.50	2.25
4.0	1.00	2.00	3.00
5.0	1.25	2.50	3.75
6.0	1.50	3.00	4.50
7.0	1.75	3.50	5.25
8.0	2.00	4.00	6.00
9.0	2.25	4.50	6.75
10.0	2.50	5.00	7.50
11.0	2.75	5.50	8.25
12.0	3.00	6.00	9.00
13.0	3.25	6.50	9.75
14.0	3.50	7.00	10.50
15.0	3.75	7.50	11.25
16.0	4.00	8.00	12.00
17.0	4.25	8.50	12.75
18.0	4.50	9.00	13.50
19.0	4.75	9.50	14.25
20.0	5.00	10.00	15.00

Note: Each input command may vary to approximately 50% of the change to the next highest or lowest command and still be considered valid.

PWM (SEC) 200 mSec Minimum Delay Between Pulses

0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
8.0
8.5
9.0

SINGLE* UMX RELAYS

U	M	X	-	8	7	6	5	UMX-4 4	UMX-4 3	UMX-4 2	UMX-4 1
0	0	0	0	0	0	0	0	0	0	0	0
X	X	X	X	X	X	X	X	X	X	X	1
X	X	X	X	X	X	X	X	X	X	X	0
X	X	X	X	X	X	X	X	X	X	1	X
X	X	X	X	X	X	X	X	X	X	0	X
X	X	X	X	X	X	X	X	X	1	X	X
X	X	X	X	X	X	X	X	X	0	X	X
X	X	X	X	X	X	X	X	1	X	X	X
X	X	X	X	X	X	X	X	0	X	X	X
X	X	X	X	X	X	X	1	X	X	X	X
X	X	X	X	X	X	X	0	X	X	X	X
X	X	X	X	X	X	1	X	X	X	X	X
X	X	X	X	X	X	0	X	X	X	X	X
X	X	X	X	X	1	X	X	X	X	X	X
X	X	X	X	X	0	X	X	X	X	X	X
1	X	X	X	X	X	X	X	X	X	X	X
0	X	X	X	X	X	X	X	X	X	X	X
1	1	1	1	1	1	1	1	1	1	1	1

TABLE 4. OUTPUT EXPANDER
(each relay independently controllable)

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, OFF, ON, OFF.

For PWM signal, use OFF, OFF, OFF, OFF.

*Dual **UMX** control available in PWM mode only. PWM time base doubles in "Dual **UMX**" mode.

TABLE 5. 4 or 8 INPUT EXPANDER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, OFF, ON . For PWM signal, use OFF, OFF, ON, ON.

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	UMX-4 4	UMX-4 3	UMX-4 2	UMX-4 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 available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

TABLE 6. 4 or 8 STAGE SEQUENCER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, OFF, OFF. For PWM signal, use OFF, OFF, ON, OFF.
*Note: for adjustable thresholds, use **UCS Series***

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	UMX-4 4	UMX-4 3	UMX-4 2	UMX-4 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 available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

TABLE 7. RTU CONTROLLER 3 HEAT, 3 COOL, FAN, ECONOMIZER

For current/voltage signal, DIP switches 5, 6, 7, and 8 are OFF, ON, ON, OFF For PWM signal, use OFF, ON, OFF, OFF.

mA	5V	10V	15V	PWM (SEC)	8	7	6	5	UMX-4 4	UMX-4 3	UMX-4 2	UMX-4 1
4.0	1.00	2.00	3.00	1.0	0	0	0	0	0	0	0	0
6.0	1.50	3.00	4.50	2.0	0	0	0	0	0	0	0	1
8.0	2.00	4.00	6.00	3.0	0	0	0	0	0	0	1	1
10.0	2.50	5.00	7.50	4.0	0	0	0	0	0	1	1	1
12.0	3.00	6.00	9.00	5.0	0	0	0	0	1	1	1	1
14.0	3.50	7.00	10.50	6.0	0	0	0	1	0	0	0	1
16.0	4.00	8.00	12.00	7.0	0	0	1	1	0	0	0	1
18.0	4.50	9.00	13.50	8.0	0	1	1	1	0	0	0	1
20.0	5.00	10.00	15.00	9.0	1	0	0	0	0	0	0	1

*Dual **UMX** control available in both current/voltage and PWM modes. PWM time base doubles in "Dual **UMX**" mode.

Contact Kele for other available control sequences.

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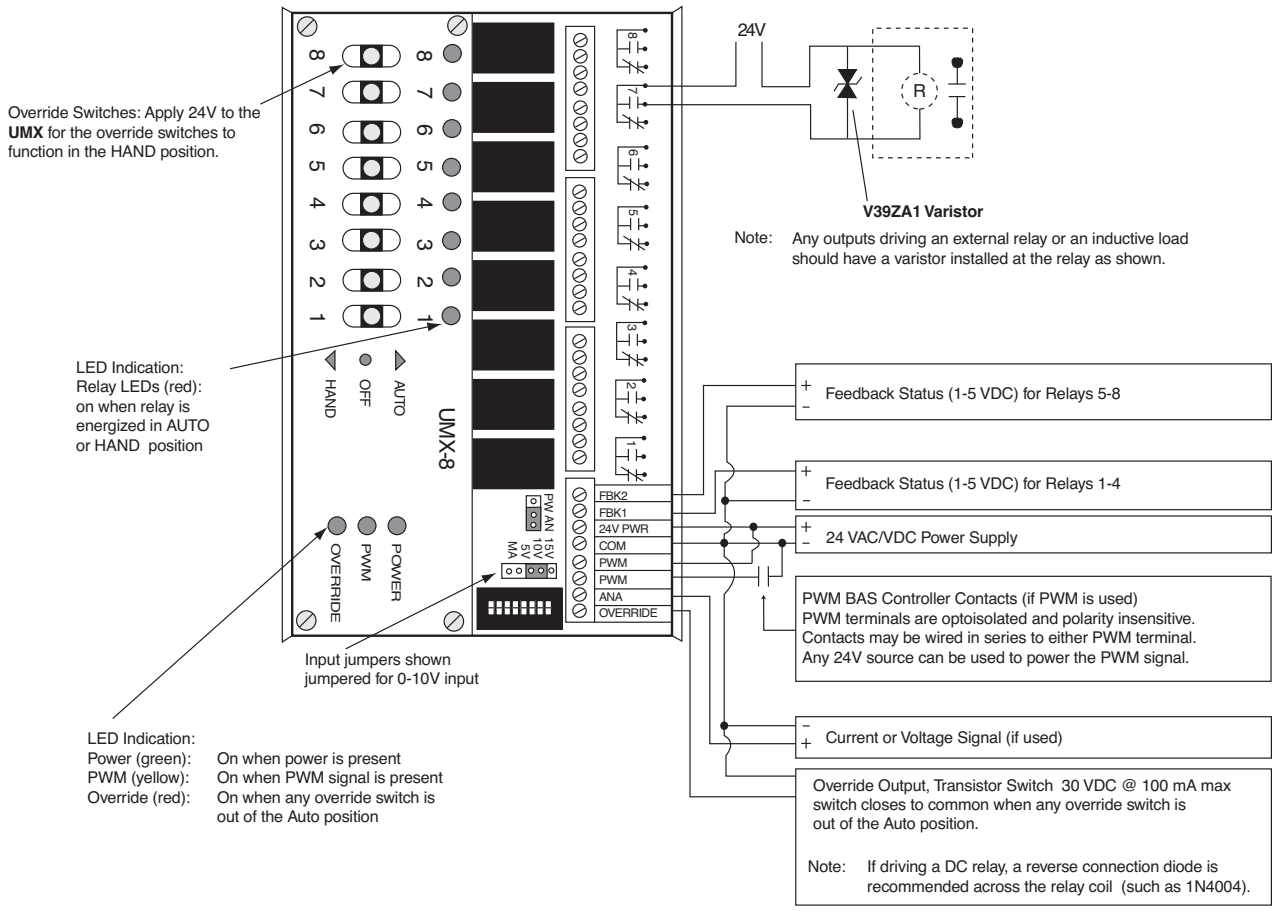
WIRING



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			FBK2 - Feedback Circuit #2		
Relays 1, 2, 3, 4	Off	1.0V	Relays 5, 6, 7, 8	Off	1.0V
Relay 1	On	Add 0.27V	Relay 5	On	Add 0.27V
Relay 2	On	Add 0.53V	Relay 6	On	Add 0.53V
Relay 3	On	Add 1.07V	Relay 7	On	Add 1.07V
Relay 4	On	Add 2.13V	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.

ORDERING INFORMATION

MODEL	DESCRIPTION
UMX-4	**Four-stage multifunction expander with HOA switches**
UMX-8	**Eight-stage multifunction expander with HOA switches**

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