FR1020
DC INPUT
FIELD RANGEABLE
DUAL ALARM

DESCRIPTION

The FR1020 monitors a DC input signal and provides two sets of SPDT alarm relay contacts with an adjustable trip setpoint. The setpoint has a set of red/green LEDs to indicate alarm status. The configuration of the alarm is user-settable as; a high/high, a high/low, or a low/low alarm; normal or reverse acting relays; adjustable deadband; a latching alarm.

SETTING THE ALARM SETPOINT AND DEADBAND

The product is configured as indicated on the label on the product case. Check that all range select and alarm configuration jumpers are properly set for the desired operation. Refer to Block Diagram and Pin Connections for connections. Both alarms are identical in performance.

Connect a precision DC voltage or current source to the input.

(Note: When calibrating a latching alarm, do the setup as a standard alarm (DB) and move the jumper to the LATCH position when setup is complete.)

SETPOINT

To calibrate the alarm setpoint, set the input signal to the alarm value. Turn the Deadband control fully ccw to reduce its influence to a minimum. Adjust the alarm Setpoint control until its LED just turns red (ccw lowers the setpoint, cw raises it).

Adjust the DEADBAND control for the desired amount of deadband. Vary the input signal up and down to check the levels at which the relay trips and resets. The setpoint will remain centered in the middle of the deadband. With deadband set at the desired amount of hysteresis, the SETPOINT control can be used to move the deadband window up or down as desired.

RECONFIGURING THE INPUT RANGE AND ALARM CONFIGURATIONS

Unplug the module and unscrew the four screws at the corner of the base to remove the cover.

CAUTION: For safety, do not apply power while cover is removed.

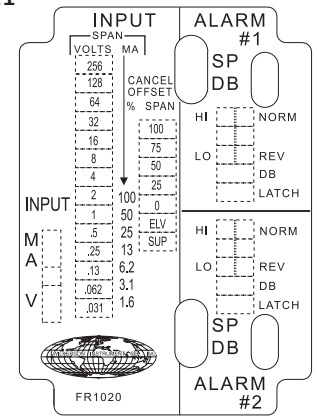
FIGURE 1 illustrates the input range select and alarm configuration jumper positions. The top of the case also indicates jumper positions.

A. Positive inputs

1. Place the INPUT jumper in its upper (MA) position for DC current inputs or its lower (V) position for DC voltage inputs.

2. Span is the difference between full scale signal and low scale signal. Place the INPUT SPAN jumper at the next position above the desired span. The labeled values represent the maximum achievable span for each position.

FIGURE 1



For example, the position marked 2 Volts allows the SETPOINT to be adjusted from 0 to 2 volts.

Remember: SPAN is the difference between full-scale and the low end.

For example, a -10/+10 V input range has a span of 20 volts, 4/20 mA has a span of 16 mA.

3. The INPUT CANCEL OFFSET % SPAN jumper positions are labeled as percent of maximum span. ELV offset cancels input offsets that are elevated (+) above 0. SUP cancels input offsets that are suppressed
(-) below 0. For example, for a range of +5/+10 V (span = 5 V), the 8 volt span position will be used. The 5 volt input offset is 62.5% of the 8 volt maximum span and is elevated. (5/8 = 62.5%) Place the jumper in the position nearest the desired offset. In the above example either the 50% or the 75% positions could be used.

4. Place the ELV/SUP jumper in the ELV (elevated) position for positive input offsets, SUP (suppressed) for negative offsets. In the above example, ELV would be used.

B. Negative Inputs

1. Determine SPAN.
(Ex: 0 to -10 V)

Span = f.s - low scale.
Span = -10 - 0 = 10 V

2. Place the INPUT SPAN jumper at the next highest position (16 V)

3. To calculate the OFFSET jumper position divide the input f.s by the SPAN jumper position (10/16 = 62.5%). Place the jumper in the position nearest the desired offset.

4. To cancel a suppressed input, place the ELV/SUP jumper in the SUP position.

C. Place the alarm configuration jumper in the position that will provide the desired alarm action (refer to the following descriptions).

1. HI/LO jumper.
HI selects alarm on an increasing signal. LO selects alarm on a decreasing signal.

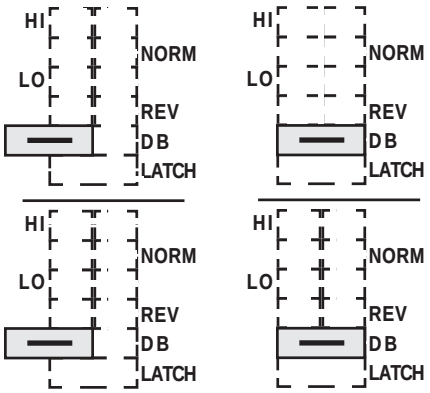
2. NORM/REV.
NORM has the relay energized for normal conditions and de-energized for an alarm condition. This provides fail safe operation since power failure will put the relay in the alarm condition. REV has the relay in the opposite condition. It will be de-energized for normal conditions and will energize for an alarm condition.

3. DB/LATCH.
DB jumper allows the alarm to trip at the set point level and recover at a level determined by the amount of deadband set into the DB control.

LATCH mode allows the alarm to trip at the set point level, but it will not recover. To reset the alarm a contact closure must momentarily connect the reset pins together.

The alarm can not be reset until the input signal has been reduced below the alarm value.

DEADBAND JUMPER POSITIONS



0.1% to 25% of SPAN **25% to 100% of SPAN**

D. Replace the cover, positioned so that the holes in the top are aligned with the SP and DB controls.

E. Apply power and calibrate SETPOINT and DB per instructions above.

RELAY CONTACT PROTECTION

When inductive loads such as motors, relays or transformers are switched, voltage transients may be generated which exceed the ratings of the relay contacts. The resulting arcing can quickly destroy the contacts. Surge suppression is required across inductive loads to guard against premature relay failure. FIGURE 2 illustrates diode surge suppression for a DC load. The diodes operating (peak inverse) voltage should exceed the loads supply voltage by at least 50% and should have a current rating of at least one ampere.

FIGURE 3 shows surge suppression for an AC load, using an MOV (Metal Oxide Varistor) and a capacitor. The breakdown voltage ratings of both the MOV and the capacitor must exceed the peak AC voltage.

With normal sine-wave power, PEAK = 1.414 x RMS voltage. For 115 VAC power, a 200 volt peak rating is recommended.

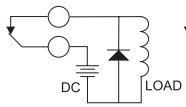


Figure 2
Surge Supression
Inductive DC Load

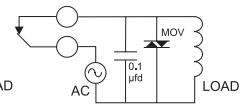


Figure 3
Surge Supression
Inductive AC Load

SPECIFICATIONS

INPUT LIMITS
any voltage between -256 and +256 VDC
any current between -100 and +100 mAdc

FULL SCALE RANGES
31 mV to 256 VDC in 14 steps
1.6 mA to 100 mAdc in 7 steps

OFFSET
can cancel any input offset between -110% and +110% of span

INPUT IMPEDANCE
Voltage
1 megohm
Current
20 ohms

SETPOINT
0 to 100% of span

DEADBAND
0.1% to 100% of span

LATCHING ALARM
Reset by remote contact closure or by momentary power interruption

RESPONSE TIME
20 ms typical

ACCURACY
0.1% of span

COMMON MODE REJECTION
120 dB, DC to 60 Hz

RELAY CONTACTS
SPDT,
5 A contacts

OPERATING TEMPERATURE
14°F to 140°F/-10°C to 60°C

TEMPERATURE STABILITY
(0.02% of span +30 µV)/C max

POWER (2.5 W max)
115 VAC ±10%, 50 or 60 Hz
230 VAC ±10%, 50 or 60 Hz
24 VAC ±10%, 50 or 60 Hz
(DC Power Option)
12 VDC (limits 10 VDC to 15 VDC)
24 VDC (limits 21 VDC to 32 VDC)

Isolation, DC power supply to input common: 100 megohms

MOUNTING

The module is designed to plug into a standard 11-pin relay socket. (MP011) is a molded plastic socket that can be mounted on a flat surface or snapped into a 2¾ inch wide PVC track (TRK48).

(DMP011) is a DIN rail (35mm) mounted socket.

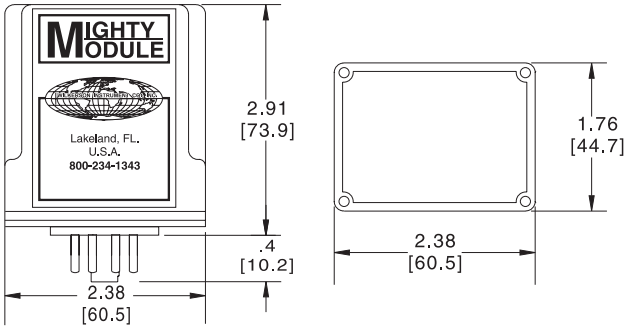
A hold-down clip (CLP1) is available for installations where vibration may be a problem.

WARRANTY

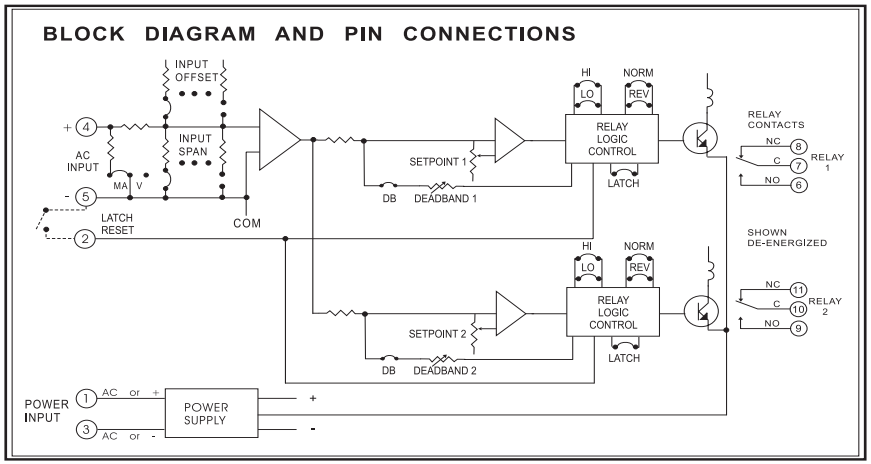
The Field Rangeable Series of products carry a limited permanent warranty. In the event of a failure due to defective material or workmanship, the unit will be repaired or replaced at no charge.

Relays are not covered by the warranty.

CASE DIMENSIONS INCHES [mm]



BLOCK DIAGRAM AND PIN CONNECTIONS



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