

RETIRED

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Telex 23-0505



ACROMAG
INCORPORATED

30765 WIXOM ROAD • WIXOM, MICHIGAN 48096

EP005642C

MODEL 3861-K

12 JUNE 80 MR-V

GENERAL: The Model 3861-K is a 712-K modified to take
1,000VDC continuous common mode voltage.

REFERENCES: Bulletin 7-011.2

Instructions 7-011.3

Instructions: Series 700

Model 712 Millivolt/Thermocouple Transmitter Modules

These instructions cover the following Models: 712-M, S712-M, 712-J, 712-K, 712-T, 712-S, 712-E, S712-J, S712-K, S-712-T, S712-S & S712-E.

SPECIFICATIONS

INPUT:

Model 712-M: DC Voltage.

All other models: Thermocouple (model number indicates type).

NARROW SPAN: The prefix "S" is used to designate narrow span units, such as S712-J.

Narrow span units handle 2 to 5mV spans. Range is factory calibrated to customer specifications. Zero and span trim adjustments are provided.

SPAN ADJUSTMENT: 5 to 50mV on standard units (continuous adjustment). Trim adjustments on narrow span units.

ZERO ADJUSTMENT: -5 to +25mV on standard units (continuous adjustment). Trim adjustment on narrow span units.

COLD JUNCTION COMPENSATION: Automatic compensation over whole range of ambient temperature specification.

INPUT IMPEDANCE: 200K ohm minimum

OUTPUT: 4 to 20mA into 0 to 1000 ohms (0 to 900 ohms for 24V DC powered cages).

10 to 50mA into 0 to 400 ohms (0 to 360 ohms for 24V DC powered cages).

NOTE: The negative output lead is common with the cage DC power supply.

- TV option: zero-based voltage output to 20V output max. (customer specified range), 62.5 ohms/V output resistance.

LOAD EFFECT: The output current will change less than 0.1% as load resistance is changed over entire range.

CURRENT LIMITING: Output current will limit at approximately 150% of full scale when the input is overdriven.

ISOLATION: Input circuit is electrically isolated from the output and power circuits allowing the input to operate at up to 100V DC off ground.

AMBIENT TEMPERATURE RANGE: 32°-122°F (0°-50°C).

ACCURACY:

Standard Conditions: $\pm 0.15\%$ of test limit ($\pm 0.30\%$ test limit for narrow span units at 5mV span).

Temperature Effect: $\pm 0.012\%/^{\circ}\text{F}$ maximum over the ambient temperature range ($\pm 0.022\%/^{\circ}\text{F}$ maximum for narrow span units at 5mV span).

Standard test conditions: 0 to 10 millivolts input, 4 to 20mA output, room temperature of 25°C, 500 ohm resistive load, 100 ohm resistive source, 24V and 15V DC supply.

NOISE REJECTION:

Common Mode: 130 db at 60Hz with 100 ohm unbalance.

Normal Mode: 40 db at 60Hz.

TC BREAK PROTECTION: Field selectable "UP" or "DOWN".

RESPONSE TIME: 500 msec to reach 98% of output span - typical.

POWER SUPPLY: Power supply requirements drawn from card cage power supply.

POWER SUPPLY EFFECT: Cage powered units are not affected by rated supply variations.

WARM-UP TIME: 5 seconds to reach rated accuracy.

CONSTRUCTION: Epoxy glass printed circuit board with edge connector.

SHIPPING WEIGHT: 1 pound (.45 Kg.) packed.

INSTALLATION

The Series 790 card enclosures are equipped with user adjustable Safety Keys which must be set by the user at time of installation. Using the card enclosure instructions for reference, (Bulletin 7 - 010.1) set the keys as follows: Left Key: "H" horizontal
Right Key: "V" vertical

If the transmitter is not factory calibrated, refer to "CALIBRATION" below. If the unit is factory calibrated insert it into an Acromag Series 791, 792, or 793 card enclosure. Install the card enclosure in any convenient location suitable for general purpose electronic equipment. Use an auxiliary enclosure to protect against unfavorable environments and locations.

CALIBRATION

The adjustment procedures below are for the Model 712-M. Calibration of thermocouple units are the same, except an Acromag Series 320 Reference is used to simulate a thermocouple input. Refer to Bulletin 10 - 003.0 for details. As an alternative, an ice bath or other reference can be used. Narrow span units are factory calibrated for best performance.

If the unit is factory calibrated go to Adjustment Procedure below to verify or change calibration. If the unit was not calibrated, select the output current range before beginning the Adjustment Procedure.

OUTPUT 4-20mA: J1 & J2 OUT

OUTPUT 10-50mA: J1 & J2 IN

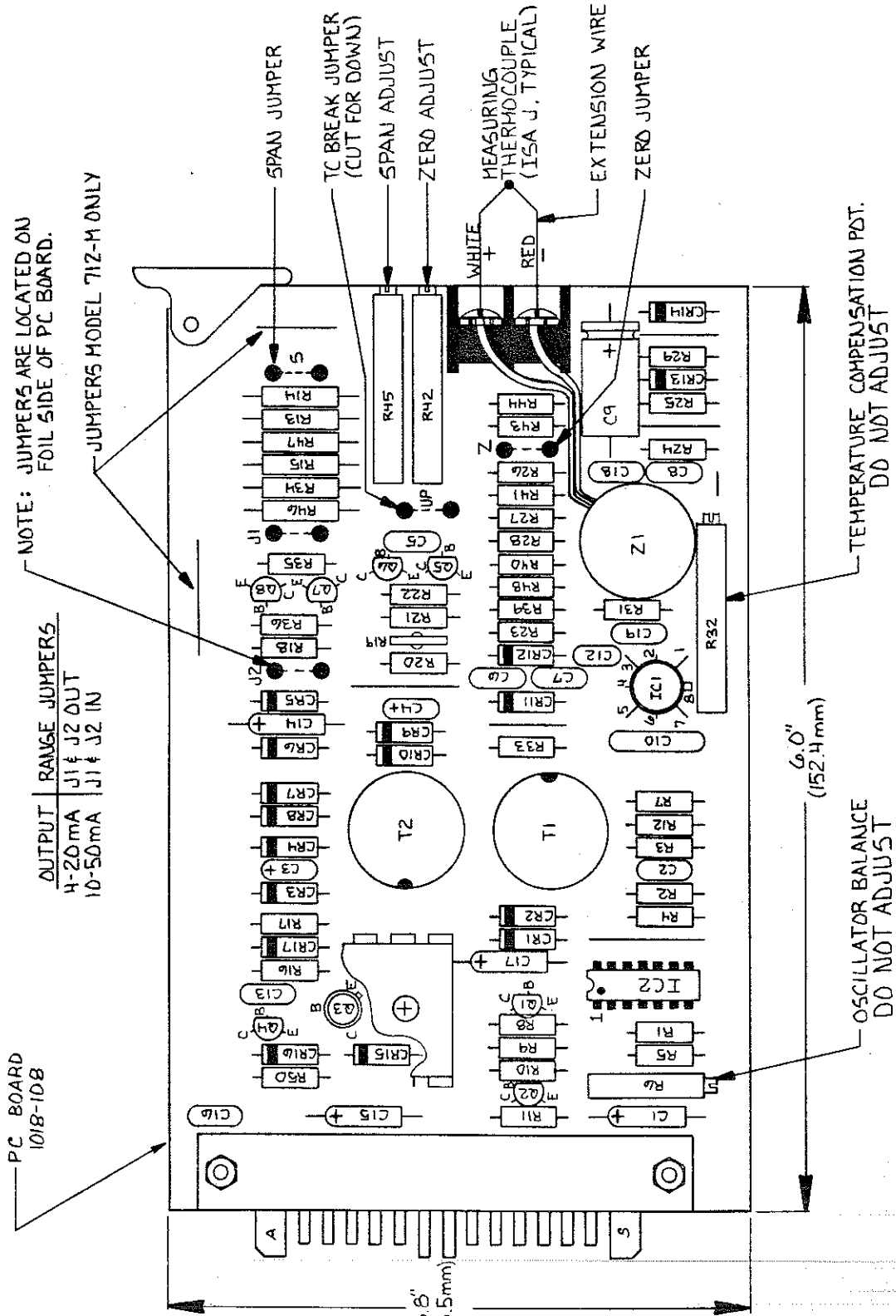
Adjustment Procedure:

1. Connect the transmitter as shown in the wiring connection diagram (page 4). The input calibration signal must have a source resistance of less than 100 ohms, and be adjustable 0 to 50mV with an accuracy of 0.1% or better. Load the transmitter within the limitations listed under "OUTPUT" of the preceding "SPECIFICATIONS" section. The output current must be measured to 0.1% accuracy or better for proper results.
2. SPAN (S) and ZERO (Z) jumpers change the range of adjustment for the span and zero potentiometers. For Model 712-M and Model 712-(TC), input spans of less than 15mV are calibrated per Steps 3 through 5. If the span is much greater than 15mV, the SPAN pot. may reach full travel before reaching calibration. If this occurs, cut the jumper marked "S" (span) to increase pot. range from 15 to 50mV. Likewise, if the ZERO pot. will not reach calibration, cut the "Z" (zero) jumper to increase pot. range. DO NOT cut these jumpers unless necessary, much better results are achieved with them for smaller spans. For Model S712-M and Model S712-TC units, span and zero jumpers will be cut if necessary as part of the standard factory calibration.
3. Set input millivolt source to minimum value for the application and adjust the 20-turn zero pot. marked ZERO to give minimum transmitter output, such as 4 or 10mA.
4. Set input millivolt source to maximum value for the application and adjust the 20-turn pot. marked SPAN to give maximum transmitter output, such as 20 or 50mA.
5. Repeat 3 and 4, above, until readings converge. Instrument is now calibrated.

GENERAL MAINTENANCE

These instruments are solid state and require no maintenance on a regular basis, except for annual cleaning, and calibration verification. If the transmitter is not operating properly, remove the unit and give it a full bench check-out. Most problems are found in the field wiring or other circuits, not in the transmitter. If the problem is traced to the unit itself, conventional electronic trouble shooting methods may be used to identify the problem.

| | | | |
|----------|----------|------|----------|
| DATE | REVISION | BY | CHK |
| 10-24-68 | A | 1611 | 10-24-68 |
| 10-24-68 | B | 4175 | 10-24-68 |
| 10-24-68 | C | 4424 | 10-24-68 |



NOTE: JUMPERS ARE LOCATED ON FOIL SIDE OF PC BOARD.

JUMPERS MODEL 712-M ONLY

OUTPUT RANGE JUMPERS

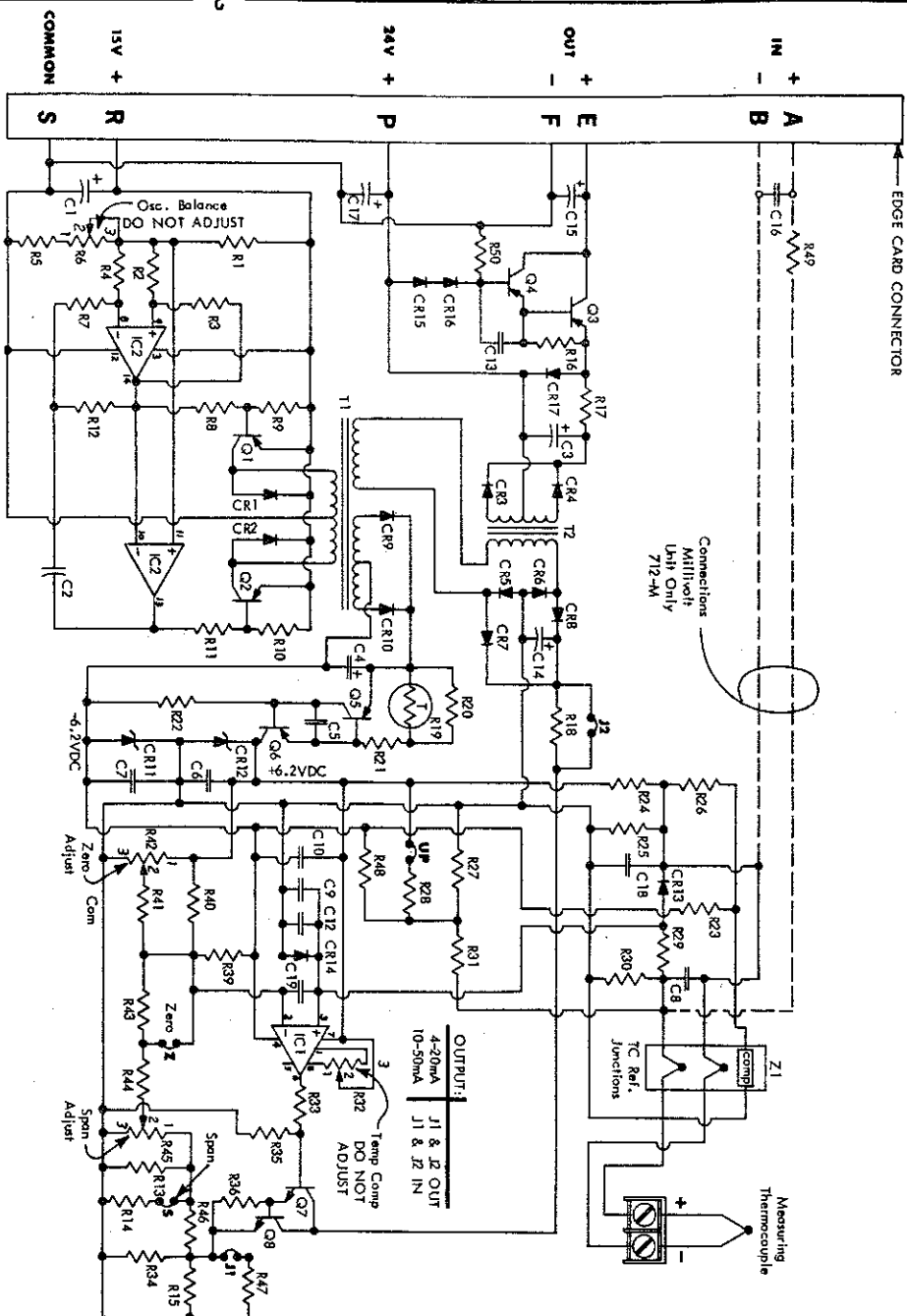
| | |
|---------|-------------|
| 4-20mA | J1 & J2 OUT |
| 10-50mA | J1 & J2 IN |

PC BOARD 1018-108

TEMPERATURE COMPENSATION P.D.T. DO NOT ADJUST

OSCILLATOR BALANCE DO NOT ADJUST

| | |
|---------------------------------------|---------------------------|
| TOLERANCES UNLESS OTHERWISE SPECIFIED | ACROMAG INC. - WIXOM MICH |
| DECIMAL | SCALE |
| FRACTIONAL | DRAWN BY STEW |
| ANGULAR | APPROVED BY KLG |
| | TITLE |
| | MV & T.C. TRANSMITTERS |
| | DATE |
| | 3-23-70 |
| | DRAWING NUMBER |
| | 00-051C |



- RESISTORS (see Note 1)**
- R1 10K ohm 1/8W 1%
 - R2 100K ohm
 - R3 1M ohm
 - R4 470K ohm
 - R5 9.70K ohm 1/8W 1%
 - R6 500 ohm 15T Pot
 - R7 1M ohm
 - R8 5.6K ohm
 - R9 1K ohm
 - R10 5.6K ohm
 - R11 75K ohm 1/8W 1%
 - R12 15 ohm 1/2W 1%
 - R13 10 ohm 1/2W 1%
 - R14 40.2 ohm 1/2W 1%
 - R15 22K ohm
 - R16 33 ohm
 - R17 150 ohm
 - R18 100 ohm Thermistor
 - R19 30.1 ohm 1/8W 1%
 - R20 100K ohm
 - R21 26.7 ohm 1/8W 1%
 - R22 100K ohm
 - R23-28 See Table 1
 - R29 270 ohm
 - R30 Not Used
 - R31 See Table 1
 - R32 100K ohm 22T Pot
 - R33 22K ohm
 - R34 See Table 2
 - R35 47K ohm
 - R36 22K ohm
 - R37-38 Not Used
 - R39 See Table 2
 - R40 Not Used
 - R41 See Table 2
 - R42 5K ohm 22T Pot
 - R43, 44 499 ohm 1/8W 1%
 - R45 100 ohm 22T Pot
 - R47 13.3 ohm 1/2W 1%
 - R48 See Table 1
 - R49 See Table 1
 - R50 22K ohm

CAPACITORS

- C1 4.7µf 35V
- C2 0.001µf 100V
- C3 150µf 15V
- C4 3.3µf 35V
- C5-C8 0.002µf 1KV
- C9 250µf 3V
- C10 0.05µf 500V
- C12 0.002µf 1KV
- C13 200µf 300V
- C14, 15 4.7µf 35V
- C16 0.002µf 1KV
- C17 4.7µf 35V
- C18 0.002µf 1KV
- C19 200µf 300V

SEMICONDUCTORS

- CR1-CR10 Acromag 1001-113
- CR11, 12 Acromag 1001-083
- CR13-CR17 Acromag 1001-068
- Q1, 2 Acromag 1023-089
- Q3 Acromag 1023-046
- Q4 Acromag 1023-049
- Q5, 6 Acromag 1023-047
- Q7, 8 Acromag 1023-041
- IC1 Acromag 1033-133
- IC2 Acromag 1033-152

OTHER PARTS

- T1 Acromag 1014-054
- T2 Acromag 1014-053
- Z1 See Table 1

NOTE 1: Resistors ±10%, 1/4W unless otherwise specified.

R47

R48

R49

R50

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TABLE 2. Standard or Narrow Span Option

| | |
|----------------------|------------------|
| 712- | 5-712- |
| R34 Not Used | 40.2 ohm 1/8W 1% |
| R39 200K ohm 1/8W 1% | 732K ohm 1/8W 1% |
| R41 100K ohm 1/8W 1% | 402K ohm 1/8W 1% |
| R46 26.7 ohm 1/8W 1% | 130 ohm 1/8W 1% |

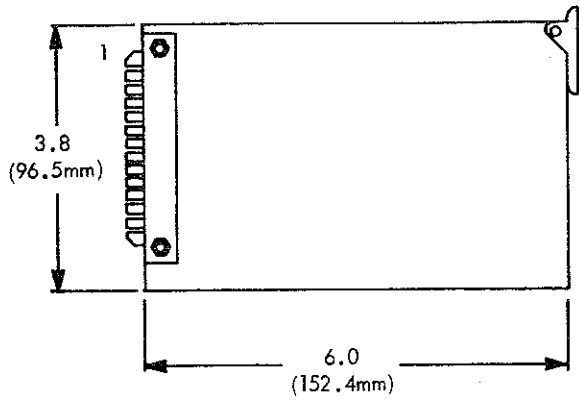
TABLE 1 (See Note 1)

| mV | INPUT TYPE | | | | |
|-----|------------|-------------------|-------------------|------------------|-------------------|
| | J | K | T | R & S | E |
| R23 | Not Used | 4.99K ohm 1/8W 1% | 4.99K ohm 1/8W 1% | Not Used | 4.99K ohm 1/8W 1% |
| R24 | Not Used | 11.0K ohm 1/8W 1% | 11.0K ohm 1/8W 1% | Not Used | 11.0K ohm 1/8W 1% |
| R25 | Not Used | 31.6 ohm 1/8W 1% | 25.5 ohm 1/8W 1% | Jumper | 38.3 ohm 1/8W 1% |
| R26 | Not Used | 1.21K ohm 1/8W 1% | 1.21K ohm 1/8W 1% | Not Used | 1.21K ohm 1/8W 1% |
| R27 | Not Used | 10K ohm | 10K ohm | 10K ohm | 10K ohm |
| R28 | Not Used | 33K ohm | 33K ohm | 33K ohm | 33K ohm |
| R31 | Not Used | 22M ohm | 22M ohm | 22M ohm | 22M ohm |
| R38 | Not Used | 68K ohm | 68K ohm | 68K ohm | 68K ohm |
| R49 | Jumper | Not Used | Not Used | Not Used | Not Used |
| Z1 | Not Used | Acromag 5003-427 | Acromag 5003-431 | Acromag 5003-453 | Acromag 5003-457 |

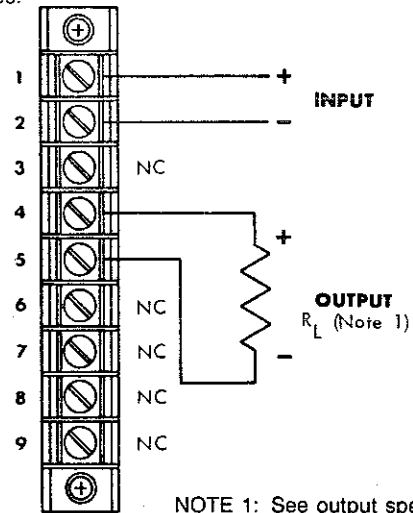
| | | | |
|------------------------------|------------|-----------------------------|----------------|
| TOLERANCES (unless as noted) | | ACROMAG INC. - WIXOM, MICH. | |
| DECIMAL | FRACTIONAL | DATE | DRAWING NUMBER |
| | | 3-15-76 | 4500-051C |
| TITLE | | DRAWN BY | |
| MV ADD TC. TRANSMITTERS | | S.T.V. | |
| SCALE | | APPROVED BY | |
| | | 1/2 | |

| | | | |
|-------|----------|----|-----|
| REV | DATE | BY | CHK |
| 001 A | 10-11-74 | WJ | WJ |
| 002 B | 4-17-76 | WJ | WJ |
| 003 C | 4-22-76 | WJ | WJ |

Terminal strip on Series 790 rack enclosures.

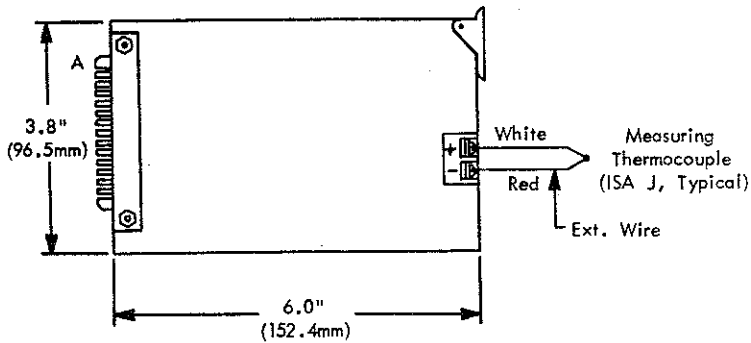


DIMENSIONS

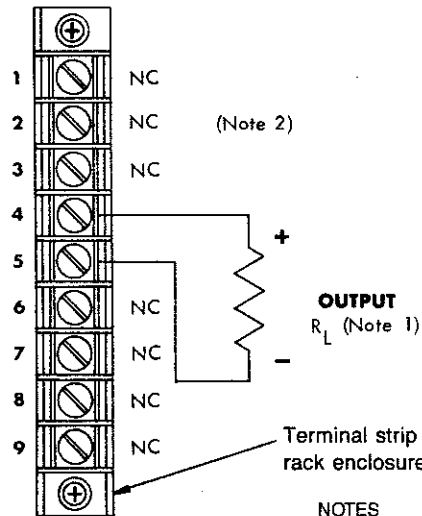


NOTE 1: See output specification for load limits.

CONNECTION DIAGRAM FOR MODEL 712-MV and MODEL S712-MV



**CONNECTION DIAGRAM FOR MODELS:
712-J, 712-K, 712-T, 712-S, 712-E,
S712-J, S712-K, S712-T, S712-S and S712-E**



Terminal strip on Series 790 rack enclosures.

NOTES

1. See output specifications for load limits.
2. Input is made directly to the barrier strip on the plug-in card.



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