Thermocouple/DC Converter

**Description**

The group 4002 is designed to convert a number of thermocouples and specified range to any DC instrumentation output signal. Input and output signals are buffered and scaled using laser trimmed monolithic operational amplifier circuits.

Two-wire and four-wire power options are available. These options are denoted by the number 4002 suffix as described under Product Description in the AGM 'Product Index'.

Notes: When making differential temperature measurements, use the 4000 DC/DC series converter. To make average temperature measurements, either connect the thermocouples in series or parallel.

**Operation**

2-wire

The signal conditioning circuit uses an auto zeroing amplifier, precision band-gap voltage references, a low power CMOS oscillator, and a low power current transformer for extreme temperature stability, low lift off voltage, high input/output isolation and high noise immunity. Input/output protection is provided for in case of accidental connection to 117 VAC source. An embedded precision electronic thermometer ensures accurate cold junction compensation.

Lift off voltage : 8 VDC
Supply voltage   : 8 to 90 vdc

4-Wire

Isolation between the prime power and both input and output signals is standard.

For the option of optical isolation between the input/output signals, the output signals of the buffering and scaling amplifiers are converted to a frequency by a precision linear VCO over a very wide dynamic frequency range. The frequency is coupled to the output side through an optical isolator. The frequency is then converted to a corresponding analog signal and applied to the input of a line driver. For milli-amp outputs, automatic load compensation due to changes in loop resistance using a constant current differential operational amplifier circuit is standard.

The circuits on the input and output sides of the photo-coupler have independent +/- 15 VDC power supplies. These independent supplies are derived from a miniature power supply within the module. The miniature supply consists of a 3-winding transformer: one primary and two secondaries. The primary is driven by a 24 vdc input that is chopped at 30KHZ. The output of each secondary is rectified, filtered and regulated with a dual tracking IC regulator. One +/-15 supply operates all input circuits and the other +/-15vdc operates the output circuits.

**General Specifications**

Input - any type of AC signal can be stipulated.
**Description**

The 4010 Signal Selector is a Plug-in or DIN mount modular instrument based on integrated circuit technology and is encapsulated to provide an environmental seal.

Within the group 4010, there are options for high, low and medium select system requirements. These options are denoted by the number 4010 suffix as described under Product Description in the AGM ‘Product Index’.

**Operation**

Any combination of standard analog instrumentation input/output signals can be specified. Depending on how the signals are connected, the Signal Selector will select either the highest or lowest of the input signals. That signal will be represented as the output. Standard quantity of inputs is 3, although a 4-channel signal selector is available. Number of channels to be selected from is not limited to a single instrument. One output of one signal selector can be an input to another allowing as many channels to be selected from as required.

Each channel has its own differential amplifier, and therefore each signal selector channel may be connected anywhere in the instrumentation loop without creating ground loops. Each channel also has independent zero and span calibration control.

The amplifiers of each channel are zero based during factory calibration, which allows for normal field calibration by only one control per channel.

Low drift monolithic operational amplifiers are used for the differential and summing amplifiers throughout the module.

An internal transformer operated DC/DC power supply isolates the signal selector circuitry from prime power. A monolithic dual-tracking regulator controls bipolar supply voltages to the operational amplifiers.

The 4010 module can be supplied with any of AGM’s standard mountings – rack, bulkhead, panel, weather tight, or explosion proof.

**General Specifications**

Input - any instrumentation type of analog signal can be stipulated.

*Output - Any stipulated instrumentation type of analog signal. e.g. 0/10 vdc, 4/20madc, etc. Any input to output scaling can be specified.

Accuracy - +/-0.10% calibration, repeatability and linearity. Over ambient temperature range, 0/50 deg C and supply regulation is +/-0.25%.

Adjustments - Twenty turn pots for typical +/-50% field variation of input signal offset and span.

Power - 4-wire only. Module power requirements are 24vdc +/- 10% regulation with a maximum of 3 watts. Input and output signals are isolated from 24 vdc are provided by a DC/DC/DC power supply within the module.
NOTES:

1. ALL MODULES ARE EIA 400 SLOTS PLUG-IN.
2. TERMINALS ARE #6-40 SCREW TYPE BARRIER STRIP.
3. THE VALUE OF "W" DEPENDS ON THE SPECIFIED INPUT SIGNAL.
4. TYPICAL VALUES FOR "W" ARE
   4/20mA = 50 OHMS, 10/30mA = 30 OHMS
   1/5 VDC = EXCESS OF 1 MEGAOHM
5. TYPICAL DC ANALOG OUTPUT SPECIFICATIONS ARE
   0/200 OHMS LOAD ON A 4/20mA BASIS OR
   0/100 OHMS MAXIMUM OUTPUT LOAD ON A 0/5VDC BASIS.
6. POLARITY OF INPUT CONNECTIONS DETERMINES WHETHER A SIGNAL IS "HIGH" OR "LOW".
7. SIGNAL SELECTION CONNECT (+) SIGNAL LEAD TO (+) TERMINAL & (-) SIGNAL LEAD TO (-) TERMINAL.
8. ACCIDENTAL REVERSE POLARITY TO POWER CONNECTIONS CAUSES FUSE TO BLOW.
9. ALL NEGATIVE (-) INPUT SIGNAL LEADS MUST
   HAVE A COMMON DIPLEXER WITH THE ADDITIONAL OUTPUT NEGATIVE (-) TERMINAL. IF POSSIBLE,
   CONNECT ALL INPUT NEGATIVE (-) SIGNAL LEADS TOGETHER AND TO THE NEGATIVE (-) OUTPUT
   TERMINAL OF THE ASSEMBLY.
10. "LOSS OF SIGNAL LOCKOUT CIRCUIT" FEATURE IS OPTIONAL.
11. EQUIPMENT MUST HAVE GOOD VENTILATION.
   AVOID TEMPERATURE NOT TO EXCEED 50° C.
12. Fuse is a 2A/250V MINIATURE FUSE.
AGM ELECTRONICS, INC.
TUCSON, ARIZONA

WIRING & SCHEMATIC DIAGRAM
EA PANEL ADAPTED FOR EIA
MOUNTING AND EA MODULES

Panel Dimensions:

- For Single Relay (pin 845)
- For Dual Relay (pin 740)
- For Dual Independent Relays (pin 682)

Notes:

1. All modules are EA400 or 5980 series plug-in. Refer to serialized nameplate on side of module for input/output specifications.
2. Terminals are #4-40 screw type barrier strip.
3. Equipment must have good ventilation. Ambient temperature not to exceed 50°C.
4. Fuse is a Littlefuse #3AG 2.0A Type.
5. Diode is a General Semiconductor 1.5KE30A.
6. The following passive panels may be used with this assembly:
   - For Single Relay P/N 8045
   - For Dual Relay P/N 7999
   - For Dual Independent Relays P/N 8652
7. For passive panel rail fabrication, see Fab-C-2107-11.
8. For side plate fabrication, see:
   - Single Passive Panel Units: Fab-C-2107-12
   - Double Passive Panel Units: Fab-C-2107-19
   - -13, "A" Dim = 4.06" #1936
   - -11, "A" Dim = 5.90" #1935
9. For assembly details see Fab-C-3169. When a module requires 2 each passive panels, double rails are used.
10. 24 VDC Prime Power Source to have 10% regulation. Input 24 VDC Power Terminals to panel are fuse protected for power reversal.
11. Panel shown is representation only. For specific wiring details see wiring and schematic diagrams (WSD).

AGM Component Numbers:

- Screw, #2173
- Standoff, #2107
- Standoff, #3112
- Screw, #2163
- Standoff, #3112
- Terminal Strip, #1536

Signature: [Signature]
Date: 10/10/78

Drawn: KM
Approved: DE

Checked: O/S

Customer Approve:

Approved for Prod:

H-Added Dwg ENC-3522-1A
As sheet 2 of 2.

I-Changed Ch 4
As Add Module

Back mount dimensions in inches (mm):

10.50 (266.7)
7.75 (197.1)
3.50 (88.9)
1.50 (38.1)
1.00 (25.4)

Panel shown is representation only. For specific wiring details see wiring and schematic diagrams (WSD).
EIA RACK MOUNT OPTION
FLUSH MOUNT OR RECESSED

AGM ELECTRONICS, INC.
TUCSON, ARIZONA

TA PANEL ADAPTED FOR EIA
MOUNTING AND EIA MODULES

CODE IDENT NO. SIZE PART NO. REV
A ENC-C3535 J

SCALE: NONE WT SHEET 2 OF 2
Physical - EIA rack, TA panel, PTA dust enclosure, HPM, DIN, AUX or NEM mounting options are available. Refer to the 'Enclosure/assembly data sheet' for dimensions.

*Open circuit output voltages for current outputs:
  600 ohm loop drive is 18.5 vdc max
  1500 ohm loop drive is 42.6 vdc max
*Output - Any stipulated instrumentation type of analog signal. e.g. 0/10 vdc. 4/20madc, etc. Any input to output scaling can be specified.

Burn-out detection - Upscale or down scale may be requested.

Accuracy - +/-0.10% calibration, repeatability and linearity. Over ambient temperature range, 0/50 deg C and supply regulation is +/-0.25%.

Adjustments - Twenty turn pots for typical +/-15% field variation of input signal offset and span.

Power - 4-wire only. Module power requirements are 24vdc +/- 10% regulation with a maximum of 3 watts. Input and output signals are isolated from 24 vdc are provided by a DC/DC/DC power supply within the module.

Physical - EIA rack, TA panel, PTA dust enclosure, HPM, DIN, AUX or NEM mounting options are available. Refer to the 'Enclosure/assembly data sheet' for dimensions.

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