1040 Loop Controller Module Quick Start Manual
0037-75540 (PK517)

CAUTION: Installation and configuration should be performed only by personnel who are technically competent to do so. Local Regulations regarding electrical installation & safety must be observed.

1. INSTALLATION - MECHANICAL

1.1 GENERAL DESCRIPTION

The Chromalox 1040 System - comprising one or more Bus Modules each with up to eight Loop Modules - is designed for installation in an enclosure which is sealed against the ingress of dust and moisture. The enclosure must contain sufficient length of 35mm Top-Hat DIN mounting rail to accommodate the system modules (see below) plus an extra 50mm of rail to permit modules to be separated for removal/replacement.

The space required by the 1040 modules is shown below:

![DIN Rail Clamp Diagram]

- DIN Rail Clamp
- 30mm
- 22mm
- 100mm

NOTE: An additional 60mm of space is required above and below the system modules to permit ventilation and to accommodate wiring bend radii to enclosure trunking or conduits. Allow sufficient slack in all wiring to permit the trunking to be moved as required, to permit “hot” swapping of modules (i.e. modules to be removed/replaced whilst the system is under power).

WARNING: The maximum of eight Loop Module’s per Bus Module must not be exceeded.

It is recommended that (a) some means of preventing unauthorised access to the enclosure interior (e.g. lockable doors) is provided, and (b) that a suitable DIN rail clamp be used, once the 1040 system is fully installed, to prevent the system from moving on the DIN rail.

1.2 VENTILATION

Under normal circumstances, no forced ventilation is required and the enclosure need not contain ventilation slots, but temperatures within the enclosure must be within specification.

1.3 INSTALLING A LOOP MODULE

The 1040 system is installed in the following order:
1. Bus Communications Module (refer to Bus Module installation instructions)
2. Interconnect Module(s)
3. First Loop Controller Module
4. Second Loop Controller Module
5. Third Loop Controller Module etc.

To install the Loop Module follow the instructions below:

CAUTION: HOT SWAPPING OF LOOP CONTROLLER MODULES. Although hot swapping of Loop Modules is possible, caution must be exercised in order to eliminate the risk of receiving an electric shock due to the possibility of up to 240VAC being present at the relay terminals of a Loop Module. Before removing any connectors from a Loop Module, please ensure that all hazardous voltages have been isolated from the appropriate connectors.

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2. INSTALLATION - ELECTRICAL

![Electrical Connections Diagram]

Module Type | 1 | 2 | 3 | 4 | 5 | 6
---|---|---|---|---|---|---
300601 | Relay | Relay | Relay | Relay | Relay | Relay
306001 | SSR | SSR | SSR | SSR | SSR | SSR
304000 | SSR | SSR | SSR | Relay | Relay | Relay
400600 | Relay | Relay | Relay | Relay | Relay | Relay
406000 | SSR | SSR | SSR | SSR | SSR | SSR
404200 | SSR | SSR | SSR | SSR | Relay | Relay

Heater Break input (120011 only)

Note: Heater current input is applicable to 120011, 300601, 306001 and 304000 modules

Figure 5 - Single Loop Electrical Connections

![Multiple Loop Electrical Connections Diagram]

Figure 6 - Multiple Loop Electrical Connections

Figure 1 - Installing an Interconnect Module

Figure 2 - Installing a Loop Module

Figure 3 - Removing a Loop Module

Figure 4 - Removing an Interconnect Module

Figure 5 - Single Loop Electrical Connections

Figure 6 - Multiple Loop Electrical Connections

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2.1 INSTALLATION CONSIDERATIONS

If the instrument is being installed in existing equipment, the wiring in the area should be checked to ensure that good wiring practices have been followed.

2.2 NOISE SUPPRESSION AT SOURCE

Usually when good wiring practices are followed, no further noise protection is necessary. Sometimes in severe electrical environments, the amount of noise is so great that it has to be suppressed at source. Many manufacturers of relays, contactors etc., supply "surge suppressors" which mount on the noise source. For those devices that do not have surge suppressors supplied, Resistance-Capacitance (RC) networks and for Metal Oxide Varistors (MOVs) may be added.

2.3 THERMOCOUPLE INPUTS

The correct type of extension leadwire/compensation cable must be used for the entire distance between the Loop Module connector and the thermocouple correct polarity must be observed throughout and joints in the cable should be avoided. If the thermocouple is grounded, this must be done at one point only. If the correct type of extension leadwire/compensation cable is not used, this shield must also be grounded at one point only.

2.4 RTD INPUTS

The extension leads should be of copper and the resistance of the wires connecting the resistance element should not exceed 50 Ω per lead (the leads should be of equal resistance). For three wire RTDs, connect the resistive leg and the common legs of the RTD as illustrated. For a two wire RTD a wire should be connected to the open lead of the third wire. Two wire RTDs should only be used when the leads are less than 3 meters long. Avoid cable joints.

2.5 HEATER CURRENT INPUT

For single loop modules with a heater current input the main heater conductor should be passed through a current transformer (CT) the secondary should then be connected to the input terminals of the Loop Module. A value of CT should be selected so that the secondary has a maximum current value of 50mA.

For multiple loop modules with a heater current input a single CT is used. Each of the main heater conductors is passed through the single CT. The value of CT needed to be able to withstand the maximum current in all three conductors at the same time. If a CT cannot be found that is of sufficient size then one of the conductors can be passed through the CT in the opposite direction to the other two this has the effect of cancelling out one of the other conductors and as such reducing the secondary current.

Thermocouple Inputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Voltage</th>
<th>Drive Capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.15V</td>
<td>0-20mA</td>
<td>500mA maximum load</td>
</tr>
<tr>
<td>0.1V</td>
<td>0-10mA</td>
<td>500mA maximum load</td>
</tr>
<tr>
<td>0.05V</td>
<td>0-5mA</td>
<td>500mA maximum load</td>
</tr>
</tbody>
</table>

3. LOOP MODULE SPECIFICATIONS

**Function**

Each Loop Module performs the control functions and provides the input and output connections for its own control loops. Up to 4 universal process inputs and up to 6 outputs, dependent on model variant.

**Types Available**

- 12000: One Universal input, two SSR/relay outputs (selectable)
- 120001: One Universal input, one Heater Break input, two SSR/relay outputs and one linear or three SSR/relay outputs (selectable)
- 30601: Three Universal inputs, one Heater Break input, six relay outputs
- 30600: Three Universal inputs, one Heater Break input, six SSR outputs
- 40600: Four Universal inputs, six relay outputs
- 406004: Four Universal inputs, four SSR outputs and two Relay Outputs

**Process Input**

Type and scale user selectable (see Process inputs table)

**Heater Current Input**

Measures a Heater current value via an external CT for use by the Heater Break Alarm function.

**RTD Inputs**

<table>
<thead>
<tr>
<th>Measurement Accuracy</th>
<th>±0.1% of range span ≤ ±1LSB for single Loop Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearization Accuracy</td>
<td>Better than ±0.2% any point (0.05°C typical)</td>
</tr>
<tr>
<td>Temperature Stability</td>
<td>0.1% of range span/C change in ambient temperature</td>
</tr>
<tr>
<td>Lead Compensation</td>
<td>Automatic to 0.02 maximum lead resistance, giving less than 0.5% of span additional error</td>
</tr>
</tbody>
</table>

**DC Linear Inputs**

<table>
<thead>
<tr>
<th>Measurement Accuracy</th>
<th>Better than ±0.05% of programmed range ≤ ±1LSB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Stability</td>
<td>0.1% of range span/C change in ambient temperature</td>
</tr>
<tr>
<td>Input</td>
<td>±0.1% of programmed range</td>
</tr>
<tr>
<td>Input Sampling Method</td>
<td>In 10 samples per second (100 ms)</td>
</tr>
<tr>
<td>Input Resolution</td>
<td>6 bits over 250 milliseconds rolling window</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Better than ±0.05% of span</td>
</tr>
<tr>
<td>Isolation</td>
<td>Via external current transformer</td>
</tr>
<tr>
<td>Internal Burden</td>
<td>150</td>
</tr>
<tr>
<td>Input Span</td>
<td>0 – 60mA rms (assuming sinusoidal input current waveform)</td>
</tr>
<tr>
<td>Range Maximum</td>
<td>Adjusted ±0.5 A at 1000Ω</td>
</tr>
<tr>
<td>Range Minimum</td>
<td>Fixed at 0A</td>
</tr>
</tbody>
</table>

**Relay Outputs**

- Contact Type: Single-pole single-throw (SPST) Normally open contacts (N/O)
- Rating: 2A resistive @ 120V AC/DC
- Lifetime: 1 000 000 cycles at rated current/20mA current

**SSR Drive Outputs**

- Drive Capability: 12V DC nominal (100V minimum) to ±20mA load
- Isolation: isolated from process input and relay outputs. Not isolated from other similar outputs in the same system

**Approvals**

- EMC Standard: EN61326-1
- Safety: Complies with EN61010-1 and UL 3121-1

**Physical**

- Dimensions: Height: 95mm; Width: 22mm; Depth: 120mm
- Mounting: 35mm x 7.5mm DIN rail mounting via Interconnect Module (EN50022, DIN46277-3)
- Connector Types: All 5.0mm Combi-loc type
- Weight: 0.15kg