File E185611
Project 05NK13596

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REPORT

on

PROCESS CONTROL EQUIPMENT, ELECTRICAL

Watlow Winona Inc.
Winona, MN

DESCRIPTION

PRODUCT COVERED:

* USL, CNL – Process Controller, Base Module EHG2-(CNTL,EXTR, **or AAAA**), followed by any alpha-numeric character between 0-9 and A-Z;

GENERAL CHARACTER:

* The EHG2-(CNTL,EXTR **or AAAA**)-xxxx are intended for use with Unlisted Component - wiring harness, Cat. No. A002089.

* The EHG2-(CNTL,EXTR **or AAAA**)-xxxx are Process controllers with temperature regulating/limit functionality. A thermal cutout feature is also provided. The device is primarily intended for use in the semiconductor manufacturing industry and other similar process applications. The device monitors temperature by virtue of two thermocouple inputs. One thermocouple is used for the operating control functionality (PID algorithm) and the other is used for the temperature limiting functionality.

*The EHG2-(CNTL,EXTR, **or AAAA**)-xxxx were additionally investigated as a Type 2 (safety) action device with Software Class B. Information regarding this investigation is included in the manufacturer's file E43684, Report dated 2006-03-14 (Vol. 8, Sec. 1)

*The EHG2-(CNTL,EXTR, **or AAAA**)-xxxx may be assembled with the optional EHG2-MODU-xxxx user interface. The user interface will display the settings, allow the user to change temperature limits, display error messages, etc. The changes that could be made by the user are controlled and limited by the boundary parameters set by the software.

*The EHG2-(CNTL,EXTR, **or AAAA**)-xxxx incorporates two microprocessors in a dual channel homogenous architecture. The system is set up in a master/slave configuration where U8 is the master microprocessor.

The temperature limit thermocouple signal is fed into the ADC of processor U8 and the process control thermocouple signal is fed into the ADC of processor U2 via independent linearization circuits. The ADC of both processors is fed a fixed reference voltage with a 1% tolerance to monitor the proper operation of the A/D converter.

The temperature limit thermocouple signal is compared against the process control thermocouple signal. If the Actual Process value is greater than the Process Comparison Value (configurable between 5°C and 30°C for EHG2-CNTL-xxxx models and between 5°C and 50°C for EHG2-EXTR-xxxx **and EHG@-AAAA-XXXX** models), the control will initiate a Safety Limit Shutdown. The comparison will activate after initial valid A/D input readings.

The operating relay is controlled by processor U2. The operating relay is switched in parallel with a triac to prevent arcing across the relay contacts. The operating relay contacts are operated in a first on last off sequence to maximize the life of the contacts. The operating relay and the triac are both controlled by static logic signals.

The safety limit relay is controlled by both processors (U2 and U8). In order for the limit relay to be energized both processors need to have the same logic value and satisfy a logic "AND" configuration of two transistors. Processor U8 controls transistor Q4 via pin 2 and processor U2 controls transistor Q9 via pin 27. Both processors need to have the same logic value to energize the safety relay but each processor can independently de-energize the limit relay.

The unit is powered by a Switch Mode Power Supply, which provides the rest of the circuitry with SELV, Limited Energy signal.

RATINGS:

Electrical -

INPUTS:

Control Input	Input Rating	Terminals
Power supply	100-240 V ac, 6 VA 50/60 Hz	J1 - 1/5 (L2) to 2/6(L1)
Process Thermocouple	SELV, Limited Energy (Class 2)	J3 – 3 to 7
Temperature Limit Thermocouple	SELV, Limited Energy (Class 2)	J3 – 4 to 8

COMMUNICATION:

Type	Rating	Terminal
Connection to the user interface and RS 485	SELV, Limited Energy (Class 2)	J2

OUTPUTS:

Type	Rating	Terminal
Alarm Relay (K4)*	SELV, Limited Energy (Class 2)	J1 – 7 to 8
Alarm Relay (K3)	10 A, 100-240 V ac, 50/60 Hz	J3 – 1 to 2
Heater Relay (K1)	10 A, 100-240 V ac, 50/60 Hz	J3 – 1 to 2

Temperature - Maximum ambient operating temperature 70°C

Alarm Relay K4 not populated on EHG2-AAAA-xxxx models.

The declared drift values for each protective/safety function are noted below:

1. Thermal-Cutout has a ±3°C Deviation & Drift for EHG2-CNTL-xxxx models and ±6°C Deviation and Drift for EGH2-EXTR-xxxx **and EHG2-AAAA-xxxx** models. Time to trip is controlled by the software and set at 3 seconds.

MODEL NOMENCLATURE:

EHG2 - CNTL - xxxx
I II III

I – Basic model

II –
* CNTL – Base Module 0 - 200°C range silicone rubber heaters
EXTR - Base Module 0 - **438°C** range other heaters(Extended Range)
AAAA – Base Module 0 - 438°C range without LTA alarm relay.

III – xxxx
1 - 0000 basic control
2 - DISP with display module
3 - COMS with communications module
4 - DSCM with display & communications module

Other combinations possible indicating custom screening on dust cover.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

Use - For use only in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

USL/CNL indicates evaluation to CAN/CSA-C22.2 NO. 61010-1◆ISA-82.02.01 (IEC 61010-1 MOD)◆UL 61010-1, Second Edition.

Per the manufacturer’s declaration, this control was evaluated for installation in a Pollution Degree II environment with an Installation Category (Overvoltage Category) III rating.

The units are for use in an extended environment: 0°C to 70°C, 0% to 95% relative humidity. They are intended for field wiring and provided with a specialized wiring harness.

The device was subjected to a complete environmental stress test sequence and software safety evaluation. Tests were conducted in accordance with UL 60730-1, Annex H. It was deemed that the aforementioned requirements of UL 60730-1 satisfy the requirements outlined in the Semi S2-0200, the Environmental, Health and Safety Guidelines for Semiconductor Manufacturing, Par. 11.6 and Note 26. This control is suitable for temperature limiting applications. The operating and/or protective functions that are examined in accordance with the UL 60730-1, Annex H and declared by the manufacturer are as follows:

1. Temperature Limiting (normal operation)
2. Thermal-Cutout (abnormal operation) - Deviation & Drift of ±3°C for EHG2-CNTL-xxxx models, ±6°C Deviation & Drift for EHG2-EXTR-xxxx **and EHG2-AAAA-xxxx** models.
3. Time to trip - controlled by the software and set at 3 seconds.