

Installation Manual & Set-Up Guide

IntelliTrace

Ordinary Area

CIP Ambient Sensing Control Panel
CIP-EXT Ambient Sensing Extender Control Panel
CIP Line Sensing Control Panel
CIP-EXT Line Sensing Extender Control Panel

Hazardous Area

CIPC1D2 Ambient Sensing Control Panel
CIPC1D2-EXT Ambient Sensing Extender Control Panel
CIP C1D2 Line Sensing Control Panel
CIPC1D2-EXT Line Sensing Extender Control Panel



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Safety Precautions

IMPORTANT SAFEGUARDS



Throughout the IntelliTrace® Setup Guide, these symbols will alert you to potential hazards. Safety precautions should always be followed to reduce the risk of fire, electrical shock, injury and even death to persons.

Please read all instructions before operating your IntelliTrace® CIP, CIP-EXT Control Panel.



To avoid electrical shock or injury, always remove power before servicing a circuit. Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Contact an area supervisor or safety personnel for more information.

WARNING



HIGH VOLTAGE is used in the operation of this equipment; DEATH ON CONTACT may result if personnel fail to observe safety precautions.

Learn the areas containing high-voltage connections when installing or operating this equipment.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Before working inside the equipment, turn power off and ground all points of high potential before touching them.

WARNING

ELECTRIC SHOCK HAZARD



Any installation involving control equipment must be performed by a qualified person and must be effectively grounded in accordance with the National Electrical Code to eliminate shock hazard.

Table of Contents

Contents	Page Number
Safety Precautions	ii
Table of Contents	iii
Introduction.....	1
Model Overview	2
Theory of Operation	3
Modes of Control.....	4
Pre-Service Storage	5
Before Powering Up	5
General Panel Notes	6
General Warnings	7
Receiving, Handling and Lifting	9
Start-up and Commissioning	9
Installation.....	10
Main Menu Screen	11
Temp Setup Menu.....	13
Precautions & Warnings	15
Security Levels & Password Screen	16
Temp Setup Menu (Cont.)	17
Apply Settings Globally	20
Soft Start Feature	20
Load Setup Menu	21
Tuning Menu.....	23
Control Modes: ON/OFF, Autotune & PID	24
Sensor Mapping	25
System Properties	27
Auto Cycle Feature	29
Communications	30
Remote Monitoring & System Management	30
Alarm Log	31
Active Alarms	32
Clearing Alarms	32
Alarm Troubleshooting	33
Extension Panels – Connection & Considerations	34
Connecting the Extension panel to the Main Panel	34
Extension Panel Considerations	34
Wireless Temperature Sensing	35
Appendix A	46
Panel Specifications	46
Default Settings	47
Appendix B	53
ModBus Specification	53
Service Contact Information	129

Introduction

IntelliTrace

For nearly 100 years, customers have relied upon Chromalox for premiere quality and innovative solutions for industrial heating applications. Chromalox manufactures the world's largest and broadest line of electric heat and control products.

The IntelliTrace® CIP Series Multiple Circuit Panels and Extender Panels are a complete temperature control and system management solution for electrical heat trace applications. They are designed for industrial applications in Hazardous (Class I, Division 2) or Non-Hazardous environments.

IntelliTrace® provides the user with an easy to navigate touch-screen interface, system parameter monitoring, off duty preventative maintenance, application flexibility and system customization.

The CIP and CIPC1D2 can provide ambient sensing control, line sensing control or a hybrid of both line and ambient Sensing control.

IntelliTrace® Features:

- 40 Amps/Circuit @ 100 – 600 VAC
- SSR Output Power Control
- 2 to 72 Circuit
- Large Touch Screen HMI
- Integral Control Panel and Circuit Breaker Distribution (non-hazardous areas)
- 1-pole or 2-pole Designs
- Soft Start, On/Off, PID and Manual (Hand) Control
- Modbus RTU/RS485 or TCP/Ethernet Communications
- Full Monitoring & Alarms (Lo/Hi Current & Temperature, Sensor, Transmitter Battery, Communications & GFEP)
- Hazardous (Class I, Division 2) and Non Hazardous Environments
- NEMA 4 Enclosure (Optional NEMA 4X 304 SS)
- UL, cUL Listing (CE available)

Touch Screen Computer:

- 10" on 6 – 72 Circuit Systems and 7" On 2 – 8 Circuit Systems
- 2 or 6 Circuit Detail Displayed at a Time
- Quick Launch to any 2 or 6 Circuit Group Display
- Remote Desktop Monitoring
- Extremely Intuitive Navigation, User Setting and Operation
- Fully Customizable Circuit Naming and Parameter Programming

Options:

- Powerful and Flexible Sensor Mapping (CIP, CIPC1D2 only)
- Enclosure Heater
- Fully Integrated Wireless Temperature Sensing
- IntelliTrace® Supervisory Control (ISC) for Central Command of Multiple Systems

Model Overview

The Chromalox line of IntelliTrace® Heat Trace Control Panels provides a significant amount of application and feature flexibility.

The CIP and CIPC1D2 are designed for ambient and line sensing applications. Additionally, the CIP and CIPC1D2 have the capability to function as both a line sensing control panel and an ambiensensing control panel should the customizable sensor mapping feature be selected.

The IntelliTrace® matching CIP and, CIPC1D2-EXT Extension Panels provide the flexibility for the owner to

meet their process expansion needs. Simply connect the Extension Panel to its matching CIP, CIPC1D2 Base Panel and circuit capacity is seamlessly increased. The Extension Panels do not have a HMI, but otherwise are identical.

These panels are UL and cUL Listed for Ordinary (Non Hazardous CIP) and Hazardous (Class I, Division 2 CIP C1D2) Environments. CE is available.

Please see Table 1 below for applicable features and capabilities by model type.

Table 1

Standard Features/Capabilities	CIP	CIPC1D2	CIP-EXT	CIPC1D2-EXT
Ordinary, Non-Hazardous Area	X	n/a	X	n/a
Hazardous Area (Class I, Division 2)	n/a	X	n/a	X
7" Touch Screen HMI (2-4 Loop Versions)	X	X	n/a	n/a
10" Touch Screen HMI (6-48 Loop Versions)	X	X	n/a	n/a
40 Amps/Loop @ 100-600 VAC	X	X	X	X
Circuits	2, 4, 6, 8, 12, 18, 24, 30, 36, 42, 48 (Expandable to 72 with -EXT Panel)			
SCR Control	X	X	X	X
NEMA 4 Enclosure	X	X	X	X
Integral Circuit Panel with Circuit Breakers	X	n/a	X	n/a
Soft Start Feature	X	X	1	1
Full Communications	X	X	1	1
Full Alarm Capabilities	X	X	1	1
Complete GFEP Monitoring & Alarms	X	X	1	1
Load Monitoring & Alarms	X	X	1	1
Sensor Mapping	X	X	1	1
UL, cUL Listing	X	X	X	X
Snow Melting Programming	X	X	X*	X*
Options				
Enclosure Heater	X	X	X	X
Wireless Temperature Sensing	X	X	1	1
Main Breaker/Disconnect	X	n/a	X	n/a
Nema 4X 304 SS Enclosure	X	X	X	X
HMI Sunshield	X	X	n/a	n/a
Panel Weathersheid	X	X	X	X
Heater Power and RTD Terminal Blocks	X	X	X	X
Z-purge system	X	n/a	X	n/a
Panel Light (on separate breaker)	X	X	X	X
Powered Receptacle (on separate breaker)	X	X	X	X
Copper Ground Bar	X	X	X	X
CE available	X	X	X	X

X - Available as a standard or option for this model

1 - This feature is enabled when paired with matching base panel

n/a - This feature is not available for this model

*Consult Engineering

Theory of Operation

The set-up of the individual and global circuit parameters is explained in the Temp/Load Set-up sections of this manual. This Theory of Operation overview is intended to give a quick summary of how it all works together.

- Each circuit of the system may be enabled (active) or disabled (inactive). A disabled loop will have no output and will not map into the common alarm. It will display “Circuit #” and “Disabled” text above the process temperature. Alarms for disabled circuit will not be monitored or displayed on the screen.
- Each circuit of the system may use unique individual control parameters or the control parameters may be alike. The Global Settings function facilitates this action.
- The GFEP and Load current are automatically and continuously being calculated. The horizontal orange bar indicates the average output current for that circuit. The GFEP current value is not displayed on the screen but its value is compared to the GFEP setpoint. A GFEP alarm condition will occur when the GFEP current value exceeds the GFEP setpoint value.
- If a ground fault that exceeds the GFEP setpoint value is detected during normal operation and “Trip” button on the Load Setpoints screen is checked, the output of the defective circuit is set to 0% and that circuit goes into an alarm condition. If “Trip” button is not selected, the operation of that circuit continues and that circuit goes into alarm condition. The GFEP alarm may be either Latching or Non-Latching.
- During extended periods of time where the output of all circuits are off, such as during warmer seasons, the Auto Cycle feature may be engaged. This feature initiates power to each circuit and checks for alarms. Each output is tested for one minute within the desired Auto Cycle Interval. The Auto Cycle feature may be disabled by setting the Auto Cycle Interval time to “0 Hours”.
- To limit inrush current on the overall system, a proprietary Soft Start algorithm is applied during system start-up. This will ONLY occur while the operation mode is set to AUTO. The Soft Start program will increment output % by 1% every 1 second until the desired temperature is reached or the output % achieves 100%. After the Soft Start program completes its cycle, the Control Mode of the system will either be PID or ON/OFF Control Mode, depending what was selected by the user. The Soft Start Program will not function if the control mode is set to Manual.

Modes of Control

Ambient Sensing Control

Strict ambient-sensing control utilizes a thermostat or a simple electronic controller which senses the ambient temperature via an RTD, Thermocouple or Bulb & Capillary sensor. This is the simplest type of control as the heating circuit is energized only when the ambient temperature drops below the setpoint of the controlling device. This is also known as On/Off control. A relatively large temperature variation around the setpoint is anticipated. Mechanical thermostats are often employed due to their low cost and acceptable accuracy. Multiple heater circuits are controlled by a singular ambient sensed temperature. This is the least efficient type of control and it is typically limited to freeze-protection applications.

PASC - Proportional Ambient Sensing Control

Proportional ambient sensing control (PASC) utilizes an electronic controller which continuously compares ambient temperature and the rate of the change of the ambient temperature to the desired temperature setpoint and regulates the heater output power accordingly. The result is a smaller temperature variation around the desired setpoint and a much smoother response to changing weather conditions. Like ambient sensing control, multiple heater circuits are controlled by a singular ambient sensed temperature. PASC control is therefore significantly more energy efficient than ambient sensing control. PASC control can be employed in a variety of heat trace temperature control applications but is typically used for freeze protection.

Line Sensing Control

Line sensing control is where each heated section of pipe (or heated surface area) is controlled independently of other sections of pipe and therefore must have its own controller. Multiple sections of pipe may also be independently controlled by an electronic multiple circuit control system. The control method may be either proportional or On/Off control. Each section may have different setpoints and different allowances around the setpoint temperature. Line sensing control is typically found in process temperature maintenance applications. These applications are typically more critical and thus demand tighter temperature control. Electronic control is highly recommended over thermostat control. Like PASC, the pipe surface temperature and the rate at which it is changing is continuously compared to the setpoint temperature. The controller responds to these variations and regulates the heater output power accordingly. Mission critical applications should only be managed by controllers which monitor all parameters and present alarms both locally and remotely via communications or supervisory control means.

De-Icing/Snow Melting Control

Snow melting control utilizes an electronic controller which senses temperature and moisture via an aerial sensor (CS-ASM), gutter sensor (CS-GSM) or pavement sensor (CS-PSM). Note that the pavement sensor only senses moisture and will require a secondary sensor to sense temperature. This sensor can be a sensor listed above or an RTD.

Pre-Service Storage

If this equipment cannot be placed into service upon receipt, prevent damage caused by impact, harsh environmental conditions, condensation or liquid ingress. Preferably store in a clean, dry, air conditioned, or ventilated building. During storage, assemblies should be placed on a firm, level surface to prevent distortion.

Outdoor storage of indoor equipment is not recommended. The covering provided during shipment of indoor assemblies is NOT adequate for outdoor storage.

Cover the equipment to keep it free from dust, dirt, and corrosive elements. The covering must protect the assembly, but permit adequate ventilation. Blocking placed between the roof of the equipment and the cover will help keep covering material from restricting the air flow.

If the storage area is subject to humidity and significant temperature changes, energize the anti-condensation heaters provided in the equipment, or add heat from a separate source to prevent condensation inside the equipment. The internal temperature must be at least 5°C (9°F) above the ambient.

If storage temperatures fall below 0°C (32°F), energize the internal equipment heaters provided, or add sufficient heat from a separate source to keep the internal temperature of the panel to at least 0°C (32°F).

In areas with high humidity, inspect the equipment regularly, and add additional heat if necessary to keep the equipment dry.

Remove all loose packing, documents, and flammable materials before energizing heating elements.

Heat from a separate source must be removed before the equipment is put into service.

WARNING: Care must be taken that integral control power transformers are not accidentally back-fed from the heater circuits. Disconnect primary and secondary fuses.

Summer Standby Operation

If equipment is switched off during warm periods, and they are subject to humidity and significant temperature changes, energize the anti-condensation heaters provided in the equipment, or add heat from a separate source to prevent condensation inside the equipment. The internal temperature must be at least 5°C (9°F) above the ambient.

Before Powering Up

Chromalox takes great pride in knowing that we have provided to you a product of premium quality and workmanship. We have taken every precaution to ensure that your equipment arrives safe and secure.

However, vibration and temperature changes during shipping can cause some components to become loose. Additionally, throughout the life span of this product, other environmental and application conditions may have affected the mechanical and electrical continuity of several internal components. Therefore, for your safety and overall product performance, please take the time to familiarize yourself with the **MAINTENANCE, OPERATION, AND INSTALLATION INSTRUCTIONS** technical manual that was shipped with your panel.

Since it is not uncommon for electrical wiring and mechanical connections to become slightly loosened during shipment, we ask that you pay particular attention to section 4-5.3 Wiring and Connections:



4-5.3 WIRING AND CONNECTIONS. Check wiring and connections as follows:

- a. Inspect wiring for wear, fraying, chipping, nicks, and evidence of overheating. Repair minor defects with a good grade of electrical tape, or replace if needed.
- b. Inspect for loose electrical and mechanical connections. Tighten or replace defective crimp-style lugs. Re-solder loose solder connections. Tighten or replace all loose or missing hardware.



General Panel Notes

1. This panel is designed to UL508A to facilitate NEC and CEC compliance and also designed to EN ##### to facilitate CE compliance. Also designed to IEC #####. However it is the responsibility of installer(s) and end user(s) to make sure that the installation wiring and all equipment, including this panel, fulfill appropriate national and local electrical code requirements.
2. Incoming and outgoing branch circuit conductors may not be protected by fuses or breakers in this panel. Consult appropriate national and local electrical codes and device specifications for selective coordination.
3. Protection relays must be set on site according to the requirements of the site engineer's protection study. Low-level ground fault protection, if required, should be provided.
4. Consult all applicable instruction manuals.
5. Customer interlocks are provided for use of external shutdown device(s). Interlocks require contacts that open to trip or shutdown.
6. Contacts are shown in the de-energized state. Controller contacts shown on electrical schematics are internal to the controller. Most of these contacts are programmable to suit the mode of operation. Consult the appropriate user manual(s).
7. Dashed lines indicate user field wiring connections.
8. The panel installer must ground the panel according to appropriate national and local electrical code requirements.
9. Conduit openings in enclosure are to be user installed, sized and located as required. Hubs or fittings must be of the same environmental rating as the enclosure to maintain integrity.
10. Unless fitted with an HMI sun shield, do not place this equipment in direct sunlight.
11. Unless panel is properly equipped with an enclosure heater for ambient temps below 0°C (32°F), the ambient temperature outside this panel must be between 0°C (32°F) and 40°C (104°F).
12. If the panel cannot be placed into service upon receipt, an anticondensation heater must be used to prevent condensation from forming inside the panel. This heater can be user supplied or factory supplied but must be used to prevent damage to the panel.
13. Dimensions are for reference only, and are nominal unless otherwise specified.

Precautions & Warnings


General Equipment Warnings

The user must ensure that their employees are fully trained and supervised in the proper working procedures in order to ensure their safety. The plant must be maintained in a safe condition.

Personnel must be fully aware of the risk associated with electricity and hazardous area usage. Only qualified personnel shall perform work on this unit during installation, operation, and maintenance procedures.


This equipment was specifically designed for its intended purpose and shall not be used for any other application without a complete re-evaluation by the manufacturer. The operator shall ensure these instructions are kept with the equipment to prevent any misuse for which the equipment has not been designed.



The Safety Alert Symbol  is used on the product, consult the documentation to find out the nature of the potential hazard, any actions to be taken, and the consequences of not adhering to the requirement.

The seriousness of the potential hazard is identified by one of three signal words.



The Safety Alert Symbol  is used on the product, consult the documentation to find out the nature of the potential electrical hazard, any actions to be taken, and the consequences of not adhering to the requirement.

The seriousness of the potential hazard is identified by one of three signal words.

Electrical Safety

All personnel working on electrical equipment shall strictly adhere to the applicable local, countrywide, and industry-recognized standards. Examples of such standards may include, but not limited to, the IEC (International Electric Code), NEC (National Electric Code), OSHA (Occupational Safety and Health Administration), NFPA (National Fire Protection Association), Health and Safety Work Act 1974, Factories Act 1961, and others. Failure to adhere to proper safety standards, including proper use of PPE (Personal Protective Equipment) may result in injury or even death. Chromalox will not be liable for failure of customer to adhere to governing standards.



DANGER – will result in serious injury or death.



WARNING – could result in serious injury or death.



CAUTION – may result in minor or moderate injury.



Means Protective Earth (ground) terminal. De-energize all equipment before opening junction boxes and control panels and follow the appropriate lockout/tagout procedures. Do not work on live circuits. Qualified persons and associated equipment must be effectively grounded in accordance with the applicable governing standard, such as the IEC (International Electric Code) to eliminate shock hazard. During any service work, please follow the proper electrical isolation, lockout/tagout, and disconnection procedures.

General Warnings

DANGER/DANGER

EXPLOSION HAZARD . Explosion could occur if this product is installed in a location in an environment it is not designed for. Ensure environmental rating is appropriate for the product.

Risque d'explosion. Une explosion peut se produire si ce produit est installé à un endroit dans un environnement pour lequel il n'a pas été conçu. Assurez-vous que la classification environnementale est appropriée pour le produit.

CAUTION/MISE EN GARDE

EQUIPMENT DAMAGE. Users should install adequate controls and safety devices with their electric heating equipment. The consequences of all possible failure modes must be evaluated.

Dommages matériels. Les utilisateurs doivent installer des contrôles et des dispositifs de sécurité adéquats avec leur équipement de chauffage électrique. Les conséquences de tous les modes de défaillance possibles doivent être évaluées.

CAUTION/MISE EN GARDE

EQUIPMENT DAMAGE. Equipment can be damaged by the ingress of water. Care must be taken to ensure that water does not enter the enclosure when covers are removed.

Dommages à l'équipement. L'équipement peut être endommagé par la pénétration d'eau. Il faut veiller à ce que l'eau ne pénètre pas dans le boîtier lorsque les couvercles sont retirés.

NOTICE/AVIS

All personnel working on electrical equipment must adhere to all national and local regulations, codes, and standards.

Tout le personnel travaillant sur des équipements électriques à basse tension doit se conformer à toutes les réglementations, codes et normes nationales et locales.

NOTICE/AVIS

Only suitably qualified and experienced persons, who are familiar with this equipment, and the work they are to do, should carry out installation, commissioning, operation, or maintenance of this equipment.

l'installation, la mise en service, le fonctionnement ou l'entretien de cet équipement ne doivent être effectués que par des personnes qualifiées et expérimentées, déjà familiarisées avec cet équipement et le travail qu'elles doivent faire.

NOTICE/AVIS

Such persons shall adhere to proper electrical safety procedures, including the use of appropriate personal protective equipment (ppe).

Ces personnes doivent respecter les procédures de sécurité électrique appropriées, y compris l'utilisation d'un équipement de protection individuelle (epi) adéquat.

NOTICE/AVIS

Failure to adhere to any of the above may result in equipment damage, operating losses, injury, or death. Chromalox will not be liable for failure to adhere to all governing regulations, codes, standards, site procedures and information given in this manual.

Le non-respect de l'une des consignes ci-dessus peut entraîner des dommages matériels, des pertes d'exploitation, des blessures ou la mort. chromalox ne sera pas responsable du non-respect de toutes les réglementations, codes, normes, procédures de site et informations données dans ce manuel.

NOTICE/AVIS

If in doubt, contact chromalox.

En cas de doute, contactez chromalox.

NOTICE/AVIS

If the equipment is used in a manner not specified by the manufacturer, then the protection provided by the equipment may be impaired.

Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.

NOTICE/AVIS

If the equipment is used in a manner not specified by the manufacturer, then the warranty will be invalidated.

Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.

 **DANGER/DANGER**

HAZARDOUS VOLTAGE ENCLOSED. Contact will cause electric shock and burn. Isolate all sources of power elsewhere before working on equipment.

Tension dangereuse enfermée. Débranchez toutes les sources d'alimentation avant de retirer le couvercle intérieur de la boîte de jonction.

 **CAUTION/MISE EN GARDE**

EQUIPMENT DAMAGE. Equipment may not operate properly if not installed correctly. Install this device vertically.

Dommages à l'équipement. L'équipement pourrait ne pas fonctionner correctement s'il n'est pas installé correctement. Installez cet appareil à la verticale.

 **CAUTION/MISE EN GARDE**

EQUIPMENT DAMAGE. Do not engage the Auto Cycle feature during normal operation. The heating cables will become fully energized for approximately 2 minutes throughout the Auto Cycle Interval which could cause damaging temperature overshoot.

Dommages à l'équipement. N'engagez pas la fonction de cycle automatique pendant le fonctionnement normal. Les câbles chauffants seront entièrement sous tension pendant environ 2 minutes au cours de l'intervalle de cycle automatique, ce qui pourrait provoquer un dépassement de température nuisible.

 **CAUTION/MISE EN GARDE**

An arc flash label is provided. Data for this should be determined using a site arc flash study. The completed label should be affixed to the outside of the equipment.

Une étiquette d'éclair d'arc est fournie. Les données de cette étiquette doivent être déterminées à l'aide d'une étude d'éclair d'arc sur le site. L'étiquette remplie doit être apposée à l'extérieur de l'équipement.

 **NOTICE/AVIS**

De-energize all equipment before opening junction boxes and control panels and follow the appropriate lockout/tagout procedures. Do not work on live circuits. All equipment must be effectively grounded [earthed] in accordance with all national and local regulations, codes, and standards. During any service work, please follow the proper electrical isolation and lockout/tagout procedures.

Mettez tous les équipements hors tension avant d'ouvrir les boîtes de jonction et les panneaux de commande et suivez les procédures de verrouillage et d'étiquetage appropriées. Ne travaillez pas sur des circuits sous tension. Tous les équipements doivent être mis à la terre conformément à l'ensemble des réglementations, codes et normes nationaux et locaux. Lors de toute intervention, veuillez suivre les procédures d'isolation électrique et de verrouillage/déconnexion appropriées.

 **NOTICE/AVIS**

Users should install adequate controls and safety devices with their electric heating equipment. Where the consequences of failure may be severe, back-up controls are recommended.

Les utilisateurs doivent installer des contrôles et des dispositifs de sécurité adéquats avec leur équipement de chauffage électrique. Lorsque les conséquences d'une défaillance peuvent être graves, il est recommandé d'installer des commandes de secours.

 **NOTICE/AVIS**

The equipment must be installed with a 2-pole isolating device when this equipment is connected to a supply where both wires/terminals are live.

L'équipement doit être installé avec un dispositif d'isolation bipolaire lorsqu'il est connecté à une alimentation où les deux fils/bornes sont sous tension.

 **NOTICE/AVIS**

Tighten or replace all loose or missing hardware.

Resserrez ou remplacez toute ferrure desserrée ou manquante.

 **NOTICE/AVIS**

Refer to the Chromalox unit design drawing for specific certifications(s) and/or classification rating. Certified enclosures MUST NOT be modified, altered, or repaired by anyone other than the manufacturer. Improper usage will void the warranty and could create a dangerous environment.

Reportez-vous au dessin de conception de l'unité Chromalox pour les certifications particulières et/ou la classification. Les boîtiers certifiés NE DOIVENT PAS être modifiés, altérés ou réparés par une personne autre que le fabricant. Une utilisation inappropriée annule la garantie et peut créer un environnement dangereux.

Receiving, Handling & Lifting



The packaging supplied is only suitably for short term indoor storage.

Any outdoor storage is considered temporary (less than 48 hours) and the entire system must immediately be protected from the outdoor elements with appropriate coverings. The coverings shall be suitably covered for protection against adverse weather, using a tear-free waterproof membrane such as a tarpaulin. The equipment shall be placed on dry ground or on blocks to lift it clear of any possible water.

The unit must be handled with care and stored in clean, dry conditions as befits any electrical apparatus. Units must not be exposed to wet or damp atmospheres. Units shall be stored in areas with uniform temperature control to prevent condensation accumulation.

Unpacking

All hardware and materials are to be removed with tools designed for the purpose.

Equipment Handling & Lifting

Ensure that the equipment is correctly moved and installed by technically qualified and competent persons experienced in the class of work involved. Know the capabilities of the lifting equipment available to handle the weight of the system. At no time should any person be under, or in contact with, a suspended load.

Ensure that all precautions are taken regarding the weight of the panel or controller. Lifting equipment shall have capacity for the given weight.

Exercise care during any movement and placement operations to prevent falling or unintentional rolling or tipping.

Each unit is manufactured with great care from the highest quality materials and thoroughly inspected before leaving the manufacturing facility. Examine the equipment against the packing list to check that the quantity received, and its identity is complete.

Start-up & Commissioning

Installation review, Start-up, and Commissioning shall only be performed by Chromalox personnel. Otherwise, the User assumes all responsibilities, and all warranties, both written and implied, are voided otherwise.

Contact Chromalox Service Group or www.chromalox.com for additional information.

Check that labels and tags are secure and correct.

Ensure all other safety and / or shutdown devices are functioning properly.

It is a warranty requirement to comply with these instructions and documented evidence shall be maintained in the form of a signed checklist as per the Appendix A or operator's equivalent.

NOTE: A completed Maintenance Checklist or equivalent will be required in the event of any safety or warranty claim.



NOTICE/AVIS

Inspect the equipment/system to ensure no damage has occurred within 48 hours of receipt. If damaged, please report any claims to your carrier and contact Chromalox within 7 days for repair options. Do not attempt to operate damaged equipment.

Inspectez l'équipement/le système pour vous assurer qu'aucun dommage n'est survenu dans les 48 heures suivant la réception. En cas de dommage, veuillez signaler toute réclamation à votre transporteur et contacter Chromalox dans les 7 jours pour connaître les possibilités de réparation. N'essayez pas de faire fonctionner un équipement endommagé.

Any service work must be performed by trained personnel.

Contact your local Chromalox representative for technical support. Provide your unit part number, model number, and Chromalox purchase order number to properly identify the equipment.

Installation

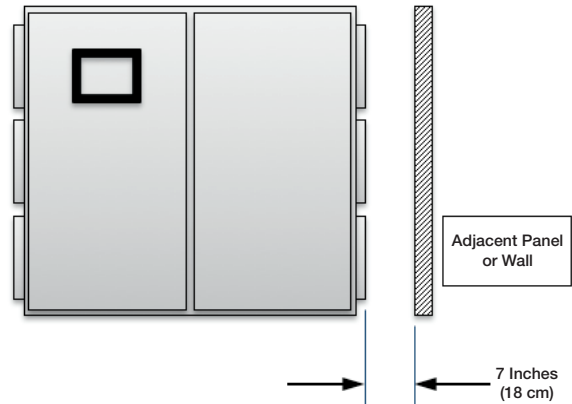
Heat Sink Considerations – Heat Dissipation

The Chromalox CIP & CIPC1D2 Multiple Loop Heat Trace panels employ SSRs (Solid State Relays) as a means to switch the heating load power. Inherently, SSRs produce heat when operating. This heat is dissipated through the heat sinks which are typically mounted on the sides of the enclosures. These heat sinks must be mounted such that the fins are vertically orientation in order to allow the heat sink to properly dissipate the heat from the controller. The air flow around these heat sinks must in no way become restricted.

To maintain UL/cUL listing, the heat sinks must be inspected prior to and during every season, or no more than every 12 months, to confirm that no debris or objects are in contact with the heat sink. All debris must be removed from the heat sink fins. High pressure blasts of clean, dry air or other means which will not damage the fins are to be used to dislodge all debris from the fins.

Servicing Heat Sinks

In the rare occurrence that the Power Board assembly, which includes the Heat Sink, needs to be removed or inspected, a minimum of 7 inches (18 cm) of clearance is needed to externally withdraw the assembly from the enclosure.



Outdoor Applications

Equipment protection from the environment must be carefully considered when installing these systems outdoors. Both **Solar Loading** and **UV Rays** from the sun can impact the performance of these systems.

Solar Loading

The panel ratings, per UL/cUL, are based on operating the panel within the listed ambient environmental temperatures and under NO SOLAR LOAD (exposure to direct sunlight).

Therefore, it is **highly recommended** to install an adequately designed Solar Shield to provide shade across the entire top of the panel so no solar load is realized. This Shield will also provide some protection to the HMI Touchscreen.

See the appendix for Solar Shield design options offered by Chromalox.

UV Rays

The IntelliTrace® heat trace panels employ an HMI touch screen with LED backlit technology. UV rays are known to be damaging to these types of HMI touch screens. Chromalox insists on installing HMI sunscreens in all outdoor applications to protect the HMI Touch screen from these harmful rays.

See the appendix for HMI Sunscreen design options offered by Chromalox.

Please note that warranties will only be honored if all of the following conditions are met:

1. Suggested options are adequately designed are properly employed
2. These designs must either meet or exceed the designs suggested by Chromalox
3. This Optional Equipment must be installed prior to initial equipment commissioning

Main Menu Screen

The CIP touch screen computer is extremely user friendly and quite intuitive. Navigation to any other screens or any 2 or 6 circuit grouping of circuits is accomplished by selecting the blue labeled buttons along the bottom of the screen or in the upper right or left hand corners.

The main menu screen displays alarm status, circuit number, circuit name, process and set point temperatures, current load demand, manual/auto control state and output percentage for 2-6 circuits at a time. See Figure 1.

Figure 1A: Freeze Protection/Process Maintain programming

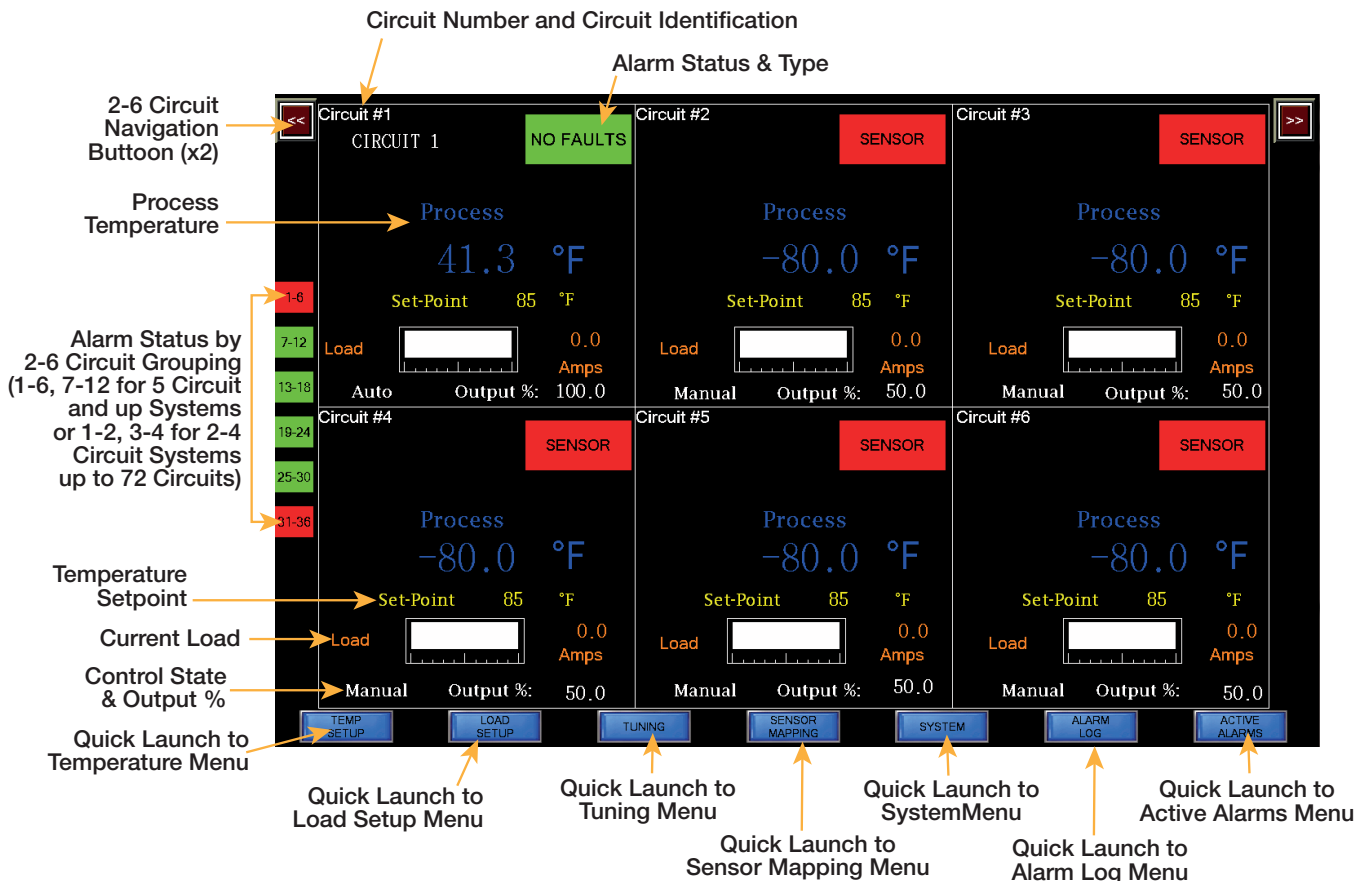
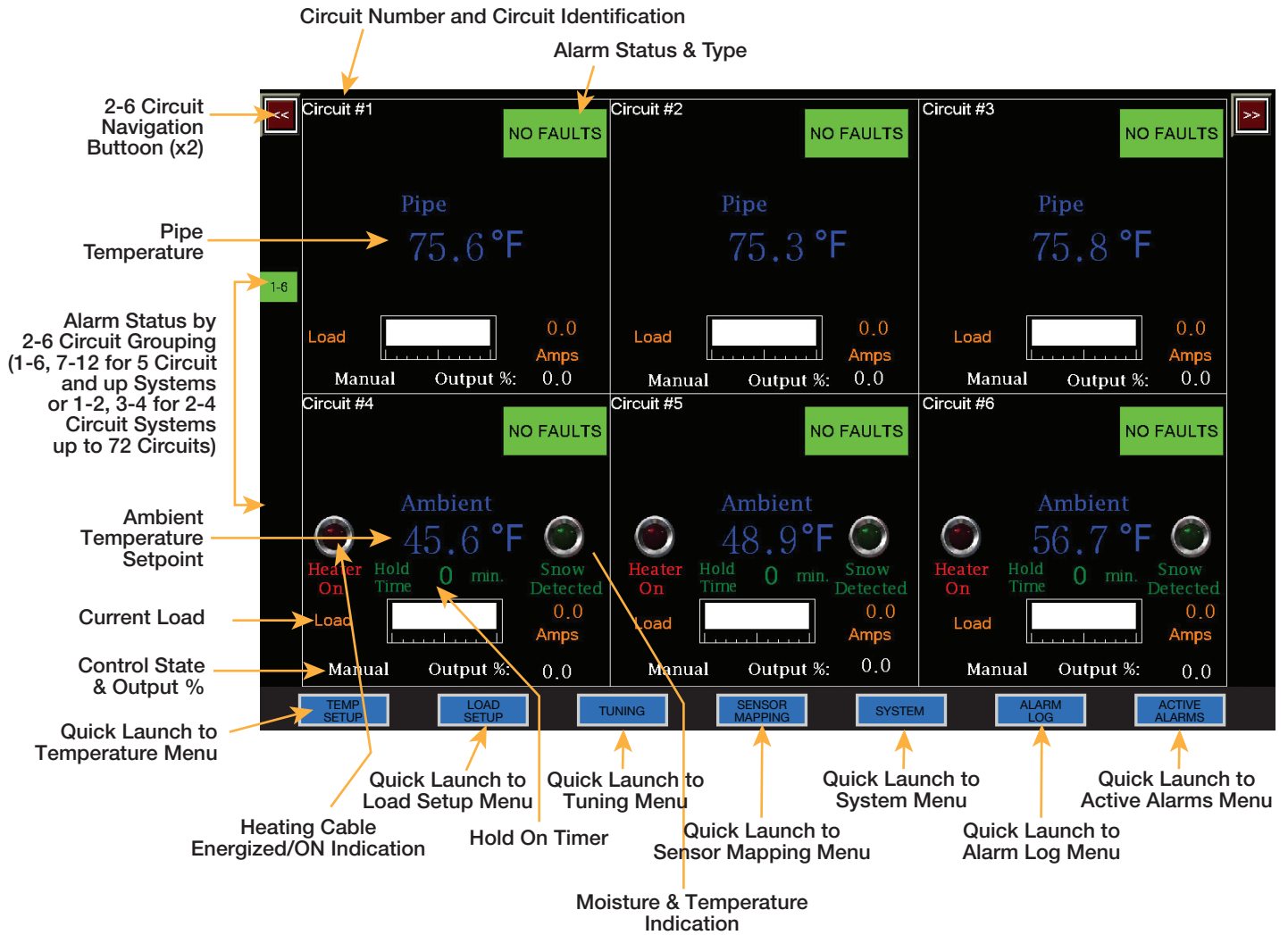


Figure 1B: De-Icing Programming



Temp Setup Menu

The Temp Setup button at the bottom of the screen is a quick launch to the Temperature Property Sheet which is simply a series of tabulated screens. See Figure 2.

Figure 2A: Freeze Protection/Process Maintain Programming



Each block contains input cells for the panel operation. For example, temperature and override controls are located within the Temp Setup Screen.

Navigation notes:

1. Each screen illustrates 2 or 6 circuits at a time. To make setting changes to circuits beyond the current screen within the menus, one must select the Circuit Navigation buttons in the upper right or left of screen.
2. For most screens, to save your settings and exit back to the mail screen, select the "X" button in the lower right corner of the screen.

Figure 2B: De-Icing Programming



Each block contains input cells for the panel operation. For example, temperature and override controls are located within the Temp Setup Screen.

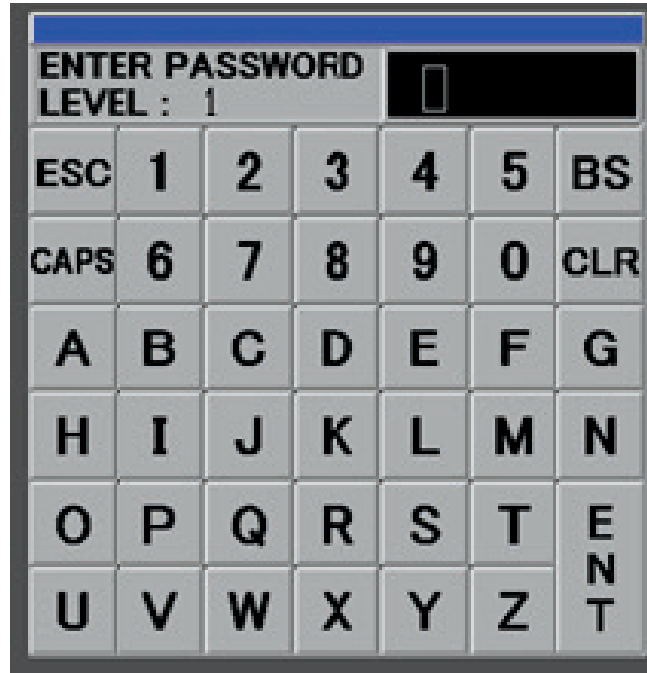
Navigation notes:

1. Each screen illustrates 2 or 6 circuits at a time. To make setting changes to circuits beyond the current screen within the menus, one must select the Circuit Navigation buttons in the upper right or left of screen.
2. For most screens, to save your settings and exit back to the main screen, select the “X” button in the lower right corner of the screen.

Security Levels & Password Screen

After touching the Temp Setup button, but before the Temp Setup Menu is presented, a pop-up screen requesting a password will appear. See Figure 3:

Figure 3



Initial factory set passwords for the below levels of Security are:

Level	Title	Code
4.	Manager	999
3.	Engineering	55
2.	Supervisor	20
1.	Operator	100

Enter the appropriate password and then hit ENT to continue to the setup screen.

Each of the above Security Levels has predefined accessibility and rights within the programming of the control panel. They include:

Level	Title	Accessibility/Rights
4.	Manager	All customer pages, all passwords and Setpoints editing
3.	Engineering	All customer pages, Engineering password and All Setpoints editing
2.	Supervisor	Setpoints, Tuning and Sensor Mapping Tabs & All Setpoints editing
1.	Operator	Setpoints Tab. Temperature Set Point editing

Changes to specific areas within the menus can only be made once the correct security level code has been selected.

Temp Setup Menu

The Temp Setup Menu tab (See Figure 4) contains input cells for the following settings for each circuit:

- Customized Naming of each Circuit
- Process Temperature Set Point
- High & Low Temperature Alarm Limits
- Maximum allowable GFEP (Ground Fault Equipment Protection) Alarm Limit
- Output behavior, whether Automatically or Manually
- Manual Output Load Percentage (if enabled)
- Circuit Output Override (Enable or Disable Each Circuit)

Additionally, there exists a “Global Setting” within the Circuit# 1 Grid

- Apply Globally Setting

Figure 4 A: Freeze Protection/Process Maintain Programming

The screenshot displays a 2x3 grid of circuit configuration panels, labeled #1 through #6. Each panel contains the following settings:

- Name:** CIRCUIT 1 (for #1), blank for others.
- Temp Stpt:** 85 °F
- Hi Temp Stpt:** 180 °F
- Lo Temp Stpt:** -10 °F
- Output %:** 50
- Buttons:** AUTO (green), MANUAL (black), SOFT START ENABLED (green), and CKT ENABLED (green).

Panel #1 includes an additional 'APPLY GLOB.' button. The interface also features navigation arrows in the top-left and top-right corners, and a close button (X) in the bottom-right corner.

Figure 4B: De-Icing Programming

<p>Name: <input type="text" value="CKT1"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="APPLY GLOB."/> <input type="button" value="CKT ENABLED"/></p> <p>#1</p>	<p>Name: <input type="text" value="CKT2"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="CKT ENABLED"/></p> <p>#2</p>	<p>Name: <input type="text" value="CKT3"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="CKT ENABLED"/></p> <p>#3</p>
<p>Name: <input type="text" value="CKT4"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Hold Time: <input type="text" value="5"/> min</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="CKT ENABLED"/></p> <p>#4</p>	<p>Name: <input type="text" value="CKT5"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Hold Time: <input type="text" value="5"/> min</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="CKT ENABLED"/></p> <p>#5</p>	<p>Name: <input type="text" value="CKT6"/></p> <p>Temp Stpt: <input type="text" value="80"/> °F</p> <p>Hi/Lo Stpt: <input type="text" value="90"/> <input type="text" value="60"/> °F</p> <p>Hold Time: <input type="text" value="5"/> min</p> <p>Output %: <input type="text" value="0"/></p> <p><input type="button" value="AUTO"/> <input type="button" value="MANUAL"/> <input type="button" value="SOFT START DISABLED"/></p> <p><input type="button" value="CKT ENABLED"/></p> <p>#6</p>

Temp Setup Menu Navigation notes:

1. Each screen illustrates 2 or 6 circuits at a time. To make setting changes to circuits beyond the current screen within the Temp Setup Menu, one must select the Circuit Navigation buttons in the upper right or left of screen.

Figure 5A illustrates the input cell identification and location for a single circuit within the Temp Setup Menu:

Figure 5A: Freeze Protection/Process Maintain Programming

The screenshot shows the configuration screen for 'CIRCUIT 1'. The settings are as follows:

- Name:** CIRCUIT 1
- Temp Stpt:** 85 °F
- Hi Temp Stpt:** 180 °F
- Lo Temp Stpt:** -10 °F
- Output %:** 50

Control buttons include:

- AUTO** (highlighted with a red oval)
- MANUAL** (highlighted with a red oval)
- SOFT START ENABLED**
- APPLY GLOB.** (labeled '#1')
- CKT ENABLED** (labeled '#1')

Labels on the right side of the screen:

- Circuit Name
- Temperature Setpoint
- High Temperature Alarm Limit
- Low Temperature Alarm Limit
- Manual Output Load Percentage
- Soft Start Enable/Disable
- Auto/Manual Output Operation

Labels at the bottom of the screen:

- Apply Temperature Settings to all Circuits
- Enable/Disable Circuit

Figure 5B: De-Icing Programming

The screenshot shows the configuration screen for 'CKT4'. The settings are as follows:

- Name:** CKT4
- Temp Stpt:** 80 °F
- Hi/Lo Stpt:** 90 °F / 60 °F
- Hold Time:** 5 min
- Output %:** 0

Control buttons include:

- AUTO** (highlighted with a red oval)
- MANUAL** (highlighted with a red oval)
- SOFT START DISABLED**
- CKT ENABLED** (labeled '#4')

Labels on the right side of the screen:

- Circuit Name
- Temperature Setpoint
- High Temperature Alarm Limit
- Low Temperature Alarm Limit
- Hold On Timer
- Manual Output Load Percentage
- Soft Start Enable/Disable
- Auto/Manual Output Operation
- Enable/Disable Circuit

Definitions for each of the Temp Setup Input Cells:

Name:	Customize the Name of this individual circuit or loop
Temp STPT:	Process Temperature Set Point (degrees F or C)
HI STPT:	High Temperature Alarm Limit (degrees F or C)
LO STPT:	Low Temperature Alarm Limit (degrees F or C)
Auto/Manual:	Select Auto if you wish the Output behavior to be a function of a PID Algorithm or ON/OFF Control (See Tuning Tab for selection) Select Manual if you wish the Output to be driven by a pre-determined Output Percentage. Enter the desired % output.
Disable Output:	Select this check box if you wish to turn off or disable this circuit.
Apply Globally:	This allows the user to copy all of the settings or Circuit Parameters from Circuit #1 to all other available circuits.
Hold Time:	Allows user to set a time for heating cable to stay on up to 600 minutes (10 hours) after snow/ice storm. (minutes)

Apply Settings Globally

The CIP has a feature which allows the user to apply settings from a single circuit to all of the remaining circuit within the system. Within Circuit #1 on the Load Setup Menu (See Figure 6), complete the input of the parameters and select the “Apply Glob” button to mirror these settings across all circuits.

Soft Start Feature

These control panels are ideal for controlling heat trace cable. Certain heating cables exhibit inherent current inrush in colder temperatures. This inrush can cause nuisance breaker tripping. To limit inrush current on the overall system, a proprietary soft start algorithm is applied during system start-up. This will ONLY occur while the operation mode is set to AUTO.

The soft start program will increment output % by 1% every 1 second until the desired temperature is reached or the output % achieves 100%. After the soft start program completes its cycle, the control mode of the system will either be PID or ON/OFF Control Mode, depending what was selected by the user.

The soft start program will not function if the control mode is set to Manual.

The default setting of the proprietary soft start feature for each circuit is “enabled”. However, the soft start feature may be disabled if so desired by the owner. The owner has the option to manage the soft start feature on each circuit individually.

See Figure 5.

Load Setup Menu

The Load Setup Menu (See Figure 6) contains input cells for the following settings for each circuit:

- High & Low Load Alarm Limits
- Trip and/or Latch Enabled/Disabled (Output Permission) upon GFEP Violation
- Maximum allowable GFEP (Ground Fault Equipment Protection) Alarm Limit

Additionally, there exists a “Global Setting” within the circuit# 1 Grid

- Apply Glob. Setting

Figure 6

The screenshot displays a software interface for configuring six circuits. Each circuit's settings are shown in a separate panel. The panels are arranged in a 2x3 grid. Each panel contains the following settings:

- Circuit #1:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH, TRIP, and APPLY GLOB. buttons.
- Circuit #2:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH and TRIP buttons.
- Circuit #3:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH and TRIP buttons.
- Circuit #4:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH and TRIP buttons.
- Circuit #5:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH and TRIP buttons.
- Circuit #6:** Hi Load Stpt: 40.0^A, Lo Load Stpt: 0.0^A, GFEP Stpt: 30 mA. Includes LATCH and TRIP buttons.

The interface includes standard window controls (minimize, maximize, close) in the corners of the main window.

Definitions for each of the Load Setup Menu Input Cells

Load HI Stpt High Current Alarm Limit (Amps)

LoadLO Stpt Low Current Alarm Limit (Amps)

GFEP: Maximum Allowable Leakage Current setpoint (milliamps)

Trip (GFEP): Enabled: If the GFEP limit is met, the output will be 0%.
Disabled: If the GFEP limit is met, the output is unaffected.

Latch (GFEP): Enabled: If the GFEP limit is met, the alarm condition will remain until it is manually cleared.
Disabled: If the GFEP limit is met, the alarm condition will be cleared once the GFEP variable is less than the GFEP setpoint

Apply Globally: This allows the user to copy all of the settings or Circuit Parameters from Circuit #1 to all other available Circuits.

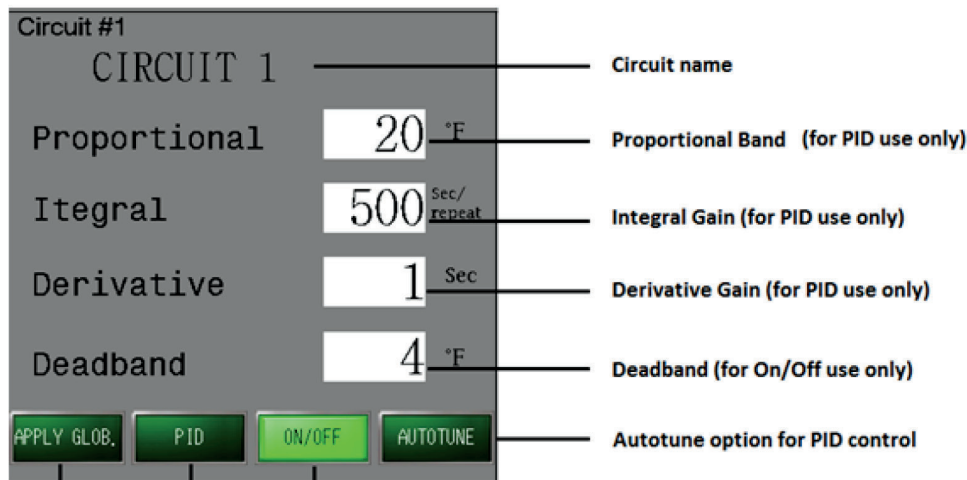
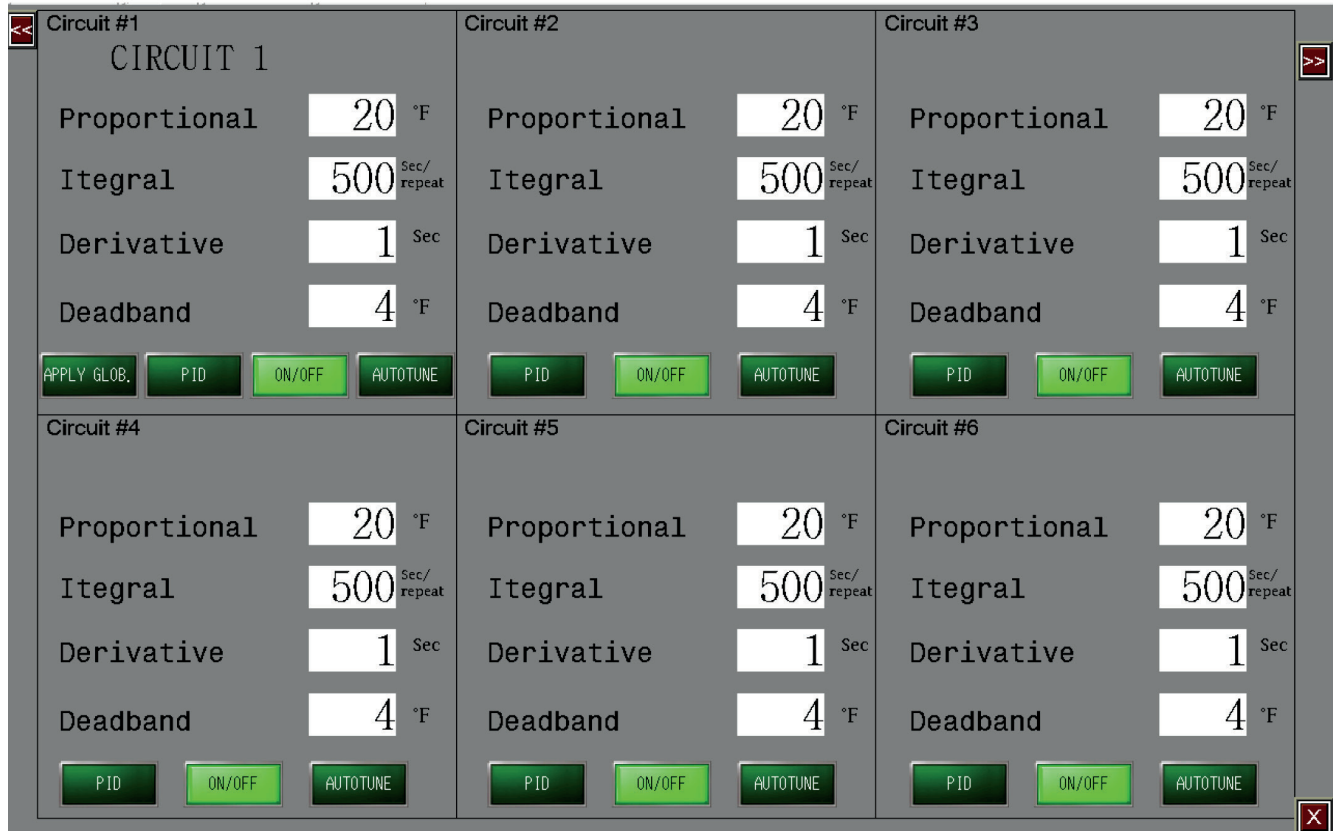
Apply Settings Globally

The CIP has a feature which allows the user to apply settings from a single loop to all of the remaining loops within the system. Within Loop #1 on the Setpoints Tab (See Figure 4), complete the input of the parameters and select the “Apply Globally” button to mirror these settings across all loops.

Tuning Menu

The owner has a choice of how the output is to be operated: Auto, Manual or Off. These selections are made within the Temp Setup Menu. If “Auto”, or Automatic Control Operation is desired, then the tuning of the automatic control is accomplished via the Tuning Menu.

Figure 7



On/Off Control

PID control mode

Apply Globally button (Copies load settings from CKT # 1 to the rest of them)

Control Modes: ON/OFF, PID & Autotune

ON/OFF

- Select ON/OFF if you wish the operation of the heaters to be 100% ON when a demand for heat exists and 0% once the Set Point Temperature of the Process is achieved.
- The Deadband is enabled while in ON/OFF control mode.
- The Deadband is the temperature range equally divided above & below the temperature set point, where the controller will not take corrective action.
 - Example: A setting of “10” for the deadband will result in a deadband that is 5 degrees above and below the temperature setpoint.
- The deadband is adjustable in 2 degree increments. It's default is 10.

PID

- Select PID if you desire PID Control of the load.
- The Proportional Band (P), the Integral (I) & Derivative (D) are modes of control that work in union to bring the process variable to setpoint as smoothly and quickly as possible. They are enabled while in PID Control mode.
- The P, I & D will be automatically established during the Autotune procedure (see above).
- Additionally, the P, I & D may all be manually established by the user. Great care should be taken when manually establishing the P, I & D.
- Proportional Band: The temperature band expressed in degrees within which the controller's proportioning action takes place. (Note: The wider the proportional band, the greater the area around the setpoint in which the proportional action takes place.) This is sometimes referred to as gain, which is the reciprocal of proportional band.

Autotune

- If the Autotune Feature is selected, then the PID parameters will be calculated and entered by the system once the Autotune function has completed its demand profile function.
- The Autotune function establishes the individual P, I & D (Proportional Band, Integral & Derivative) control modes. These modes help to bring the process variable to the setpoint temperature as quickly as possible.
- In order to properly calculate the P, I & D modes, the Autotune program requires a 25 degree rise in sensed temperature after initiating the program. If within 30 minutes the temperature will not reach its setpoint, the Autotune algorithm will be canceled and old PID values will be used.
- Once the Autotune feature is activated, you must not change the menu page until the Autotune algorithm is completed. Changing the page will cause the Autotune algorithm to shut down.
- The Autotune function is a one-time algorithm set up of the P, I & D control modes. Should your process variables change significantly, it is suggested to that the Autotune feature be turned off and then reinitiated.

Tuning Tab Navigation Notes:

1. Each screen illustrates 6 loops at a time. To make setting changes to loops beyond the current screen within the Tuning tab, one must select the Loop Navigation buttons in the upper right or left of screen.

Sensor Mapping

The CIP and CIPC1D2 models provide the owner with customizable sensor mapping. This becomes a very powerful and desirable feature when the owner needs added flexibility in controlling the circuit outputs beyond the standard single sensor input.

1. Sensor Mapping is the assignment of one or more Sensor Inputs to one or more output circuits.

Sensor (Input) Mapping is accessed via the **Sensor Mapping Menu**.

Sensor Mapping

Ambient or Line Sensing, Single Sensor

A single sensor (RTD) may be mapped (or linked) to multiple output circuits. This allows several circuits to be controlled by a single sensor.

Minimum, Maximum, Averaging

Several sensors may be mapped to a single output circuit. This allows a single circuit to be controlled by the minimum, or the maximum or the average temperature of all of the sensors mapped to that output circuit. This may be desirable on long runs or zones which realize varying temperatures or weather conditions at different times of the day.

This does not apply when only 1 Input/Circuit selection is made from the Order Table.

Multiple Sensor Mapping

A single sensor may be used independently or combined with other sensors to control more than one circuit.

For Example:

The average temperature of Sensors 1, 3 and 5 is used to control Circuit 1 while simultaneously the maximum Temperature of Sensor 3, 4 and 5 is used to control Circuit 2.

Combining Sensing Types

The owner may need to have multiple line and/or ambient sensing control scenarios occurring simultaneously.

For example, these may be occurring simultaneously:

1. Circuits 1, 2, 3, 4, and 5 are all controlled by a single RTD (Sensor 1) that is sensing the ambient temperature (Ambient Sensing)
2. Circuit 6 is controlled by Sensor Input 2 which is strapped to a process pipe. (Line Sensing)

Sensor mapping is accomplished within the Sensor Mapping Menu. See Figure 8.

Figure 8A: Freeze Protection/Process Maintain Programming

<p>Circuit #1</p> <p>CIRCUIT 1</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="1"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>	<p>Circuit #2</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="2"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>	<p>Circuit #3</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="3"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>
<p>Circuit #4</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="4"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>	<p>Circuit #5</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="5"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>	<p>Circuit #6</p> <p>Sensor #:</p> <p>Input # 1: <input type="text" value="6"/></p> <p>Input # 2: <input type="text" value="0"/></p> <p>Input # 3: <input type="text" value="0"/></p> <p><input type="button" value="AVERAGE"/> <input type="button" value="MINIMUM"/> <input type="button" value="MAXIMUM"/></p>

Figure 8B: De-Icing Programming

<p>Circuit #1 CKT1</p> <p>Sensor #:</p> <p>Sensor #1 <input type="text" value="1"/></p> <p>Sensor #2 <input type="text" value="0"/></p> <p>Sensor #3 <input type="text" value="0"/></p> <p>Control: <input type="checkbox"/> SNOW <input checked="" type="checkbox"/> AMB./PIPE</p>	<p>Circuit #2 CKT2</p> <p>Sensor #:</p> <p>Sensor #1 <input type="text" value="2"/></p> <p>Sensor #2 <input type="text" value="0"/></p> <p>Sensor #3 <input type="text" value="0"/></p> <p>Control: <input type="checkbox"/> SNOW <input checked="" type="checkbox"/> AMB./PIPE</p>	<p>Circuit #3 CKT3</p> <p>Sensor #:</p> <p>Sensor #1 <input type="text" value="3"/></p> <p>Sensor #2 <input type="text" value="0"/></p> <p>Sensor #3 <input type="text" value="0"/></p> <p>Control: <input type="checkbox"/> SNOW <input checked="" type="checkbox"/> AMB./PIPE</p>
<p>Circuit #4 CKT4</p> <p>Sensor #:</p> <p>Snow Sensor #1 <input type="text" value="1"/></p> <p>Snow Sensor #2 <input type="text" value="0"/></p> <p>Snow Sensor #3 <input type="text" value="0"/></p> <p>Amb./Pipe Sensor <input type="text" value="7"/></p> <p>Control: <input checked="" type="checkbox"/> SNOW <input type="checkbox"/> AMB./PIPE</p>	<p>Circuit #5 CKT5</p> <p>Sensor #:</p> <p>Snow Sensor #1 <input type="text" value="2"/></p> <p>Snow Sensor #2 <input type="text" value="0"/></p> <p>Snow Sensor #3 <input type="text" value="0"/></p> <p>Amb./Pipe Sensor <input type="text" value="8"/></p> <p>Control: <input checked="" type="checkbox"/> SNOW <input type="checkbox"/> AMB./PIPE</p>	<p>Circuit #6 CKT6</p> <p>Sensor #:</p> <p>Snow Sensor #1 <input type="text" value="3"/></p> <p>Snow Sensor #2 <input type="text" value="0"/></p> <p>Snow Sensor #3 <input type="text" value="0"/></p> <p>Amb./Pipe Sensor <input type="text" value="8"/></p> <p>Control: <input checked="" type="checkbox"/> SNOW <input type="checkbox"/> AMB./PIPE</p>

Deicing programming allows the user to have a mix of both pipe/line sensing circuits and Deicing (Roof & Gutter, Snow Melting, etc.) circuits. In Figure 8B, circuits 1-3 are pipe/line sensing circuits and circuits 4-6 are deicing circuits.

For applications that utilize both pipe/line sensing and Deicing, the ambient/ Pipe Sensor must be set up as sensor #7. This is due to sensors 1-6 being RTD inputs that are separately utilized. The deicing sensors (CS-ASM and CS-GSM) have both a temperature and moisture reading and the temperature reading from the CS-ASM can be both Snow Sensor #1-3 and the Ambient/Pipe Sensor.

System Properties

Several informative items and general settings are available within the System Menu.

The System tab is only available to the two highest owner security levels: Manager and Engineer.

The Autocycle function is reviewed in the Autocycle Feature section.

Here, one can enter/revise the Facility Name, Date, Time, Temperature Units, Auto Cycle Interval and Security Codes. The Manager has access to all security codes while the Engineer has access to only the Engineering Security Code. See Figure 9.

The Security Passwords and the respective rights for each security level are reviewed in the **Security Level and Password Screen** Section.

Figure 9A: Freeze Protection/Process Maintain Programming

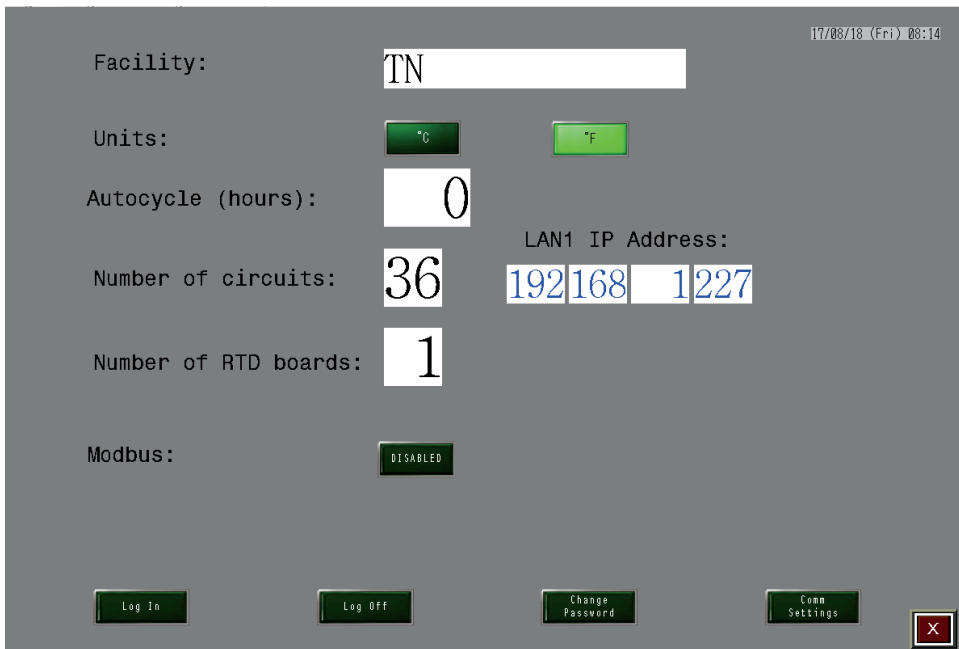
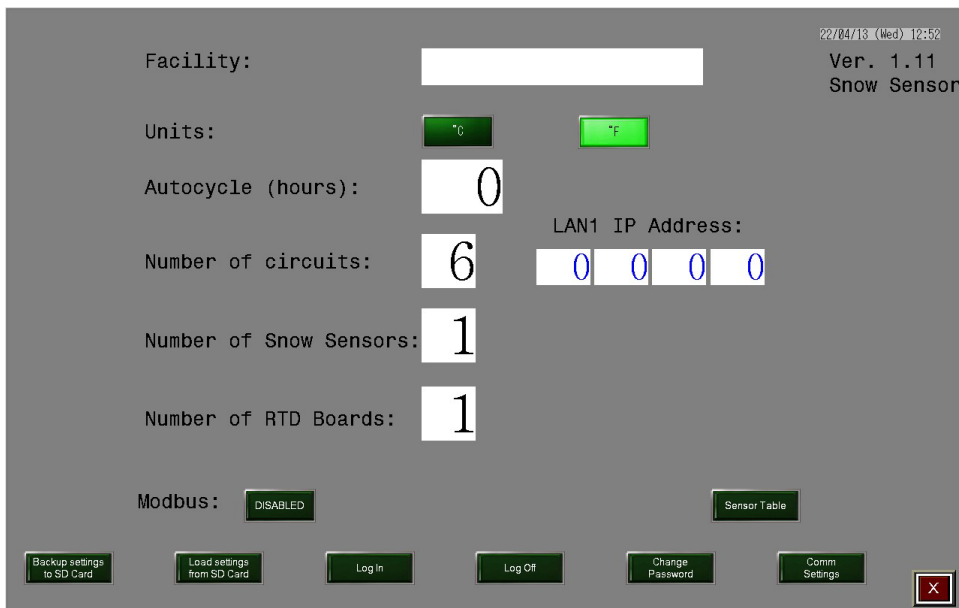


Figure 9B: De-Icing Programming



System Page Definitions

Facility – name of the facility

Units – degree Celsius or Fahrenheit

Autocycle – Autocycle feature. Value of 0 disables it

Number of circuits – number of SSR circuits (not boards) installed in the panel

Number of RTD boards – Number of RTD boards installed in the panel

Modbus – Modbus feature can be disabled or enabled to speed up processing and screen update current security level password

Comm Settings – used to select correct Modbus communication parameters (baud rate, parity, stop bits, etc)

IP Address – present IP address of the HMI screen. IP address can be changed by pushing Comm Settings button.

Log In – used to change current security level

Log Off – used to log off from the system

Change Password – used to change current security level password

Sensor Table – includes sensor mapping for up to 20 snow sensors (CS-ASM, CS-GSM, CS-PSM) as well as sensor status.

Figure 9C: De-Icing Programming

Snow Sensor Mapping Details 1/3:						
Sensor Number:	Sensor Type:			Address:	Location:	Status:
1	<input checked="" type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	1	SNOW1	<input checked="" type="checkbox"/>
2	<input type="checkbox"/> CS-PSM	<input checked="" type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	2	SNOW2	<input checked="" type="checkbox"/>
3	<input type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input checked="" type="checkbox"/> CS-ASM	3	SNOW3	<input checked="" type="checkbox"/>
4	<input checked="" type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	4		<input type="checkbox"/>
5	<input checked="" type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	5		<input type="checkbox"/>
6	<input checked="" type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	6		<input type="checkbox"/>
7	<input checked="" type="checkbox"/> CS-PSM	<input type="checkbox"/> CS-GSM	<input type="checkbox"/> CS-ASM	7		<input type="checkbox"/>

Auto Cycle Feature

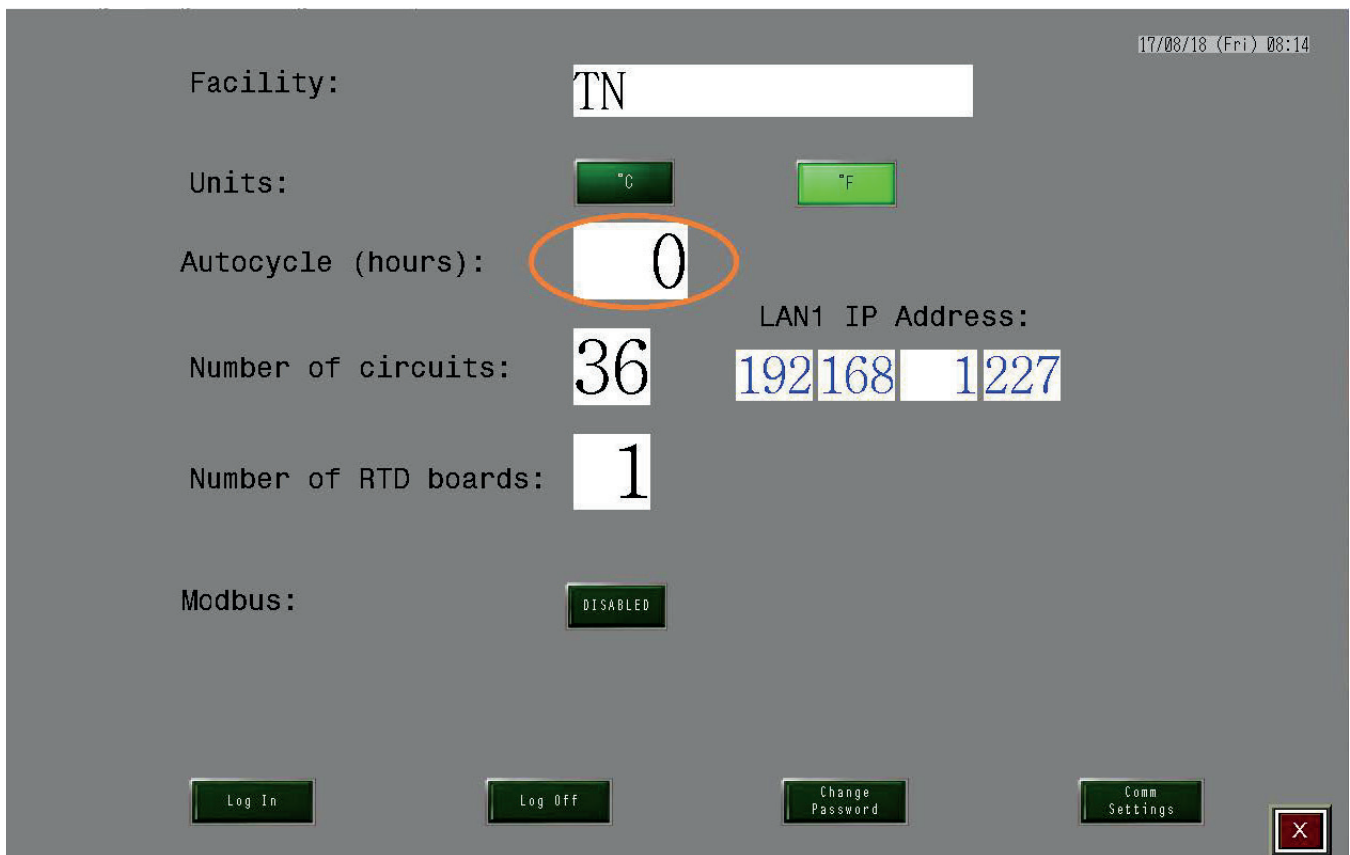
During prolonged down time periods, typically during the summer months, it is advisable to intermittently exercise the loops. This exercising of the loops is accomplished via the Autocycle feature.

To enable the Auto Cycle feature, select an Auto Cycle Interval greater than 0 hours within the System tab. See Figure 9. The Auto Cycle feature is disabled when the Auto Cycle Interval equals 0 hours.

On a sequential circuit basis, the Autocycle feature periodically monitors system performance between 1-999 hours. The minimum and maximum values for Current Load, GFEP and Temperatures are stored. Once the new high or low value is attained the old value is overwritten and displayed in the Autocycle tab text boxes. See Figure 10.

This provides a certain level of preventative maintenance of the system as Faults (Alarms) will present themselves accordingly. Problem areas can be addressed during non-essential operating periods.

Figure 10



WARNING:

It is NOT advisable to engage the Auto Cycle feature during normal operating periods. The heating cables will become fully energized for approximately 2 minutes throughout the Auto Cycle Interval which could cause undesirable temperature overshoot.

Communications

All changes to the MODBUS settings are achieved via the COMMS screen. See Figure 11.

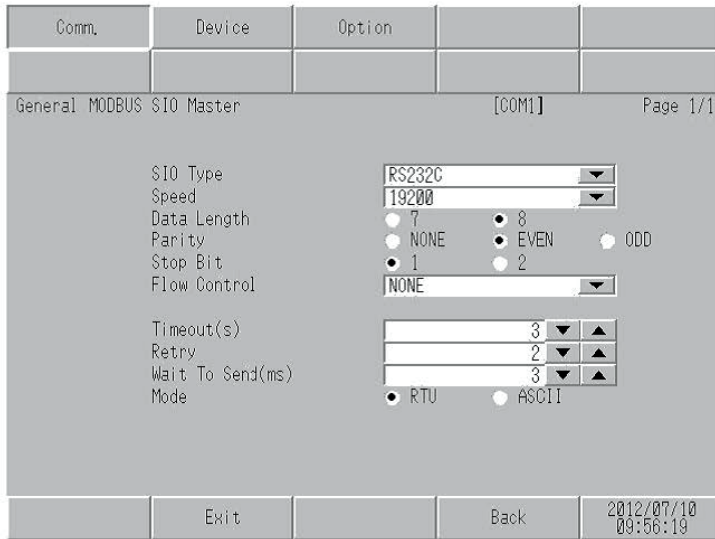
The Comms (Communications) screen may be accessed by selecting the COMMS button located at the bottom of the System screen. The MODBUS Address, Communication Speed, Parity and Stop parameters are set within the Communications screen.

For complete communications specification details on ModBus messaging, Registers and Sensor Mapping, please reference our “ModBus Wiring and Registry Map Instructions Document A-60682-04. This is an addendum to the PK497 manual. Go to the ITLS or ITAS product pages and search in the Technical Resources Tab at: www.chromalox.com.

Remote Monitoring & System Management

Users may monitor as well as adjust the System Parameters settings of the panel remotely. The files required for this feature are available to the owner. Due to the frequent program updates, we ask that you contact the factory for the most recent release version.

Figure 11



Communication Settings

To display the setting screen, touch (Device/ PLC Settings) from (Peripheral Equipment Settings) in offline mode.

Touch the External Device you want to set from the displayed list.

Setup Items	Setup Description
SIO Type	Select the SIO type for communicating with the External Device. IMPORTANT In the communications settings, set (SIO Type) correctly according to interface specifications of the Display. If you select an SIO type that the serial interface does not support, proper operation cannot be guaranteed. Refer to your Display Manual for details on the serial interface specifications.
Speed	Select the communications speed between the External Drive and the Display
Data Length	Select a data length
Parity	Select how to check parity.
Stop Bit	Select a stop bit length.
Flow Control	Select the communications control method to prevent overflow of transmission and reception data

Alarm Log

The purpose of Alarm Log is to record every alarm condition with a date and time stamp. This log may be viewed via the ALARM LOG button at the bottom of the main screen. See Figure 12.

Alarm condition example: Sensor Error alarm on circuit 18 will be recorded as “11/08/12 – 13:38:48 SENSOR ALRAM CKT 18”. Every alarm event is saved into a text file (Storage Card\log5.txt). Each event is appended to the file string on a new line.

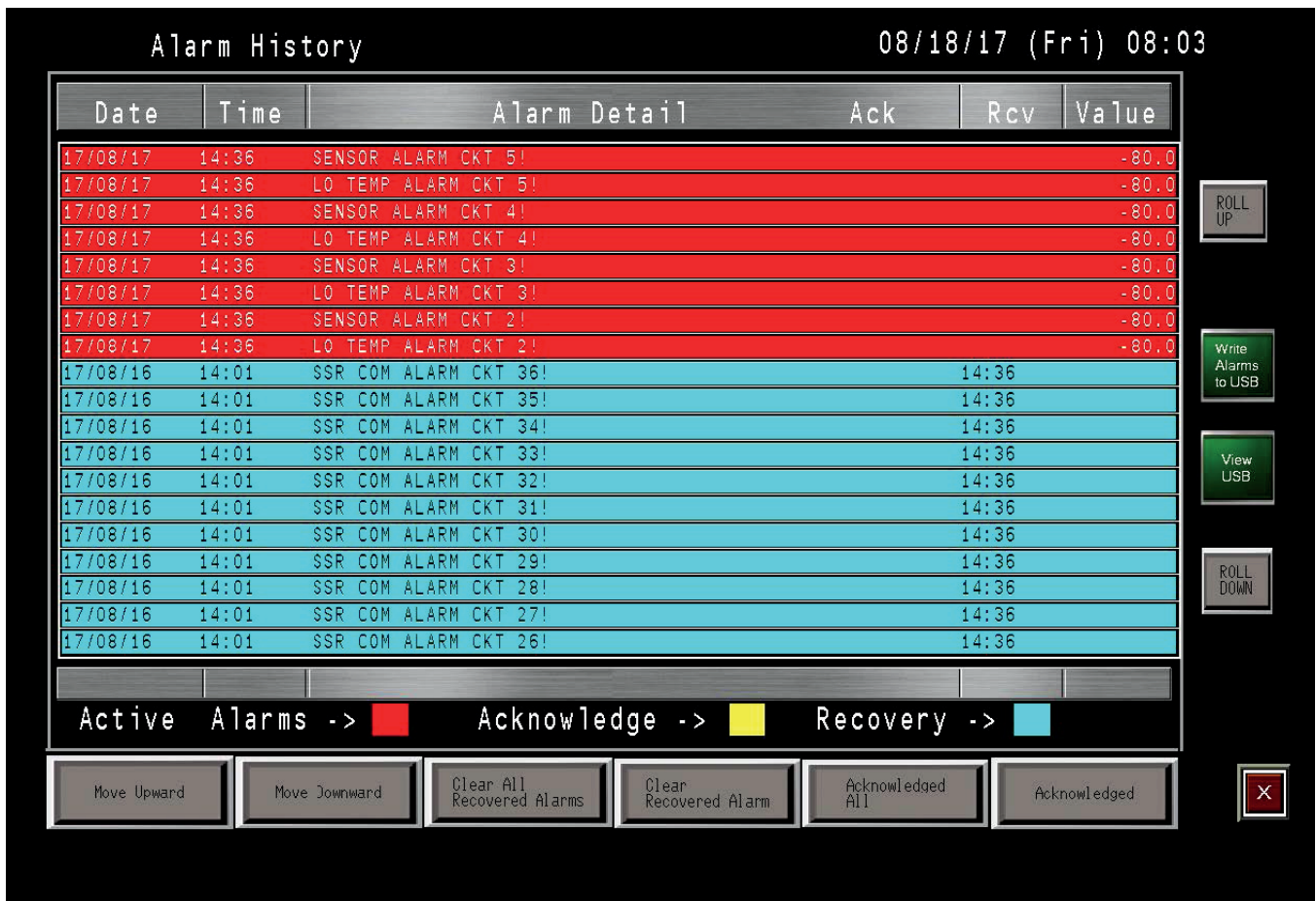
This table holds up to 750 events (alarms). If the number of entries exceeds 750 then the event that is last

on the list (by date) will be removed from the table. This process repeats indefinitely. Once an alarm has been recovered, it can be removed from the list by pushing the clear recovered alarm button.

To extract these files, one must:

1. Plug a USB flash drive into the USB port located on the back of the CIP computer. Go to Alarm Log Screen and push green button on the right of the screen labeled “Write Alarms to USB.”

Figure 12



- Move Upward – moves cursor one position up
- Move Downward – moves cursor one position down
- Clear All Recovered Alarms – clears all recovered alarms from the alarm log
- Clear Recovered Alarm – clears selected recovered alarm from the log
- Acknowledge All – acknowledge all present alarms

- Acknowledged – acknowledge selected alarm
- Roll Up – move cursor one position up
- Roll Down – move cursor one position down
- Write Alarms to USB – saves alarm log into USB thumb drive
- View USB – reads previously recorded alarm log from the USB thumb drive

Active Alarms

Alarms within any 6-circuit or 2-circuit grouping are indicated by RED squares in the left and right panels on any screen. If the square is GREEN, then no faults exist within that 6-circuit grouping. Once a fault is realized within any 6-circuit grouping, one may view the individual alarm circuit or circuits in two different ways:

1. When in the Main Display screen, one may navigate to the desired 6-circuit grouping via the Navigation buttons found in the upper right hand or upper left hand corner. Alarm conditions are illustrated within each circuit window. Up to three alarm conditions can be illustrated for any single circuit on the Main Menu screen.
2. One may view the status of all fault conditions by selecting the ACTIVE ALARMS MENU button located at the bottom of the main display screen. To navigate to the desired 6-circuit grouping, one must press the Circuit Navigation buttons found in the upper right or left corner of any screen. See Figure 13.

Clearing Alarms

Except for a Communications Alarm and a Latched GFEP Alarm, all other alarms are cleared once the acceptable parameters are achieved.

Figure 13



Alarm Troubleshooting

The Alarm Condition, the resultant Output and the Design Behavior for each Alarm type can be found in Table 2 below.

Table 2

Alarm Type	Condition	Output			Design Behavior
HIGH TEMP	Sensed Temp => Hi Temp Setpoint	No change			Alarm will be cleared automatically when Sensed Temp < Hi Temp Setpoint
LOWTEMP	Sensed Temp <= Lo Temp Setpoint	No change			Alarm will be cleared automatically when Sensed Temp > Lo Temp Setpoint
GFEP	Sensed GFEP Current => GFEP Setpoint	Trip	Latch		Alarm will be cleared automatically when sensed GFEP Current < GFEP Setpoint
		No	No	Output will remain at selected output %.	
		Yes	No	Output will go to 0% (OFF) while in alarm state	
		No	Yes	Output will remain at selected output %.	The Alarm condition may only be cleared with a manual RESET of the GFEP Alarm.
Yes	Yes	Output will go to 0% (OFF) until alarm is reset			
HI CURRENT (LOAD on Faults Screen)	Sensed Load Current => Hi Current Setpoint	Output will switch to Manual Mode			Alarm will be cleared automatically when sensed Load Current < Hi Current Setpoint
LO CURRENT (LOAD on Faults Screen)	Sensed Load Current <= Lo Current Setpoint	No change			Alarm will clear automatically when Sensed Load Current > Lo Current Setpoint. If your output is turned OFF, GFEP and Load values will not be updated.
SENSOR	Sensor Open, Sensor Shorted, Sensor Fault	Output will switch to Manual Mode			Alarm will clear automatically when the RTD resistance is between 75.44Ω - 311.56Ω. Check if your sensor wire is not damaged and that it is properly connected to the Sensor board.
COMM	Communication Error	Output will switch to Manual Mode			Make sure that the communication cable that connects the Touchscreen computer with boards inside enclosure is properly connected and/or not broken. Press “RESET ALM” to reset this alarm.

Extension Panels

Connecting an Extension panel or a Remote Sensor Panel to the Main Panel

Below is the procedure to connect an Extension or a Remote Sensor Panel to the Main Panel. The Main Panel will manage the circuits in the Extension Panel and the inputs of the Remote Sensor Panel.

Procedure:

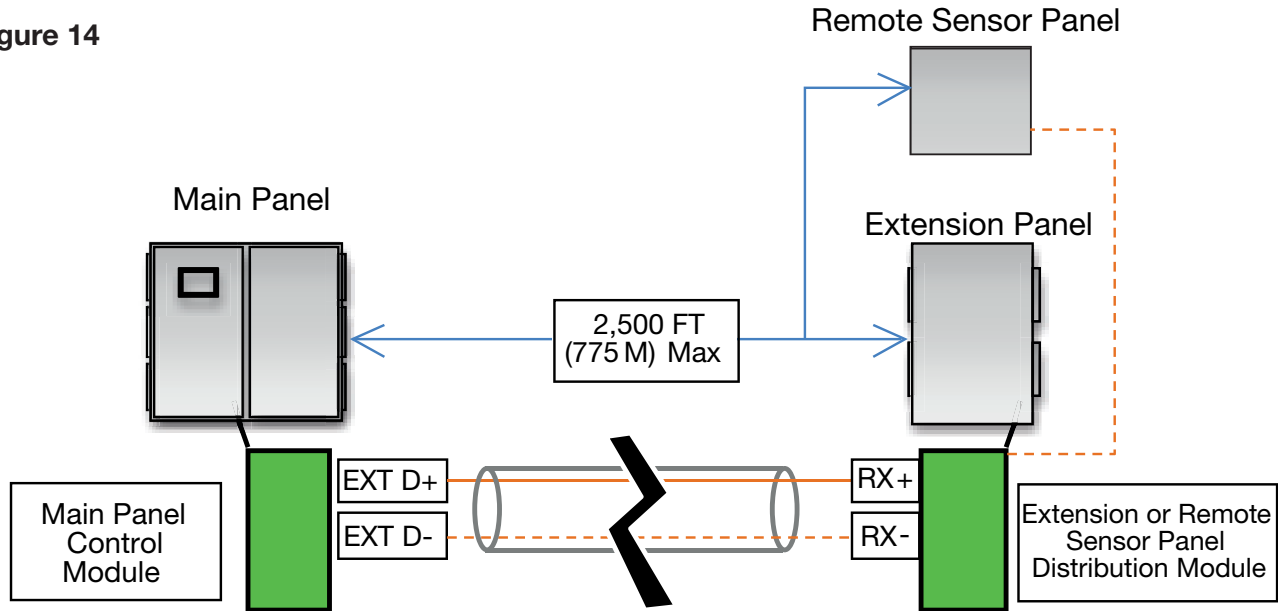
1. Turn off the power to the system.
2. In the main panel (the one with a touch screen computer) locate the control board. (0135-02273)
3. Connect one end of the twisted pair cable into connectors J5.1 (EXT D+) and J5.2 (EXT D-) on the control board of the Main Panel. Connect the other end of the twisted pair cable into connector J5.1 EXT D+ and J5.2 (EXT D-) on the distribution board of the Extension panel.

Make sure that EXT D+ is connected to RX+ and EXT D- to RX-. (See Diagram Below)

4. If the number of loops needs to be changed, power up the system and login into the setup menu using 8658 as the password. Go to the "System" tab and select the desired number of loops and press "OK".
5. Cycle power to the system.

****Note - a 2 or 4 Circuit Extension Panel may be added to a 6-48 Circuit system but not vice versa.**

Figure 14



Extension Panel or Remote Sensor Panel Considerations

Environmental influences such as EMI/RFI can compromise the communication signal between the Extension or Remote Sensor Panel and the Main Panel. The use of properly designed cable will protect against and minimize these influences.

Here is a design guide for extension panel wiring:
 RS-485 Max. total cable length..... 2,500 ft (800 M)
 RS-485 Wire specification..... T1/E1/DSL compatible
 24-AWG shielded cable

Chromalox uses the following vendor and cable item as a viable reference:

Example Vendor: L-com
 Typical Specification:.... 2 - 120 Ohm (E1) Shielded Pair
 Vendor Item Number: TSC9928
 Available at: <http://www.l-com.com>

Wireless Temperature Sensing

Overview

Chromalox now provides fully integrated Wireless Temperature Sensing Solutions for Heat Trace applications in ordinary and hazardous locations.

The components of the Chromalox Heat Trace Wireless Temperature Sensing system include the IntelliTrace CIP Series Heat Trace Control Panel and specific industrial wireless transmitters which are paired with appropriate temperature sensors.

Control Panel

When the wireless temperature sensing feature is selected, the IntelliTrace Control Panel is properly configured at the factory and internally equipped with an industrial-duty **Wireless HART**® certified **wireless gateway, antenna** and the necessary communication accessories.

The panel facilitates both wired and wireless temperature sensor inputs and the touchscreen computer HMI distinguishes wireless circuits from wired ones. Several of the IntelliTrace HMI screens are impacted when Wireless Temperature Sensing is ordered and enabled at the factory: The Main Screen and Sensor Mapping Menu.

Main Menu

On the main menu screen, the alarm status will appear as BATTERY when the transmitter battery of a wireless circuit is due to be changed. Each wireless circuit has its own transmitter battery life meter. This provides three levels of remaining battery life so that you may properly plan service before it is needed.



Wireless Transmitter Battery Meter

BATTERY

Battery Life Good.
No Maintenance Needed.

BATTERY

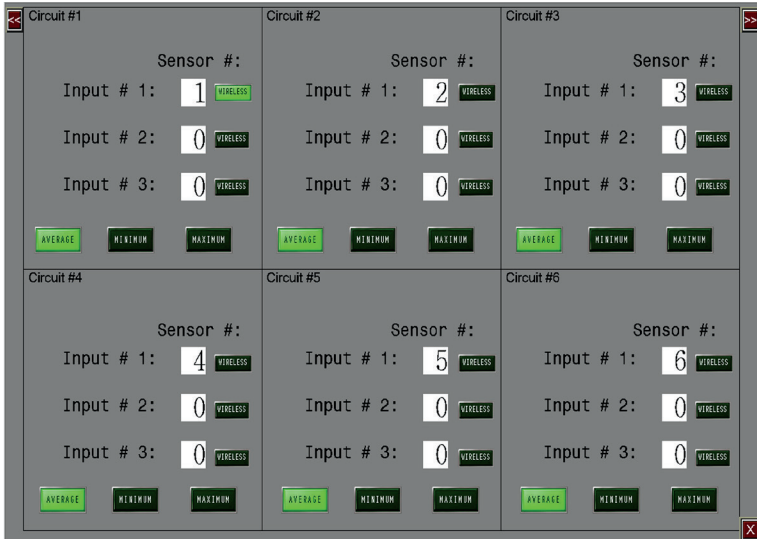
Battery Life Low.
Plan for Maintenance.

BATTERY

Battery Life Very Low.
Perform Maintenance Immediately.

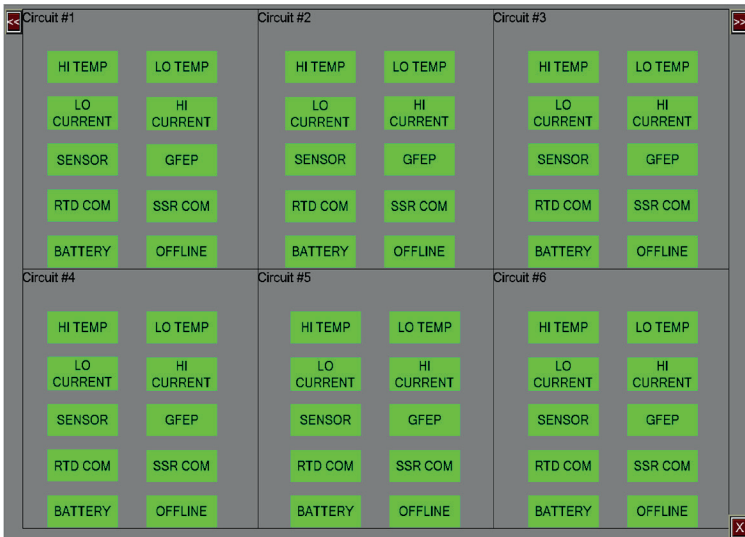
Sensor Mapping Tab

Wireless sensors will automatically show up in the SENSOR window of the I/O Mapping Tab. They are labeled as WS #1, WS #2, etc., and can be assigned to any output circuit.



Faults Page

The BATTERY fault state on the Faults page will change from Green to either Orange or Red depending on the remaining battery life of the Wireless Transmitter.



Wireless Transmitter

Chromalox has chosen the Rosemount® 248 Wireless Temperature Transmitter. This transmitter is **Wireless HART®** certified and it may be pipe or structure mounted. When deployed in a Mesh network, this transmitter is actually both a transmitter and a receiver (also known as a Bi-Directional Wireless Device).

The 248 Transmitter is offered in either aluminum or polymer housing and is available with or without a matching universal mounting bracket. A battery is also required and ordered as a separate item. Manufacturer's data sheets and user manuals are available in the technical resources tab within the Heat Trace products / Wireless Temperature Sensing section at www.chromalox.com

Rosemount 248 Wireless Temperature Transmitter Features

- Output - WirelessHART 2.4 GHz
- IEC 62591 Compliant
- Update Rate – 1 sec to 60 min - user selectable
- Accuracy +/- 0.45oC @ 20oC
- Wireless radio
 - o 2.4 – 2.485 GHz
 - o 15 channels
 - o IEEE 802.15.4 compliant
- Power Module
 - o Lithium Thionyl Chloride with PTB enclosure
 - o 7 to 10 year life (1 minute update rate)
- Housing
 - o IP66/67
 - o NEMA 4X
- Self-Calibrating Unit
- Direct Pipe or Flat Surface Mounting
- Accepts RTD & Thermocouple Sensors & mV input
- The following approvals/certifications:



Polymer Housing



Aluminum Housing



Please see the Rosemount 248 Data Sheet and Instruction Manual for completed details. Manufacturer's data sheets and user manuals are available in the technical resources tab within the Heat Trace products / Wireless Temperature Sensing section at www.chromalox.com

Ordering Information:

There are many design and feature options available on the Rosemount 248 model. Chromalox has standardized on the following:

Wireless Temperature Transmitter

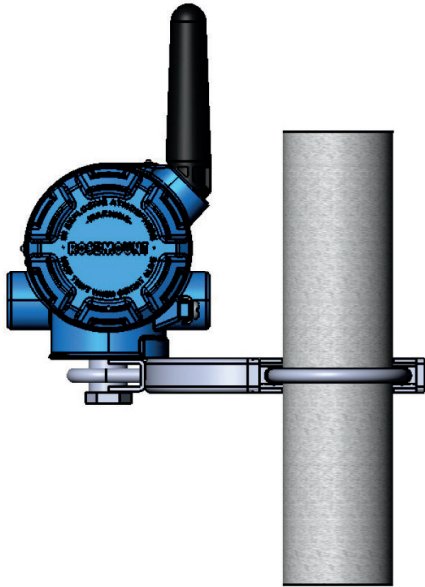
Rosemount 248 Wireless Temperature Transmitter, USA Intrinsically Safe and Non-incendive, Aluminum or Polymer Housing, with 1/2-14 NPT Conduit Entry Size, WirelessHART, 2.4 GHz, External Omni-directional Antenna (Aluminum Housing only), 5-point Calibration, External ground lug, 60Hz & 3 Year Warranty

Description (Manufacturer Model No.)	Part Number
Aluminum Housing with universal mounting bracket (248DXI5D2NSWA3WK1B5C4Q4G1WR3)	0108-70477
Aluminum Housing without universal mounting bracket (248DXI5D2NSWA3WK1C4Q4G1WR3)	0108-70478
Polymer Housing with universal mounting bracket (248DXI5P2NSWA3WP5B5C4Q4WR3)	0108-70479
Polymer Housing without universal mounting bracket (248DXI5P2NSWA3WP5C4Q4WR3)	0108-70480
Battery for 248 Wireless Trans0mitter with Aluminum Housing Only	0108-70432
Battery for 248 Wireless Transmitter with Polymer Housing Only	0108-70481

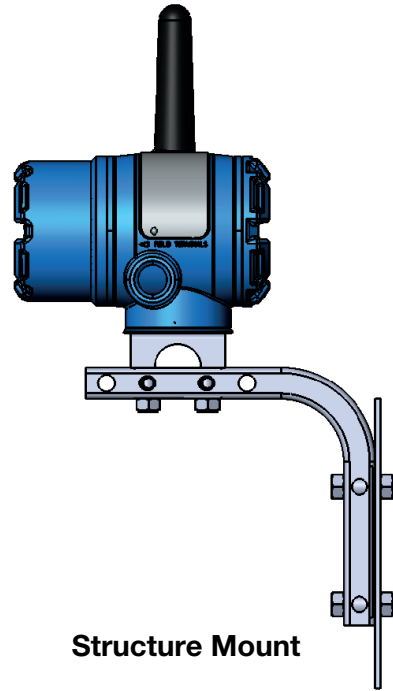
Universal Mounting Bracket

The Rosemount 248 Wireless Temperature Transmitter may be ordered with or without a matching Universal Mounting Bracket (see above table). This bracket eases and enables transmitter mounting to either pipe structures or flat structural surfaces.

Rosemount 248 Wireless Temperature Transmitter with Universal Mounting Bracket *(Shown With Aluminum Housing Model)*



Pipe Mounting



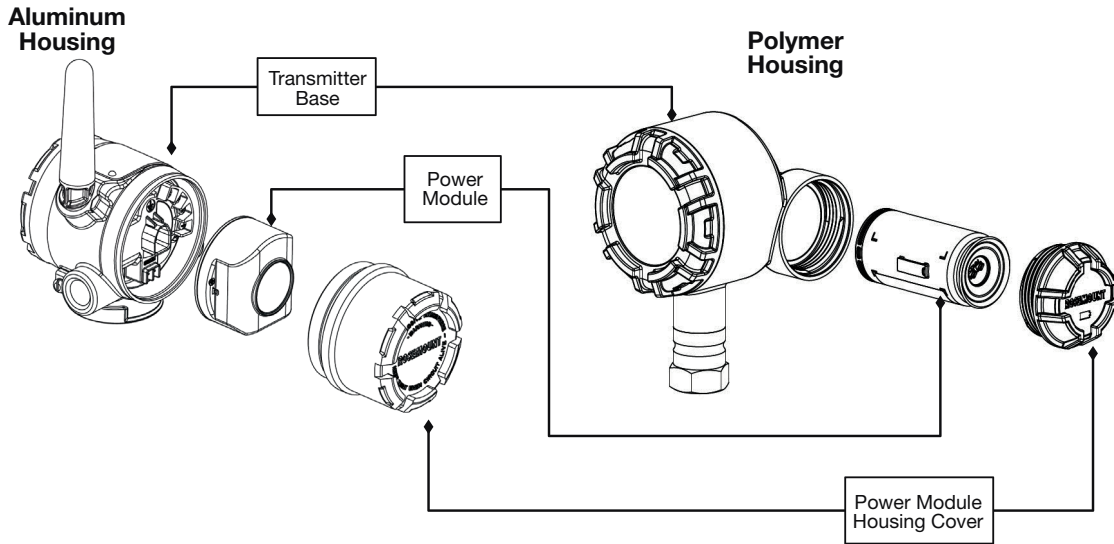
Structure Mount

Transmitter Power Module (Battery)

The transmitter power module must be installed prior to device configuration and device use. It may be removed from the device in between configuration and commissioning.

The Polymer housing transmitter utilizes the **Green Power Module** while the Aluminum housing transmitter uses the **Black Power Module**. These are dramatically different in physical dimensions and may not be used universally.

Exploded view of the two models:



Temperature Sensor

Although other RTD sensors may be utilized, Chromalox has standardized on the RBF185M type Heat Trace Sensor. This industrial duty RTD is designed to be Pipe Mounted and it comes complete with either an Aluminum or 316L Stainless Steel connection head.

This sensor is suitable for NEMA 4X or IP66 environments and designed for ordinary or hazardous areas (Class I, Divisions 1 & 2).

Heat Trace Temperature Sensor - 100 Ohm, 3-Wire RTD

Pipe Mounted Heat Trace Sensor with Connection Head

- 316 SS Sheath, 1/2" or 3/4" NPT Connection Port



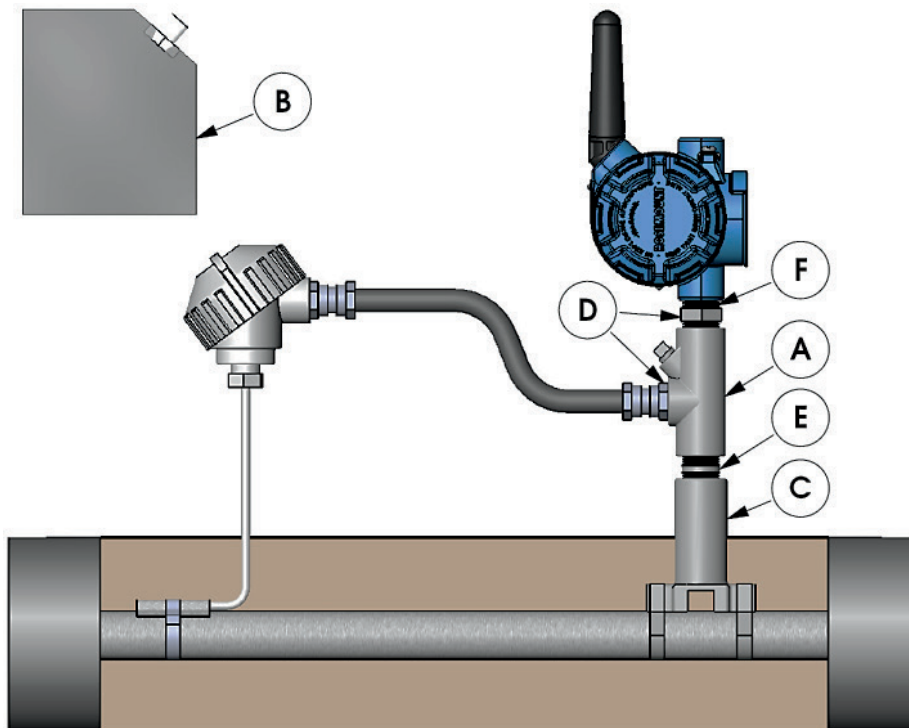
Description (Manufacturer Model No.)	Part Number
RBF185M-HT30418RD31SB/C Aluminum - NEMA 4X	317315
RBF185M-HT30418RD91SB/C 316L Stainless Steel - NEMA 4X	317323
RBF185M-HT30418RD93SB/C Aluminum - Class I, Div's 1 & 2, NEMA 4X, IP66	317340
RBF185M-HT30418RD94SB/C 316L Stainless Steel - Class I, Div's 1 & 2, NEMA 4X, IP66	399550

Wireless Transmitter Pipe Mounting Kit

To simplify co-location installation of the RBF 185M Type pipe mounted heat trace temperature sensor and Rosemount 248 Wireless transmitter, Chromalox has developed a pipe mounting kit.

This kit may be installed in both ordinary and hazardous areas (Class I, Divisions 1 or 2).

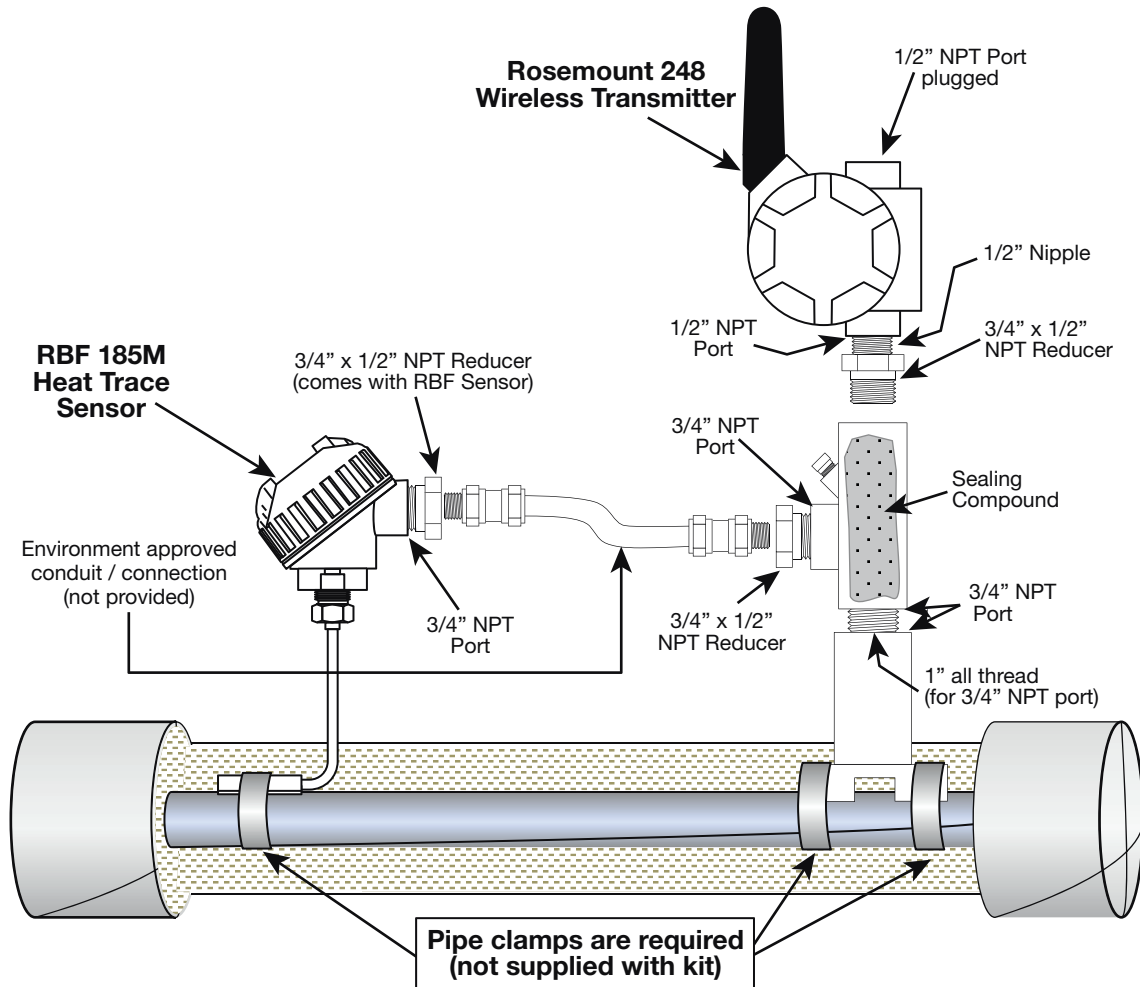
Description			Part Number	
Pipe Standoff Kit, Divisions 1 & 2			394337	
Item	Qty.	Component	Div. 1	Div. 2
A	1	3/4" Seal Fitting	Yes	Yes
B	1	Sealing Compound & Fiber	Yes	No
C	1	Pipe Standoff	Yes	Yes
D	2	3/4" To 1/2" NPT Reducer	Yes	Yes
E	1	All-thread	Yes	Yes
F	1	1/2" NPT X 1" Nipple	Yes	Yes



Wireless Transmitter Pipe Mounting Kit Detail:

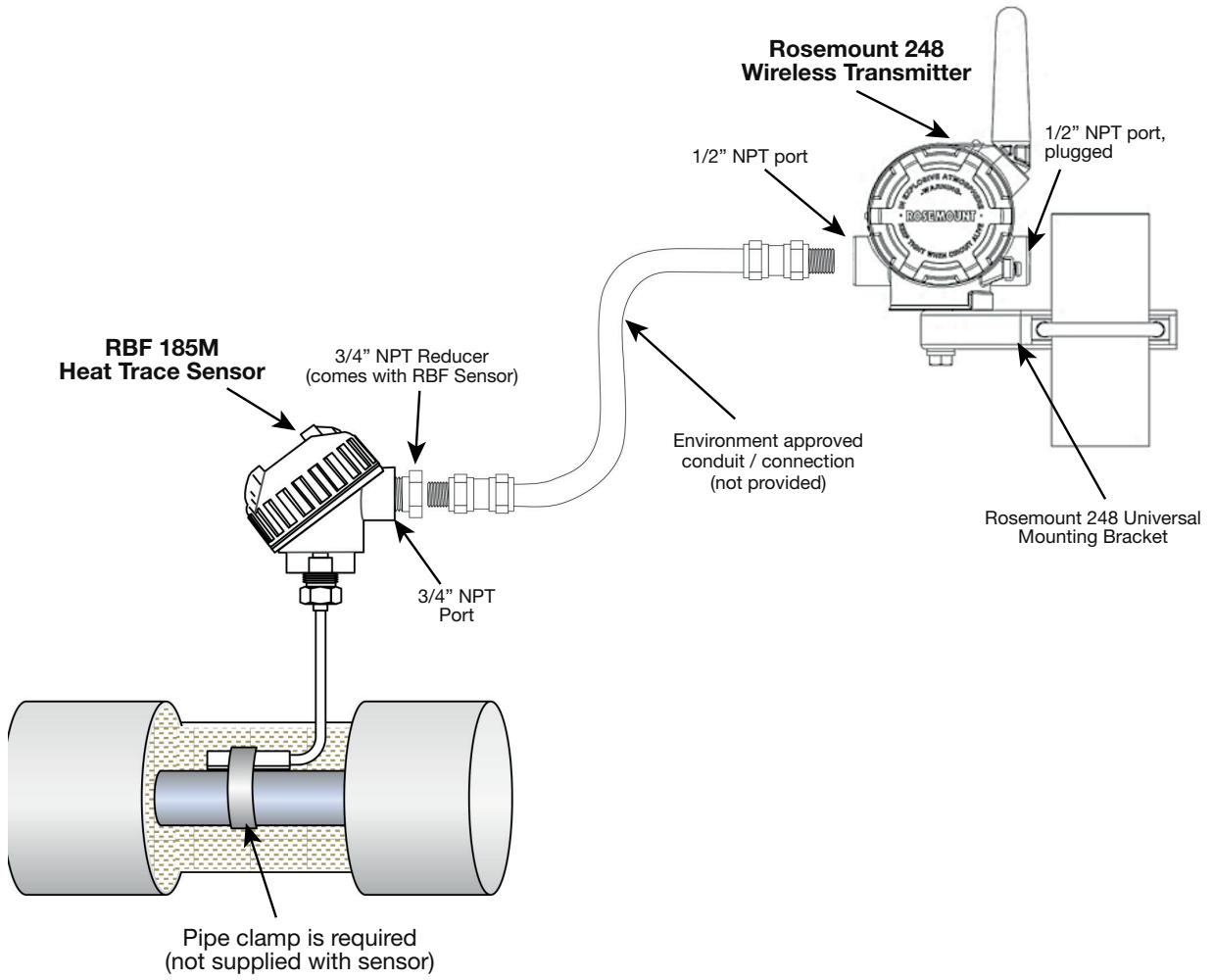
Installation Notes:

1. The conduit (customer supplied) from the seal fitting to the sensor must be rated for the environment in which it is being installed.
2. Pipe clamps are required to secure the RBF sensor and Kit Pipe Standoff (C) to the piping.
3. DIVISION 1 AREA: The Sealing Compound is required for Div. 1 areas. It is used to seal off the Seal Fitting ports, ensuring that no gas ingress occurs within the Wireless Transmitter or the Sensor. The Fiber is used as a dam for the sealing compound.



Installation Example –

Wireless Transmitter and Universal Mounting Bracket to Pipe Mounted Heat Trace Sensor



Wireless Network Planning

It is generally expected that the user / installer has substantial knowledge of wireless networking whereby they fully understand wireless topology, component capabilities and system-wide organization. To ensure complete system integrity, the Chromalox specified core components must be properly employed and wireless network design best practices must be followed. Chromalox will not be held responsible otherwise.

For support, Chromalox provides optional professional startup and commissioning services as well as the following wireless sensing information and guidelines:

Wireless Network Topology

When it comes to industrial wireless sensor networks (WSN), two types of topologies, (or the way wireless components interact with each other), exist: **Infrastructure and Ad hoc**. Each has their own strengths and limitations.

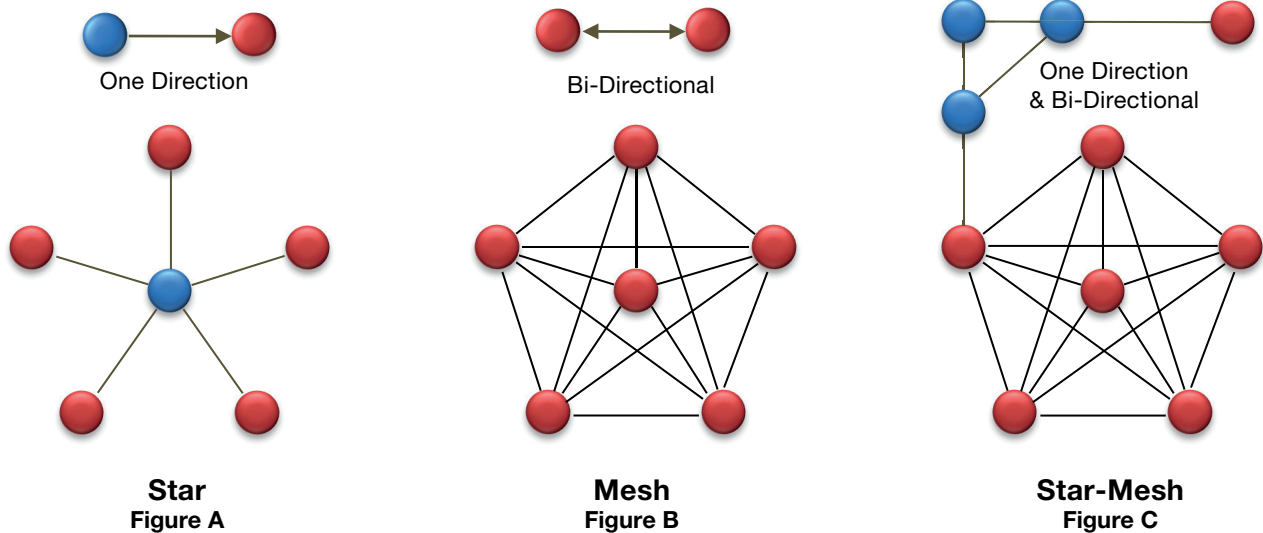
In the Infrastructure or **Star** topology, there is one central coordinator, typically a hub (or switch). In this topology, the sensor devices communicate via the hub rather than directly with each other as shown in [Figure A](#) below. Communication rates are relatively high while complexity, reliability and distances between components are relatively low.

In an Ad hoc or **Mesh** topology, however, all devices are capable of communicating with all other devices within radio range, creating the topology shown in [Figure B](#). The benefits of this topology include increased reliability and the distance between components whereas latency and complexity becomes greater.

It is also possible to have a hybrid topology called **Star-Mesh**, in which there is a combination of both Mesh and Star topologies such as in [Figure C](#).

In reality, most Industrial Sensor Networks combine internal wired and wireless topologies, which employ routers, gateways and firewalls with external Mesh topologies that are comprised of multiple bi-directional wireless sensors tied to a common wireless gateway.

See the **Site Installation Guidelines** for component considerations within a Mesh or Ad hoc wireless sensor network.



Site Installation Guidelines

Many factors, such as component positioning, equipment density, site obstructions, and environmental conditions, will impact wireless communication integrity. Network reliability and latency may be maximized by better understanding component limitations and adhering to fundamental installation guidelines. The following guidelines are biased towards an Ad hoc or Mesh Sensor Network Topology.

Communication Range

The effective wireless communication range between nodes, under ideal conditions (clear line of sight), is 600-750 feet (200-250 meters). Most environments have obstructions, which may compromise signal performance below commonly acceptable levels. An obstruction vs. distance guideline to consider would be:

- Heavy obstructions (high density industrial plant environment): 100 feet (30 meters)
- Medium obstructions (light processing or manufacturing facility): 250 feet (80 meters)
- Light obstructions (remotely located structures, such as a tank farm): 500 feet (160 meters)
- Clear line-of-sight, with antenna mounted above obstructions and angle of terrain change less than 5 degrees : 600-750 feet (200-250 meters)

Additional environmental and material factors which can shorten effective wireless communication distance:

Environmental

- Device proximity to the ground or water.
- Barrier isolation (walls). Having a mesh network both inside and outside of a building.

Material

- Metals - Potentially the greatest impact
- Wood, soil or anything with water content – moderate impact
- Fiberglass - slight impact

To increase the distance a network can cover, you can add Repeaters or Nodes. In a Mesh network, a node is merely a bi-directional wireless transmitter, such as the Rosemount 248.

Antenna Positioning

Signal strength will be improved when the antenna of wireless transmitters and /or gateways is unobstructed and kept away from the ground or bodies of water. Quite often, by utilizing a directional antenna or having the antenna be remotely mounted to the gateway (or control panel) the communication strength becomes greater. Antenna extension cables are available to accommodate most structure challenges such as penetrating walls or rooftops. In most situations, the optimum design is to have the gateway antenna as close to the center of the system as possible.

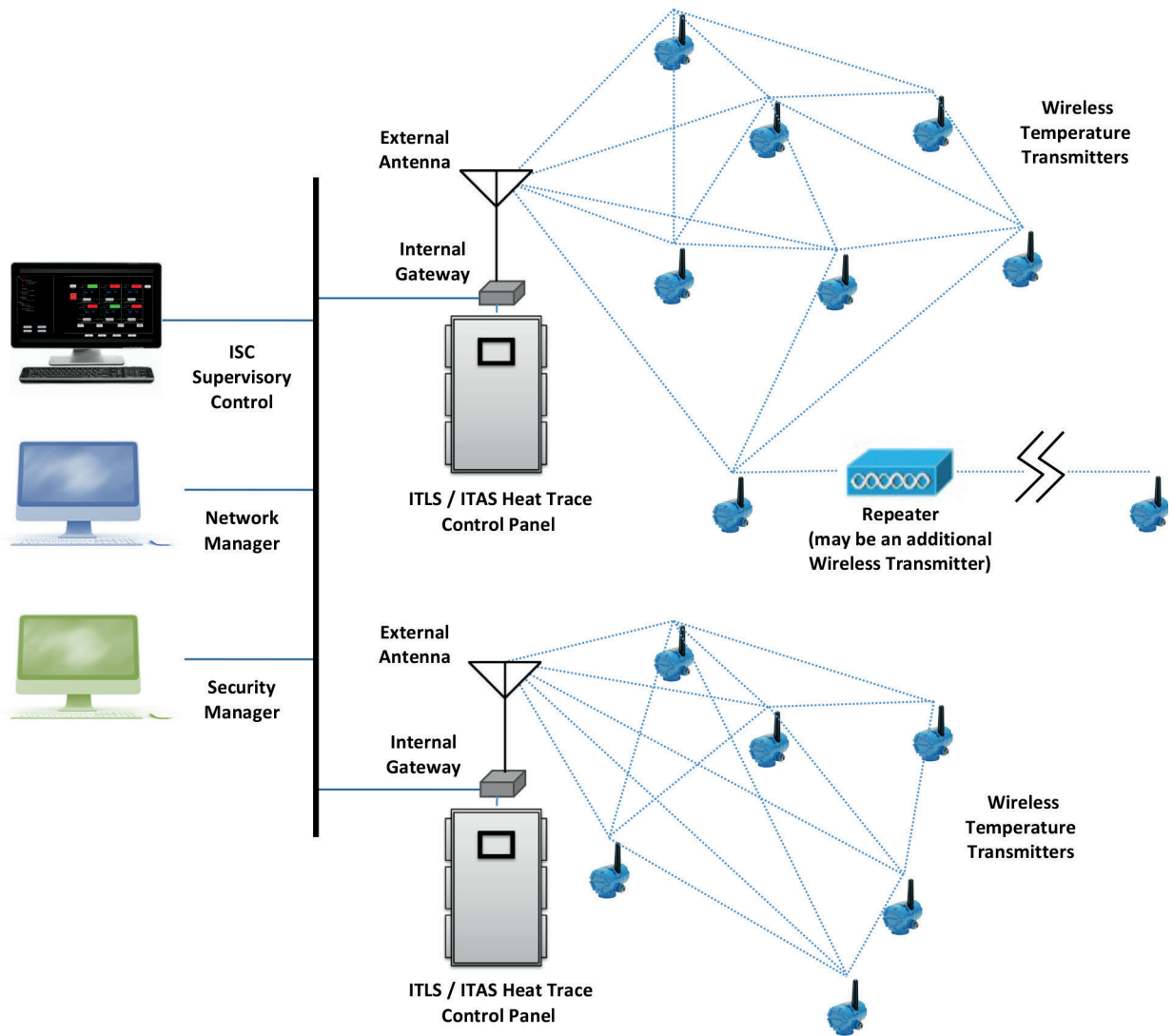
- Devices (antenna) should be mounted >0.5m from any vertical surface
- Wireless transmitter antenna should always be positioned vertically, either straight up or straight down.
- Devices should be mounted >1.5m off of the ground
- Avoid having devices mounted inside and outside of a building. The signal does not transmit well through wood or cement walls.

Redundancy

A mesh network obtains its reliability by having multiple or redundant communication paths between wireless devices, such as transmitters and gateways.

- Each wireless transmitter device in the network should have a minimum of three neighbors.
- Place five or more wireless devices within effective communication range of the gateway itself.
- For networks with considerably more than five devices, have at least 25% of them within range of the gateway. This minimizes latency in the network.

Below is a representation of a typical industrial wireless sensor network:



Commissioning the Wireless Network

To most efficiently setup and commission your wireless network, please refer to the RMT 248 Quick Install Guide 00825-0200-4248, RMT 248 Product Data Sheet 00813-0100-4248 and RMT 248 Reference Manual 00809-0100-4248 for complete commissioning details

and guidance. These documents are available in the technical resources tab within the Heat Trace products / Wireless Temperature Sensing section at www.chromalox.com.

Appendix A

Specifications

Input	
Input Types	- 3-wire RTD, 100 Ω PT, 0.00385 $\Omega/\Omega^{\circ}\text{C}$, 20 Ω balanced lead wire, - Dry Contact Closure (Thermostat) - Snow or Ice Sensor (voltage drop)
Number of Sensor Inputs	1 to 252 per Circuit
Sensing Configuration	1: Sensed Reading 2 (or more): Min, Max, Average
Output	
Power Switching	SSR Zero Cross Fired, DOT (Demand on Transfer) Timing
Number of Circuits	2-72 Per ITAS or ITLS system
Capacity	40 Amps per Circuit (Breaker size shall be 50 Amps maximum per circuit or 125% of anticipated load)
Control Types	
PID	Control mode must be set to Auto
Autotune	On or Off
Proportional Band, ($^{\circ}\text{F}$)	Range: 1 – 100
Integral (sec/repeat)	Range: 0 – 9,999
Rate or Derivative, (seconds)	Range: 0 – 500
On/Off	Control mode must be set to Auto
Dead band, ($^{\circ}\text{F}$)	Range: 2 – 100
Manual	Range: 0 – 100%
Soft Start, Current Clamping	Enable or Disable
Settings	
Temperature (SP)	Range: -80 $^{\circ}\text{F}$ to +1100 $^{\circ}\text{F}$ Range: -62 $^{\circ}\text{C}$ to +593 $^{\circ}\text{C}$
Low Temperature Alarm	Range: -80 $^{\circ}\text{F}$ to +1050 $^{\circ}\text{F}$, Off Range: -62 $^{\circ}\text{C}$ to +566 $^{\circ}\text{C}$, Off
High Temperature Alarm	Range: -80 $^{\circ}\text{F}$ to +1150 $^{\circ}\text{F}$, Off Range: -62 $^{\circ}\text{C}$ to +621 $^{\circ}\text{C}$, Off
Low Current Alarm	Range: 0.0 A – 50.0 A, Off
High Current Alarm	Range: 0.1 A – 50.0 A, Off
GFEP	Range: 30mA – 150 mA, +/-2.5% of Span or +/- 3mA
GFEP Alarm Condition	Alarm Only or Alarm & Trip. (These conditions are latching or non-latching)
Output on Sensor Failure	Mode Range: 0 – 100%, Bumpless Transfer to Manual Mode
Security	4 Levels of password protected security
Alarm State	Normal Operation: Closed (default), Open
Display, HMI, Indication	
Display	10 in. (25 cm) or 7 in. (18 cm) diagonal measurement, depending on the panel selection
Human Interface	Touchscreen Display

Alarms		
Alarm Types	Low & High Temperature, Low & High Current, High GFEP, Sensor Failure, Communications, Wireless Transmitter Battery	
Alarm Relay	5 Amps, Customer Supplied 2-30 VDC or 12-240 VAC	
Alarm Contact State	Mode	Default
	Normal Operation	Closed
	Alarm Condition	Open
	Power Off	Open
Communications		
ModBus	RTU/RS485 (2 or 4 wire), TCP/Ethernet	
Baud Rate, Hz	2400, 4800, 9600, 19200, 38400, 56000	
Parity	Range: Even, Odd, None	
ModBus ID	Range: 1 – 255	
BacNET	Available, Contact Sales	
Operating & Environmental		
Temperature	-40°F to 104°F (-40°C to 40°C) *Enclosure heater required for below 0°C (32°F)*	
Humidity	Relative Humidity 0% to 90%	
Power Supply	100-600 Vac 50/60Hz	
Protection	IEC IP66 (Front Panel)	
Enclosure Rating	NEMA 4 or Optional NEMA 4X 304SS	
Approvals	UL/cUL Ordinary and Class I, Division 2, Groups A,B,C,D Hazardous locations (UL file Number: E165116)	
Temperature Rating	T4 (Derate to T3 & Groups B,C,D when using enclosure heater)	

Default Settings

Below is the parameter settings chart organized by Menu Screen. It includes the default, minimum, maximum and/or the range of settings, where applicable.

Parameter	Default	Min	Max
Temperature Setpoint	0°F (-18°C)	-80°F (62°C)	1100°F (593°C)
Hi Temp Setpoint	200°F (93°C)	-80°F (62°C)	1100°F (593°C)
Lo Temp Setpoint	32°F (0°C)	-80°F (62°C)	1100°F (593°C)
HI Current	50 Amp	0.2 Amp	50 Amp
Lo Current	0.2 Amp	0 Amp	50 Amp
GFEP	30 mA	20 mA	150 mA
Control Mode	Manual	Manual	Auto
Output %	0	0	100
Integral	8	0	100
Derivative	2	0	500
PID or ON/OFF	On/OFF	PID	On/OFF
Soft Start	Enabled	Enabled	Disabled
Hold On Timer	5 minutes	0 minutes	600 minutes

Solar Shield Options

Equipment protection from the environment must be carefully considered when installing these systems outdoors. Both Solar Loading and UV Rays from the sun can impact the performance of these systems.

Chromalox offers optional industrial duty, heavy gage Stainless Steel canopy type Solar Shields

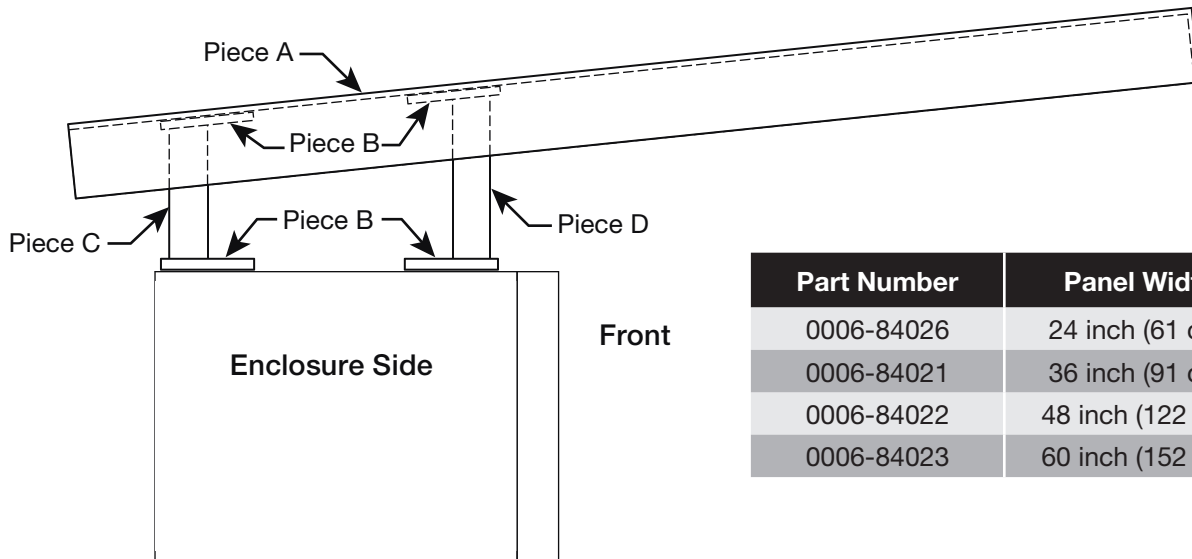
which provide solar load protection to the control panel enclosure itself. In addition, it also provides some UV protection to the HMI / Touchscreen.

The Solar Shield spans the entire width of the panel. Cut outs are provided for the Lifting Eye Hooks.

Construction includes:

Piece Description

- A 12 Gage x 30" (76 cm) x Panel Width - 304 SS Sheet for solar shield
- B 0.250" (6.5 mm) thick 304 SS plate for tubing base and cap
- C 1.0" (25 mm) 304 SS structural square support tubing



Part Number	Panel Width
0006-84026	24 inch (61 cm)
0006-84021	36 inch (91 cm)
0006-84022	48 inch (122 cm)
0006-84023	60 inch (152 cm)

HMI / Touchscreen Note:

The Solar Shield will provide some UV protection to the HMI / Touchscreen. However, without complete UV protection, the life of the HMI / Touchscreen will be compromised. For outdoor installations, Chromalox insists on installing an HMI Sunscreen to fully protect the HMI / Touchscreen from harmful

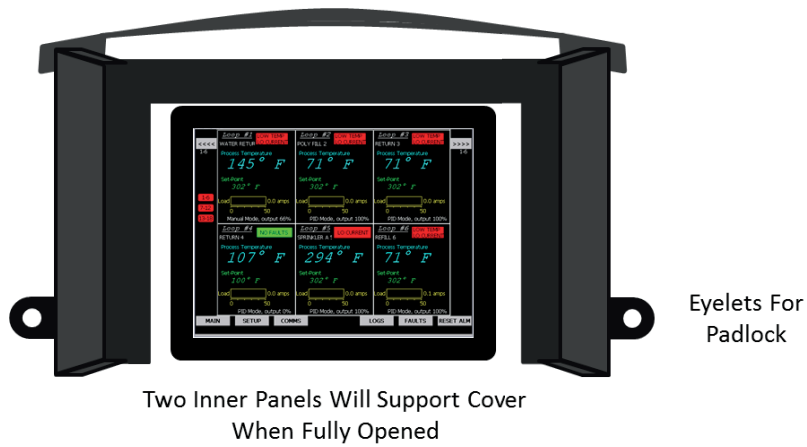
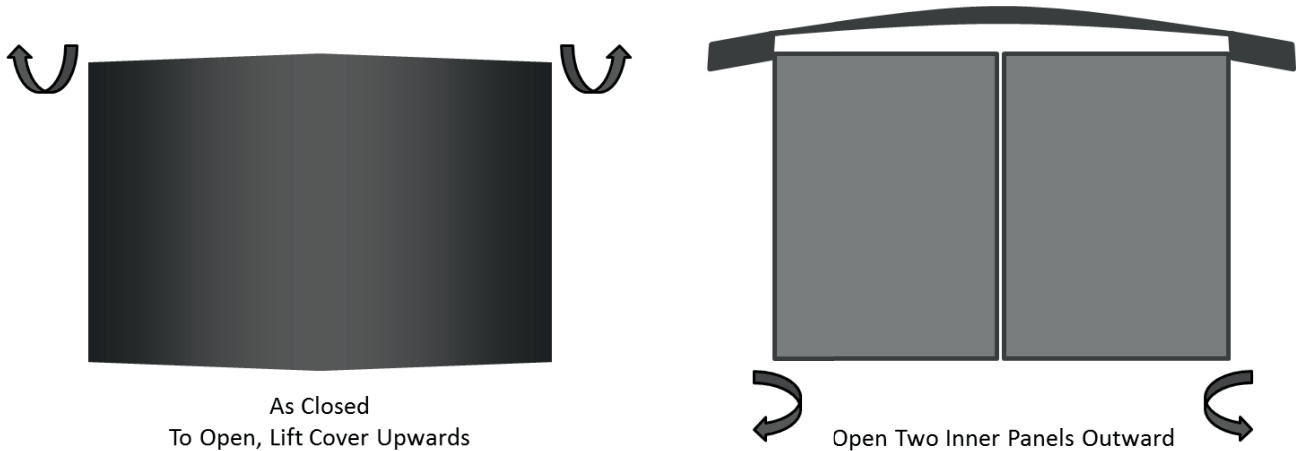
UV rays. HMI warranty claims will not be honored on outdoor installations which do not employ Chromalox-recommended Sunscreens.

See HMI Sunscreen Options.

HMI Sunscreen Options

The HMI Sunscreen provides complete protection from the harmful effects of UV Ray exposure. When installed properly, along with the supplied hardware and accessories, the NEMA 4/4X control panel rating is maintained.

The Sunscreen collapses nearly flush with the front of the enclosure when not in use and it may be secured shut with a common padlock.



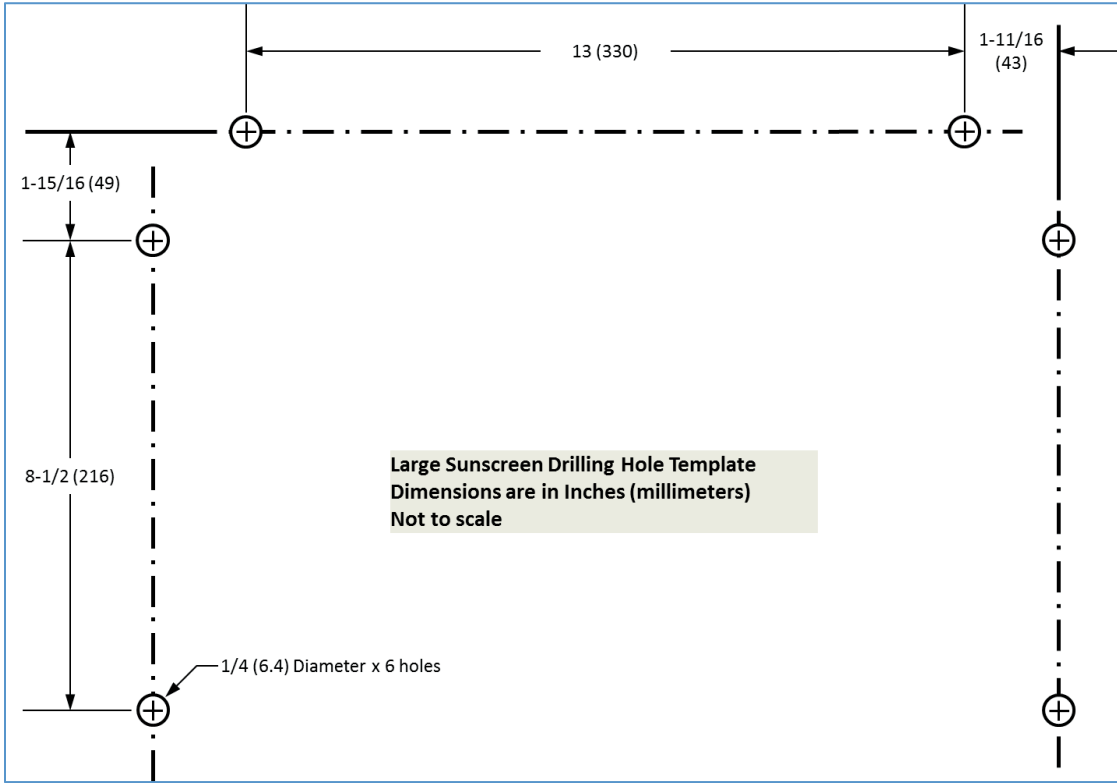
Part Number	Applicable Control Panel	Material
0076-15392	CIP-6-72	Painted Steel
0076-15488	CIP-2-4	Painted Steel

Retrofitting control panels with the HMI Sunscreen is done as follows:

1. Use the mounting template below to establish the drill hole locations.
2. Install the provided gas-tight sealing washers and sealing gasket along with the cap screws and nuts.

Field Installation

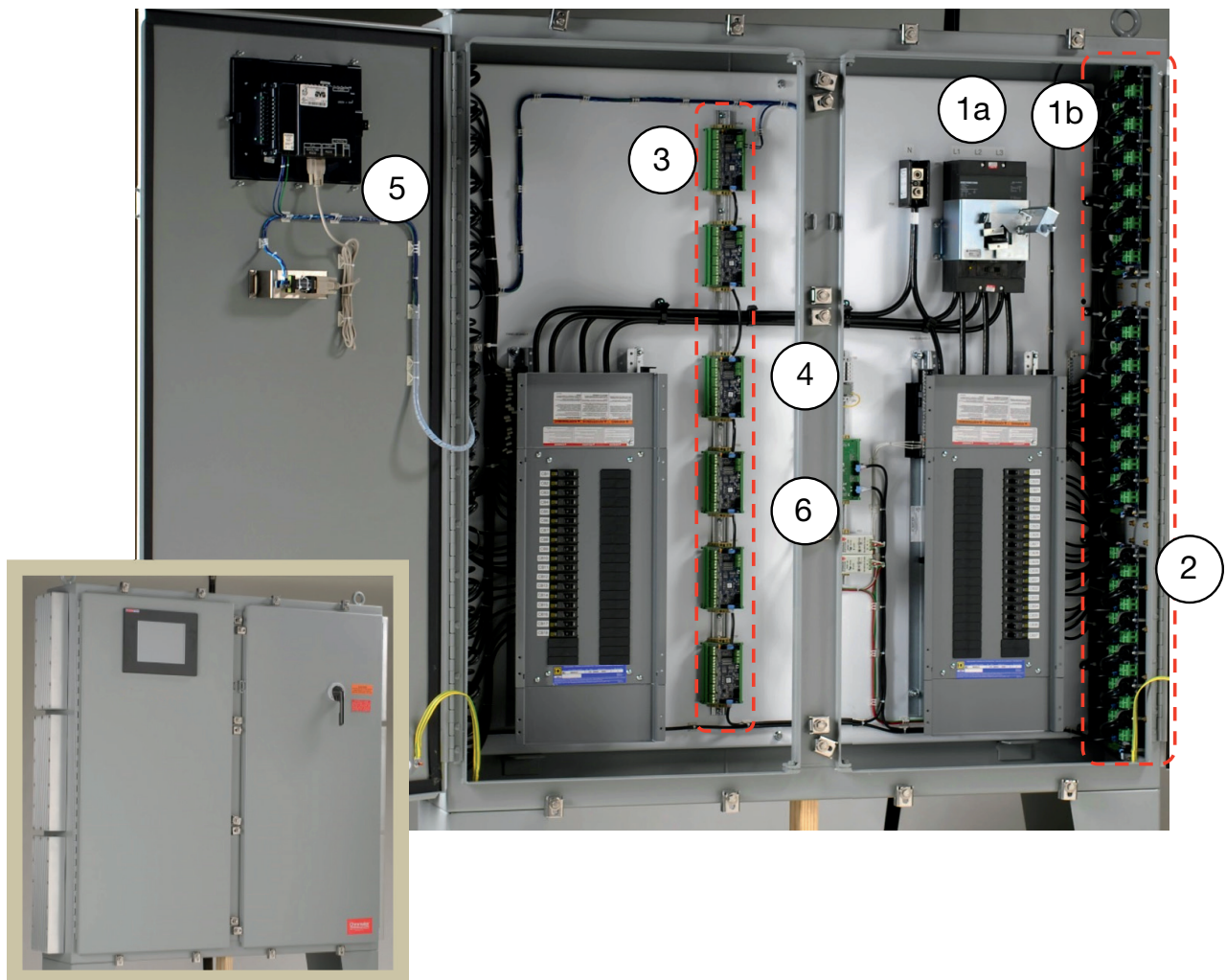
Below is the mounting template for the larger Sunscreen, 0076-15392 for the CIP-6-72 designs:



Wiring Considerations

All standard IntelliTRACE panels will have the same core components. Please see the table and pictures below to understand basic wiring needs. Refer to the wiring diagram(s) supplied with your specific panel for reference.

Item	Function	CIP	CIP-EXT	CIPC1D2	CIPC1D2-EXT
1a	Main Voltage Supply - In	X	X		
1b	Remote Voltage Distribution – In			X	X
2	Heaters - Out	X	X	X	X
3	Temperature Sensors (RTD) - In	X	X	X	X
4	Alarm - Out	X		X	
5	Communications - Out	X		X	
6	Extension Panel Connection	X	X	X	X



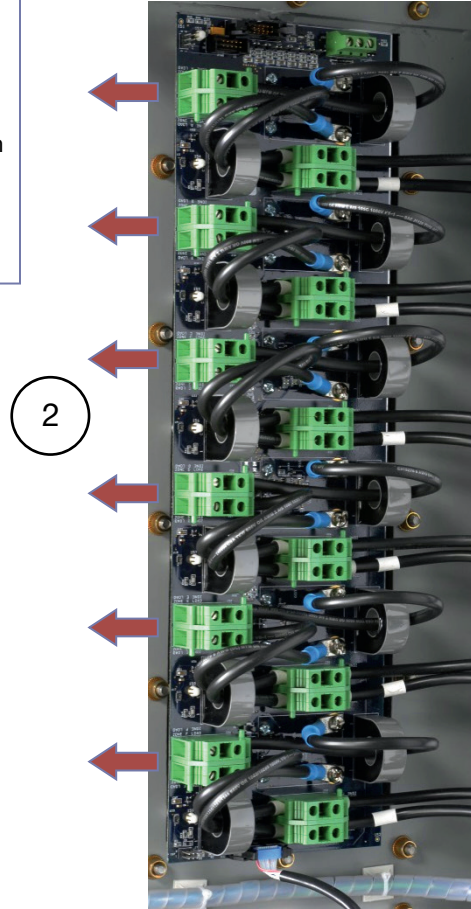
Heater (Load) – OUT

Heat Trace or Other Resistive Heater Loads are connected here.

Modules are labeled:

- Zone A is the first circuit on each module
- Zone F is the last circuit on each module

**Power Module (6 Pack)
Side/Rear Panel Mounted
(2-Pack Not Shown)**

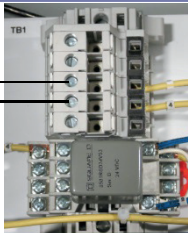


**Remote Voltage
Distribution – IN**

Unless an optional Z-Purge pressurization system is employed, Hazardous Area panels (C1D2) require wiring from a remote area (non-hazardous). Each circuit will need its own separate voltage feed.

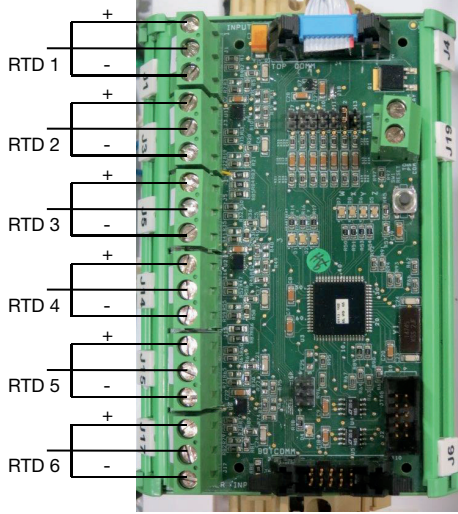
Non-Hazardous Area panels are pre-wired.

**Alarm Contact
DIN Rail Mounted**



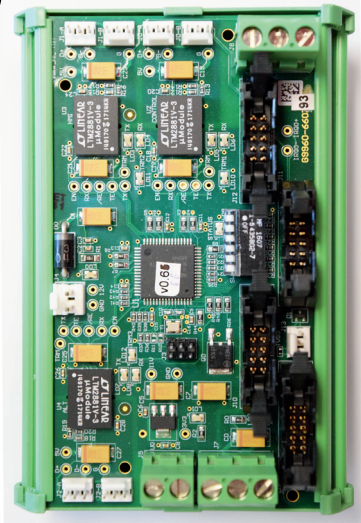
1a
1b

**Sensor Input Module
DIN Rail Mounted**



6 x 3 Pin & 1 x 2 Pin
Terminal Blocks

**Control/Distribution
Module
DIN Rail Mounted**



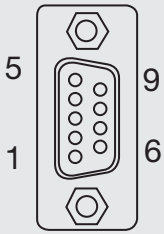
4 x 3 Pin & 2 x 2 Pin
Terminal Blocks

Appendix B

Modbus Wiring Connection for CIP Control Panels

RS-422/RS-485

D-Sub 9 Pin Plug Connector

Product Side	Pin No.	RS-422/RS485		Meaning
		Signal Name	Direction	
	1	RDA	Input	Receive Data A (+)
	2	RDB	Input	Receive Data B (-)
	3	SDA	Output	Send Data A (+)
	4	ERA	Output	Data Terminal Ready A (+)
	5	SG	—	Signal Ground
	6	CSB	Input	Send Possible B (-)
	7	SDB	Output	Send Data B (-)
	8	CSA	Input	Send Possible A (+)
	9	ERB	Output	Data Terminal Ready B (-)
	Shell	FG	—	Finctional Ground (Common with SG)

Interfit bracket is #4-40 (UNC)

Reccomendations:

- Cable Connector: XM3D-0921 manufactured by OMRON Coprporation
- Cable Cover: XM2S-0913 manufactured by OMRON Coprporation
- Jack Screw (#4-40 UNC): XM2Z-0073 manufactured by OMRON Coprporation

Modbus Wiring Connection for CIPC1D2 Control Panels

Modbus TCP

1. Connect Ethernet cable to the back of the HMI display
2. Press “Comm Settings” button on the System page
3. Go to Offline mode and touch [Main Unit] on the item changeover switch.
4. From the [Main Unit Settings] screen, touch [Ethernet Local Settings].
5. The [Ethernet Local Settings] screen opens. Touch the IP address input field to display the numeric touch keys and then enter an IP address. (For example, 192.168.0.1)

Note: For details about the IP address setting, ask your network administrator.

Screen Settings	Operation Settings	Display Settings	Menu and Error Settings	Window Settings
System Area Settings	Ethernet Local Settings			
Local Name:	[Input Field]			
IP Address:	◀ ▶ CLR ESC	192	168	0 1
Subnet Mask:	7 8 9	255	255	255 0
Port:	4 5 6	8000		
Gateway:	1 2 3	0	0	0 0
Auto Recogni:	1 2 3	<input checked="" type="radio"/> Enable <input type="radio"/> Disable		
Speed Setting:	0 +/- BS	<input checked="" type="radio"/> 100M <input type="radio"/> 10M		
Duplex Settings:		<input checked="" type="radio"/> Half <input type="radio"/> Full		
	Exit		Back	2006/05/22 02:02:16

6. Using the same steps, specify the [Subnet Mask], [Port], and [Gateway].
7. [Exit] saves the changes and restarts the display unit.

Description of Modbus Register Set

Table A
Modbus Function Code Set

Function Code	Function Name
03	Read Holding Registers
04	Read Input Registers
06	Write Single Holding Register
16	Write Multiple Holding Registers

Detailed Register Descriptions are on the following pages. See Table 1 & 2 for CIP 6 Registers and Table 3 & 4 for CIP 2-4 Registers.

Input Registers

Channel outputs can be disabled through use of the discrete output register set.

Table 1: CIP 6-72 Circuit Input Registers

Input Register Address	Name	Range	Format
300001	Temperature from Sensor 1	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300002	Temperature from Sensor 2	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300003	Temperature from Sensor 3	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300004	Temperature from Sensor 4	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300005	Temperature from Sensor 5	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300006	Temperature from Sensor 6	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300007	Temperature from Sensor 7	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300008	Temperature from Sensor 8	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300009	Temperature from Sensor 9	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300010	Temperature from Sensor 10	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300011	Temperature from Sensor 11	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300012	Temperature from Sensor 12	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300013	Temperature from Sensor 13	from -800 to 11001	expressed in tenth of deg e.g., 765 = 76.5°F
300014	Temperature from Sensor 14	from -800 to 11002	expressed in tenth of deg e.g., 765 = 76.5°F
300015	Temperature from Sensor 15	from -800 to 11003	expressed in tenth of deg e.g., 765 = 76.5°F
300016	Temperature from Sensor 16	from -800 to 11004	expressed in tenth of deg e.g., 765 = 76.5°F
300017	Temperature from Sensor 17	from -800 to 11005	expressed in tenth of deg e.g., 765 = 76.5°F
300018	Temperature from Sensor 18	from -800 to 11006	expressed in tenth of deg e.g., 765 = 76.5°F
300019	Temperature from Sensor 19	from -800 to 11007	expressed in tenth of deg e.g., 765 = 76.5°F
300020	Temperature from Sensor 20	from -800 to 11008	expressed in tenth of deg e.g., 765 = 76.5°F
300021	Temperature from Sensor 21	from -800 to 11009	expressed in tenth of deg e.g., 765 = 76.5°F
300022	Temperature from Sensor 22	from -800 to 11010	expressed in tenth of deg e.g., 765 = 76.5°F
300023	Temperature from Sensor 23	from -800 to 11011	expressed in tenth of deg e.g., 765 = 76.5°F
300024	Temperature from Sensor 24	from -800 to 11012	expressed in tenth of deg e.g., 765 = 76.5°F
300025	Temperature from Sensor 25	from -800 to 11013	expressed in tenth of deg e.g., 765 = 76.5°F

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300026	Temperature from Sensor 26	from -800 to 11014	expressed in tenth of deg e.g., 765 = 76.5°F
300027	Temperature from Sensor 27	from -800 to 11015	expressed in tenth of deg e.g., 765 = 76.5°F
300028	Temperature from Sensor 28	from -800 to 11016	expressed in tenth of deg e.g., 765 = 76.5°F
300029	Temperature from Sensor 29	from -800 to 11017	expressed in tenth of deg e.g., 765 = 76.5°F
300030	Temperature from Sensor 30	from -800 to 11018	expressed in tenth of deg e.g., 765 = 76.5°F
300031	Temperature from Sensor 31	from -800 to 11019	expressed in tenth of deg e.g., 765 = 76.5°F
300032	Temperature from Sensor 32	from -800 to 11020	expressed in tenth of deg e.g., 765 = 76.5°F
300033	Temperature from Sensor 33	from -800 to 11021	expressed in tenth of deg e.g., 765 = 76.5°F
300034	Temperature from Sensor 34	from -800 to 11022	expressed in tenth of deg e.g., 765 = 76.5°F
300035	Temperature from Sensor 35	from -800 to 11023	expressed in tenth of deg e.g., 765 = 76.5°F
300036	Temperature from Sensor 36	from -800 to 11024	expressed in tenth of deg e.g., 765 = 76.5°F
300037	Temperature from Sensor 37	from -800 to 11025	expressed in tenth of deg e.g., 765 = 76.5°F
300038	Temperature from Sensor 38	from -800 to 11026	expressed in tenth of deg e.g., 765 = 76.5°F
300039	Temperature from Sensor 39	from -800 to 11027	expressed in tenth of deg e.g., 765 = 76.5°F
300040	Temperature from Sensor 40	from -800 to 11028	expressed in tenth of deg e.g., 765 = 76.5°F
300041	Temperature from Sensor 41	from -800 to 11029	expressed in tenth of deg e.g., 765 = 76.5°F
300042	Temperature from Sensor 42	from -800 to 11030	expressed in tenth of deg e.g., 765 = 76.5°F
300043	Temperature from Sensor 43	from -800 to 11031	expressed in tenth of deg e.g., 765 = 76.5°F
300044	Temperature from Sensor 44	from -800 to 11032	expressed in tenth of deg e.g., 765 = 76.5°F
300045	Temperature from Sensor 45	from -800 to 11033	expressed in tenth of deg e.g., 765 = 76.5°F
300046	Temperature from Sensor 46	from -800 to 11034	expressed in tenth of deg e.g., 765 = 76.5°F
300047	Temperature from Sensor 47	from -800 to 11035	expressed in tenth of deg e.g., 765 = 76.5°F
300048	Temperature from Sensor 48	from -800 to 11036	expressed in tenth of deg e.g., 765 = 76.5°F
300049	Temperature from Sensor 49	from -800 to 11037	expressed in tenth of deg e.g., 765 = 76.5°F
300050	Temperature from Sensor 50	from -800 to 11038	expressed in tenth of deg e.g., 765 = 76.5°F
300051	Temperature from Sensor 51	from -800 to 11039	expressed in tenth of deg e.g., 765 = 76.5°F
300052	Temperature from Sensor 52	from -800 to 11040	expressed in tenth of deg e.g., 765 = 76.5°F
300053	Temperature from Sensor 53	from -800 to 11041	expressed in tenth of deg e.g., 765 = 76.5°F
300054	Temperature from Sensor 54	from -800 to 11042	expressed in tenth of deg e.g., 765 = 76.5°F
300055	Temperature from Sensor 55	from -800 to 11043	expressed in tenth of deg e.g., 765 = 76.5°F
300056	Temperature from Sensor 56	from -800 to 11044	expressed in tenth of deg e.g., 765 = 76.5°F
300057	Temperature from Sensor 57	from -800 to 11045	expressed in tenth of deg e.g., 765 = 76.5°F
300058	Temperature from Sensor 58	from -800 to 11046	expressed in tenth of deg e.g., 765 = 76.5°F
300059	Temperature from Sensor 59	from -800 to 11047	expressed in tenth of deg e.g., 765 = 76.5°F
300060	Temperature from Sensor 60	from -800 to 11048	expressed in tenth of deg e.g., 765 = 76.5°F
300061	Temperature from Sensor 61	from -800 to 11049	expressed in tenth of deg e.g., 765 = 76.5°F
300062	Temperature from Sensor 62	from -800 to 11050	expressed in tenth of deg e.g., 765 = 76.5°F
300063	Temperature from Sensor 63	from -800 to 11051	expressed in tenth of deg e.g., 765 = 76.5°F
300064	Temperature from Sensor 64	from -800 to 11052	expressed in tenth of deg e.g., 765 = 76.5°F
300065	Temperature from Sensor 65	from -800 to 11053	expressed in tenth of deg e.g., 765 = 76.5°F
300066	Temperature from Sensor 66	from -800 to 11054	expressed in tenth of deg e.g., 765 = 76.5°F

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300067	Temperature from Sensor 67	from -800 to 11055	expressed in tenth of deg e.g., 765 = 76.5°F
300068	Temperature from Sensor 68	from -800 to 11056	expressed in tenth of deg e.g., 765 = 76.5°F
300069	Temperature from Sensor 69	from -800 to 11057	expressed in tenth of deg e.g., 765 = 76.5°F
300070	Temperature from Sensor 70	from -800 to 11058	expressed in tenth of deg e.g., 765 = 76.5°F
300071	Temperature from Sensor 71	from -800 to 11059	expressed in tenth of deg e.g., 765 = 76.5°F
300072	Temperature from Sensor 72	from -800 to 11060	expressed in tenth of deg e.g., 765 = 76.5°F
300073	Load current 1	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300074	Load current 2	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300075	Load current 3	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300076	Load current 4	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300077	Load current 5	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300078	Load current 6	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300079	Load current 7	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300080	Load current 8	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300081	Load current 9	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300082	Load current 10	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300083	Load current 11	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300084	Load current 12	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300085	Load current 13	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300086	Load current 14	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300087	Load current 15	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300088	Load current 16	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300089	Load current 17	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300090	Load current 18	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300091	Load current 19	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300092	Load current 20	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300093	Load current 21	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300094	Load current 22	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300095	Load current 23	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300096	Load current 24	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300097	Load current 25	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300098	Load current 26	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300099	Load current 27	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300100	Load current 28	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300101	Load current 29	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300102	Load current 30	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300103	Load current 31	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300104	Load current 32	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300105	Load current 33	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300106	Load current 34	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps
300107	Load current 35	from 0 to 50.0 Amps	expressed in tenth of Amps e.g., 56 = 5.6 Amps

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300149	GFEP current 5	from 30 to 150 mA	expressed in mA
300150	GFEP current 6	from 30 to 150 mA	expressed in mA
300151	GFEP current 7	from 30 to 150 mA	expressed in mA
300152	GFEP current 8	from 30 to 150 mA	expressed in mA
300153	GFEP current 9	from 30 to 150 mA	expressed in mA
300154	GFEP current 10	from 30 to 150 mA	expressed in mA
300155	GFEP current 11	from 30 to 150 mA	expressed in mA
300156	GFEP current 12	from 30 to 150 mA	expressed in mA
300157	GFEP current 13	from 30 to 150 mA	expressed in mA
300158	GFEP current 14	from 30 to 150 mA	expressed in mA
300159	GFEP current 15	from 30 to 150 mA	expressed in mA
300160	GFEP current 16	from 30 to 150 mA	expressed in mA
300161	GFEP current 17	from 30 to 150 mA	expressed in mA
300162	GFEP current 18	from 30 to 150 mA	expressed in mA
300163	GFEP current 19	from 30 to 150 mA	expressed in mA
300164	GFEP current 20	from 30 to 150 mA	expressed in mA
300165	GFEP current 21	from 30 to 150 mA	expressed in mA
300166	GFEP current 22	from 30 to 150 mA	expressed in mA
300167	GFEP current 23	from 30 to 150 mA	expressed in mA
300168	GFEP current 24	from 30 to 150 mA	expressed in mA
300169	GFEP current 25	from 30 to 150 mA	expressed in mA
300170	GFEP current 26	from 30 to 150 mA	expressed in mA
300171	GFEP current 27	from 30 to 150 mA	expressed in mA
300172	GFEP current 28	from 30 to 150 mA	expressed in mA
300173	GFEP current 29	from 30 to 150 mA	expressed in mA
300174	GFEP current 30	from 30 to 150 mA	expressed in mA
300175	GFEP current 31	from 30 to 150 mA	expressed in mA
300176	GFEP current 32	from 30 to 150 mA	expressed in mA
300177	GFEP current 33	from 30 to 150 mA	expressed in mA
300178	GFEP current 34	from 30 to 150 mA	expressed in mA
300179	GFEP current 35	from 30 to 150 mA	expressed in mA
300180	GFEP current 36	from 30 to 150 mA	expressed in mA
300181	GFEP current 37	from 30 to 150 mA	expressed in mA
300182	GFEP current 38	from 30 to 150 mA	expressed in mA
300183	GFEP current 39	from 30 to 150 mA	expressed in mA
300184	GFEP current 40	from 30 to 150 mA	expressed in mA
300185	GFEP current 41	from 30 to 150 mA	expressed in mA
300186	GFEP current 42	from 30 to 150 mA	expressed in mA
300187	GFEP current 43	from 30 to 150 mA	expressed in mA
300188	GFEP current 44	from 30 to 150 mA	expressed in mA
300189	GFEP current 45	from 30 to 150 mA	expressed in mA

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300190	GFEP current 46	from 30 to 150 mA	expressed in mA
300191	GFEP current 47	from 30 to 150 mA	expressed in mA
300192	GFEP current 48	from 30 to 150 mA	expressed in mA
300193	GFEP current 49	from 30 to 150 mA	expressed in mA
300194	GFEP current 50	from 30 to 150 mA	expressed in mA
300195	GFEP current 51	from 30 to 150 mA	expressed in mA
300196	GFEP current 52	from 30 to 150 mA	expressed in mA
300197	GFEP current 53	from 30 to 150 mA	expressed in mA
300198	GFEP current 54	from 30 to 150 mA	expressed in mA
300199	GFEP current 55	from 30 to 150 mA	expressed in mA
300200	GFEP current 56	from 30 to 150 mA	expressed in mA
300201	GFEP current 57	from 30 to 150 mA	expressed in mA
300202	GFEP current 58	from 30 to 150 mA	expressed in mA
300203	GFEP current 59	from 30 to 150 mA	expressed in mA
300204	GFEP current 60	from 30 to 150 mA	expressed in mA
300205	GFEP current 61	from 30 to 150 mA	expressed in mA
300206	GFEP current 62	from 30 to 150 mA	expressed in mA
300207	GFEP current 63	from 30 to 150 mA	expressed in mA
300208	GFEP current 64	from 30 to 150 mA	expressed in mA
300209	GFEP current 65	from 30 to 150 mA	expressed in mA
300210	GFEP current 66	from 30 to 150 mA	expressed in mA
300211	GFEP current 67	from 30 to 150 mA	expressed in mA
300212	GFEP current 68	from 30 to 150 mA	expressed in mA
300213	GFEP current 69	from 30 to 150 mA	expressed in mA
300214	GFEP current 70	from 30 to 150 mA	expressed in mA
300215	GFEP current 71	from 30 to 150 mA	expressed in mA
300216	GFEP current 72	from 30 to 150 mA	expressed in mA
300217	Output Demand 1	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300218	Output Demand 2	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300219	Output Demand 3	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300220	Output Demand 4	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300221	Output Demand 5	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300222	Output Demand 6	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300223	Output Demand 7	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300224	Output Demand 8	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300225	Output Demand 9	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300226	Output Demand 10	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300227	Output Demand 11	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300228	Output Demand 12	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300229	Output Demand 13	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300230	Output Demand 14	0-1000	expressed in tenth of % e.g., 500 = 50.0 %

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300231	Output Demand 15	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300232	Output Demand 16	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300233	Output Demand 17	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300234	Output Demand 18	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300235	Output Demand 19	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300236	Output Demand 20	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300237	Output Demand 21	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300238	Output Demand 22	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300239	Output Demand 23	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300240	Output Demand 24	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300241	Output Demand 25	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300242	Output Demand 26	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300243	Output Demand 27	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300244	Output Demand 28	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300245	Output Demand 29	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300246	Output Demand 30	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300247	Output Demand 31	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300248	Output Demand 32	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300249	Output Demand 33	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300250	Output Demand 34	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300251	Output Demand 35	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300252	Output Demand 36	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300253	Output Demand 37	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300254	Output Demand 38	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300255	Output Demand 39	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300256	Output Demand 40	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300257	Output Demand 41	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300258	Output Demand 42	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300259	Output Demand 43	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300260	Output Demand 44	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300261	Output Demand 45	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300262	Output Demand 46	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300263	Output Demand 47	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300264	Output Demand 48	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300265	Output Demand 49	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300266	Output Demand 50	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300267	Output Demand 51	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300268	Output Demand 52	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300269	Output Demand 53	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300270	Output Demand 54	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300271	Output Demand 55	0-1000	expressed in tenth of % e.g., 500 = 50.0 %

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300272	Output Demand 56	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300273	Output Demand 57	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300274	Output Demand 58	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300275	Output Demand 59	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300276	Output Demand 60	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300277	Output Demand 61	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300278	Output Demand 62	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300279	Output Demand 63	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300280	Output Demand 64	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300281	Output Demand 65	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300282	Output Demand 66	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300283	Output Demand 67	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300284	Output Demand 68	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300285	Output Demand 69	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300286	Output Demand 70	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300287	Output Demand 71	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300288	Output Demand 72	0-1000	expressed in tenth of % e.g., 500 = 50.0 %
300289	Temperature circuit 1	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300290	Temperature circuit 2	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300291	Temperature circuit 3	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300292	Temperature circuit 4	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300293	Temperature circuit 5	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300294	Temperature circuit 6	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300295	Temperature circuit 7	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300296	Temperature circuit 8	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300297	Temperature circuit 9	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300298	Temperature circuit 10	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300299	Temperature circuit 11	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300300	Temperature circuit 12	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300301	Temperature circuit 13	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300302	Temperature circuit 14	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300303	Temperature circuit 15	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300304	Temperature circuit 16	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300305	Temperature circuit 17	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300306	Temperature circuit 18	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300307	Temperature circuit 19	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300308	Temperature circuit 20	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300309	Temperature circuit 21	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300310	Temperature circuit 22	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300311	Temperature circuit 23	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300312	Temperature circuit 24	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300354	Temperature circuit 66	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300355	Temperature circuit 67	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300356	Temperature circuit 68	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300357	Temperature circuit 69	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300358	Temperature circuit 70	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300359	Temperature circuit 71	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300360	Temperature circuit 72	from -800 to 11000	expressed in tenth of deg e.g., 765 = 76.5°F
300951	Snow detected ckt # 1	1- snow present; 0 - snow not detected	16 bit unsigned int
300952	Snow detected ckt # 2	1- snow present; 0 - snow not detected	16 bit unsigned int
300953	Snow detected ckt # 3	1- snow present; 0 - snow not detected	16 bit unsigned int
300954	Snow detected ckt # 4	1- snow present; 0 - snow not detected	16 bit unsigned int
300955	Snow detected ckt # 5	1- snow present; 0 - snow not detected	16 bit unsigned int
300956	Snow detected ckt # 6	1- snow present; 0 - snow not detected	16 bit unsigned int
300957	Snow detected ckt # 7	1- snow present; 0 - snow not detected	16 bit unsigned int
300958	Snow detected ckt # 8	1- snow present; 0 - snow not detected	16 bit unsigned int
300959	Snow detected ckt # 9	1- snow present; 0 - snow not detected	16 bit unsigned int
300960	Snow detected ckt # 10	1- snow present; 0 - snow not detected	16 bit unsigned int
300961	Snow detected ckt # 11	1- snow present; 0 - snow not detected	16 bit unsigned int
300962	Snow detected ckt # 12	1- snow present; 0 - snow not detected	16 bit unsigned int
300963	Snow detected ckt # 13	1- snow present; 0 - snow not detected	16 bit unsigned int
300964	Snow detected ckt # 14	1- snow present; 0 - snow not detected	16 bit unsigned int
300965	Snow detected ckt # 15	1- snow present; 0 - snow not detected	16 bit unsigned int
300966	Snow detected ckt # 16	1- snow present; 0 - snow not detected	16 bit unsigned int
300967	Snow detected ckt # 17	1- snow present; 0 - snow not detected	16 bit unsigned int
300968	Snow detected ckt # 18	1- snow present; 0 - snow not detected	16 bit unsigned int
300969	Snow detected ckt # 19	1- snow present; 0 - snow not detected	16 bit unsigned int
300970	Snow detected ckt # 20	1- snow present; 0 - snow not detected	16 bit unsigned int
300971	Snow detected ckt # 21	1- snow present; 0 - snow not detected	16 bit unsigned int
300972	Snow detected ckt # 22	1- snow present; 0 - snow not detected	16 bit unsigned int
300973	Snow detected ckt # 23	1- snow present; 0 - snow not detected	16 bit unsigned int
300974	Snow detected ckt # 24	1- snow present; 0 - snow not detected	16 bit unsigned int
300975	Snow detected ckt # 25	1- snow present; 0 - snow not detected	16 bit unsigned int
300976	Snow detected ckt # 26	1- snow present; 0 - snow not detected	16 bit unsigned int
300977	Snow detected ckt # 27	1- snow present; 0 - snow not detected	16 bit unsigned int
300978	Snow detected ckt # 28	1- snow present; 0 - snow not detected	16 bit unsigned int
300979	Snow detected ckt # 29	1- snow present; 0 - snow not detected	16 bit unsigned int
300980	Snow detected ckt # 30	1- snow present; 0 - snow not detected	16 bit unsigned int
300981	Snow detected ckt # 31	1- snow present; 0 - snow not detected	16 bit unsigned int
300982	Snow detected ckt # 32	1- snow present; 0 - snow not detected	16 bit unsigned int
300983	Snow detected ckt # 33	1- snow present; 0 - snow not detected	16 bit unsigned int
300984	Snow detected ckt # 34	1- snow present; 0 - snow not detected	16 bit unsigned int

Input Registers, cont'd.

Input Register Address	Name	Range	Format
301149	Snow sensor communication error #55	1- error, 0- OK	16 bit unsigned int
301150	Snow sensor communication error #56	1- error, 0- OK	16 bit unsigned int
301151	Snow sensor communication error #57	1- error, 0- OK	16 bit unsigned int
301152	Snow sensor communication error #58	1- error, 0- OK	16 bit unsigned int
301153	Snow sensor communication error #59	1- error, 0- OK	16 bit unsigned int
301154	Snow sensor communication error #60	1- error, 0- OK	16 bit unsigned int
301155	Snow sensor communication error #61	1- error, 0- OK	16 bit unsigned int
301156	Snow sensor communication error #62	1- error, 0- OK	16 bit unsigned int
301157	Snow sensor communication error #63	1- error, 0- OK	16 bit unsigned int
301158	Snow sensor communication error #64	1- error, 0- OK	16 bit unsigned int
301159	Snow sensor communication error #65	1- error, 0- OK	16 bit unsigned int
301160	Snow sensor communication error #66	1- error, 0- OK	16 bit unsigned int
301161	Snow sensor communication error #67	1- error, 0- OK	16 bit unsigned int
301162	Snow sensor communication error #68	1- error, 0- OK	16 bit unsigned int
301163	Snow sensor communication error #69	1- error, 0- OK	16 bit unsigned int
301164	Snow sensor communication error #70	1- error, 0- OK	16 bit unsigned int
301165	Snow sensor communication error #71	1- error, 0- OK	16 bit unsigned int
301166	Snow sensor communication error #72	1- error, 0- OK	16 bit unsigned int

Holding Registers

Table 2: CIP 6-72 Circuit Holding Registers

Holding Register Address	Name	Range	Format
400001	Setpoint 1	from -80 to 1100 F	expressed as integer number
400002	Setpoint 2	from -80 to 1100 F	expressed as integer number
400003	Setpoint 3	from -80 to 1100 F	expressed as integer number
400004	Setpoint 4	from -80 to 1100°F	expressed as integer number
400005	Setpoint 5	from -80 to 1100 F	expressed as integer number
400006	Setpoint 6	from -80 to 1100 F	expressed as integer number
400007	Setpoint 7	from -80 to 1100 F	expressed as integer number
400008	Setpoint 8	from -80 to 1100 F	expressed as integer number
400009	Setpoint 9	from -80 to 1100 F	expressed as integer number
400010	Setpoint 10	from -80 to 1100 F	expressed as integer number
400011	Setpoint 11	from -80 to 1100 F	expressed as integer number
400012	Setpoint 12	from -80 to 1100 F	expressed as integer number
400013	Setpoint 13	from -80 to 1100 F	expressed as integer number
400014	Setpoint 14	from -80 to 1100 F	expressed as integer number
400015	Setpoint 15	from -80 to 1100 F	expressed as integer number
400016	Setpoint 16	from -80 to 1100 F	expressed as integer number
400017	Setpoint 17	from -80 to 1100 F	expressed as integer number
400018	Setpoint 18	from -80 to 1100 F	expressed as integer number
400019	Setpoint 19	from -80 to 1100 F	expressed as integer number
400020	Setpoint 20	from -80 to 1100 F	expressed as integer number
400021	Setpoint 21	from -80 to 1100 F	expressed as integer number
400022	Setpoint 22	from -80 to 1100 F	expressed as integer number
400023	Setpoint 23	from -80 to 1100 F	expressed as integer number
400024	Setpoint 24	from -80 to 1100 F	expressed as integer number
400025	Setpoint 25	from -80 to 1100 F	expressed as integer number
400026	Setpoint 26	from -80 to 1100 F	expressed as integer number
400027	Setpoint 27	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400028	Setpoint 28	from -80 to 1100 F	expressed as integer number
400029	Setpoint 29	from -80 to 1100 F	expressed as integer number
400030	Setpoint 30	from -80 to 1100 F	expressed as integer number
400031	Setpoint 31	from -80 to 1100 F	expressed as integer number
400032	Setpoint 32	from -80 to 1100 F	expressed as integer number
400033	Setpoint 33	from -80 to 1100 F	expressed as integer number
400034	Setpoint 34	from -80 to 1100 F	expressed as integer number
400035	Setpoint 35	from -80 to 1100 F	expressed as integer number
400036	Setpoint 36	from -80 to 1100 F	expressed as integer number
400037	Setpoint 37	from -80 to 1100 F	expressed as integer number
400038	Setpoint 38	from -80 to 1100 F	expressed as integer number
400039	Setpoint 39	from -80 to 1100 F	expressed as integer number
400040	Setpoint 40	from -80 to 1100 F	expressed as integer number
400041	Setpoint 41	from -80 to 1100 F	expressed as integer number
400042	Setpoint 42	from -80 to 1100 F	expressed as integer number
400043	Setpoint 43	from -80 to 1100 F	expressed as integer number
400044	Setpoint 44	from -80 to 1100 F	expressed as integer number
400045	Setpoint 45	from -80 to 1100 F	expressed as integer number
400046	Setpoint 46	from -80 to 1100 F	expressed as integer number
400047	Setpoint 47	from -80 to 1100 F	expressed as integer number
400048	Setpoint 48	from -80 to 1100 F	expressed as integer number
400049	Setpoint 49	from -80 to 1100 F	expressed as integer number
400050	Setpoint 50	from -80 to 1100 F	expressed as integer number
400051	Setpoint 51	from -80 to 1100 F	expressed as integer number
400052	Setpoint 52	from -80 to 1100 F	expressed as integer number
400053	Setpoint 53	from -80 to 1100 F	expressed as integer number
400054	Setpoint 54	from -80 to 1100 F	expressed as integer number
400055	Setpoint 55	from -80 to 1100 F	expressed as integer number
400056	Setpoint 56	from -80 to 1100 F	expressed as integer number
400057	Setpoint 57	from -80 to 1100 F	expressed as integer number
400058	Setpoint 58	from -80 to 1100 F	expressed as integer number
400059	Setpoint 59	from -80 to 1100 F	expressed as integer number
400060	Setpoint 60	from -80 to 1100 F	expressed as integer number
400061	Setpoint 61	from -80 to 1100 F	expressed as integer number
400062	Setpoint 62	from -80 to 1100 F	expressed as integer number
400063	Setpoint 63	from -80 to 1100 F	expressed as integer number
400064	Setpoint 64	from -80 to 1100 F	expressed as integer number
400065	Setpoint 65	from -80 to 1100 F	expressed as integer number
400066	Setpoint 66	from -80 to 1100 F	expressed as integer number
400067	Setpoint 67	from -80 to 1100 F	expressed as integer number
400068	Setpoint 68	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400069	Setpoint 69	from -80 to 1100 F	expressed as integer number
400070	Setpoint 70	from -80 to 1100 F	expressed as integer number
400071	Setpoint 71	from -80 to 1100 F	expressed as integer number
400072	Setpoint 72	from -80 to 1100 F	expressed as integer number
400073	Default Output Demand 1	0-100	expressed as integer number
400074	Default Output Demand 2	0-100	expressed as integer number
400075	Default Output Demand 3	0-100	expressed as integer number
400076	Default Output Demand 4	0-100	expressed as integer number
400077	Default Output Demand 5	0-100	expressed as integer number
400078	Default Output Demand 6	0-100	expressed as integer number
400079	Default Output Demand 7	0-100	expressed as integer number
400080	Default Output Demand 8	0-100	expressed as integer number
400081	Default Output Demand 9	0-100	expressed as integer number
400082	Default Output Demand 10	0-100	expressed as integer number
400083	Default Output Demand 11	0-100	expressed as integer number
400084	Default Output Demand 12	0-100	expressed as integer number
400085	Default Output Demand 13	0-100	expressed as integer number
400086	Default Output Demand 14	0-100	expressed as integer number
400087	Default Output Demand 15	0-100	expressed as integer number
400088	Default Output Demand 16	0-100	expressed as integer number
400089	Default Output Demand 17	0-100	expressed as integer number
400090	Default Output Demand 18	0-100	expressed as integer number
400091	Default Output Demand 19	0-100	expressed as integer number
400092	Default Output Demand 20	0-100	expressed as integer number
400093	Default Output Demand 21	0-100	expressed as integer number
400094	Default Output Demand 22	0-100	expressed as integer number
400095	Default Output Demand 23	0-100	expressed as integer number
400096	Default Output Demand 24	0-100	expressed as integer number
400097	Default Output Demand 25	0-100	expressed as integer number
400098	Default Output Demand 26	0-100	expressed as integer number
400099	Default Output Demand 27	0-100	expressed as integer number
400100	Default Output Demand 28	0-100	expressed as integer number
400101	Default Output Demand 29	0-100	expressed as integer number
400102	Default Output Demand 30	0-100	expressed as integer number
400103	Default Output Demand 31	0-100	expressed as integer number
400104	Default Output Demand 32	0-100	expressed as integer number
400105	Default Output Demand 33	0-100	expressed as integer number
400106	Default Output Demand 34	0-100	expressed as integer number
400107	Default Output Demand 35	0-100	expressed as integer number
400108	Default Output Demand 36	0-100	expressed as integer number
400109	Default Output Demand 37	0-100	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400110	Default Output Demand 38	0-100	expressed as integer number
400111	Default Output Demand 39	0-100	expressed as integer number
400112	Default Output Demand 40	0-100	expressed as integer number
400113	Default Output Demand 41	0-100	expressed as integer number
400114	Default Output Demand 42	0-100	expressed as integer number
400115	Default Output Demand 43	0-100	expressed as integer number
400116	Default Output Demand 44	0-100	expressed as integer number
400117	Default Output Demand 45	0-100	expressed as integer number
400118	Default Output Demand 46	0-100	expressed as integer number
400119	Default Output Demand 47	0-100	expressed as integer number
400120	Default Output Demand 48	0-100	expressed as integer number
400121	Default Output Demand 49	0-100	expressed as integer number
400122	Default Output Demand 50	0-100	expressed as integer number
400123	Default Output Demand 51	0-100	expressed as integer number
400124	Default Output Demand 52	0-100	expressed as integer number
400125	Default Output Demand 53	0-100	expressed as integer number
400126	Default Output Demand 54	0-100	expressed as integer number
400127	Default Output Demand 55	0-100	expressed as integer number
400128	Default Output Demand 56	0-100	expressed as integer number
400129	Default Output Demand 57	0-100	expressed as integer number
400130	Default Output Demand 58	0-100	expressed as integer number
400131	Default Output Demand 59	0-100	expressed as integer number
400132	Default Output Demand 60	0-100	expressed as integer number
400133	Default Output Demand 61	0-100	expressed as integer number
400134	Default Output Demand 62	0-100	expressed as integer number
400135	Default Output Demand 63	0-100	expressed as integer number
400136	Default Output Demand 64	0-100	expressed as integer number
400137	Default Output Demand 65	0-100	expressed as integer number
400138	Default Output Demand 66	0-100	expressed as integer number
400139	Default Output Demand 67	0-100	expressed as integer number
400140	Default Output Demand 68	0-100	expressed as integer number
400141	Default Output Demand 69	0-100	expressed as integer number
400142	Default Output Demand 70	0-100	expressed as integer number
400143	Default Output Demand 71	0-100	expressed as integer number
400144	Default Output Demand 72	0-100	expressed as integer number
400145	Proportional Band 1	0-100	expressed as integer number
400146	Proportional Band 2	0-100	expressed as integer number
400147	Proportional Band 3	0-100	expressed as integer number
400148	Proportional Band 4	0-100	expressed as integer number
400149	Proportional Band 5	0-100	expressed as integer number
400150	Proportional Band 6	0-100	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400151	Proportional Band 7	0-100	expressed as integer number
400152	Proportional Band 8	0-100	expressed as integer number
400153	Proportional Band 9	0-100	expressed as integer number
400154	Proportional Band 10	0-100	expressed as integer number
400155	Proportional Band 11	0-100	expressed as integer number
400156	Proportional Band 12	0-100	expressed as integer number
400157	Proportional Band 13	0-100	expressed as integer number
400158	Proportional Band 14	0-100	expressed as integer number
400159	Proportional Band 15	0-100	expressed as integer number
400160	Proportional Band 16	0-100	expressed as integer number
400161	Proportional Band 17	0-100	expressed as integer number
400162	Proportional Band 18	0-100	expressed as integer number
400163	Proportional Band 19	0-100	expressed as integer number
400164	Proportional Band 20	0-100	expressed as integer number
400165	Proportional Band 21	0-100	expressed as integer number
400166	Proportional Band 22	0-100	expressed as integer number
400167	Proportional Band 23	0-100	expressed as integer number
400168	Proportional Band 24	0-100	expressed as integer number
400169	Proportional Band 25	0-100	expressed as integer number
400170	Proportional Band 26	0-100	expressed as integer number
400171	Proportional Band 27	0-100	expressed as integer number
400172	Proportional Band 28	0-100	expressed as integer number
400173	Proportional Band 29	0-100	expressed as integer number
400174	Proportional Band 30	0-100	expressed as integer number
400175	Proportional Band 31	0-100	expressed as integer number
400176	Proportional Band 32	0-100	expressed as integer number
400177	Proportional Band 33	0-100	expressed as integer number
400178	Proportional Band 34	0-100	expressed as integer number
400179	Proportional Band 35	0-100	expressed as integer number
400180	Proportional Band 36	0-100	expressed as integer number
400181	Proportional Band 37	0-100	expressed as integer number
400182	Proportional Band 38	0-100	expressed as integer number
400183	Proportional Band 39	0-100	expressed as integer number
400184	Proportional Band 40	0-100	expressed as integer number
400185	Proportional Band 41	0-100	expressed as integer number
400186	Proportional Band 42	0-100	expressed as integer number
400187	Proportional Band 43	0-100	expressed as integer number
400188	Proportional Band 44	0-100	expressed as integer number
400189	Proportional Band 45	0-100	expressed as integer number
400190	Proportional Band 46	0-100	expressed as integer number
400191	Proportional Band 47	0-100	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400192	Proportional Band 48	0-100	expressed as integer number
400193	Proportional Band 49	0-100	expressed as integer number
400194	Proportional Band 50	0-100	expressed as integer number
400195	Proportional Band 51	0-100	expressed as integer number
400196	Proportional Band 52	0-100	expressed as integer number
400197	Proportional Band 53	0-100	expressed as integer number
400198	Proportional Band 54	0-100	expressed as integer number
400199	Proportional Band 55	0-100	expressed as integer number
400200	Proportional Band 56	0-100	expressed as integer number
400201	Proportional Band 57	0-100	expressed as integer number
400202	Proportional Band 58	0-100	expressed as integer number
400203	Proportional Band 59	0-100	expressed as integer number
400204	Proportional Band 60	0-100	expressed as integer number
400205	Proportional Band 61	0-100	expressed as integer number
400206	Proportional Band 62	0-100	expressed as integer number
400207	Proportional Band 63	0-100	expressed as integer number
400208	Proportional Band 64	0-100	expressed as integer number
400209	Proportional Band 65	0-100	expressed as integer number
400210	Proportional Band 66	0-100	expressed as integer number
400211	Proportional Band 67	0-100	expressed as integer number
400212	Proportional Band 68	0-100	expressed as integer number
400213	Proportional Band 69	0-100	expressed as integer number
400214	Proportional Band 70	0-100	expressed as integer number
400215	Proportional Band 71	0-100	expressed as integer number
400216	Proportional Band 72	0-100	expressed as integer number
400217	Integral Band 1	0-9999	expressed as integer number
400218	Integral Band 2	0-9999	expressed as integer number
400219	Integral Band 3	0-9999	expressed as integer number
400220	Integral Band 4	0-9999	expressed as integer number
400221	Integral Band 5	0-9999	expressed as integer number
400222	Integral Band 6	0-9999	expressed as integer number
400223	Integral Band 7	0-9999	expressed as integer number
400224	Integral Band 8	0-9999	expressed as integer number
400225	Integral Band 9	0-9999	expressed as integer number
400226	Integral Band 10	0-9999	expressed as integer number
400227	Integral Band 11	0-9999	expressed as integer number
400228	Integral Band 12	0-9999	expressed as integer number
400229	Integral Band 13	0-9999	expressed as integer number
400230	Integral Band 14	0-9999	expressed as integer number
400231	Integral Band 15	0-9999	expressed as integer number
400232	Integral Band 16	0-9999	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400233	Integral Band 17	0-9999	expressed as integer number
400234	Integral Band 18	0-9999	expressed as integer number
400235	Integral Band 19	0-9999	expressed as integer number
400236	Integral Band 20	0-9999	expressed as integer number
400237	Integral Band 21	0-9999	expressed as integer number
400238	Integral Band 22	0-9999	expressed as integer number
400239	Integral Band 23	0-9999	expressed as integer number
400240	Integral Band 24	0-9999	expressed as integer number
400241	Integral Band 25	0-9999	expressed as integer number
400242	Integral Band 26	0-9999	expressed as integer number
400243	Integral Band 27	0-9999	expressed as integer number
400244	Integral Band 28	0-9999	expressed as integer number
400245	Integral Band 29	0-9999	expressed as integer number
400246	Integral Band 30	0-9999	expressed as integer number
400247	Integral Band 31	0-9999	expressed as integer number
400248	Integral Band 32	0-9999	expressed as integer number
400249	Integral Band 33	0-9999	expressed as integer number
400250	Integral Band 34	0-9999	expressed as integer number
400251	Integral Band 35	0-9999	expressed as integer number
400252	Integral Band 36	0-9999	expressed as integer number
400253	Integral Band 37	0-9999	expressed as integer number
400254	Integral Band 38	0-9999	expressed as integer number
400255	Integral Band 39	0-9999	expressed as integer number
400256	Integral Band 40	0-9999	expressed as integer number
400257	Integral Band 41	0-9999	expressed as integer number
400258	Integral Band 42	0-9999	expressed as integer number
400259	Integral Band 43	0-9999	expressed as integer number
400260	Integral Band 44	0-9999	expressed as integer number
400261	Integral Band 45	0-9999	expressed as integer number
400262	Integral Band 46	0-9999	expressed as integer number
400263	Integral Band 47	0-9999	expressed as integer number
400264	Integral Band 48	0-9999	expressed as integer number
400265	Integral Band 49	0-9999	expressed as integer number
400266	Integral Band 50	0-9999	expressed as integer number
400267	Integral Band 51	0-9999	expressed as integer number
400268	Integral Band 52	0-9999	expressed as integer number
400269	Integral Band 53	0-9999	expressed as integer number
400270	Integral Band 54	0-9999	expressed as integer number
400271	Integral Band 55	0-9999	expressed as integer number
400272	Integral Band 56	0-9999	expressed as integer number
400273	Integral Band 57	0-9999	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400274	Integral Band 58	0-9999	expressed as integer number
400275	Integral Band 59	0-9999	expressed as integer number
400276	Integral Band 60	0-9999	expressed as integer number
400277	Integral Band 61	0-9999	expressed as integer number
400278	Integral Band 62	0-9999	expressed as integer number
400279	Integral Band 63	0-9999	expressed as integer number
400280	Integral Band 64	0-9999	expressed as integer number
400281	Integral Band 65	0-9999	expressed as integer number
400282	Integral Band 66	0-9999	expressed as integer number
400283	Integral Band 67	0-9999	expressed as integer number
400284	Integral Band 68	0-9999	expressed as integer number
400285	Integral Band 69	0-9999	expressed as integer number
400286	Integral Band 70	0-9999	expressed as integer number
400287	Integral Band 71	0-9999	expressed as integer number
400288	Integral Band 72	0-9999	expressed as integer number
400289	Derivative Band 1	0-500	expressed as integer number
400290	Derivative Band 2	0-500	expressed as integer number
400291	Derivative Band 3	0-500	expressed as integer number
400292	Derivative Band 4	0-500	expressed as integer number
400293	Derivative Band 5	0-500	expressed as integer number
400294	Derivative Band 6	0-500	expressed as integer number
400295	Derivative Band 7	0-500	expressed as integer number
400296	Derivative Band 8	0-500	expressed as integer number
400297	Derivative Band 9	0-500	expressed as integer number
400298	Derivative Band 10	0-500	expressed as integer number
400299	Derivative Band 11	0-500	expressed as integer number
400300	Derivative Band 12	0-500	expressed as integer number
400301	Derivative Band 13	0-500	expressed as integer number
400302	Derivative Band 14	0-500	expressed as integer number
400303	Derivative Band 15	0-500	expressed as integer number
400304	Derivative Band 16	0-500	expressed as integer number
400305	Derivative Band 17	0-500	expressed as integer number
400306	Derivative Band 18	0-500	expressed as integer number
400307	Derivative Band 19	0-500	expressed as integer number
400308	Derivative Band 20	0-500	expressed as integer number
400309	Derivative Band 21	0-500	expressed as integer number
400310	Derivative Band 22	0-500	expressed as integer number
400311	Derivative Band 23	0-500	expressed as integer number
400312	Derivative Band 24	0-500	expressed as integer number
400313	Derivative Band 25	0-500	expressed as integer number
400314	Derivative Band 26	0-500	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400315	Derivative Band 27	0-500	expressed as integer number
400316	Derivative Band 28	0-500	expressed as integer number
400317	Derivative Band 29	0-500	expressed as integer number
400318	Derivative Band 30	0-500	expressed as integer number
400319	Derivative Band 31	0-500	expressed as integer number
400320	Derivative Band 32	0-500	expressed as integer number
400321	Derivative Band 33	0-500	expressed as integer number
400322	Derivative Band 34	0-500	expressed as integer number
400323	Derivative Band 35	0-500	expressed as integer number
400324	Derivative Band 36	0-500	expressed as integer number
400325	Derivative Band 37	0-500	expressed as integer number
400326	Derivative Band 38	0-500	expressed as integer number
400327	Derivative Band 39	0-500	expressed as integer number
400328	Derivative Band 40	0-500	expressed as integer number
400329	Derivative Band 41	0-500	expressed as integer number
400330	Derivative Band 42	0-500	expressed as integer number
400331	Derivative Band 43	0-500	expressed as integer number
400332	Derivative Band 44	0-500	expressed as integer number
400333	Derivative Band 45	0-500	expressed as integer number
400334	Derivative Band 46	0-500	expressed as integer number
400335	Derivative Band 47	0-500	expressed as integer number
400336	Derivative Band 48	0-500	expressed as integer number
400337	Derivative Band 49	0-500	expressed as integer number
400338	Derivative Band 50	0-500	expressed as integer number
400339	Derivative Band 51	0-500	expressed as integer number
400340	Derivative Band 52	0-500	expressed as integer number
400341	Derivative Band 53	0-500	expressed as integer number
400342	Derivative Band 54	0-500	expressed as integer number
400343	Derivative Band 55	0-500	expressed as integer number
400344	Derivative Band 56	0-500	expressed as integer number
400345	Derivative Band 57	0-500	expressed as integer number
400346	Derivative Band 58	0-500	expressed as integer number
400347	Derivative Band 59	0-500	expressed as integer number
400348	Derivative Band 60	0-500	expressed as integer number
400349	Derivative Band 61	0-500	expressed as integer number
400350	Derivative Band 62	0-500	expressed as integer number
400351	Derivative Band 63	0-500	expressed as integer number
400352	Derivative Band 64	0-500	expressed as integer number
400353	Derivative Band 65	0-500	expressed as integer number
400354	Derivative Band 66	0-500	expressed as integer number
400355	Derivative Band 67	0-500	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400356	Derivative Band 68	0-500	expressed as integer number
400357	Derivative Band 69	0-500	expressed as integer number
400358	Derivative Band 70	0-500	expressed as integer number
400359	Derivative Band 71	0-500	expressed as integer number
400360	Derivative Band 72	0-500	expressed as integer number
400361	Deadband 1	2-100	expressed as integer number
400362	Deadband 2	2-100	expressed as integer number
400363	Deadband 3	2-100	expressed as integer number
400364	Deadband 4	2-100	expressed as integer number
400365	Deadband 5	2-100	expressed as integer number
400366	Deadband 6	2-100	expressed as integer number
400367	Deadband 7	2-100	expressed as integer number
400368	Deadband 8	2-100	expressed as integer number
400369	Deadband 9	2-100	expressed as integer number
400370	Deadband 10	2-100	expressed as integer number
400371	Deadband 11	2-100	expressed as integer number
400372	Deadband 12	2-100	expressed as integer number
400373	Deadband 13	2-100	expressed as integer number
400374	Deadband 14	2-100	expressed as integer number
400375	Deadband 15	2-100	expressed as integer number
400376	Deadband 16	2-100	expressed as integer number
400377	Deadband 17	2-100	expressed as integer number
400378	Deadband 18	2-100	expressed as integer number
400379	Deadband 19	2-100	expressed as integer number
400380	Deadband 20	2-100	expressed as integer number
400381	Deadband 21	2-100	expressed as integer number
400382	Deadband 22	2-100	expressed as integer number
400383	Deadband 23	2-100	expressed as integer number
400384	Deadband 24	2-100	expressed as integer number
400385	Deadband 25	2-100	expressed as integer number
400386	Deadband 26	2-100	expressed as integer number
400387	Deadband 27	2-100	expressed as integer number
400388	Deadband 28	2-100	expressed as integer number
400389	Deadband 29	2-100	expressed as integer number
400390	Deadband 30	2-100	expressed as integer number
400391	Deadband 31	2-100	expressed as integer number
400392	Deadband 32	2-100	expressed as integer number
400393	Deadband 33	2-100	expressed as integer number
400394	Deadband 34	2-100	expressed as integer number
400395	Deadband 35	2-100	expressed as integer number
400396	Deadband 36	2-100	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400397	Deadband 37	2-100	expressed as integer number
400398	Deadband 38	2-100	expressed as integer number
400399	Deadband 39	2-100	expressed as integer number
400400	Deadband 40	2-100	expressed as integer number
400401	Deadband 41	2-100	expressed as integer number
400402	Deadband 42	2-100	expressed as integer number
400403	Deadband 43	2-100	expressed as integer number
400404	Deadband 44	2-100	expressed as integer number
400405	Deadband 45	2-100	expressed as integer number
400406	Deadband 46	2-100	expressed as integer number
400407	Deadband 47	2-100	expressed as integer number
400408	Deadband 48	2-100	expressed as integer number
400409	Deadband 49	2-100	expressed as integer number
400410	Deadband 50	2-100	expressed as integer number
400411	Deadband 51	2-100	expressed as integer number
400412	Deadband 52	2-100	expressed as integer number
400413	Deadband 53	2-100	expressed as integer number
400414	Deadband 54	2-100	expressed as integer number
400415	Deadband 55	2-100	expressed as integer number
400416	Deadband 56	2-100	expressed as integer number
400417	Deadband 57	2-100	expressed as integer number
400418	Deadband 58	2-100	expressed as integer number
400419	Deadband 59	2-100	expressed as integer number
400420	Deadband 60	2-100	expressed as integer number
400421	Deadband 61	2-100	expressed as integer number
400422	Deadband 62	2-100	expressed as integer number
400423	Deadband 63	2-100	expressed as integer number
400424	Deadband 64	2-100	expressed as integer number
400425	Deadband 65	2-100	expressed as integer number
400426	Deadband 66	2-100	expressed as integer number
400427	Deadband 67	2-100	expressed as integer number
400428	Deadband 68	2-100	expressed as integer number
400429	Deadband 69	2-100	expressed as integer number
400430	Deadband 70	2-100	expressed as integer number
400431	Deadband 71	2-100	expressed as integer number
400432	Deadband 72	2-100	expressed as integer number
400433	Sensor # circuit 1	0-72	specify sensor # from 0(unused) up to 72
400434	Sensor # circuit 1	0-72	specify sensor # from 0(unused) up to 72
400435	Sensor # circuit 1	0-72	specify sensor # from 0(unused) up to 72
400436	Sensor # circuit 2	0-72	specify sensor # from 0(unused) up to 72
400437	Sensor # circuit 2	0-72	specify sensor # from 0(unused) up to 72

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400643	Sensor # circuit 71	0-72	specify sensor # from 0(unused) up to 72
400644	Sensor # circuit 71	0-72	specify sensor # from 0(unused) up to 72
400645	Sensor # circuit 71	0-72	specify sensor # from 0(unused) up to 72
400646	Sensor # circuit 72	0-72	specify sensor # from 0(unused) up to 72
400647	Sensor # circuit 72	0-72	specify sensor # from 0(unused) up to 72
400648	Sensor # circuit 72	0-72	specify sensor # from 0(unused) up to 72
400649	Temp. calculation algorithm CKT 1	0-2	AVERAGE 0, MIN 1, MAX 2
400650	Temp. calculation algorithm CKT 2	0-2	AVERAGE 0, MIN 1, MAX 2
400651	Temp. calculation algorithm CKT 3	0-2	AVERAGE 0, MIN 1, MAX 2
400652	Temp. calculation algorithm CKT 4	0-2	AVERAGE 0, MIN 1, MAX 2
400653	Temp. calculation algorithm CKT 5	0-2	AVERAGE 0, MIN 1, MAX 2
400654	Temp. calculation algorithm CKT 6	0-2	AVERAGE 0, MIN 1, MAX 2
400655	Temp. calculation algorithm CKT 7	0-2	AVERAGE 0, MIN 1, MAX 2
400656	Temp. calculation algorithm CKT 8	0-2	AVERAGE 0, MIN 1, MAX 2
400657	Temp. calculation algorithm CKT 9	0-2	AVERAGE 0, MIN 1, MAX 2
400658	Temp. calculation algorithm CKT 10	0-2	AVERAGE 0, MIN 1, MAX 2
400659	Temp. calculation algorithm CKT 11	0-2	AVERAGE 0, MIN 1, MAX 2
400660	Temp. calculation algorithm CKT 12	0-2	AVERAGE 0, MIN 1, MAX 2
400661	Temp. calculation algorithm CKT 13	0-2	AVERAGE 0, MIN 1, MAX 2
400662	Temp. calculation algorithm CKT 14	0-2	AVERAGE 0, MIN 1, MAX 2
400663	Temp. calculation algorithm CKT 15	0-2	AVERAGE 0, MIN 1, MAX 2
400664	Temp. calculation algorithm CKT 16	0-2	AVERAGE 0, MIN 1, MAX 2
400665	Temp. calculation algorithm CKT 17	0-2	AVERAGE 0, MIN 1, MAX 2
400666	Temp. calculation algorithm CKT 18	0-2	AVERAGE 0, MIN 1, MAX 2
400667	Temp. calculation algorithm CKT 19	0-2	AVERAGE 0, MIN 1, MAX 2
400668	Temp. calculation algorithm CKT 20	0-2	AVERAGE 0, MIN 1, MAX 2
400669	Temp. calculation algorithm CKT 21	0-2	AVERAGE 0, MIN 1, MAX 2
400670	Temp. calculation algorithm CKT 22	0-2	AVERAGE 0, MIN 1, MAX 2
400671	Temp. calculation algorithm CKT 23	0-2	AVERAGE 0, MIN 1, MAX 2
400672	Temp. calculation algorithm CKT 24	0-2	AVERAGE 0, MIN 1, MAX 2
400673	Temp. calculation algorithm CKT 25	0-2	AVERAGE 0, MIN 1, MAX 2
400674	Temp. calculation algorithm CKT 26	0-2	AVERAGE 0, MIN 1, MAX 2
400675	Temp. calculation algorithm CKT 27	0-2	AVERAGE 0, MIN 1, MAX 2
400676	Temp. calculation algorithm CKT 28	0-2	AVERAGE 0, MIN 1, MAX 2
400677	Temp. calculation algorithm CKT 29	0-2	AVERAGE 0, MIN 1, MAX 2
400678	Temp. calculation algorithm CKT 30	0-2	AVERAGE 0, MIN 1, MAX 2
400679	Temp. calculation algorithm CKT 31	0-2	AVERAGE 0, MIN 1, MAX 2
400680	Temp. calculation algorithm CKT 32	0-2	AVERAGE 0, MIN 1, MAX 2
400681	Temp. calculation algorithm CKT 33	0-2	AVERAGE 0, MIN 1, MAX 2
400682	Temp. calculation algorithm CKT 34	0-2	AVERAGE 0, MIN 1, MAX 2
400683	Temp. calculation algorithm CKT 35	0-2	AVERAGE 0, MIN 1, MAX 2

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400684	Temp. calculation algorithm CKT 36	0-2	AVERAGE 0, MIN 1, MAX 2
400685	Temp. calculation algorithm CKT 37	0-2	AVERAGE 0, MIN 1, MAX 2
400686	Temp. calculation algorithm CKT 38	0-2	AVERAGE 0, MIN 1, MAX 2
400687	Temp. calculation algorithm CKT 39	0-2	AVERAGE 0, MIN 1, MAX 2
400688	Temp. calculation algorithm CKT 40	0-2	AVERAGE 0, MIN 1, MAX 2
400689	Temp. calculation algorithm CKT 41	0-2	AVERAGE 0, MIN 1, MAX 2
400690	Temp. calculation algorithm CKT 42	0-2	AVERAGE 0, MIN 1, MAX 2
400691	Temp. calculation algorithm CKT 43	0-2	AVERAGE 0, MIN 1, MAX 2
400692	Temp. calculation algorithm CKT 44	0-2	AVERAGE 0, MIN 1, MAX 2
400693	Temp. calculation algorithm CKT 45	0-2	AVERAGE 0, MIN 1, MAX 2
400694	Temp. calculation algorithm CKT 46	0-2	AVERAGE 0, MIN 1, MAX 2
400695	Temp. calculation algorithm CKT 47	0-2	AVERAGE 0, MIN 1, MAX 2
400696	Temp. calculation algorithm CKT 48	0-2	AVERAGE 0, MIN 1, MAX 2
400697	Temp. calculation algorithm CKT 49	0-2	AVERAGE 0, MIN 1, MAX 2
400698	Temp. calculation algorithm CKT 50	0-2	AVERAGE 0, MIN 1, MAX 2
400699	Temp. calculation algorithm CKT 51	0-2	AVERAGE 0, MIN 1, MAX 2
400700	Temp. calculation algorithm CKT 52	0-2	AVERAGE 0, MIN 1, MAX 2
400701	Temp. calculation algorithm CKT 53	0-2	AVERAGE 0, MIN 1, MAX 2
400702	Temp. calculation algorithm CKT 54	0-2	AVERAGE 0, MIN 1, MAX 2
400703	Temp. calculation algorithm CKT 55	0-2	AVERAGE 0, MIN 1, MAX 2
400704	Temp. calculation algorithm CKT 56	0-2	AVERAGE 0, MIN 1, MAX 2
400705	Temp. calculation algorithm CKT 57	0-2	AVERAGE 0, MIN 1, MAX 2
400706	Temp. calculation algorithm CKT 58	0-2	AVERAGE 0, MIN 1, MAX 2
400707	Temp. calculation algorithm CKT 59	0-2	AVERAGE 0, MIN 1, MAX 2
400708	Temp. calculation algorithm CKT 60	0-2	AVERAGE 0, MIN 1, MAX 2
400709	Temp. calculation algorithm CKT 61	0-2	AVERAGE 0, MIN 1, MAX 2
400710	Temp. calculation algorithm CKT 62	0-2	AVERAGE 0, MIN 1, MAX 2
400711	Temp. calculation algorithm CKT 63	0-2	AVERAGE 0, MIN 1, MAX 2
400712	Temp. calculation algorithm CKT 64	0-2	AVERAGE 0, MIN 1, MAX 2
400713	Temp. calculation algorithm CKT 65	0-2	AVERAGE 0, MIN 1, MAX 2
400714	Temp. calculation algorithm CKT 66	0-2	AVERAGE 0, MIN 1, MAX 2
400715	Temp. calculation algorithm CKT 67	0-2	AVERAGE 0, MIN 1, MAX 2
400716	Temp. calculation algorithm CKT 68	0-2	AVERAGE 0, MIN 1, MAX 2
400717	Temp. calculation algorithm CKT 69	0-2	AVERAGE 0, MIN 1, MAX 2
400718	Temp. calculation algorithm CKT 70	0-2	AVERAGE 0, MIN 1, MAX 2
400719	Temp. calculation algorithm CKT 71	0-2	AVERAGE 0, MIN 1, MAX 2
400720	Temp. calculation algorithm CKT 72	0-2	AVERAGE 0, MIN 1, MAX 2
400721	Soft Start 1	0-1	0 -NO, 1- YES
400722	Soft Start 2	0-1	0 -NO, 1- YES
400723	Soft Start 3	0-1	0 -NO, 1- YES
400724	Soft Start 4	0-1	0 -NO, 1- YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400725	Soft Start 5	0-1	0 -NO, 1- YES
400726	Soft Start 6	0-1	0 -NO, 1- YES
400727	Soft Start 7	0-1	0 -NO, 1- YES
400728	Soft Start 8	0-1	0 -NO, 1- YES
400729	Soft Start 9	0-1	0 -NO, 1- YES
400730	Soft Start 10	0-1	0 -NO, 1- YES
400731	Soft Start 11	0-1	0 -NO, 1- YES
400732	Soft Start 12	0-1	0 -NO, 1- YES
400733	Soft Start 13	0-1	0 -NO, 1- YES
400734	Soft Start 14	0-1	0 -NO, 1- YES
400735	Soft Start 15	0-1	0 -NO, 1- YES
400736	Soft Start 16	0-1	0 -NO, 1- YES
400737	Soft Start 17	0-1	0 -NO, 1- YES
400738	Soft Start 18	0-1	0 -NO, 1- YES
400739	Soft Start 19	0-1	0 -NO, 1- YES
400740	Soft Start 20	0-1	0 -NO, 1- YES
400741	Soft Start 21	0-1	0 -NO, 1- YES
400742	Soft Start 22	0-1	0 -NO, 1- YES
400743	Soft Start 23	0-1	0 -NO, 1- YES
400744	Soft Start 24	0-1	0 -NO, 1- YES
400745	Soft Start 25	0-1	0 -NO, 1- YES
400746	Soft Start 26	0-1	0 -NO, 1- YES
400747	Soft Start 27	0-1	0 -NO, 1- YES
400748	Soft Start 28	0-1	0 -NO, 1- YES
400749	Soft Start 29	0-1	0 -NO, 1- YES
400750	Soft Start 30	0-1	0 -NO, 1- YES
400751	Soft Start 31	0-1	0 -NO, 1- YES
400752	Soft Start 32	0-1	0 -NO, 1- YES
400753	Soft Start 33	0-1	0 -NO, 1- YES
400754	Soft Start 34	0-1	0 -NO, 1- YES
400755	Soft Start 35	0-1	0 -NO, 1- YES
400756	Soft Start 36	0-1	0 -NO, 1- YES
400757	Soft Start 37	0-1	0 -NO, 1- YES
400758	Soft Start 38	0-1	0 -NO, 1- YES
400759	Soft Start 39	0-1	0 -NO, 1- YES
400760	Soft Start 40	0-1	0 -NO, 1- YES
400761	Soft Start 41	0-1	0 -NO, 1- YES
400762	Soft Start 42	0-1	0 -NO, 1- YES
400763	Soft Start 43	0-1	0 -NO, 1- YES
400764	Soft Start 44	0-1	0 -NO, 1- YES
400765	Soft Start 45	0-1	0 -NO, 1- YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400766	Soft Start 46	0-1	0 -NO, 1- YES
400767	Soft Start 47	0-1	0 -NO, 1- YES
400768	Soft Start 48	0-1	0 -NO, 1- YES
400769	Soft Start 49	0-1	0 -NO, 1- YES
400770	Soft Start 50	0-1	0 -NO, 1- YES
400771	Soft Start 51	0-1	0 -NO, 1- YES
400772	Soft Start 52	0-1	0 -NO, 1- YES
400773	Soft Start 53	0-1	0 -NO, 1- YES
400774	Soft Start 54	0-1	0 -NO, 1- YES
400775	Soft Start 55	0-1	0 -NO, 1- YES
400776	Soft Start 56	0-1	0 -NO, 1- YES
400777	Soft Start 57	0-1	0 -NO, 1- YES
400778	Soft Start 58	0-1	0 -NO, 1- YES
400779	Soft Start 59	0-1	0 -NO, 1- YES
400780	Soft Start 60	0-1	0 -NO, 1- YES
400781	Soft Start 61	0-1	0 -NO, 1- YES
400782	Soft Start 62	0-1	0 -NO, 1- YES
400783	Soft Start 63	0-1	0 -NO, 1- YES
400784	Soft Start 64	0-1	0 -NO, 1- YES
400785	Soft Start 65	0-1	0 -NO, 1- YES
400786	Soft Start 66	0-1	0 -NO, 1- YES
400787	Soft Start 67	0-1	0 -NO, 1- YES
400788	Soft Start 68	0-1	0 -NO, 1- YES
400789	Soft Start 69	0-1	0 -NO, 1- YES
400790	Soft Start 70	0-1	0 -NO, 1- YES
400791	Soft Start 71	0-1	0 -NO, 1- YES
400792	Soft Start 72	0-1	0 -NO, 1- YES
400793	PID vs ON OFF 1	0-1	0 -ON/OFF, 1- PID
400794	PID vs ON OFF 2	0-1	0 -ON/OFF, 1- PID
400795	PID vs ON OFF 3	0-1	0 -ON/OFF, 1- PID
400796	PID vs ON OFF 4	0-1	0 -ON/OFF, 1- PID
400797	PID vs ON OFF 5	0-1	0 -ON/OFF, 1- PID
400798	PID vs ON OFF 6	0-1	0 -ON/OFF, 1- PID
400799	PID vs ON OFF 7	0-1	0 -ON/OFF, 1- PID
400800	PID vs ON OFF 8	0-1	0 -ON/OFF, 1- PID
400801	PID vs ON OFF 9	0-1	0 -ON/OFF, 1- PID
400802	PID vs ON OFF 10	0-1	0 -ON/OFF, 1- PID
400803	PID vs ON OFF 11	0-1	0 -ON/OFF, 1- PID
400804	PID vs ON OFF 12	0-1	0 -ON/OFF, 1- PID
400805	PID vs ON OFF 13	0-1	0 -ON/OFF, 1- PID
400806	PID vs ON OFF 14	0-1	0 -ON/OFF, 1- PID

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400807	PID vs ON OFF 15	0-1	0 -ON/OFF, 1- PID
400808	PID vs ON OFF 16	0-1	0 -ON/OFF, 1- PID
400809	PID vs ON OFF 17	0-1	0 -ON/OFF, 1- PID
400810	PID vs ON OFF 18	0-1	0 -ON/OFF, 1- PID
400811	PID vs ON OFF 19	0-1	0 -ON/OFF, 1- PID
400812	PID vs ON OFF 20	0-1	0 -ON/OFF, 1- PID
400813	PID vs ON OFF 21	0-1	0 -ON/OFF, 1- PID
400814	PID vs ON OFF 22	0-1	0 -ON/OFF, 1- PID
400815	PID vs ON OFF 23	0-1	0 -ON/OFF, 1- PID
400816	PID vs ON OFF 24	0-1	0 -ON/OFF, 1- PID
400817	PID vs ON OFF 25	0-1	0 -ON/OFF, 1- PID
400818	PID vs ON OFF 26	0-1	0 -ON/OFF, 1- PID
400819	PID vs ON OFF 27	0-1	0 -ON/OFF, 1- PID
400820	PID vs ON OFF 28	0-1	0 -ON/OFF, 1- PID
400821	PID vs ON OFF 29	0-1	0 -ON/OFF, 1- PID
400822	PID vs ON OFF 30	0-1	0 -ON/OFF, 1- PID
400823	PID vs ON OFF 31	0-1	0 -ON/OFF, 1- PID
400824	PID vs ON OFF 32	0-1	0 -ON/OFF, 1- PID
400825	PID vs ON OFF 33	0-1	0 -ON/OFF, 1- PID
400826	PID vs ON OFF 34	0-1	0 -ON/OFF, 1- PID
400827	PID vs ON OFF 35	0-1	0 -ON/OFF, 1- PID
400828	PID vs ON OFF 36	0-1	0 -ON/OFF, 1- PID
400829	PID vs ON OFF 37	0-1	0 -ON/OFF, 1- PID
400830	PID vs ON OFF 38	0-1	0 -ON/OFF, 1- PID
400831	PID vs ON OFF 39	0-1	0 -ON/OFF, 1- PID
400832	PID vs ON OFF 40	0-1	0 -ON/OFF, 1- PID
400833	PID vs ON OFF 41	0-1	0 -ON/OFF, 1- PID
400834	PID vs ON OFF 42	0-1	0 -ON/OFF, 1- PID
400835	PID vs ON OFF 43	0-1	0 -ON/OFF, 1- PID
400836	PID vs ON OFF 44	0-1	0 -ON/OFF, 1- PID
400837	PID vs ON OFF 45	0-1	0 -ON/OFF, 1- PID
400838	PID vs ON OFF 46	0-1	0 -ON/OFF, 1- PID
400839	PID vs ON OFF 47	0-1	0 -ON/OFF, 1- PID
400840	PID vs ON OFF 48	0-1	0 -ON/OFF, 1- PID
400841	PID vs ON OFF 49	0-1	0 -ON/OFF, 1- PID
400842	PID vs ON OFF 50	0-1	0 -ON/OFF, 1- PID
400843	PID vs ON OFF 51	0-1	0 -ON/OFF, 1- PID
400844	PID vs ON OFF 52	0-1	0 -ON/OFF, 1- PID
400845	PID vs ON OFF 53	0-1	0 -ON/OFF, 1- PID
400846	PID vs ON OFF 54	0-1	0 -ON/OFF, 1- PID
400847	PID vs ON OFF 55	0-1	0 -ON/OFF, 1- PID

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400848	PID vs ON OFF 56	0-1	0 -ON/OFF, 1- PID
400849	PID vs ON OFF 57	0-1	0 -ON/OFF, 1- PID
400850	PID vs ON OFF 58	0-1	0 -ON/OFF, 1- PID
400851	PID vs ON OFF 59	0-1	0 -ON/OFF, 1- PID
400852	PID vs ON OFF 60	0-1	0 -ON/OFF, 1- PID
400853	PID vs ON OFF 61	0-1	0 -ON/OFF, 1- PID
400854	PID vs ON OFF 62	0-1	0 -ON/OFF, 1- PID
400855	PID vs ON OFF 63	0-1	0 -ON/OFF, 1- PID
400856	PID vs ON OFF 64	0-1	0 -ON/OFF, 1- PID
400857	PID vs ON OFF 65	0-1	0 -ON/OFF, 1- PID
400858	PID vs ON OFF 66	0-1	0 -ON/OFF, 1- PID
400859	PID vs ON OFF 67	0-1	0 -ON/OFF, 1- PID
400860	PID vs ON OFF 68	0-1	0 -ON/OFF, 1- PID
400861	PID vs ON OFF 69	0-1	0 -ON/OFF, 1- PID
400862	PID vs ON OFF 70	0-1	0 -ON/OFF, 1- PID
400863	PID vs ON OFF 71	0-1	0 -ON/OFF, 1- PID
400864	PID vs ON OFF 72	0-1	0 -ON/OFF, 1- PID
400865	TRIP 1	0-1	0 -NO, 1- YES
400866	TRIP 2	0-1	0 -NO, 1- YES
400867	TRIP 3	0-1	0 -NO, 1- YES
400868	TRIP 4	0-1	0 -NO, 1- YES
400869	TRIP 5	0-1	0 -NO, 1- YES
400870	TRIP 6	0-1	0 -NO, 1- YES
400871	TRIP 7	0-1	0 -NO, 1- YES
400872	TRIP 8	0-1	0 -NO, 1- YES
400873	TRIP 9	0-1	0 -NO, 1- YES
400874	TRIP 10	0-1	0 -NO, 1- YES
400875	TRIP 11	0-1	0 -NO, 1- YES
400876	TRIP 12	0-1	0 -NO, 1- YES
400877	TRIP 13	0-1	0 -NO, 1- YES
400878	TRIP 14	0-1	0 -NO, 1- YES
400879	TRIP 15	0-1	0 -NO, 1- YES
400880	TRIP 16	0-1	0 -NO, 1- YES
400881	TRIP 17	0-1	0 -NO, 1- YES
400882	TRIP 18	0-1	0 -NO, 1- YES
400883	TRIP 19	0-1	0 -NO, 1- YES
400884	TRIP 20	0-1	0 -NO, 1- YES
400885	TRIP 21	0-1	0 -NO, 1- YES
400886	TRIP 22	0-1	0 -NO, 1- YES
400887	TRIP 23	0-1	0 -NO, 1- YES
400888	TRIP 24	0-1	0 -NO, 1- YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400889	TRIP 25	0-1	0 -NO, 1- YES
400890	TRIP 26	0-1	0 -NO, 1- YES
400891	TRIP 27	0-1	0 -NO, 1- YES
400892	TRIP 28	0-1	0 -NO, 1- YES
400893	TRIP 29	0-1	0 -NO, 1- YES
400894	TRIP 30	0-1	0 -NO, 1- YES
400895	TRIP 31	0-1	0 -NO, 1- YES
400896	TRIP 32	0-1	0 -NO, 1- YES
400897	TRIP 33	0-1	0 -NO, 1- YES
400898	TRIP 34	0-1	0 -NO, 1- YES
400899	TRIP 35	0-1	0 -NO, 1- YES
400900	TRIP 36	0-1	0 -NO, 1- YES
400901	TRIP 37	0-1	0 -NO, 1- YES
400902	TRIP 38	0-1	0 -NO, 1- YES
400903	TRIP 39	0-1	0 -NO, 1- YES
400904	TRIP 40	0-1	0 -NO, 1- YES
400905	TRIP 41	0-1	0 -NO, 1- YES
400906	TRIP 42	0-1	0 -NO, 1- YES
400907	TRIP 43	0-1	0 -NO, 1- YES
400908	TRIP 44	0-1	0 -NO, 1- YES
400909	TRIP 45	0-1	0 -NO, 1- YES
400910	TRIP 46	0-1	0 -NO, 1- YES
400911	TRIP 47	0-1	0 -NO, 1- YES
400912	TRIP 48	0-1	0 -NO, 1- YES
400913	TRIP 49	0-1	0 -NO, 1- YES
400914	TRIP 50	0-1	0 -NO, 1- YES
400915	TRIP 51	0-1	0 -NO, 1- YES
400916	TRIP 52	0-1	0 -NO, 1- YES
400917	TRIP 53	0-1	0 -NO, 1- YES
400918	TRIP 54	0-1	0 -NO, 1- YES
400919	TRIP 55	0-1	0 -NO, 1- YES
400920	TRIP 56	0-1	0 -NO, 1- YES
400921	TRIP 57	0-1	0 -NO, 1- YES
400922	TRIP 58	0-1	0 -NO, 1- YES
400923	TRIP 59	0-1	0 -NO, 1- YES
400924	TRIP 60	0-1	0 -NO, 1- YES
400925	TRIP 61	0-1	0 -NO, 1- YES
400926	TRIP 62	0-1	0 -NO, 1- YES
400927	TRIP 63	0-1	0 -NO, 1- YES
400928	TRIP 64	0-1	0 -NO, 1- YES
400929	TRIP 65	0-1	0 -NO, 1- YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400930	TRIP 66	0-1	0 -NO, 1- YES
400931	TRIP 67	0-1	0 -NO, 1- YES
400932	TRIP 68	0-1	0 -NO, 1- YES
400933	TRIP 69	0-1	0 -NO, 1- YES
400934	TRIP 70	0-1	0 -NO, 1- YES
400935	TRIP 71	0-1	0 -NO, 1- YES
400936	TRIP 72	0-1	0 -NO, 1- YES
400937	LATCH 1	0-1	0 -NO, 1- YES
400938	LATCH 2	0-1	0 -NO, 1- YES
400939	LATCH 3	0-1	0 -NO, 1- YES
400940	LATCH 4	0-1	0 -NO, 1- YES
400941	LATCH 5	0-1	0 -NO, 1- YES
400942	LATCH 6	0-1	0 -NO, 1- YES
400943	LATCH 7	0-1	0 -NO, 1- YES
400944	LATCH 8	0-1	0 -NO, 1- YES
400945	LATCH 9	0-1	0 -NO, 1- YES
400946	LATCH 10	0-1	0 -NO, 1- YES
400947	LATCH 11	0-1	0 -NO, 1- YES
400948	LATCH 12	0-1	0 -NO, 1- YES
400949	LATCH 13	0-1	0 -NO, 1- YES
400950	LATCH 14	0-1	0 -NO, 1- YES
400951	LATCH 15	0-1	0 -NO, 1- YES
400952	LATCH 16	0-1	0 -NO, 1- YES
400953	LATCH 17	0-1	0 -NO, 1- YES
400954	LATCH 18	0-1	0 -NO, 1- YES
400955	LATCH 19	0-1	0 -NO, 1- YES
400956	LATCH 20	0-1	0 -NO, 1- YES
400957	LATCH 21	0-1	0 -NO, 1- YES
400958	LATCH 22	0-1	0 -NO, 1- YES
400959	LATCH 23	0-1	0 -NO, 1- YES
400960	LATCH 24	0-1	0 -NO, 1- YES
400961	LATCH 25	0-1	0 -NO, 1- YES
400962	LATCH 26	0-1	0 -NO, 1- YES
400963	LATCH 27	0-1	0 -NO, 1- YES
400964	LATCH 28	0-1	0 -NO, 1- YES
400965	LATCH 29	0-1	0 -NO, 1- YES
400966	LATCH 30	0-1	0 -NO, 1- YES
400967	LATCH 31	0-1	0 -NO, 1- YES
400968	LATCH 32	0-1	0 -NO, 1- YES
400969	LATCH 33	0-1	0 -NO, 1- YES
400970	LATCH 34	0-1	0 -NO, 1- YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400971	LATCH 35	0-1	0 -NO, 1- YES
400972	LATCH 36	0-1	0 -NO, 1- YES
400973	LATCH 37	0-1	0 -NO, 1- YES
400974	LATCH 38	0-1	0 -NO, 1- YES
400975	LATCH 39	0-1	0 -NO, 1- YES
400976	LATCH 40	0-1	0 -NO, 1- YES
400977	LATCH 41	0-1	0 -NO, 1- YES
400978	LATCH 42	0-1	0 -NO, 1- YES
400979	LATCH 43	0-1	0 -NO, 1- YES
400980	LATCH 44	0-1	0 -NO, 1- YES
400981	LATCH 45	0-1	0 -NO, 1- YES
400982	LATCH 46	0-1	0 -NO, 1- YES
400983	LATCH 47	0-1	0 -NO, 1- YES
400984	LATCH 48	0-1	0 -NO, 1- YES
400985	LATCH 49	0-1	0 -NO, 1- YES
400986	LATCH 50	0-1	0 -NO, 1- YES
400987	LATCH 51	0-1	0 -NO, 1- YES
400988	LATCH 52	0-1	0 -NO, 1- YES
400989	LATCH 53	0-1	0 -NO, 1- YES
400990	LATCH 54	0-1	0 -NO, 1- YES
400991	LATCH 55	0-1	0 -NO, 1- YES
400992	LATCH 56	0-1	0 -NO, 1- YES
400993	LATCH 57	0-1	0 -NO, 1- YES
400994	LATCH 58	0-1	0 -NO, 1- YES
400995	LATCH 59	0-1	0 -NO, 1- YES
400996	LATCH 60	0-1	0 -NO, 1- YES
400997	LATCH 61	0-1	0 -NO, 1- YES
400998	LATCH 62	0-1	0 -NO, 1- YES
400999	LATCH 63	0-1	0 -NO, 1- YES
401000	LATCH 64	0-1	0 -NO, 1- YES
401001	LATCH 65	0-1	0 -NO, 1- YES
401002	LATCH 66	0-1	0 -NO, 1- YES
401003	LATCH 67	0-1	0 -NO, 1- YES
401004	LATCH 68	0-1	0 -NO, 1- YES
401005	LATCH 69	0-1	0 -NO, 1- YES
401006	LATCH 70	0-1	0 -NO, 1- YES
401007	LATCH 71	0-1	0 -NO, 1- YES
401008	LATCH 72	0-1	0 -NO, 1- YES
401009	ENABLE/DISABLE CIRCUIT 1	0-1	0-ENABLED, 1-DISABLED
401010	ENABLE/DISABLE CIRCUIT 2	0-1	0-ENABLED, 1-DISABLED
401011	ENABLE/DISABLE CIRCUIT 3	0-1	0-ENABLED, 1-DISABLED

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401012	ENABLE/DISABLE CIRCUIT 4	0-1	0-ENABLED, 1-DISABLED
401013	ENABLE/DISABLE CIRCUIT 5	0-1	0-ENABLED, 1-DISABLED
401014	ENABLE/DISABLE CIRCUIT 6	0-1	0-ENABLED, 1-DISABLED
401015	ENABLE/DISABLE CIRCUIT 7	0-1	0-ENABLED, 1-DISABLED
401016	ENABLE/DISABLE CIRCUIT 8	0-1	0-ENABLED, 1-DISABLED
401017	ENABLE/DISABLE CIRCUIT 9	0-1	0-ENABLED, 1-DISABLED
401018	ENABLE/DISABLE CIRCUIT 10	0-1	0-ENABLED, 1-DISABLED
401019	ENABLE/DISABLE CIRCUIT 11	0-1	0-ENABLED, 1-DISABLED
401020	ENABLE/DISABLE CIRCUIT 12	0-1	0-ENABLED, 1-DISABLED
401021	ENABLE/DISABLE CIRCUIT 13	0-1	0-ENABLED, 1-DISABLED
401022	ENABLE/DISABLE CIRCUIT 14	0-1	0-ENABLED, 1-DISABLED
401023	ENABLE/DISABLE CIRCUIT 15	0-1	0-ENABLED, 1-DISABLED
401024	ENABLE/DISABLE CIRCUIT 16	0-1	0-ENABLED, 1-DISABLED
401025	ENABLE/DISABLE CIRCUIT 17	0-1	0-ENABLED, 1-DISABLED
401026	ENABLE/DISABLE CIRCUIT 18	0-1	0-ENABLED, 1-DISABLED
401027	ENABLE/DISABLE CIRCUIT 19	0-1	0-ENABLED, 1-DISABLED
401028	ENABLE/DISABLE CIRCUIT 20	0-1	0-ENABLED, 1-DISABLED
401029	ENABLE/DISABLE CIRCUIT 21	0-1	0-ENABLED, 1-DISABLED
401030	ENABLE/DISABLE CIRCUIT 22	0-1	0-ENABLED, 1-DISABLED
401031	ENABLE/DISABLE CIRCUIT 23	0-1	0-ENABLED, 1-DISABLED
401032	ENABLE/DISABLE CIRCUIT 24	0-1	0-ENABLED, 1-DISABLED
401033	ENABLE/DISABLE CIRCUIT 25	0-1	0-ENABLED, 1-DISABLED
401034	ENABLE/DISABLE CIRCUIT 26	0-1	0-ENABLED, 1-DISABLED
401035	ENABLE/DISABLE CIRCUIT 27	0-1	0-ENABLED, 1-DISABLED
401036	ENABLE/DISABLE CIRCUIT 28	0-1	0-ENABLED, 1-DISABLED
401037	ENABLE/DISABLE CIRCUIT 29	0-1	0-ENABLED, 1-DISABLED
401038	ENABLE/DISABLE CIRCUIT 30	0-1	0-ENABLED, 1-DISABLED
401039	ENABLE/DISABLE CIRCUIT 31	0-1	0-ENABLED, 1-DISABLED
401040	ENABLE/DISABLE CIRCUIT 32	0-1	0-ENABLED, 1-DISABLED
401041	ENABLE/DISABLE CIRCUIT 33	0-1	0-ENABLED, 1-DISABLED
401042	ENABLE/DISABLE CIRCUIT 34	0-1	0-ENABLED, 1-DISABLED
401043	ENABLE/DISABLE CIRCUIT 35	0-1	0-ENABLED, 1-DISABLED
401044	ENABLE/DISABLE CIRCUIT 36	0-1	0-ENABLED, 1-DISABLED
401045	ENABLE/DISABLE CIRCUIT 37	0-1	0-ENABLED, 1-DISABLED
401046	ENABLE/DISABLE CIRCUIT 38	0-1	0-ENABLED, 1-DISABLED
401047	ENABLE/DISABLE CIRCUIT 39	0-1	0-ENABLED, 1-DISABLED
401048	ENABLE/DISABLE CIRCUIT 40	0-1	0-ENABLED, 1-DISABLED
401049	ENABLE/DISABLE CIRCUIT 41	0-1	0-ENABLED, 1-DISABLED
401050	ENABLE/DISABLE CIRCUIT 42	0-1	0-ENABLED, 1-DISABLED
401051	ENABLE/DISABLE CIRCUIT 43	0-1	0-ENABLED, 1-DISABLED
401052	ENABLE/DISABLE CIRCUIT 44	0-1	0-ENABLED, 1-DISABLED

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401053	ENABLE/DISABLE CIRCUIT 45	0-1	0-ENABLED, 1-DISABLED
401054	ENABLE/DISABLE CIRCUIT 46	0-1	0-ENABLED, 1-DISABLED
401055	ENABLE/DISABLE CIRCUIT 47	0-1	0-ENABLED, 1-DISABLED
401056	ENABLE/DISABLE CIRCUIT 48	0-1	0-ENABLED, 1-DISABLED
401057	ENABLE/DISABLE CIRCUIT 49	0-1	0-ENABLED, 1-DISABLED
401058	ENABLE/DISABLE CIRCUIT 50	0-1	0-ENABLED, 1-DISABLED
401059	ENABLE/DISABLE CIRCUIT 51	0-1	0-ENABLED, 1-DISABLED
401060	ENABLE/DISABLE CIRCUIT 52	0-1	0-ENABLED, 1-DISABLED
401061	ENABLE/DISABLE CIRCUIT 53	0-1	0-ENABLED, 1-DISABLED
401062	ENABLE/DISABLE CIRCUIT 54	0-1	0-ENABLED, 1-DISABLED
401063	ENABLE/DISABLE CIRCUIT 55	0-1	0-ENABLED, 1-DISABLED
401064	ENABLE/DISABLE CIRCUIT 56	0-1	0-ENABLED, 1-DISABLED
401065	ENABLE/DISABLE CIRCUIT 57	0-1	0-ENABLED, 1-DISABLED
401066	ENABLE/DISABLE CIRCUIT 58	0-1	0-ENABLED, 1-DISABLED
401067	ENABLE/DISABLE CIRCUIT 59	0-1	0-ENABLED, 1-DISABLED
401068	ENABLE/DISABLE CIRCUIT 60	0-1	0-ENABLED, 1-DISABLED
401069	ENABLE/DISABLE CIRCUIT 61	0-1	0-ENABLED, 1-DISABLED
401070	ENABLE/DISABLE CIRCUIT 62	0-1	0-ENABLED, 1-DISABLED
401071	ENABLE/DISABLE CIRCUIT 63	0-1	0-ENABLED, 1-DISABLED
401072	ENABLE/DISABLE CIRCUIT 64	0-1	0-ENABLED, 1-DISABLED
401073	ENABLE/DISABLE CIRCUIT 65	0-1	0-ENABLED, 1-DISABLED
401074	ENABLE/DISABLE CIRCUIT 66	0-1	0-ENABLED, 1-DISABLED
401075	ENABLE/DISABLE CIRCUIT 67	0-1	0-ENABLED, 1-DISABLED
401076	ENABLE/DISABLE CIRCUIT 68	0-1	0-ENABLED, 1-DISABLED
401077	ENABLE/DISABLE CIRCUIT 69	0-1	0-ENABLED, 1-DISABLED
401078	ENABLE/DISABLE CIRCUIT 70	0-1	0-ENABLED, 1-DISABLED
401079	ENABLE/DISABLE CIRCUIT 71	0-1	0-ENABLED, 1-DISABLED
401080	ENABLE/DISABLE CIRCUIT 72	0-1	0-ENABLED, 1-DISABLED
401081	AUTO vs MANUAL 1	0-1	0-MANUAL, 1-AUTO
401082	AUTO vs MANUAL 2	0-1	0-MANUAL, 1-AUTO
401083	AUTO vs MANUAL 3	0-1	0-MANUAL, 1-AUTO
401084	AUTO vs MANUAL 4	0-1	0-MANUAL, 1-AUTO
401085	AUTO vs MANUAL 5	0-1	0-MANUAL, 1-AUTO
401086	AUTO vs MANUAL 6	0-1	0-MANUAL, 1-AUTO
401087	AUTO vs MANUAL 7	0-1	0-MANUAL, 1-AUTO
401088	AUTO vs MANUAL 8	0-1	0-MANUAL, 1-AUTO
401089	AUTO vs MANUAL 9	0-1	0-MANUAL, 1-AUTO
401090	AUTO vs MANUAL 10	0-1	0-MANUAL, 1-AUTO
401091	AUTO vs MANUAL 11	0-1	0-MANUAL, 1-AUTO
401092	AUTO vs MANUAL 12	0-1	0-MANUAL, 1-AUTO
401093	AUTO vs MANUAL 13	0-1	0-MANUAL, 1-AUTO

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401094	AUTO vs MANUAL 14	0-1	0-MANUAL, 1-AUTO
401095	AUTO vs MANUAL 15	0-1	0-MANUAL, 1-AUTO
401096	AUTO vs MANUAL 16	0-1	0-MANUAL, 1-AUTO
401097	AUTO vs MANUAL 17	0-1	0-MANUAL, 1-AUTO
401098	AUTO vs MANUAL 18	0-1	0-MANUAL, 1-AUTO
401099	AUTO vs MANUAL 19	0-1	0-MANUAL, 1-AUTO
401100	AUTO vs MANUAL 20	0-1	0-MANUAL, 1-AUTO
401101	AUTO vs MANUAL 21	0-1	0-MANUAL, 1-AUTO
401102	AUTO vs MANUAL 22	0-1	0-MANUAL, 1-AUTO
401103	AUTO vs MANUAL 23	0-1	0-MANUAL, 1-AUTO
401104	AUTO vs MANUAL 24	0-1	0-MANUAL, 1-AUTO
401105	AUTO vs MANUAL 25	0-1	0-MANUAL, 1-AUTO
401106	AUTO vs MANUAL 26	0-1	0-MANUAL, 1-AUTO
401107	AUTO vs MANUAL 27	0-1	0-MANUAL, 1-AUTO
401108	AUTO vs MANUAL 28	0-1	0-MANUAL, 1-AUTO
401109	AUTO vs MANUAL 29	0-1	0-MANUAL, 1-AUTO
401110	AUTO vs MANUAL 30	0-1	0-MANUAL, 1-AUTO
401111	AUTO vs MANUAL 31	0-1	0-MANUAL, 1-AUTO
401112	AUTO vs MANUAL 32	0-1	0-MANUAL, 1-AUTO
401113	AUTO vs MANUAL 33	0-1	0-MANUAL, 1-AUTO
401114	AUTO vs MANUAL 34	0-1	0-MANUAL, 1-AUTO
401115	AUTO vs MANUAL 35	0-1	0-MANUAL, 1-AUTO
401116	AUTO vs MANUAL 36	0-1	0-MANUAL, 1-AUTO
401117	AUTO vs MANUAL 37	0-1	0-MANUAL, 1-AUTO
401118	AUTO vs MANUAL 38	0-1	0-MANUAL, 1-AUTO
401119	AUTO vs MANUAL 39	0-1	0-MANUAL, 1-AUTO
401120	AUTO vs MANUAL 40	0-1	0-MANUAL, 1-AUTO
401121	AUTO vs MANUAL 41	0-1	0-MANUAL, 1-AUTO
401122	AUTO vs MANUAL 42	0-1	0-MANUAL, 1-AUTO
401123	AUTO vs MANUAL 43	0-1	0-MANUAL, 1-AUTO
401124	AUTO vs MANUAL 44	0-1	0-MANUAL, 1-AUTO
401125	AUTO vs MANUAL 45	0-1	0-MANUAL, 1-AUTO
401126	AUTO vs MANUAL 46	0-1	0-MANUAL, 1-AUTO
401127	AUTO vs MANUAL 47	0-1	0-MANUAL, 1-AUTO
401128	AUTO vs MANUAL 48	0-1	0-MANUAL, 1-AUTO
401129	AUTO vs MANUAL 49	0-1	0-MANUAL, 1-AUTO
401130	AUTO vs MANUAL 50	0-1	0-MANUAL, 1-AUTO
401131	AUTO vs MANUAL 51	0-1	0-MANUAL, 1-AUTO
401132	AUTO vs MANUAL 52	0-1	0-MANUAL, 1-AUTO
401133	AUTO vs MANUAL 53	0-1	0-MANUAL, 1-AUTO
401134	AUTO vs MANUAL 54	0-1	0-MANUAL, 1-AUTO

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401135	AUTO vs MANUAL 55	0-1	0-MANUAL, 1-AUTO
401136	AUTO vs MANUAL 56	0-1	0-MANUAL, 1-AUTO
401137	AUTO vs MANUAL 57	0-1	0-MANUAL, 1-AUTO
401138	AUTO vs MANUAL 58	0-1	0-MANUAL, 1-AUTO
401139	AUTO vs MANUAL 59	0-1	0-MANUAL, 1-AUTO
401140	AUTO vs MANUAL 60	0-1	0-MANUAL, 1-AUTO
401141	AUTO vs MANUAL 61	0-1	0-MANUAL, 1-AUTO
401142	AUTO vs MANUAL 62	0-1	0-MANUAL, 1-AUTO
401143	AUTO vs MANUAL 63	0-1	0-MANUAL, 1-AUTO
401144	AUTO vs MANUAL 64	0-1	0-MANUAL, 1-AUTO
401145	AUTO vs MANUAL 65	0-1	0-MANUAL, 1-AUTO
401146	AUTO vs MANUAL 66	0-1	0-MANUAL, 1-AUTO
401147	AUTO vs MANUAL 67	0-1	0-MANUAL, 1-AUTO
401148	AUTO vs MANUAL 68	0-1	0-MANUAL, 1-AUTO
401149	AUTO vs MANUAL 69	0-1	0-MANUAL, 1-AUTO
401150	AUTO vs MANUAL 70	0-1	0-MANUAL, 1-AUTO
401151	AUTO vs MANUAL 71	0-1	0-MANUAL, 1-AUTO
401152	AUTO vs MANUAL 72	0-1	0-MANUAL, 1-AUTO
401153	AUTOTUNE 1	0-1	0-NO, 1-YES
401154	AUTOTUNE 2	0-1	0-NO, 1-YES
401155	AUTOTUNE 3	0-1	0-NO, 1-YES
401156	AUTOTUNE 4	0-1	0-NO, 1-YES
401157	AUTOTUNE 5	0-1	0-NO, 1-YES
401158	AUTOTUNE 6	0-1	0-NO, 1-YES
401159	AUTOTUNE 7	0-1	0-NO, 1-YES
401160	AUTOTUNE 8	0-1	0-NO, 1-YES
401161	AUTOTUNE 9	0-1	0-NO, 1-YES
401162	AUTOTUNE 10	0-1	0-NO, 1-YES
401163	AUTOTUNE 11	0-1	0-NO, 1-YES
401164	AUTOTUNE 12	0-1	0-NO, 1-YES
401165	AUTOTUNE 13	0-1	0-NO, 1-YES
401166	AUTOTUNE 14	0-1	0-NO, 1-YES
401167	AUTOTUNE 15	0-1	0-NO, 1-YES
401168	AUTOTUNE 16	0-1	0-NO, 1-YES
401169	AUTOTUNE 17	0-1	0-NO, 1-YES
401170	AUTOTUNE 18	0-1	0-NO, 1-YES
401171	AUTOTUNE 19	0-1	0-NO, 1-YES
401172	AUTOTUNE 20	0-1	0-NO, 1-YES
401173	AUTOTUNE 21	0-1	0-NO, 1-YES
401174	AUTOTUNE 22	0-1	0-NO, 1-YES
401175	AUTOTUNE 23	0-1	0-NO, 1-YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401176	AUTOTUNE 24	0-1	0-NO, 1-YES
401177	AUTOTUNE 25	0-1	0-NO, 1-YES
401178	AUTOTUNE 26	0-1	0-NO, 1-YES
401179	AUTOTUNE 27	0-1	0-NO, 1-YES
401180	AUTOTUNE 28	0-1	0-NO, 1-YES
401181	AUTOTUNE 29	0-1	0-NO, 1-YES
401182	AUTOTUNE 30	0-1	0-NO, 1-YES
401183	AUTOTUNE 31	0-1	0-NO, 1-YES
401184	AUTOTUNE 32	0-1	0-NO, 1-YES
401185	AUTOTUNE 33	0-1	0-NO, 1-YES
401186	AUTOTUNE 34	0-1	0-NO, 1-YES
401187	AUTOTUNE 35	0-1	0-NO, 1-YES
401188	AUTOTUNE 36	0-1	0-NO, 1-YES
401189	AUTOTUNE 37	0-1	0-NO, 1-YES
401190	AUTOTUNE 38	0-1	0-NO, 1-YES
401191	AUTOTUNE 39	0-1	0-NO, 1-YES
401192	AUTOTUNE 40	0-1	0-NO, 1-YES
401193	AUTOTUNE 41	0-1	0-NO, 1-YES
401194	AUTOTUNE 42	0-1	0-NO, 1-YES
401195	AUTOTUNE 43	0-1	0-NO, 1-YES
401196	AUTOTUNE 44	0-1	0-NO, 1-YES
401197	AUTOTUNE 45	0-1	0-NO, 1-YES
401198	AUTOTUNE 46	0-1	0-NO, 1-YES
401199	AUTOTUNE 47	0-1	0-NO, 1-YES
401200	AUTOTUNE 48	0-1	0-NO, 1-YES
401201	AUTOTUNE 49	0-1	0-NO, 1-YES
401202	AUTOTUNE 50	0-1	0-NO, 1-YES
401203	AUTOTUNE 51	0-1	0-NO, 1-YES
401204	AUTOTUNE 52	0-1	0-NO, 1-YES
401205	AUTOTUNE 53	0-1	0-NO, 1-YES
401206	AUTOTUNE 54	0-1	0-NO, 1-YES
401207	AUTOTUNE 55	0-1	0-NO, 1-YES
401208	AUTOTUNE 56	0-1	0-NO, 1-YES
401209	AUTOTUNE 57	0-1	0-NO, 1-YES
401210	AUTOTUNE 58	0-1	0-NO, 1-YES
401211	AUTOTUNE 59	0-1	0-NO, 1-YES
401212	AUTOTUNE 60	0-1	0-NO, 1-YES
401213	AUTOTUNE 61	0-1	0-NO, 1-YES
401214	AUTOTUNE 62	0-1	0-NO, 1-YES
401215	AUTOTUNE 63	0-1	0-NO, 1-YES
401216	AUTOTUNE 64	0-1	0-NO, 1-YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401217	AUTOTUNE 65	0-1	0-NO, 1-YES
401218	AUTOTUNE 66	0-1	0-NO, 1-YES
401219	AUTOTUNE 67	0-1	0-NO, 1-YES
401220	AUTOTUNE 68	0-1	0-NO, 1-YES
401221	AUTOTUNE 69	0-1	0-NO, 1-YES
401222	AUTOTUNE 70	0-1	0-NO, 1-YES
401223	AUTOTUNE 71	0-1	0-NO, 1-YES
401224	AUTOTUNE 72	0-1	0-NO, 1-YES
401225	RESERVED	RESERVED	RESERVED
401226	RESERVED	RESERVED	RESERVED
401227	IS SYSTEM IN ALARM STATE	0-1	0-NO, 1-YES
401228	TEMP UNITS	0-1	0-F, 1 C
401229	ALARM REG CKT 1	See Alarm Bits Desc.	
401230	ALARM REG CKT 2	See Alarm Bits Desc.	
401231	ALARM REG CKT 3	See Alarm Bits Desc.	
401232	ALARM REG CKT 4	See Alarm Bits Desc.	
401233	ALARM REG CKT 5	See Alarm Bits Desc.	
401234	ALARM REG CKT 6	See Alarm Bits Desc.	
401235	ALARM REG CKT 7	See Alarm Bits Desc.	
401236	ALARM REG CKT 8	See Alarm Bits Desc.	
401237	ALARM REG CKT 9	See Alarm Bits Desc.	
401238	ALARM REG CKT 10	See Alarm Bits Desc.	
401239	ALARM REG CKT 11	See Alarm Bits Desc.	
401240	ALARM REG CKT 12	See Alarm Bits Desc.	
401241	ALARM REG CKT 13	See Alarm Bits Desc.	
401242	ALARM REG CKT 14	See Alarm Bits Desc.	
401243	ALARM REG CKT 15	See Alarm Bits Desc.	
401244	ALARM REG CKT 16	See Alarm Bits Desc.	
401245	ALARM REG CKT 17	See Alarm Bits Desc.	
401246	ALARM REG CKT 18	See Alarm Bits Desc.	
401247	ALARM REG CKT 19	See Alarm Bits Desc.	
401248	ALARM REG CKT 20	See Alarm Bits Desc.	
401249	ALARM REG CKT 21	See Alarm Bits Desc.	
401250	ALARM REG CKT 22	See Alarm Bits Desc.	
401251	ALARM REG CKT 23	See Alarm Bits Desc.	
401252	ALARM REG CKT 24	See Alarm Bits Desc.	
401253	ALARM REG CKT 25	See Alarm Bits Desc.	
401254	ALARM REG CKT 26	See Alarm Bits Desc.	
401255	ALARM REG CKT 27	See Alarm Bits Desc.	
401256	ALARM REG CKT 28	See Alarm Bits Desc.	
401257	ALARM REG CKT 29	See Alarm Bits Desc.	

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401258	ALARM REG CKT 30	See Alarm Bits Desc.	
401259	ALARM REG CKT 31	See Alarm Bits Desc.	
401260	ALARM REG CKT 32	See Alarm Bits Desc.	
401261	ALARM REG CKT 33	See Alarm Bits Desc.	
401262	ALARM REG CKT 34	See Alarm Bits Desc.	
401263	ALARM REG CKT 35	See Alarm Bits Desc.	
401264	ALARM REG CKT 36	See Alarm Bits Desc.	
401265	ALARM REG CKT 37	See Alarm Bits Desc.	
401266	ALARM REG CKT 38	See Alarm Bits Desc.	
401267	ALARM REG CKT 39	See Alarm Bits Desc.	
401268	ALARM REG CKT 40	See Alarm Bits Desc.	
401269	ALARM REG CKT 41	See Alarm Bits Desc.	
401270	ALARM REG CKT 42	See Alarm Bits Desc.	
401271	ALARM REG CKT 43	See Alarm Bits Desc.	
401272	ALARM REG CKT 44	See Alarm Bits Desc.	
401273	ALARM REG CKT 45	See Alarm Bits Desc.	
401274	ALARM REG CKT 46	See Alarm Bits Desc.	
401275	ALARM REG CKT 47	See Alarm Bits Desc.	
401276	ALARM REG CKT 48	See Alarm Bits Desc.	
401277	ALARM REG CKT 49	See Alarm Bits Desc.	
401278	ALARM REG CKT 50	See Alarm Bits Desc.	
401279	ALARM REG CKT 51	See Alarm Bits Desc.	
401280	ALARM REG CKT 52	See Alarm Bits Desc.	
401281	ALARM REG CKT 53	See Alarm Bits Desc.	
401282	ALARM REG CKT 54	See Alarm Bits Desc.	
401283	ALARM REG CKT 55	See Alarm Bits Desc.	
401284	ALARM REG CKT 56	See Alarm Bits Desc.	
401285	ALARM REG CKT 57	See Alarm Bits Desc.	
401286	ALARM REG CKT 58	See Alarm Bits Desc.	
401287	ALARM REG CKT 59	See Alarm Bits Desc.	
401288	ALARM REG CKT 60	See Alarm Bits Desc.	
401289	ALARM REG CKT 61	See Alarm Bits Desc.	
401290	ALARM REG CKT 62	See Alarm Bits Desc.	
401291	ALARM REG CKT 63	See Alarm Bits Desc.	
401292	ALARM REG CKT 64	See Alarm Bits Desc.	
401293	ALARM REG CKT 65	See Alarm Bits Desc.	
401294	ALARM REG CKT 66	See Alarm Bits Desc.	
401295	ALARM REG CKT 67	See Alarm Bits Desc.	
401296	ALARM REG CKT 68	See Alarm Bits Desc.	
401297	ALARM REG CKT 69	See Alarm Bits Desc.	
401298	ALARM REG CKT 70	See Alarm Bits Desc.	

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401299	ALARM REG CKT 71	See Alarm Bits Desc.	
401300	ALARM REG CKT 72	See Alarm Bits Desc.	
401301	HI TEMP SETPOINT 1	from -80 to 1100 F	expressed as integer number
401302	HI TEMP SETPOINT 2	from -80 to 1100 F	expressed as integer number
401303	HI TEMP SETPOINT 3	from -80 to 1100 F	expressed as integer number
401304	HI TEMP SETPOINT 4	from -80 to 1100 F	expressed as integer number
401305	HI TEMP SETPOINT 5	from -80 to 1100 F	expressed as integer number
401306	HI TEMP SETPOINT 6	from -80 to 1100 F	expressed as integer number
401307	HI TEMP SETPOINT 7	from -80 to 1100 F	expressed as integer number
401308	HI TEMP SETPOINT 8	from -80 to 1100 F	expressed as integer number
401309	HI TEMP SETPOINT 9	from -80 to 1100 F	expressed as integer number
401310	HI TEMP SETPOINT 10	from -80 to 1100 F	expressed as integer number
401311	HI TEMP SETPOINT 11	from -80 to 1100 F	expressed as integer number
401312	HI TEMP SETPOINT 12	from -80 to 1100 F	expressed as integer number
401313	HI TEMP SETPOINT 13	from -80 to 1100 F	expressed as integer number
401314	HI TEMP SETPOINT 14	from -80 to 1100 F	expressed as integer number
401315	HI TEMP SETPOINT 15	from -80 to 1100 F	expressed as integer number
401316	HI TEMP SETPOINT 16	from -80 to 1100 F	expressed as integer number
401317	HI TEMP SETPOINT 17	from -80 to 1100 F	expressed as integer number
401318	HI TEMP SETPOINT 18	from -80 to 1100 F	expressed as integer number
401319	HI TEMP SETPOINT 19	from -80 to 1100 F	expressed as integer number
401320	HI TEMP SETPOINT 20	from -80 to 1100 F	expressed as integer number
401321	HI TEMP SETPOINT 21	from -80 to 1100 F	expressed as integer number
401322	HI TEMP SETPOINT 22	from -80 to 1100 F	expressed as integer number
401323	HI TEMP SETPOINT 23	from -80 to 1100 F	expressed as integer number
401324	HI TEMP SETPOINT 24	from -80 to 1100 F	expressed as integer number
401325	HI TEMP SETPOINT 25	from -80 to 1100 F	expressed as integer number
401326	HI TEMP SETPOINT 26	from -80 to 1100 F	expressed as integer number
401327	HI TEMP SETPOINT 27	from -80 to 1100 F	expressed as integer number
401328	HI TEMP SETPOINT 28	from -80 to 1100 F	expressed as integer number
401329	HI TEMP SETPOINT 29	from -80 to 1100 F	expressed as integer number
401330	HI TEMP SETPOINT 30	from -80 to 1100 F	expressed as integer number
401331	HI TEMP SETPOINT 31	from -80 to 1100 F	expressed as integer number
401332	HI TEMP SETPOINT 32	from -80 to 1100 F	expressed as integer number
401333	HI TEMP SETPOINT 33	from -80 to 1100 F	expressed as integer number
401334	HI TEMP SETPOINT 34	from -80 to 1100 F	expressed as integer number
401335	HI TEMP SETPOINT 35	from -80 to 1100 F	expressed as integer number
401336	HI TEMP SETPOINT 36	from -80 to 1100 F	expressed as integer number
401337	HI TEMP SETPOINT 37	from -80 to 1100 F	expressed as integer number
401338	HI TEMP SETPOINT 38	from -80 to 1100 F	expressed as integer number
401339	HI TEMP SETPOINT 39	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401340	HI TEMP SETPOINT 40	from -80 to 1100 F	expressed as integer number
401341	HI TEMP SETPOINT 41	from -80 to 1100 F	expressed as integer number
401342	HI TEMP SETPOINT 42	from -80 to 1100 F	expressed as integer number
401343	HI TEMP SETPOINT 43	from -80 to 1100 F	expressed as integer number
401344	HI TEMP SETPOINT 44	from -80 to 1100 F	expressed as integer number
401345	HI TEMP SETPOINT 45	from -80 to 1100 F	expressed as integer number
401346	HI TEMP SETPOINT 46	from -80 to 1100 F	expressed as integer number
401347	HI TEMP SETPOINT 47	from -80 to 1100 F	expressed as integer number
401348	HI TEMP SETPOINT 48	from -80 to 1100 F	expressed as integer number
401349	HI TEMP SETPOINT 49	from -80 to 1100 F	expressed as integer number
401350	HI TEMP SETPOINT 50	from -80 to 1100 F	expressed as integer number
401351	HI TEMP SETPOINT 51	from -80 to 1100 F	expressed as integer number
401352	HI TEMP SETPOINT 52	from -80 to 1100 F	expressed as integer number
401353	HI TEMP SETPOINT 53	from -80 to 1100 F	expressed as integer number
401354	HI TEMP SETPOINT 54	from -80 to 1100 F	expressed as integer number
401355	HI TEMP SETPOINT 55	from -80 to 1100 F	expressed as integer number
401356	HI TEMP SETPOINT 56	from -80 to 1100 F	expressed as integer number
401357	HI TEMP SETPOINT 57	from -80 to 1100 F	expressed as integer number
401358	HI TEMP SETPOINT 58	from -80 to 1100 F	expressed as integer number
401359	HI TEMP SETPOINT 59	from -80 to 1100 F	expressed as integer number
401360	HI TEMP SETPOINT 60	from -80 to 1100 F	expressed as integer number
401361	HI TEMP SETPOINT 61	from -80 to 1100 F	expressed as integer number
401362	HI TEMP SETPOINT 62	from -80 to 1100 F	expressed as integer number
401363	HI TEMP SETPOINT 63	from -80 to 1100 F	expressed as integer number
401364	HI TEMP SETPOINT 64	from -80 to 1100 F	expressed as integer number
401365	HI TEMP SETPOINT 65	from -80 to 1100 F	expressed as integer number
401366	HI TEMP SETPOINT 66	from -80 to 1100 F	expressed as integer number
401367	HI TEMP SETPOINT 67	from -80 to 1100 F	expressed as integer number
401368	HI TEMP SETPOINT 68	from -80 to 1100 F	expressed as integer number
401369	HI TEMP SETPOINT 69	from -80 to 1100 F	expressed as integer number
401370	HI TEMP SETPOINT 70	from -80 to 1100 F	expressed as integer number
401371	HI TEMP SETPOINT 71	from -80 to 1100 F	expressed as integer number
401372	HI TEMP SETPOINT 72	from -80 to 1100 F	expressed as integer number
401373	LO TEMP SETPOINT 1	from -80 to 1100 F	expressed as integer number
401374	LO TEMP SETPOINT 2	from -80 to 1100 F	expressed as integer number
401375	LO TEMP SETPOINT 3	from -80 to 1100 F	expressed as integer number
401376	LO TEMP SETPOINT 4	from -80 to 1100 F	expressed as integer number
401377	LO TEMP SETPOINT 5	from -80 to 1100 F	expressed as integer number
401378	LO TEMP SETPOINT 6	from -80 to 1100 F	expressed as integer number
401379	LO TEMP SETPOINT 7	from -80 to 1100 F	expressed as integer number
401380	LO TEMP SETPOINT 8	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401381	LO TEMP SETPOINT 9	from -80 to 1100 F	expressed as integer number
401382	LO TEMP SETPOINT 10	from -80 to 1100 F	expressed as integer number
401383	LO TEMP SETPOINT 11	from -80 to 1100 F	expressed as integer number
401384	LO TEMP SETPOINT 12	from -80 to 1100 F	expressed as integer number
401385	LO TEMP SETPOINT 13	from -80 to 1100 F	expressed as integer number
401386	LO TEMP SETPOINT 14	from -80 to 1100 F	expressed as integer number
401387	LO TEMP SETPOINT 15	from -80 to 1100 F	expressed as integer number
401388	LO TEMP SETPOINT 16	from -80 to 1100 F	expressed as integer number
401389	LO TEMP SETPOINT 17	from -80 to 1100 F	expressed as integer number
401390	LO TEMP SETPOINT 18	from -80 to 1100 F	expressed as integer number
401391	LO TEMP SETPOINT 19	from -80 to 1100 F	expressed as integer number
401392	LO TEMP SETPOINT 20	from -80 to 1100 F	expressed as integer number
401393	LO TEMP SETPOINT 21	from -80 to 1100 F	expressed as integer number
401394	LO TEMP SETPOINT 22	from -80 to 1100 F	expressed as integer number
401395	LO TEMP SETPOINT 23	from -80 to 1100 F	expressed as integer number
401396	LO TEMP SETPOINT 24	from -80 to 1100 F	expressed as integer number
401397	LO TEMP SETPOINT 25	from -80 to 1100 F	expressed as integer number
401398	LO TEMP SETPOINT 26	from -80 to 1100 F	expressed as integer number
401399	LO TEMP SETPOINT 27	from -80 to 1100 F	expressed as integer number
401400	LO TEMP SETPOINT 28	from -80 to 1100 F	expressed as integer number
401401	LO TEMP SETPOINT 29	from -80 to 1100 F	expressed as integer number
401402	LO TEMP SETPOINT 30	from -80 to 1100 F	expressed as integer number
401403	LO TEMP SETPOINT 31	from -80 to 1100 F	expressed as integer number
401404	LO TEMP SETPOINT 32	from -80 to 1100 F	expressed as integer number
401405	LO TEMP SETPOINT 33	from -80 to 1100 F	expressed as integer number
401406	LO TEMP SETPOINT 34	from -80 to 1100 F	expressed as integer number
401407	LO TEMP SETPOINT 35	from -80 to 1100 F	expressed as integer number
401408	LO TEMP SETPOINT 36	from -80 to 1100 F	expressed as integer number
401409	LO TEMP SETPOINT 37	from -80 to 1100 F	expressed as integer number
401410	LO TEMP SETPOINT 38	from -80 to 1100 F	expressed as integer number
401411	LO TEMP SETPOINT 39	from -80 to 1100 F	expressed as integer number
401412	LO TEMP SETPOINT 40	from -80 to 1100 F	expressed as integer number
401413	LO TEMP SETPOINT 41	from -80 to 1100 F	expressed as integer number
401414	LO TEMP SETPOINT 42	from -80 to 1100 F	expressed as integer number
401415	LO TEMP SETPOINT 43	from -80 to 1100 F	expressed as integer number
401416	LO TEMP SETPOINT 44	from -80 to 1100 F	expressed as integer number
401417	LO TEMP SETPOINT 45	from -80 to 1100 F	expressed as integer number
401418	LO TEMP SETPOINT 46	from -80 to 1100 F	expressed as integer number
401419	LO TEMP SETPOINT 47	from -80 to 1100 F	expressed as integer number
401420	LO TEMP SETPOINT 48	from -80 to 1100 F	expressed as integer number
401421	LO TEMP SETPOINT 49	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401422	LO TEMP SETPOINT 50	from -80 to 1100 F	expressed as integer number
401423	LO TEMP SETPOINT 51	from -80 to 1100 F	expressed as integer number
401424	LO TEMP SETPOINT 52	from -80 to 1100 F	expressed as integer number
401425	LO TEMP SETPOINT 53	from -80 to 1100 F	expressed as integer number
401426	LO TEMP SETPOINT 54	from -80 to 1100 F	expressed as integer number
401427	LO TEMP SETPOINT 55	from -80 to 1100 F	expressed as integer number
401428	LO TEMP SETPOINT 56	from -80 to 1100 F	expressed as integer number
401429	LO TEMP SETPOINT 57	from -80 to 1100 F	expressed as integer number
401430	LO TEMP SETPOINT 58	from -80 to 1100 F	expressed as integer number
401431	LO TEMP SETPOINT 59	from -80 to 1100 F	expressed as integer number
401432	LO TEMP SETPOINT 60	from -80 to 1100 F	expressed as integer number
401433	LO TEMP SETPOINT 61	from -80 to 1100 F	expressed as integer number
401434	LO TEMP SETPOINT 62	from -80 to 1100 F	expressed as integer number
401435	LO TEMP SETPOINT 63	from -80 to 1100 F	expressed as integer number
401436	LO TEMP SETPOINT 64	from -80 to 1100 F	expressed as integer number
401437	LO TEMP SETPOINT 65	from -80 to 1100 F	expressed as integer number
401438	LO TEMP SETPOINT 66	from -80 to 1100 F	expressed as integer number
401439	LO TEMP SETPOINT 67	from -80 to 1100 F	expressed as integer number
401440	LO TEMP SETPOINT 68	from -80 to 1100 F	expressed as integer number
401441	LO TEMP SETPOINT 69	from -80 to 1100 F	expressed as integer number
401442	LO TEMP SETPOINT 70	from -80 to 1100 F	expressed as integer number
401443	LO TEMP SETPOINT 71	from -80 to 1100 F	expressed as integer number
401444	LO TEMP SETPOINT 72	from -80 to 1100 F	expressed as integer number
401445	GFEP SETPOINT 1	from 30 to 150 mA	expressed as integer number
401446	GFEP SETPOINT 2	from 30 to 150 mA	expressed as integer number
401447	GFEP SETPOINT 3	from 30 to 150 mA	expressed as integer number
401448	GFEP SETPOINT 4	from 30 to 150 mA	expressed as integer number
401449	GFEP SETPOINT 5	from 30 to 150 mA	expressed as integer number
401450	GFEP SETPOINT 6	from 30 to 150 mA	expressed as integer number
401451	GFEP SETPOINT 7	from 30 to 150 mA	expressed as integer number
401452	GFEP SETPOINT 8	from 30 to 150 mA	expressed as integer number
401453	GFEP SETPOINT 9	from 30 to 150 mA	expressed as integer number
401454	GFEP SETPOINT 10	from 30 to 150 mA	expressed as integer number
401455	GFEP SETPOINT 11	from 30 to 150 mA	expressed as integer number
401456	GFEP SETPOINT 12	from 30 to 150 mA	expressed as integer number
401457	GFEP SETPOINT 13	from 30 to 150 mA	expressed as integer number
401458	GFEP SETPOINT 14	from 30 to 150 mA	expressed as integer number
401459	GFEP SETPOINT 15	from 30 to 150 mA	expressed as integer number
401460	GFEP SETPOINT 16	from 30 to 150 mA	expressed as integer number
401461	GFEP SETPOINT 17	from 30 to 150 mA	expressed as integer number
401462	GFEP SETPOINT 18	from 30 to 150 mA	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401463	GFEP SETPOINT 19	from 30 to 150 mA	expressed as integer number
401464	GFEP SETPOINT 20	from 30 to 150 mA	expressed as integer number
401465	GFEP SETPOINT 21	from 30 to 150 mA	expressed as integer number
401466	GFEP SETPOINT 22	from 30 to 150 mA	expressed as integer number
401467	GFEP SETPOINT 23	from 30 to 150 mA	expressed as integer number
401468	GFEP SETPOINT 24	from 30 to 150 mA	expressed as integer number
401469	GFEP SETPOINT 25	from 30 to 150 mA	expressed as integer number
401470	GFEP SETPOINT 26	from 30 to 150 mA	expressed as integer number
401471	GFEP SETPOINT 27	from 30 to 150 mA	expressed as integer number
401472	GFEP SETPOINT 28	from 30 to 150 mA	expressed as integer number
401473	GFEP SETPOINT 29	from 30 to 150 mA	expressed as integer number
401474	GFEP SETPOINT 30	from 30 to 150 mA	expressed as integer number
401475	GFEP SETPOINT 31	from 30 to 150 mA	expressed as integer number
401476	GFEP SETPOINT 32	from 30 to 150 mA	expressed as integer number
401477	GFEP SETPOINT 33	from 30 to 150 mA	expressed as integer number
401478	GFEP SETPOINT 34	from 30 to 150 mA	expressed as integer number
401479	GFEP SETPOINT 35	from 30 to 150 mA	expressed as integer number
401480	GFEP SETPOINT 36	from 30 to 150 mA	expressed as integer number
401481	GFEP SETPOINT 37	from 30 to 150 mA	expressed as integer number
401482	GFEP SETPOINT 38	from 30 to 150 mA	expressed as integer number
401483	GFEP SETPOINT 39	from 30 to 150 mA	expressed as integer number
401484	GFEP SETPOINT 40	from 30 to 150 mA	expressed as integer number
401485	GFEP SETPOINT 41	from 30 to 150 mA	expressed as integer number
401486	GFEP SETPOINT 42	from 30 to 150 mA	expressed as integer number
401487	GFEP SETPOINT 43	from 30 to 150 mA	expressed as integer number
401488	GFEP SETPOINT 44	from 30 to 150 mA	expressed as integer number
401489	GFEP SETPOINT 45	from 30 to 150 mA	expressed as integer number
401490	GFEP SETPOINT 46	from 30 to 150 mA	expressed as integer number
401491	GFEP SETPOINT 47	from 30 to 150 mA	expressed as integer number
401492	GFEP SETPOINT 48	from 30 to 150 mA	expressed as integer number
401493	GFEP SETPOINT 49	from 30 to 150 mA	expressed as integer number
401494	GFEP SETPOINT 50	from 30 to 150 mA	expressed as integer number
401495	GFEP SETPOINT 51	from 30 to 150 mA	expressed as integer number
401496	GFEP SETPOINT 52	from 30 to 150 mA	expressed as integer number
401497	GFEP SETPOINT 53	from 30 to 150 mA	expressed as integer number
401498	GFEP SETPOINT 54	from 30 to 150 mA	expressed as integer number
401499	GFEP SETPOINT 55	from 30 to 150 mA	expressed as integer number
401500	GFEP SETPOINT 56	from 30 to 150 mA	expressed as integer number
401501	GFEP SETPOINT 57	from 30 to 150 mA	expressed as integer number
401502	GFEP SETPOINT 58	from 30 to 150 mA	expressed as integer number
401503	GFEP SETPOINT 59	from 30 to 150 mA	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
401504	GFEP SETPOINT 60	from 30 to 150 mA	expressed as integer number
401505	GFEP SETPOINT 61	from 30 to 150 mA	expressed as integer number
401506	GFEP SETPOINT 62	from 30 to 150 mA	expressed as integer number
401507	GFEP SETPOINT 63	from 30 to 150 mA	expressed as integer number
401508	GFEP SETPOINT 64	from 30 to 150 mA	expressed as integer number
401509	GFEP SETPOINT 65	from 30 to 150 mA	expressed as integer number
401510	GFEP SETPOINT 66	from 30 to 150 mA	expressed as integer number
401511	GFEP SETPOINT 67	from 30 to 150 mA	expressed as integer number
401512	GFEP SETPOINT 68	from 30 to 150 mA	expressed as integer number
401513	GFEP SETPOINT 69	from 30 to 150 mA	expressed as integer number
401514	GFEP SETPOINT 70	from 30 to 150 mA	expressed as integer number
401515	GFEP SETPOINT 71	from 30 to 150 mA	expressed as integer number
401516	GFEP SETPOINT 72	from 30 to 150 mA	expressed as integer number
401517	HI LOAD SPT CKT 1	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401518	HI LOAD SPT CKT 2	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401519	HI LOAD SPT CKT 3	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401520	HI LOAD SPT CKT 4	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401521	HI LOAD SPT CKT 5	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401522	HI LOAD SPT CKT 6	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401523	HI LOAD SPT CKT 7	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401524	HI LOAD SPT CKT 8	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401525	HI LOAD SPT CKT 9	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401526	HI LOAD SPT CKT 10	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401527	HI LOAD SPT CKT 11	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401528	HI LOAD SPT CKT 12	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401529	HI LOAD SPT CKT 13	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401530	HI LOAD SPT CKT 14	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401531	HI LOAD SPT CKT 15	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401532	HI LOAD SPT CKT 16	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401533	HI LOAD SPT CKT 17	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401534	HI LOAD SPT CKT 18	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401535	HI LOAD SPT CKT 19	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401536	HI LOAD SPT CKT 20	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401537	HI LOAD SPT CKT 21	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401538	HI LOAD SPT CKT 22	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401539	HI LOAD SPT CKT 23	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401540	HI LOAD SPT CKT 24	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401541	HI LOAD SPT CKT 25	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401542	HI LOAD SPT CKT 26	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401543	HI LOAD SPT CKT 27	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps
401544	HI LOAD SPT CKT 28	0-500 ; e.g. 25 = 2.5 Amp	expressed in tenth/Amps e.g., 56 = 5.6 Amps

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402103	Hold time counter ckt 1	0 to 60	16 bit unsigned int
402104	Hold time counter ckt 2	0 to 60	16 bit unsigned int
402105	Hold time counter ckt 3	0 to 60	16 bit unsigned int
402106	Hold time counter ckt 4	0 to 60	16 bit unsigned int
402107	Hold time counter ckt 5	0 to 60	16 bit unsigned int
402108	Hold time counter ckt 6	0 to 60	16 bit unsigned int
402109	Hold time counter ckt 7	0 to 60	16 bit unsigned int
402110	Hold time counter ckt 8	0 to 60	16 bit unsigned int
402111	Hold time counter ckt 9	0 to 60	16 bit unsigned int
402112	Hold time counter ckt 10	0 to 60	16 bit unsigned int
402113	Hold time counter ckt 11	0 to 60	16 bit unsigned int
402114	Hold time counter ckt 12	0 to 60	16 bit unsigned int
402115	Hold time counter ckt 13	0 to 60	16 bit unsigned int
402116	Hold time counter ckt 14	0 to 60	16 bit unsigned int
402117	Hold time counter ckt 15	0 to 60	16 bit unsigned int
402118	Hold time counter ckt 16	0 to 60	16 bit unsigned int
402119	Hold time counter ckt 17	0 to 60	16 bit unsigned int
402120	Hold time counter ckt 18	0 to 60	16 bit unsigned int
402121	Hold time counter ckt 19	0 to 60	16 bit unsigned int
402122	Hold time counter ckt 20	0 to 60	16 bit unsigned int
402123	Hold time counter ckt 21	0 to 60	16 bit unsigned int
402124	Hold time counter ckt 22	0 to 60	16 bit unsigned int
402125	Hold time counter ckt 23	0 to 60	16 bit unsigned int
402126	Hold time counter ckt 24	0 to 60	16 bit unsigned int
402127	Hold time counter ckt 25	0 to 60	16 bit unsigned int
402128	Hold time counter ckt 26	0 to 60	16 bit unsigned int
402129	Hold time counter ckt 27	0 to 60	16 bit unsigned int
402130	Hold time counter ckt 28	0 to 60	16 bit unsigned int
402131	Hold time counter ckt 29	0 to 60	16 bit unsigned int
402132	Hold time counter ckt 30	0 to 60	16 bit unsigned int
402133	Hold time counter ckt 31	0 to 60	16 bit unsigned int
402134	Hold time counter ckt 32	0 to 60	16 bit unsigned int
402135	Hold time counter ckt 33	0 to 60	16 bit unsigned int
402136	Hold time counter ckt 34	0 to 60	16 bit unsigned int
402137	Hold time counter ckt 35	0 to 60	16 bit unsigned int
402138	Hold time counter ckt 36	0 to 60	16 bit unsigned int
402139	Hold time counter ckt 37	0 to 60	16 bit unsigned int
402140	Hold time counter ckt 38	0 to 60	16 bit unsigned int
402141	Hold time counter ckt 39	0 to 60	16 bit unsigned int
402142	Hold time counter ckt 40	0 to 60	16 bit unsigned int
402143	Hold time counter ckt 41	0 to 60	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402144	Hold time counter ckt 42	0 to 60	16 bit unsigned int
402145	Hold time counter ckt 43	0 to 60	16 bit unsigned int
402146	Hold time counter ckt 44	0 to 60	16 bit unsigned int
402147	Hold time counter ckt 45	0 to 60	16 bit unsigned int
402148	Hold time counter ckt 46	0 to 60	16 bit unsigned int
402149	Hold time counter ckt 47	0 to 60	16 bit unsigned int
402150	Hold time counter ckt 48	0 to 60	16 bit unsigned int
402151	Hold time counter ckt 49	0 to 60	16 bit unsigned int
402152	Hold time counter ckt 50	0 to 60	16 bit unsigned int
402153	Hold time counter ckt 51	0 to 60	16 bit unsigned int
402154	Hold time counter ckt 52	0 to 60	16 bit unsigned int
402155	Hold time counter ckt 53	0 to 60	16 bit unsigned int
402156	Hold time counter ckt 54	0 to 60	16 bit unsigned int
402157	Hold time counter ckt 55	0 to 60	16 bit unsigned int
402158	Hold time counter ckt 56	0 to 60	16 bit unsigned int
402159	Hold time counter ckt 57	0 to 60	16 bit unsigned int
402160	Hold time counter ckt 58	0 to 60	16 bit unsigned int
402161	Hold time counter ckt 59	0 to 60	16 bit unsigned int
402162	Hold time counter ckt 60	0 to 60	16 bit unsigned int
402163	Hold time counter ckt 61	0 to 60	16 bit unsigned int
402164	Hold time counter ckt 62	0 to 60	16 bit unsigned int
402165	Hold time counter ckt 63	0 to 60	16 bit unsigned int
402166	Hold time counter ckt 64	0 to 60	16 bit unsigned int
402167	Hold time counter ckt 65	0 to 60	16 bit unsigned int
402168	Hold time counter ckt 66	0 to 60	16 bit unsigned int
402169	Hold time counter ckt 67	0 to 60	16 bit unsigned int
402170	Hold time counter ckt 68	0 to 60	16 bit unsigned int
402171	Hold time counter ckt 69	0 to 60	16 bit unsigned int
402172	Hold time counter ckt 70	0 to 60	16 bit unsigned int
402173	Hold time counter ckt 71	0 to 60	16 bit unsigned int
402174	Hold time counter ckt 72	0 to 60	16 bit unsigned int
402175	Hold time setpoint ckt 1	0 to 60	16 bit unsigned int
402176	Hold time setpoint ckt 2	0 to 60	16 bit unsigned int
402177	Hold time setpoint ckt 3	0 to 60	16 bit unsigned int
402178	Hold time setpoint ckt 4	0 to 60	16 bit unsigned int
402179	Hold time setpoint ckt 5	0 to 60	16 bit unsigned int
402180	Hold time setpoint ckt 6	0 to 60	16 bit unsigned int
402181	Hold time setpoint ckt 7	0 to 60	16 bit unsigned int
402182	Hold time setpoint ckt 8	0 to 60	16 bit unsigned int
402183	Hold time setpoint ckt 9	0 to 60	16 bit unsigned int
402184	Hold time setpoint ckt 10	0 to 60	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402185	Hold time setpoint ckt 11	0 to 60	16 bit unsigned int
402186	Hold time setpoint ckt 12	0 to 60	16 bit unsigned int
402187	Hold time setpoint ckt 13	0 to 60	16 bit unsigned int
402188	Hold time setpoint ckt 14	0 to 60	16 bit unsigned int
402189	Hold time setpoint ckt 15	0 to 60	16 bit unsigned int
402190	Hold time setpoint ckt 16	0 to 60	16 bit unsigned int
402191	Hold time setpoint ckt 17	0 to 60	16 bit unsigned int
402192	Hold time setpoint ckt 18	0 to 60	16 bit unsigned int
402193	Hold time setpoint ckt 19	0 to 60	16 bit unsigned int
402194	Hold time setpoint ckt 20	0 to 60	16 bit unsigned int
402195	Hold time setpoint ckt 21	0 to 60	16 bit unsigned int
402196	Hold time setpoint ckt 22	0 to 60	16 bit unsigned int
402197	Hold time setpoint ckt 23	0 to 60	16 bit unsigned int
402198	Hold time setpoint ckt 24	0 to 60	16 bit unsigned int
402199	Hold time setpoint ckt 25	0 to 60	16 bit unsigned int
402200	Hold time setpoint ckt 26	0 to 60	16 bit unsigned int
402201	Hold time setpoint ckt 27	0 to 60	16 bit unsigned int
402202	Hold time setpoint ckt 28	0 to 60	16 bit unsigned int
402203	Hold time setpoint ckt 29	0 to 60	16 bit unsigned int
402204	Hold time setpoint ckt 30	0 to 60	16 bit unsigned int
402205	Hold time setpoint ckt 31	0 to 60	16 bit unsigned int
402206	Hold time setpoint ckt 32	0 to 60	16 bit unsigned int
402207	Hold time setpoint ckt 33	0 to 60	16 bit unsigned int
402208	Hold time setpoint ckt 34	0 to 60	16 bit unsigned int
402209	Hold time setpoint ckt 35	0 to 60	16 bit unsigned int
402210	Hold time setpoint ckt 36	0 to 60	16 bit unsigned int
402211	Hold time setpoint ckt 37	0 to 60	16 bit unsigned int
402212	Hold time setpoint ckt 38	0 to 60	16 bit unsigned int
402213	Hold time setpoint ckt 39	0 to 60	16 bit unsigned int
402214	Hold time setpoint ckt 40	0 to 60	16 bit unsigned int
402215	Hold time setpoint ckt 41	0 to 60	16 bit unsigned int
402216	Hold time setpoint ckt 42	0 to 60	16 bit unsigned int
402217	Hold time setpoint ckt 43	0 to 60	16 bit unsigned int
402218	Hold time setpoint ckt 44	0 to 60	16 bit unsigned int
402219	Hold time setpoint ckt 45	0 to 60	16 bit unsigned int
402220	Hold time setpoint ckt 46	0 to 60	16 bit unsigned int
402221	Hold time setpoint ckt 47	0 to 60	16 bit unsigned int
402222	Hold time setpoint ckt 48	0 to 60	16 bit unsigned int
402223	Hold time setpoint ckt 49	0 to 60	16 bit unsigned int
402224	Hold time setpoint ckt 50	0 to 60	16 bit unsigned int
402225	Hold time setpoint ckt 51	0 to 60	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402226	Hold time setpoint ckt 52	0 to 60	16 bit unsigned int
402227	Hold time setpoint ckt 53	0 to 60	16 bit unsigned int
402228	Hold time setpoint ckt 54	0 to 60	16 bit unsigned int
402229	Hold time setpoint ckt 55	0 to 60	16 bit unsigned int
402230	Hold time setpoint ckt 56	0 to 60	16 bit unsigned int
402231	Hold time setpoint ckt 57	0 to 60	16 bit unsigned int
402232	Hold time setpoint ckt 58	0 to 60	16 bit unsigned int
402233	Hold time setpoint ckt 59	0 to 60	16 bit unsigned int
402234	Hold time setpoint ckt 60	0 to 60	16 bit unsigned int
402235	Hold time setpoint ckt 61	0 to 60	16 bit unsigned int
402236	Hold time setpoint ckt 62	0 to 60	16 bit unsigned int
402237	Hold time setpoint ckt 63	0 to 60	16 bit unsigned int
402238	Hold time setpoint ckt 64	0 to 60	16 bit unsigned int
402239	Hold time setpoint ckt 65	0 to 60	16 bit unsigned int
402240	Hold time setpoint ckt 66	0 to 60	16 bit unsigned int
402241	Hold time setpoint ckt 67	0 to 60	16 bit unsigned int
402242	Hold time setpoint ckt 68	0 to 60	16 bit unsigned int
402243	Hold time setpoint ckt 69	0 to 60	16 bit unsigned int
402244	Hold time setpoint ckt 70	0 to 60	16 bit unsigned int
402245	Hold time setpoint ckt 71	0 to 60	16 bit unsigned int
402246	Hold time setpoint ckt 72	0 to 60	16 bit unsigned int
402248	Ambient sensor map. ckt 1	0 to 72	16 bit unsigned int
402249	Ambient sensor map. ckt 2	0 to 72	16 bit unsigned int
402250	Ambient sensor map. ckt 3	0 to 72	16 bit unsigned int
402251	Ambient sensor map. ckt 4	0 to 72	16 bit unsigned int
402252	Ambient sensor map. ckt 5	0 to 72	16 bit unsigned int
402253	Ambient sensor map. ckt 6	0 to 72	16 bit unsigned int
402254	Ambient sensor map. ckt 7	0 to 72	16 bit unsigned int
402255	Ambient sensor map. ckt 8	0 to 72	16 bit unsigned int
402256	Ambient sensor map. ckt 9	0 to 72	16 bit unsigned int
402257	Ambient sensor map. ckt 10	0 to 72	16 bit unsigned int
402258	Ambient sensor map. ckt 11	0 to 72	16 bit unsigned int
402259	Ambient sensor map. ckt 12	0 to 72	16 bit unsigned int
402260	Ambient sensor map. ckt 13	0 to 72	16 bit unsigned int
402261	Ambient sensor map. ckt 14	0 to 72	16 bit unsigned int
402262	Ambient sensor map. ckt 15	0 to 72	16 bit unsigned int
402263	Ambient sensor map. ckt 16	0 to 72	16 bit unsigned int
402264	Ambient sensor map. ckt 17	0 to 72	16 bit unsigned int
402265	Ambient sensor map. ckt 18	0 to 72	16 bit unsigned int
402266	Ambient sensor map. ckt 19	0 to 72	16 bit unsigned int
402267	Ambient sensor map. ckt 20	0 to 72	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402268	Ambient sensor map. ckt 21	0 to 72	16 bit unsigned int
402269	Ambient sensor map. ckt 22	0 to 72	16 bit unsigned int
402270	Ambient sensor map. ckt 23	0 to 72	16 bit unsigned int
402271	Ambient sensor map. ckt 24	0 to 72	16 bit unsigned int
402272	Ambient sensor map. ckt 25	0 to 72	16 bit unsigned int
402273	Ambient sensor map. ckt 26	0 to 72	16 bit unsigned int
402274	Ambient sensor map. ckt 27	0 to 72	16 bit unsigned int
402275	Ambient sensor map. ckt 28	0 to 72	16 bit unsigned int
402276	Ambient sensor map. ckt 29	0 to 72	16 bit unsigned int
402277	Ambient sensor map. ckt 30	0 to 72	16 bit unsigned int
402278	Ambient sensor map. ckt 31	0 to 72	16 bit unsigned int
402279	Ambient sensor map. ckt 32	0 to 72	16 bit unsigned int
402280	Ambient sensor map. ckt 33	0 to 72	16 bit unsigned int
402281	Ambient sensor map. ckt 34	0 to 72	16 bit unsigned int
402282	Ambient sensor map. ckt 35	0 to 72	16 bit unsigned int
402283	Ambient sensor map. ckt 36	0 to 72	16 bit unsigned int
402284	Ambient sensor map. ckt 37	0 to 72	16 bit unsigned int
402285	Ambient sensor map. ckt 38	0 to 72	16 bit unsigned int
402286	Ambient sensor map. ckt 39	0 to 72	16 bit unsigned int
402287	Ambient sensor map. ckt 40	0 to 72	16 bit unsigned int
402288	Ambient sensor map. ckt 41	0 to 72	16 bit unsigned int
402289	Ambient sensor map. ckt 42	0 to 72	16 bit unsigned int
402290	Ambient sensor map. ckt 43	0 to 72	16 bit unsigned int
402291	Ambient sensor map. ckt 44	0 to 72	16 bit unsigned int
402292	Ambient sensor map. ckt 45	0 to 72	16 bit unsigned int
402293	Ambient sensor map. ckt 46	0 to 72	16 bit unsigned int
402294	Ambient sensor map. ckt 47	0 to 72	16 bit unsigned int
402295	Ambient sensor map. ckt 48	0 to 72	16 bit unsigned int
402296	Ambient sensor map. ckt 49	0 to 72	16 bit unsigned int
402297	Ambient sensor map. ckt 50	0 to 72	16 bit unsigned int
402298	Ambient sensor map. ckt 51	0 to 72	16 bit unsigned int
402299	Ambient sensor map. ckt 52	0 to 72	16 bit unsigned int
402300	Ambient sensor map. ckt 53	0 to 72	16 bit unsigned int
402301	Ambient sensor map. ckt 54	0 to 72	16 bit unsigned int
402302	Ambient sensor map. ckt 55	0 to 72	16 bit unsigned int
402303	Ambient sensor map. ckt 56	0 to 72	16 bit unsigned int
402304	Ambient sensor map. ckt 57	0 to 72	16 bit unsigned int
402305	Ambient sensor map. ckt 58	0 to 72	16 bit unsigned int
402306	Ambient sensor map. ckt 59	0 to 72	16 bit unsigned int
402307	Ambient sensor map. ckt 60	0 to 72	16 bit unsigned int
402308	Ambient sensor map. ckt 61	0 to 72	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402309	Ambient sensor map. ckt 62	0 to 72	16 bit unsigned int
402310	Ambient sensor map. ckt 63	0 to 72	16 bit unsigned int
402311	Ambient sensor map. ckt 64	0 to 72	16 bit unsigned int
402312	Ambient sensor map. ckt 65	0 to 72	16 bit unsigned int
402313	Ambient sensor map. ckt 66	0 to 72	16 bit unsigned int
402314	Ambient sensor map. ckt 67	0 to 72	16 bit unsigned int
402315	Ambient sensor map. ckt 68	0 to 72	16 bit unsigned int
402316	Ambient sensor map. ckt 69	0 to 72	16 bit unsigned int
402317	Ambient sensor map. ckt 70	0 to 72	16 bit unsigned int
402318	Ambient sensor map. ckt 71	0 to 72	16 bit unsigned int
402319	Ambient sensor map. ckt 72	0 to 72	16 bit unsigned int
402320	Control sensor map. ckt 1	0 to 72	16 bit unsigned int
402321	Control sensor map. ckt 2	0 to 72	16 bit unsigned int
402322	Control sensor map. ckt 3	0 to 72	16 bit unsigned int
402323	Control sensor map. ckt 4	0 to 72	16 bit unsigned int
402324	Control sensor map. ckt 5	0 to 72	16 bit unsigned int
402325	Control sensor map. ckt 6	0 to 72	16 bit unsigned int
402326	Control sensor map. ckt 7	0 to 72	16 bit unsigned int
402327	Control sensor map. ckt 8	0 to 72	16 bit unsigned int
402328	Control sensor map. ckt 9	0 to 72	16 bit unsigned int
402329	Control sensor map. ckt 10	0 to 72	16 bit unsigned int
402330	Control sensor map. ckt 11	0 to 72	16 bit unsigned int
402331	Control sensor map. ckt 12	0 to 72	16 bit unsigned int
402332	Control sensor map. ckt 13	0 to 72	16 bit unsigned int
402333	Control sensor map. ckt 14	0 to 72	16 bit unsigned int
402334	Control sensor map. ckt 15	0 to 72	16 bit unsigned int
402335	Control sensor map. ckt 16	0 to 72	16 bit unsigned int
402336	Control sensor map. ckt 17	0 to 72	16 bit unsigned int
402337	Control sensor map. ckt 18	0 to 72	16 bit unsigned int
402338	Control sensor map. ckt 19	0 to 72	16 bit unsigned int
402339	Control sensor map. ckt 20	0 to 72	16 bit unsigned int
402340	Control sensor map. ckt 21	0 to 72	16 bit unsigned int
402341	Control sensor map. ckt 22	0 to 72	16 bit unsigned int
402342	Control sensor map. ckt 23	0 to 72	16 bit unsigned int
402343	Control sensor map. ckt 24	0 to 72	16 bit unsigned int
402344	Control sensor map. ckt 25	0 to 72	16 bit unsigned int
402345	Control sensor map. ckt 26	0 to 72	16 bit unsigned int
402346	Control sensor map. ckt 27	0 to 72	16 bit unsigned int
402347	Control sensor map. ckt 28	0 to 72	16 bit unsigned int
402348	Control sensor map. ckt 29	0 to 72	16 bit unsigned int
402349	Control sensor map. ckt 30	0 to 72	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402350	Control sensor map. ckt 31	0 to 72	16 bit unsigned int
402351	Control sensor map. ckt 32	0 to 72	16 bit unsigned int
402352	Control sensor map. ckt 33	0 to 72	16 bit unsigned int
402353	Control sensor map. ckt 34	0 to 72	16 bit unsigned int
402354	Control sensor map. ckt 35	0 to 72	16 bit unsigned int
402355	Control sensor map. ckt 36	0 to 72	16 bit unsigned int
402356	Control sensor map. ckt 37	0 to 72	16 bit unsigned int
402357	Control sensor map. ckt 38	0 to 72	16 bit unsigned int
402358	Control sensor map. ckt 39	0 to 72	16 bit unsigned int
402359	Control sensor map. ckt 40	0 to 72	16 bit unsigned int
402360	Control sensor map. ckt 41	0 to 72	16 bit unsigned int
402361	Control sensor map. ckt 42	0 to 72	16 bit unsigned int
402362	Control sensor map. ckt 43	0 to 72	16 bit unsigned int
402363	Control sensor map. ckt 44	0 to 72	16 bit unsigned int
402364	Control sensor map. ckt 45	0 to 72	16 bit unsigned int
402365	Control sensor map. ckt 46	0 to 72	16 bit unsigned int
402366	Control sensor map. ckt 47	0 to 72	16 bit unsigned int
402367	Control sensor map. ckt 48	0 to 72	16 bit unsigned int
402368	Control sensor map. ckt 49	0 to 72	16 bit unsigned int
402369	Control sensor map. ckt 50	0 to 72	16 bit unsigned int
402370	Control sensor map. ckt 51	0 to 72	16 bit unsigned int
402371	Control sensor map. ckt 52	0 to 72	16 bit unsigned int
402372	Control sensor map. ckt 53	0 to 72	16 bit unsigned int
402373	Control sensor map. ckt 54	0 to 72	16 bit unsigned int
402374	Control sensor map. ckt 55	0 to 72	16 bit unsigned int
402375	Control sensor map. ckt 56	0 to 72	16 bit unsigned int
402376	Control sensor map. ckt 57	0 to 72	16 bit unsigned int
402377	Control sensor map. ckt 58	0 to 72	16 bit unsigned int
402378	Control sensor map. ckt 59	0 to 72	16 bit unsigned int
402379	Control sensor map. ckt 60	0 to 72	16 bit unsigned int
402380	Control sensor map. ckt 61	0 to 72	16 bit unsigned int
402381	Control sensor map. ckt 62	0 to 72	16 bit unsigned int
402382	Control sensor map. ckt 63	0 to 72	16 bit unsigned int
402383	Control sensor map. ckt 64	0 to 72	16 bit unsigned int
402384	Control sensor map. ckt 65	0 to 72	16 bit unsigned int
402385	Control sensor map. ckt 66	0 to 72	16 bit unsigned int
402386	Control sensor map. ckt 67	0 to 72	16 bit unsigned int
402387	Control sensor map. ckt 68	0 to 72	16 bit unsigned int
402388	Control sensor map. ckt 69	0 to 72	16 bit unsigned int
402389	Control sensor map. ckt 70	0 to 72	16 bit unsigned int
402390	Control sensor map. ckt 71	0 to 72	16 bit unsigned int

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
402391	Control sensor map. ckt 72	0 to 72	16 bit unsigned int

Input Registers

Table 3: CIP 2-4 Circuit Input Registers

Note: Snow programming not available for 2 and 4 circuit panels

Input Register Address	Name	Range	Format
300001	Temperature from Sensor 1	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300002	Temperature from Sensor 2	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300003	Temperature from Sensor 3	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300004	Temperature from Sensor 4	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300005	Temperature from Sensor 5	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300006	Temperature from Sensor 6	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300007	Temperature from Sensor 7	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300008	Temperature from Sensor 8	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300009	Temperature from Sensor 9	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300010	Temperature from Sensor 10	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300011	Temperature from Sensor 11	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300012	Temperature from Sensor 12	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300013	Load current 1	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300014	Load current 2	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300015	Load current 3	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300016	Load current 4	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300017	Load current 5	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300018	Load current 6	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300019	Load current 7	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300020	Load current 8	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300021	Load current 9	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300022	Load current 10	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300023	Load current 11	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300024	Load current 12	from 0 to 50.0 Amps	expressed in tenth of Amps i.e. 56 = 5.6 Amps
300025	GFEP current 1	from 30 to 150 mA	expressed in mA
300026	GFEP current 2	from 30 to 150 mA	expressed in mA
300027	GFEP current 3	from 30 to 150 mA	expressed in mA
300028	GFEP current 4	from 30 to 150 mA	expressed in mA
300029	GFEP current 5	from 30 to 150 mA	expressed in mA
300030	GFEP current 6	from 30 to 150 mA	expressed in mA
300031	GFEP current 7	from 30 to 150 mA	expressed in mA
300032	GFEP current 8	from 30 to 150 mA	expressed in mA
300033	GFEP current 9	from 30 to 150 mA	expressed in mA
300034	GFEP current 10	from 30 to 150 mA	expressed in mA
300035	GFEP current 11	from 30 to 150 mA	expressed in mA
300036	GFEP current 12	from 30 to 150 mA	expressed in mA
300037	Output Demand 1	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300038	Output Demand 2	0-1000	expressed in tenth of % i.e. 500 = 50.0 %

Input Registers, cont'd.

Input Register Address	Name	Range	Format
300039	Output Demand 3	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300040	Output Demand 4	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300041	Output Demand 5	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300042	Output Demand 6	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300043	Output Demand 7	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300044	Output Demand 8	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300045	Output Demand 9	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300046	Output Demand 10	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300047	Output Demand 11	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300048	Output Demand 12	0-1000	expressed in tenth of % i.e. 500 = 50.0 %
300049	Temperature circuit 1	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300050	Temperature circuit 2	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300051	Temperature circuit 3	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300052	Temperature circuit 4	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300053	Temperature circuit 5	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300054	Temperature circuit 6	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300055	Temperature circuit 7	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300056	Temperature circuit 8	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300057	Temperature circuit 9	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300058	Temperature circuit 10	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300059	Temperature circuit 11	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F
300060	Temperature circuit 12	from -800 to 11000	expressed in tenth of deg i.e. 765 = 76.5°F

Holding Registers

Table 4: CIP 2-4 Circuit Holding Registers

Note: Snow programming not available for 2 and 4 circuit panels

Holding Register Address	Name	Range	Format
400001	Setpoint 1	from -80 to 1100 F	expressed as integer number
400002	Setpoint 2	from -80 to 1100 F	expressed as integer number
400003	Setpoint 3	from -80 to 1100 F	expressed as integer number
400004	Setpoint 4	from -80 to 1100 F	expressed as integer number
400005	Setpoint 5	from -80 to 1100 F	expressed as integer number
400006	Setpoint 6	from -80 to 1100 F	expressed as integer number
400007	Setpoint 7	from -80 to 1100 F	expressed as integer number
400008	Setpoint 8	from -80 to 1100 F	expressed as integer number
400009	Setpoint 9	from -80 to 1100 F	expressed as integer number
400010	Setpoint 10	from -80 to 1100 F	expressed as integer number
400011	Setpoint 11	from -80 to 1100 F	expressed as integer number
400012	Setpoint 12	from -80 to 1100 F	expressed as integer number
400013	Default Output Demand 1	0-100	expressed as integer number
400014	Default Output Demand 2	0-100	expressed as integer number
400015	Default Output Demand 3	0-100	expressed as integer number
400016	Default Output Demand 4	0-100	expressed as integer number
400017	Default Output Demand 5	0-100	expressed as integer number
400018	Default Output Demand 6	0-100	expressed as integer number
400019	Default Output Demand 7	0-100	expressed as integer number
400020	Default Output Demand 8	0-100	expressed as integer number
400021	Default Output Demand 9	0-100	expressed as integer number
400022	Default Output Demand 10	0-100	expressed as integer number
400023	Default Output Demand 11	0-100	expressed as integer number
400024	Default Output Demand 12	0-100	expressed as integer number
400025	Proportional Band 1	0-100	expressed as integer number
400026	Proportional Band 2	0-100	expressed as integer number
400027	Proportional Band 3	0-100	expressed as integer number
400028	Proportional Band 4	0-100	expressed as integer number
400029	Proportional Band 5	0-100	expressed as integer number
400030	Proportional Band 6	0-100	expressed as integer number
400031	Proportional Band 7	0-100	expressed as integer number
400032	Proportional Band 8	0-100	expressed as integer number
400033	Proportional Band 9	0-100	expressed as integer number
400034	Proportional Band 10	0-100	expressed as integer number
400035	Proportional Band 11	0-100	expressed as integer number
400036	Proportional Band 12	0-100	expressed as integer number
400037	Integral Band 1	0-9999	expressed as integer number
400038	Integral Band 2	0-9999	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400039	Integral Band 3	0-9999	expressed as integer number
400040	Integral Band 4	0-9999	expressed as integer number
400041	Integral Band 5	0-9999	expressed as integer number
400042	Integral Band 6	0-9999	expressed as integer number
400043	Integral Band 7	0-9999	expressed as integer number
400044	Integral Band 8	0-9999	expressed as integer number
400045	Integral Band 9	0-9999	expressed as integer number
400046	Integral Band 10	0-9999	expressed as integer number
400047	Integral Band 11	0-9999	expressed as integer number
400048	Integral Band 12	0-9999	expressed as integer number
400049	Derivative Band 1	0-500	expressed as integer number
400050	Derivative Band 2	0-500	expressed as integer number
400051	Derivative Band 3	0-500	expressed as integer number
400052	Derivative Band 4	0-500	expressed as integer number
400053	Derivative Band 5	0-500	expressed as integer number
400054	Derivative Band 6	0-500	expressed as integer number
400055	Derivative Band 7	0-500	expressed as integer number
400056	Derivative Band 8	0-500	expressed as integer number
400057	Derivative Band 9	0-500	expressed as integer number
400058	Derivative Band 10	0-500	expressed as integer number
400059	Derivative Band 11	0-500	expressed as integer number
400060	Derivative Band 12	0-500	expressed as integer number
400061	Deadband 1	2-100	expressed as integer number
400062	Deadband 2	2-100	expressed as integer number
400063	Deadband 3	2-100	expressed as integer number
400064	Deadband 4	2-100	expressed as integer number
400065	Deadband 5	2-100	expressed as integer number
400066	Deadband 6	2-100	expressed as integer number
400067	Deadband 7	2-100	expressed as integer number
400068	Deadband 8	2-100	expressed as integer number
400069	Deadband 9	2-100	expressed as integer number
400070	Deadband 10	2-100	expressed as integer number
400071	Deadband 11	2-100	expressed as integer number
400072	Deadband 12	2-100	expressed as integer number
400073	Sensor # circuit 1	0-12	specify sensor # from 0(unused) up to 72
400074	Sensor # circuit 1	0-12	specify sensor # from 0(unused) up to 72
400075	Sensor # circuit 1	0-12	specify sensor # from 0(unused) up to 72
400076	Sensor # circuit 2	0-12	specify sensor # from 0(unused) up to 72

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400077	Sensor # circuit 2	0-12	specify sensor # from 0(unused) up to 72
400078	Sensor # circuit 2	0-12	specify sensor # from 0(unused) up to 72
400079	Sensor # circuit 3	0-12	specify sensor # from 0(unused) up to 72
400080	Sensor # circuit 3	0-12	specify sensor # from 0(unused) up to 72
400081	Sensor # circuit 3	0-12	specify sensor # from 0(unused) up to 72
400082	Sensor # circuit 4	0-12	specify sensor # from 0(unused) up to 72
400083	Sensor # circuit 4	0-12	specify sensor # from 0(unused) up to 72
400084	Sensor # circuit 4	0-12	specify sensor # from 0(unused) up to 72
400085	Sensor # circuit 5	0-12	specify sensor # from 0(unused) up to 72
400086	Sensor # circuit 5	0-12	specify sensor # from 0(unused) up to 72
400087	Sensor # circuit 5	0-12	specify sensor # from 0(unused) up to 72
400088	Sensor # circuit 6	0-12	specify sensor # from 0(unused) up to 72
400089	Sensor # circuit 6	0-12	specify sensor # from 0(unused) up to 72
400090	Sensor # circuit 6	0-12	specify sensor # from 0(unused) up to 73
400091	Sensor # circuit 7	0-12	specify sensor # from 0(unused) up to 74
400092	Sensor # circuit 7	0-12	specify sensor # from 0(unused) up to 75
400093	Sensor # circuit 7	0-12	specify sensor # from 0(unused) up to 76
400094	Sensor # circuit 8	0-12	specify sensor # from 0(unused) up to 77
400095	Sensor # circuit 8	0-12	specify sensor # from 0(unused) up to 78
400096	Sensor # circuit 8	0-12	specify sensor # from 0(unused) up to 79
400097	Sensor # circuit 9	0-12	specify sensor # from 0(unused) up to 79
400098	Sensor # circuit 9	0-12	specify sensor # from 0(unused) up to 79
400099	Sensor # circuit 9	0-12	specify sensor # from 0(unused) up to 80
400100	Sensor # circuit 10	0-12	specify sensor # from 0(unused) up to 81
400101	Sensor # circuit 10	0-12	specify sensor # from 0(unused) up to 82
400102	Sensor # circuit 10	0-12	specify sensor # from 0(unused) up to 82
400103	Sensor # circuit 11	0-12	specify sensor # from 0(unused) up to 81
400104	Sensor # circuit 11	0-12	specify sensor # from 0(unused) up to 82
400105	Sensor # circuit 11	0-12	specify sensor # from 0(unused) up to 82
400106	Sensor # circuit 12	0-12	specify sensor # from 0(unused) up to 81
400107	Sensor # circuit 12	0-12	specify sensor # from 0(unused) up to 82
400108	Sensor # circuit 12	0-12	specify sensor # from 0(unused) up to 82
400109	Temp. calculation algorithm CKT 1	0-2	AVERAGE 0, MIN 1, MAX 2
400110	Temp. calculation algorithm CKT 2	0-2	AVERAGE 0, MIN 1, MAX 2
400111	Temp. calculation algorithm CKT 3	0-2	AVERAGE 0, MIN 1, MAX 2
400112	Temp. calculation algorithm CKT 4	0-2	AVERAGE 0, MIN 1, MAX 2
400113	Temp. calculation algorithm CKT 5	0-2	AVERAGE 0, MIN 1, MAX 2
400114	Temp. calculation algorithm CKT 6	0-2	AVERAGE 0, MIN 1, MAX 2
400115	Temp. calculation algorithm CKT 7	0-2	AVERAGE 0, MIN 1, MAX 2

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400116	Temp. calculation algorithm CKT 8	0-2	AVERAGE 0, MIN 1, MAX 2
400117	Temp. calculation algorithm CKT 9	0-2	AVERAGE 0, MIN 1, MAX 2
400118	Temp. calculation algorithm CKT 10	0-2	AVERAGE 0, MIN 1, MAX 2
400119	Temp. calculation algorithm CKT 11	0-2	AVERAGE 0, MIN 1, MAX 2
400120	Temp. calculation algorithm CKT 12	0-2	AVERAGE 0, MIN 1, MAX 2
400121	Soft Start 1	0-1	0 -NO, 1- YES
400122	Soft Start 2	0-1	0 -NO, 1- YES
400123	Soft Start 3	0-1	0 -NO, 1- YES
400124	Soft Start 4	0-1	0 -NO, 1- YES
400125	Soft Start 5	0-1	0 -NO, 1- YES
400126	Soft Start 6	0-1	0 -NO, 1- YES
400127	Soft Start 7	0-1	0 -NO, 1- YES
400128	Soft Start 8	0-1	0 -NO, 1- YES
400129	Soft Start 9	0-1	0 -NO, 1- YES
400130	Soft Start 10	0-1	0 -NO, 1- YES
400131	Soft Start 11	0-1	0 -NO, 1- YES
400132	Soft Start 12	0-1	0 -NO, 1- YES
400133	PID vs ON OFF 1	0-1	0 -ON/OFF, 1- PID
400134	PID vs ON OFF 2	0-1	0 -ON/OFF, 1- PID
400135	PID vs ON OFF 3	0-1	0 -ON/OFF, 1- PID
400136	PID vs ON OFF 4	0-1	0 -ON/OFF, 1- PID
400137	PID vs ON OFF 5	0-1	0 -ON/OFF, 1- PID
400138	PID vs ON OFF 6	0-1	0 -ON/OFF, 1- PID
400139	PID vs ON OFF 7	0-1	0 -ON/OFF, 1- PID
400140	PID vs ON OFF 8	0-1	0 -ON/OFF, 1- PID
400141	PID vs ON OFF 9	0-1	0 -ON/OFF, 1- PID
400142	PID vs ON OFF 10	0-1	0 -ON/OFF, 1- PID
400143	PID vs ON OFF 11	0-1	0 -ON/OFF, 1- PID
400144	PID vs ON OFF 12	0-1	0 -ON/OFF, 1- PID
400145	TRIP 1	0-1	0-NO, 1-YES
400146	TRIP 2	0-1	0-NO, 1-YES
400147	TRIP 3	0-1	0-NO, 1-YES
400148	TRIP 4	0-1	0-NO, 1-YES
400149	TRIP 5	0-1	0-NO, 1-YES
400150	TRIP 6	0-1	0-NO, 1-YES
400151	TRIP 7	0-1	0-NO, 1-YES
400152	TRIP 8	0-1	0-NO, 1-YES
400153	TRIP 9	0-1	0-NO, 1-YES
400154	TRIP 10	0-1	0-NO, 1-YES

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400155	TRIP 11	0-1	0-NO, 1-YES
400156	TRIP 12	0-1	0-NO, 1-YES
400157	LATCH 1	0-1	0-NO, 1-YES
400158	LATCH 2	0-1	0-NO, 1-YES
400159	LATCH 3	0-1	0-NO, 1-YES
400160	LATCH 4	0-1	0-NO, 1-YES
400161	LATCH 5	0-1	0-NO, 1-YES
400162	LATCH 6	0-1	0-NO, 1-YES
400163	LATCH 7	0-1	0-NO, 1-YES
400164	LATCH 8	0-1	0-NO, 1-YES
400165	LATCH 9	0-1	0-NO, 1-YES
400166	LATCH 10	0-1	0-NO, 1-YES
400167	LATCH 11	0-1	0-NO, 1-YES
400168	LATCH 12	0-1	0-NO, 1-YES
400169	ENABLED/DISABLED CIRCUIT 1	0-1	0-ENABLED, 1-DISABLED
400170	ENABLED/DISABLED CIRCUIT 2	0-1	0-ENABLED, 1-DISABLED
400171	ENABLED/DISABLED CIRCUIT 3	0-1	0-ENABLED, 1-DISABLED
400172	ENABLED/DISABLED CIRCUIT 4	0-1	0-ENABLED, 1-DISABLED
400173	ENABLED/DISABLED CIRCUIT 5	0-1	0-ENABLED, 1-DISABLED
400174	ENABLED/DISABLED CIRCUIT 6	0-1	0-ENABLED, 1-DISABLED
400175	ENABLED/DISABLED CIRCUIT 7	0-1	0-ENABLED, 1-DISABLED
400176	ENABLED/DISABLED CIRCUIT 8	0-1	0-ENABLED, 1-DISABLED
400177	ENABLED/DISABLED CIRCUIT 9	0-1	0-ENABLED, 1-DISABLED
400178	ENABLED/DISABLED CIRCUIT 10	0-1	0-ENABLED, 1-DISABLED
400179	ENABLED/DISABLED CIRCUIT 11	0-1	0-ENABLED, 1-DISABLED
400180	ENABLED/DISABLED CIRCUIT 12	0-1	0-ENABLED, 1-DISABLED
400181	AUTO vs MANUAL 1	0-1	0-MANUAL, 1-AUTO
400182	AUTO vs MANUAL 2	0-1	0-MANUAL, 1-AUTO
400183	AUTO vs MANUAL 3	0-1	0-MANUAL, 1-AUTO
400184	AUTO vs MANUAL 4	0-1	0-MANUAL, 1-AUTO
400185	AUTO vs MANUAL 5	0-1	0-MANUAL, 1-AUTO
400186	AUTO vs MANUAL 6	0-1	0-MANUAL, 1-AUTO
400187	AUTO vs MANUAL 7	0-1	0-MANUAL, 1-AUTO
400188	AUTO vs MANUAL 8	0-1	0-MANUAL, 1-AUTO
400189	AUTO vs MANUAL 9	0-1	0-MANUAL, 1-AUTO
400190	AUTO vs MANUAL 10	0-1	0-MANUAL, 1-AUTO
400191	AUTO vs MANUAL 11	0-1	0-MANUAL, 1-AUTO
400192	AUTO vs MANUAL 12	0-1	0-MANUAL, 1-AUTO

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400193	AUTOTUNE 1	0-1	0-NO, 1-YES
400194	AUTOTUNE 2	0-1	0-NO, 1-YES
400195	AUTOTUNE 3	0-1	0-NO, 1-YES
400196	AUTOTUNE 4	0-1	0-NO, 1-YES
400197	AUTOTUNE 5	0-1	0-NO, 1-YES
400198	AUTOTUNE 6	0-1	0-NO, 1-YES
400199	AUTOTUNE 7	0-1	0-NO, 1-YES
400200	AUTOTUNE 8	0-1	0-NO, 1-YES
400201	AUTOTUNE 9	0-1	0-NO, 1-YES
400202	AUTOTUNE 10	0-1	0-NO, 1-YES
400203	AUTOTUNE 11	0-1	0-NO, 1-YES
400204	AUTOTUNE 12	0-1	0-NO, 1-YES
400205	RESERVED		
400206	RESERVED		
400207	IS SYSTEM IN ALARM STATE	0-1	0-NO, 1-YES
400208	TEMP UNITS	0-1	0-F, 1 C
400209	ALARM REG CKT 1	See Alarm Bits Desc.	
400210	ALARM REG CKT 2	See Alarm Bits Desc.	
400211	ALARM REG CKT 3	See Alarm Bits Desc.	
400212	ALARM REG CKT 4	See Alarm Bits Desc.	
400213	ALARM REG CKT 5	See Alarm Bits Desc.	
400214	ALARM REG CKT 6	See Alarm Bits Desc.	
400215	ALARM REG CKT 7	See Alarm Bits Desc.	
400216	ALARM REG CKT 8	See Alarm Bits Desc.	
400217	ALARM REG CKT 9	See Alarm Bits Desc.	
400218	ALARM REG CKT 10	See Alarm Bits Desc.	
400219	ALARM REG CKT 11	See Alarm Bits Desc.	
400220	ALARM REG CKT 12	See Alarm Bits Desc.	
400221	HI TEMP SETPOINT 1	from -80 to 1100 F	expressed as integer number
400222	HI TEMP SETPOINT 2	from -80 to 1100 F	expressed as integer number
400223	HI TEMP SETPOINT 3	from -80 to 1100 F	expressed as integer number
400224	HI TEMP SETPOINT 4	from -80 to 1100 F	expressed as integer number
400225	HI TEMP SETPOINT 5	from -80 to 1100 F	expressed as integer number
400226	HI TEMP SETPOINT 6	from -80 to 1100 F	expressed as integer number
400227	HI TEMP SETPOINT 7	from -80 to 1100 F	expressed as integer number
400228	HI TEMP SETPOINT 8	from -80 to 1100 F	expressed as integer number
400229	HI TEMP SETPOINT 9	from -80 to 1100 F	expressed as integer number
400230	HI TEMP SETPOINT 10	from -80 to 1100 F	expressed as integer number

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400231	HI TEMP SETPOINT 11	from -80 to 1100 F	expressed as integer number
400232	HI TEMP SETPOINT 12	from -80 to 1100 F	expressed as integer number
400233	LO TEMP SETPOINT 1	from -80 to 1100 F	expressed as integer number
400234	LO TEMP SETPOINT 2	from -80 to 1100 F	expressed as integer number
400235	LO TEMP SETPOINT 3	from -80 to 1100 F	expressed as integer number
400236	LO TEMP SETPOINT 4	from -80 to 1100 F	expressed as integer number
400237	LO TEMP SETPOINT 5	from -80 to 1100 F	expressed as integer number
400238	LO TEMP SETPOINT 6	from -80 to 1100 F	expressed as integer number
400239	LO TEMP SETPOINT 7	from -80 to 1100 F	expressed as integer number
400240	LO TEMP SETPOINT 8	from -80 to 1100 F	expressed as integer number
400241	LO TEMP SETPOINT 9	from -80 to 1100 F	expressed as integer number
400242	LO TEMP SETPOINT 10	from -80 to 1100 F	expressed as integer number
400243	LO TEMP SETPOINT 11	from -80 to 1100 F	expressed as integer number
400244	LO TEMP SETPOINT 12	from -80 to 1100 F	expressed as integer number
400245	GFEP SETPOINT 1	from 30 to 150 mA	expressed as integer number
400246	GFEP SETPOINT 2	from 30 to 150 mA	expressed as integer number
400247	GFEP SETPOINT 3	from 30 to 150 mA	expressed as integer number
400248	GFEP SETPOINT 4	from 30 to 150 mA	expressed as integer number
400249	GFEP SETPOINT 5	from 30 to 150 mA	expressed as integer number
400250	GFEP SETPOINT 6	from 30 to 150 mA	expressed as integer number
400251	GFEP SETPOINT 7	from 30 to 150 mA	expressed as integer number
400252	GFEP SETPOINT 8	from 30 to 150 mA	expressed as integer number
400253	GFEP SETPOINT 9	from 30 to 150 mA	expressed as integer number
400254	GFEP SETPOINT 10	from 30 to 150 mA	expressed as integer number
400255	GFEP SETPOINT 11	from 30 to 150 mA	expressed as integer number
400256	GFEP SETPOINT 12	from 30 to 150 mA	expressed as integer number
400257	HI LOAD CURRENT SETPOINT 1	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400258	HI LOAD CURRENT SETPOINT 2	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400259	HI LOAD CURRENT SETPOINT 3	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400260	HI LOAD CURRENT SETPOINT 4	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400261	HI LOAD CURRENT SETPOINT 5	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400262	HI LOAD CURRENT SETPOINT 6	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400263	HI LOAD CURRENT SETPOINT 7	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400264	HI LOAD CURRENT SETPOINT 8	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400265	HI LOAD CURRENT SETPOINT 9	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400266	HI LOAD CURRENT SETPOINT 10	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400267	HI LOAD CURRENT SETPOINT 11	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400268	HI LOAD CURRENT SETPOINT 12	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400269	LO LOAD CURRENT SETPOINT 1	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps

Holding Registers, cont'd.

Holding Register Address	Name	Range	Format
400270	LO LOAD CURRENT SETPOINT 2	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400271	LO LOAD CURRENT SETPOINT 3	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400272	LO LOAD CURRENT SETPOINT 4	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400273	LO LOAD CURRENT SETPOINT 5	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400274	LO LOAD CURRENT SETPOINT 6	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400275	LO LOAD CURRENT SETPOINT 7	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400276	LO LOAD CURRENT SETPOINT 8	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400277	LO LOAD CURRENT SETPOINT 9	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400278	LO LOAD CURRENT SETPOINT 10	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400279	LO LOAD CURRENT SETPOINT 11	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps
400280	LO LOAD CURRENT SETPOINT 12	from 0 to 50 Amps	expressed in tenth/Amps i.e. 56 = 5.6 Amps

Alarm Bits Descriptions

Table 5: CIP 2-72 Alarm Bits Description

Bit #	Alarm
0	HI TEMP
1	LO TEMP
2	SENSOR
3	LO CURRENT
4	HI CURRENT
5	GFEP
6	RTD COM
7	SSR COM
8	WIREELSS SENSOR VERY LOW BATTERY
9	WIREELSS SENSOR LOW BATTERY
10	WIRELESS SENSOR OFFLINE

Service Contact Information

Chromalox is a global supplier, providing the highest level of customer support. If you should have questions concerning your intelliTRACE™ CIP control panel, or need information, you may contact Chromalox at:

Corporate Headquarters Chromalox, Inc.	Controls Division Chromalox, Inc.
103 Gamma Drive Pittsburgh, PA 15238 Phone: (412) 967-3800	1347 Heil-Quaker Blvd LaVergne, TN 37086 Phone: (615) 793-3900
Customer Service Hotline: 1-800-443-2640	

For application questions, you can:

1. Call one of our application engineers for personal assistance at 1-888-996-9258.
2. Visit the technical reference section of our website at www.chromalox.com for downloadable manuals in PDF format.

Limited Warranty:

Please refer to the Chromalox limited warranty applicable to this product at <http://www.chromalox.com/customer-service/policies/termsofsale.aspx>.

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