Maxum™ Power Entry Control Module (PECM)
(2020132-001 and 2022018-001)

[Replacement for 2017559-009 & -010, 2020110-004,
2020132-701 and 2021081-001 & -701]

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Getting Help

Contacts for Help
Siemens provides support for the Maxum System worldwide. Contact information is provided on all Siemens products at the websites noted below.

This page provides contact information for Maxum System technical support, training, spare parts, and field service callout. Worldwide e-mail requests can be submitted 24 hours a day, 7 days a week. Service contracts can be established for direct remote phone service for products or for regular field service visits to the site.

To Contact Us:

<table>
<thead>
<tr>
<th>Siemens AG</th>
<th>Siemens Energy &amp; Automation, Inc.</th>
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</thead>
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Training
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<thead>
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Spares
<table>
<thead>
<tr>
<th>Siemens Energy &amp; Automation, Inc.</th>
<th>Siemens Pte. Limited</th>
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<tbody>
<tr>
<td>Tel: +49 721 595 4288</td>
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Support
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<th>Siemens Pte. Limited</th>
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</thead>
<tbody>
<tr>
<td>Tel: +49 721 595 7216</td>
<td>Tel: +65 6490 8702</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:niko.benas@siemens.com">niko.benas@siemens.com</a></td>
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Before You Call
When contacting Siemens Customer Service for installation technical assistance, the user will need to provide the unit serial number and a detailed description of the problem.

Indicate the installation problem encountered and provide any other information that will aid the customer service representative in correcting the problem.
Safety Practices and Precautions

Safety First
This product has been designed, tested, and supplied in a safe condition in accordance with IEC Publication 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements. This manual contains information and warnings which have to be followed to ensure safe operation and to maintain the product in a safe condition.

Terms in This Manual
WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

Terms as Marked on Equipment
DANGER indicates a personal injury hazard immediately accessible as one reads the markings.

CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.

Symbols in This Manual

⚠️ This symbol indicates where applicable warning, caution, or other information is to be found.

Symbols Marked on Equipment

⚡ DANGER - High voltage

Descending Triangle (△)
Protective ground (earth) terminal

⚠️ ATTENTION - Refer to Manual

Hazardous or Poisonous Gases
When hazardous gases (such as poisonous, flammable, or oxygen depleting) are potentially present in or around the Maxum edition II Process Gas Chromatograph (hereafter referred to as Maxum II) area, all national and international requirements must be fulfilled to protect personnel and the environment against hazards that could arise. All process conditions (such as normal, backup, and upset) must be considered in the determination for potential hazardous gas presence. To avoid leaks, scheduled preventive maintenance and inspection for leaks should be performed by the customer. Leak sources should also be minimized as is noted in the procedure by external venting of the oven exhaust and analyzer vents. This reduces (does not eliminate) the sources for leaks, so personnel protection is a requirement whenever hazardous/poisonous gases may be present. Disregarding this warning could result in serious injury or death and damage to equipment.
Safety Practices and Precautions, Continued

Correct Operating Voltage
Before switching on the power, check that the operating voltage listed on the equipment agrees with the available line voltage. Ensure that the power supply switch is set to the correct input voltage.

Danger Arising from Loss of Ground
Any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.

Safe Equipment
If it is determined that the equipment cannot be operated safely, it should be taken out of operation and secured against unintentional usage.

Use the Proper Fuse
To avoid fire hazard, use only a fuse of the correct type, voltage rating, and current rating as specified in the parts list for your product. Use of repaired fuses or short-circuiting of the fuse switch is not permitted.

Safety Guidelines
DO NOT perform electrical parts replacement or repairs until all power supplies have been disconnected.

Only a properly trained technician should work on the equipment with power applied.

When opening covers or removing parts, extreme care should be taken since hot surfaces and "live" parts or connections can be exposed.
PECM Overview

Introduction
PECM
This section describes the Power Entry Control Module (PECM) assembly that is available for use in the Maxum Edition II system. This manual is intended to be used by trained service personnel familiar with the equipment, troubleshooting, and all applicable safety codes. This product is intended for use solely in the Maxum Process Gas Chromatograph.

General Description
The Power Entry and Control Module (PECM) assembly contains the electronics that conditions electrical power entering the Maxum GC and distributes the power to various other components. The PECM provides electronic interface to the power relays for oven heating systems. Additionally, the PECM may provide controls for temperature control circuits and for the Solenoid Valve Control Module.

Temperature controls in the Maxum are provided as needed by any particular application. Generally the chromatograph oven operates at an elevated temperature and requires temperature control. Additionally, the Flame Ionization and Flame Photometric Detectors require individual temperature control. Finally, some valves, the methanator and some sample conditioning equipment may require temperature control. Each device which is temperature controlled requires a set of electrical sensors to measure the temperature. These are connected as “inputs” to a dedicated temperature control circuit in the Maxum electronics. Each device which is temperature controlled also requires a 30 to 1400 watt heater element. The heater element takes its electrical power from the PECM through a power relay. The relay is switched on and off by the same temperature control circuit to which the sensors were connected. Various safety circuits ensure safe control of these heating elements.

Since the original release of the Maxum GC, improvements and changes have been made to the PECM. These are described below.

Changes to PECM
The PECM has been changed in its design since its original release. The newest version of this part is also used as the spare part replacement for the previous version. The original PECM was a single electronic circuit board with a metal protective shield. It provided connection points for the electrical power coming into the Maxum GC and mounted low power electrical relays which could switch power to any electrical heater smaller than 200 watts.

The newest version of the module, PECM-2, is a two part circuit board. One part connects the electrical power. The other part includes certain electronic circuits. Key features of the newer design are:

- Easy access (no cover)
- Two on-board temperature control circuits that can allow use of a lower cost Thermistor Detector Personality Module (TCD DPM): in some cases the less costly 2021797-002 can be used instead of full-featured 2021797-001.
PECM Overview, Continued

- Additional medium-wattage heater circuit.
- May allow elimination of additional DPM when it is used for temperature control only, such as for heated valves and the methanator.
- Includes solenoid valve control which eliminates the need for individual SVCM controller boards. When converting older design and eliminating original SVCM controller boards, additional long cables are required.
- Improved low-profile fuse holders
- LED indicators for air pressure switch on air-bath heater circuits
- Built-in provision for connection of Uninterruptible Power Supply (UPS) for 24vdc circuits. The heaters are powered through different connectors to minimize the loading of the AC power needed for running the 24vdc circuits.

The new part is also used as the spare part replacement for the earlier version. It provides all new features at the same cost. In many cases, it can eliminate other spare parts used for the SVCM or for temperature control.

Temperature Control and Heater Hardware

The PECM-2 can be integrally involved in control of temperature zones in the Maxum GC.

The original Maxum design provided for only one type of heater assembly for its air bath configurations (single isothermal; dual isothermal; or Programmed Temperature Control). This was a 1400 watt heater assembly. A single heater was used for the single isothermal configuration and two heaters were used in the other configurations. Now, a second air bath heater assembly has been introduced. It is a 500 watt heater and can be used in single isothermal configurations where the controlled oven temperature is 70°C or less. In all other air bath configurations, the original heater is required.

Additionally, a new “medium power” Solid State Relay Board (temperature control relay module) is available. The original assembly included four large relays suitable for switching two of the 1400 watt air bath oven heater elements. However, many Maxum GCs do not require that much power. Therefore, a new SSRB has been added to the Maxum spare part offering which can lower spare parts costs. The newer board provides smaller relays which are capable of controlling the new 500 watt air bath heater assembly (described above). In addition, the “medium power” SSRB can be used to control the two 250 watt heaters used in the Maxum airless oven configurations. The newer board can also be used to control the low wattage heaters in the heated Flame Ionization and Flame Photometric detector housings or in heated sample injection valves.
These changes and new parts create the following configuration options.

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Heater and Temperature Control Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIGH POWER CONFIGURATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Two Air bath ovens; either</td>
<td>Original high power heater control relay assembly and two 1400 watt air bath heater assemblies</td>
</tr>
<tr>
<td>• Dual isothermal air bath</td>
<td></td>
</tr>
<tr>
<td>• Programmed Temperature</td>
<td></td>
</tr>
<tr>
<td>Single isothermal air bath oven operating above 70°C control temperature</td>
<td>Original high power heater control relay assembly and 1400 watt air bath heater assembly</td>
</tr>
<tr>
<td><strong>MEDIUM POWER CONFIGURATIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Single isothermal air bath oven operating at 70°C or below control temperature</td>
<td>New medium power heater control relay board and 500 watt air bath heater assembly</td>
</tr>
<tr>
<td>Airless ovens; either</td>
<td>New medium power heater control relay board and standard heaters for airless ovens.</td>
</tr>
<tr>
<td>• Single isothermal airless</td>
<td>-- OR --</td>
</tr>
<tr>
<td>• Dual isothermal airless</td>
<td>Original high power temperature controller relay board and standard heaters for airless ovens.</td>
</tr>
<tr>
<td>Heated sample injection valves,</td>
<td>Control relays on Power Entry and Control Module (PECM)</td>
</tr>
<tr>
<td>heated Flame Ionization and Flame Photometric Detector Modules</td>
<td></td>
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</tbody>
</table>

One other change has been made on the Solid State Relay boards since the original Maxum design. The individual solid state relays have changed. The newer part provides an indicator LED which shows the operational status of the control signals. The newer part also provides a plastic shield which covers the connection screw terminals and helps prevent inadvertent contact. Note, however, the older relay is entirely enclosed in a sheet metal housing so human contact is not possible without disassembly of the module.

Both the original and newer relays are available as a spare part and are interchangeable.
# PECM Specifications

## Configuration

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly</td>
<td>Assembly is supplied without metal cover making access easier for components and wiring</td>
</tr>
<tr>
<td>UPS</td>
<td>Fuses are mounted in low-profile fuse holders</td>
</tr>
<tr>
<td>UPS</td>
<td>Built-in provision for connection of Uninterruptible Power Supply (UPS) for 24VDC circuits</td>
</tr>
<tr>
<td>Medium Wattage Relays</td>
<td>Relays on PECM for 2 medium wattage heaters 5A max (600W)</td>
</tr>
<tr>
<td>Low Wattage Relays</td>
<td>Relays on PECM for 6 low wattage heaters 2A max (250W)</td>
</tr>
<tr>
<td>Valve Control</td>
<td>5 channels: ch 1-4 for detector heaters, heated valves or AC DO’s ch 5 can run interposing relays for sample system</td>
</tr>
<tr>
<td>Temperature Control</td>
<td>Two channels optional</td>
</tr>
<tr>
<td>LED display</td>
<td>Display of the heater air pressure switch activation is provided</td>
</tr>
<tr>
<td>Purge Disable</td>
<td>A jumper is provided to disable the purge alarm when a purged enclosure is not required by the safety codes</td>
</tr>
</tbody>
</table>

## Performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Control</td>
<td>± 0.05°F (± 0.02°C)</td>
</tr>
</tbody>
</table>
Replacements for Obsolete Parts

Introduction
In some cases, the part being replaced is obsolete and the replacement part has a different part number(s). This section is provided to detail the recommended spare part replacement for obsolete parts though the user should check the description of the parts to ensure that the parts will perform the replacement desired.

Global Part Numbers
The part numbers listing in the manual have been abbreviated to a shortened form of the global Siemens part number. The global number will have a prefix of “GWK-AI” so a number listed below as 2021828-001 would have a global Siemens part number of GWK-AI2021828-001.

Selecting a replacement part
The table below lists the obsolete parts by part number and the recommended spare part or parts that will perform the functional replacement of the spare part.

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Replacement Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017799-001</td>
<td>PECM, original version</td>
<td>2021828-001</td>
</tr>
</tbody>
</table>
Configuration Options

Introduction
One PECM is used in the Maxum gas chromatograph. The PECM is not used in any other Maxum devices. The configuration options occur with optional items which may be used in conjunction with the base PECM assembly and in the interconnect cabling.

PECM
The choice of PECM options depends primarily on the configuration used in the particular application. Generally, the complete PECM-2 is utilized, though selection of individual boards of the assembly is provided for spares.

2021828-001 PECM-2 Assembly complete with Temperature and Solenoid Valve Controls (both bottom and top boards included)
2021789-001 PECM-2 with Temp and SVCM Control - bottom connect board only
2021784-001 PECM-2 with Temp and SVCM Control - top controller board only

Interconnect Cables
The Oven Heater Sensor Connect cables connect the OT/TL and temperature sensing RTDs in the air bath or airless ovens to the heater control circuits on the PECM-2. They replace the cable that previously connected to a Detector Personality Module when the PECM-2 circuits are used for temperature control. The short cable is intended for heater wiring on the left side, and the long cable for the right side.

The SVCM Solenoid Interconnect cables connect the SMC solenoids to the PECM-2. The short cable is intended for interconnect to SVCMs on the left-side, and the long cable for the right side SVCMs. Two cables are required per module (one cable will handle four solenoids).

2017596-001 Oven Heater Sensor Connect Cable (short)
2017596-002 Oven Heater Sensor Connect Cable (long)
2021823-001 SVCM Solenoid Interconnect cable (1000 mm) long
2021823-002 SVCM Solenoid Interconnect cable (500 mm) short
Installation

Introduction
This section is intended for trained service personnel and details the procedures for removal and installation of the PECM-2 assembly. The PECM-2 is mounted on the left wall of the electronic enclosure. Procedures in this section include:

- PECM-2 Assembly removal and installation

The Maxum II has special instructions in the custom documentation and on tags placed on the unit. These must be followed as well to ensure safe operation of the Maxum II.

**WARNING** Specific additional instructions are provided with tags placed on the Maxum II and in the custom application drawing package noted below. Installation should include all of the items noted in both of these as well as the manuals. The tagging and custom application drawing package are unique to the particular Maxum II.

Custom Application Drawing Package
Included with your analyzer is a custom application drawing package that provides drawings and information pertinent only to your analyzer. Because procedures in this manual reference the drawing package, you should have this package readily available during installation.

Typical drawings included are:

- System Block and Utility Requirements
- System Outline and Dimensional Drawings
- Sampling System – Plumbing and Spare Parts List
- Sampling System Dimensional Diagram
- Sampling Probe
- Electronic Controller – Internal Layout
- Applicable Wiring Diagrams
- Oven Plumbing Diagram – Sensor Near Electronics
- Recommended Spare Parts - Analyzer
- Manufacturing Test Charts
- Stream Composition Data
Installation, Continued

PECM Assembly Removal and Installation

The PECM-2 assembly is mounted to the left wall of the Electronic Enclosure. The PECM-2 assembly consists of a base board with attached temperature controller board. The temperature control board mounts directly on the base board. This manual covers use of this part also as a replacement for the earlier version of the PECM in the next section.

Read through the entire procedure before performing these steps to ensure that the steps are understood with particular attention to the CAUTIONs.

**CAUTION:** Before beginning to remove or install the PECM-2 assembly, the power should be externally removed from the GC. AC power comes directly into this board for regulation and distribution in the electronics enclosure, so power should be removed and secured/tagged to prevent inadvertent application while this procedure is being performed.

- Before beginning replacement, be sure to save a current database of the application to be reloaded after the PECM-2 is replaced in case this becomes necessary. Once the database is saved, remove power from the Maxum II (refer to the shutdown procedure page 21.)

- Open electronics door. If the latch is locked, use 4mm (5/32”) Allen wrench to unlock. **DO NOT** open door and place tension on the MAINTENANCE PANEL interface ribbon cable.

- Label all of the cable connections before disconnecting if they are not already labeled. Be sure to read the Warning below concerning those tagged with orange labels.

**WARNING** The cable harness connectors and the chassis plugs associated with the Heater circuits are marked with orange identifier tags. Before reconnecting any connector or plug to a Heater circuit, ensure that the orange identifier tag on the connector or plug reads identical to the orange identifier tag on its mating connector.

- Unplug cables from all PECM connectors.

- Unplug the atmospheric reference tube from the purge switch. (SW1, tubing connection on the bottom board on the PECM-2, middle right side, back)

- Use a 5mm nut driver to loosen two hex nuts at the top of each side of base plate of the PECM-2.

- Slide the PECM up and then lift the PECM off of the mounting bolts.
Installation, Continued

**WARNING** The PECM-2 is used in applications with both 115VAC and 230VAC power. Before installing a replacement assembly, ensure that the correct fuses for the particular application are installed in the PECM-2.

- On the replacement PECM-2 assembly do the following:
  a. See that Purge Disable jumper JP2 is set correctly.
  b. Ensure the TL/OT boards are moved to the replacement PECM (J15 & J16) to maintain the same T-rating of the GC.
  c. Install the appropriate fuses for either 115VAC or 230VAC in Fuses F1 and F2 and install covers (a chart at the end of this section gives the locations, part numbers, and fuses that need to be used in each case.) Be sure to put the fuse cover on over the fuses once installed.
  d. Move jumper cables or termination plugs to the replacement PECM.

- Ensure there are no wires behind the mounting position of the PECM.

- Install the replacement PECM on the two mounting bolts.

- Tighten the two 5mm hex nuts.

- Start at the back of new controller and plug in the following cables (refer to the connector identification picture page 15.)
  a. Purge switch SW1 (tubing connection)
  b. Relay power plug TB9 and Heater Relay Control cable.
  c. Fan power cable plug J18, and 24VDC power cables to TB1 & TB2 on top board (there are TB1 and TB2 connectors on the bottom board as well - see “h” below.)
  d. I²C connections (J30 to J33 if used.)
  e. Solenoid control plugs (J101 to J106.) *
  f. Low wattage heater connections (TB8, TB3 to TB5, and LWH1 to LWH6) *
  g. Temperature control plugs (RTD's) and jumpers (Oven Htr 1 & 2, Temp Controller 1 & 2, and Temp 1 & 2 RTD.) *
  h. AC inputs (TB1, TB2, & TB10.)
  i. Heater pressure switch (J10) *(If no cable, then a jumper is needed.)

  * These items are optional in the configuration.

- When replacing in a unit that has a MMI-1, then connect the MMI LED cable to J17.

- Connect the Purge Signal cable to J1302.
Installation, Continued

- Ensure the correct fuses are in the correct positions.

<table>
<thead>
<tr>
<th></th>
<th>Fuses for 115VAC</th>
<th>Fuses for 230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>AC Power Circuit 1</td>
<td>16A (1901693-001)</td>
</tr>
<tr>
<td>F5</td>
<td>Heater Channel 6</td>
<td>6.3A (1901695-001)</td>
</tr>
<tr>
<td>F2</td>
<td>AC Power Circuit 2</td>
<td>16A (1901693-001)</td>
</tr>
<tr>
<td>F4</td>
<td>LWH 1-5 (low wattage heaters)</td>
<td>10A (1901694-001)</td>
</tr>
<tr>
<td>F3</td>
<td>Power Supply (24V out)</td>
<td>3.15A (1302004-033)</td>
</tr>
</tbody>
</table>

Fuse kit 2020151-001 has 20 fuses of each amp rating included.

Note: Cables and jumpers are supplied in the kit for additional temperature control. It is not required to use the temperature control features of this board if the unit was not using the PECM for temperature control before installing this kit.

- When the procedure is completed, then refer to the section on startup and shutdown of the PECM assembly.
Installation, Continued

PECM Connector Identification

This is to show what connectors may be connected on a particular installation. Not all of the connectors are used, so be sure to see what is implemented on the particular installation. In some cases, plugs will need to be moved from the installed board to the replacement board, though there may not be a cable attached.
Installation, Continued

The PECM Kit described below has a number of items to permit it to be used as a universal replacement kit for existing PECMs.

<table>
<thead>
<tr>
<th>Part No.</th>
<th>ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022019-001</td>
<td>1</td>
<td>PECM Kit with Temp/SVCM control</td>
</tr>
<tr>
<td>2021828-001</td>
<td>1</td>
<td>PECM Assembly with Temp/SVCM control</td>
</tr>
<tr>
<td>2021837-001</td>
<td>2</td>
<td>Maxum II 24V Power Cable</td>
</tr>
<tr>
<td>2017596-001</td>
<td>3</td>
<td>Long Sensor Near Heater Cable (2)</td>
</tr>
<tr>
<td>2017959-001</td>
<td>4</td>
<td>Heater Termination Plug (2)</td>
</tr>
<tr>
<td>1901694-001</td>
<td>5</td>
<td>5x20MM Ceramic Fast Acting 10A Fuse (2)</td>
</tr>
<tr>
<td>1901693-001</td>
<td>6</td>
<td>5x20MM Ceramic Fast Acting 16A Fuse (2)</td>
</tr>
<tr>
<td>2017902-001</td>
<td>7</td>
<td>PECM Ground Strap Cable</td>
</tr>
<tr>
<td>2021811-001</td>
<td>8</td>
<td>PECM On-board Temp Ctrl Jumper Cable</td>
</tr>
<tr>
<td>2020211-009</td>
<td>9</td>
<td>Maxum II Circuit SVCM Cable Labels</td>
</tr>
<tr>
<td>2021717-009</td>
<td>10</td>
<td>16.9K Single Channel TL/OT PCBA (2)</td>
</tr>
<tr>
<td>1901646-001</td>
<td>11</td>
<td>Reflow for 5x20mm Fuse Cover (2)</td>
</tr>
</tbody>
</table>

The number corresponds to the ID in the list of the kit above.
Installation, Continued

PECM-2 Replacement of PECM-1 Assembly

The PECM-2 assembly can be used as a direct replacement of earlier versions of the PECM. The PECM-2 has more capabilities than the earlier version, though these do not have to be active. Replacement with minimal change may be the quickest way to bring a system back into operation and to minimize overall spare parts inventory. Refer to the previous section containing the parts included in the replacement kit for identification of parts and what will be used in this replacement.

In this example, it is assumed that the temperature control will not be utilized on the replacement PECM, so that cabling and programming will not need to be changed for those devices. If this is desired, then some database re-application and re-wiring of cabling will be required. How this is accomplished depends upon the specific custom configuration of the gas chromatograph, and engineering for this can be provided by Siemens by contacting the sales contact listed on page 2 of this manual.

**CAUTION:** Before beginning to remove or install the PECM-2 assembly, the power should be externally removed from the GC. AC power comes directly into this board for regulation and distribution in the electronics enclosure, so power should be removed and secured/tagged to prevent inadvertent application while this procedure is being performed.

- Before beginning replacement, be sure to save a current database of the application to be reloaded after the PECM-2 is replaced in case this becomes necessary. Once the database is saved, remove power from the Maxum II (refer to the shutdown procedure page 21.)
- Open electronics door. If the latch is locked, use 4mm (5/32”) Allen wrench to unlock. **DO NOT** open door and place tension on the MAINTENANCE PANEL interface ribbon cable.
- Label all of the cable connections before disconnecting if they are not already labeled. Be sure to read the Warning below concerning those tagged with orange labels. Refer to the later instruction about the revised labeling for the PECM-2.

**WARNING** The cable harness connectors and the chassis plugs associated with the Heater circuits are marked with orange identifier tags. Before reconnecting any connector or plug to a Heater circuit, ensure that the orange identifier tag on the connector or plug reads identical to the orange identifier tag on its mating connector.

- Unplug cables from all PECM connectors.
- Unplug the atmospheric reference tube from the purge switch. (SW1, tubing connection on the bottom board on the PECM-2, middle right side, back)
- Use a 5mm nut driver to loosen two hex nuts at the top of each side of base plate of the PECM-2.
- Slide the PECM up and then lift the PECM off of the mounting bolts.

**WARNING** If new functionality is moved to the PECM-2 from other devices, then engineering must be done to ensure correct operation. Incorrect placement of cables with orange tags can cause the T-rating of the instrument to be exceeded, which may cause ignition of combustible gases when present.
 WARNING The PECM-2 is used in applications with both 115VAC and 230VAC power. Before installing a replacement assembly, ensure that the correct fuses for the particular application are installed in the PECM-2.

- On the replacement PECM-2 assembly do the following:
  a. See that Purge Disable jumper JP2 on the PECM-2 is set correctly. If purge is disabled on the PECM-1 that is being removed, there will be a Purge Bypass jumper cable (PN 2017988-001) installed in series with the SYSCON purge cable. Note that this Purge Bypass cable can be removed and discarded when installing the PECM-2 (since the JP2 jumper disables the purge alarm).
  b. Install the appropriate fuses for either 115VAC or 230VAC in Fuses F1 and F2 and install covers (a chart at the end of this section gives the locations, part numbers, and fuses that need to be used in each case.) Be sure to put the fuse cover on over the fuses once installed.
  c. Move jumper cables or termination plugs to the replacement PECM.

- Ensure there are no wires behind the mounting position of the PECM.
- Install the replacement PECM on the two mounting bolts.
- Tighten the two 5mm hex nuts.

- The following is a chart of cable indicators on the PECM-1 and comparable PECM-2 indicator:

<table>
<thead>
<tr>
<th>PECM - 1 Label</th>
<th>PECM - 2 Label and explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal connectors at PECM top from left to right</td>
<td></td>
</tr>
<tr>
<td>[Not on PECM-1]</td>
<td>TB10 AC Power (added to permit optional UPS for 24V PS)</td>
</tr>
<tr>
<td>TB1 &amp; TB2</td>
<td>TB1 &amp; TB2 AC Power Circuits to PECM</td>
</tr>
<tr>
<td>LWH1 to LWH5</td>
<td>TB3 to TB7 Low Wattage Heater 1 to 5 power</td>
</tr>
<tr>
<td>LH6</td>
<td>TB8 Medium/Low Wattage Heater 6 power</td>
</tr>
<tr>
<td>PECM Right side from top downward</td>
<td></td>
</tr>
<tr>
<td>SSR PWR</td>
<td>TB9 heater power lines</td>
</tr>
<tr>
<td>Purge SW</td>
<td>SW1 Atmos Reference (on bottom/back board)</td>
</tr>
<tr>
<td>Middle of PECM from left to right - top row</td>
<td></td>
</tr>
<tr>
<td>DEBUG</td>
<td>[Not on PECM-2]</td>
</tr>
<tr>
<td>ABH1</td>
<td>OVEN HTR 1</td>
</tr>
<tr>
<td>ABH2</td>
<td>OVEN HTR 2</td>
</tr>
<tr>
<td>SYSCON PURGE</td>
<td>J1302 Purge Signal</td>
</tr>
<tr>
<td>ABH CTL</td>
<td>Htr Ctl</td>
</tr>
<tr>
<td>Ext I&lt;sup&gt;2&lt;/sup&gt;C</td>
<td>[Not on PECM-2]</td>
</tr>
<tr>
<td>Middle of PECM from left to right - middle row - right side only</td>
<td></td>
</tr>
<tr>
<td>LED’s</td>
<td>J17 MMI-1 LEDs (used when no user keyboard/display in door)</td>
</tr>
<tr>
<td>I&lt;sup&gt;2&lt;/sup&gt;C</td>
<td>J30-J33 I&lt;sup&gt;2&lt;/sup&gt;C cable</td>
</tr>
<tr>
<td>Middle of PECM from left to right - bottom row</td>
<td></td>
</tr>
<tr>
<td>LWH1 to LWH5</td>
<td>LWH1 to LWH5</td>
</tr>
<tr>
<td>HTR PRESS</td>
<td>J10 Heater air press switch</td>
</tr>
<tr>
<td>LWH6</td>
<td>LWH6</td>
</tr>
</tbody>
</table>
Installation, Continued

- LWH1 to 6 control for Low Wattage heaters 1 to 6
- Start at the back of new controller and plug in the following cables (refer to the connector identification picture page 15.)
  a. Purge switch SW1 (tubing connection)
  b. Relay power plug TB9 and Heater Relay Control cable.
  c. Fan power cable plug J18, and 24VDC power cables to TB1 & TB2 on top board (there are TB1 and TB2 connectors on the bottom board as well - see “h” below.)
  d. I2C connections (J30 to J33 if used.)
  e. Solenoid control plugs (J101 to J106) *
  f. Low wattage heater connections (TB8, TB3 to TB5, and LWH1 to LWH6) *
  g. Temperature control plugs (RTD’s) and jumpers
     (Oven Htr 1 & 2, Temp Controller 1 & 2, and Temp 1 & 2 RTD) *
  h. AC inputs (TB1, TB2, & TB10)
  i. Heater pressure switch (J10) *

* These items are optional in the configuration.
- When replacing in a unit that has a MMI-1, connect the MMI LED cable to J17.
- Connect the Purge Signal cable to J1302.
- Move 24V cable (from power supply) from WDB J1 to PECM-2 TB1.
- Add 24V power cable, 2021837-001 from PECM-2 TB2 to WDB J1.
- Ensure the correct fuses are in the correct positions. Fuse kit 2020151-001 has 20 fuses of each amp rating included.

<table>
<thead>
<tr>
<th></th>
<th>Fuses for 115VAC</th>
<th>Fuses for 230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>AC Power Circuit 1</td>
<td>16A (1901693-001)</td>
</tr>
<tr>
<td>F5</td>
<td>Heater Channel 6</td>
<td>6.3A (1901695-001)</td>
</tr>
<tr>
<td>F2</td>
<td>AC Power Circuit 2</td>
<td>16A (1901693-001)</td>
</tr>
<tr>
<td>F4</td>
<td>LWH 1-5 (low wattage heaters)</td>
<td>10A (1901694-001)</td>
</tr>
<tr>
<td>F3</td>
<td>Power Supply (24V out)</td>
<td>3.15A (1302004-033)</td>
</tr>
</tbody>
</table>

Note: Cables and jumpers are supplied in the kit for additional temperature control. It is not required to use the temperature control features of this board if the unit was not using the PECM for temperature control before installing this kit.
- When the procedure is completed, then refer to the section on startup and shutdown of the PECM assembly.
PECM Startup and Shutdown Procedures

**Important**
Before proceeding with these procedures make sure the PECM-2 is installed correctly in accordance with these instructions and local and national codes. Refer to the custom documentation package for particular Maxum II details and/or procedures for the particular unit.

**Instructions**
Perform all the procedures consecutively in this section.

**WARNING** When the Electronic Enclosure door is open, voltage dangerous to life exists. These procedures will involve operation of the unit with the electronics door open, which will require a “hot work permit” in some locations to ensure that there are no hazards for the personnel working in the area.

**PECM-2 Startup Procedures**
Perform all the procedures consecutively in this section.

- Ensure that the AC (Mains) power is off to the Maxum II (If power is not already off, follow the shutdown procedure to remove power on page 21.)
- Open the electronic enclosure door and inspect all connections to the Power Entry Control Module (PECM.)
- Inspect all SNE/DPM/EPC/SVCM connections.

- If appropriate permits are obtained to operate with the door open, then apply power to the unit. No intervention should be necessary for the PECM to begin to operate after a few minutes. If normal operation is not achieved, refer to the section on troubleshooting to resolve the issue. The troubleshooting section defines the normal LED operating modes for this assembly. Close the electronics door and secure it per the applicable safety codes.

- If conditions do not permit the unit to be operated with the door open, then close the door, secure it per the applicable safety codes, and apply power to the unit. Correct operation can be determined through the interface on the door or a remote interface if one is not included in the door of the electronics enclosure.

- Follow the procedure for restart of the specific unit.
PECM Startup and Shutdown Procedures, Continued

PECM-2 Shutdown Procedure
Perform all the procedures consecutively in this section.

- If a current database has not been saved, first save a database to a remote device to provide a potential method of reloading when a PECM has been replaced. Generally, it will not be needed to reload the database, though in some cases this may be required.

- Put the Maxum II in Hold and wait for the cycle to complete. This will provide the quickest restart of the application when power is restored.

- Once the cycle is completed and the Maxum II is holding, then remove power from the unit.
Troubleshooting

The PECM-2 should start automatically once power is applied. If the unit is not operational after applying power, then review the information below to aid in correcting the problem.

The most common issue with replacing the PECM-2 is cables, wiring connections, and jumpers. Check all of the cable connections to ensure that they are seated and connected properly.

The alarm system can also provide direct information on alarms for an error, so review these to see if they provide an indication of the problem. These alarms have a written description which will provide an indication of the problem area.

If reapplication was done with the change of the PECM, then addresses may not have been changed in the database as needed. Verify that addresses are correct if change to the location of hardware occurred.

The LEDs on the PECM board can help with troubleshooting problems. There are two sets of LEDs: one on each side of the front board as shown in the diagram to the right. The bottom set of three LEDs is the same as used on other boards (described below.) The left set is for the PECM software and the right set is for the temperature controller software. Each will go through a separate display on power up and normal operation. The top two sets of four LEDs each are for the operation of each of the two temperature controllers on the front board. Heater 1 is on the left and heater 2 is on the right side of the board. The corrective action to take for each of the LED indications is noted below with a corrective action reference number on the diagram at the right. The normal operating state is not defined below as no corrective action is required for this state. The normal state indication is shown in the diagram below.

Corrective Action 1. The Normal, Warning, and Fault LEDs are common to most boards used in the GC electronics. There are six States, five of which are abnormal States. These are defined by LEDs with the color showing ON. The normal green LED is DIM in State 4. When communication occurs in States 4, 5, or 6, then the green normal LED will flash ON during the communication. Note that there are two sets of these (the left one for the bottom board and the right one for the top board).

If one of the abnormal States (1, 2, 3, 5, or 6) persists, then corrective action is required as noted below (corrective actions are listed in order of precedence for performing, so the user should do one item and then check to see if the issue is resolved before attempting the next item):

- State 1 –
  a. if all units in this state, then power to the analyzer and/or board is not active
  b. reset the device or cycle power
  c. check power connections to board (AC and 24VDC)
  d. replace unit

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Troubleshooting, Continued

- **State 2** –
  a. reset the device or cycle power
  b. replace unit.

- **State 3** –
  a. reset the device or cycle analyzer power
  b. if all modules are in State 3, then SNECON is not communicating (check cabling and connections)
  c. replace unit.

- **State 5** –
  a. reset the device or cycle power
  b. check communication cable connections.

- **State 6** –
  a. reset the device or cycle power
  b. check communication cable connections
  c. check for missing Temp Limit setpoint boards.
  d. check for shorted or open RTDs.
  e. replace the unit
  f. replace other connected units.

**Corrective Action 2.** Overtemp for either of the heater circuits will cause a shutdown of this circuit. It indicates that the temperature has exceeded the temperature limit point window. This maintains the T-rating, though it says that something is not working in the control circuit. The unit must have the power reset before the circuit will begin functioning again. If this is not the result of the oven temp test button on the board to test this circuit, then the heater relays should be checked to make sure that they have not failed in the ON position, that the TL/OT temperature probes are operational, there is no loose connection of wires or connectors, and that none of the connecting wires have been switched to the wrong device.

If there is a software heater overtemp alarm and there is no overtemp LED active on the PECM (if temperature control is done from this board), clear the alarm and see if it continues to occur. If it continues to occur, then replace the board.

If the PECM is controlling a cartridge heater, the setpoint may be too close to the limit temperature. If this is the case, then the temperature setpoint should be adjusted to a lower temperature.
# Spare Parts

## Spare Parts List

Please refer to page 2 for information on where to order spare parts. Providing the unit serial number of the instrument will expedite the ordering process.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number (Siemens global)</th>
<th>Part Number (Americas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PECM, Version 2 Complete Replacement Kit</td>
<td>GWK-AI2022019-001</td>
<td>2022019-001</td>
</tr>
<tr>
<td>PECM-2 with Temp and SVCM Control - two board set (no cables) - contained in 2022019-001</td>
<td>GWK-AI2021828-001</td>
<td>2021828-001</td>
</tr>
<tr>
<td>PECM-2 with Temp and SVCM Control - bottom connect board only</td>
<td>GWK-AI2021789-001</td>
<td>2021789-001</td>
</tr>
<tr>
<td>PECM-2 with Temp and SVCM Control - top controller board only</td>
<td>GWK-AI2021784-001</td>
<td>2021784-001</td>
</tr>
<tr>
<td>Oven Heater Sensor Connect Cable (short)</td>
<td>GWK-AI2017596-001</td>
<td>2017596-001</td>
</tr>
<tr>
<td>Oven Heater Sensor Connect Cable (long)</td>
<td>GWK-AI2017596-002</td>
<td>2017596-002</td>
</tr>
<tr>
<td>SVCM Solenoid Interconnect cable (1000 mm) long</td>
<td>GWK-AI2021823-001</td>
<td>2021823-001</td>
</tr>
<tr>
<td>SVCM Solenoid Interconnect cable (500 mm) short</td>
<td>GWK-AI2021823-002</td>
<td>2021823-002</td>
</tr>
<tr>
<td>Fuse kit</td>
<td>GWK-AI2020151-001</td>
<td>2020151-001</td>
</tr>
</tbody>
</table>