

DI PA MI GCI Installing an Inrush Current Limiter on a Maxum II Equipped with an Automatic Purge Unit

Application examples

Preface

Safety Considerations

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Installing the ICL

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**Additional Instructions
for Legacy Maxum
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This procedure is applicable only to Maxum II Gas Chromatographs equipped with type px purge and Automatic Purge Control units.

Legal information

Warning notice system


This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

| |
|---|
|  DANGER |
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| |
|--|
| indicates that death or severe personal injury will result if proper precautions are not taken. |
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|--|
|  WARNING |
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| |
|---|
| indicates that death or severe personal injury may result if proper precautions are not taken. |
|---|

| |
|--|
|  CAUTION |
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|--|
| indicates that minor personal injury can result if proper precautions are not taken. |
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|---------------|
| NOTICE |
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| |
|--|
| indicates that property damage can result if proper precautions are not taken. |
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If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

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|  WARNING |
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| Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed. |
|--|

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Warning - Internet

| |
|---|
|  WARNING |
| Do not connect analyzer to the internet. |
| This equipment must not be connected to the internet except by a secure connection using a network security appliance administered by qualified IT personnel. |
| Default passwords must be changed during installation in compliance with facility IT practices and requirements. |
| Failure to implement robust network security may expose your company to internet hacking attacks that could result in theft or loss of sensitive data, equipment damage, serious injury or death. |

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit (<https://www.siemens.com/industrialsecurity>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (<https://www.siemens.com/cert>).

Manuals You Will Need

Note

Required documents

This manual depends on parts of several Siemens documents. Download these to have the complete product documentation available.

Application-specific information is in the Custom Documentation package that is unique to each analyzer.


Maxum II Air Bath and Airless Oven Models

- Maxum II Explosion Protection Safety Standards (<https://support.industry.siemens.com/cs/document/42017542/>) **READ FIRST**
- Maxum II Gas Chromatograph Portal Reference Manual (<https://support.industry.siemens.com/cs/document/109762016/>)
- Maxum II Modular Oven Reference Manual (<https://support.industry.siemens.com/cs/document/109750271/>)
- Maxum II Official Product Specifications (<https://support.industry.siemens.com/cs/document/109742522/>)
- Maxum edition II Process Gas Chromatograph Installation Manual (<https://support.industry.siemens.com/cs/document/42017307/>)

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Safety Considerations

| |
|--|
|  WARNING |
| Follow Safety Precautions. Failure to follow proper procedures may result in equipment damage, personal injury or death. |
| Full safety precautions must be followed throughout all sections of this procedure to prevent possible injury, equipment damage, or death. Verify that the area is clear of flammable gases and vapors and that appropriate authorization is obtained to do the work (hot work permits). |

| |
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| NOTICE |
| Read the Safety Manual |
| Anyone who works on Siemens Maxum is strongly advised to read and be familiar with the Maxum II Explosion Protection Safety Standards (https://support.industry.siemens.com/cs/document/42017542/). Pay close attention to the first section. |

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| NOTICE |
| Verify that the certification of the analyzer is still valid. |
| Ensure that the analyzer has NOT been modified or repurposed in a way that would void the certification. |

1.1 Approved Use

The Maxum edition II gas chromatograph is primarily used in all branches of the fine chemicals, refining, and hydrocarbon processing industries. It performs chemical composition analysis of gases and liquids that are present in all phases of production. The application flexibility of the Maxum II allows it to analyze a wide variety of samples including feedstock, partially processed streams, final products, and process byproducts including wastes and environmental hazards.


The Maxum II product is intended to be used only in conjunction with other devices and components which have been recommended and approved by Siemens. Appropriate safety standards were used in the development, manufacture, testing, and documentation of the Maxum II. Under normal operation, this product is safe for use providing that all safety and handling guidelines are observed with respect to configuration, assembly, approved use, and maintenance. These guidelines, if not included in the scope of this manual, are detailed in the applicable manuals in the section titled Manuals You Will Need (Page 4).

This device has been designed with safe isolation between high and low voltage circuits. Low voltages which are connected must also be generated using safe isolation. If any part of the Maxum II is opened, certain parts of the device are accessible which may carry dangerous voltages. Therefore, only suitably qualified personnel may work on this device as indicated in the next section which is titled "Qualified Personnel".

1.2 Qualified Personnel

Only suitably qualified personnel may operate or perform maintenance on the Maxum II process gas chromatograph. For the purposes of safety, qualified personnel are defined as follows:

- Those who have been appropriately trained for the tasks which they are performing (for example, commissioning, maintenance, or operation).
- Those who have been appropriately trained in the operation of the Maxum II process gas chromatograph and are sufficiently acquainted with Maxum II documentation.
- Those who are familiar with the safety concepts of the Maxum II process gas chromatograph and are sufficiently acquainted with Maxum II documentation.
- Those who are authorized to energize, ground, and tag circuits and devices in accordance with established safety practices may perform those tasks for which they are trained.

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|  WARNING |
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|---|
| Avoid injury and property damage |
|---|

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|---|
| Operation or Maintenance of the Maxum II by unqualified personnel or failure to observe the warnings in this manual or on the device may lead to severe personal injury and/or extensive property damage. |
|---|

Installing the ICL

2.1 Overview

A Maxum II gas chromatograph (GC) with px purge uses an automatic purge control unit (APU) to control a relay that can completely power down the GC if positive purge pressure inside the electronics cabinet (EC) is lost. When power is restored, the APU flushes the EC with air until a minimum volume is reached, then energizes the power disconnect relay, powering on the GC.

At that instant, the 24 VDC power supply can draw a large amount of inrush current. In a device with no power disconnect relay, this poses no problem and is typically dealt with by using "slow-blow" fuses.

With the power disconnect relay, the inrush current can damage or shorten the life of the relay contacts. To prevent this type of damage, an inrush current limiter (ICL) is inserted into the AC mains wiring path before it enters the power supply.

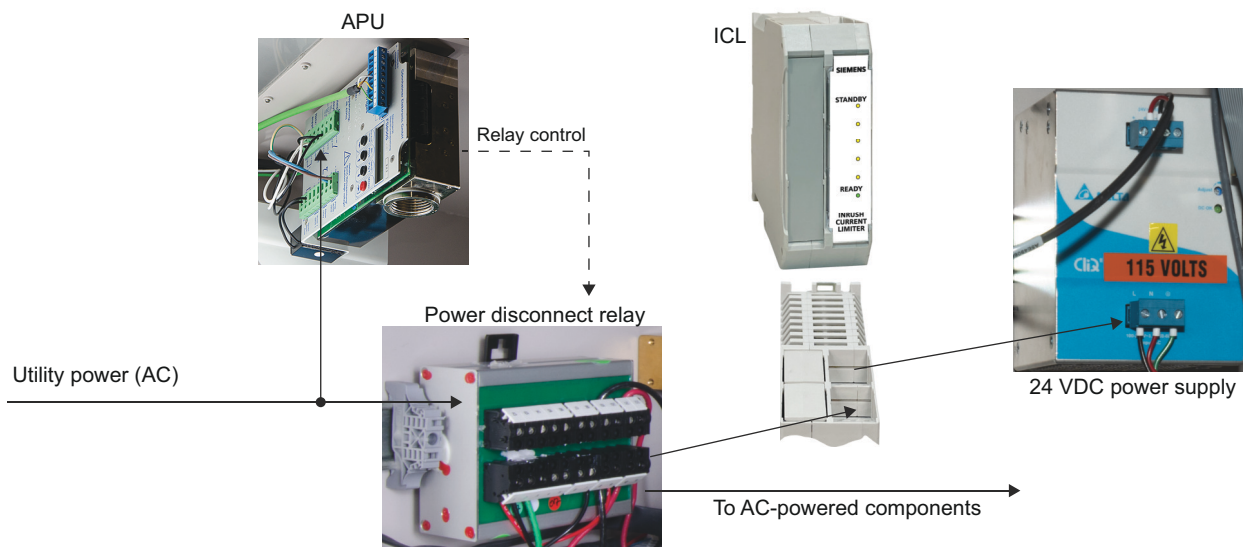


Figure 2-1 ICL use position in power path (simplified)

Note

This procedure requires that power be turned off at a point outside of the analyzer, ensuring that no internal circuit can be energized.

Note

Because the EC will be opened, the work must be performed indoors in a dry environment.


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|  WARNING |
| Lethal voltages exist in the work area. Observe safety practices required in the facility where the work is to be performed and guidelines given in the Maxum II Explosion Protection Safety Standards Manual. |
| Failure to observe safety practices can result in severe injury or death. |

Table 2-1 Specifications


| Rating | Min | Max | Nom |
|-------------------------------------|--------|---------|-------------|
| Ambient operating temperature T_a | -20°C | 78°C | |
| Voltage (input and output) | 85 VAC | 253 VAC | 110-230 VAC |
| Current | | | 3.15 A |

2.2 General Analyzer Shutdown Procedure

Back Up the Database

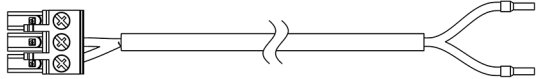
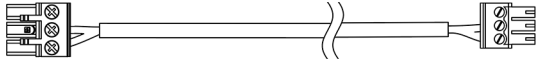
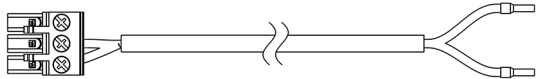
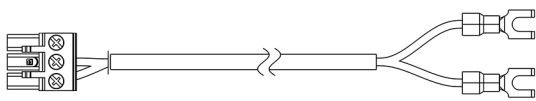
If a current database has not been saved, first save a database to a remote device to provide a potential method of reloading if a SYSCON or a CAC3 has been replaced or an earlier database needs to be restored to the analyzer. Generally, a database reload will not be needed, though in some cases this may be required.

1. 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.
2. After the cycle has completed and the analyzer is in Hold:
 - Turn off carrier gas, valve gas, instrument air, and sample flows.
 - Remove power from the unit.

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|  WARNING |
| Voltage dangerous to life exists. Failure to follow appropriate safety procedures may result in severe injury or death. |
| Before beginning to work inside the electronics compartment, the power must be externally removed from the GC. AC power comes directly into the electronics enclosure, so power must be removed and secured/tagged to prevent inadvertent application while work is being performed. |

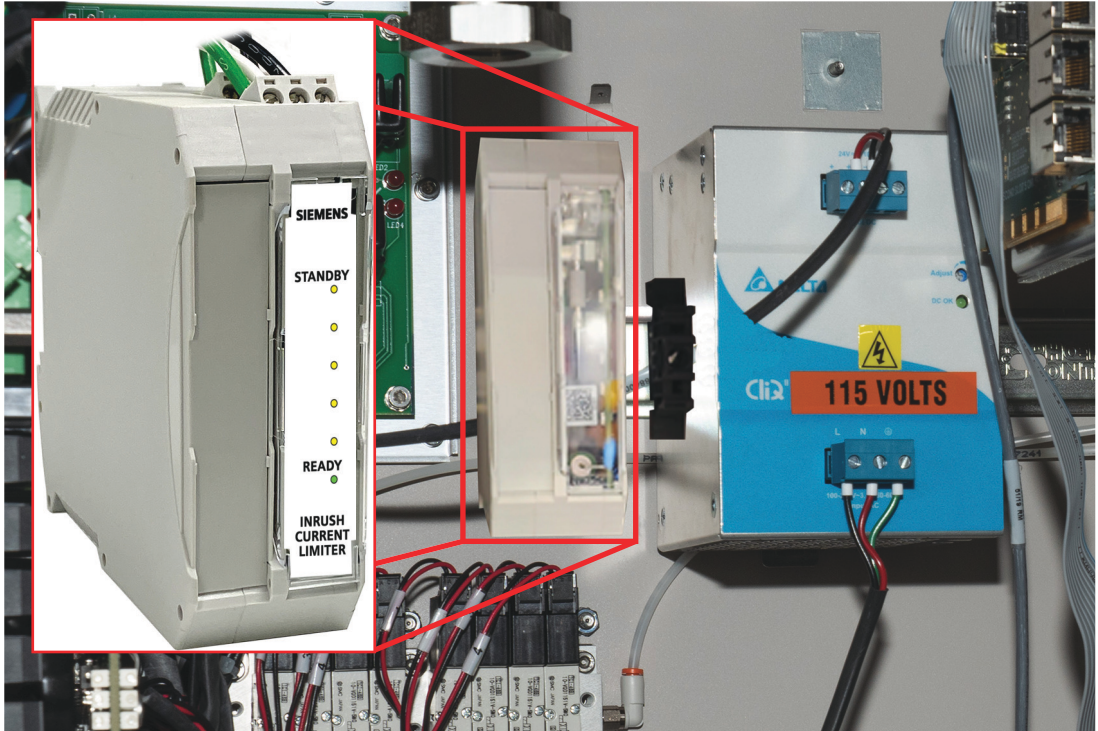
2.3 Installing the ICL

Review contents of kit (parts list to be determined).

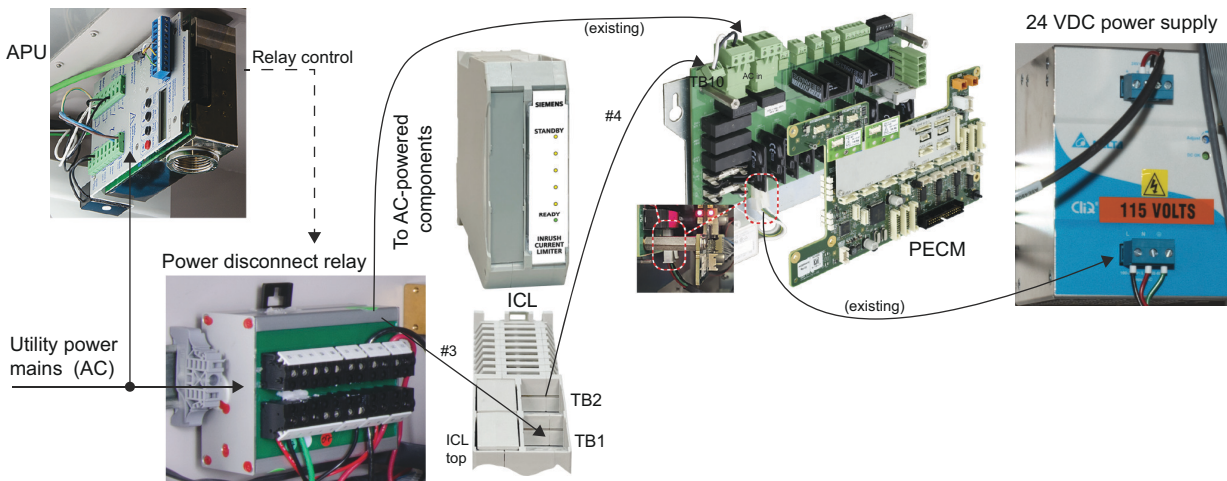
| Item | Description | Part Number |
|------|--|----------------|
| 1 | ICL | A5E52421963001 |
| 2 | DIN-rail spacer | |
| 3 | MAA - cable power relay (Line and Neutral) > ICL TB1-1 (Line) and TB1-2 (Neutral)  | A5E52616430001 |
| 4 | MAA - cable ICL TB2-1 (Line) and TB2-2 (Neutral) > PECM TB10-1 (Line) and TB10-2 (Neutral)  | A5E52616428001 |
| 5 | MMO - cable Power Relay terminals (Line and Neutral) > ICL TB1-1 (Line) and TB1-2 (Neutral)  | A5E52616430001 |
| 6 | MMO - cable ICL TB2 > PS AC input TB (observe black Line and white Neutral)  | A5E52616431001 |
| | (other parts to be determined) | |

Airless and Air Bath Models

1. Remove the DIN end stop and install the DIN spacer on the DIN rail to the left side of the 24 VDC power supply. This maintains proper space for heat dissipation of the components. If necessary move the power supply and other components slightly to the right. Maintain a minimum distance of 10 mm between the power supply and the ICL cases.
2. Place the ICL loosely on the DIN rail to the left of the spacer.

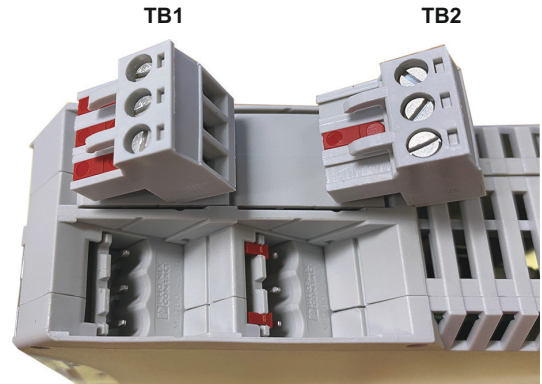
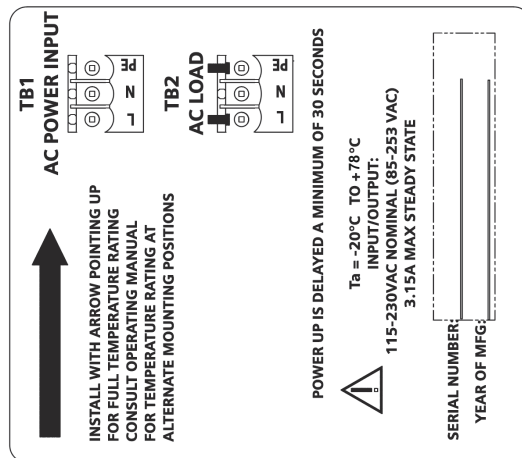


3. Remove the black (Line) wire from the power relay terminals in the cable going to the PECM TB10. Remember where it was. This cable will be discarded.



4. Install the black (Line) wire of Item #3 (A5E52616430001) on the power-relay terminal from which you removed the black wire in the old cable.

5. Remove the white (Neutral) wire from the power relay terminal in the cable going to the PECM TB10. Remember where it was.
6. Install the white (Neutral) wire of Item #3 on the power-relay terminal from which you removed the white wire in the old cable.
7. Plug the other end of Item #3 into TB1 on the ICL.
8. Install Item #4 (A5E52616428001) by plugging one end into ICL TB2, and the other end into PECM TB10 (upper-left corner of the power board).

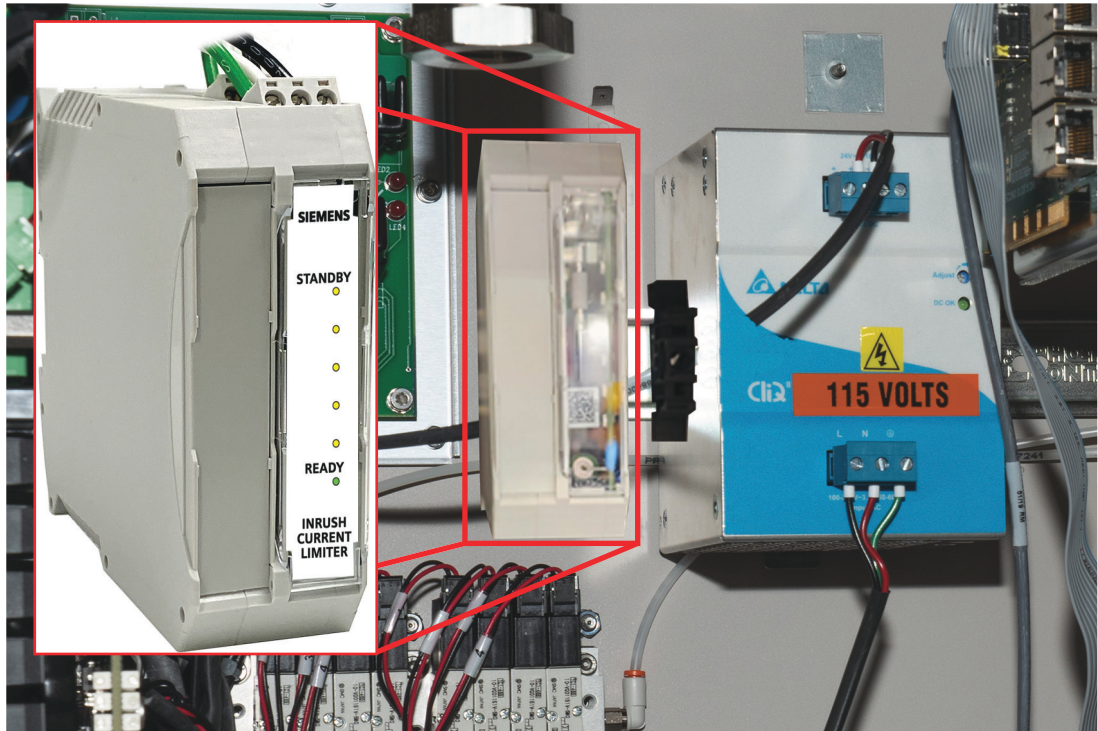


9. Secure the ICL to the DIN rail by pressing downward until the spring-loaded clip snaps over the edge of the DIN rail.
10. Install a DIN end stop on the left side of the ICL.

Modular Oven Model

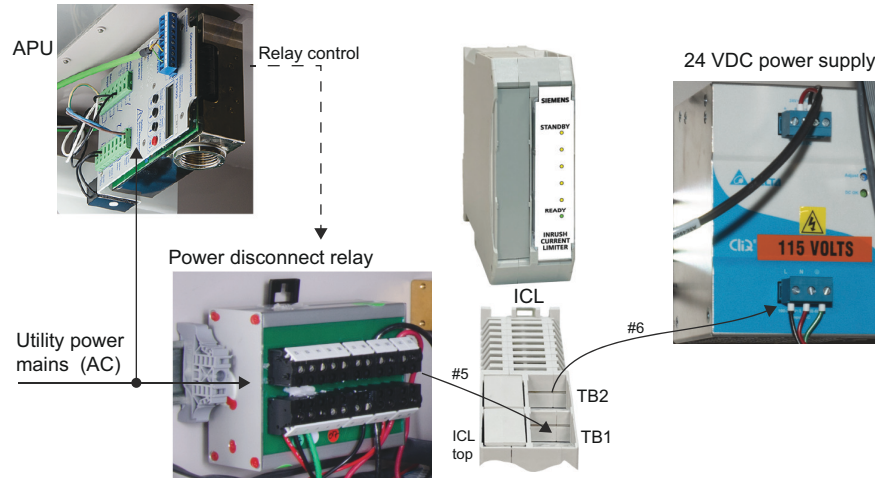
In the Maxum II Modular Oven models, the ICL is inserted into the path from the power disconnect relay to the 24 VDC power supply.

1. Remove the DIN end stop and install the DIN spacer on the DIN rail to the left side of the 24 VDC power supply. This maintains proper space for heat dissipation of the components. If necessary move the power supply and other components slightly to the right. Maintain a minimum distance of 10 mm between the power supply and the ICL cases.
2. Place the ICL loosely on the DIN rail to the left of the spacer.



3. Remove the black (Line) wire from the power relay terminals in the cable going to the 24 VDC power supply. Remember where it was. This cable will be discarded.
4. Install the black (Line) wire of Item #5 (A5E52616430001) on the power-relay terminal from which you removed the black wire in the old cable.
5. Remove the white (Neutral) wire from the power relay terminal in the cable going to the 24 VDC power supply. Remember where it was.
6. Install the white (Neutral) wire of Item #5 on the power-relay terminal from which you removed the white wire in the old cable.
7. Remove the old cable from the 24 VDC power supply terminals.
8. Plug one end of Item #6 into ICL TB2.
9. Install the black (Line) wire of Item #6 (A5E52616431001) on the L terminal of the 24 VDC power supply input.

10. Install the white (Neutral) wire of Item #6 on the N terminal of the 24 VDC power supply input.



11. Secure the ICL to the DIN rail by pressing downward until the spring-loaded clip snaps over the edge of the DIN rail.

12. Install a DIN end stop on the left side of the ICL.




2.4 Inspect the installation

Take advantage of the opportunity presented by the open electronics cabinet to check the routing and labeling of cables, especially heater cables that deliver 110 or 220 VAC.

When the interior of the EC has been inspected, verify the the function of the ICL using the procedure in the next section.

2.5 Test Procedure to Verify the Status of the APU Power Relay

1. Electrically de-energize all AC circuits to the Maxum II GC and APU
2. Purge air will not invalidate test, however it is recommended to have this off during testing

| | |
|--|----------------|
|  | CAUTION |
| Voltage hazardous to life exists. Failure to observe proper safety precautions may result in injury or death. | |
| Verify that the unit is electrically de-energized prior to beginning functionality test. | |

| | | |
|----|---------|----|
| 14 | PE — PE | 13 |
| 15 | PE — PE | 12 |
| 16 | N | 11 |
| 17 | L1 | 10 |
| 18 | L2 | 9 |
| 19 | L3 | 8 |
| 20 | L2 | 7 |
| 21 | L1 | 6 |
| 22 | N | 5 |
| 23 | L3 | 4 |
| 24 | N — N | 3 |
| 25 | Lx — Lx | 2 |
| 26 | PE — PE | 1 |



Power relay contact layout

Test Procedure

Verify that relay contacts open

1. Open the door to the Electronics Cabinet. NOTE: Purge air will not invalidate this test, however it is recommended to have the purge air shut off for the duration of these tests
2. If APU Power Relay has wiring landed on terminal 4 or 5, test for continuity across the relays. Position one meter lead on terminal 4 and one lead on terminal 22, ensuring an Open electrical circuit exists (resistance meter should read in an O.L. condition). Repeat test for terminals 5 and 23
3. If APU Power Relay has wiring landed on terminal 6 or 7, test for continuity across the relays. Position one meter lead on terminal 6 and one lead on terminal 20, ensuring an Open electrical circuit exists (resistance meter should read in an O.L. condition). Repeat test for terminals 7 and 21

4. If APU Power Relay has wiring landed on terminal 8 or 9, test for continuity across the relays. Position one meter lead on terminal 8 and one lead on terminal 18, ensuring an Open electrical circuit exists (resistance meter should read in an O.L. condition). Repeat test for terminals 9 and 19
5. If APU Power Relay has wiring landed on terminal 10 or 11, test for continuity across the relays. Position one meter lead on terminal 10 and one lead on terminal 16, ensuring an Open electrical circuit exists (meter should read in an O.L. condition). Repeat test for terminals 11 and 17

Upon completion of testing, restore unit to normal configuration

1. Ensure APU Override Switch positioned to Normal
2. Open air supply valve to purge air if closed during previous steps
3. Supply electrical power to GC equipment
4. Return unit to normal operation
5. If any components do not energize as expected, investigate cause and correct

2.6 Verify ICL Function

If desired, and if local rules allow, and if proper permits are in place, the function of the ICL can be observed using the Maintenance Switch (APU override). This allows observation of the indicator LEDs on the ICL front panel, followed by the SYSCON boot sequence.

Observing the ICL Powerup Sequence

| | |
|---------------------------------------|---|
| SIEMENS | Switch the analyzer to Maintenance mode by using the switch on the front panel, then turn on AC power to the analyzer. |
| STANDBY ● | The ICL limits inrush current by opening a resistive path between the AC source and the 24 VDC power supply. This process takes approximately 30 seconds to one minute. During startup, a series of yellow Standby LEDs illuminate as various stages of the circuit activate. |
| ● | |
| ● | |
| ● | |
| READY ● | Finally, the green Ready LED illuminates indicating that the 24 VDC power supply is active, and the SYSCON begins the normal bootup sequence. This verifies that the ICL has been installed correctly. |
| INRUSH CURRENT LIMITER | Turn off the power to the analyzer and move the Maintenance Switch back to the Normal position. Close and secure the analyzer door. |

Prepare to Start the Analyzer

By definition of px purge, no power can reach the ICL (or any other internal component) until the APU powers up and completes an initial purge of the EC. Therefore, the technician must perform the **applicable parts** of the startup procedure and wait for the analyzer to attain a state of readiness for normal operation. This verifies enclosure integrity and proper connection of the retrofit component. At that point, the technician can place the analyzer in the RUN state to resume normal operation and verify that this happens.

Following is the General Startup Procedure from the Maxum Edition II Analyzer - General Maintenance Manual (<https://support.industry.siemens.com/cs/document/109759983/>). This is a general procedure, so not all steps are required for every application, and some applications may require additional steps.

2.7 ICL Maintenance Considerations

1. Remove power connections from the analyzer.
2. Examine the relay to make sure that all contacts open when the relay control coil is de-energized.
3. Using an ohmmeter, verify **no continuity** on each contact pair.
See Test Procedure to Verify the Status of the APU Power Relay (Page 16).
4. Reconnect power to the analyzer.
5. Verify that the maintenance switch for the APU is set for normal operation.
6. Startup, allow the initial purge to finish (Purge LED next to the maintenance switch constantly ON), wait for full bootup; have the analyzer running, or at least powered up and ready to run.
7. Open the door.
The APU de-energizes the power disconnect relay, and signal-disconnect relay if present, into the open state.
8. Verify that this successfully occurred by observing that all LED indicators are dark unless they are on the APU itself. The SYSCON, heaters, DPMs, and any auxiliary components are powered down and inoperative.
If anything remains powered up, inspect the wiring to the power-disconnect relay, then replace the relay if all wiring is in order.

Note

In some applications an unsafe level of power may be present on the signal wiring. In that case, the proper function of the separate signal-disconnect relay must be verified. The wiring of such a relay will be documented in the custom documentation package.

2.8 General Startup Procedure

The startup procedure described in this section explains the principle steps necessary to power the Maxum II GC in a manner that does not compromise the safety systems of the analyzer.

Note

The specific application and the facility in which this equipment is installed will impose additional requirements for startup and shutdown.

This section does not explain the startup procedures required that relate to software functions or the analytical application of the analyzer. Please see other documentation and manuals for information and startup steps that relate to these other aspects of startup.

2.8.1 Procedure

Following is the procedure for safe startup of the Maxum II GC.

1. Verify that AC power is turned off at main power feed lines. All indicator lights should be off.
2. Verify that the analyzer has been mounted and installed correctly.
3. Inspect the electronics compartment for contamination by dust or condensation. Clean and dry if necessary.
4. (If APU is used) Verify that all power and signal lines have been connected correctly through the APU power-disconnect relay and signal-disconnect relays.

NOTICE

APU Considerations

When an APU is used, there must not be any signal wiring entering the Maxum II EC that is powered from any outside source without connecting through the APU signal-disconnect relays (internally or externally mounted). This warning includes the Advance Data Hiway, Ethernet, and any other input or output signal lines that are connected to other equipment which may source power onto the signal lines.

5. Verify that clean (free of particulates and flammable gases and vapors), dry instrument air has been attached correctly to the analyzer air lines. Refer to separate installation documentation for instructions on making required attachments. Air flow should be set to off at this time.
All air, gas supply and sample lines should be blown down and cleared of any particulates or chemicals prior to pressurizing these lines to the Maxum II gas chromatograph.
6. Make a physical inspection of all analyzer safety systems to verify that there is no mechanical damage and that all systems are in good repair. This inspection must include the Methanator (if in use), the Air Treater (if in use), the oven heater systems, and all detector assemblies. Refer to the "Maintenance Considerations" sections provided throughout this manual for specific inspection tasks for different components.

7. Inspect the EC door gasket. Verify it is clean and will seal all the way around the door. Check all ports both gas and electrical to verify they are sealed to the cabinet and any electrical wiring external connections have a proper wire seal.
8. (If APU is equipped) Verify that the maintenance switch for the APU is set for normal operation.
9. (If APU is not equipped) Verify that fast purge valve is set to off.
10. Close the EC door and oven door. Turn on instrument air and verify that cable access points and other openings in the EC are properly sealed or closed off.

Note

The remainder of the startup process is dependent on whether an APU is installed.

If py (not equipped with APU)

11. Set the air pressure to the value stated on the purge tag.
12. Turn on the fast purge switch and allow fast purge air to flow for at least 8 minutes. Flow of fast purge air can be verified because of the louder sound of the air flow. The fast purge relief valve opens slightly and the air can be heard as it leaves the EC.
13. Turn off the fast purge switch. Flow of normal purge air should continue.
14. Turn on electrical power to the system.

If px (equipped with APU)

15. Turn on electrical power to the system. The remainder of the startup process is automatic and is described as follows.
16. APU power comes on. The Purge LED next to the maintenance switch begins to blink.
17. The APU activates the fast purge function. Activation of fast purge can be verified by the louder sound of air flow. Fast purge continues for approximately 8 to 20 minutes. During this time the Purge LED next to the maintenance switch should blink intermittently. Allow at least 30 minutes before interrupting the startup purge to diagnose a delay.
18. Once the APU determines that the analyzer is properly purged, it activates power to the analyzer. At this point the Purge LED next to the maintenance switch should stay on constantly.

Note

If the fast purge process does not complete correctly ending in the Purge LED light remaining on, then turn off power and repair any leaks that may exist.

(For all systems)

19. Once power has been applied to the main analyzer, complete startup of the system (refer to startup procedures available in installation documentation). For systems with APU, the Purge light next to the maintenance switch should remain on. For systems without APU, the purge light on the Maintenance Panel or CIM display should remain off.

Note

(For systems without APU) If there is ever a loss of purge, the Purge alarm LED on the display will light and a software purge alarm is logged.

(For systems with an APU) If there is ever a loss of purge, the APU will turn off power to the analyzer.

Additional Instructions for Legacy Maxum Configurations

3

3.1 Component Layout

Additional hardware is added to Maxum units equipped with SYSCON2.1 and earlier. These brackets are shown in red in the diagrams below. The ICL components discussed in earlier sections are shown in blue.

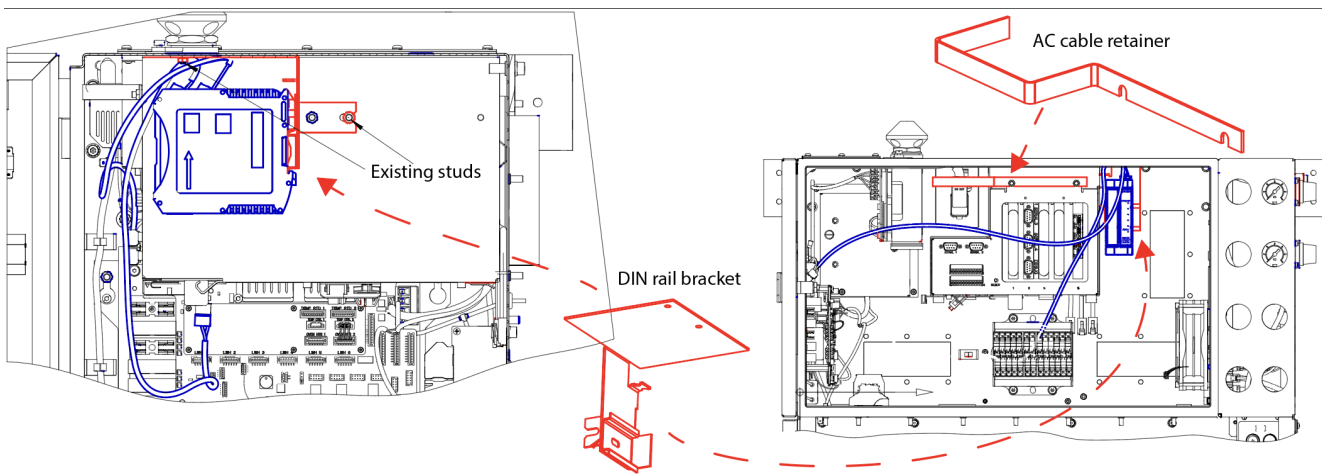


Figure 3-1 ICL installed in a unit with SYSCON2.1 cage

The DIN rail bracket mounts to the side of the SYSCON cage.

The AC cable retainer bracket prevents using the AC power connector on the 24 VDC power supply from being used as a switch to power down (and power up) the SYSCON.

3.1 Component Layout

Contacts

Register at the Siemens Industry Online Support (SIOS) website:
<https://support.industry.siemens.com>

| International | USA |
|---|--|
| <p>Siemens AG DI PA AP Process Analytics Oestliche Rheinbrueckenstrasse 50 76187 Karlsruhe Germany Web site: www.siemens.com/processanalytics Support Information: https://support.industry.siemens.com</p> <p>Spares Contact your local Siemens sales representative</p> <p>Support Requests www.siemens.com/automation/support-request</p> | <p>Siemens Industry, Inc. 5980 West Sam Houston Parkway North Suite 500 Houston, TX 77041 USA Tel: +1 713 939 7400 Fax: +1 713 939 9050 Email: saasales.industry@siemens.com Web site: www.usa.siemens.com/pa</p> <p>Training Tel: +1 800 448 8224 (USA) Email: saatraining.industry@siemens.com</p> <p>Spares Tel: +1 800 448 8224 (USA) Email: PAspareparts.industry@siemens.com</p> <p>Support Requests www.siemens.com/automation/support-request Tel: +1 800 448 8224 (USA) Email: GCsupport.industry@siemens.com</p> |

| Singapore | Online Support Request |
|--|--|
| <p>Siemens Pte Ltd 203 Woodlands Avenue 9 Unit #01-52 Singapore 738956 Web Site: http://www.siemens.com.sg</p> | <p>Web site: www.siemens.com/automation/support-request</p> |

