Procedure to Replace Various TCD DPMs with Paired IS TCD DPM and TC DPM in a Maxum or Maxum II Analyzer

Difficulty Level: Medium
Estimated time to execute: 2 Hours

Revision History

Issue	Date	Reason
001	1/31/2017	Initial Issue
002	11/1/2018	Update for new IS TCD4 DPM (part number A5E43267455001)
003	12/2019	Add security information

SIEMENS

Table of Contents

1.0 Description

This document describes the procedure to replace a TCD Detector Personality Module (2017974-001 or 2020988-001 where temperature control is being used) with a new IS TCD DPM (kit A5E36128806004) and a new TC DPM (A5E02645925002) in a new dual-DPM housing. The analyzer must be powered down for this procedure. If the DPM to be replaced does not use the temperature-control channels, use kit A5E36128806003 with procedure IP-0031-002.

The IS TCD DPM is intrinsically safe only when properly installed in the Maxum II Modular Oven model. This document describes only upgrades applicable to the Airless or Airbath Oven models which do not have an intrinsically safe detector.

Warning: Possible ignition source

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.

A parts kit, Siemens part number A5E36128806004, is required for this procedure. This kit contains the following items.

Upgrade Kit: IS TCD3 DPM, TC DPM (*A5E36128806004*)

Item	Quantity	Part Number	Description
1	1	2021753-001	HOUSING, UNSHIELDED, SNE
2	1	A5E42685089001	THERMISTOR DPM V4, W/ BRACKET
3	1	A5E02645925002	PCBA, BASE3 DPM, TEMPCON ONLY
4	4	1312107-814	SCREW, M3X8, SOCKET HEAD CAP, SST
5	2	A5E36108960001	CABLE, ADAPTER, 8-CELL DETECTOR
6	1	A5E34938550001	PCBA, IS TCD3DPM LEGACY SPARE PART ADAPT
7	4	1312601-005	NUT, M5 WITH LOCKWASHER, ZINC PLATED
8	2	1312092-017	SCREW, SHOULDER M5 X 3.18, SOCKET HEAD
9	1	2020910-001	PCBA, OEFT ADAPTER
10	1	1901381-001	CABLE,FLEX,LAMINATED,30COND,6IN,SHIELDED
11	1	2020902-001	OEFT FLEX CABLE PCBA
12	2	2017959-001	PLUG, HEATER TERMINATION
13	2	2017596-001	CABLE, HEATER / SENSOR NEAR
14	1	2021756-001	CABLE, MODULE ID #1 PLUG
15	1	2021756-002	CABLE, MODULE ID #2 PLUG
16	1	2021756-003	CABLE, MODULE ID #3 PLUG
17	2	2021757-001	CABLE, I2C, MODULE
18	2	A5E30514085	PLUG, 3.5MM, ORANGE, BL 3.5/10/180 OR
19	1	A5E02807143001	PROCEDURE REF, KIT INSERT SHEET

1.1 Custom Application Drawing Package

The Custom Drawing Package delivered with the equipment shows what parts were installed by the factory. If no replacements have been made from installation, then the Custom Drawing Package will provide the user with the part numbers of the items in the unit. If changes have been made, this may still provide information on the type of parts that are currently installed.

The analyzer has special instructions in the custom documentation. These must be followed to ensure safe operation of the unit.

Included with your analyzer is a custom application drawing package that provides drawings and information pertinent only to your analyzer. Because the drawing package has specific information concerning the analyzer with which it shipped, you should have this package readily available during installation.

Typical documents included in this package may include:

- 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
- Data Base Information Files

2.0 Identifying Existing Components

This section describes the various versions of parts which may be installed in the unit. In some cases the part being replaced has a new version. In these cases, it is necessary for the user to be aware that an upgrade is occurring, and extra parts from the kit may be necessary to make the conversion from existing to new equipment.

2.1 Sensor Near Electronics Assembly (SNE)

Each SNE assembly may have one or two main components; a DPM is always present, and a SNE controller (SNECON) board may be present.

Up to three SNE assemblies can be installed within a single electronic enclosure. The location, as illustrated below, determines the settings of the hardware ID plugs or switches of the cards mounted in the SNE assemblies.

Newer analyzers with more powerful processors use an embedded software SNECON called an EmSNE.The EmSNE software runs on the system control board to control the DPMs and other I^2C devices. Upgrade from a hardware SNECON to a EmSNE software is beyond the scope of this document.

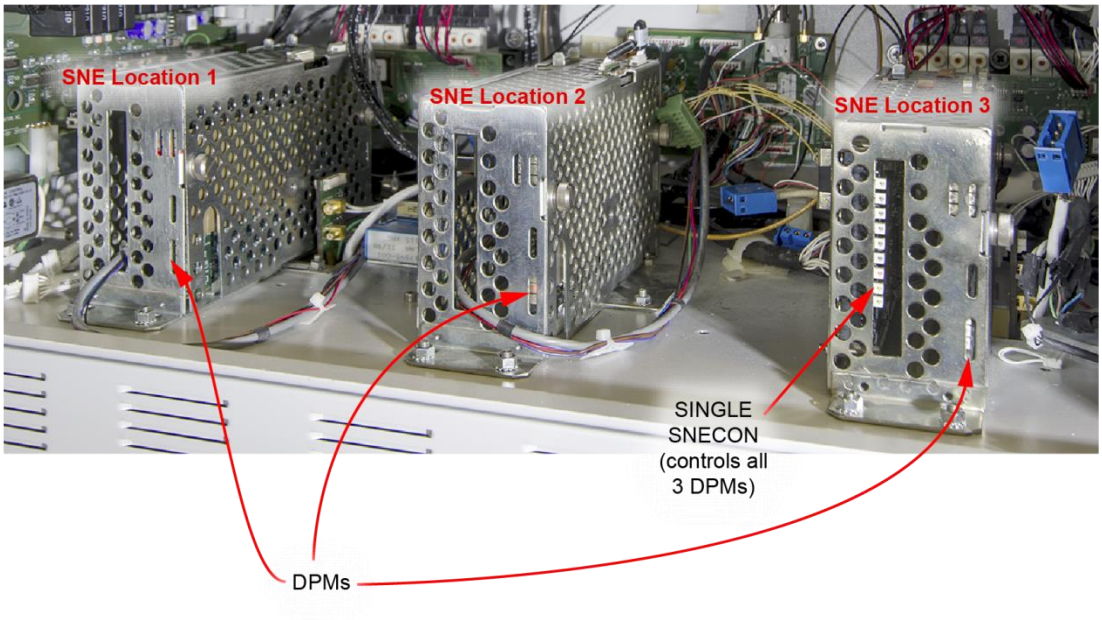


Figure 1. SNE Assembly Locations

2.1.1 NE Housing Type

The SNE housing comes in four versions:

- The original enclosed perforated housing (Maxum Edition I)
- A modified enclosed housing with DPM Connector board (early Maxum Edition II)
- An open-frame housing design (Maxum Edition II),
- The current housing that accommodates two DPMs. (IS TCD and TC)

Each of the first three provides a place to mount two boards. The left side (viewing the installed SNE assembly from the front of the unit) is the slot for a SNECON board. The right side of the housing provides a slot for the Detector Personality Module (DPM) board or Temperature Controller (TC DPM) Board.

The new Dual-DPM housing (part number A5E36301130001) provides space for a TC DPM on the left side and an IS TCD DPM or Base DPM on the right.

This procedure uses a TC DPM on the left side and an IS TCD DPM mounted on the right.

Figure 2. SNE Enclosed Housing

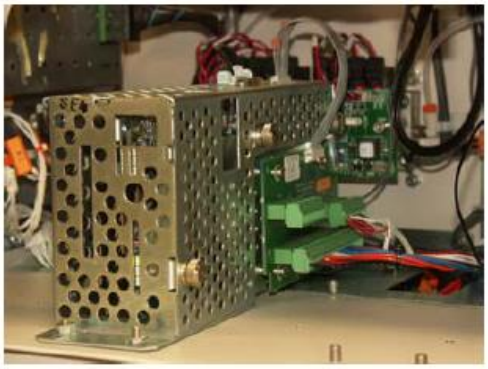


Figure 3. SNE Enclosed Housing with DPM Connector Board

Two open-frame style housings are provided with each kit. The 2021753-001 is provided in case a hardware SNECON board must be relocated. The newer A5E36301130001 is supplied with the new IS TCD DPM installed.

The open frame housing permits easy removal and installation of the boards without disassembly of a housing. The diagram below compares the assembly of the SNECON and DPM boards in the cage and open housings. The open housing allows easier access the connectors.

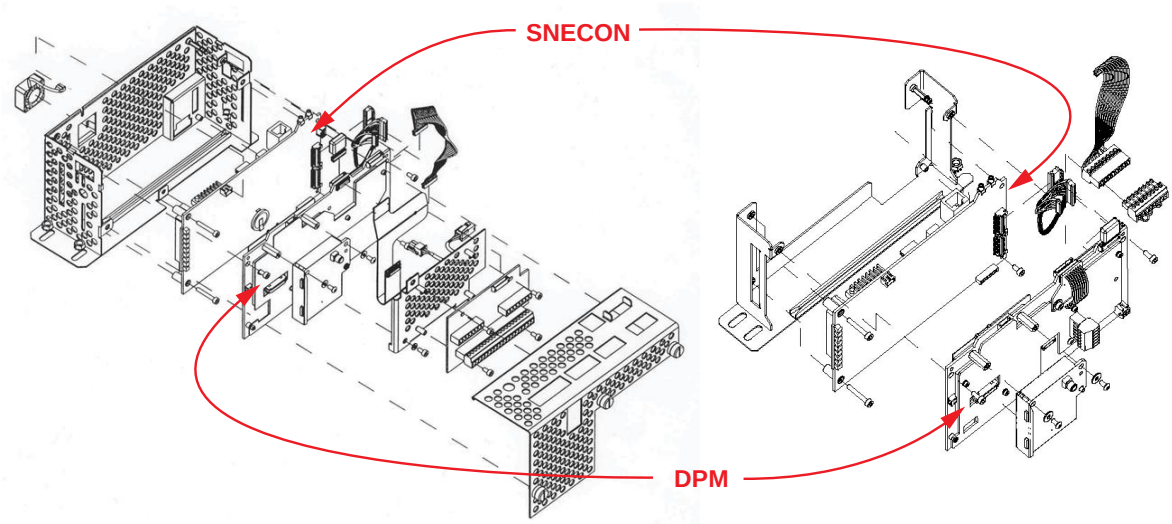


Figure 4. Closed and Open Enclosures Compared

2.1.1 Hardware and Software SNECONs

The current Maxum II analyzers use a software SNECON running on the SYSCON processor. The A5E36301130001 housing does not accommodate a hardware SNECON, but does support the combination of a temperature control DPM with an IS TCD DPM. This combination provides both functions in a single DPM location.

2.1.2 Mounting a Hardware SNECON

If a SNECON is mounted in the same housing as the DPM that must be replaced, then the SNE enclosure in a nearby SNE location should be changed to a 2021753-001 (Figure 5), and the SNECON moved to that housing.

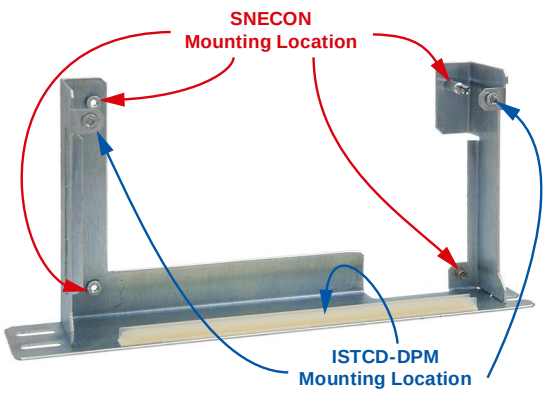


Figure 5. 2021753-001

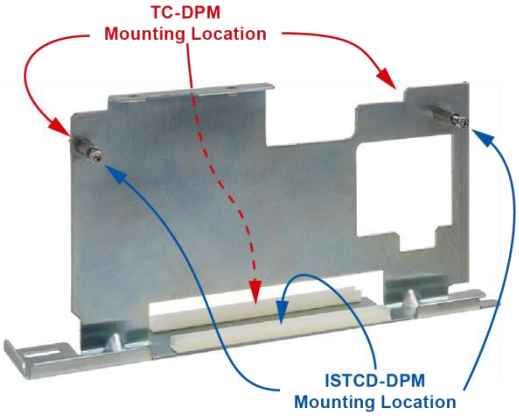


Figure 6. A5E36301130001

The new Dual-DPM housing (part number A5E36301130001, Figure 6) provides space for a TC DPM on the left side and an IS TCD DPM or Base DPM on the right to replace the TCD and temperature-control functions of the old DPM.

2.1.2.1 Installing the Shoulder Screw

A shoulder screw must be installed on the rear slot of the housing, as shown in Figure 7. This engages in the slot at the back of the mounting location in the electronics enclosure, shown in Figure 8.

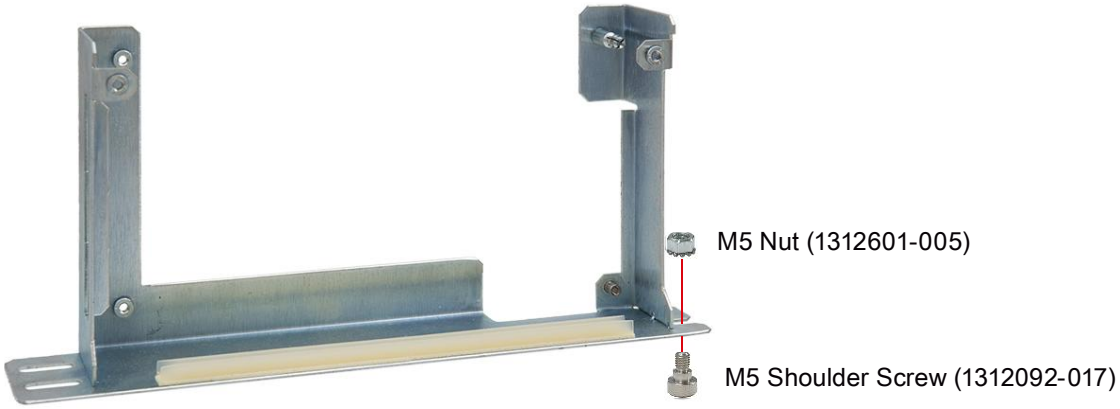


Figure 7. Installing Rear Shoulder Screw

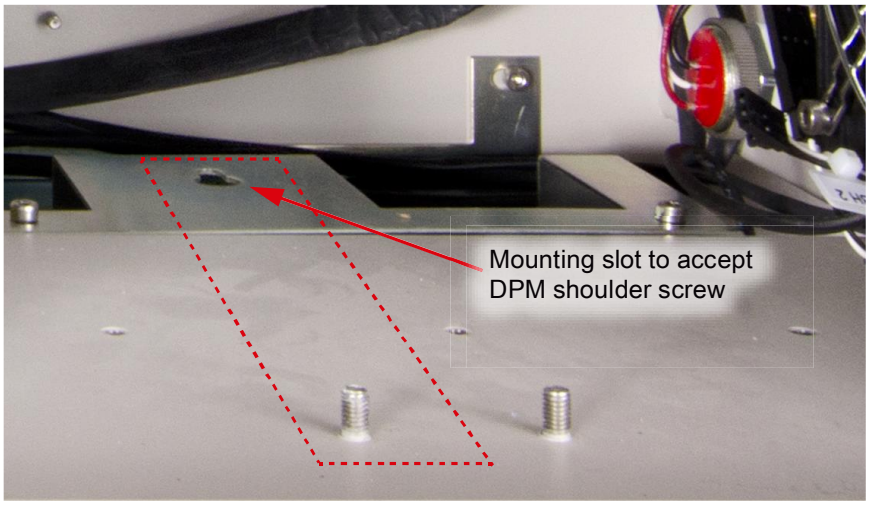
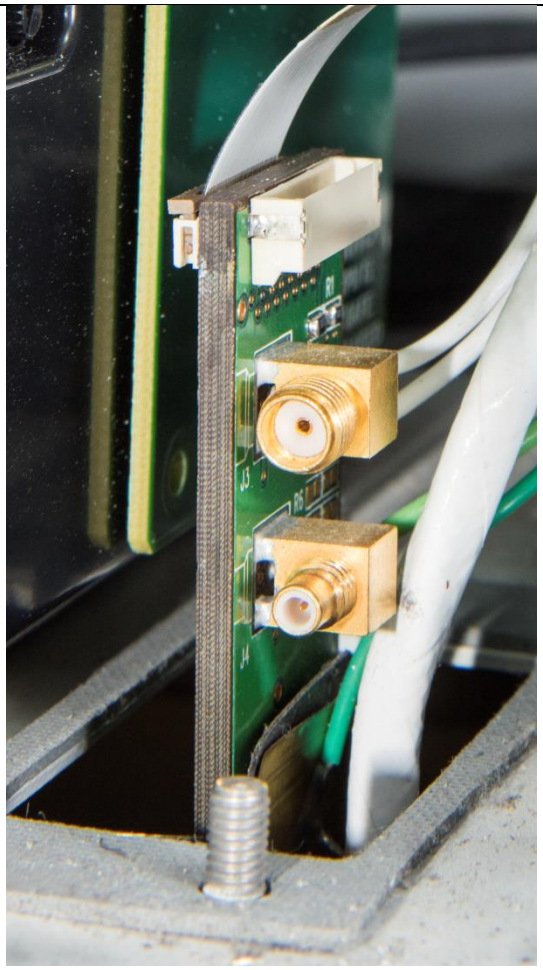
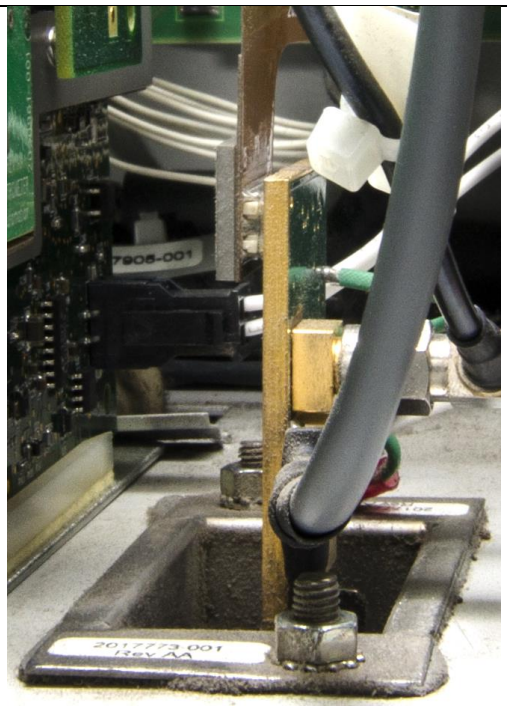
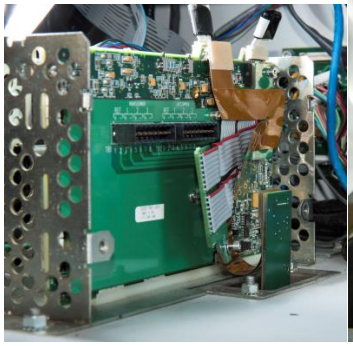


Figure 8. DPM Mounting Location

2.2 Identifying Advance Maxum Feedthrough Hardware

Advance Maxum analyzers had a feedthrough board that passed signals from the oven to the electronics enclosure. Two types were used.

If you have this…	Then use these upgrade components…
 **Figure 9. Original Feedthrough** See installation steps in Section 5.2.3.1	 **Figure 10. 30-Conductor Cable 1901381-001** Install from feedthrough to adapter board below.  **Figure 11. OEFT Adapter Board 2020910-001** Mounts on board shown below,  **Figure 12. Legacy Adapter Board A5E34938550001** Mounts on new IS TCD DPM. Specific instructions for this upgrade given in the *Original Feedthrough* section.

If you have this…	Then use these upgrade components…
 Or…  	 **Figure 13. Feedthrough Flex Cable 2020902-001**  **Figure 14. Legacy Adapter Board A5E34938550001** (Mounts on new IS TCD DPM) Specific instructions for this upgrade given in the *Modified Feedthrough* section.

2.1 Detector Cable Connectors in Maxum II

When replacing a TCD DPM part umber 2021797-001 with an IS TCD DPM, detector cable adapter (A5E36108960001) must be used. Two adapters are supplied in the kit. See the *Maxum II Detector Connection* section.

2.2 Temperature Setpoint Modules

The 2021797-001 DPM will have one or two Temperature Setpoint Modules installed. Remove these and install them in the same location on the new Temperature Control DPM.

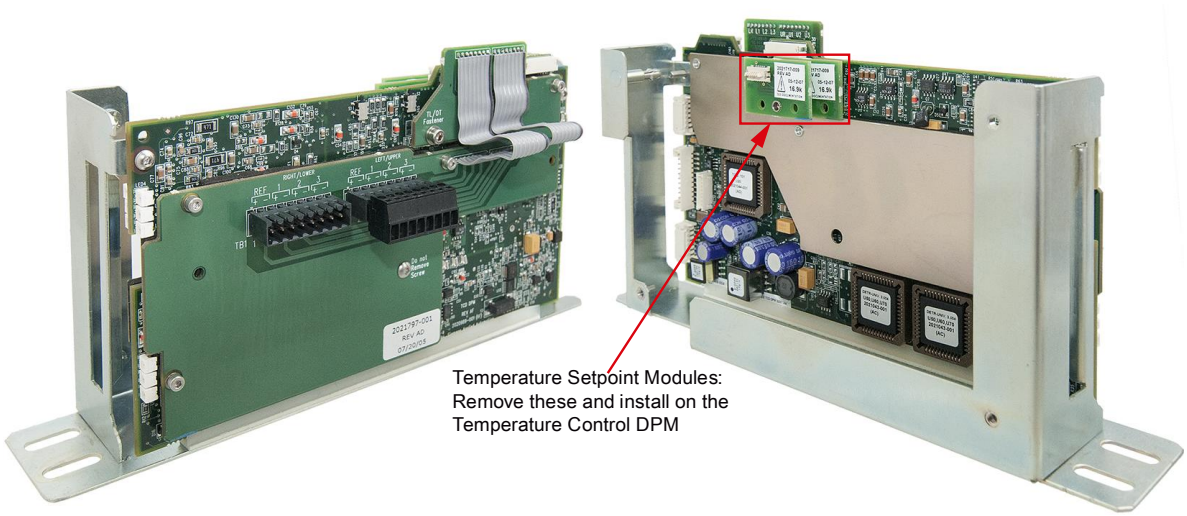


Figure 15. TCD DPM 2021797-001

A 2021797-001 may be installed using only one heater control channel. When this is the case, a heater termination plug (sometimes called a “dummy plug”) is installed in the RTD connector as shown below. (Two plugs shown installed in example) Two heater termination plugs are supplied in the kit.

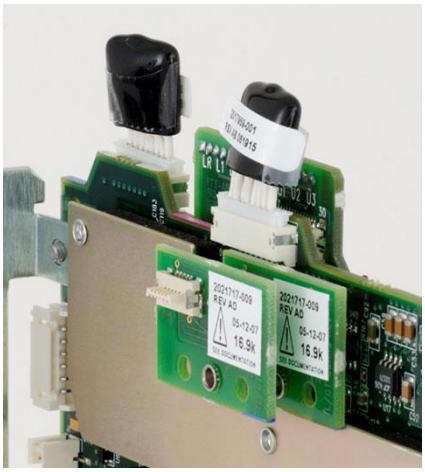


Figure 16. Heater Termination Plugs (2017959-001) Installed on TCD DPM (2021797-001)

2.3 SNECON Connector Identification

This section shows 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.

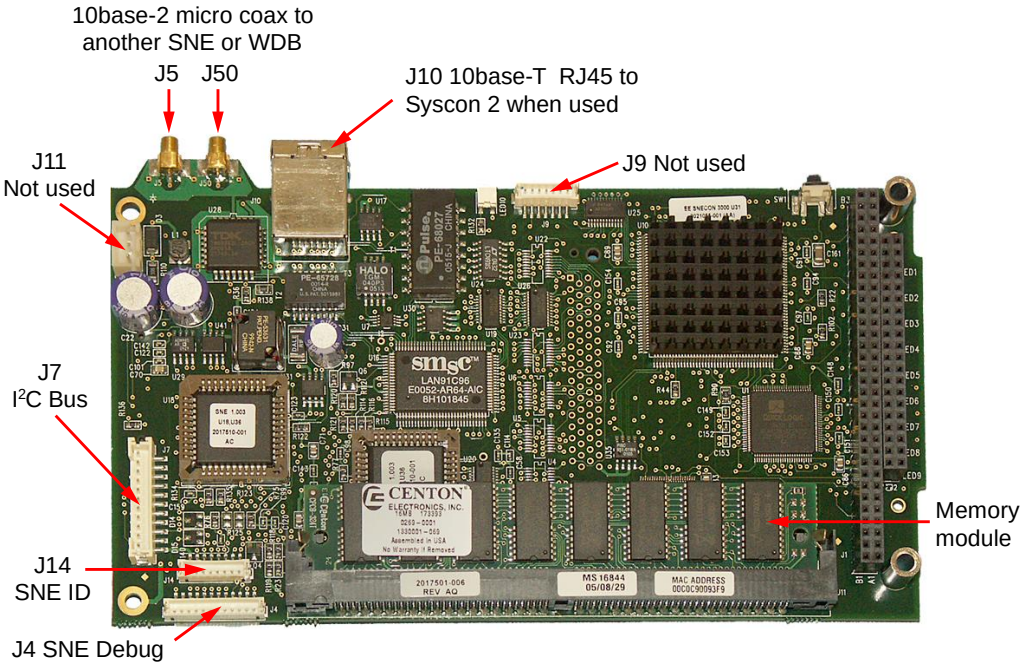


Figure 17. SNECON Board Side A

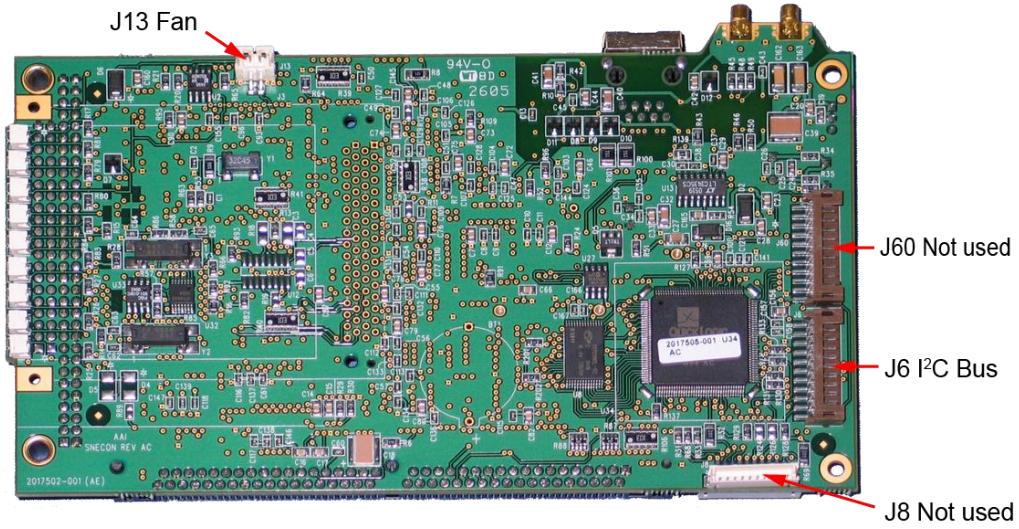


Figure 18. SNECON Board Side B

2.4 IS TCD DPM and TC DPM Connector Identification

The following illustrations show connectors that may be connected on a particular installation. Be sure to see what is implemented on the particular installation.

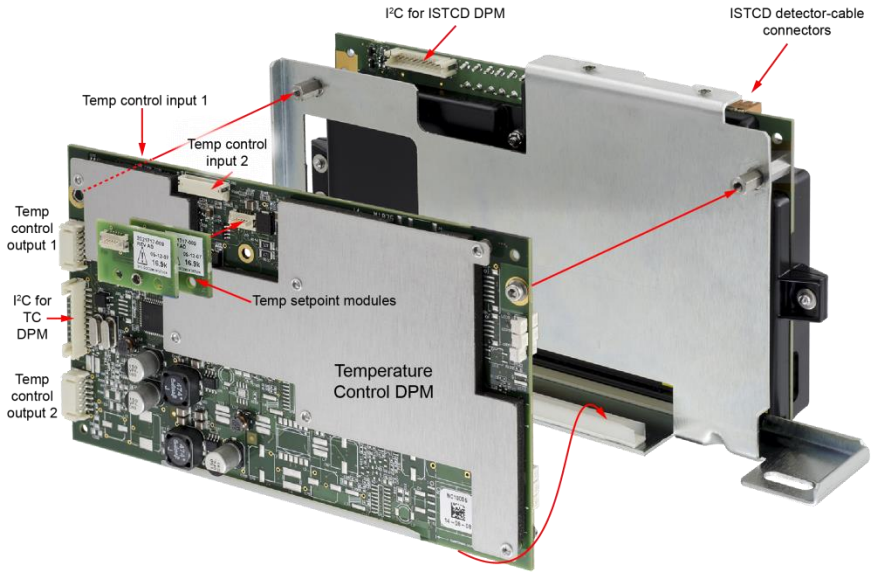


Figure 19. IS TCD3 DPM with TC DPM, Left Side (IS TCD4 DPM similar)

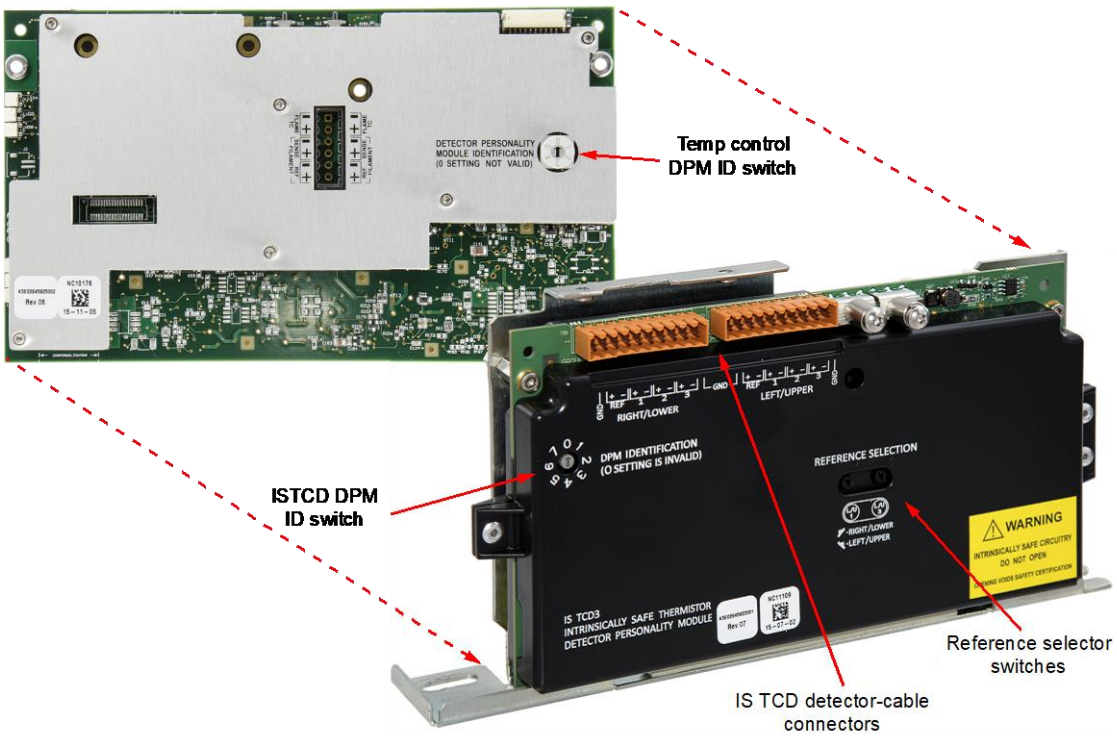


Figure 20. IS TCD3 DPM with TC DPM, Right Side (IS TCD4 DPM similar)

2.4.1 Comparison of IS TCD3 DPM and IS TCD4 DPM

Note:
While the IS TCD DPMs are similar, the detector connectors are not compatible.

- The IS TCD4 DPM CAN be used as a replacement for the IS TCD3 DPM with a pin blocking plug.
- The IS TCD3 DPM CANNOT be used as a replacement for the IS TCD4 DPM.

2.4.1.1 Part Numbers

The IS TCD4 DPM is compatible with the MAXUM Airbath and Airless platforms for Intrinsically Safe and non-Intrinsically Safe detectors. Where an Intrinsically Safe TCD is used, the safety certification for the MAXUM Airbath and Airless only allow the IS TCD4 DPM. The IS TCD3 DPM is ONLY certified for use with an Intrinsically Safe detector in the Maxum Modular Oven model. (Both IS TCD3 DPM and IS TCD4 DPM are certified for use in the Maxum Modular Oven model). The Maxum Airbath and Airless models that use an Intrinsically Safe detector are certified only when an IS TCD4 DPM is properly installed.

The IS TCD4 DPM (part number A5E43267455001) is installed in current analyzers, and can be used as a replacement for the IS TCD3 DPM by using a blocking plug on pin 1 of the 11-pin connector. However, the IS TCD3 DPM cannot be used as a replacement for the IS TCD4 DPM. See the note under the Connections heading.

The IS TCD3 DPM (part number A5E02645923001) can be used as a replacement part for earlier DPMs in Maxum I analyzers using an adapter, part number A5E34938550001. See the publications IP-0034: Procedure to Replace Various TCD DPMs with Paired IS TCD DPM and TC DPM in a Maxum or Maxum II Analyzer on the Siemens web site.

The illustration below shows the differences between the IS TCD3 DPM and the IS TCD4 DPM.

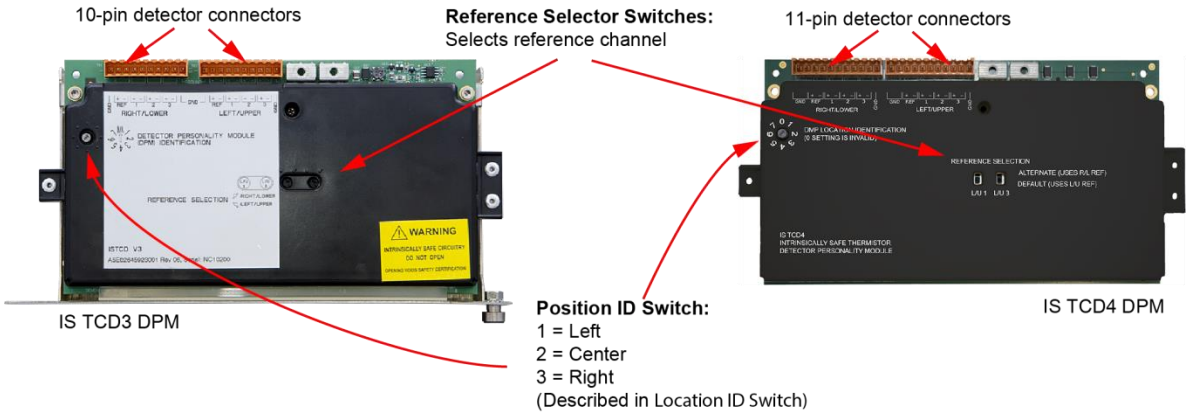


Figure 21. DPM Versions Compared

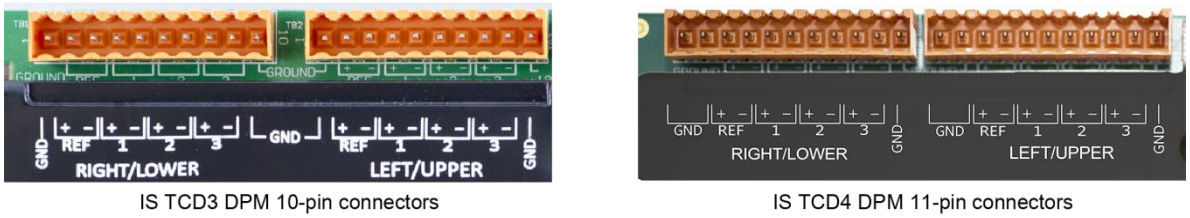


Figure 22. DPM Detector Connectors

3.0 General Analyzer Shutdown Procedure

3.1 Back Up the Database

If a current database has not been saved, backup the database using Gas Chromatograph Portal workstation software. Generally, a database reload is not needed for this procedure however it is a best practice to back up the Database when performing a planned shutdown.

3.2 Shutdown Steps

1. Put the analyzer in Hold and wait for the cycle to complete. This will provide the quickest restart of the application when power is restored.
2. Once the cycle is completed and the analyzer is in Hold, block all carrier gas, valve gas, and sample gas supplies, then remove power from the unit.

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 enclosure, 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.

4.0 Removing the SNE Assembly

Warning: Possible ignition source

Some of the cables may have an orange tag. These cables must be reconnected to the same location after replacement of the assembly and have a matching tag on the assembly which should be moved to the replacement part. Failure to reconnect these to the same location can cause the T-rating of the unit to be exceeded which could become an ignition source for combustibles if present.

NOTE: If they are not already marked, mark the locations of cables before disconnecting them.

1. Remove interface cables from top and left side of SNE assembly. Identify each cable connection point. The following cables to be removed are:

    a. On the left hand side of the SNE assembly, if a SNECON board is present, there may be two Ethernet micro coax cables (10base-2) connected to J5 and J50 at the top-back of the SNECON*, and possibly three connections at the bottom-back-left of the SNECON board: I^2C bus cable connections, module ID (do not remove unless this is part of a larger wiring harness), and debug connector. None of these will have orange tags. If applicable, the 10base-2 connections are removed by pulling on the gold connector to unlatch the connector. The JST connectors (the white connectors with individual wires) are designed to be removed by simply pulling on the wires – it is not necessary to pry on the housing.
        * If the analyzer has already been upgraded to SYSCON2 without upgrading the DPMs, the SNE is possibly communicating through a 10base-T cable plugged into the RJ45 jack J10 (See Figure 17), with no 10base-2 cables. Unplug the 10base-T cable from J10 if this is present.

    b. On the right hand side of the SNE assembly (for DPM or Temperature Control Board), there may be several cables to manage. Some of the cables may have orange tags attached, and these must be reconnected to the same location on the upgrade part. Move the tags from the old device to the same location on the new device to ensure that these are reconnected properly. See the warning above. All other cables should be disconnected and properly identified/labeled to permit reconnection to the same location on the new part.

2. Remove the 5mm nut (two nuts if old enclosed-style cage) from front SNE mounting housing; (Figure 23). If the new open housing has been installed, then only one of the bolts will fit through the new housing, and thus only one nut will need to be replaced.

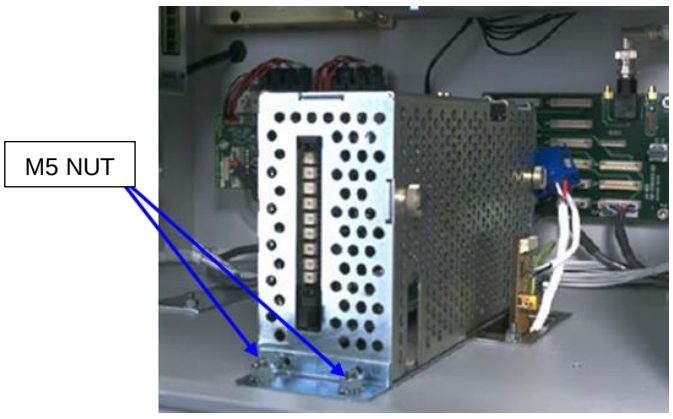


Figure 23. SNE Assembly Mounting Nut

3. Pull SNE slightly forward to release from rear mounting guide.

5.0 SNE Disassembly and Reassembly

5.1 Removing the Detector Personality Module (DPM)

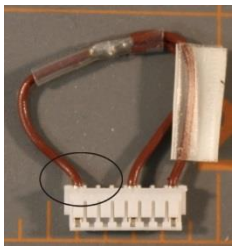
1. If the DPM is mounted in the enclosed housing, then remove the screen cover by unscrewing the three fastening screws. These are captive screws and will remain with the panel.
2. Loosen the thumbscrew that secures the connector board assembly to the DPM and remove the assembly (this is only found on earlier Maxum II units).
3. Remove any termination or ID cables from the old board.
4. If any cable has an orange label, make sure to clearly mark the location on the new board where it should connect. If possible move the label from the old board to the new one.

5.1.1 Moving the SNE Controller Board (SNECON) to a Different Cage

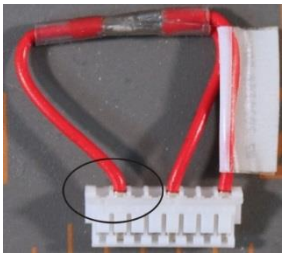
1. If present, remove the three M3 screws securing the SNECON to the original SNE Housing. Leave the location ID plug on the board. If the location ID plug is part of a wiring harness, replace it with the plug from the kit for the location from which it is being removed. (NOT the location to which it will move.)
2. Install the SNECON controller board into the left-hand slot of the nearest available cage using the same hardware. If an empty DPM location is available, use the supplied 2021753-001 housing.

5.1.2 Setting the DPM Location ID Switches

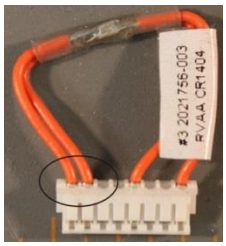
Figure 1 shows the location IDs for the SNE assemblies. The location ID switches on both of the new DPMs, shown in Figure 20, must be set to match the location ID plug of the DPM being replaced. The location ID plugs are shown below.



Location ID 1



Location ID 2



Location ID 3

When both an IS TCD3 DPM and a TC DPM are installed in the same housing, the location ID switches are set to the same number. The software differentiates between the two DPM types. The location ID for the TC DPM must be set before being mounted in the housing. See Figure 20.

5.1.1 Reference Selection Switches

Check the positions of the reference selection switches. Ensure that they are set to the default “LEFT /UPPER” position.

5.1.2 Temperature Setpoint Modules

If a temperature setpoint module was used on the DPM being replaced, install it at the same location for the same channel on the TC DPM.

5.2 DPM Connections

See Figure 19 and Figure 20 for the locations of the connectors. For most connections the locations will be similar to or the same as the DPM being replaced. The following list includes the connections, but the cables may be connected in any order that is convenient.

1. SNECON to I^2C distribution point (wiring distribution board or PECM I^2C bus)
2. I^2C distribution point to TC DPM (2021757-001 cable supplied in kit)
3. I^2C distribution point to IS TCD DPM (2021757-001 cable supplied in kit)
4. Plug in cable to Temp Control Output 1 on TC DPM (if used)
5. Plug in cable to Temp Control Output 2 on TC DPM (if used)
6. Plug in cable to Temp Control Input 1 on TC DPM (if used; install heater termination plug if not)
7. Plug in cable to Temp Control Input 2 on TC DPM (if used; install heater termination plug if not)

5.2.1 SNE Assembly Mounting

1. Secure the TC DPM to the left side of the housing using two of the supplied M3x8 screws.
2. If working on a Maxum II, Mount the SNE assembly (DPMs in dual housing) in the electronics enclosure by inserting the shoulder screw on the rear of the DPM bracket into the guide slot at the rear of the SNE location. The left hole of the front of the bracket goes over the left stud. Secure this with an M5 nut.
3. If working on an Advance Maxum with a detector feedthrough, follow the directions in the appropriate section.

5.2.2 Maxum II Detector Connection

1. Plug the black connectors of the adapter cables onto the detector cables that were plugged into the old DPM.
2. Plug the orange connectors of the adapter cables onto TB1 and TB2 of the DPM.

Figure 24. Cable Adapter (A5E36108960001)

NOTE:

When an IS TCD3 DPM is ordered with part number A5E02645923001, the order is filled with a kit with an IS TCD4 DPM and two blocking plugs to install on each detector cable connector on pin 1. The 10-pin terminal block plugs then only fit onto the right-most 10 pins of the connectors.

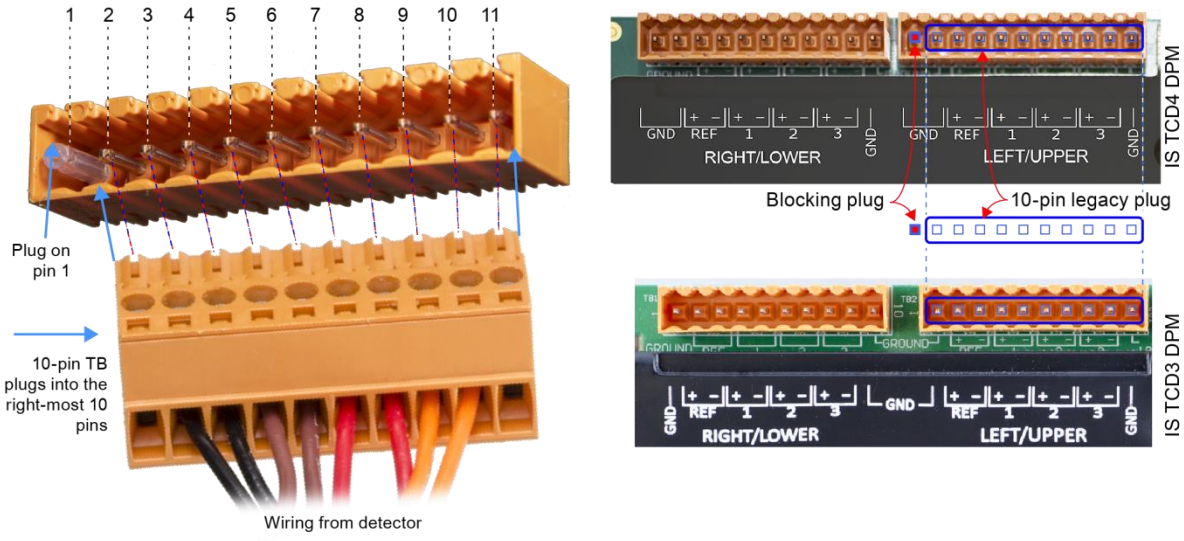


Figure 25. Inserting the 10-pin TB plug into the 11-pin DPM connector

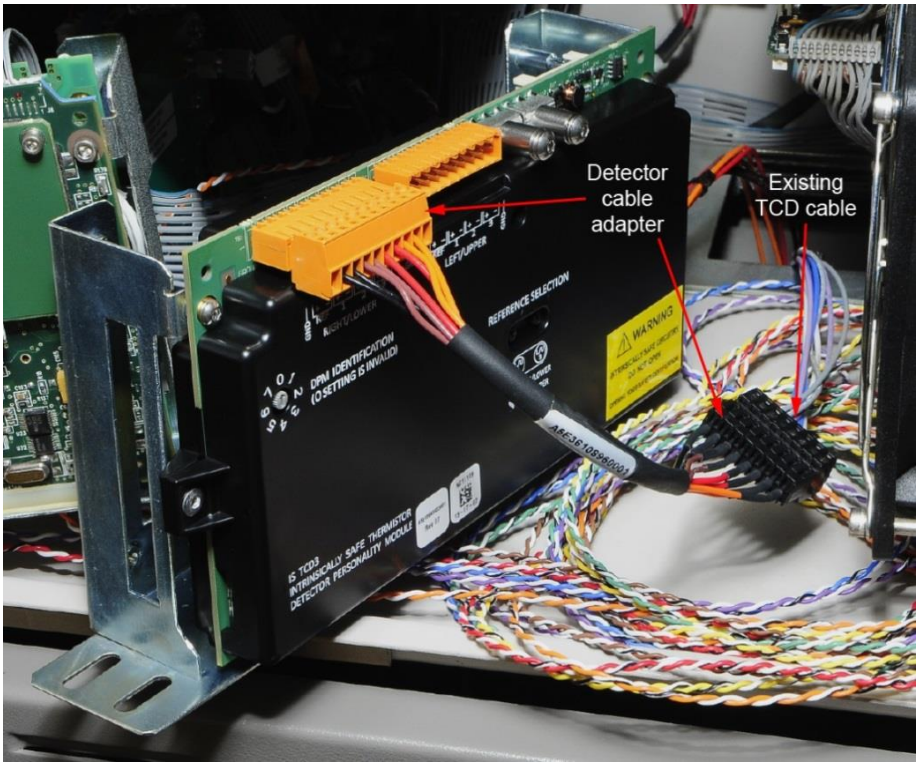


Figure 26. Cable adapters being installed

5.2.3 Advance Maxum Detector Connection

Maxum I analyzers used a feedthrough board between the oven-mounted detectors and the electronics enclosure. Two types were used.

Install the appropriate adapters identified in Section 2.2.

NOTE:

When a Legacy Adapter Board (A5E34938550001) is mounted on an IS TCD4 DPM, the plugs must be shifted to the right as shown below.

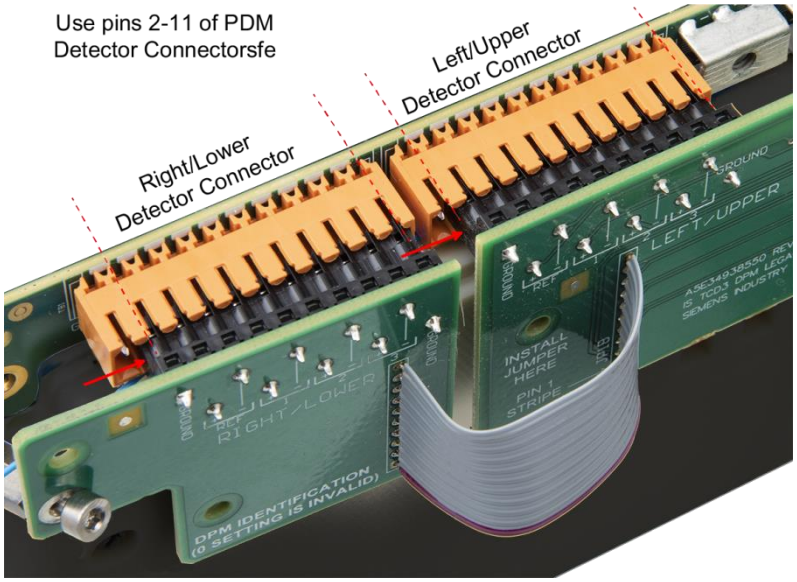


Figure 27. Inserting the 10-pin Legacy Adapter plugs into the 11-pin DPM connectors

5.2.3.1 Original Feedthrough

1. Mount The Legacy Adapter Board (A5E34938550001) on the DPM. (See Figure 12)
2. Plug the OEFT adapter onto the Legacy Adapter Board. (See Figure 28.)
3. Mount the SNE assembly in the electronics enclosure by inserting the shoulder screw on the rear of the DPM bracket into the guide slot at the rear of the SNE location. The left hole of the front of the bracket goes over the left stud. Secure this with an M5 nut.
4. Insert 30-pin cable in Feedthrough connector as shown below. Carefully press the brown retainer bar straight down into the connector to lock the cable in position.
5. Insert the other end of the 30-pin cable into the top connector of the OEFT adapter as shown below. Rotate the connector latch upward (See curved red line in Figure 28) to secure the cable.

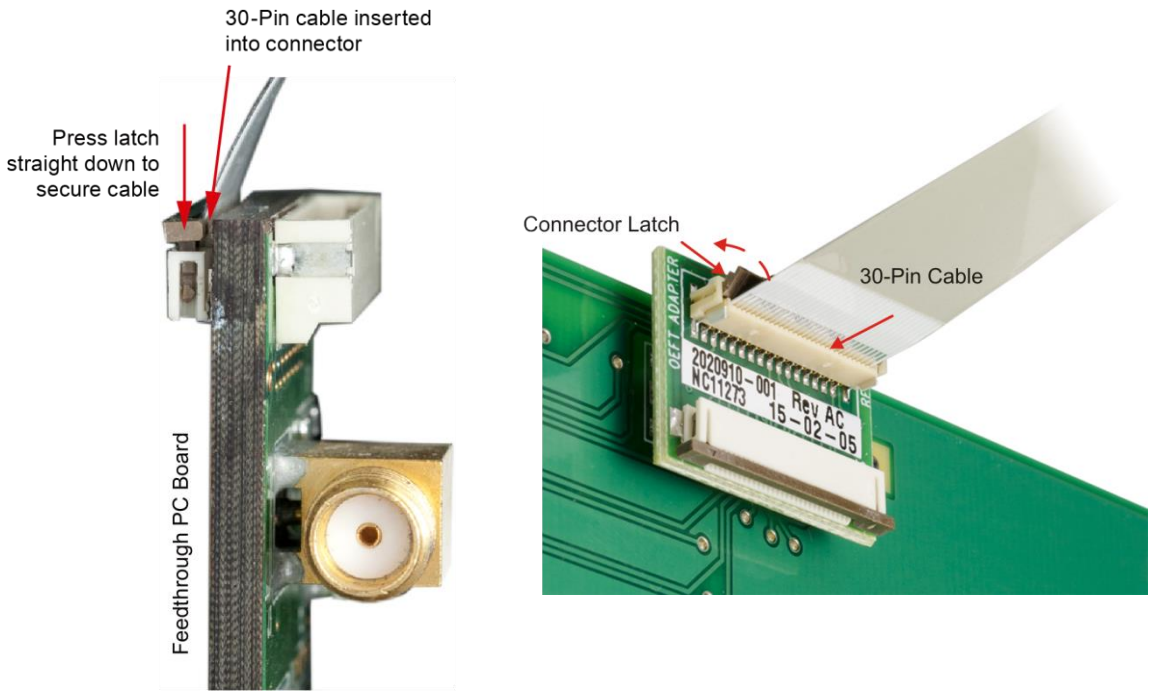


Figure 28. Installing the 30-Pin Cable

The completed installation should be similar to Figure 29.

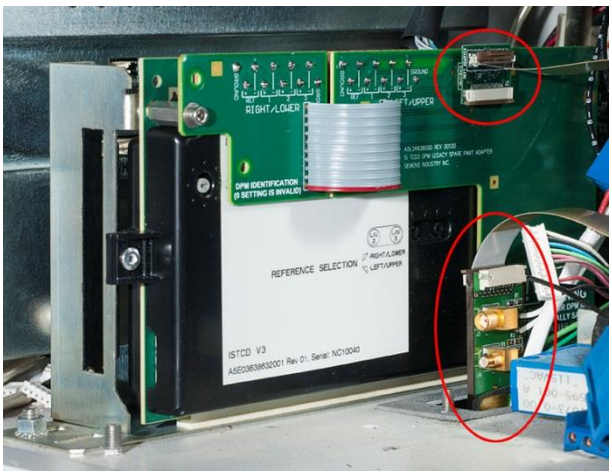


Figure 29. Original Feedthrough Upgrade

5.2.3.2 Modified Feedthrough

1. Mount The Legacy Adapter Board (A5E34938550001) on the DPM. (See Figure 14)
2. Mount the SNE assembly in the electronics enclosure by inserting the shoulder screw on the rear of the DPM bracket into the guide slot at the rear of the SNE location. The left hole of the front of the bracket goes over the left stud. Secure this with an M5 nut.
3. Plug one end of the feedthrough flex cable (2020902-001) into the connector on the feedthrough. By reversing the connectors, the cable can be used with the cable pointing up or down depending on what is most convenient in the individual analyzer. Choose the position that leaves the least stress on the connectors and interferes less with other components in the analyzer.

4. Plug other end of the cable into the matching socket on the legacy adapter board that was mounted in step 1.

6.0 General Analyzer Startup Procedure

Before proceeding with these instructions, make sure the unit is installed correctly in accordance with these instructions and local and national codes. See the custom documentation package for particular Maxum details and procedures for the particular unit.

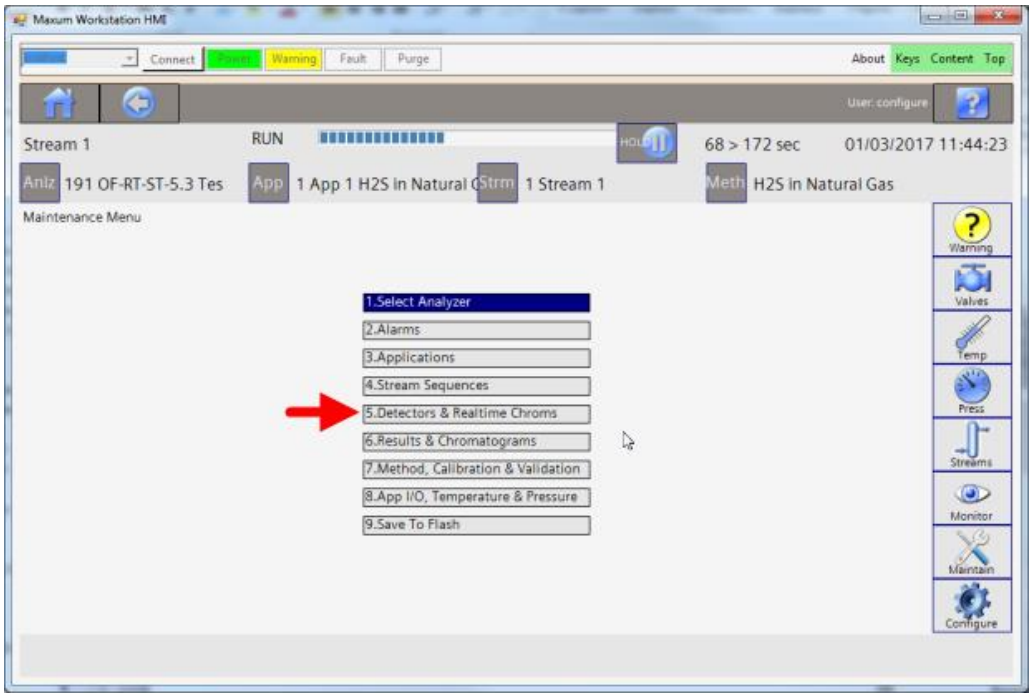
1. Before applying power to the Maxum, inspect all connections. Verify that all connections that existed in the old DPM and SNECON are connected to the new DPM and SNECON and completely seated in the connectors.
2. Close the electronics door and secure it per the applicable safety codes.
3. Apply power to the unit once it has properly purged. 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.
4. Allow time for the unit to reach operating temperature. The analyzer should be recalibrated after replacing the DPM module. Follow the procedure for restart of the specific unit.

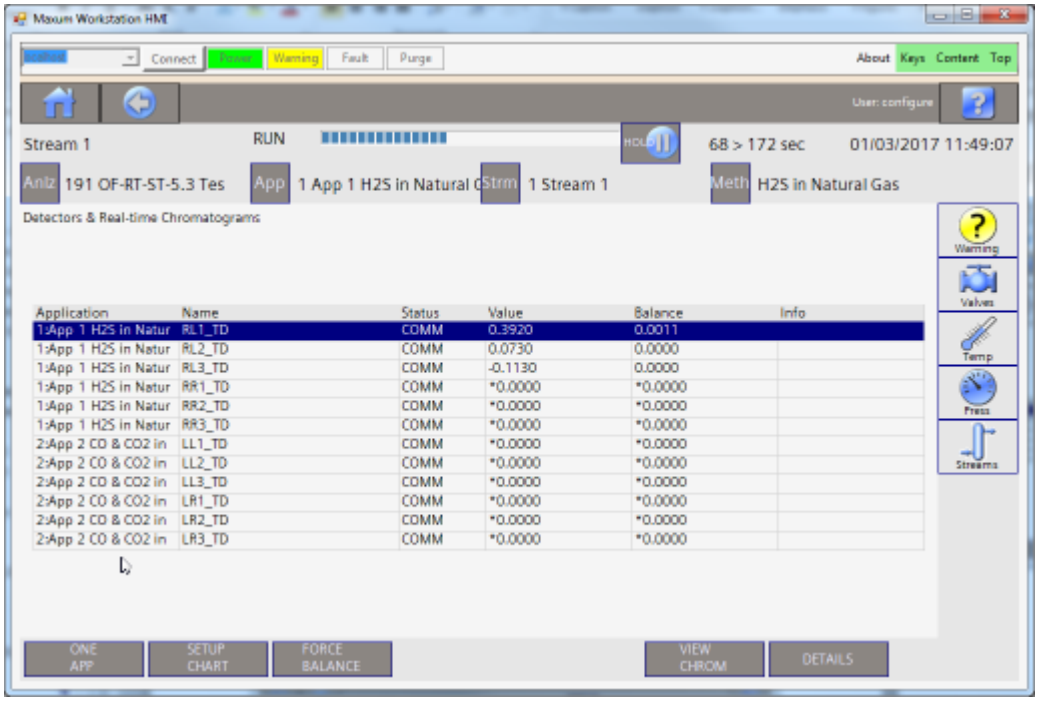
7.0 Verifying DPM Configuration

The configuration of the new DPM may be verified in the analyzer software system. This can be done at the analyzer via the front-panel touchscreen (Human-Machine Interface or HMI) or on a workstation PC running Gas Chromatograph Portal (GCP).

7.1 DPM Configuration From the HMI

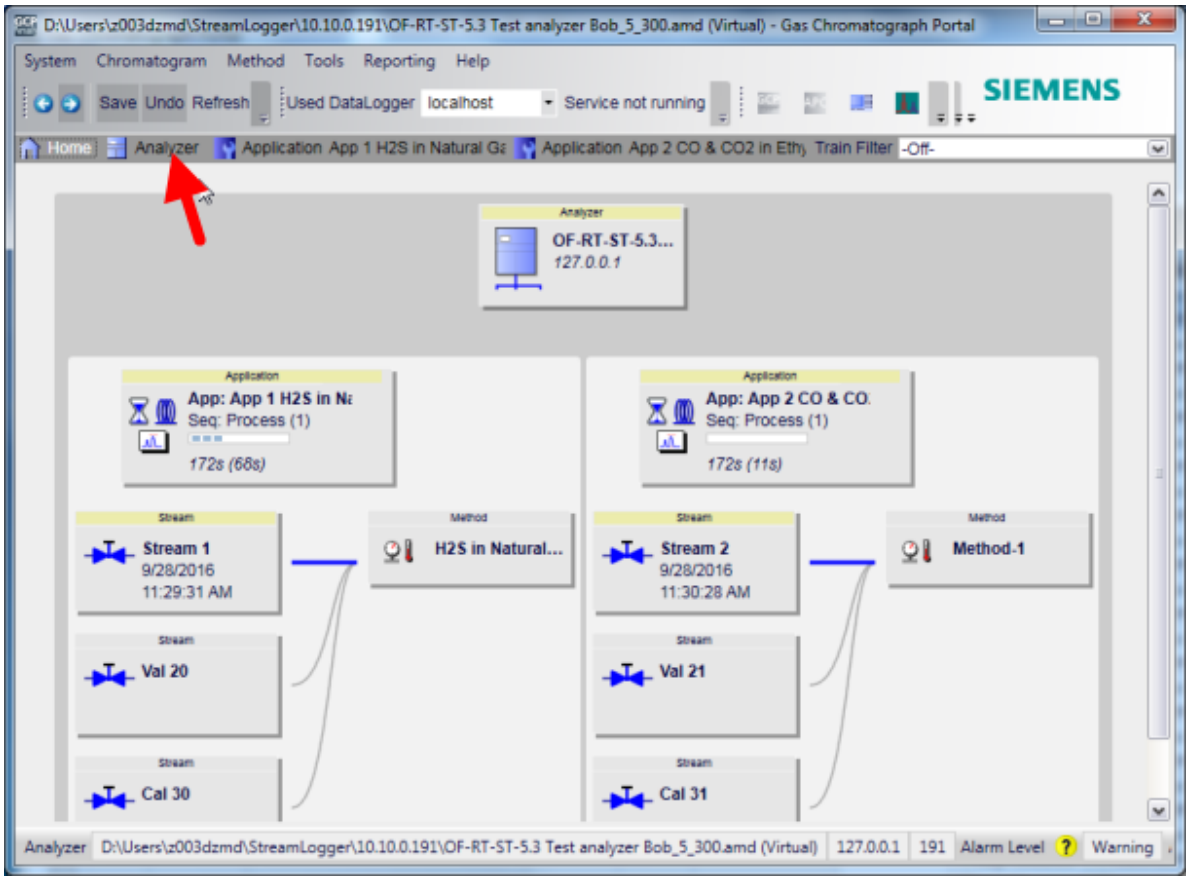
From the home screen, press item 5, “Detectors & Realtime Chroms”.



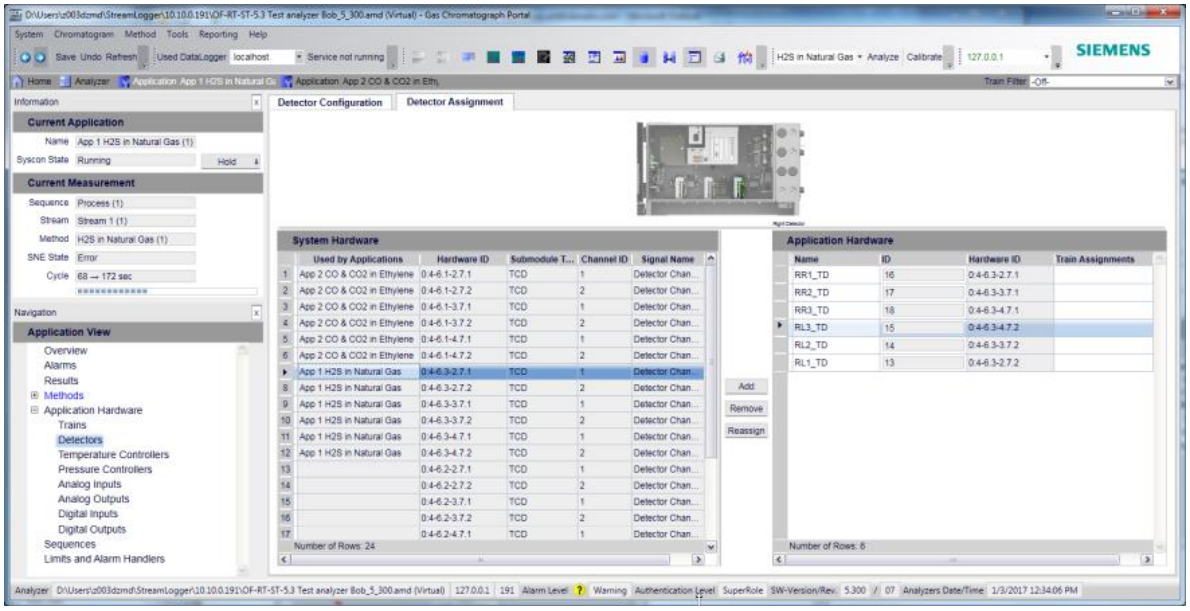


Verify that all detector channels appear correctly and have the status of “COMM”.

7.2 DPM Configuration From Gas Chromatograph Portal



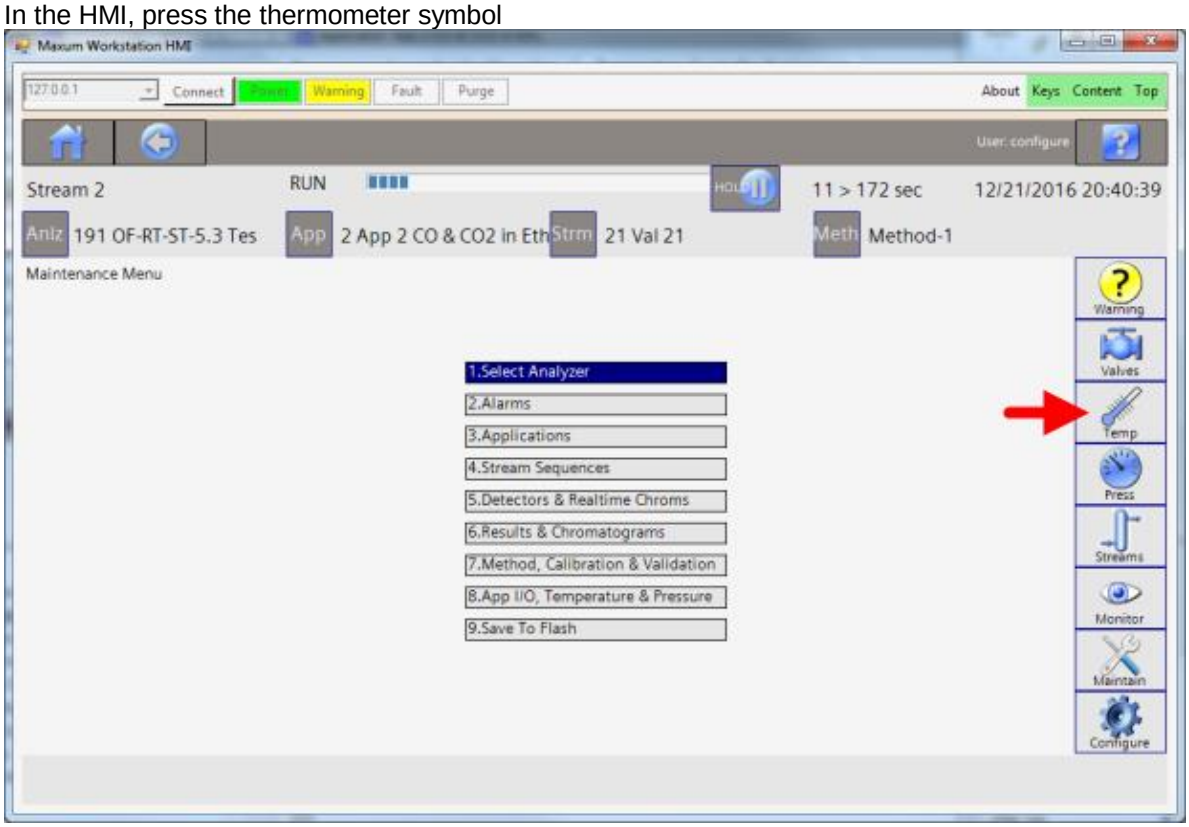
Choose “Application View/Application Hardware/Detectors”.

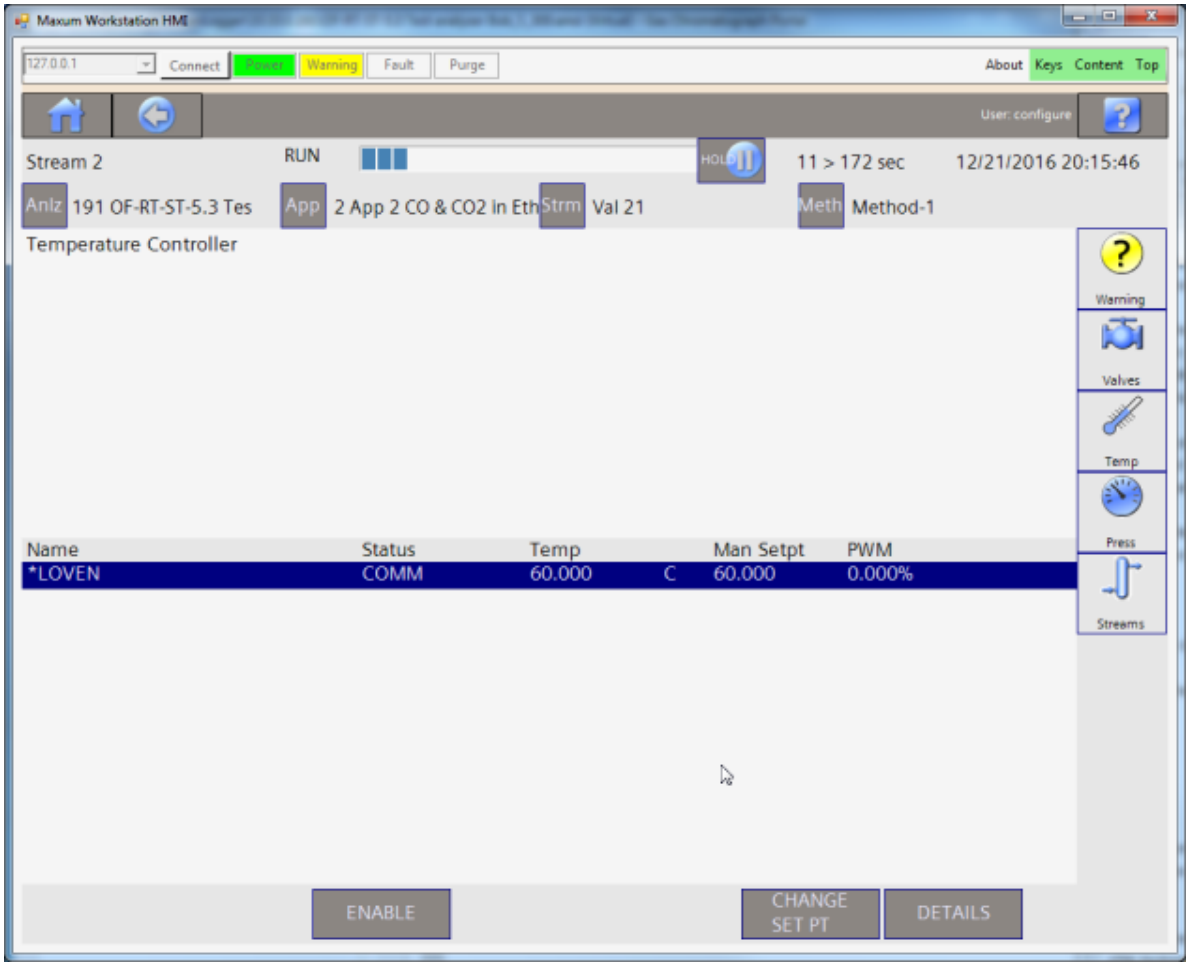


Verify that the new DPM is communicating with the system.

7.1 Verifying the TC DPM Configuration

In the HMI, press the thermometer symbol

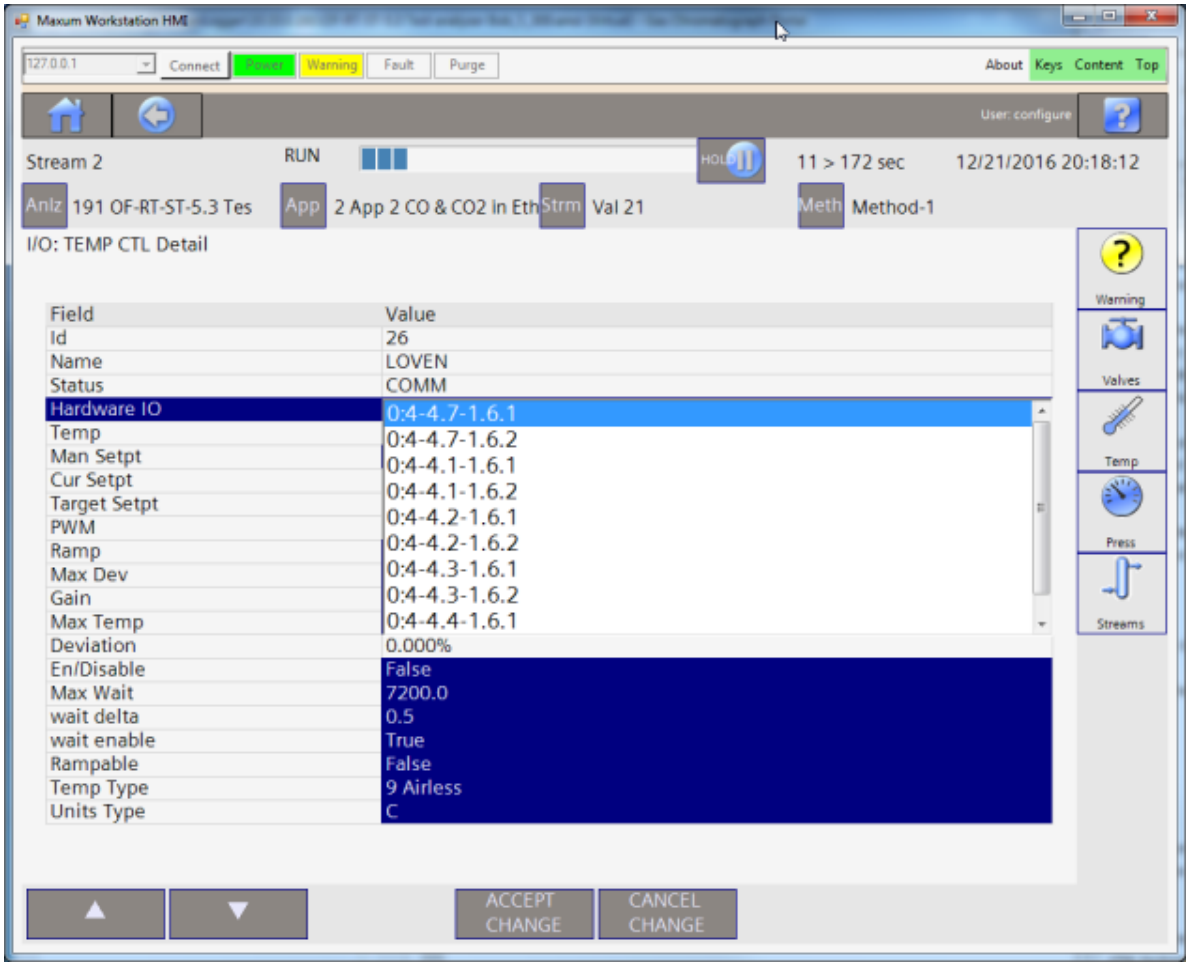




Verify that the status is “COMM”.

Select the desired temperature controller and press “DETAILS”.

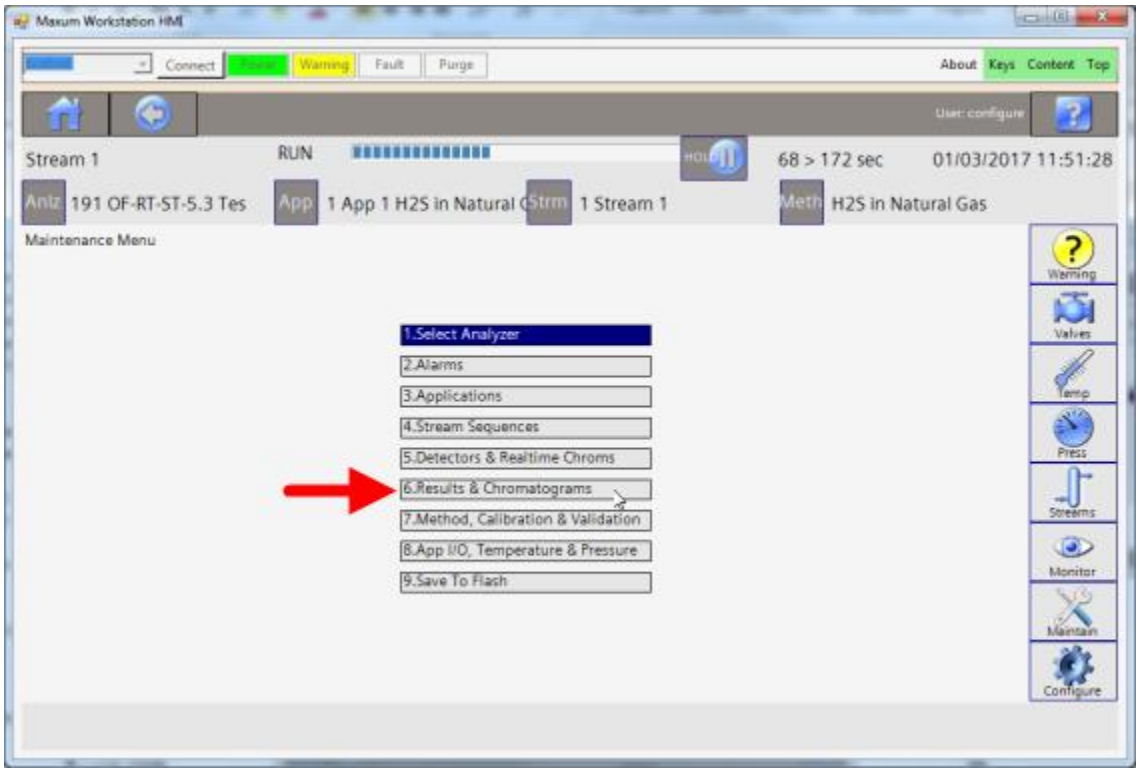
Select “Hardware IO”, then click “MODIFY” to display the available control channels.



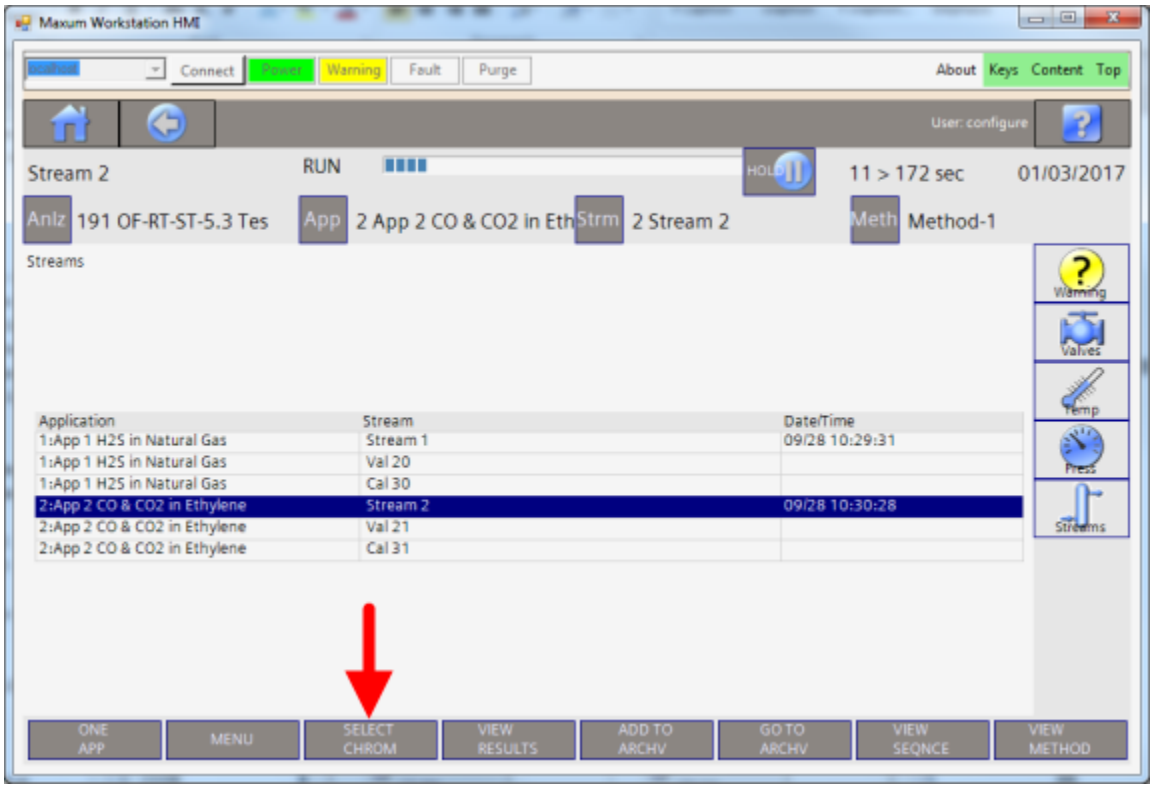
Use the arrow buttons to select the hardware ID of the new TC DPM channel, then press “ACCEPT CHANGE”.

8.0 Verifying Chromatograms after Upgrade

Increased sensitivity and lower noise may change appearance of chromatograms. After running a few cycles detector performance can be seen by displaying each of the detectors.

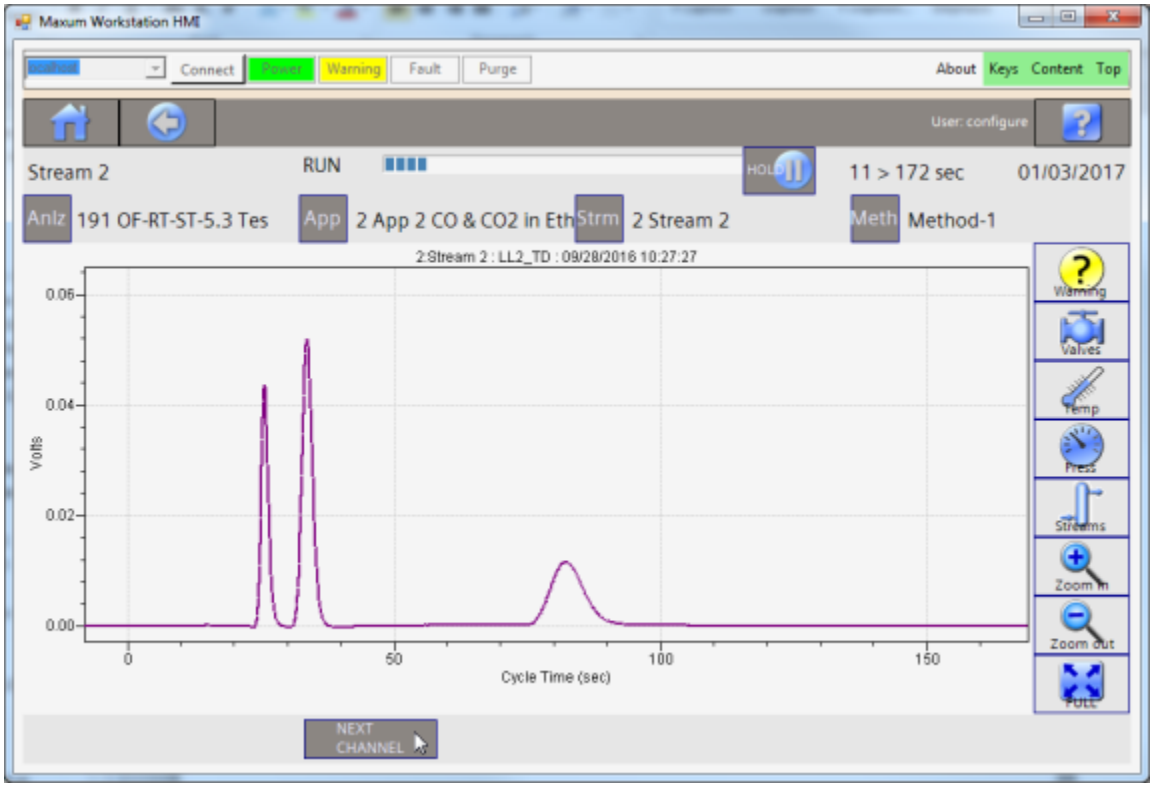


From the home screen, press item 6, “Results & Chromatograms”



From this screen you can select the chromatograms of an app.

By pressing the “NEXT CHANNEL” button, you can step through each channel to verify proper performance.



9.0 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.

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