Procedure to Upgrade a FID or Base DPM to a Base3 DPM in a Maxum I or Early Maxum II Analyzer

Difficulty Level: Medium
Estimated time to execute: 1 Hour

Revision History

Issue	Date	Reason
001	8/7/2015	Initial Issue
002	12/2019	Add security information

SIEMENS

Table of Contents

1.0 Description

This document describes the procedure to upgrade an old FID or Base Detector Personality Module in a Maxum I or early Maxum II. The specific DPM part numbers to be replaced are given in the *Identifying Existing Components* section. The analyzer must be powered down for this procedure.

Warning: 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).

A parts kit, Siemens part number 2022008-701, is required for this procedure. This kit contains the following items.

Base3 DPM Upgrade Kit 2022008-701			Used On		
Item	**Part Number**	**Description**	**Maxum II**	**Maxum I OEFT2**	**Maxum I OEFT1**
1	A5E02645925001	PCBA, BASE3 DPM	X	X	X
2	2017596-001	CABLE, HEATER / SENSOR NEAR	X	X	X
3	2021753-001	HOUSING, UNSHIELDED, SNE	X	X	X
4	1312420-332	SCREW, M3X 6, SOCKET HEAD CAP,SST	X	X	X
5	2020902-001	OEFT FLEX CABLE PCBA		X	
6	2021277-001	CABLE, HIGH VOLTAGE, DPM2/OEFT2		X	
7	2021275-001	CABLE,ELECTROMETER,SIGNAL,SMA,DPM2/OEFT2		X	
8	2021276-001	CABLE, IGNITION, DPM, GLOW PLUG		X	X
9	2021278-001	CABLE, HIGH VOLTAGE, DPM2/OEFT1			X
10	2017911-001	CABLE, FID DPM TO OEFT SIGNAL			X
11	1901381-001	CABLE,FLEX,LAMINATED,30COND,6IN,SHIELDED			X
12	2020910-001	PCBA, OEFT ADAPTER			X
13	A5E02807143001	PROCEDURE REF, KIT INSERT SHEET	X	X	X
14	A5E34938458001	PCBA, BASE3DPM LEGACY SPARE PART ADAPTER		X	X
15	*2017909-001*	*CABLE, TEMP SENSE,DPM TO OEFT,CH2*[1]		*X*	*X*

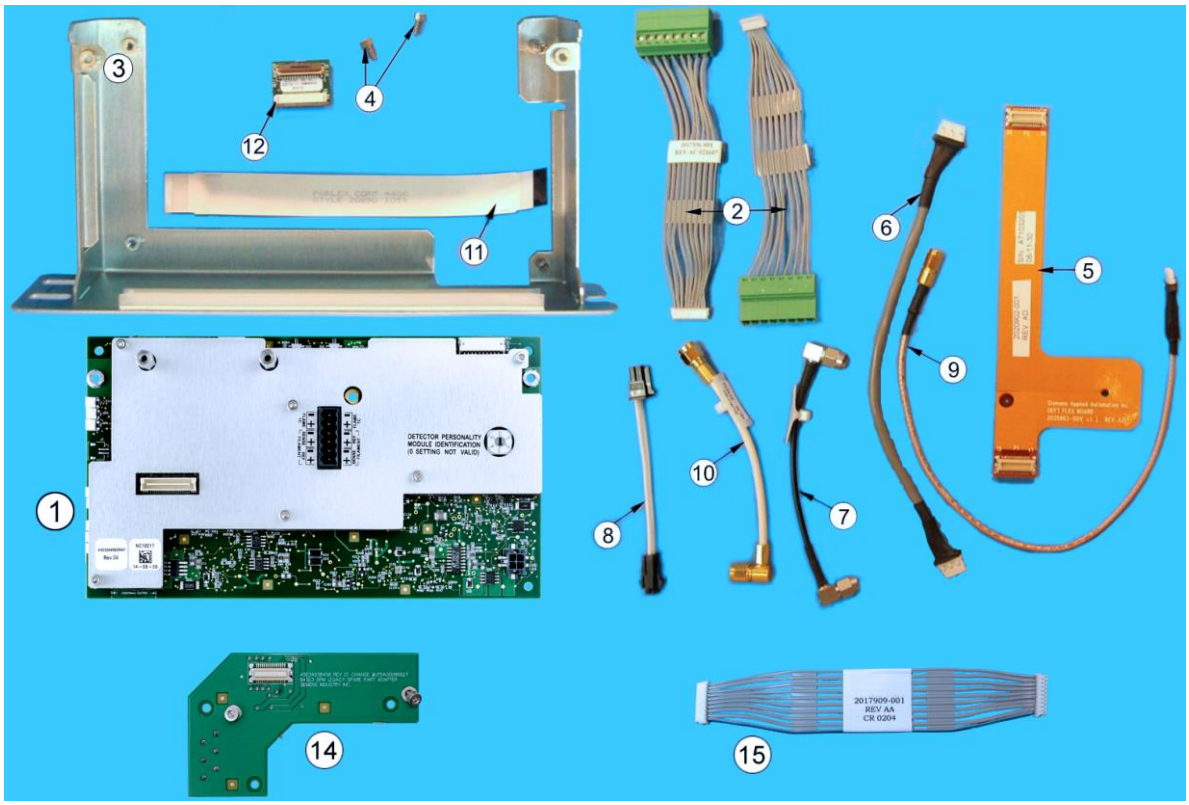


Figure 1. Base3 DPM Kit (2022008-701)

Also required is a tool kit including both standard and metric wrenches, hex wrenches, and nut drivers.

[1] Required only for heated FIDs.

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.

The table below lists the obsolete parts by part number and the recommended replacement part or parts to complete the upgrade. In some cases, there will be parts not used for the particular upgrade as the kits are designed to work with multiple configurations.

Part Number	Description	Replacement Part Number
2017973-001	FID Personality Module, 10 n-amp full scale	2022008-701 plus 2020960-003
2017973-002	FID Personality Module, 2 n-amp full scale	2022008-701 plus 2020960-003
2017973-003	FID Personality Module, 0.2 n-amp full scale	2022008-701 plus 2020960-001
2020963-001	Base Detector Personality Module Base Assembly	2022008-701

2.1 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. This section contains information for removal and installation of the Sensor Near Electronics (SNE) assembly, SNE controller (SNECON), Detector Personality Modules (DPMs), and Mezzanine boards. Refer to the specific section for each of these devices.

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 specific Maxum II, 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

2.2 DPM Type

The photos included here are a quick way to identify which part the user has installed. Be sure to verify that the part numbers match. This is the best way to ensure that a misidentification is not made, since some of the parts are very similar in appearance.

The DPM board slot on the right side is the one with the most options. Therefore, the user should ensure that the correct identification is made and correct replacement is being used. Four different FID boards may be installed, and some of these boards have six different mezzanine boards that may be installed on them. There are also three versions of the detector feedthrough, each of which uses different interconnects to attach to the DPM.

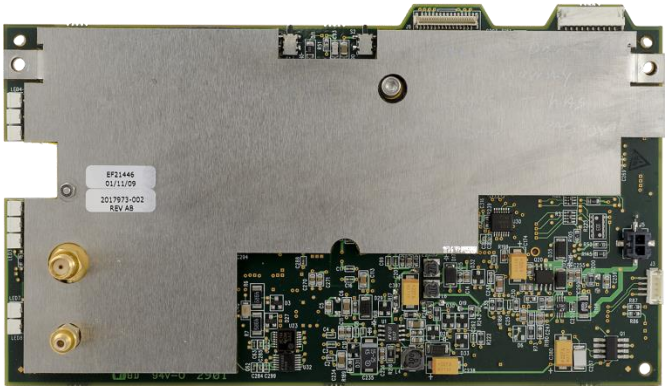


Figure 2. Maxum I FID DPM (2017973-00x)

Figure 3. Early Maxum II Base DPM (2020963-001)

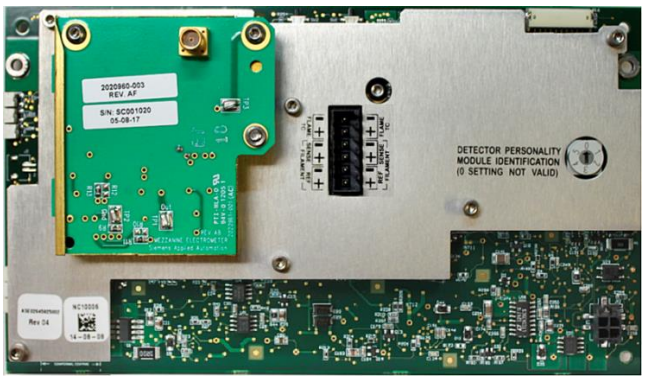


Figure 4. Base3 DPM shown with Mezzanine Module (A5E02645925001)

2.3 SNE Housing Type

The SNE housing comes in three versions: the original enclosed housing with perforated holes (Maxum Edition I), a modified enclosed housing with DPM Connector board (early Maxum Edition II), and the newer open-frame housing design (Maxum Edition II). Each provides a place to mount two boards. The left side (looking at 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 (TEMPCON) Board.

Figure 5. SNE Enclosed Housing

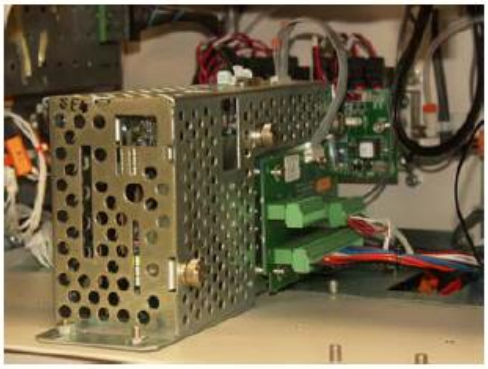


Figure 6. SNE Enclosed Housing with DPM Connector Board

A new open-frame style housing is provided with each kit. If not already present, the SNE assembly should be updated to the new style. The current open frame housing permits easy removal and installation of the boards without disassembly of a housing. The diagram below shows the disassembly of the boards from the housing. The open housing makes it much easier for the user to access the items, and some tasks can be done without removing the housing from the electronics enclosure.

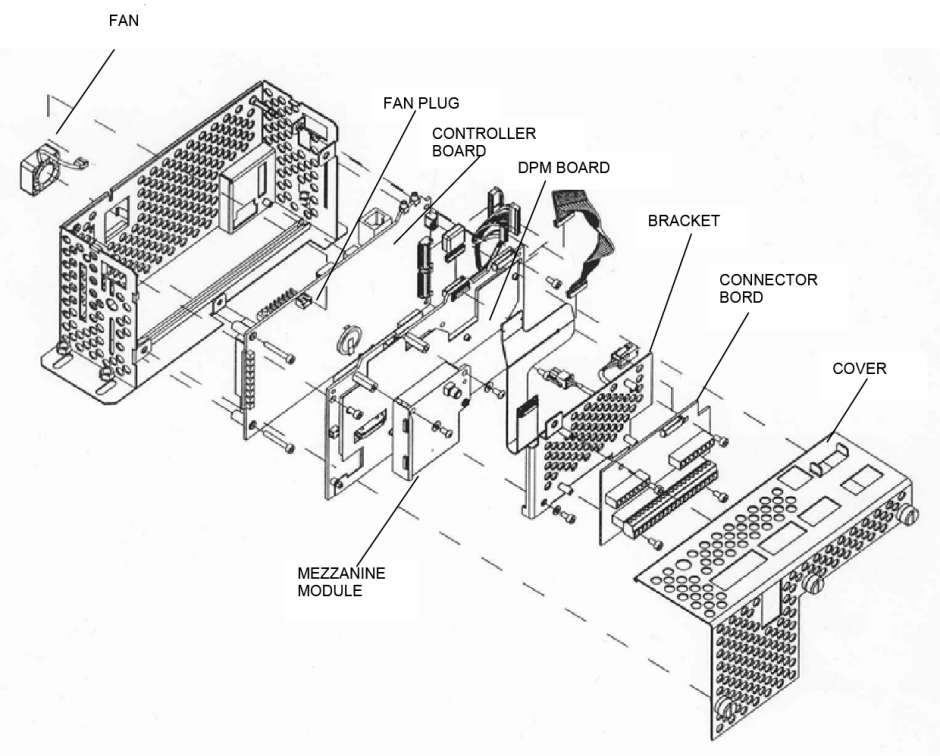


Figure 7. Old SNE Exploded View

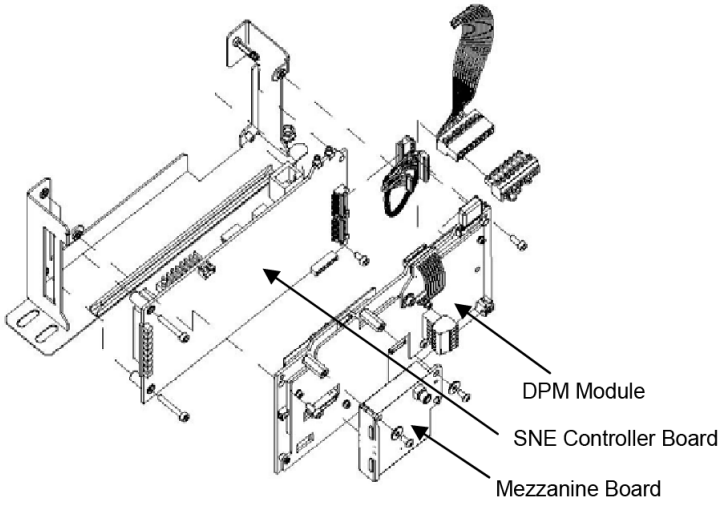


Figure 8. New SNE Exploded View

2.4 Sensor Near Electronics Assembly (SNE)

A total of up to three SNE assemblies can be installed within a single electronic enclosure. The removal and installation procedures, presented in this section, are applicable to each installed SNE assembly. Not all SNE assemblies within the unit will have the same individual parts installed, such as the SNECON board; which is usually only mounted in one of the SNE assemblies in each unit.

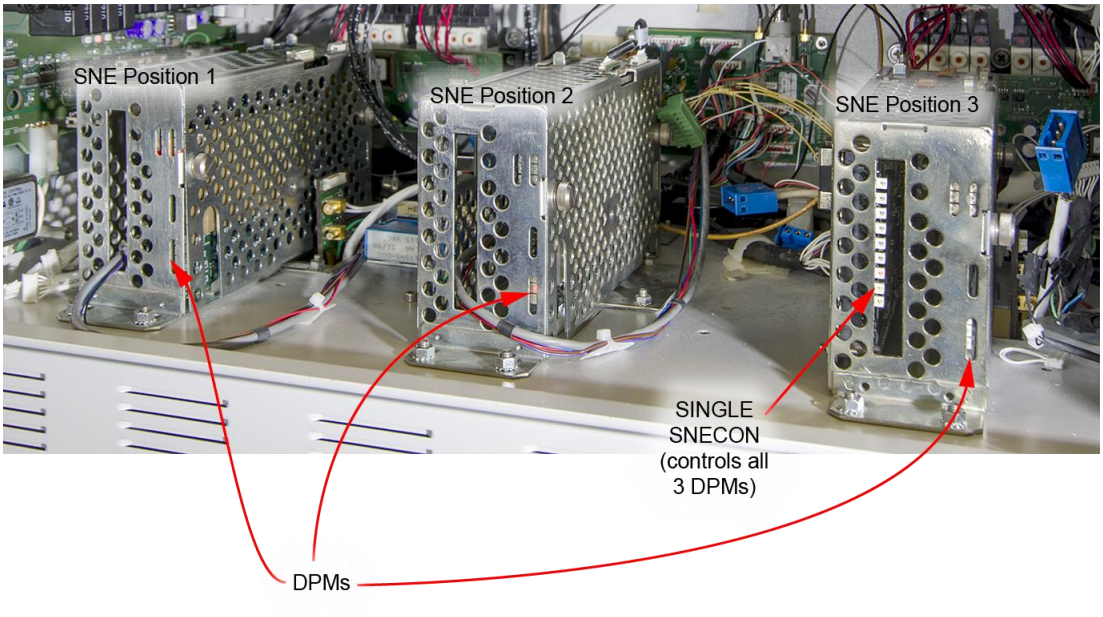


Figure 9. SNE Assembly Locations

All interface wiring connections on the SNE assembly, are on the back, top, left, and right sides of the SNE.

The cabling is normally accessible. If the system is an earlier version with the oven electronics feedthrough (OEFT), cabling on the right side of the SNE is obstructed by the close proximity of the feedthrough assembly connector extension. This requires disconnecting the top and left side connectors first. To access right side connections, it is necessary that the SNE assembly be released and rotated from its mounting assembly.

The cabling attached to the right side is fragile and must not be bent or pinched during removal and installation.

2.5 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. 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.

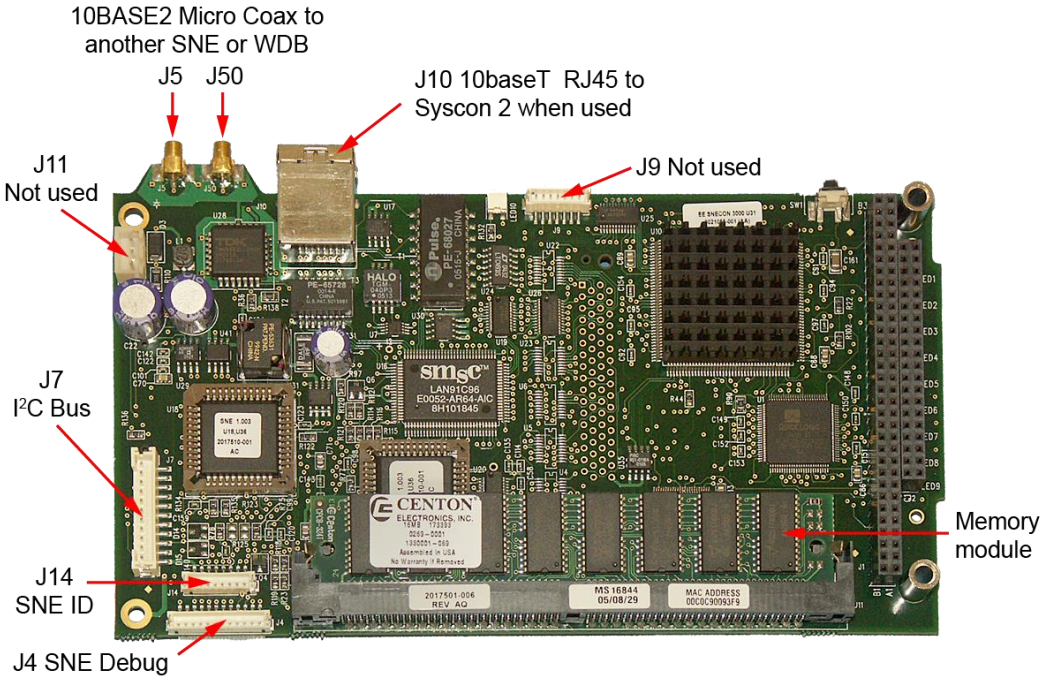


Figure 10. SNECON Board Side A

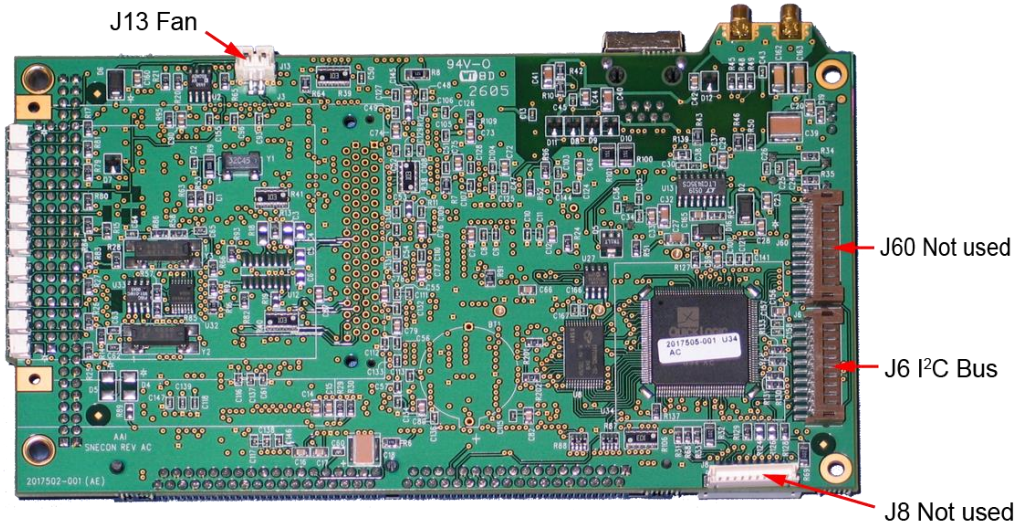


Figure 11. SNECON Board Side B

2.6 DPM 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.

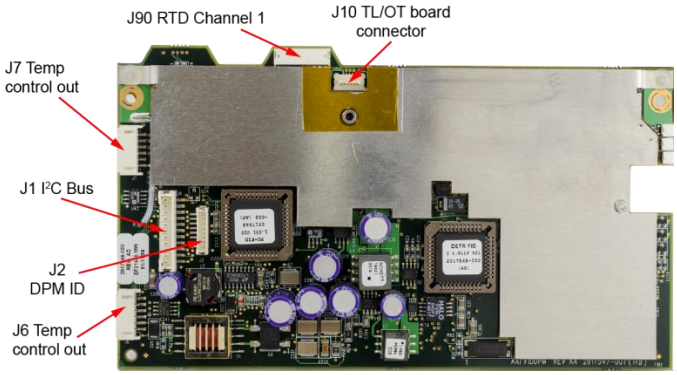


Figure 12. FID DPM 2017973 Side A

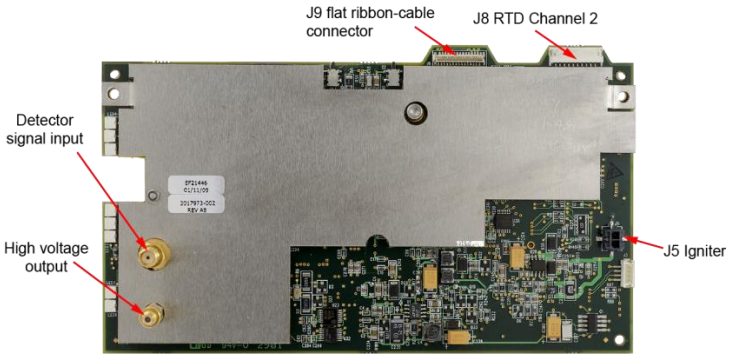


Figure 13. FID DPM 2017973 Side B

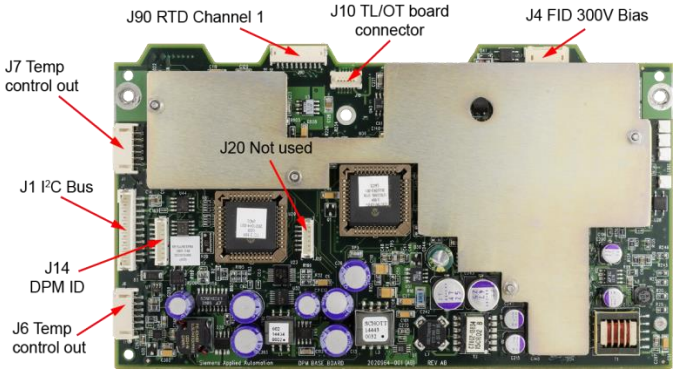


Figure 14. Base DPM 2020963 Side A

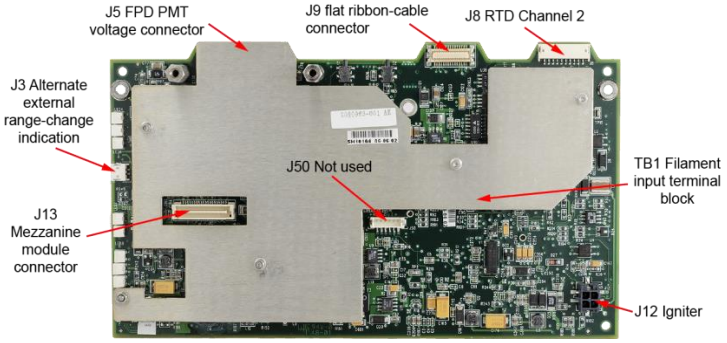


Figure 15. Base DPM 2020963 Side B

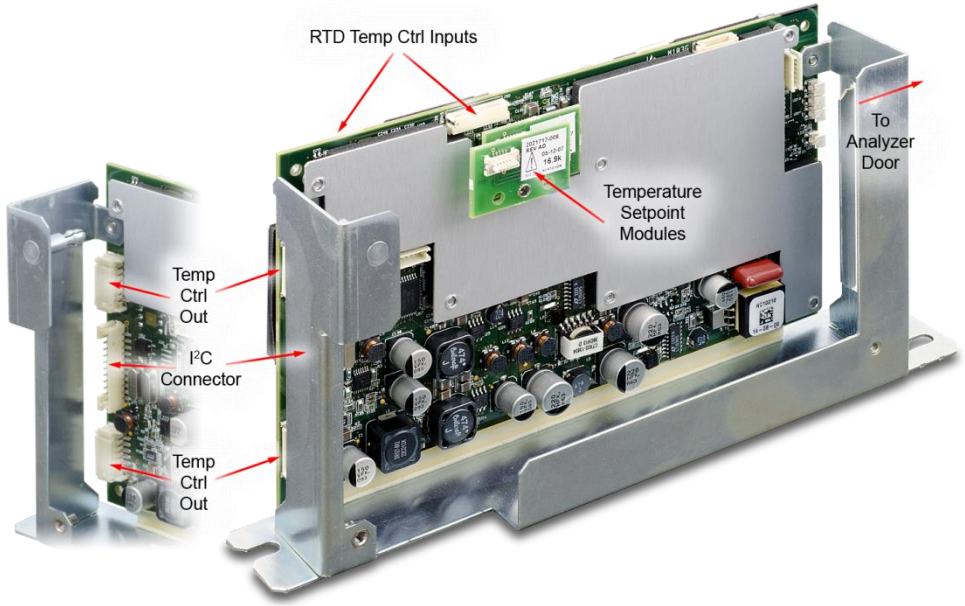


Figure 16. Base3 DPM Side A

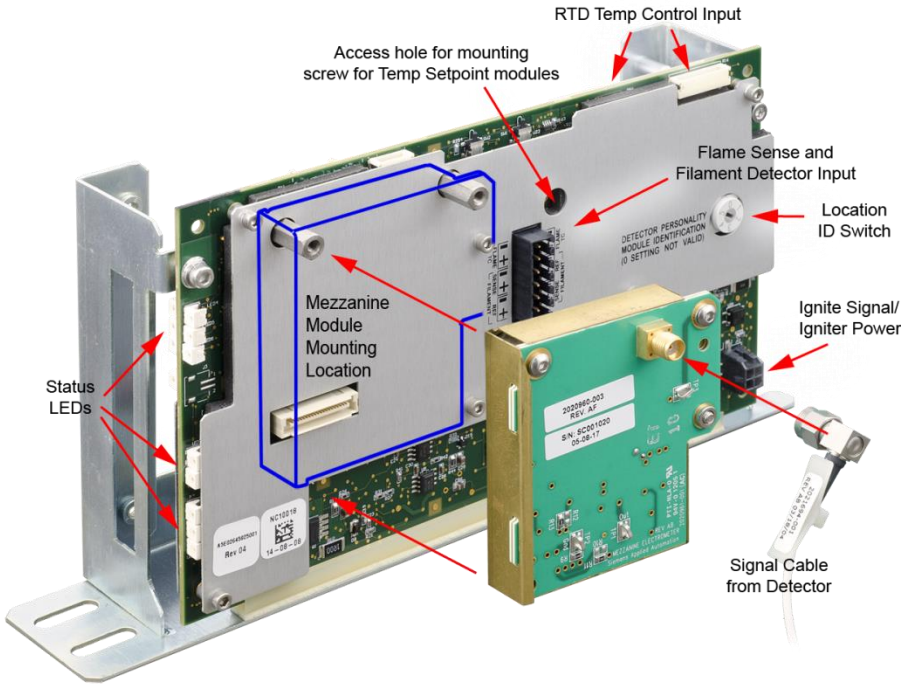


Figure 17. Base3 DPM Side B (w/ Mezzanine Board)

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, 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: 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.

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 cables connected 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 micro cable 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 – not necessary to pry on housing.

      * If the analyzer has already been upgraded to SYSCON2 without upgrading the DPMs, the SNE is possibly communicating through 10BASET (Ethernet) connections. The mini coax cables (10BASE2) are removed in this case.

   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. Additional orange tags may be included to label the new part, or the user can move the tags 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 bracket; (Figure 18). 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 removed.

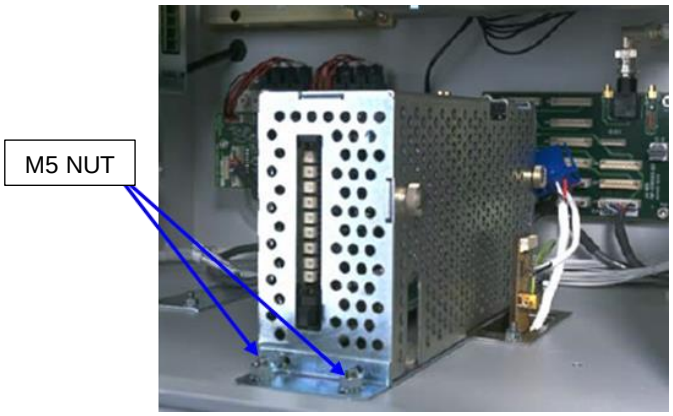


Figure 18. SNE Assembly Mounting Nut

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

5.0 SNE Disassembly and Reassembly

5.1 Replacing the Detector Personality Module (DPM)

If the SNE assembly was removed from a Maxum Edition I unit that uses the Oven Electronics Feedthrough (OEFT), then kit parts other than the DPM may be used to interface the new board to the existing equipment – see Section 5.2. The section between the top electronics enclosure and the chromatographic oven section can be quickly examined to determine if the unit is a Maxum Edition I or Edition II. If this section has a 2" grate, it is a Maxum Edition I. If this section is about 5" with a hinged door, it is a Maxum Edition II. Thus, if you have a unit with the small grate, then you need to refer to the section below for interfacing to existing Maxum I equipment if the SNE has not already been replaced previously.

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 and place on the new board. *Be sure to move the TL/OT board that controls the T-rating to the upgrade board.* These are critical for proper operation of the assembly. For the base DPMs used for the flame detectors, the mezzanine board must also be moved to the replacement DPM or a replacement mezzanine board must be utilized.
4. Verify that any cables that were attached with an orange label have the same label for the new board to ensure all cables are reconnected to the same location(s).

5.1.1 Moving the SNE Controller Board (SNECON) to new Cage

1. If present, remove the three M3 screws securing the SNECON to the original SNE Housing.
2. Install the SNECON controller board into the left-hand slot of the new open-frame designed cage provided with the kit using the same hardware.

5.1.2 Setting the DPM Position ID

Figure 9 shows the position IDs for the SNE assemblies. The position ID switch on the new DPM, shown in Figure 19, must be set to match the position ID of the DPM being replaced. In systems where a SNECON is present, set the position ID switch to 1.

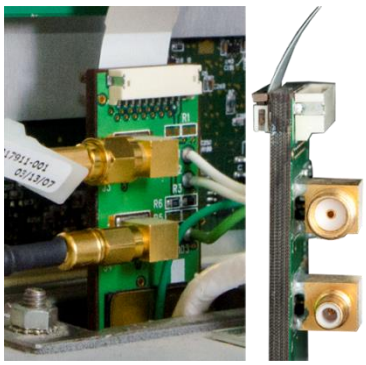
5.2 Interfacing to Existing Maxum I Equipment

If replacing a DPM in system prior to Edition II, then some additional items provided in the kit will permit the user to replace the DPM in these systems. If the part has previously been replaced with a current spare, then no other special equipment will be needed as this occurred on the previous installation.

Use selected equipment from the kit based on whether you are interfacing to an original feedthrough or revised feedthrough. See the subsections below to determine which feedthrough is in your equipment. Then follow the instructions specific to the feedthrough.

5.2.1 Original Feedthrough

1. Replace the original covered cage assembly with the new open cage assembly so that the DPMs will fit into the cage without modification of the cage.



2. Install new Base3 DPM Legacy Adapter PCBA (A5E34938458001) to the new Base3 DPM as shown in Figure 20 and Figure 21. The black connector on the adapter board connects to the filament connector of the Base3 DPM. The left side captive screw is installed in place of the original screw holding the Temperature Set Point Resistor boards and the right side captive screw is installed in place of the right screw connecting the DPM to the cage.
3. Attach the OEFT Adapter PCBA (2020910-001) to the Base3 DPM Legacy Adapter (connector J1) as shown in Figure 21. Note that the notches in the corners of the two connectors must match.

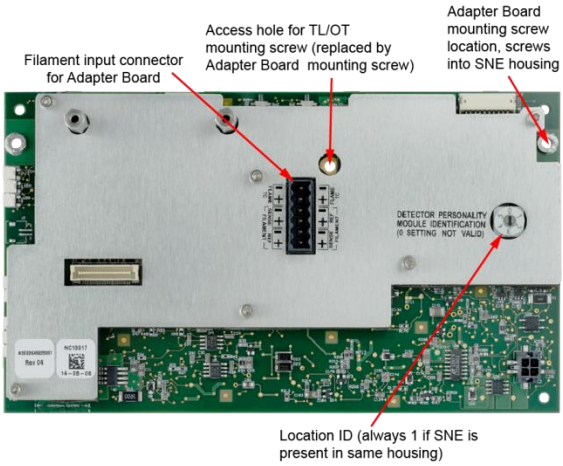


Figure 19. Base3 DPM

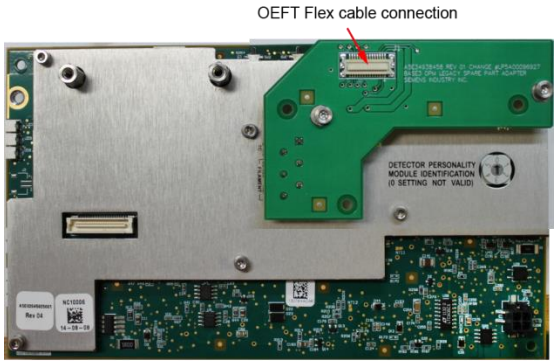


Figure 20. Base3 DPM with Adapter Board

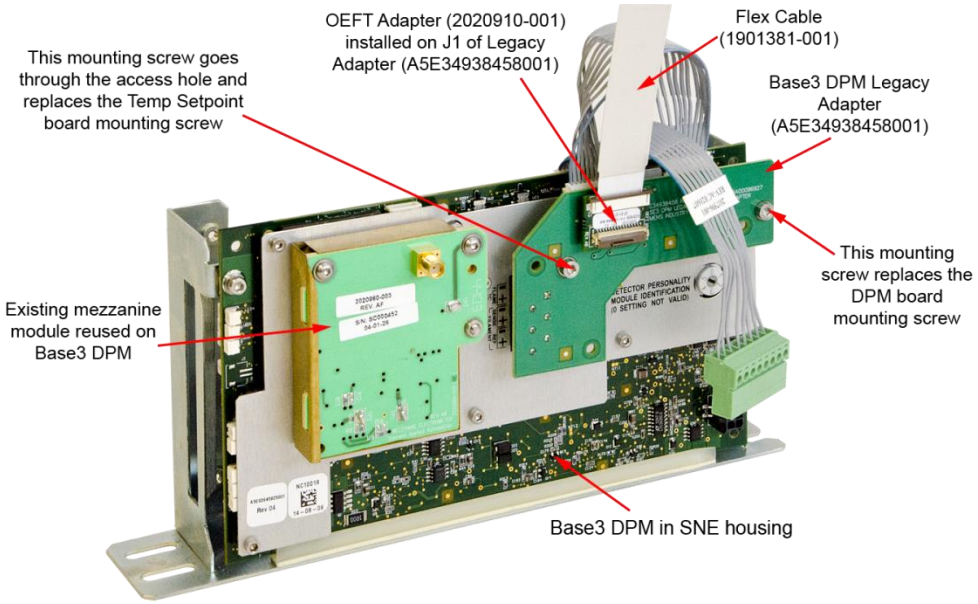


Figure 21.

4. Attach the Shielded 6 inch 30 conductor laminated flex cable (1901381-001) to the OEFT Adapter PCBA. Open the connector door from the laminated flex cable. (See Figure 21.) Install the laminated flex cable and close the door on the connector. The door on the connector is fragile.
5. Attach the other end of the shielded 6 inch 30 conductor laminated flex cable (1901381-001) to the OEFT connector as shown in Figure 22.
6. Replace the existing high voltage cable with the DPM2/OEFT1 high voltage cable (2021278-001).
7. Replace the existing signal cable with the FID DPM to OEFT signal cable (2017911-001).
8. Install the Glow Plug DPM ignition cable from the DPM to the OEFT1 (2021276-001).
9. For each of the heater control cables connections, connect the RTD cable (2017596-001) to the DPM which will allow connection to the existing heater cable connections (J8 and J90). If either of the existing heater cable connections is not used, then insert the RTD termination plug (2017959- 001) into the DPM instead of the cable.

Note: For a Maxum I heated FID, install the Ch2 DPM to OEFT Temp Sense cable (2017909-001) attaching one end to the DPM Temp Ch2 RTD input (connector J8) and the other end to the Base3 DPM Adapter (connector J2)

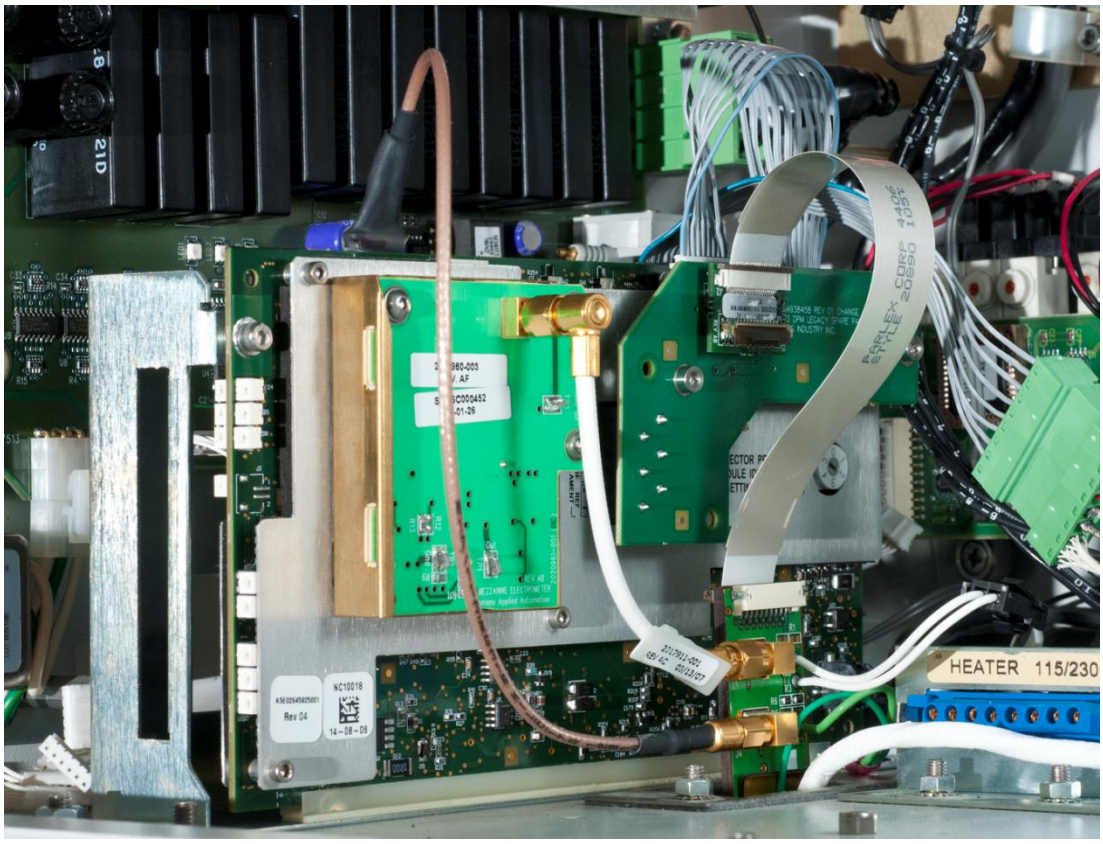


Figure 22. Base3 DPM Interfaced to Original Feedthrough

5.2.2 Revised Feedthrough

1. Replace the original covered cage assembly with the new open cage assembly so that the DPMs will fit into the cage without modification of the cage.
2. Install new Base3 DPM Legacy Adapter PCBA (A5E34938458001) to the new Base3 DPM as shown in Figure 20 and Figure 23. The black connector on the adapter board connects to the filament connector of the Base3 DPM. The left side captive screw is installed in place of the original screw holding the Temperature Set Point Resistor boards and the right side captive screw is installed in place of the right screw connecting the DPM to the cage.
3. Attach the OEFT flex cable PCBA (2020902-001) to the OEFT as shown in Figure 23. The other end will connect to the Base3 DPM Legacy Adapter (connector J1)
4. Replace the existing high voltage cable with the DPM2/OEFT2 high voltage cable (2021277-001).
5. Replace the existing signal cable with the DPM2/OEFT2 SMA signal electrometer cable (2021275-001).
6. Install the Glow Plug DPM ignition cable from the DPM to the OEFT1 (2021276-001).
7. For each of the heater control cable connections, connect the RTD cable (2017596-001) to the DPM which will allow connection to the existing heater cable connections (J8 and J90).
8. If either of the existing heater cable connections is not used, then insert the RTD termination plug (2017959-001) into the DPM instead of the cable.
9. **Note:** For a Maxum I heated FID, install the Ch2 DPM to OEFT Temp Sense cable (2017909-001) attaching one end to the DPM Temp Ch2 RTD input (connector J8) and the other end to the Base3 DPM Adapter (connector J2).

In Figure 23, the numbers refer to the steps on the preceding page.

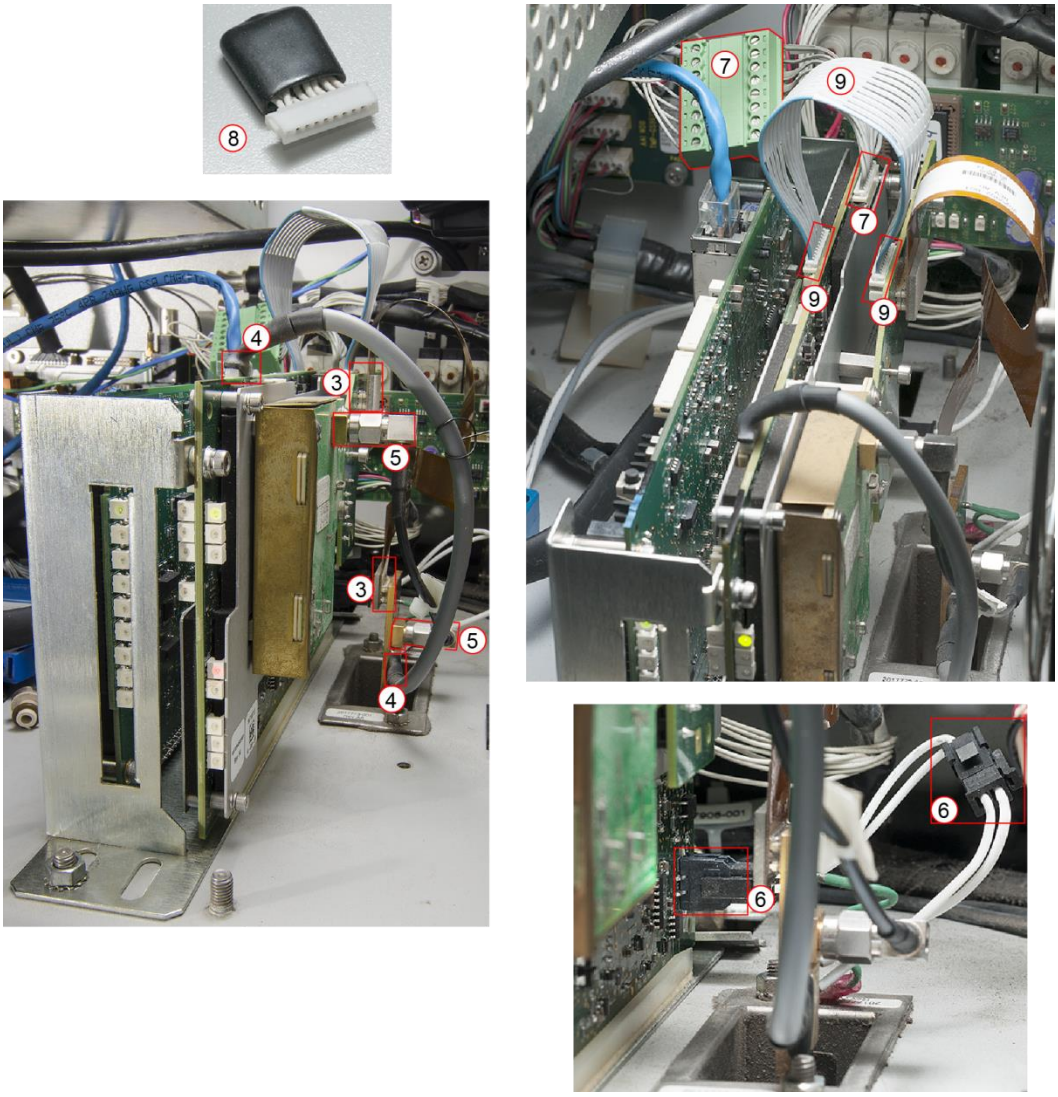


Figure 23. Base3 DPM Interfaced to Revised Feedthrough

6.0 General Analyzer Startup Procedure

Warning: Voltage dangerous to life exists. Severe injury or death can result if precautions are not observed.

When the Electronic Enclosure door is open, voltage dangerous to life is exposed. 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..

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. If appropriate permits have been obtained to meet area classification requirements necessary to operate with the door open, then apply power to the unit. No intervention should be necessary for the unit 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.
3. Close the electronics door and secure it per the applicable safety codes.
4. If the area classification does 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 once the unit has met the applicable safety code requirements. 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.
5. Allow time for the unit to reach operating temperature. The Maxum should be recalibrated after replacing the DPM module. Follow the procedure for restart of the specific unit.

7.0 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

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/industrialsecurity).