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PRODUCTS AFFECTED:	MVD 2700 Profibus PA transmitter

Micro Motion Documentation Supplement

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This Documentation Supplement obsoletes and replaces TBFY03-029.

Summary:

This supplementary document describes how to commission the MVD 2700 Profibus PA transmitter. It details the various specifics that need/can to be taken care of when using:

- Configuration - Micro Motion Transmitter Display
- Configuration - Micro Motion Prolink
- Configuration - Siemens Simatic Manager/PDM software
- Configuration - DTM based application of any manufacturer
- System Integration – Siemens S7 300/400 (Profibus) PLC.

Profibus in General:

Profibus PA communications is based on Profibus DP. Profibus PA networks do not exist stand-alone; they always get connected to a Profibus DP network by means of a Profibus DP/PA coupler (electrical converter). The coupler provides the carrier voltage for all Profibus PA communications. Different types of couplers are available from different manufacturers. For hazardous areas couplers are available that isolate the DP from the PA area and limit the power available for the PA segment.

A disadvantage of using a coupler only is that it limits the baudrate of the DP network to that of the coupler. Many customers therefore have also implemented a Profibus link. A link allows to use the highest baudrate on the DP network (up to 12 Mbit/s), while running the fixed 31.25 kbit/s baudrate on the PA segment simultaneously. If present, a link is situated between the Profibus PLC and the DP/PA coupler.

The typical manufacturers of DP/PA couplers and DP links are Siemens and Pepperl + Fuchs. Siemens has the IM-157 coupler, it is a transparent device, not requiring any GSD file or slave address and it has a fixed DP baudrate of 45.45 kbit/s. Siemens also has the IM-153 link, it is not transparent and does require a unique slave address and GSD file. One of the difficulties one can run into when using the Siemens link, is that the MVD 2700 PA I/O data needs to be integrated into the Siemens link GSD file. This can only be done by using a special Siemens Java based tool. Another difficulty is that a Siemens link will block any communication/configuration attempt from Siemens Simatic PDM, this because of it's non-transparency.

P+F has similar equipment. The P+F SK1 device is a DP/PA coupler only, it is a transparent device, not requiring any GSD file or slave address and it has a fixed DP baudrate of 93.75 kbit/s.

The P+F SK2 device is a coupler + link solution. It allows using the highest DP baudrates on the DP network and consists of the SK2 Gateway, which converts DP to PA and vice-versa, and the SK2 Power Link, which provides the power to the PA segment. Multiple SK2 Power Links can be connected to a single SK2 Gateway. (Please note the confusing terminology that P+F introduces; calling their powering device a link.)

The P+F SK2 also is a transparent solution and does not require any slave address or GSD file. This is especially advantageous when using a configuration tool like Siemens Simatic PDM, it can look and configure straight through the SK2 device. The SK2 Gateway does have a special requirement however; it can only work with so-called 'DP' types of GSD files. The 'DP' type of GSD file for the 2700 PA device is called 'YP00057A.GSD' and has been created with a special P+F link tool.

Any of the 2700 PA device GSD files (manufacturer specific 'MMI057A.GSD', profile specific 'PA139742.GSD' and P+F SK2 'YP00057A.GSD') can be downloaded using the link below.

http://www2.emersonprocess.com/en-US/brands/micromotion/Related-Information/Pages/software-downloads.aspx

Profibus configuration tools, like Siemens Simatic PDM and a DTM based application, are so-called Profibus Class 2 type of masters and always need to be connected to the DP segment! Any Profibus master (Class 1 or 2) always needs to be connected to the DP segment; they cannot be connected to a PA segment.

Note: When connecting your Class 2 configuration tool to a live Profibus segment at a customer, make sure you are using the same network settings (baudrate, T slot, T min/max sdr, etc.) as the customer is using! Not adhering to this may result in unpredictable segment behavior! If the customer is not sure about his network settings and you are using Siemens Simatic PDM, the 'Diagnostics/Test' function of the 'Setting PG/PC Interface' application can be of help. This application helps you determine the customer network parameter settings.

Configuration – Micro Motion Transmitter Display:

The Micro Motion transmitter display allows for basic Analog Input block configuration. It allows for Analog Input block assignment (mass flow, density, temperature, volume flow or drive gain) and it allows for changing the Analog Input block unit of measurement. The transmitter display does not allow for changing the Analog Input block scaling information and # of decimals behind the 'dot'; it also does not provide any Transducer or Totalizer block configuration.

Note: Changing the units of measurement from the display will automatically change the units in the Transducer block, and can therefore not cause any unit conflict!

Configuration – Micro Motion Prolink:

Micro Motion Prolink v2.8 software allows you to configure the MVD 2700 PA transmitter Transducer block and to do basic Analog Input block configuration as described at the display configuration section. The Transducer block holds all measurement configuration parameters, like the Flow Direction, Flow Damping, Flow Cut-off, Flow and Density Calibration factors, etc. Prolink <u>does not</u> provide a means to configure the complete transmitter Analog Input and Totalizer function blocks. Prolink configuration is based on Modbus communications using the transmitter service port, it is not based on Profibus communications.

Note: When changing the units of measurement from Prolink v2.8, make sure they are set the same in both the Transducer and Analog Input block(s), thus avoiding a unit conflict.

Note: Even though Prolink v2.8 does not provide a 100% MVD 2700 Profibus PA configuration, it does provide basic MVD 2700 PA transmitter configuration. Prolink v2.8 meets the configuration needs of many 2700 PA end users and may therefore eliminate the need for Siemens Simatic PDM or a DTM based application!

Configuration - Simatic Manager/PDM:

Siemens Simatic PDM provides 100% MVD 2700 Profibus PA configuration. PDM is available stand-alone (laptop) or integrated (S7 PLC). Installing the MVD 2700 PA Simatic PDM files is PDM version dependant. The below explains how to install them for PDM v5.x and v6.x.

Note: Any of the blocks (Physical, Transducer, Analog Input and Totalizer) has a Block Target Mode and Block Actual Mode parameter. The possible settings for the Block Target Mode are 'AUTO' and 'OOS (Out Of Service). Configuration can be done from any of the two different block modes.

1. Download the Micro Motion MVD 2000 PA transmitter PDM files from the link below and extract them to a local folder on your hard drive:

http://www2.emersonprocess.com/en-US/brands/micromotion/Related-Information/Pages/software-downloads.aspx

PDM v5.x

2. Install the Micro Motion MVD 2000 PA transmitter PDM files:
   - Run the 'DeviceInstall.exe' file.
   - During the installation the files will copied to the proper directory on your computer.
   - When finished, the installation wizard tells you if the files were installed succesfully or not.
   - If not, copy the MVD PDM files (except for the 'DeviceInstall.exe' file) to the Siemens/PDM/SIM_PDM/DeviceInstall folder and run the 'DeviceInstall.exe' file (that is already in that folder) from there.

PDM v6.x

2. Install the Micro Motion MVD 2000 PA transmitter PDM files:
    • Start the Simatic/Simatic PDM/Manage Device Catalog application.
    • Browse to the location where you have stored the MVD PA PDM files.
    • Select Micro Motion/Profibus PA/Sensors/Flow/Coriolis/MMI Coriolis Flow.
    • Click 'Ok' to start the installation and wait for the 'The Selected Device Types Were Imported' confirmation of a successful install.
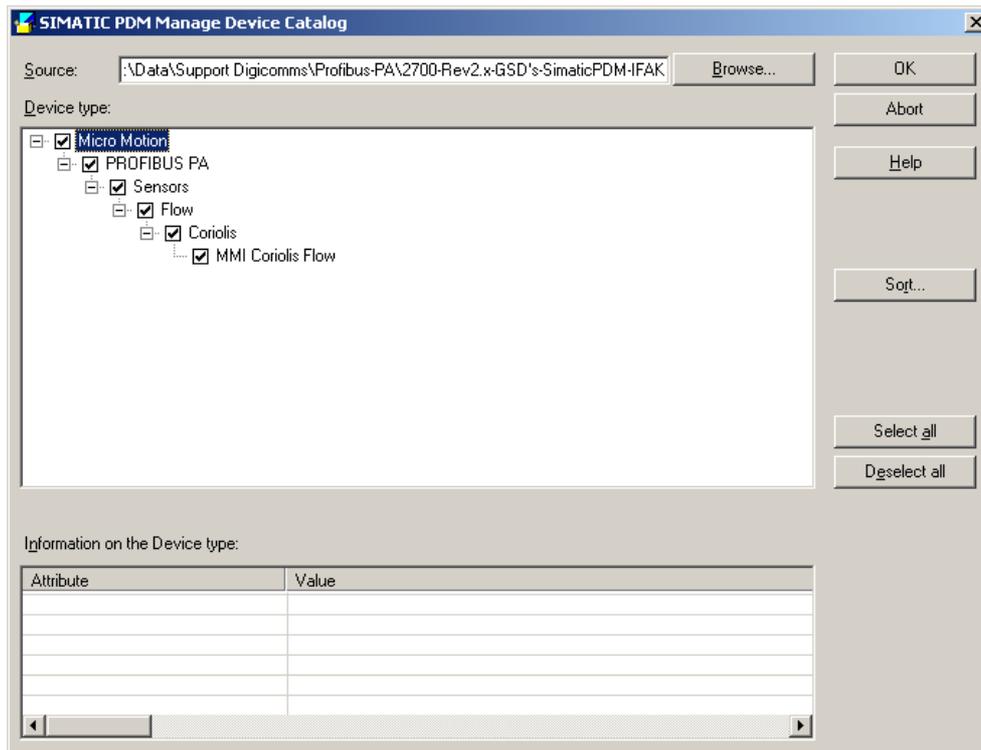
3. Start the Simatic Manager program.
4. Switch to the 'Process Device Network View'.
5. Create a new project that includes your PROFIBUS DP net. (Refer to Simatic Manager/PDM documentation on how to do this.)
6. Under the Profibus DP net, insert a PROFIBUS PA device tag:
    • If desirable, assign the device tag a different name.
    • Assign the device tag the slave address '126'. (This is the default address with which the transmitter is shipped from the factory.) The transmitter slave address can be changed through the transmitter display. If this was done before connecting with Simatic Manager/PDM, assign the device tag that particular slave address. If the transmitter was ordered without display, the Simatic PDM – LifeList application (Simatic/Simatic PDM/LifeList) can be used to determine the actual address of the transmitter.
7. Double-click on the device tag and the Simatic PDM application will be started from Simatic Manager.
8. If you're asked to log on as a 'Maintenance Engineer' or 'Specialist', select 'Specialist'. As a 'Specialist' you're able to change the transmitters slave address from Simatic PDM, as a 'Maintenance Engineer' you're not.

9. In the 'Simatic PDM Device Selection' screen, link the device tag to the MVD transmitter PDM files as in the screen shot below:
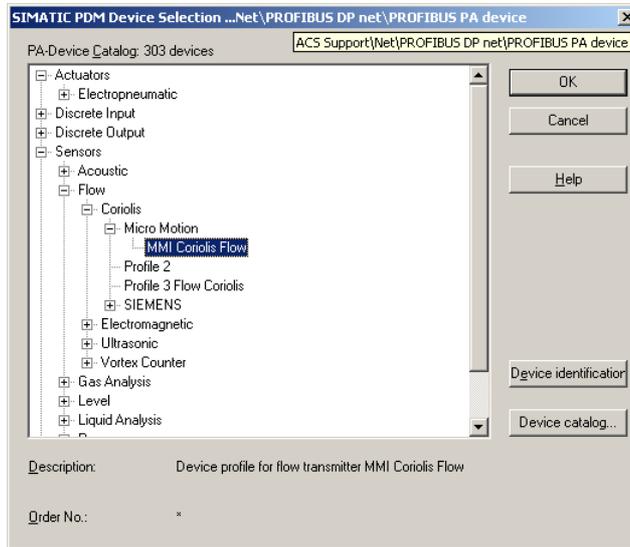
10. When PDM is opened, your screen should look like the following:
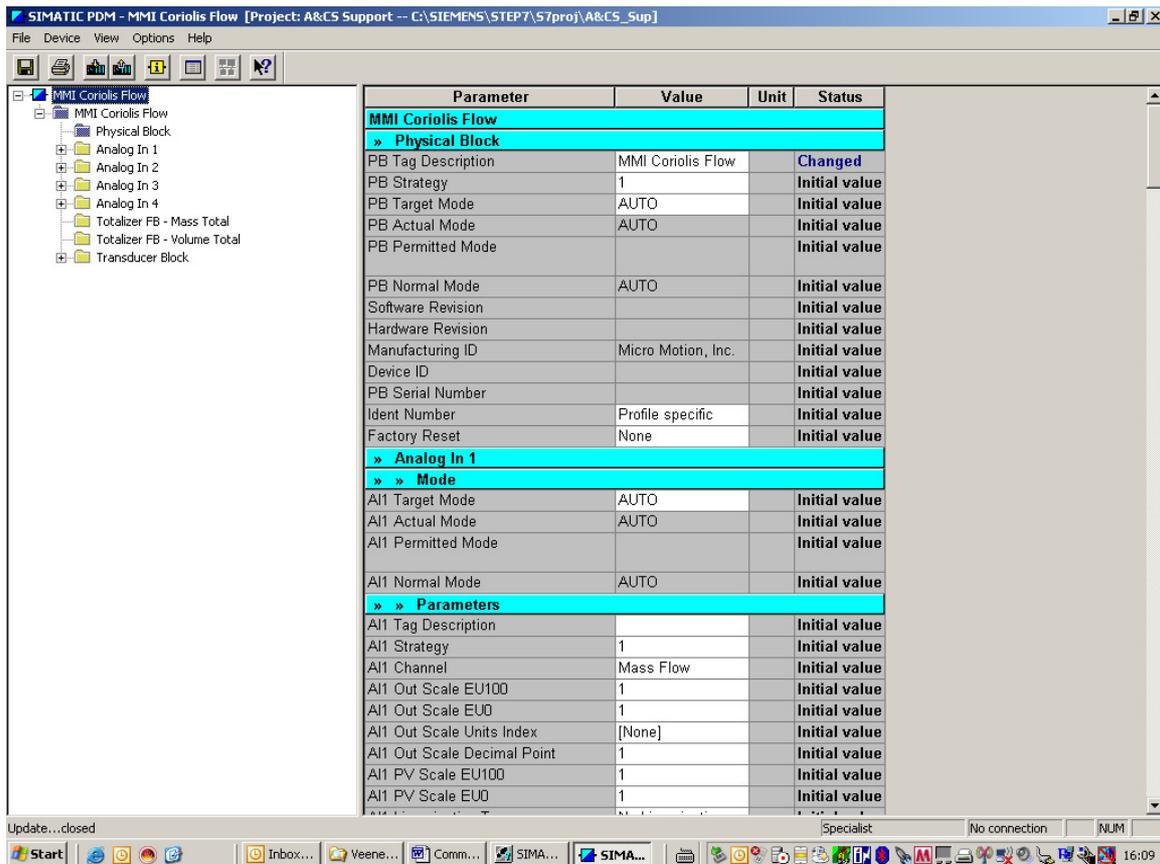
11. In Simatic PDM, use the 'Download to PG/PC' button [icon] to upload the transmitter configuration to the PDM database (this can take some time).

12. From the 'Options' menu, 'Settings' function and 'Table' tab, enable the 'Online Dialog In The Table Available' function as in the screen shot below. It must be enabled if configuration data needs to be written to the transmitter. (The 'Download to Device' button [icon] is not always properly working for the MVD transmitter!)
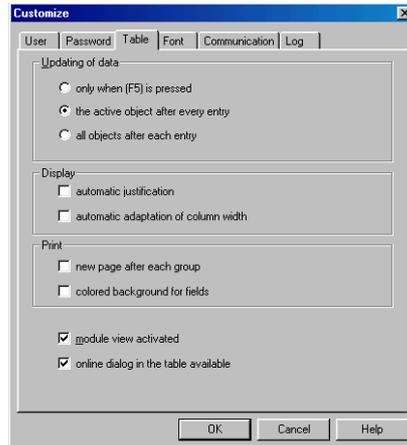
13. In the left part of the screen, right mouse click on the 'Physical Block' and select the 'Online' function.

   Note: Use the same method to access any of the other transmitter function blocks!

14. The contents of the transmitter Physical block will appear in a new screen as shown below. You're now online with the transmitter configuration.
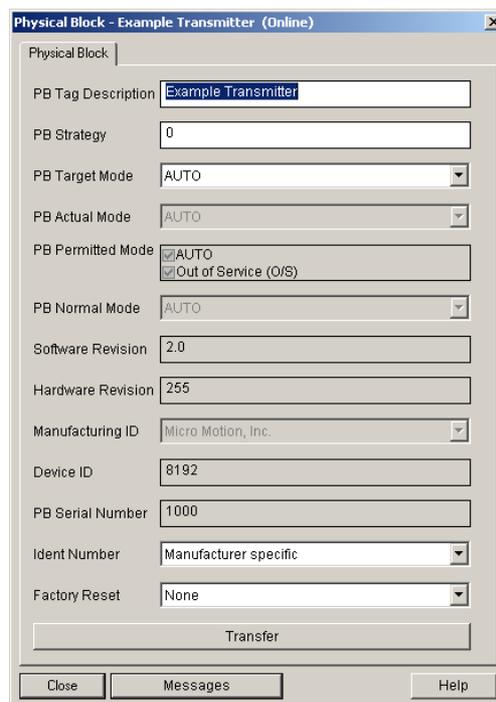
15. Check the '**Ident Number**' setting and change it if required:
    - With the '**Manufacturer Specific**' setting, the Profibus PLC is able to read all four process variables (mass flow rate, temperature, density and volume flow rate) and the two totalizers (mass total and volume total) from the transmitter.
    - With the '**Profile Specific**' setting, the Profibus PLC is able to read up to three process variables (a selection out of the four) and the mass total (not the volume total) from the transmitter.
16. In the Transducer block:
    - Check the sensor flow and density calibration factors. Use the sensor tag plate or sensor calibration sheet as a reference. The sensor calibration factors are stored in the transmitter right after factory calibration.
    - Check if any flow specific parameters have to be changed, like 'Measurement Mode', 'Flow Damping' and 'Mass Flow Low Cutoff' to meet application specific needs.
17. Configure a number of Analog Input blocks equal to the number of process variables that need to be read by the PLC, starting at the first Analog Input block. (The Analog Input blocks leave the factory with a default configuration.) Essential parameters in an Analog Input block are:
    - '**AI1 Channel**': select mass flow rate, temperature, density or volume flow rate.
    - '**AI1 Linearization Type**': select No Linearization
    - '**AI1 Out Scale Units Index**': Unit of measurement, can be kg/h, °C, kg/m3, l/h, etc.
    - '**AI1 Out Scale EU0**': Lower scale value at the output of the block
    - '**AI1 Out Scale EU100**': Upper scale value at the output of the block
    - '**AI1 PV Scale EU0**': Lower scale value at the input of the block
    - '**AI1 PV Scale EU100**': Upper scale value at the input of the block

Note: Configure the Out Scale and PV Scale information exactly the same!
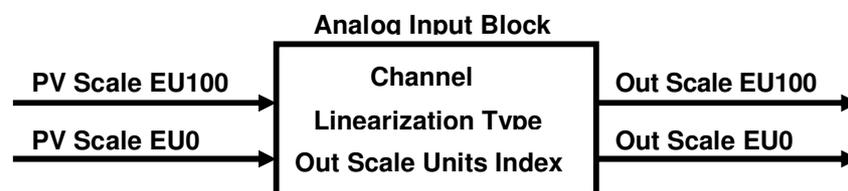
18. If required, all four Analog Input blocks can be simulated. Simulation must be enabled per Analog Input block. A 'Simulate Value' and 'Simulate Status' can be configured per block. Entering '128' for the 'Simulate Status' represents the status 'Good'.
19. Configure a number of Totalizer blocks equal to the number of totalizer values that need to be read by the PLC. (The Totalizer blocks leave the factory with a default configuration.) Essential parameters in a Totalizer block are:
    - '**Mass Total FB Set Total**': 'Totalize' will make the block totalize.
    - '**Mass Total FB Mode Total**': 'Balanced' will make the totalizer value increase with positive flow and decrease with negative flow; 'Positive Only' will make the totalizer value increase only with positive flow and hold with negative flow.
20. When finished with the transmitter configuration, check if all the block 'Target Modes' are set back to 'Auto'. This is a requirement to read proper transmitter block outputs in the PLC.

Note: If the 'Target Mode' of the Physical block is set to 'Out of Service', this will overwrite the 'Actual Mode' of all other blocks.

21. Use the 'Device' function of the 'Device' menu to get access to the 'Zero Calibration' tab.
22. Prepare the meter zero calibration by flushing the sensor for some time. Flushing the sensor is required to make sure it's single phase filled only (there should be no air present in case of a liquid application and no condensate in case of a gas application) and to get the sensor at operating temperature.
23. When finished with the meter zero preparation, perform a meter zero by executing the zero calibration (need to transfer a 'Cancel' first, after which an 'Execute' will work):
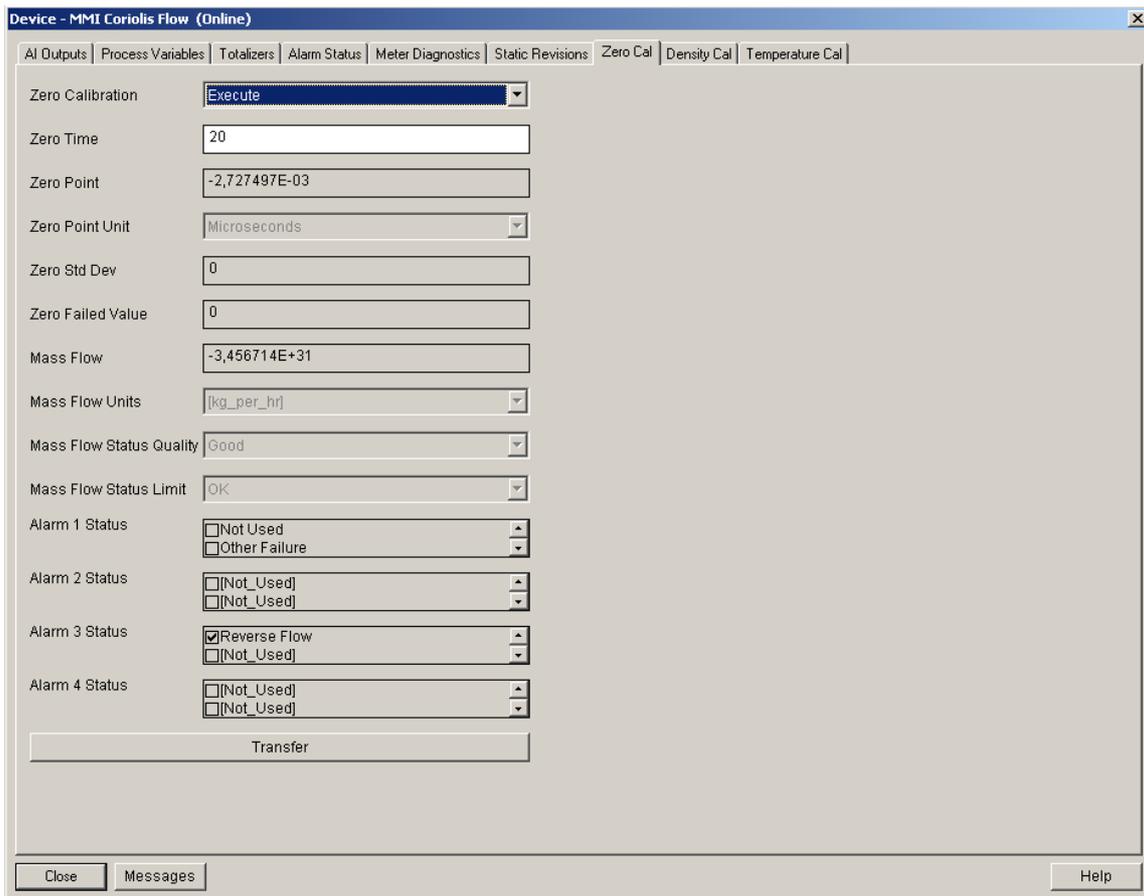
24. Use the 'Device' function of the 'Device' menu to verify if the process data readings make sense and if the 'Status Quality' of the Analog Input and Totalizer blocks configured reads 'Good'. If so, the transmitter is properly configured and it's blocks are ready to be read by the PLC. If not:
    • Check if any of the block 'Target Modes' is still set to 'Out of Service'.
    • Check if the units of measurement in the Analog Input blocks and Transducer block are set the same. If not, the 'Status Quality' of the corresponding block will read 'Bad'.
    • Use the 'Alarm Status' tab to find out if any meter alarms are active.

Configuration - DTM based application

Micro Motion provides a MVD 2700 Profibus PA device type of DTM, providing 100% MVD 2700 PA configuration. The device DTM can be used with any DTM based application, like PACTware, ABB Freelance and E+H Fieldcare. Besides the MVD 2700 PA device DTM, a Profibus communications type of DTM is also required. For obtaining the MVD PA DTM, please contact:
    • Europe: A&cs@Emersonprocess.com
    • Outside of Europe: MMICSSC.Digital_Support@EmersonProcess.com

System Integration – Siemens S7 300/400 (Profibus) PLC:

Note: Based on the 'Ident Number' setting you have made at the device configuration stage, the device (base) GSD file will be either the 'PA139742.GSD' (profile specific) or the 'MMI_057A.GSD' (manufacturer specific). If no link is used, adding the device (base) GSD file to the PLC GSD file library will be sufficient! If a link is used, the story is somewhat different!

Note continued: If a Siemens link is used, the MVD device (base) GSD file (this can be any of the two) needs to be integrated into the Siemens link GSD file. This can only be done using a special Siemens Java based tool. The Siemens link GSD file subsequently needs to be added to the GSD file library.

Note continued: If a P+F SK2 device is used, the MVD device 'DP type' of 'YP00057A.GSD' file (based on the manufacturer specific 'MMI_057A.GSD) needs to be added to the GSD file library!

1. Add the proper MVD transmitter/Siemens link GSD file to the GSD library of your PLC.
2. In the PLC software, for a Siemens S5 or S7 PLC this is the 'Hardware Configurator' application; create a tag based on the transmitter/Siemens link GSD file installed.

Siemens Coupler and P+F SK1 or SK2 (transmitter tag based):

3. Configure the PLC slot positions:
   - When using 'PA139742.GSD' as the base GSD file, **four** PLC slot positions need to be defnined, in the order:
     - **AI, AI, AI, Tot.**
   - When using 'MMI_057A.GSD' as the base GSD file, **six** PLC slot positions need to be defined, in the order:
     - **AI, AI, AI, Tot, AI, Tot.**
   - The totalizer slot positions '4' and '6' can be configured as:
     - **'Totalizer'**: PLC reads totalizer.
     - **'TotSetTot'**: like 'Totalizer', but PLC can also reset the totalizer using one output byte.
     - **'TotSetTotModeTot'**: like 'TotSetTot', but PLC can also start and stop the totalizer using another output byte (two output bytes in total).
   - Slot position '4' always applies to the transmitter mass total and slot position '6' to the transmitter volume total.
   - Only one of the two totalizer slot positions may be configured as 'TotSetTotModeTot'.

Note: If the slot position configuration is done incomplete or in the wrong order, the Profibus DP card will set a bus error (bus failure) upon reading the outputs of the transmitter function blocks.
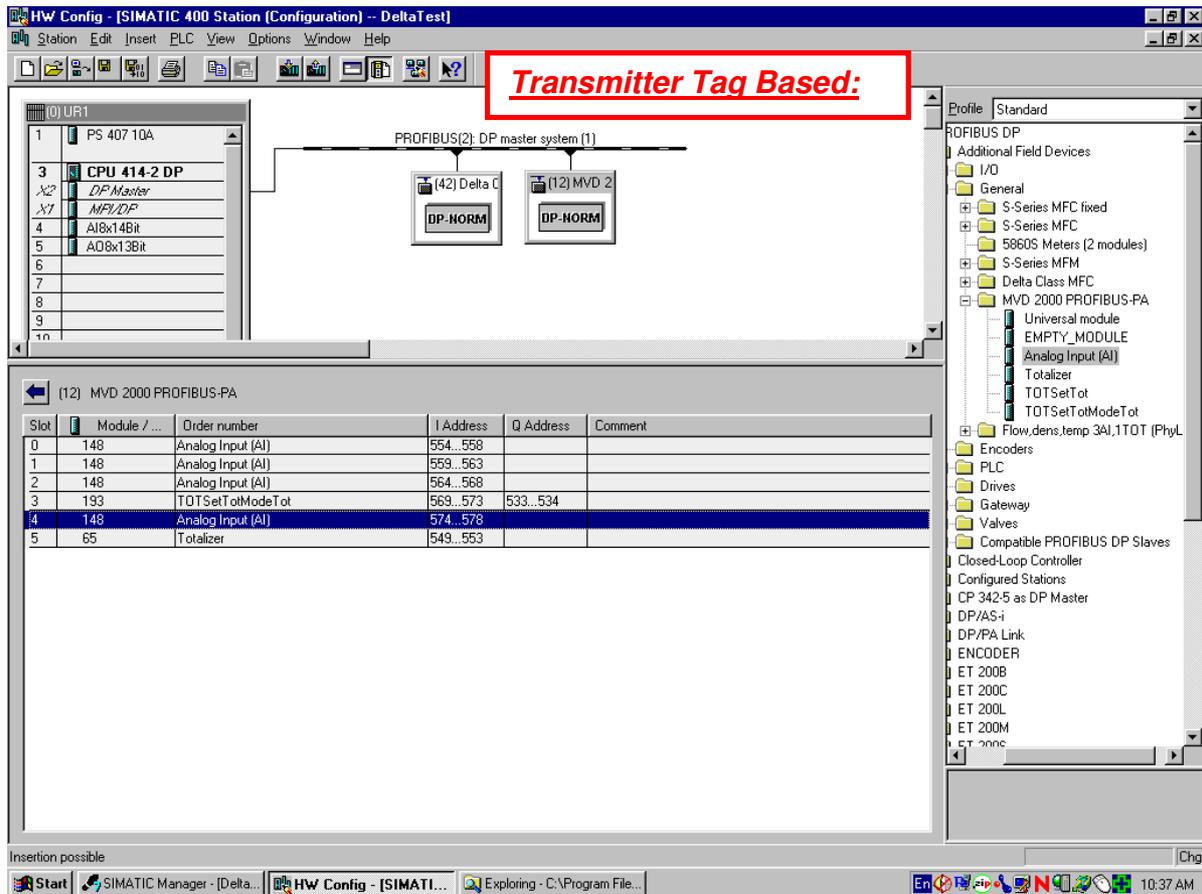
Siemens Link (link tag based):

3. Configure the PLC slot positions:
    *   See the instructions at the previous # 3 instruction.
    *   If more than one PA slave is connected to the Siemens link, additional slot lines need to be configured to define the begin of any PA slave device (the 'Begin of Device_057A' line defines the begin of a MVD 2700 Profibus PA device and also allows for slave address programming per slave):

4. Program the PLC output bytes to the transmitter in case a Totalizer block is used as 'TotSetTot' or 'TotSetTotModeTot':
    - In case of 'TotSetTot' the PLC needs to send one output byte:
        - '0x00' will make the block totalize.
        - '0x01' will make the block reset.
    - In case of 'TotSetTotModeTot' the PLC needs to send two output bytes:
        - The first output byte functions the same as described for 'TotSetTot'.
        - As for the second output byte:
            - '0x00' will make the block start totalizing in a balanced bi-directional way.
            - '0x01' will make the block start totalizing with positive flow only.
            - '0x02' will make the block start totalizing with negative flow only.
            - '0x03' will make the block stop totalizing.
5. If required, insert an 'Empty Module' into one or more slot positions to save PLC I/O. An 'Empty Module' will not read any transmitter function block output and will therefore not consume any PLC I/O.