Honeywell

Experion PKS
FMC722 on ACE Configuration Guide

EPDOC-X332-en-431A
February 2015

Release 431

Honeywell

Document	Release	Issue	Date
EPDOC-X332-en-431A	431	0	February 2015

Disclaimer

Contents

1 About this document

Provides guidelines and procedures to install and configure the FMC components.

Revision history

Revision	Date	Description
A	February 2015	Initial release of the document

2 Introduction to FMC722 on ACE solution

FMC subsea system contains several I/Os whose data can be accessed by external system that follows FMC 722 protocol. To access FMC data in ACE, FMC722 on ACE solution has been introduced. This solution enables Application Control Environment (ACE) to communicate securely with an FMC subsea system using the FMC722 protocol over TCP/IP. With Experion R431, this solution is licensed. For more information, contact your Honeywell representative.

The following topology diagram illustrates the communication between ACE and a single Topside Processing Unit (TPU).

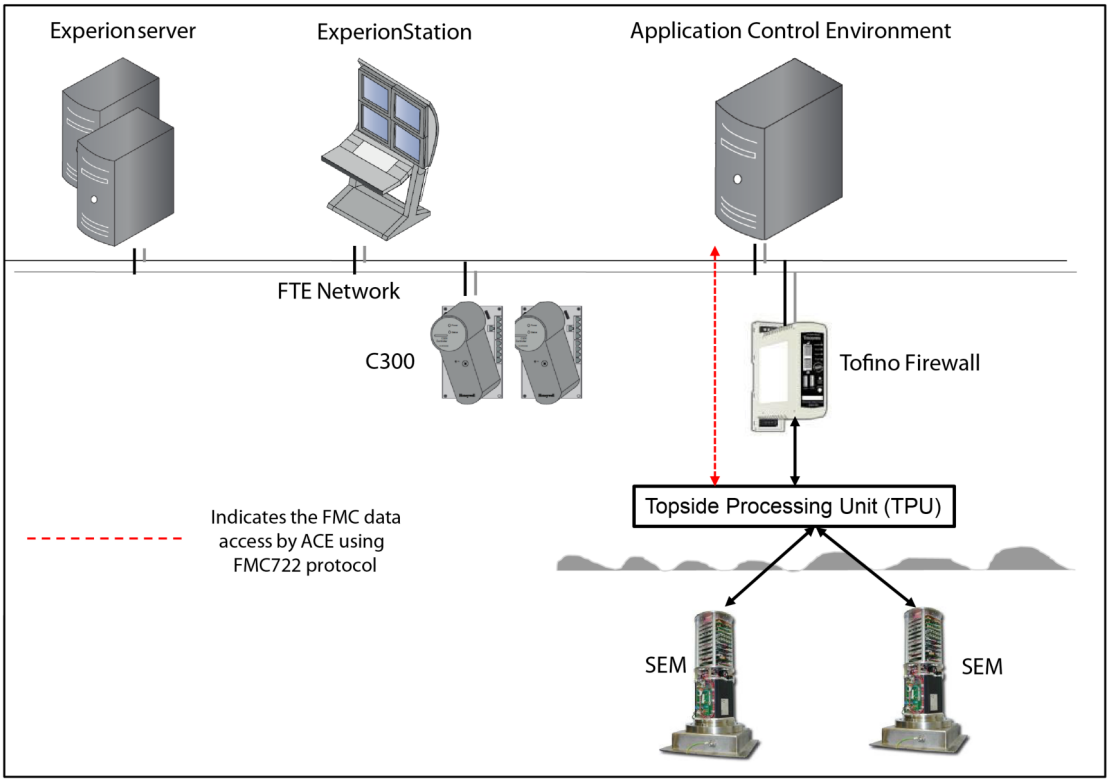


Figure 1: Communication topology between ACE and single TPU

The following figure displays the blocks in ACE and its communication flow.

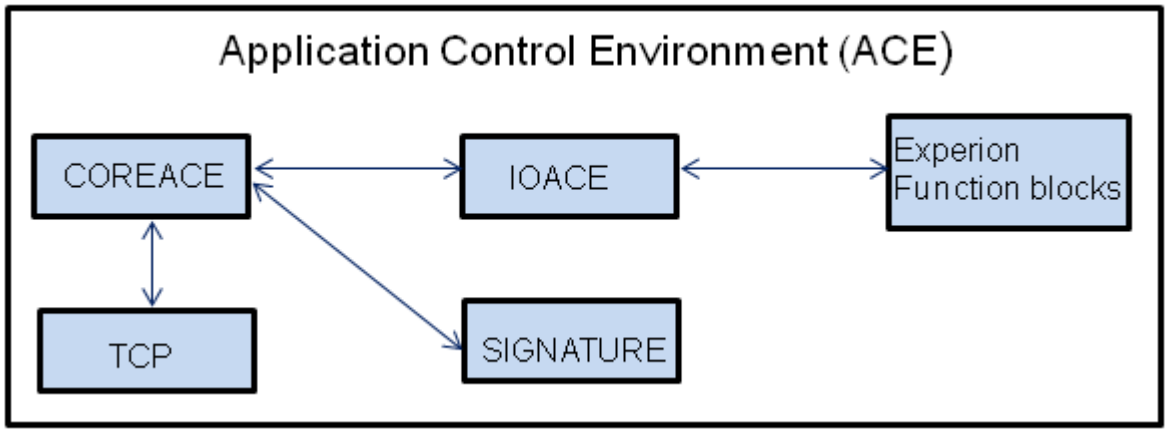


Figure 2: Communication flow between the blocks in ACE

Attention

You can connect multiple TPUs to ACE using the respective COREACE and TCP blocks connected to their individual TPUs.

Establishing communication between the Subsea Electronic Module (SEM) and ACE

SEMs communicate with the TPU using the internal FMC722 protocol. TPU is present in the Topside Electronic Module (TEM) that acts as a router/gateway between the SEMs. ACE communicates with the TPUs over the TCP/IP through FMC722 protocol, which is implemented using the following Custom Algorithm Blocks (CAB).

- FMC COREACE block: This block interprets the incoming FMC722 messages and presents the values.
- FMC IOACE block: This block represents the input or output data of an IO device connected to a SEM.
- FMC SIGNATURE block: This block reads the signature data and saves in the file.
- FMC TCP block: This block performs TCP/IP communication with the TPUs.

Attention

Each TPU has a dedicated COREACE and TCP block. Therefore, if you have multiple TPUs, then multiple COREACE and TCP blocks are required to communicate between each other.

About the Firewall

As FMC is an external system to Experion, all communications must pass through the Experion recommended firewall. For example, you can use the Tofino firewall.

The TCP/IP communication ports in Tofino firewall are restricted in the range of 6100-6104.

Related topics

“About the FMC COREACE block” on page 9
“About the FMC TCP block” on page 10
“About the FMC IOACE block” on page 11
“About the FMC SIGNATURE block” on page 12
“About TPU redundancy” on page 15

2.1 About the FMC COREACE block

The FMC COREACE block understands the FMC722 protocol, extracts information from the FMC722 raw stream data, and stores the required information in the COREACE block buffer.

The FMC COREACE block also encodes the control information from the COREACE block buffer to the FMC722 protocol for sending the information to the TPU over TCP.

The FMC COREACE block is responsible for the following:

- TPU connection startup sequence
- Synchronizing the time to the TPU
- Pinging messages
- Handling signature requests
- Buffering the most recent errors received
- Processing IO data

2.2 About the FMC TCP block

The FMC TCP block establishes direct TCP/IP socket communication with TPUs. This TCP block passes the FMC722 packets between the TPU and the FMC COREACE block.

Attention
Each TPU has one dedicated FMC TCP block.

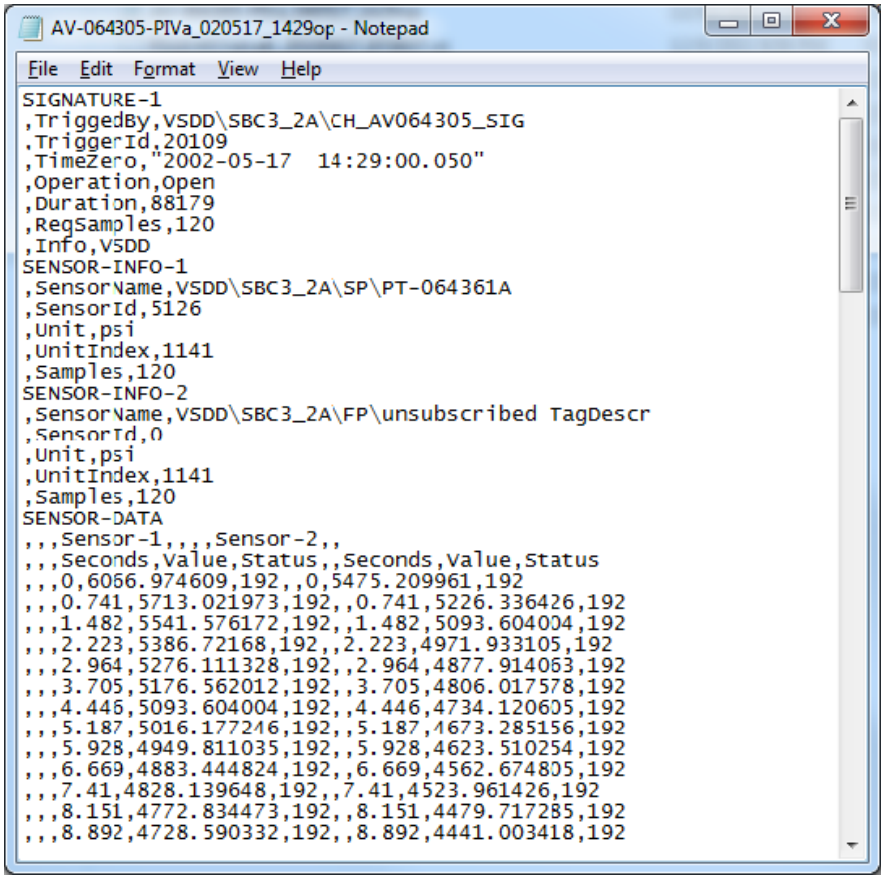
2.3 About the FMC IOACE block

The FMC IOACE block sends and receives FMC722 IO data from the FMC COREACE block. The FMC IOACE block can be configured as AI, AO, DI, or DO types. This block behaves similar to Experion IOCHANNEL function block.

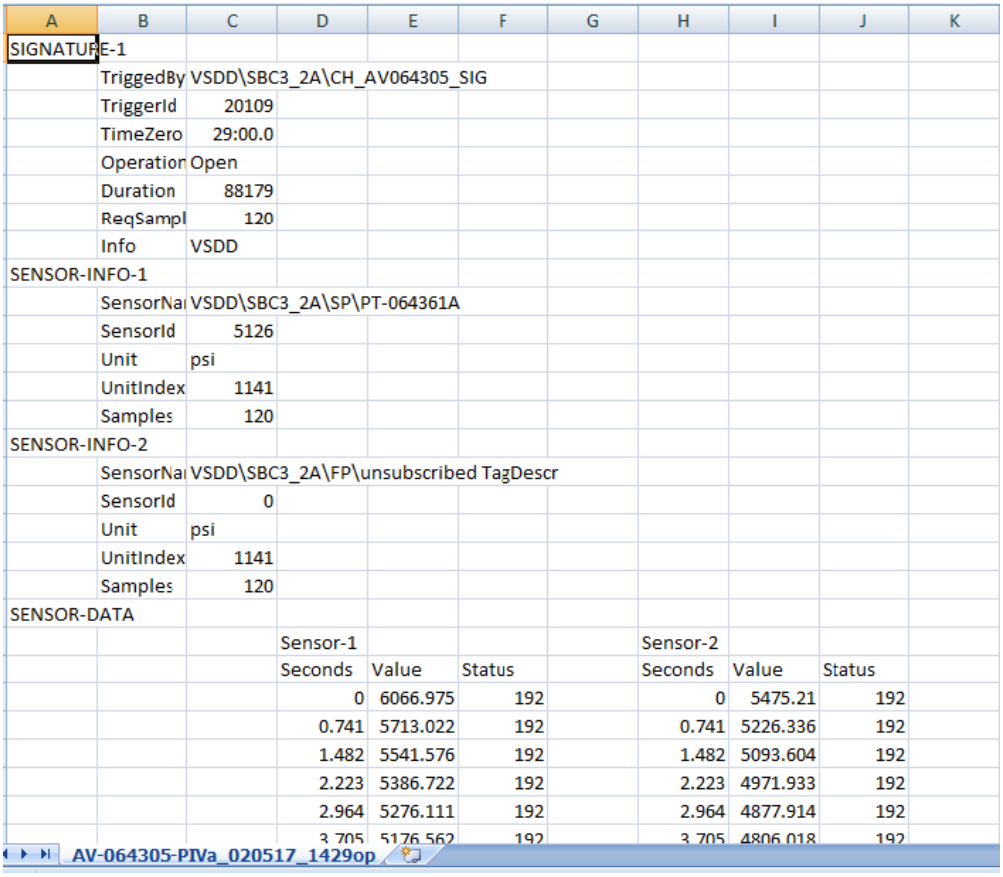
2.4 About the FMC SIGNATURE block

The FMC SIGNATURE block reads signature data from COREACE block buffer and saves it in the .csv format.

The following image is a sample of the contents of .csv file in text format.



When you open the .csv file in Microsoft Excel, the comma separated file appears as displayed in the following figure.



SIGNATURE-1										
	TriggedBy	VSDD\SBC3_2A\CH_AV064305_SIG								
	TriggerId	20109								
	TimeZero	29:00.0								
	Operation	Open								
	Duration	88179								
	ReqSampl	120								
	Info	VSDD								
SENSOR-INFO-1										
	SensorNa	VSDD\SBC3_2A\SP\PT-064361A								
	SensorId	5126								
	Unit	psi								
	UnitIndex	1141								
	Samples	120								
SENSOR-INFO-2										
	SensorNa	VSDD\SBC3_2A\FP\unsubscribed TagDescr								
	SensorId	0								
	Unit	psi								
	UnitIndex	1141								
	Samples	120								
SENSOR-DATA										
			Sensor-1				Sensor-2			
			Seconds	Value	Status		Seconds	Value	Status	
			0	6066.975	192		0	5475.21	192	
			0.741	5713.022	192		0.741	5226.336	192	
			1.482	5541.576	192		1.482	5093.604	192	
			2.223	5386.722	192		2.223	4971.933	192	
			2.964	5276.111	192		2.964	4877.914	192	
			3.705	5176.562	192		3.705	4806.018	192	

AV-064305-PIVa_020517_1429op

The file name of the .csv file is derived from the following attributes.

- Valve tag name
- Time stamp of the Signature
- Direction of movement to indicate “Op” for opening and “cl” for closing.

  Example: If the tag name is “AV064305”, the time stamp is ”2002–05–1714:29:00.050" and the valve operation is “open”, then the file name will be “AV-064305-PIVa_020517_1429op.csv”.

When the COREACE block receives the signature response, then the SIGNATURE block saves the data in a specified folder.

You can receive signature data from the TPU in one of the following methods.

- Automatic signature: Based on the configuration in TPU, data is sent by the TPU to the FMC COREACE block without any request.
- Requested signature: This is based on the requests defined by some of the FMC IOACE block parameters, such as SDB_FREQ, SDB_TAGIDX, and SDB_TIMEOUT.

The following signature types are supported.

- DO open signature
- DO close signature
- Sensor signature
- AO open signature “number one”
- AO close signature “number one”
- AO open signature “number two”
- AO close signature “number two

As the signature files are saved in the Hard Disk Drive, ensure you have enough disk space for saving signature data. Failure to save the signatures due to reasons such as, access restrictions, lack of disk space, and so on is

indicated by the FMC COREACE block through the Boolean parameter SAVEFAIL. The reason is indicated by the PROGSTSDESC parameter. You can configure an alarm using the SAVEFAIL parameter.

About the Disk Memory Alarm (DSKMEMALM) parameter

The DSKMEMALM is a parameter set to ON when the HDD memory (in MB) reduces to a value less than DSKMEMCUTOFF (Disk Memory Cutoff). You can configure an alarm using this parameter. For more information about configuring alarms using the FLAG block, see *Control Builder Components Theory* in Experion documentation.

Attention

Ensure that enough disk space is available when such an alarm is noted in the Experion Station.

2.5 About TPU redundancy

Although redundancy is not in-built, this solution can be engineered to support TPU redundancy.

ACE strategies are built to support two independent channels of communication to a pair of redundant TPUs.

Tip
Ensure you use IO redundancy logic to engineer the redundancy.

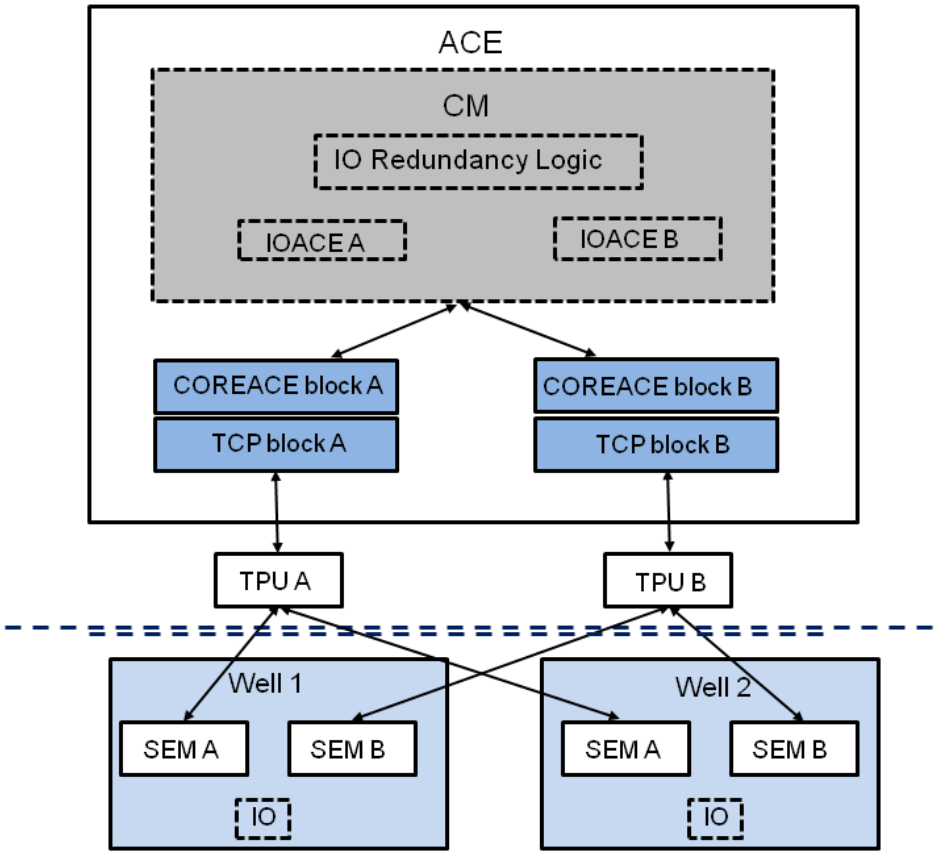


Figure 3: Topology diagram of TPU redundancy

Based on the topology, communication takes place in parallel between IOACEA and IOACEB. The two IOACE blocks communicate with their respective TPUs even though physical IOs may or may not be redundant. A redundant pair of SEMs services a single well.

3 Configuration of FMC722 on ACE solution

ACE communication with TPUs through the FMC722 protocol is established by configuring the following CAB block types.

- FMC COREACE
- FMC TCP
- FMC IOACE
- FMC SIGNATURE

Limitations

The maximum number of CAB instances for all FMC blocks is limited to 10000. However, if you load 2000 instances of non-FMC CAB block types, then the FMC CAB instance is limited to 8000. Therefore, the CAB instances for non-FMC blocks is limited to 2000.

Related topics

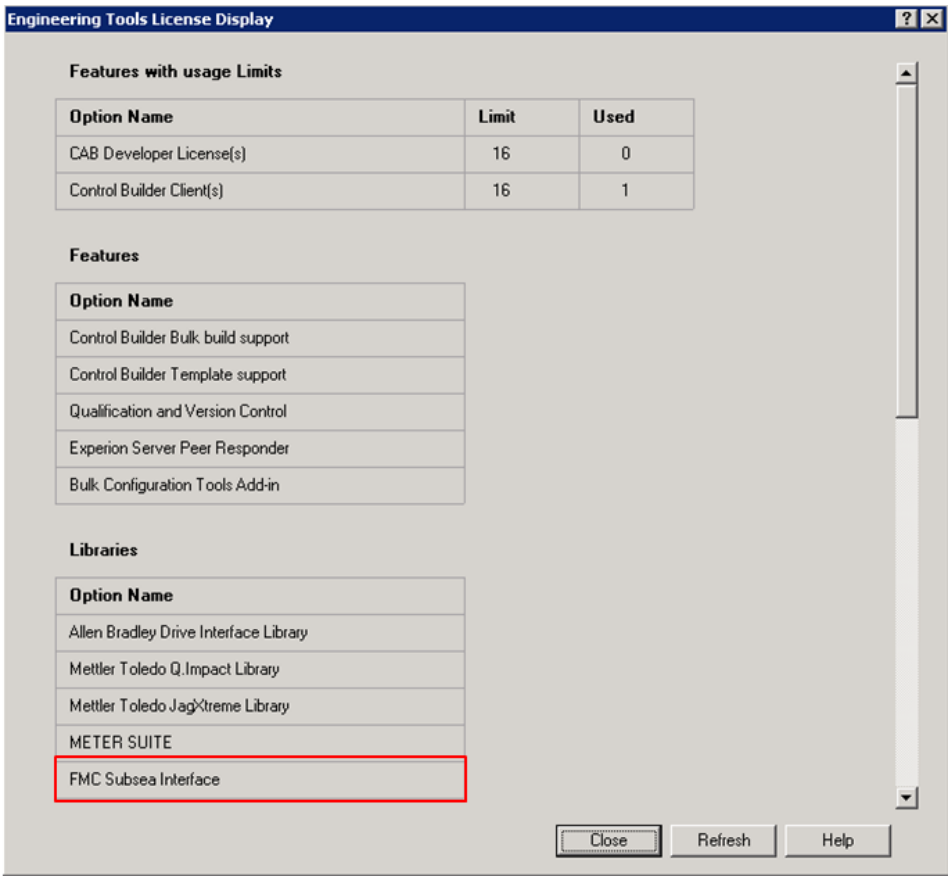
“About FMC CAB blocks license” on page 18
“Import the FMC CAB block types” on page 19
“Configuring the FMC COREACE block” on page 21
“Configuring the FMC TCP block” on page 23
“Configuring the FMC IOACE block” on page 25
“Configuring the FMC SIGNATURE block” on page 28

3.1 About FMC CAB blocks license

With Experion R431, FMC Subsea Interface is a licensed feature and must be purchased separately. For more information, contact your Honeywell representative.

To view the license status of the FMC Subsea Interface in R431

- In Control Builder, click **View** > **License Display**.
  The **Engineering Tools License Display** page appears.



3.2 Import the FMC CAB block types

The FMC CAB block types can be imported into Engineering Repository Database (ERDB) through the **File** > **Import** menu option.

Attention

Import messages are recorded in a log file called “IXP_log.txt” within this directory: C:\ProgramData\Honeywell \Experion PKS

For more information about importing the block types into Control Builder, see *Control Building User’s Guide* in Experion documentation.

The following figure displays a sample Library view in Control Builder.

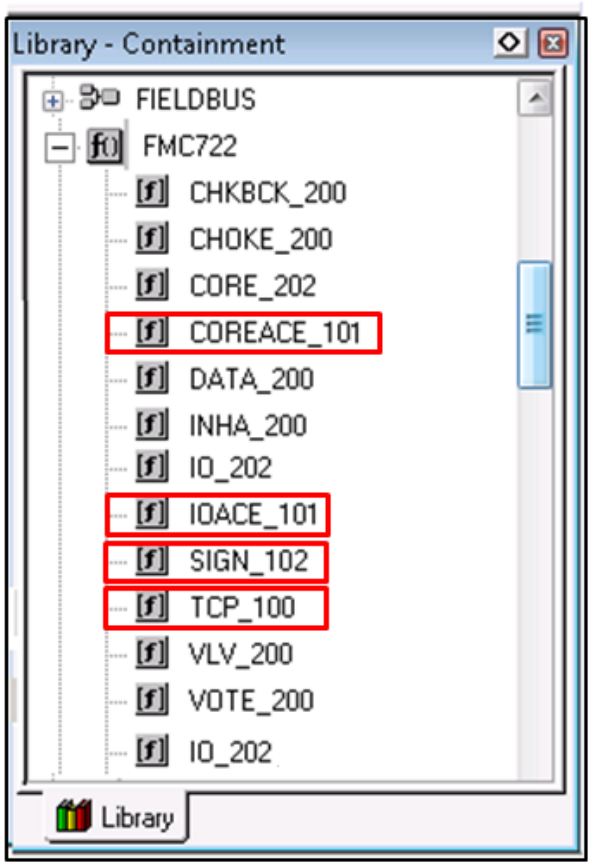


Figure 4: Library view in Control Builder

After the block types are imported, you must configure the strategies by dragging the instances in the Control Module chart. For more information about configuring the strategies, see *Control Building User’s Guide* in Experion documentation.

The version number of the block type is indicated by the number after the underscore in the function block name. The three digits indicate the major/medium/minor version.

The FMC722 library includes the following:

- C300 specific blocks : CORE_xxx, DATA_xxx, and IO_xxx
- ACE specific block, COREACE_xxx, IOACE_xxx, TCP_xxx, and SIGNATURE_xxx
- All other blocks are common to ACE and C300.

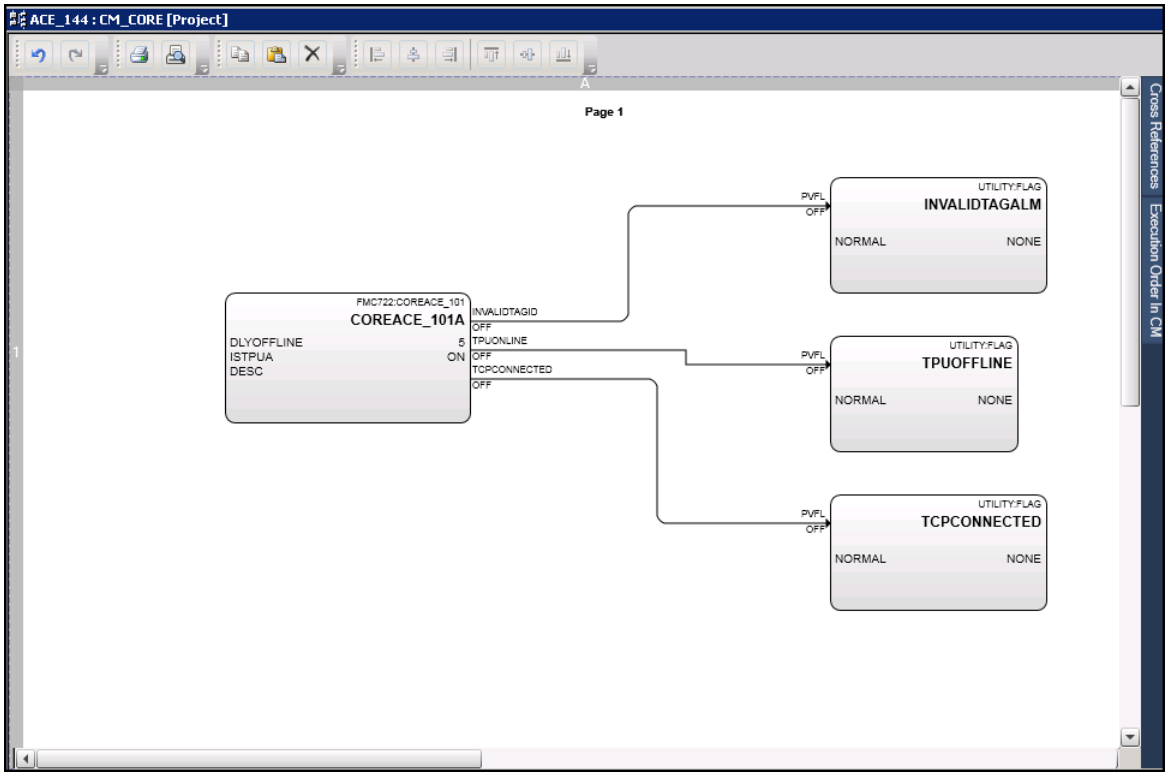
Attention

If a new set of blocks are distributed, then you have to perform a Change Parent operation on the existing block instance. For more information refer to *Custom Algorithm Block and Custom Data Block User's Guide* in Experion documentation.

3.3 Configuring the FMC COREACE block

Similar to Experion function blocks, you need to drag and drop one single instance to the Control Module chart to configure strategies. The FMC COREACE block configures a small number of Custom Data parameters.

The following figure displays a sample Control Module after instantiation of FMC COREACE block for alarming.



Attention

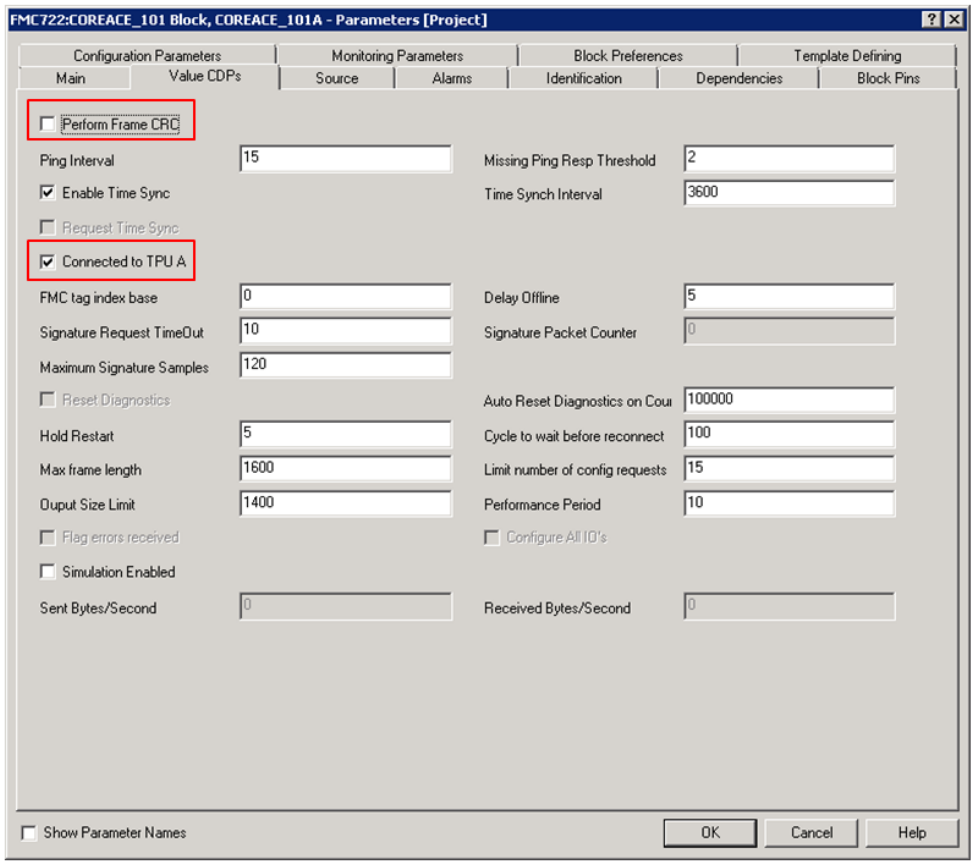
To configure an alarm based on the COREACE block communication status, use the following:

- UTILITY:FLAG block to annunciate alarm/events.
- UTILITY:MESSAGE block to annunciate message.

For more information about configuring alarms using FLAG block, see *Control Builder Components Theory* in Experion documentation.

To configure the value CDPs for the FMC COREACE block

1 On the FMC COREACE block configuration page, click the **Value CDPs** tab.
The following page appears.



2 Specify the following:

- **Connected to TPU A**: Indicates the parameter that must be set to TRUE for the FMC COREACE block that is connected to the TPUA.
- **Perform Frame CRC**: Indicates the parameter that must match the frame CRC setting on the TPU.

> **Attention**
> The FMC COREACE block configures a small number of Custom Data parameters. You can retain the default values for all other parameters. For more information on each of these parameters, see the *FMC722 on ACE Parameters Reference*.

3 Click **OK.**

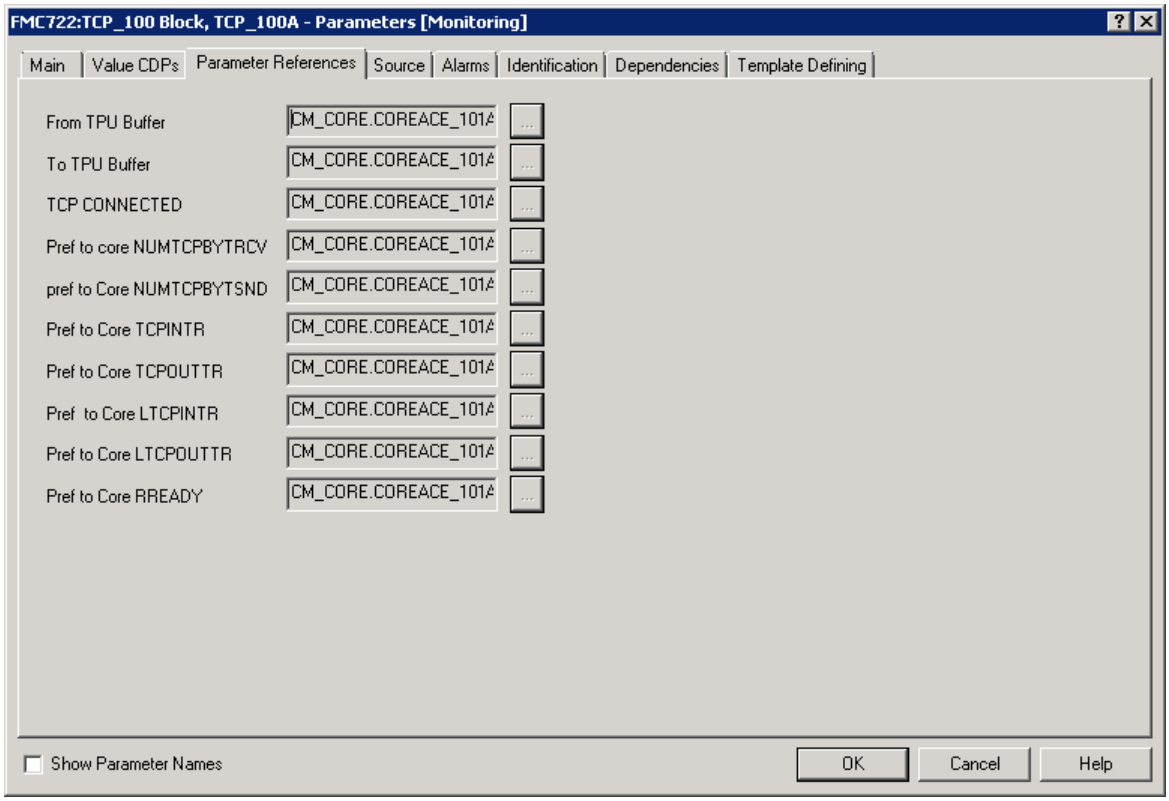
3.4 Configuring the FMC TCP block

The FMC TCP block helps in communicating over TCP/IP with TPUs. It passes the FMC722 packets between the TPU and the FMC COREACE block. The TCP block and COREACE block communicates using parameter references.

For more information about parameter references, see *Control Building User's Guide* in Experion documentation.

To configure the parameter references for the FMC TCP block

1 On the FMC TCP block configuration page, click the **Parameters Reference** tab.
The following page appears.



2 Specify the following:

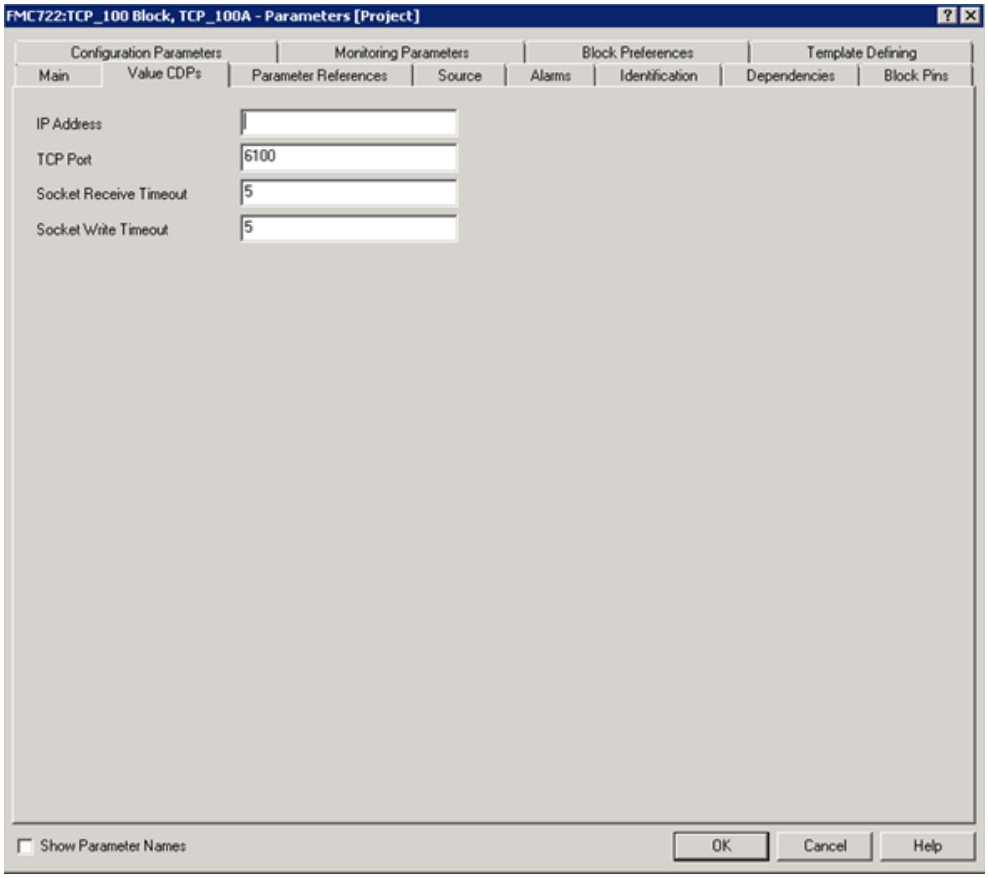
- **From TPU Buffer**: Specify the reference to the DATABUFRMTPU parameter of the FMC COREACE block.
- **To TPU Buffer**: Specify the reference to the DATABUTOTPU parameter of the FMC COREACE block. It should always refer to the zeroth index of the DATABUFRMTPU parameter.
- **TCP CONNECTED**: Specify the reference to the TCPCONNECTED parameter of the FMC COREACE block to indicate that the TCP block is connected to TPU.
- **Pref to core NUMTCPBYTRCV**: Specify the reference to the NUMTCPBYTRCV parameters of the FMC COREACE block to indicate the number of bytes received from the TCP socket.
- **Pref to core NUMTCPBYTSND**: Specify the reference to the NUMTCPBYTSND parameter of the FMC COREACE block to indicate the bytes sent to the TCP socket.
- **Pref to core TCPINTR**: Specify the reference to the TCPINTR parameter of the FMC COREACE block to indicate the transaction counters between FMC COREACE and TCP blocks.
- **Pref to core LTCPOUTTR**: Specify the reference to the LTCPOUTTR parameter of the COREACE block to indicate the transaction counters between FMC COREACE and TCP blocks.

- **Pref to core TCPOUTTR**: Specify the reference to the TCPOUTTR parameter of the COREACE block to indicate the transaction counters between the FMC COREACE and the TCP blocks.
- **Pref to core RREADY**: Specify the reference to the RREADY parameter of the COREACE block parameter to identify if the FMC COREACE block is ready to receive the next data buffer.
- **Pref to core LTCPINTR**: Specify the reference to the LTCPINTR parameter of the COREACE block to indicate the transaction counters between FMC COREACE and TCP blocks.

3 Click **OK**.

To configure the value CDPs in the FMC TCP block

1 On the FMC TCP block configuration page, click the **Value CDPs** tab.
The following page appears.



2 Specify the following:

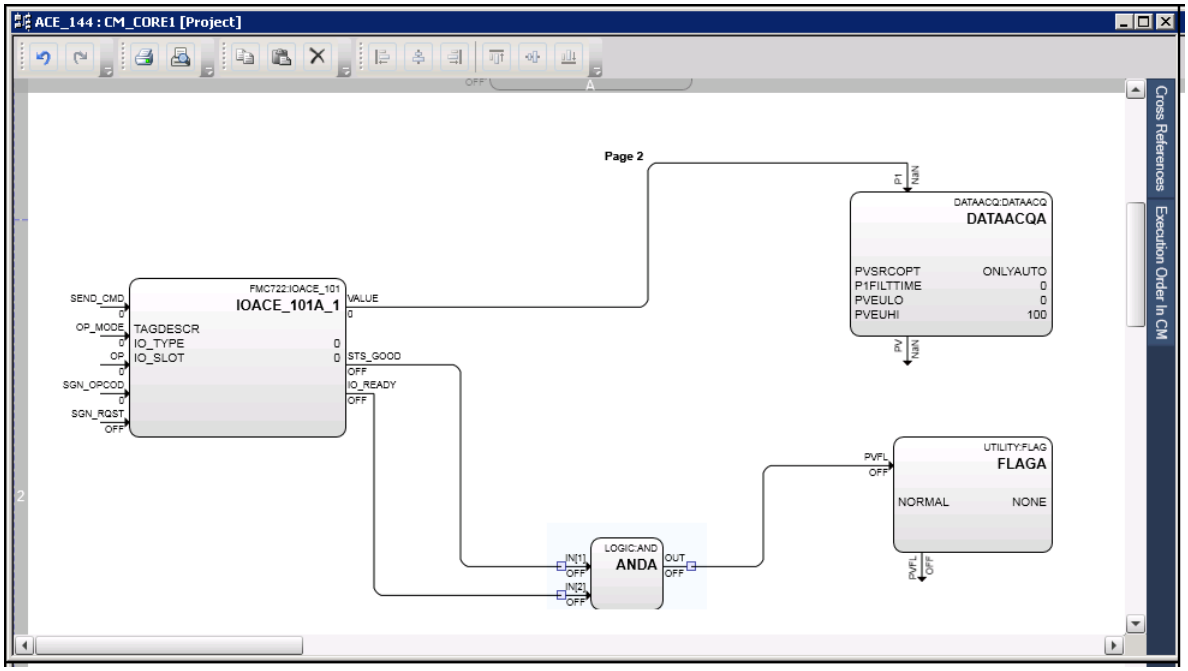
- **IP Address**: Specify the TPU IP address.
- **TCP Port**: Specify the port number through which the TCP block communicates with the TPU.
- **Socket Receive Timeout**: Indicates the socket time out for receiving, in milliseconds. The default value is 5 milliseconds.
- **Socket Write Timeout**: Indicates the socket time out for a write operation, in milliseconds. The default value is 5 milliseconds.

3 Click **OK**.
For more information about the parameters, see *FMC722 on ACE Parameter Reference*.

3.5 Configuring the FMC IOACE block

The FMC IOACE block consists of reference parameters to the FMC COREACE block.

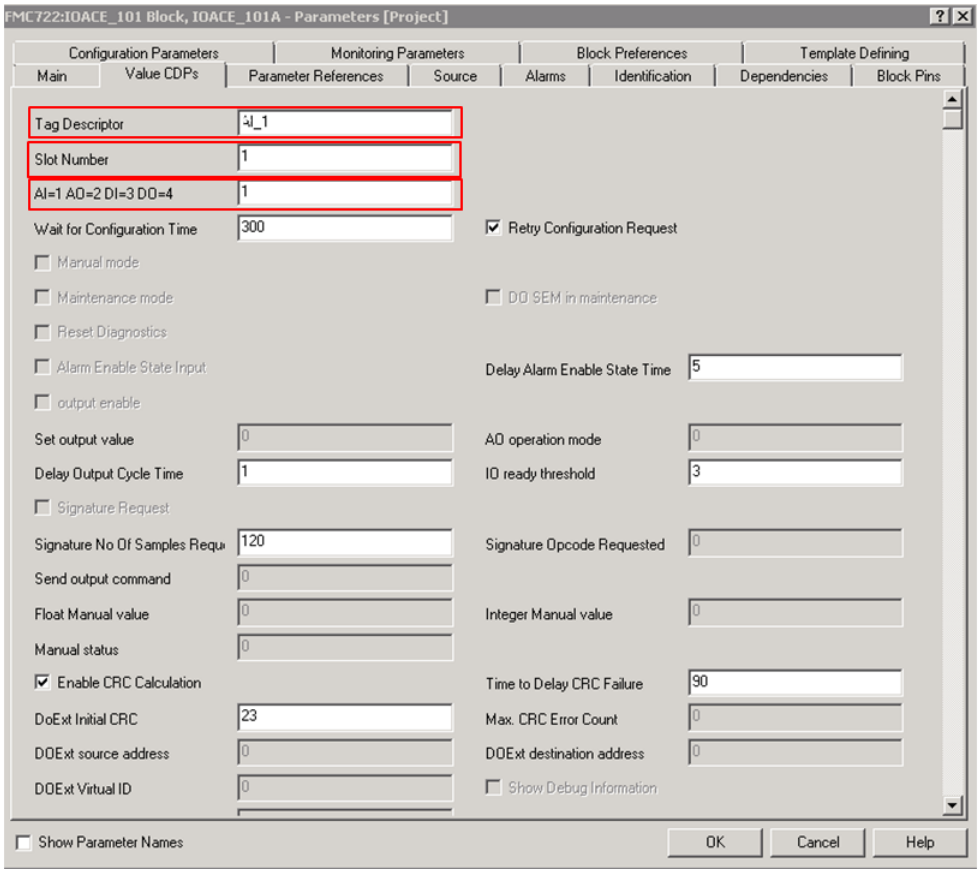
The following figure displays a sample Control Module after instantiation of the FMC IOACE block.



To show a good status an AND block has been implemented that triggers a good output if both the IO_READY and the STS_GOOD parameters are good. The DACA block is used to process the input value, alarms, and so on.

To configure the value CDPs for the FMC IOACE block

1 On the FMC IOACE block configuration page, click the **Value CDPs** tab.
The following page appears.



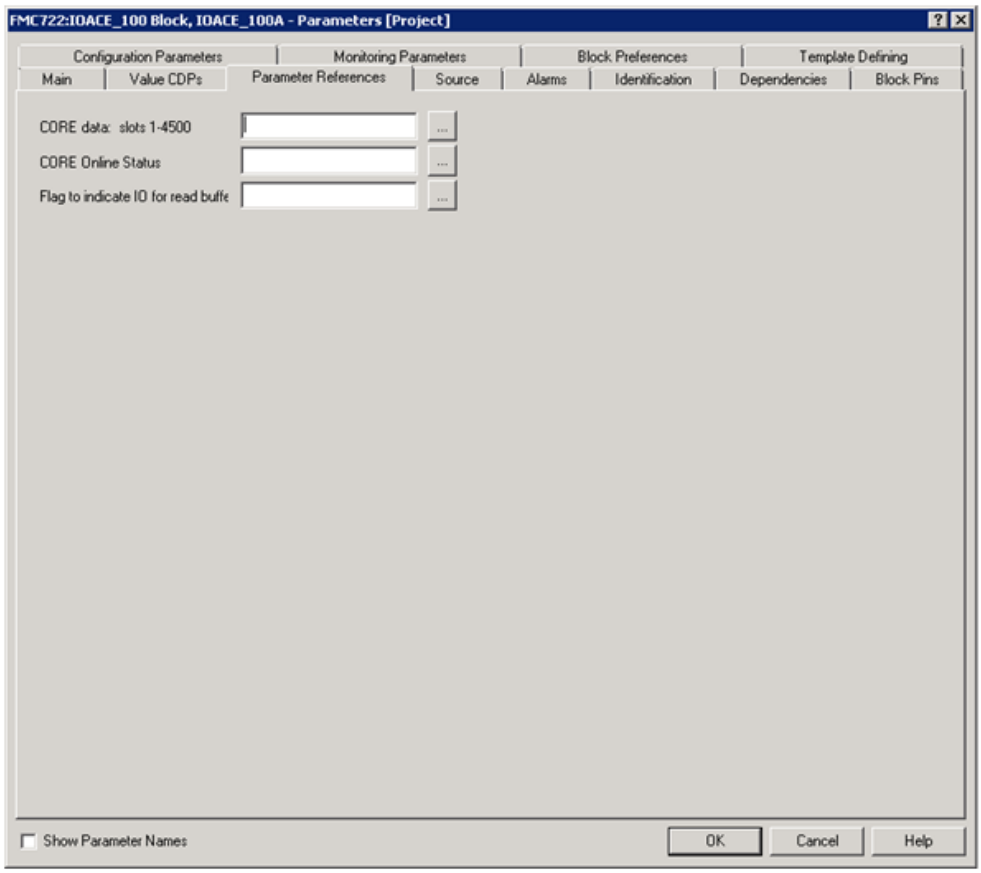
2 Specify the following:

- **Tag Descriptor**: Specify the tag description of the FMC IOACE block. This tag name must be identical to the tag name provided during configuration of TPU.
- **Slot Number**: Specify the tag index of FMC IOACE block. This tag index must be unique across IOACE blocks configured to their respective COREACE block.
- **AI=1 AO=2 DI=3 DO=4**: Specify the following FMC IOACE types. The IO types must be identical to the IO types provided during the configuration of TPU.
  - AI: 1
  - AO: 2
  - DI: 3
  - DO: 4

3 Click **OK**.

To configure the parameter references for the FMC IOACE block

1 On the FMC IOACE block configuration page, click the **Parameter References** tab.
The following configuration page appears.



2 Specify the following:

- **CORE data slots 1–4500**: Specify the reference to DATABUF1- DATABUF23 parameter of the FMC COREACE block. This reference must be calculated based on IO_SLOT value. One DATABUF can accommodate 200 IOs. Therefore, SLOT 1-200 is in DATABUF1. 201-400 in DATABUF2,401-600 in DATABUF3,601-800 in DATABUF4 and so on.
- **CORE Online Status**: Specify the reference to the COREWDC parameter of the FMC COREACE block.
- **Flag to indicate IO for read buffer**: Specify the reference to the RCVNEWIODATA parameter of the FMC COREACE block. The index of the array must match the IO Slot parameter value.

For more information about parameters, see *FMC722 on ACE Parameter Reference*.

3 Click **OK**.

Attention

The IOACE block fails to execute in the following scenarios. Note this is an intended behavior. To analyze and correct the error, see the PROGSTSDESC parameter.

- Unknown tag name: If the tag name does not match with the tag name provided during the configuration of TPU.
- IO type mismatch: If the IO type does not match with the IO type provided during the configuration of TPU.
- Tag index already exists:
- TPU fails while building the configuration response

For more details about PROGSTSDESC parameter, see *Custom Algorithm Block and Custom Data Block User's Guide* in Experion documentation.

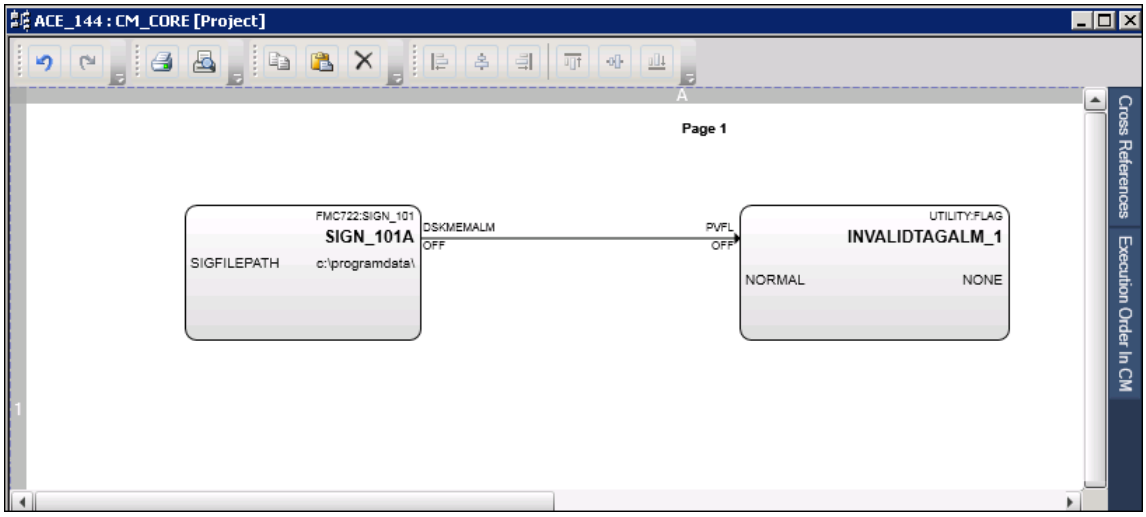
3.6 Configuring the FMC SIGNATURE block

The FMC SIGNATURE block has a path configuration parameter known as “SIGFILEPATH.” The path must point to a directory in ACE node where ACE application has read and write permissions.

Attention

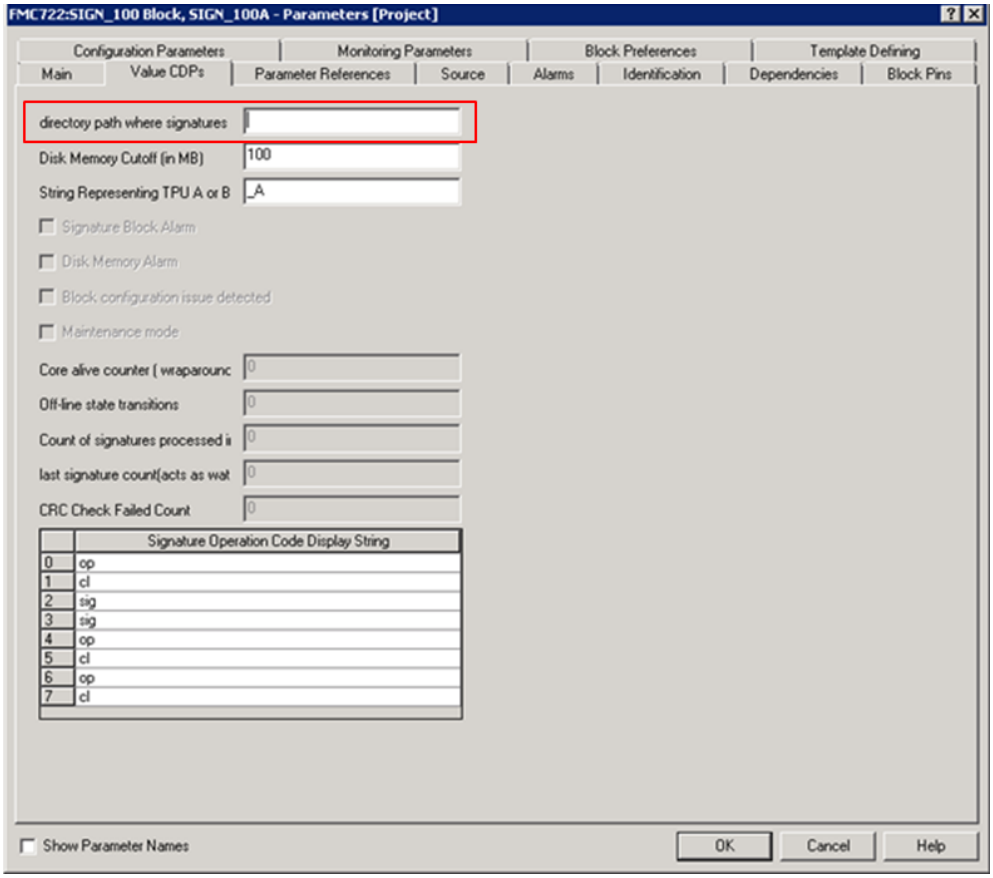
- If you configure the SIGFILEPATH parameter to a directory where you do not have write access , then the CAB block will go into exception state. Hence, the directory must be valid as the CAB block cannot validate the directory during the configuration.
- You can configure the alarm for DSKMEMALM parameter using Experion function blocks. Ensure enough disk space is available by deleting or archiving old signature files.

The following figure displays a sample Control Module after instantiation of the FMC SIGNATURE block.



To configure the value CDPs for the FMC SIGNATURE block

1 On the FMC SIGNATURE block configuration page, click the **Value CDPs** tab.
The following page appears.

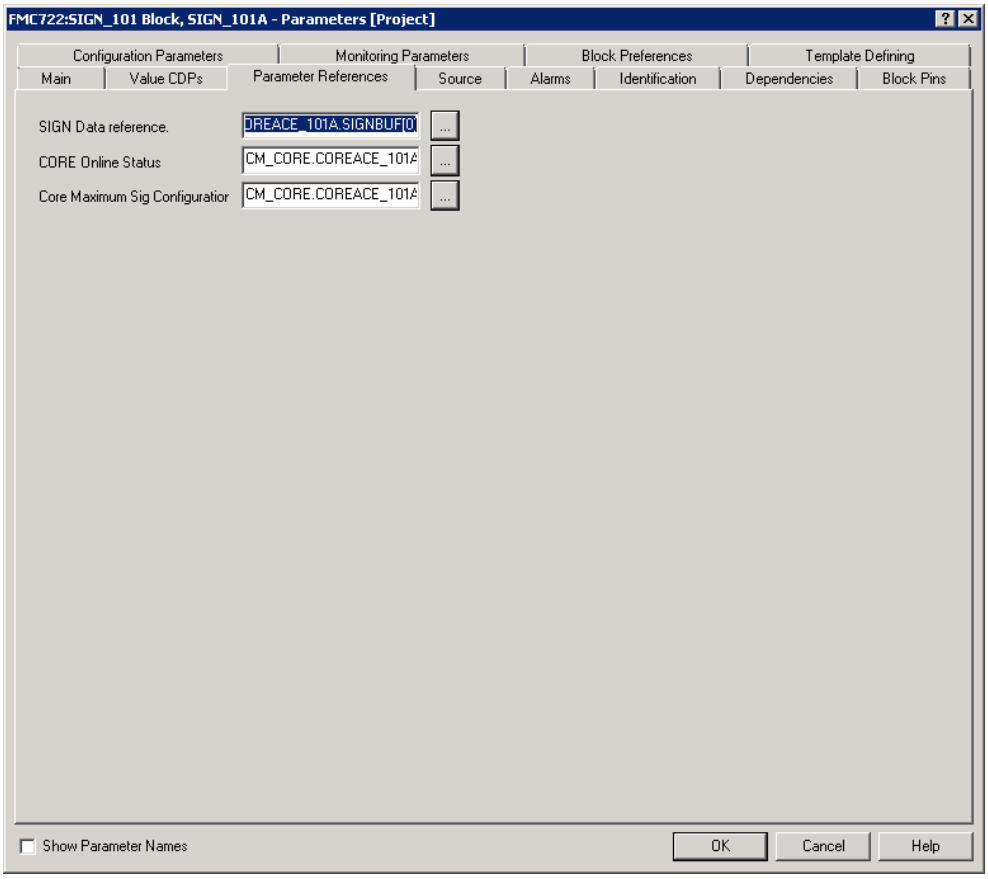


2 In the **directory path where signatures** box, specify the path to save the signature file. The path that you specify must have access to a local server.

3 Click **OK**.

To configure the parameter references for the FMC SIGNATURE block

1 On the FMC SIGNATURE block configuration page, click the **Parameter References** tab.
The following page appears.



2 Type or select the following:

- **SIGN Data Reference:** Specify the reference to the SIGNBUF parameter of the FMC COREACE block.
- **CORE Online Status:** Specify the reference to the COREWDC parameter of the FMC COREACE block.
- **Core Maximum Sig Configurator:** Specify the reference to the MAXSIGSAM parameter of the FMC COREACE block.

3 Click **OK**.

For more information about the parameters, see the*FMC722 on ACE Parameter Reference.*

4 Notices

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4.2 How to report a security vulnerability

For the purpose of submission, a security vulnerability is defined as a software defect or weakness that can be exploited to reduce the operational or security capabilities of the software.

Honeywell investigates all reports of security vulnerabilities affecting Honeywell products and services.

To report a potential security vulnerability against any Honeywell product, please follow the instructions at:

https://honeywell.com/pages/vulnerabilityreporting.aspx

Submit the requested information to Honeywell using one of the following methods:

- Send an email to security@honeywell.com.

  or

- Contact your local Honeywell Process Solutions Customer Contact Center (CCC) or Honeywell Technical Assistance Center (TAC) listed in the “Support and other contacts” section of this document.

4.3 Support

For support, contact your local Honeywell Process Solutions Customer Contact Center (CCC). To find your local CCC visit the website, https://www.honeywellprocess.com/en-US/contact-us/customer-support-contacts/Pages/default.aspx.

4.4 Training classes

Honeywell holds technical training classes on Experion PKS. These classes are taught by experts in the field of process control systems. For more information about these classes, contact your Honeywell representative, or see http://www.automationcollege.com.