DeltaV / Mettler Toledo Q-Impact Data Connection

Introduction

The Q-Impact allows class1 implicit and unconnected (UCMM) explicit connections via EthernetIP from the VIM (Virtual I/O Module) in a DeltaV IO rack. For class1, the Q-Impact acts as a server, with the DeltaV controller receiving from and writing data to locations in the Q-Impact Assembly tables. For UCMM, the Q-Impact also acts as a server receiving the UCMM messages and returning successful status (and data, if requested). The assembly areas are mapped in the Q-Impact to data that is used in the Q-Impact logic. These assembly areas are continuously updated between the Q-Impact and the VIM. The Q-Impact mapping is specific for the connection and may not be modified. Depending on the configuration in the Q-Impact, the size and location of the data used may vary. MYNAH supplies three connection definition files (vdf files) that may be imported and used as is, or as a start for configuring the actual connection definitions. Once these have been defined, then they may be added to the configuration of any VimNet Explorer vio definition. The three files define different types of connections: one class1 IO connection, one UCMM read, and one UCMM write.

Since these contain a mix of data types, the connection to DeltaV is “mapped” to allow the use several DeltaV datasets with different data types that hold values from different portions of the data buffers of the connection, dependent on the type of data in the buffer. The mapped connections are used to transfer complex data structures between the two systems.

VIM Configuration

This section provides information for configuring Q-Impact connections to the VIM. It assumes the user is familiar with configuring the VIM using the VimNet Explore utility.

Open the VimNet Explorer. If the appropriate configuration is not already loaded, create a configuration containing the VIM and Q-Impact Device. Right click on the “EthernetIP Connection Library” leaf in the navigation panel on the left of the display. Select “Add Connection Definition” or “Import Connection Definition” to load one of our default vdf files.

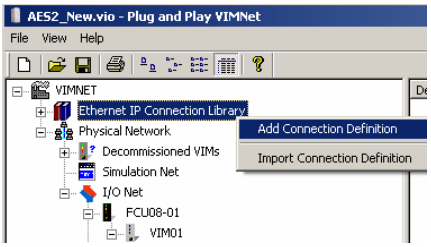
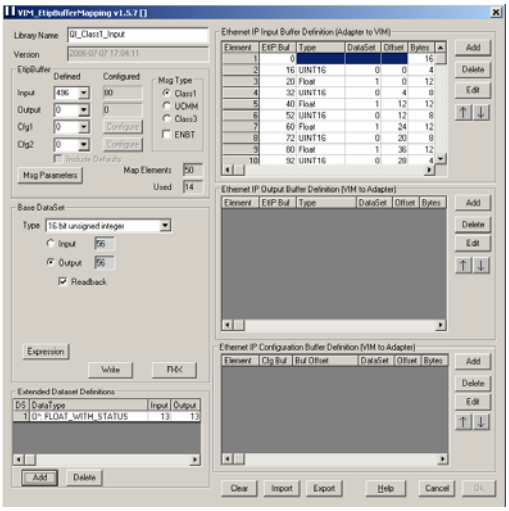


Figure 1

Next, right click on the definition and select “Properties”. This opens the “VIM_EtipBufferMapping” Utility shown in Figure 2. This is the utility that allows the configuration of the connection between the VIM and the Q-Impact. This figure shows the definition of the Q-Impact2.vdf (Class1 IO) module we supply as a starting point.

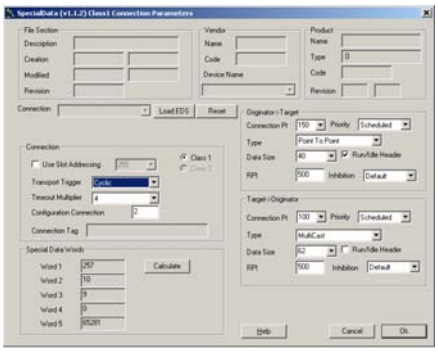


If you wish, you may enter a new name in the “Library Name” field. Then edit the Etip Buffer section below if necessary. Make sure the message type radio button (Class1) is checked, and the ENBT field is unchecked.

In the “Input” and “Output” fields, show the selected the number of bytes that will be included in the communications message buffers. The Input specified the size of the Q-Impact to VIM (target to originator or TO), which is the assembly data in the Q-Impact that will be transmitted to the VIM, while the Output specifies the bytes transmitted from the VIM to the Q-Impact (Originator to target or OT). The defaults for the Q-Impact are 496 and 0. These are fixed values for the Q-Impact.

Figure 2

Next, select the “MsgParameters” button to open the “SpecialData” utility (Figure 3). This utility allows you to enter or modify the necessary parameters to configure the actual Ethernet/IP Class1 connection. For the Q-Impact, these are fixed and should not be changed.

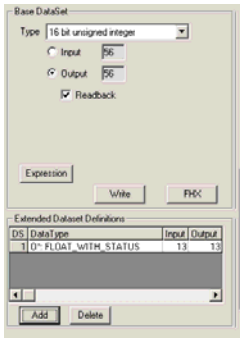


In Figure 3, the Originator (VIM) to Target (Q-Impact) is 150. Both OT and TO connections should be to “Scheduled” and Inhibition “Default”. The OT connection should be “Point to Point” while TO should be “MultiCast”. Make sure the OT connection has the “Run/Idle Header” checkbox checked and the TO does not. Next, set the RPI (requested packet interval) to the required interval. This is the expected time for the Q-Impact (TO) and VIM (OT) to send data messages. The Data size for both of these was set using the “VIM_EtipBufferMapping” utility.

Figure 3

Finally, the overall connection parameters are the “Use Slot Addressing” (unchecked), Transport Trigger, “Cyclic”, and Timeout Multiplier (4). Configuration Connection should be 0.

If any value has been changed, the last step in the SpecialData words is to select “OK” to save these parameters into the current connection definition in the VIM_EtipBufferMapping” utility. To exit without modifying the definition, select “Cancel”.



In the VIM_EtipBufferMapping” utility, select the datasets to map these connections to. Since there is mapped data with float and non-floating point data, this will require two datasets. In Figure 4, the first dataset is configured as a 16-bit unsigned integer output (with read-back). The second dataset is configured as a floating-point output dataset with read-back. This allows the connection to read discrete and unsigned integer data to one set of values and floating point to the second set.

Figure 4

Next, you can see that specific registers are mapped to the transfer buffer. Double click (or select "edit" button) in the EthernetIP Input Buffer Definition (Adapter to VIM) to add the Input Definition. Note the first set does not show a dataset or offset. This is an "unmapped" element to allow the first bytes of the buffer to be ignored.

This dialog allows the user to select the dataset (1: UINT16_WITH_STATUS for integer, and 1: FLOAT_WITH_STATUS for the floating-point inputs) for each section of the buffer to be used. Each element points to a specific range of bytes in the buffer and maps these to the specific dataset registers for that type (or specifies them as unmapped).

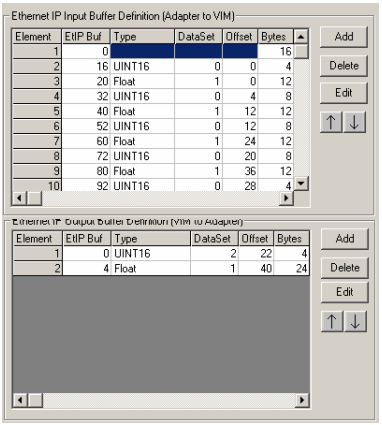
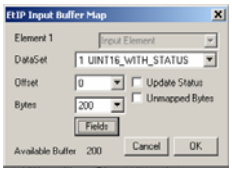


Figure 6

Figure 5



Selecting the "Fields" button will open a dialog (Ethernet/IP Buffer Fields) shown in Figure that will allow the you to enter a series of field definitions. Each field may specify a Q-Impact tag definition assigned to the assembly table(s) for the connection. These have no effect on the communications between the Q-Impact and DeltaV; however, the field definitions allow you to document the format of the transfer buffer and will show the specific DeltaV dataset registers associated with the specified fields. Each field is added by selecting the "Add" button, then filling out the parameters (including the data type of the field), the starting byte in the field, and bit (if a bit field). Also, the size (elements) may be set if the field is an array of the data type.

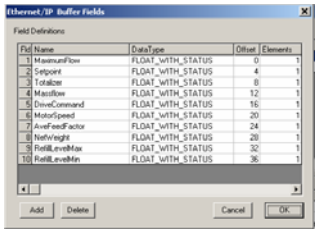
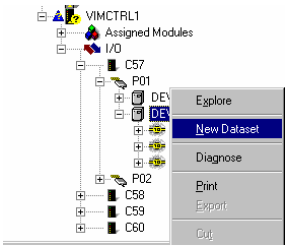


Figure 7

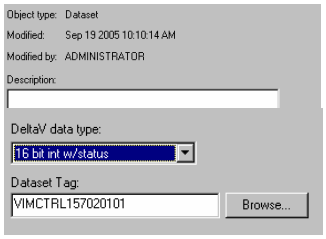
Finally, you select "OK" on all of the dialog boxes to accept the configured values or "Cancel" to leave them unmodified. You are returned to the VimNet Explorer "Ethernet IP Connection Library" with the new definition added. To add this to the VIM configuration, select the Node, the specific VIM, card, port and device for the connection, then right click on the device and select "Add Connection." In the dialog box, add a description and select the specific connection definition from the "Ethernet Device Definition" combo box. The connection is added to the list and the next available dataset(s) in DeltaV are assigned. You can open this connection by selecting the plus (+) in front of it, and examine the definition of each assigned dataset here. When configuring the actual DeltaV datasets (DeltaV Explorer), you may use these definitions as a reference.

DeltaV Configuration

The actual connection between the Q-Impact and DeltaV is configured in VimNet Explorer. The DeltaV dataset(s) assigned in DeltaV Explorer may be on any card (57-60) / port(1-2) and device, but they must match the definition as specified in VimNet Explorer. One or more datasets are assigned to a connection as necessary. The first dataset defines the connection; the remaining datasets for the connection (if required) must immediately follow the first.

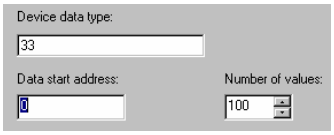


To start, use DeltaV Explorer to select the device. Right click, and select "New Dataset" to open the Dataset properties dialog. Select the data direction of the connection data for this dataset. If you are assigning an output assembly instance (AO) to the data this would be "Output", if the assembly instance was input (AI), then use "Input". Refer to the VimNet Explorer definition of the dataset for actual requirements.

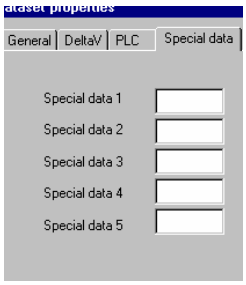


The DeltaV tab of the dataset property box is used to select the data type of the data that will be presented. This should be appropriate for the data that will be accessed in the Q-Impact. If the data in the assembly table is floating point, only a floating point dataset in DeltaV is appropriate as noted above. Mapping of datasets in the connection will allow this to be assigned separately from integer and bit registers.

On the PLC tab, the "Device data type" may be specified, but is not required. If specified, the first dataset associated with the connection is specified with a device data type of 39 (mapped EthernetIP Class1 client) or 41 (mapped UCMM client) on the PLC tab. The remaining datasets are assigned 36 (EthernetIP extension data). In addition, the number of values on this tab will determine the size of the connection data read/written from this dataset. The number of registers in the associated datasets mapping elements determines the total data in both directions, by the data direction, type, and size in each dataset.



All words on the special data tab should be 0 (any values here are ignored).



Reading Data from the Matroller (Class1 IO Data)

Class1 Input Field Xreferences

This section details the input fields supplied by the Class1 Input connection. These are all read-only data values. These are updated at the selected RPI (requested packet interval) for the connection.

Data	Buffer Offset (Size)	DeltaV Register	Element(s)
S1 Channel Number	0(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	Low Byte
S1 PAC Data Integrity Bit	1:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 8
S1 Instrument data integrity OK	1:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 9
S1 Scale over capacity	1:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 10
S1 Scale under zero	1:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 11
S1 Scale Motion	1:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 12
S1 Material Transfer Cycle Active	1:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 13
S1 Final Control Element Output	1:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 14
S1 Waiting for Ack	1:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	bit 15
S1 Feed Type	2:0(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	2 bits starting at bit 0
S1 Manual-Not Auto-Mode	2:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 2
S1 Gross Weight Feed	2:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 3
S1 Feed Override Active	2:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 4
S1 Feed Failed	2:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 5
S1 Communications Error	2:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 6
S1 Device Stability Warning	2:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 7
S1 Very Unstable Device	3:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 8
S1 Too High or Low Flow	3:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 9
S1 3x Average Flow At Cuttoff	3:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 10
S1 Fast Feed Rate Alarm	3:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 11
S1 Wait for All Overlap Requests	3:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 12
S1 Waiting to Start Primary	3:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 13
S1 Primary Overlapped Feed	3:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 14
S1 Secondary Overlapped Feed	3:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	bit 15
S1 Feed Weight	4(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R1.CV'	1 Registers
S1 Gross Weight	8(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R2.CV'	1 Registers
S1 Rate of Change Weight	12(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R3.CV'	1 Registers
S1 Slow Step Time Remaining	16(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R3.CV'	1 Registers
S1 Est Time to Complete	18(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R4.CV'	1 Registers
S2 Channel Number	20(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	Low Byte
S2 PAC Data Integrity Bit	21:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 8
S2 Instrument data integrity OK	21:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 9
S2 Scale over capacity	21:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 10
S2 Scale under zero	21:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 11
S2 Scale Motion	21:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 12
S2 Material Transfer Cycle Active	21:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 13
S2 Final Control Element Output	21:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 14
S2 Waiting for Ack	21:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	bit 15
S2 Feed Type	22:0(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	2 bits starting at bit 0
S2 Manual-Not Auto-Mode	22:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 2
S2 Gross Weight Feed	22:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 3
S2 Feed Override Active	22:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 4
S2 Feed Failed	22:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 5
S2 Communications Error	22:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 6
S2 Device Stability Warning	22:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 7
S2 Very Unstable Device	23:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 8
S2 Too High or Low Flow	23:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 9
S2 3x Average Flow At Cuttoff	23:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 10
S2 Fast Feed Rate Alarm	23:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 11
S2 Wait for All Overlap Requests	23:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 12
S2 Waiting to Start Primary	23:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 13

S2 Primary Overlapped Feed	23:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 14
S2 Secondary Overlapped Feed	23:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R6.CV'	bit 15
S2 Feed Weight	24(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R4.CV'	1 Registers
S2 Gross Weight	28(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R5.CV'	1 Registers
S2 Rate of Change Weight	32(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R6.CV'	1 Registers
S2 Slow Step Time Remaining	36(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R7.CV'	1 Registers
S2 Est Time to Complete	38(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R8.CV'	1 Registers
S3 Channel Number	40(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	Low Byte
S3 PAC Data Integrity Bit	41:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 8
S3 Instrument data integrity OK	41:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 9
S3 Scale over capacity	41:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 10
S3 Scale under zero	41:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 11
S3 Scale Motion	41:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 12
S3 Material Transfer Cycle Active	41:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 13
S3 Final Control Element Output	41:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 14
S3 Waiting for Ack	41:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R9.CV'	bit 15
S3 Feed Type	42:0(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	2 bits starting at bit 0
S3 Manual-Not Auto-Mode	42:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 2
S3 Gross Weight Feed	42:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 3
S3 Feed Override Active	42:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 4
S3 Feed Failed	42:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 5
S3 Communications Error	42:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 6
S3 Device Stability Warning	42:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 7
S3 Very Unstable Device	43:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 8
S3 Too High or Low Flow	43:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 9
S3 3x Average Flow At Cuttoff	43:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 10
S3 Fast Feed Rate Alarm	43:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 11
S3 Wait for All Overlap Requests	43:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 12
S3 Waiting to Start Primary	43:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 13
S3 Primary Overlapped Feed	43:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 14
S3 Secondary Overlapped Feed	43:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R10.CV'	bit 15
S3 Feed Weight	44(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R7.CV'	1 Registers
S3 Gross Weight	48(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R8.CV'	1 Registers
S3 Rate of Change Weight	52(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R9.CV'	1 Registers
S3 Slow Step Time Remaining	56(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R11.CV'	1 Registers
S3 Est Time to Complete	58(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R12.CV'	1 Registers
S4 Channel Number	60(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	Low Byte
S4 PAC Data Integrity Bit	61:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 8
S4 Instrument data integrity OK	61:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 9
S4 Scale over capacity	61:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 10
S4 Scale under zero	61:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 11
S4 Scale Motion	61:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 12
S4 Material Transfer Cycle Active	61:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 13
S4 Final Control Element Output	61:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 14
S4 Waiting for Ack	61:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R13.CV'	bit 15
S4 Feed Type	62:0(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	2 bits starting at bit 0
S4 Manual-Not Auto-Mode	62:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 2
S4 Gross Weight Feed	62:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 3
S4 Feed Override Active	62:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 4
S4 Feed Failed	62:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 5
S4 Communications Error	62:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 6
S4 Device Stability Warning	62:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 7
S4 Very Unstable Device	63:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 8
S4 Too High or Low Flow	63:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 9
S4 3x Average Flow At Cuttoff	63:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 10
S4 Fast Feed Rate Alarm	63:3	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 11
S4 Wait for All Overlap Requests	63:4	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 12
S4 Waiting to Start Primary	63:5	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 13
S4 Primary Overlapped Feed	63:6	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 14
S4 Secondary Overlapped Feed	63:7	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R14.CV'	bit 15
S4 Feed Weight	64(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R10.CV'	1 Registers

S4 Gross Weight	68(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R11.CV'	1 Registers
S4 Rate of Change Weight	72(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R12.CV'	1 Registers
S4 Slow Step Time Remaining	76(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R15.CV'	1 Registers
S4 Est Time to Complete	78(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R16.CV'	1 Registers

Communications Buffer Definition (Cyclic Data Content)
(Definitions are from METTLER TOLEDO Q-IMPACT Matroller Technical Manual (7-02))

Word 0 –
16-bit checksum of all the channel data. Sum all data from word 9 to 248 ignoring overflows.

Word 1
Exact logical inverse of word

Word 8 (low byte)
Channel number

Word 8 (high byte)
0. PAC Data Integrity Bit alternates polarity every 5 seconds.
1. Instrument Data Integrity OK
2. Scale Over Capacity
3. Scale Under Zero
4. Scale Motion
5. Material Transfer Cycle Active
6. Final Control Element Output, 0 = Off, 1 = On
7. Waiting for Controller to Acknowledge Last Material Transfer/Hand Add complete

Word 9 (word)
1. Feed Type
2. Feed Type, 0=Gain In Weight, 1= Loss In Weight, 2= Flow Meter, 3 = Hand Add
3. Manual-Not Auto-Mode
4. Gross Weight Feed
5. Feed Override Active – external logic inhibited from removing feed permissive
6. Feed Failed
7. Communication Error
8. Device Stability Warning
9. Very Unstable Device
10. Too High or Too Low Flow at cutoff
11. Three Times Average Flow at cutoff
12. Fast Feed Rate Alarm
13. Wait for All Overlap Requests
14. Waiting to Start Primary" Overlapped Feed
15. Primary Overlapped Feed" In Progress
16. Secondary Overlapped Feed" In Progress

Word 10 Float (2x word)
"Feed Weight." This field is reset to zero at the beginning of a feed. During most feeds, this field contains the Net Accumulated Weight for the single feed. During Primary Overlapped feeds, this field contains the combined weight of all feeds. At completion of the feed, it contains the Delivered Weight for this feed.
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6-6 (7-02)

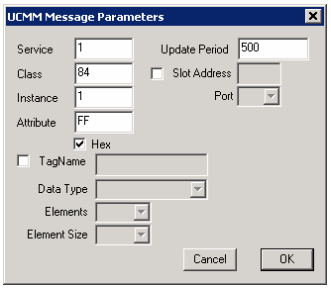
Word 12 Float (2x word)
"Gross Weight." For scales, this is the gross weight. For flow meters, this field is the same as Feed Weight.

Word 14 Float (2x word)
Rate of Change of Weight

Word 16 Word
Time until Slow Step Timer Expires in Seconds. 0 = Alarm.

Word 17 Word
Estimated Time to Complete in Seconds

Writing Data to the Matroller (UCMM)



Using ControlNet class 84h a block of data is read from the Q-IMPACT Matroller. The structure of the data block is as follows. Descriptions follow at the end. This is included in the definition (QI_UCCM_TriggeredWrite.vdf)

Output Field Xreferences. These are all write only data values. These are updated when the value in the ”WriteTrigger” is changed (incremented) in DeltaV logic. If the value is not incremented, no writes occur. If you wish a continuous update of the values in this buffer, then delete the last element (#4) in the output buffer definition. This will remove the “WriteTrigger” field as well as the mapping element for this, in this case the updates will be written at the update period specified.

Data	Buffer Offset (Size)	DeltaV Register	Element(s)
Channel Number	0(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	Low Byte
Sequence Number	1(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R1.CV'	High Byte
Material Path	2(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R2.CV'	1 Registers
Command	4(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R3.CV'	Low Byte
Group Number	5(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R3.CV'	High Byte
Overlapping Feed #	6(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R4.CV'	Low Byte
Setpoint	8(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R1.CV'	1 Registers
Pos Tolerance	12(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R2.CV'	1 Registers
Neg Tolerance	16(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R3.CV'	1 Registers
Material ID	20(20)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS01/R5.CV'	10 Registers
WriteTrigger	60(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS02/R4.CV'	1 Registers

Communications Buffer Definition (Definitions are from METTLER TOLEDO Q-IMPACT Matroller Technical Manual (7-02))

Word 0	low byte Channel number
Word 0	high byte Sequence number
Word 1	word Material Path
Word 2	low byte Command
Word 2	high byte Group number
Word 3	low byte Number or overlapping secondary feed
Word 3	high byte reserved
Word 4	float Setpoint, (target weight)
Word 6	float pos tolerance (enter a positive number)
Word 8	float neg tolerance (enter a positive number)
Word 10	ASCII Material ID. This string is included in the material transfer report. (string length = 20 bytes)

Explanation

Channel number	Channel to be used
Sequence number	An incrementing number used to separate and track commands
Material Path	Desired Material Path to be used
Command	The actual task/command that the Q-IMPACT Matroller will perform.
Group number	During an overlapping feed an arbitrary number is assigned to the “group”. In this way multiple “groups” of overlapping feeds can be done simultaneously. Scale A scale and 2 flow meter

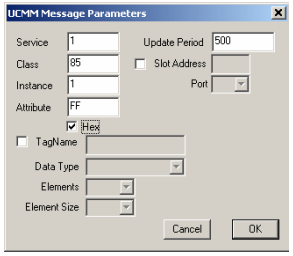
	feeds are all part of group “1”. Another scale and 3 flow meter feeds could be part of group “2”
# overlapping feeds	The Q-IMPACT Matroller must be informed of how many secondary overlapping feeds there will be. It needs this information in order to know when the final command has been received as it will only start the transfers once all commands associated with the group have been received. This is the case as the Q-IMPACT Matroller must perform various feasibility checks before it actually starts the transfers.
Setpoint	The actual target weight required.
Tolerances	The actual maximum absolute error that is allowed.
Material ID	A name for the Material

Command List

1 Start material transfer.
2 Start material transfer with Gross Weight Target. This command is only valid for a scale device.
3 Start Hand Add
4 Acknowledge material transfer or Hand Add Complete
5 Abort material transfer
6 Reset Slow Step Timer
7 Start Manual mode
8 Turn on FCE (Final Control Element) in Manual mode
9 Turn off FCE (Final Control Element) in Manual Mode
10 Restart Auto mode
11 Complete feed in Manual mode
12 Master Reset – Instrument channel
13 Report last status
14 Master Reset – Cluster
15 Validate aggregate secondary feeds
30 Reset the ControlNet Board
31 Reset the Channel

NOTE: Misuse of the two commands above will interfere with the process.

Reading Data from the Matroller (UCMM)



Using ControlNet class 85h a block of data is read from the Q-IMPACT Matroller. The structure of the data block is as follows. Descriptions follow at end. This is included in the definition (QI_UCCM_Read.vdf)

Input Field Xreferences. These are all read only data values. Updated at the selected interval (Update Period) in the connection definition.

Data	Buffer Offset (Size)	DeltaV Register	Element(s)
Channel Number	0(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R1.CV'	Low Byte
Sequence Number	1(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R1.CV'	High Byte
Material Path	2(2)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R2.CV'	1 Registers
Command	4(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R3.CV'	Low Byte
Command Status	5(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R3.CV'	High Byte
Transfer Status	6(1)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R4.CV'	Low Byte
Over tolerance	8:0	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R5.CV'	bit 0
Under tolerance	8:1	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R5.CV'	bit 1
Power Failure	8:2	'//VIMCTRL1/IO1/C57/P01/DEV01/DS04/R5.CV'	bit 2
Delivered Weight	12(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS05/R1.CV'	1 Registers
Material Transfer error	16(4)	'//VIMCTRL1/IO1/C57/P01/DEV01/DS05/R2.CV'	1 Registers

Communications Buffer Definition (Definitions are from METTLER TOLEDO Q-IMPACT Matroller Technical Manual (7-02))

Word 0	low byte Channel number
Word 0	high byte Sequence number
Word 1	word Material Path
Word 2	low byte Command
Word 2	high byte Command Status
Word 3	low byte Transfer Status
Word 3	high byte Reserved
Word 4	word Material Transfer Status Qualifiers
	0 Over Tolerance”
	1 “Under Tolerance”
	2 “Power Failure” during feed
	3-15 Reserved
	Word 5 word Reserved
Word 6	Float Delivered weight
Word 8	Float Material Transfer error

Explanation
The first four bytes of the received data are identical to the first four bytes of transmitted data. This enables you to compare the sent with the received. If they match, then your last command was received by the Q-IMPACT Matroller.

Command Status – this is the response to your command. By analyzing this number you will be able to determine whether your command was received accepted, rejected. The various responses are listed below. As you can see a response in the range 0 to 5 is desirable!

Command Status codes

0 SUCCESS	Start Gain-In-Weight Material Transfer Command Complete
1 SUCCESS	Start Loss-In-Weight Material Transfer Complete.
2 SUCCESS	Start Flow Meter Material Transfer Complete.
3 SUCCESS	Start Validate Aggregate Feed Complete.
4 SUCCESS	Start Hand Add Command Complete.
5 SUCCESS	Command Complete
6	Command Not Complete Request status again after a short delay
7 ERROR	Communications Error
8 ERROR	Invalid Instrument Channel Number
9 ERROR	Invalid Command
10 ERROR	Invalid Material-Path Table Index Number
11 ERROR	Invalid Algorithm in Material-Path Table Entry
12 ERROR	Invalid Feed Type in Material-Path Table Entry
13 ERROR	Invalid Measuring Device Channel Table Index in Material Path Table
14 ERROR	Invalid Gain in Weight Feed and Dump to Empty Algorithm Combination in Material Path Table
15 ERROR	Invalid Destination in Material Path Table Entry.
16 ERROR	Other invalid data in Material Path Table Entry
17 ERROR	Overlap Feed Request Error, including invalid Loss in Weight Feed in Material Path Entry and Overlapping Feed Command.
18 ERROR	Invalid data In Measuring Device Channel Table Entry
19 ERROR	Invalid Mode for Command, e.g., Controller is requesting to start a new material transfer before the last feed is complete or before the controller has acknowledged that the last material transfer is complete.
20 ERROR	Requested add amount too small
21 ERROR	Requested add amount would bring Scale Device over capacity
22 ERROR	Scale Device Currently over Capacity
23 ERROR	Scale Device Currently under Zero
24 ERROR	Instrument Malfunction
25 ERROR	Target Weight is less than Spill
26 ERROR	Response Timeout
27 ERROR	Too many overlapping feeds
28 WARNING	Delayed start to feed due to overlapping feed.
29 WARNING	Abort ignored since Time to Complete was less than Feed Override Time
30 ERROR	Invalid overlap group number
31 WARNING	Waiting for All Secondary Requests.
32 WARNING	Waiting for Measuring Device Stability.
33 ERROR	Not Enough Material.
34 ERROR	Device not configured or calibrated properly.

Transfer Status At the end of the Material Transfer, this code will indicate the status of the Transfer.

0 Successful	Material Transfer - K1, K2 parameters updated
1 Successful	Material Transfer - Spill Only
2 Successful	Material Transfer - Dump to Empty
3 Successful	Hand Add
4	Material Transfer Complete - Parameters NOT updated
5	Material Transfer Complete - Parameters reset.
6	Material Transfer Complete with Manual Operation
7 Failed	Unstable Scale

8 Failed	Overlapping Feed Error Corrupted Flow	
9 Failed	Erratic Flow Error	
10 Failed	Low Flow Error	
11 Failed	High Flow Rate Alarm Error	
12 Failed	Communication Error	
13 Failed	Instrument Error	
14 Failed	Scale Device Capacity Error	
15 Failed	Predictive Algorithm Error	
16 Failed	Material Transfer with Manual Operation	
17 Failed	Amount of material transferred did not match in source and destination.	
18 Failed	Controller Aborted Material Transfer	
19 Failed	Controller Reset Channel	
20 Failed	Controller Reset Cluster	
21 Failed	Reserved	
22 Failed	Slow Step Timer Timeout	
23 Failed	Secondary Requests Timeout	
24 Failed	Power Failure During Feed	
25 Failed	Start Material Transfer Command Failed Immediately	Transfer Did Not Start
26 Status Only	Material Transfer Is In Progress.	

Please contact us for any questions about these TechNotes at:

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