

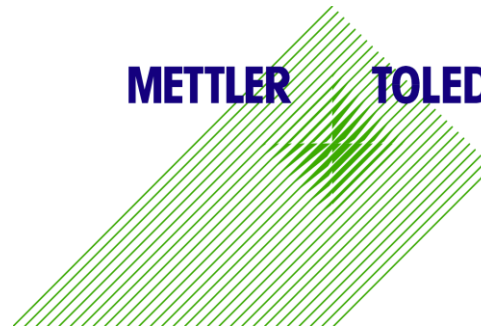
780Qi and TE



Quality Improvements
Quantity Increases
Quantifiable Results



METTLER TOLEDO

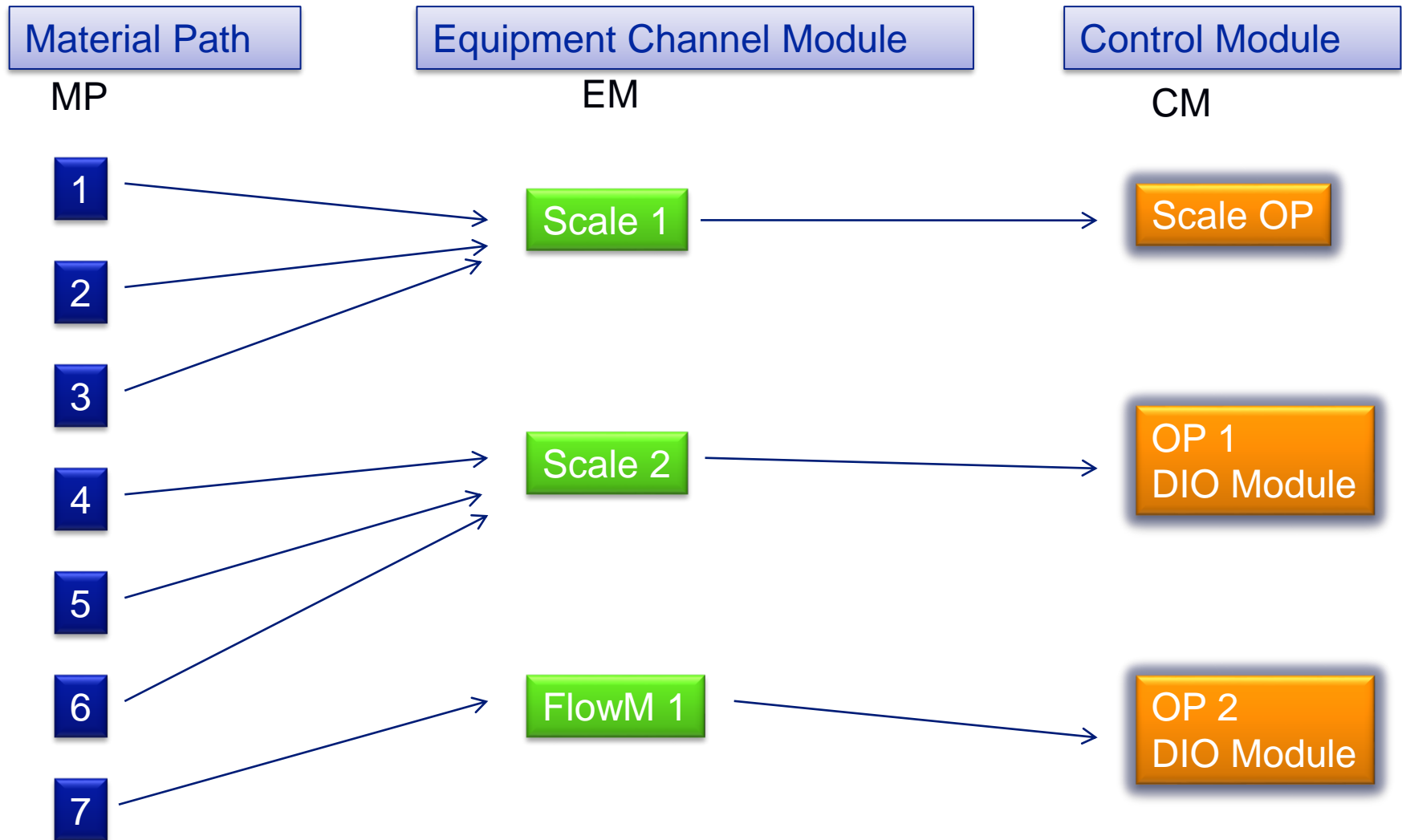


Overview

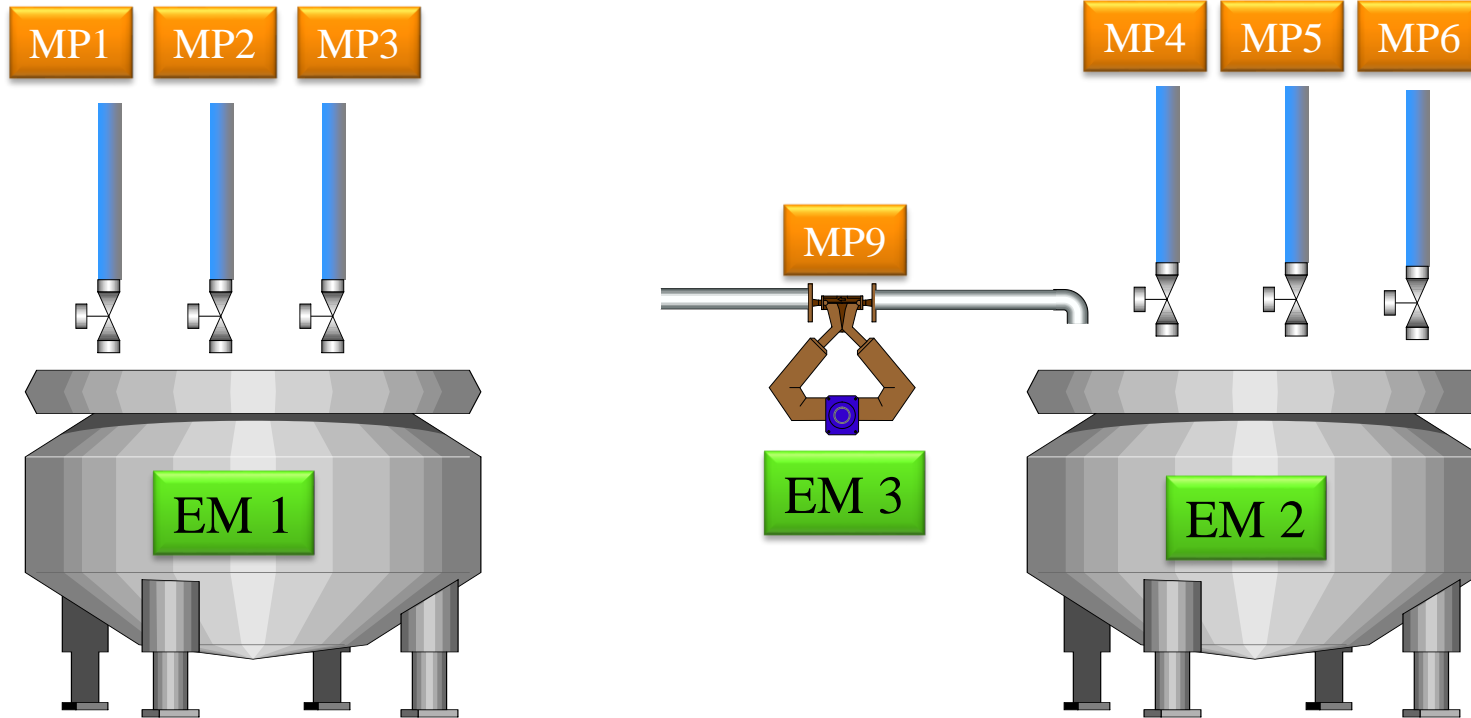
- 780 and TE is not very different from a TE program using Full Setpoint control
- Differences:
 - You write to different SD values to Start a Feed
 - You read from different SD values to determine the state of the Qi and its feeds.
 - You need to use a Qi Configuration software tool to setup certain parameters. It can be done from the front panel but is more cumbersome.
- In most case your existing batching TE application can be modified quite easily to support the Qi model
- When controlling multiple feeds into a scale the switching must be taken care of via a steering matrix (see last slide)

Install TE development software

Qi Intro – configured modules



Qi Intro – physical architecture



Starting a Feed

- The Qi Control Module, Equipment Channel and Material Path must be created in the Qi prior to starting a feed

The image displays a software interface with a sequence of function blocks on the left and an 'ExpressionInput' dialog box on the right.

Function Blocks:

- [Func18] Expression: cmdChannel% = 1, cmdMatPath% = ...
- [Func13] Direct C...: CQ0101@ = AP..., CQ0102@ = AP...
- [Func14] Print: , None, , "Start F...
- [Func27] Expression: bgMax# = cmdT..., bgUpper# = cmd...

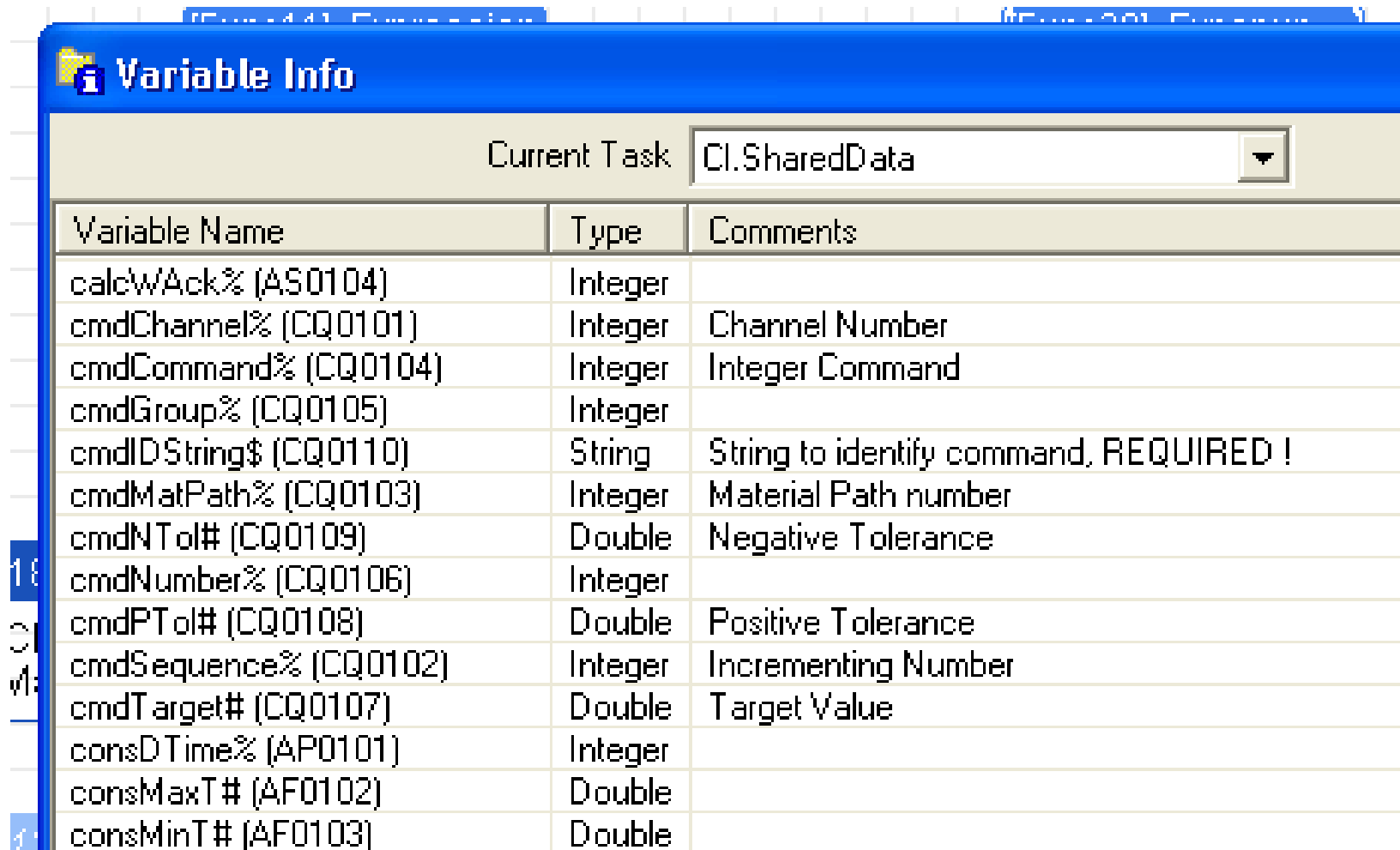
ExpressionInput Dialog:

Variable List	Expression
bgLower#	cmdChannel% = 1
bgMax#	cmdMatPath% = constMP%
bgUpper#	cmdCommand% = 1
calcFCEON%	cmdGroup% = 0
calcFeeding%	cmdNumber% = 0
calcWAck%	cmdSequence% = statSequenceNum%
cmdChannel%	cmdTarget# = cmdTarget#
cmdCommand%	cmdPTol# = constTolP#
cmdGroup%	cmdNTol# = constTolN#
cmdIDString\$	cmdIDString\$ = "StartFeedRemote"
cmdMatPath%	
cmdNTol#	
cmdNumber%	
cmdPTol#	
cmdSequence%	
cmdTarget#	

At the bottom of the dialog, there is a 'Functions' dropdown menu showing 'ABS', and 'Add' and 'Clear' buttons.

Qi Command SD's

- SDs with Comments are required and should be written to



Variable Info

Current Task: Cl.SharedData

Variable Name	Type	Comments
calcWAck% (AS0104)	Integer	
cmdChannel% (CQ0101)	Integer	Channel Number
cmdCommand% (CQ0104)	Integer	Integer Command
cmdGroup% (CQ0105)	Integer	
cmdIDString\$ (CQ0110)	String	String to identify command, REQUIRED !
cmdMatPath% (CQ0103)	Integer	Material Path number
cmdNTol# (CQ0109)	Double	Negative Tolerance
cmdNumber% (CQ0106)	Integer	
cmdPTol# (CQ0108)	Double	Positive Tolerance
cmdSequence% (CQ0102)	Integer	Incrementing Number
cmdTarget# (CQ0107)	Double	Target Value
consDTime% (AF0101)	Integer	
consMaxT# (AF0102)	Double	
consMinT# (AF0103)	Double	

Common Command Values (CQ0104)

- 1 Start Feed (Net Target)
- 2 Start Feed (Gross Target)
- 4 Acknowledge Feed
- 5 Abort Feed
- 7 Control Override mode ON
- 8 Turn FCE ON (in override mode, target contains length of time ON)
- 9 Turn FCE OFF (in override mode)
- 10 Back to AUTO mode

CQ SD Info

1 Qi Phase Commands (CQ) (Starts a FEED in TE)

Class Code: cg

ControlNet Class Code: 84 hex

Instances: 3 there are 3 instances of the Qi Command block

Qi PROCESS COMMAND SHARED DATA

<u>cg--00</u>	Composite CQ block	Struct	<u>na</u>	
<u>cg--01</u>	Equipment Channel Number	By	<u>na</u>	Equipment Channel Number for Command
<u>cg--02</u>	Message Sequence Number	By	<u>na</u>	Message Sequence Number of Command
<u>cg--03</u>	Material Path Index	US	<u>na</u>	Material Path Index
<u>cg--04</u>	Integer Command Number	By	<u>rt</u>	"Command" Number 0 None 1 Start Material Transfer 2 Start Material Transfer with Gross Weight with the scale.
<u>cg--07</u>	Target Weight	F	<u>na</u>	Target Feed Weight
<u>cg--08</u>	Positive Tolerance	F	<u>na</u>	Positive Feed Tolerance
<u>cg--09</u>	Negative Tolerance	F	<u>na</u>	Negative Feed Tolerance
<u>cg--10</u>	Batch ID/Display Message	ABy40	<u>rt</u>	Batch ID from Host Controller that is used for Data Collection Messages. If there is a "~" in the field, the data following the "~" is used as a Display Message for the <u>Q.iMPACT</u> display.

- PARTIAL LISTING of CQ's

Reading the Status of a Scale A

- **The following shared data contains the most important info**
- ED0901 – 8 bit status
- ED0904 – Net Fed, zeroed at start and updated during feed (1 second)
- ED0905 – Gross weight of Scale (or flow meter)
- ED0906 – Flow Rate of Scale

Status SD's (ED - - - -)

Index	Variable Name
1	<input type="checkbox"/> ED_Equipment_Channel_Number_9[ED0901]
2	<input checked="" type="checkbox"/> qiStatusA[ED0902]
3	<input type="checkbox"/> ED_Real_Time_Status_2_9[ED0903]
4	<input checked="" type="checkbox"/> qiNett[ED0904]
5	<input checked="" type="checkbox"/> qiGross[ED0905]
6	<input checked="" type="checkbox"/> qiRate[ED0906]
7	<input type="checkbox"/> ED Slow Step Timer 9[ED0907]

What number in the ED ?

Process 1	Flow Meter K		Process 2	Flow Meter L
Process 3	Flow Meter M		Process 4	Flow Meter N
Process 5	Flow Meter O		Process 6	Flow Meter P
Process 7	Flow Meter Q		Process 8	Flow Meter R
Process 9	Scale A		Process 10	Scale B
Process 11	Scale C		Process 12	Scale D

When there are no scales and up to 12 flow meters in the Q*IMPACT*, the assignment of Processes to Flow Meters is as follows:

Process 1	Flow Meter K		Process 2	Flow Meter L
Process 3	Flow Meter M		Process 4	Flow Meter N
Process 5	Flow Meter O		Process 6	Flow Meter P
Process 7	Flow Meter Q		Process 8	Flow Meter R
Process 9	Flow Meter S		Process 10	Flow Meter T
Process 11	Flow Meter U		Process 12	Flow Meter V

■ EXAMPLES

- ED09 - - Scale A
- ED10- - Scale B
- ED03 - - Flow Meter M

Status bits

3 Cyclic Data In

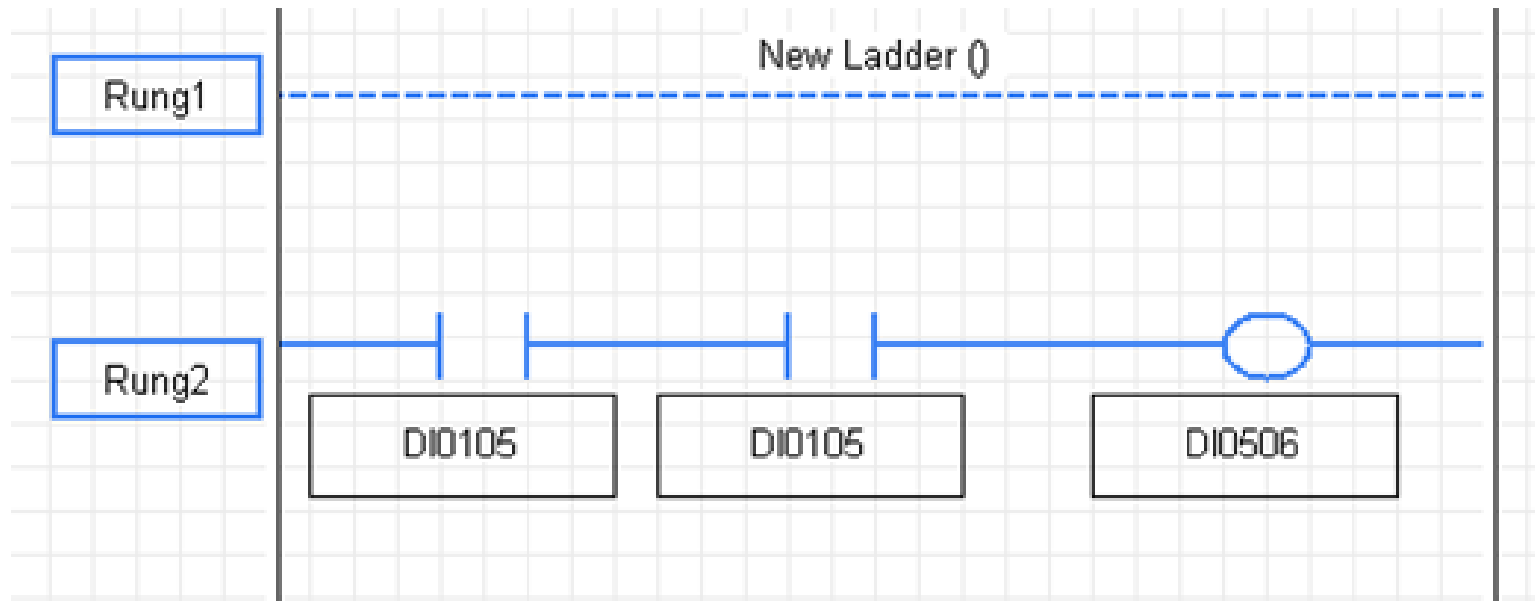
(Use ED0901 for Scale Δ in TE)

0	Channel Number (1-198)	Byte	Set once a second
1	Status 1 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	8 Binary	Set once a second. Set Critical Events immediately.

The important bits (ED - - 01)

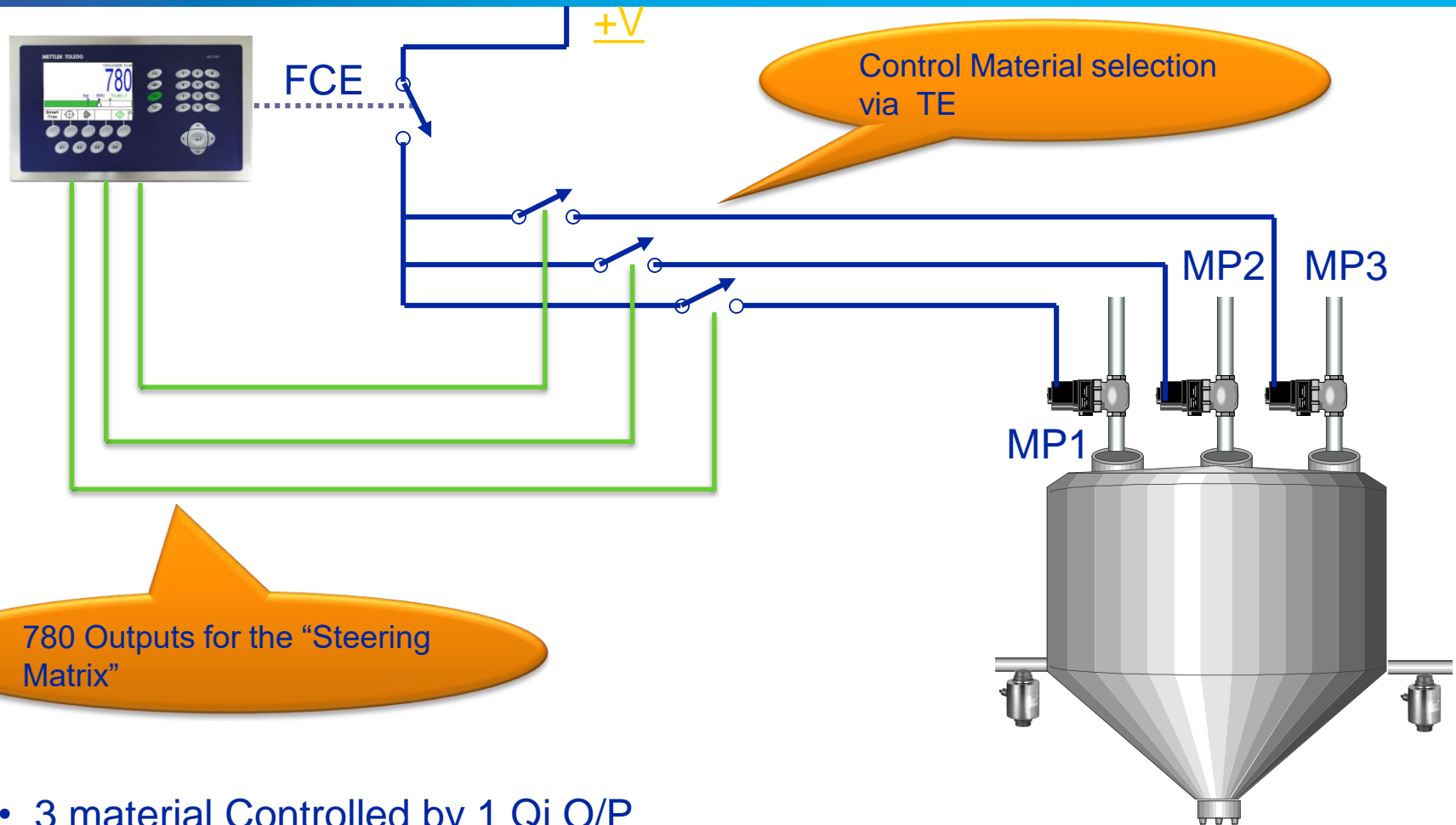
- Bit 5 – Cycle active
 - Stays ON during the Feed including the Drain Time (Settling time)
- Bit 6 – FCE ON
 - This is the high speed control OP that controls the feed. Status only DO NOT USE this in Ladder for control
- Bit 7 – Acknowledge me
 - Set at end of feed and stays on until feed is acknowledged (command 4)
 - The acknowledge command is optional on a 780 (not when using a JagXQi)
- Use TE code to extract the status of the bits for use within your program.

Outputs



- In this case Qi was configured so that the FCE was the O/P on the Scale card in slot 1 (DI0105).
- Here we use it to drive a relay O/P sacrificing a bit of speed for convenience

Qi wiring example with TE



- 3 material Controlled by 1 Qi O/P
- Qi is in DIRECT Control of the FEED
- !! Only ONE Matrix OP on at any one time

Timing diagram – 3 MPs

