Channel Database Parameters

A channel is a specific measuring device interface (for a scale or flow meter) located in one of the matrollers in the cluster. There can be up to a maximum of 200 channels in a cluster. Each channel has specific parameters that must be assigned:

Assign Measuring Device To Channel - Check this box to assign a measuring device to the specified channel.

Q.iMPACT Matroller with Bridge – Select the Matroller containing the ControlNet interface card associated with this channel.

Q.iMPACT Matroller – Select the number of the physical matroller containing the measuring device interface.

Measuring Device – Select the Measuring device for the Channel.

Scale / Flow Meter Capacity – This displays the name assigned to the current measuring device capacity. It cannot be changed here.

Measuring Device Name – This displays the name assigned to the measuring device via the scale or flow meter page. It is set during the scale or flow meter setup. It cannot be changed here.

Current Scale Zero – This displays the weight of the current-scale-zero as compared to the calibrated-scale-zero. The Q.i process (also referred to as PAC for adaptive, predictive, control) automatically attempts to re-zero the scale after a Dump to Empty operation. You cannot manually change this value. However, in the Scale Setup menus (Zero Operation), you can set the limits for the automatic zeroing of the scale. A large value here indicates a large "heel" build-up of material in the tank or vessel.

Minimum Material Addition – This sets the smallest amount of material the system will attempt to transfer with this measuring device.

Dump Trip Point – This sets the level at which the Q.i process starts looking at the Zero Flow Threshold. Once the Flow Rate drops below this threshold the Drain Timer starts. After expiration of the drain timer, the Q.i process shuts off the Dump-to-Empty operation and closes the discharge valve.

Flow Rate Thresholds, Zero – This sets the flow rate below which the system assumes a zero flow. In a dump-to-empty mode, the Q.i process uses this value to determine when the dump-to-empty is complete.

Flow Rate Thresholds, Unstable – This sets the flow rate above which the Q.i process generates a Noisy Scale condition while waiting for a stable scale reading.

Flow Rate Thresholds, Minimum PAC – This sets the flow rate above which the Q.i process begins to apply the predictive algorithms.

Process Times, Feed Override Time – This is the time in seconds before the completion of a material transfer when the Q.i algorithm inhibits the external logic from removing the permissive on the enabling logic for the Final Control Element (FCE). Examples of this type of external logic are slow step timers or an operator changing operational modes. Ie During the Feed Overide time, which is normally very near the end of the Feed, you will not be able to stop the Qi from feeding by issuing an Abort Command. Only a Power Failure or external physical intervention will stop the feed.

Process Times, Minimum Slow Step Time – The Q.i algorithm uses this value when it's computed slow step time value is less than this minimum value. The Slow Step Time is the timeout value for the material transfer.

Process Times, Stable Measuring Device Wait Time – This is the number of seconds to wait for a stable measuring device reading before returning an unstable measuring device failure status. If the flow rate is above the Unstable Scale Threshold, the Q.i algorithm returns a failure status at the completion of this wait time. If the flow rate is between eh Zero Flow and the Unstable Scale Thresholds, the Q.i algorithm returns a success status at the completion of this wait time.

Process Times, Overlap Feed Alone Time – The Q.iMPACT matroller can issue commands to start concurrent overlapped feeds to a single destination vessel. There is always a one primary overlapped feed. There may be one of more secondary overlapped feeds. The scale device at the destination vessel controls the primary overlapped feed. In order for the predictive algorithm to have time to accurately predict the cutoff, you must set the time in seconds that the primary overlapped feed must feed-along before cutoff. It is typically 10 seconds.

Process Times, Overlap Feed Alone Tolerance – Set the additional time tolerance in seconds allowed for a primary overlapping feed to complete. You may use it to compensate for potential time variations that may occur in completing secondary fees.

Once the channel parameters have been entered, they must be saved before selecting another channel or the changes will be lost. Changes can also be saved as the default settings by checking the "Save Changes also as defaults" box before clicking on the "Save Changes" button. These defaults can be used for other channels by clicking on the "Restore Defaults" button.

Material Path Database Parameters

Go back to the APC screen (by clicking on the APC icon), and click on the Configure Material-Path link.

A material-path is the flow path for a particular material through a Final Control Element (FCE) such as a feeder or valve. The material-path holds the flow measuring parameters that are unique for each material along each path. The action of an operator manually adding material (referred to as a hand-add) can also be considered a material-path. The cluster can support up to 1000 material-paths. Each material-path has specific parameters that must be configured:

Assign Material-Path - Check this box to assign the material-path to the cluster.

Material-Path Name – Enter a text description of the material-path.

Channel – Select the measuring device channel that will process this material-path. This entry points to an entry in the Channel Table.

Max. Flow Rate Alarm Threshold – Optionally, set the flow rate at which the Q.i process terminates the feed and sets an alarm. If you set this value to zero, the Q.i algorithm does not check the maximum flow rate.

Feeder Type – This is the type of feed that controls the material flow:

1. Select **Gain in Weight** when a scale channel is measuring the material automatically transferred into a holding vessel.
2. Select **Loss in Weight** when a scale channel is measuring material automatically transferred out of a vessel.
3. Select **Flow Meter** when a flow meter is measuring the delivered material.
4. Select **Hand Add** when an operator manually adds material to a vessel. A scale measures the resulting addition.

PAC Algorithm – These are the predictive algorithms that handle the material transfer:

1. Select **Spill Only** to cutoff very slow feeds or feeds with very erratic, unpredictable flow rates. **Spill Only** has no Predictive Control, and will be the only option available if the Channel has not been licensed.
2. Select the **K1** with horizontal feeds that do not have any initial downward velocity ie horizontal entry pipes, discharge weighing, vibratory feeders and Material with reasonably slow to medium Flow Rates. **K1** should also be used with a Flow Meter based Materials.
3. Select the **K2** algorithm when the Material has a downwards facing discharge orientation AND the Flow Rate is fast. Typically the Spill value will not be proportional to the Flow Rate.
4. Select the **Dump To Empty** algorithm to completely empty a tank or vessel.

Process Times, Slow Step Timer Factor - This sets the Slow Step Timer calculation factor. Slow Step Timer=Factor* (target/average flow). The Slow Step Timer measures when a material transfer is taking too long and aborts the process when the process exceeds the timer value. Typical factor values are 1.5 – 2.0.

Process Times, Min. Open Time – Set the time in seconds in which the Q.i process does not apply spill compensation immediately following the start of the feed. It allows the material flow to come up to speed before beginning to apply the predictive algorithm. A feed must be active for this length of time before the Q.i algorithm considers it successful and automatically updates the Q.i parameters. Typically from 1 – 5 seconds

Process Times, Drain Time – This sets the time in seconds that the system will wait for material to drain into or from a vessel after the Q.i process has cutoff the feed and before it tests the material delivery tolerance. Sometimes referred to as the “Calming Time”

Material Transfer Check Fields - The following four fields define a "box" around the key material transfer parameters, which the Q.i process captures at the instance of cutoff. The Q.i process uses these check fields in conjunction with the tolerance values sent by the Q.iMPACT matroller to determine when a feed is good. If the material transfer falls within the middle 50% range of the box values when offset from the average values, the Q.i process considers the feed good and updates the Q.i parameters based on the values of the current feed. If the values fall outside of this range, the Q.i process considers the feed as bad and does not update the Q.i process parameters. Initially, you may want to set these fields to a wide range to capture the process settings and then later set a more narrow range to more closely control the process.

1. **Average Flow Rate Limits, Low** – This sets the lower limit for the Average Flow Rate.
2. **Average Flow Rate Limits, High** – This sets the upper limit for the Average Flow Rate.
3. **Average Spill Limits, Low** – This sets the lower alarm limit for the Average Spill.
4. **Average Spill Limits, High** – This sets the upper alarm limit for the Average Spill.

Key Process Parameters. The following two fields are the key material transfer control parameters. The Q.i algorithm constantly updates these parameters after a good feed in order to adapt the process to evolutionary changes. If you have a process that is running well, you should NOT change these parameters. You also should NOT change them if you have only minor aberrations in the process. In these cases, these fields are information only fields to display the current values. However, if you are initially setting up the material-path, making radical changes to the material transfer process, or you are consistently getting bad cutoffs, you may need to manually set new seed values here. There is a check box at the bottom of the web page that allows you to indicate you are setting new seed values. Setting these values to zero causes the Qi to Reset the Pac parameters and apply a 100% correction at the end of the next Feed. Do this when the Materials feed characteristics have changed. Ie a new delivery pipe or Control Valve has been fitted or a blockage has been detected and removed.

Average Flow Rate - Typically, this displays the average flow rate at cutoff in weight per second. You may also use this field initially for setting new seed values for the process.

Average Spill - Typically, this displays the average spill in weight at cutoff. You may also use this field initially for setting new seed values for the process.

Algorithm Update – The Q.i process uses this value in calculating Average Flow Rate and Average Spill to control how quickly the system responds to a change in operating conditions. The range is usually 0.7 to 0.9 in material transfer processes that change slowly and infrequently. Use values from 0.1 to 0.4 for processes that change quickly or frequently. A value of 0.3 means that there is a 70% change to the PAC algorithms ie a large change.

Flow Rate Sample Period - Set this value to specify the period of time in seconds (from 1 to 60) over which the rate is calculated. Smaller values allow the Q.i process to respond more quickly to changes in rate, while larger values permit the rate to change more smoothly. In most cases, lower values give better cutoff results. Typically 1 – 3 seconds

Destination Channel - Set the channel number of the scale device for the destination vessel, where material is being fed. Enter a destination channel of 255 if the destination is outside of the cluster.

Measuring Device Name – This displays the name of the scale device at the destination vessel. You can only set this name on the Scale Setup web pages.

Once the material-path parameters have been entered, they must be saved before selecting another material-path or the changes will be lost. Changes can also be saved as the default settings by checking the "Save Changes also as Defaults" box before clicking on the "Save Change" button. These defaults can be used for other channels by clicking on the "Restore Defaults" button.