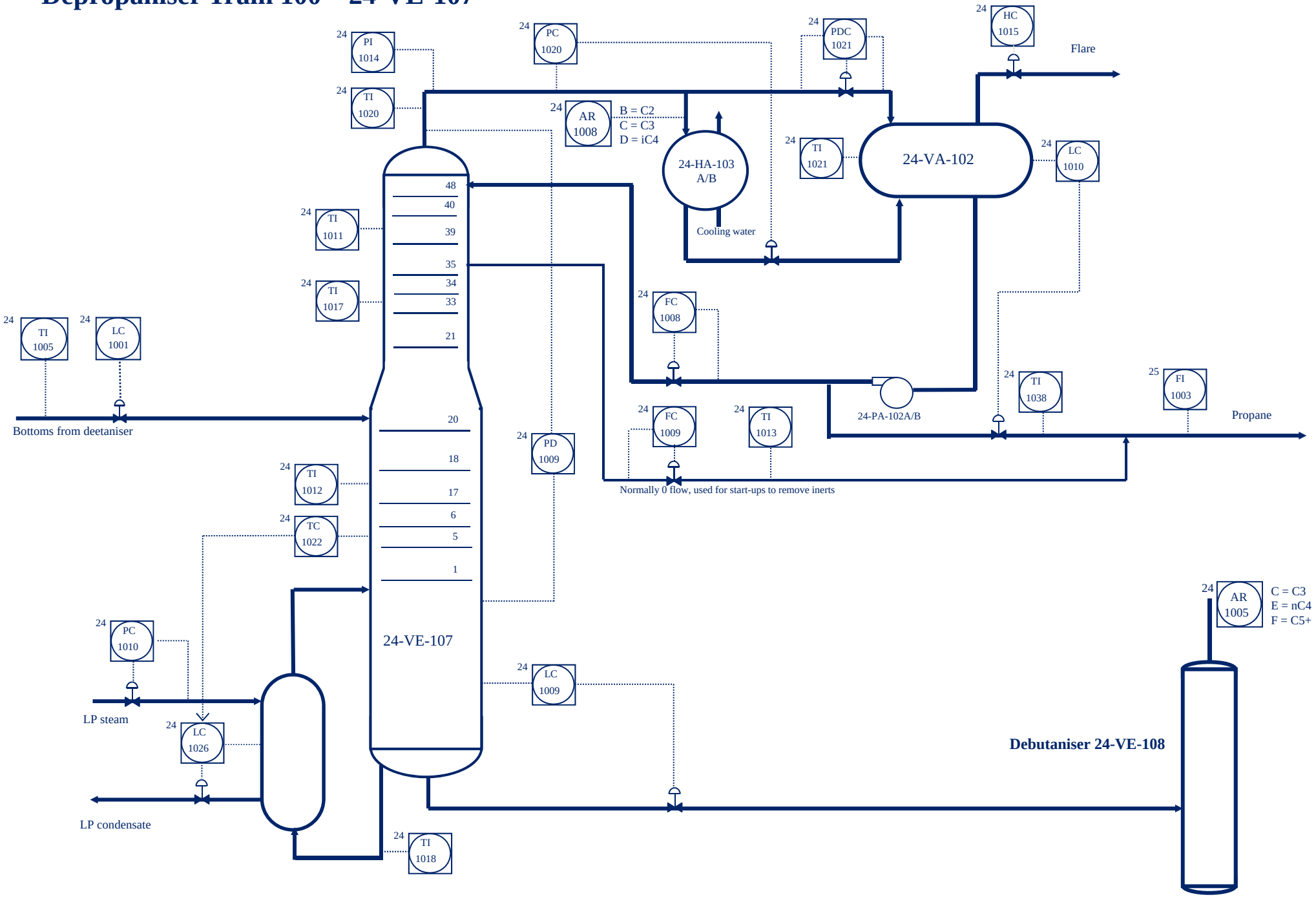
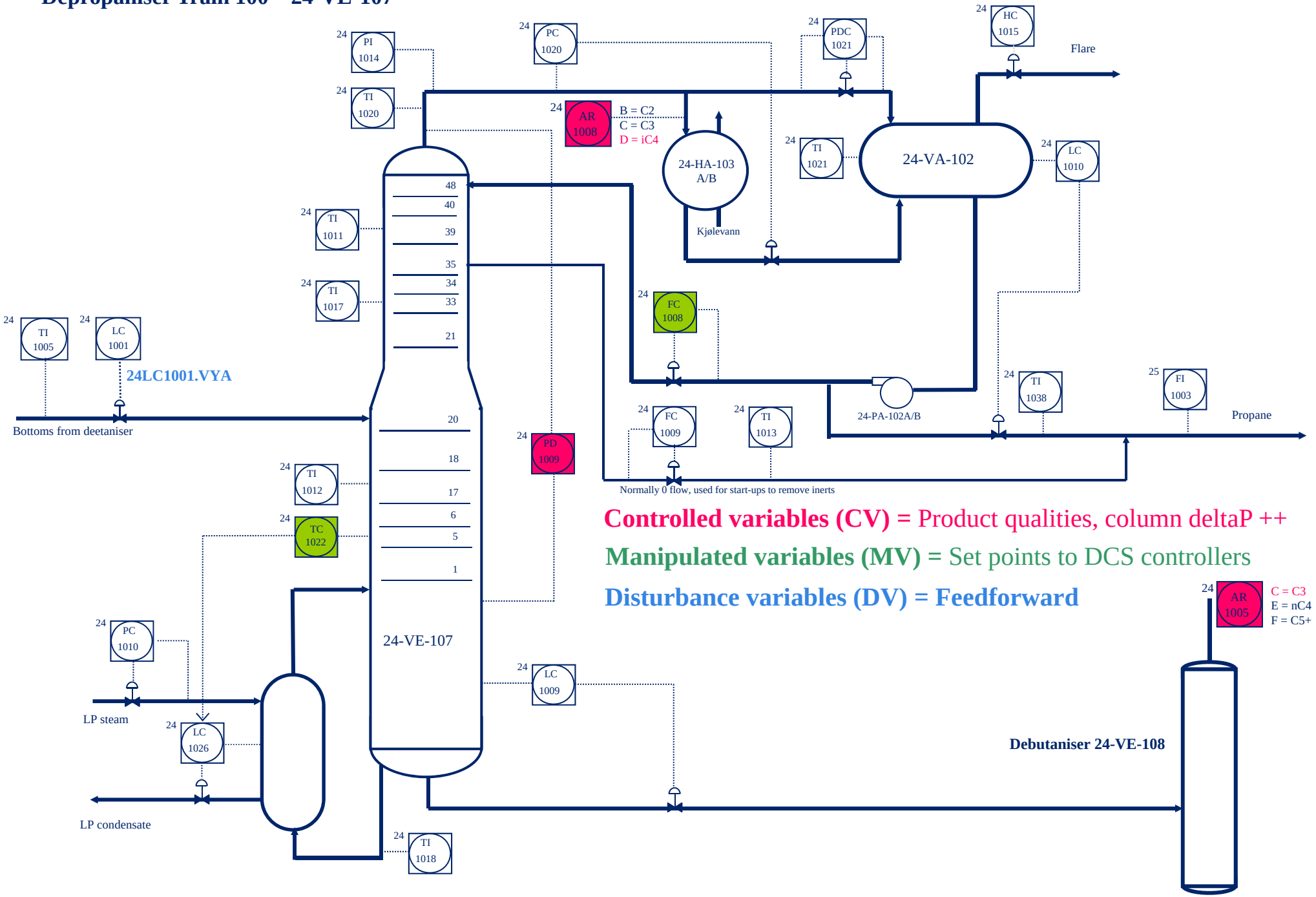
Depropaniser Train 100 – 24-VE-107

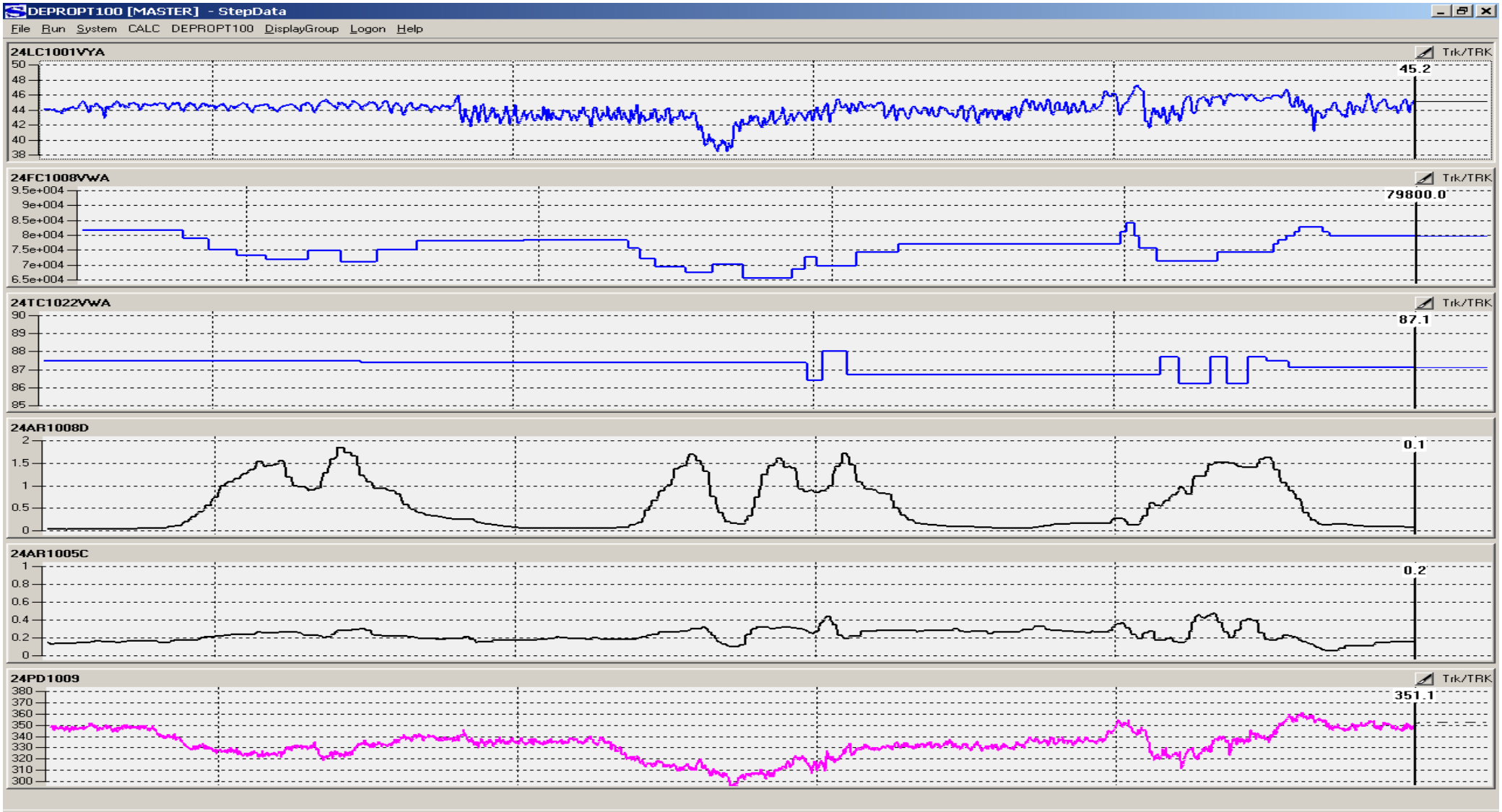


Depropaniser Train 100 – 24-VE-107



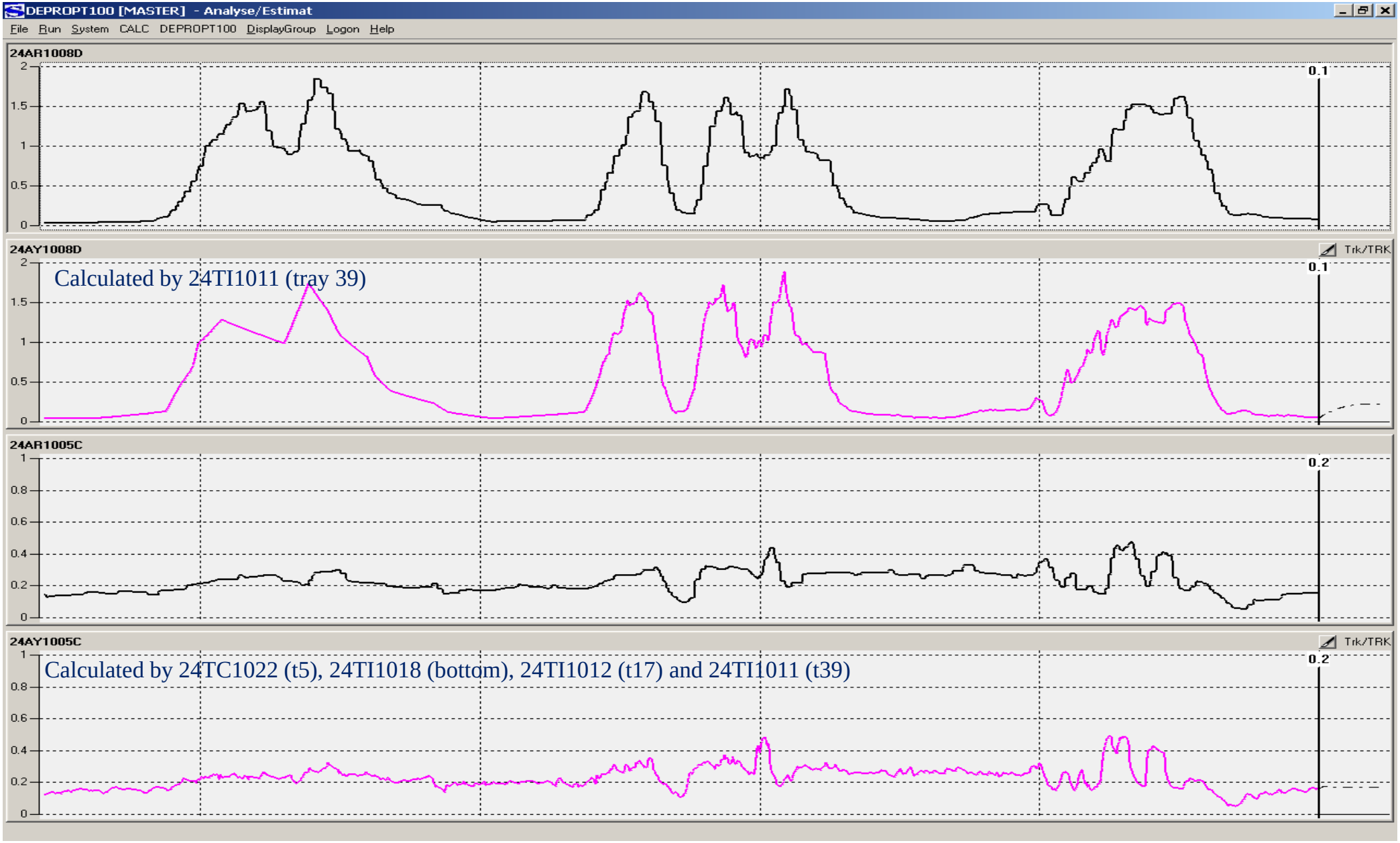
Depropaniser Train100 step testing

- 3 days – normal operation during night
- Analyser responses are delayed – temperature measurements respond 20 min earlier



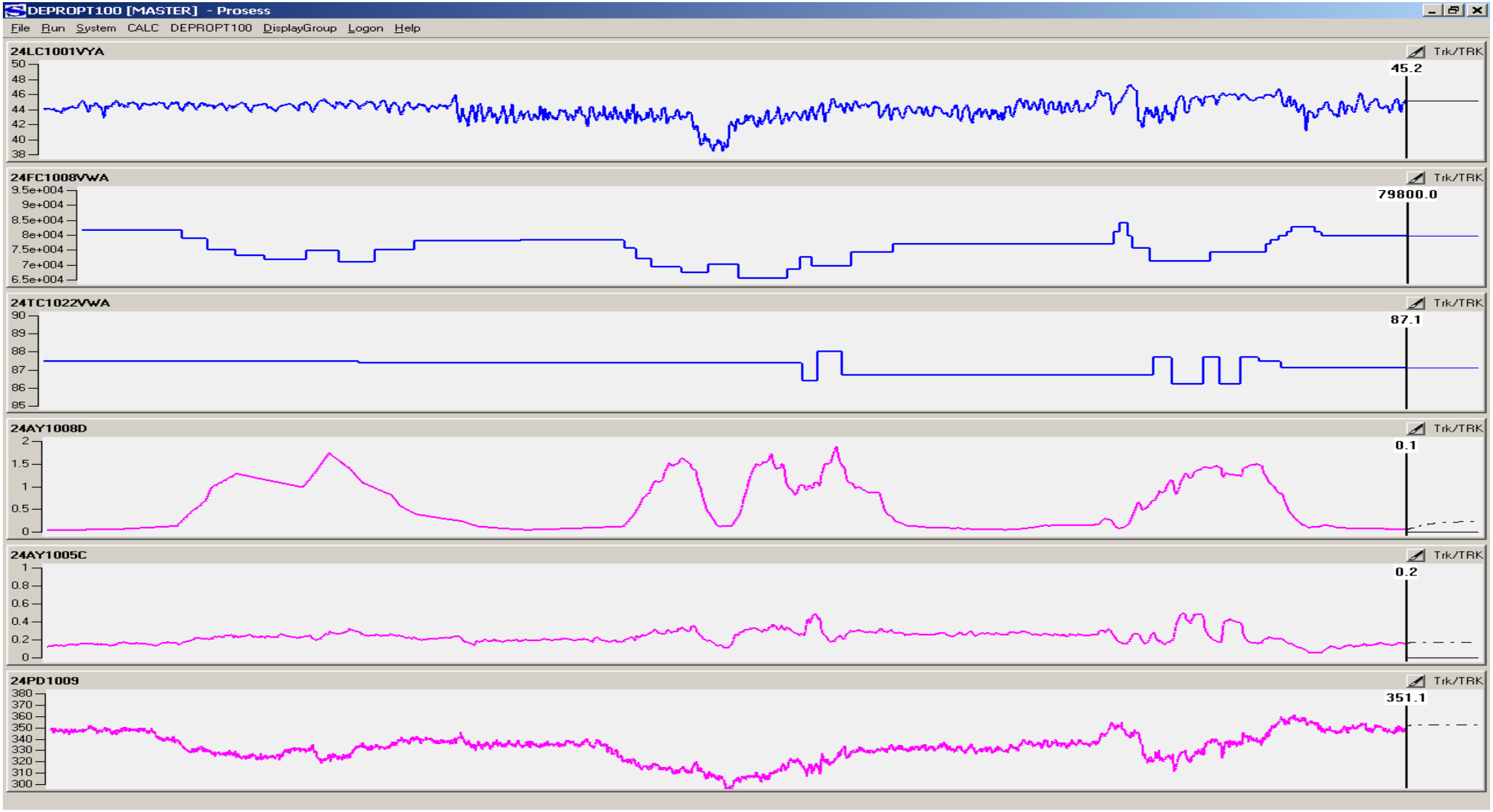
Depropaniser Train100 step testing – inferential models

- Combined process measurements → predicts product qualities well



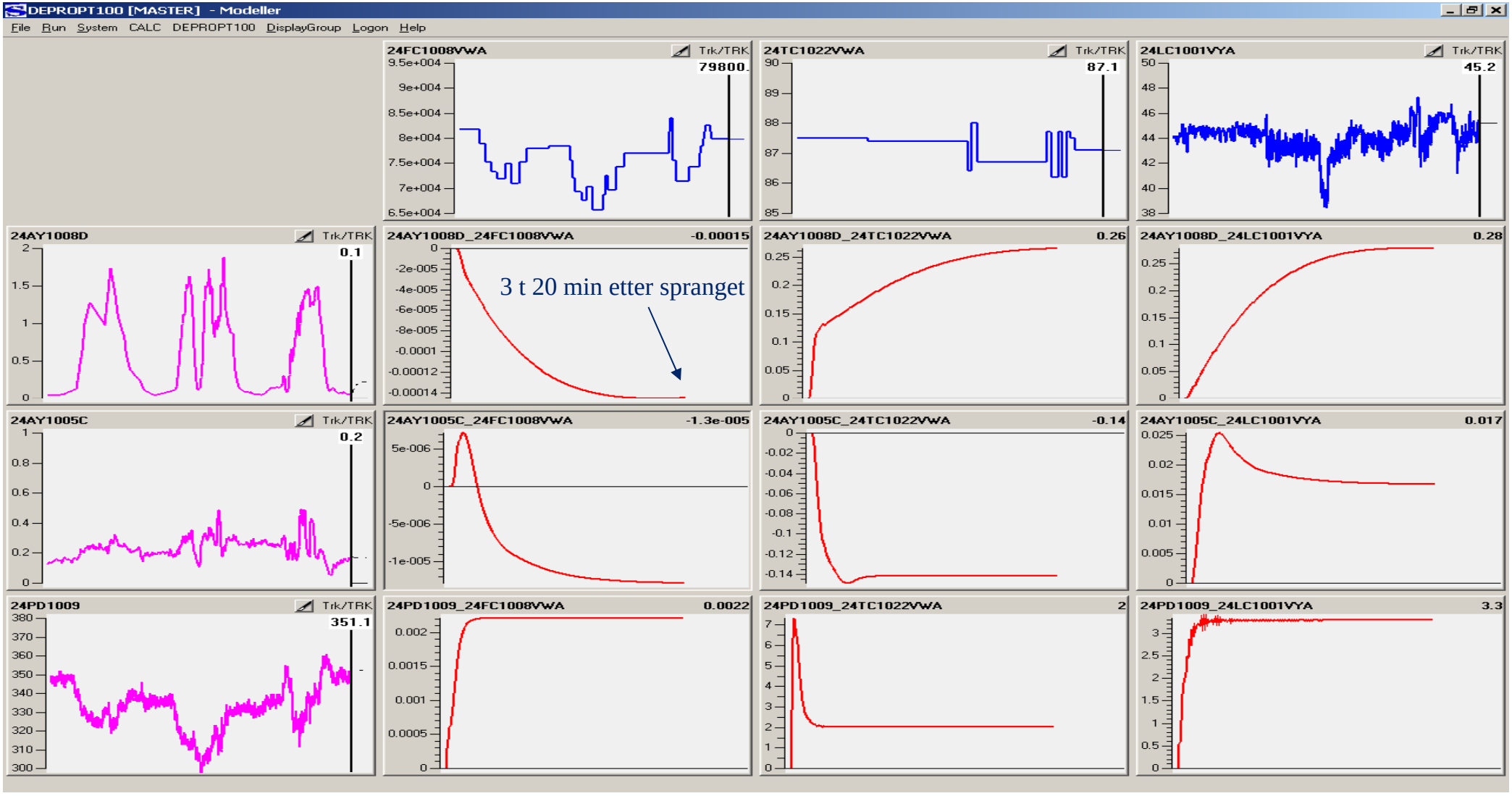
Depropaniser Train100 step testing – CV choice

- Product quality predictors, with slow corrections from analyser
  - Can control even if the analyser is out of service, automatic analyser fault detection
  - Removes a 20 min feedback delay



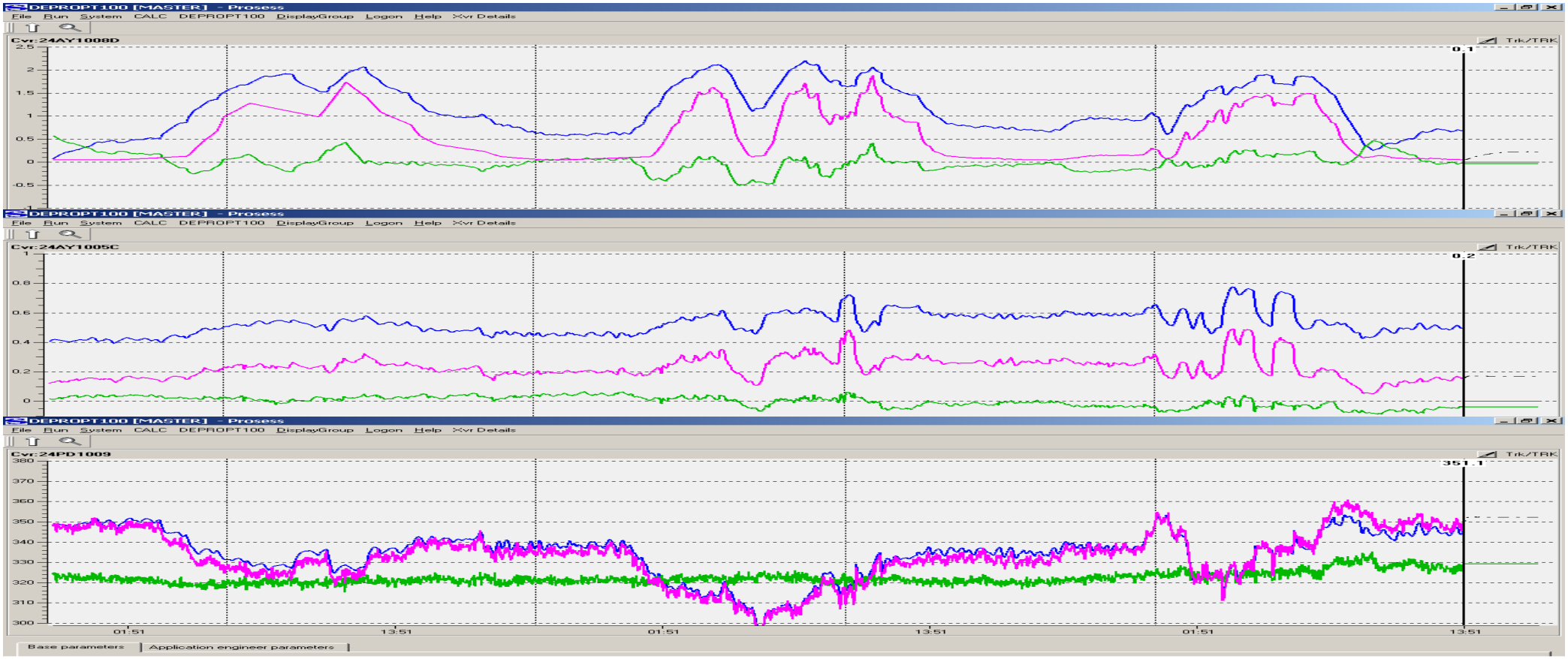
Depropaniser Train100 step testing – Dynamic responses/models

- The dynamic models (red) are step responses, made from step-test data
  - Models from 24FC1008VWA show the 3 CV responses to a reflux set point increase of 1 kg/h
  - Models from 24TC1022VWA show the CV responses to a temperature set point increase of 1 degree C
  - Models from 24LC1001VYA (DV) show the CV responses to an output increase of 1%.



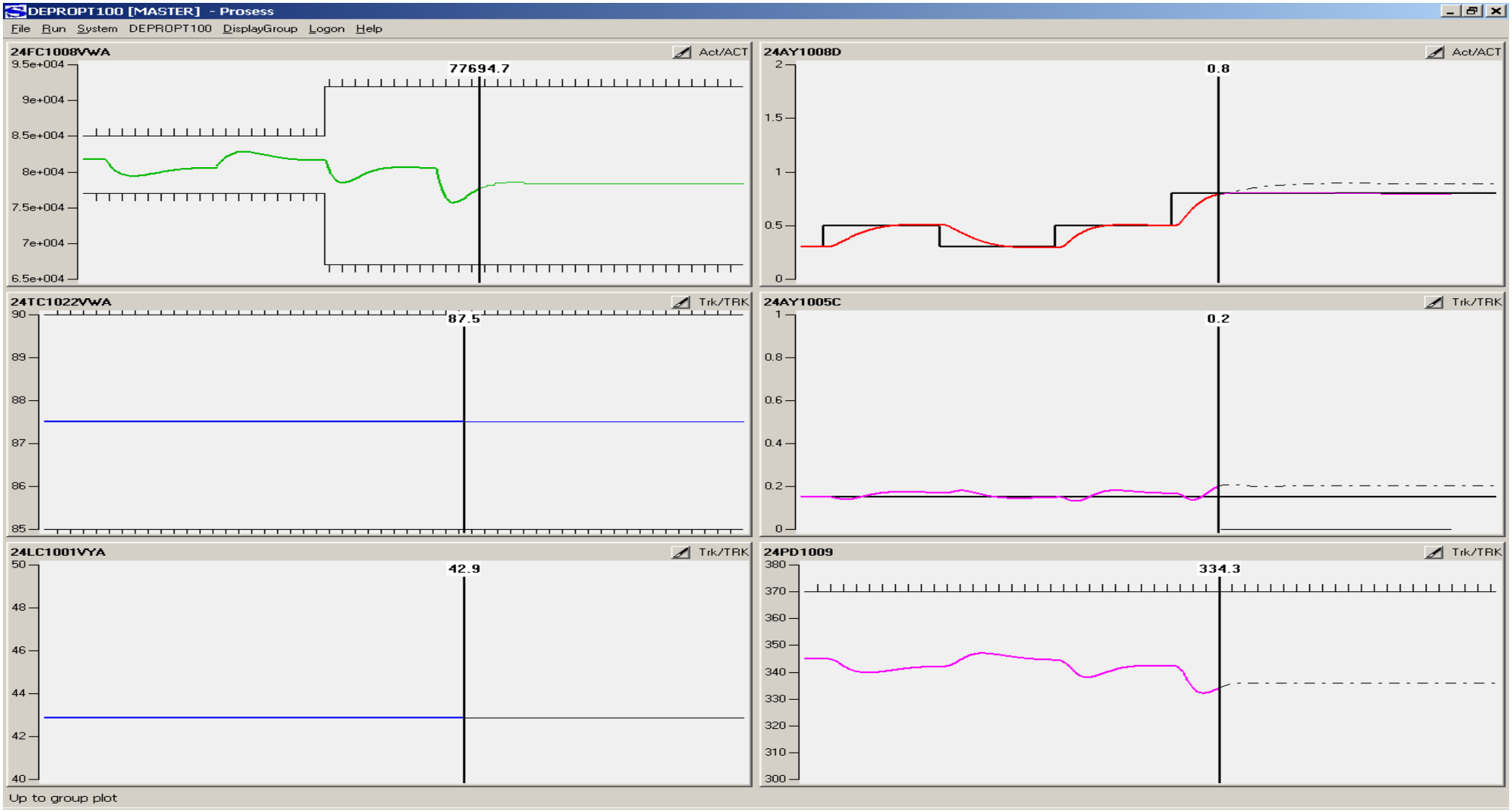
Depropaniser Train100 step testing – Dynamic responses/models

- Match between measured CV's (pink) and modelled step responses (blue) fairly good, green is model error.
  - Assumed linear responses, i.e. a reflux change of 1 kg/h gives the same product quality response whether the impurity is 0.1% or 2%. This is not correct, and the application will use logarithmic product quality transformations to compensate for the nonlinearities.



Depropaniser Train100 MPC – controller activation

- Starts with 1 MV and 1 CV – CV set point changes, controller tuning, model verification and corrections
- Shifts to another MV/CV pair, same procedure
- Interactions verified – controls 2x2 system (2 MV + 2 CV)
- Expects 3 – 5 days tuning with set point changes to achieve satisfactory performance



Depropaniser Train100 MPC – further development

- Commissions product quality control January 2004, i.e. MPC manipulates reflux and tray 5 temperature SP to control top and bottoms product quality.
- Product quality predictors will be evaluated and recalibrated if necessary.
- If boil-up constraints:
  - MV: steam pressure SP 24PC1010.VWA, CV: boiler level SP 24LC1026.VWA with high/low limits.
- If limited LP steam (plant-wide):
  - Specify max acceptable impurity in both ends (CV SP) (10-15% reduced steam consumption)
  - Marginal: MV: column pressure (24PC1020.VWA), CV: pressure controller output (24PC1020.VYA) with high/low limits. Low MV ideal value that decreases pressure against output limitation (1-3% reduced steam consumption)
- If Train 100 capacity test gives column flooding:
  - CV: column differential pressure, with high limit.
  - Specify max acceptable impurity in both ends (10-15% increased capacity compared to normal product purity)
  - Adjust feed flow (by adjusting Train 100 feed) against differential pressure high limit (see below)
- 2005/2006: Capacity control for Train 100 to push feed continuously against one or more processing constraints.
- Resources for continuous MPC maintenance important

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