Accord »

# Accord

# Template Summary

AT Heating Plant C1 Summary R01.docx

Document:    Accord Template Summary.

System:    Food and Beverage: AT Heating Plant C1

Function:    Small Food Plant Product Heating

Revision:    R01    25th July 2025

## Introduction

**Accord Template for a product heating system, e.g. in a small Food Plant.**

This document is to assist engineering personnel with installation and usage of an Accord Template; using the Accord RunTime Library. The user should be familiar with Accord system. Accord User Guides provide more information on modules and setup.

This Accord Template is for a Small Food plant to take in Product in an Intake (Reception) tank and heat it using a Heat Exchanger and transfer to Holding Tank. The product could be a sauce for example.

The template maybe easily adapted for specific installations by renaming and modifying equipment and program items in Accord Designer for Model and HMI.

**Template Contents**

The template AT Heating Plant C1 includes the following

| Item | Name | Editor |
|------|------|--------|
| Accord Model | AT Heating Plant C1 C R1.0.ctr | Designer |
| Accord HMI project | AT Heating Plant C1 HMI R1.0.zip | Designer |
| Summary | AT Heating Plant C1 Summary.doc | Word |
| Simulator | AT Heating Plant C1 SimulatorProfile.csv | Excel |

The items may have revision numbers, but the most of the filename will be as above.
A general customisation guide may be downloaded from Templates section on accord-pcs.com website.

# Index

## 1. System Description
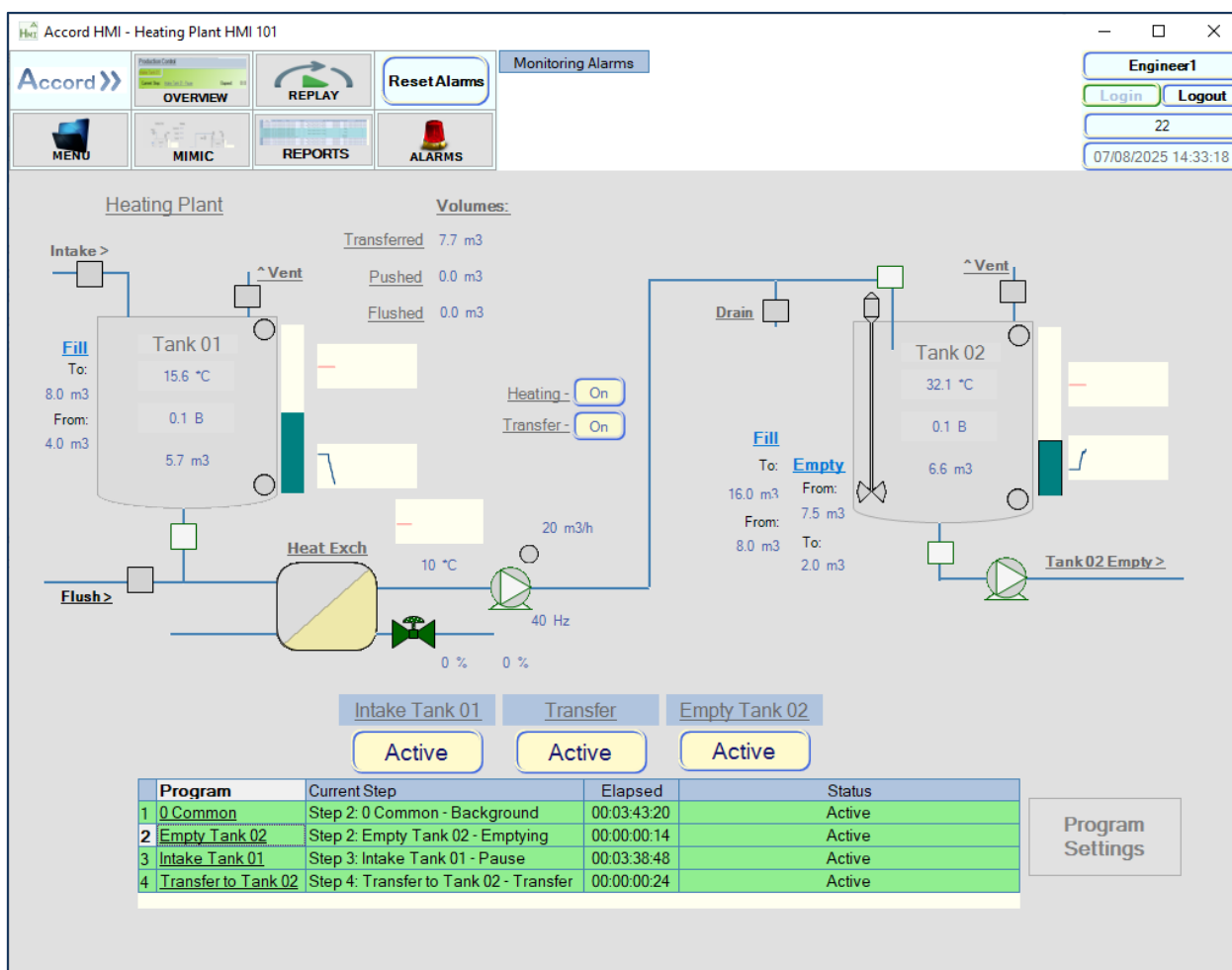
The system will provide
1. Automatic and Manual Operation of all devices and instruments.
2. Automatic program for Intake Tank 01, with Setpoints.
3. Automatic program for Transfer to Tank 2 with Heating, with Decisions and Setpoints.
4. Automatic program for Empty Tank 02, with Setpoints.



Mimic of the Heating Plant

There is full automatic operation, including the ability to change step on or steps at any time. The program will run according to selections, using the setpoints chosen, automatically stop on critical alarms and resume on Alarms reset and resume commands.

The system may be easily customised; it is easy to modify, add or delete a tank, program or step and also to change any Step Time or Setpoint.

Step Order may be changed in Designer

Setpoint Values may also be changed in Designer or HMI or Recipe Manager.

Decision States may also be changed in Designer or HMI or Recipe Manager.

## 2. Process Summary

### 2.1 List of Programs

**Common:**

There are checks for High Temperature Alarms at both Tanks. These checks will be active at all times.

**Production:**

**Intake to Tank 01:**

The product is fed into the Tank 01 through Inlet valve. The Tank level is maintained between Fill Enable and Filled Level Setpoints by switching between Filling and Pause Steps. There is an activation of a Vent Valve at a High Pressure.

**Transfer to Tank 02:**

Product is transferred if Tank 02 level is below a Start Fill Level, until the Fill Level is reached, and if Tank 01 contains product, and if the Transfer is Enabled.

The Product is heated if the selection Enable Heating is made. The heating is controlled by a PID Loop. There are Push Steps to a drain at Tank 02 and Flush steps at Start and End. The times of the Flush steps and the volumes for the Push steps are changeable as Step Times, and Setpoints. The Heating Target temperature is a setpoint also. All programs are configurable for Recipes and the program faceplates allow for Recipe Selection.

**Empty Tank 02:**

This program empties Tank 02 until it is below an Empty Level, when it goes to Pause. The Pause Step switches back to Emptying Step if the Tank refills to be above the Empty Enable setpoint.

There is an activation of a Vent Valve if Tank 02 reaches a High Pressure.
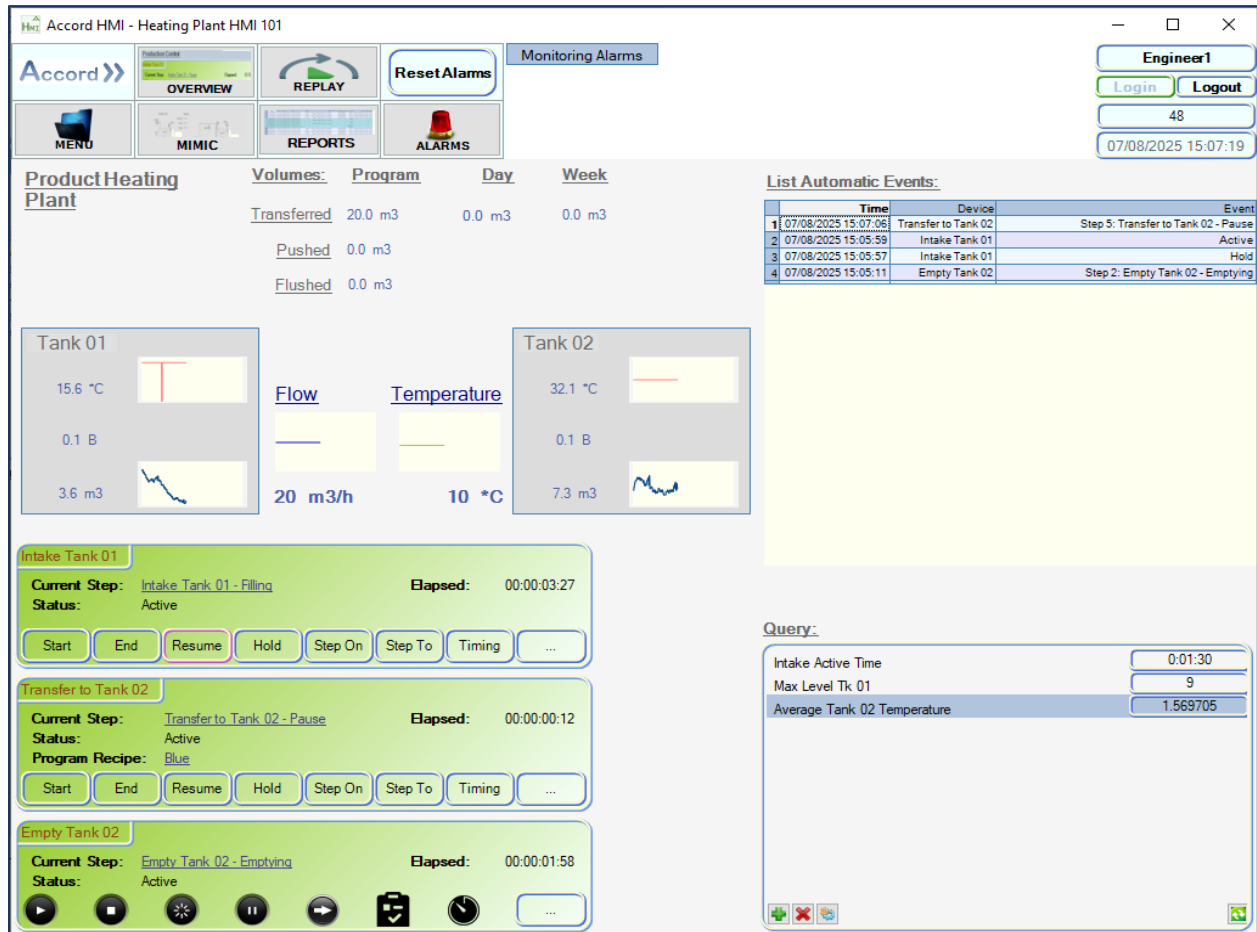
Overview of the Heating Plant

## 2.2   Process Steps

| Program | Step | Description |
|---|---|---|
| 0 Common | Startup Step | Initial Checks |
| 0 Common | Background | |
| Intake Tank 01 | Startup Step | Initial Checks |
| Intake Tank 01 | Filling | Intake until Level is above Filled Level |
| Intake Tank 01 | Pause | Return to Filling step if Level is below Refill Level |
| Transfer to Tank 02 | Startup Step | Initial Checks |
| Transfer to Tank 02 | Initial Flush | Flush the Transfer with a Volume of Water |
| Transfer to Tank 02 | Push to Drain | Push the Flush Water to Drain near Tank 02 |
| Transfer to Tank 02 | Transfer | Transfer from Tank 01 to Tank 02 if levels are ok and Enabled |
| Transfer to Tank 02 | Pause | Pause Transfer until Levels ok in both Tanks |
| Transfer to Tank 02 | Push to Tank 02 | Push remaining product to Tank 02 with Water |
| Empty Tank 02 | Startup Step | Initial Checks |
| Empty Tank 02 | Emptying | Empty until the Empty Level is reached. |
| Empty Tank 02 | Pause | Go to Emptying when tank refills above Empty Enable level |

## 2.3   Process Setpoints

| Program | Setpoint | Description |
|---|---|---|
| Intake Tank 01 | Tank 01 Fill Enable Level SP | Tank Refill Level |
| Intake Tank 01 | Tank 01 Filled Level SP | Tank Filled Level |
| Intake Tank 01 | Tank 01 High Alarm Pressure SP | High Alarm Pressure |
| Intake Tank 01 | Tank 01 Vent Pressure SP | High Alarm Pressure to Open Vent Valve |
| Transfer to Tank 02 | Tank 02 Fill Enable Level SP | Tank Refill Level |
| Transfer to Tank 02 | Tank 02 Filled Level SP | Tank Filled Level |
| Transfer to Tank 02 | Tank 02 High Alarm Pressure SP | Tank High Pressure reached |
| Transfer to Tank 02 | Tank 02 Vent Pressure SP | High Alarm Pressure to Open Vent Valve |
| Transfer to Tank 02 | Tank 02 Slow Fill Volume SP | Volume to Fill at High Speed |
| Transfer to Tank 02 | Transfer VSD High Speed SP | Pump Speed for Fast Transfer |
| Transfer to Tank 02 | Transfer VSD Low Speed SP | Pumps Speed for Slow Transfer |
| Transfer to Tank 02 | Tank 02 Line Push Volume SP | Volume of the line for Pushouts |
| Transfer to Tank 02 | Transfer Temperature SP | Temperature SP for Heating during Transfer |
| Transfer to Tank 02 | Tank 02 Agitator Enable Level SP | Level at which the Agitator is Enabled |
| 0 Common | Tank 01 High Alarm Temperature | Temperature for High Alarm |
| 0 Common | Tank 02 High Alarm Temperature | Temperature for High Alarm |
| Empty Tank 02 | Tank 02 Empty Enable SP | Level at which Emptying can start |
| Empty Tank 02 | Tank 02 Empty Level SP | Level at which Emptying pauses |

## 3. Installation

This Template acts as a working system and a good template for similar systems. Systems may differ in many ways; Item naming, Nr of items, Nr of Tanks, Nr of crystallisation stages, etc. The following are brief guides to help customisation.

Please remember that changes made to the Model in Accord Designer will be also in Designer documents and in PLC or Emulator after import and download. Changes will also be automatically available in Accord Recipe, Plan and Reports.

Accord needs to be installed on a Windows 10 or 11 PC

### 3.1 PC Software

The following software is needed.
MS SQL Server 2014 or later, preferably with Management Studio, and .Net 4.8 enabled on PC.
Accord Designer
Accord Server
Accord HMI

The template is meant for understanding Accord, using the Emulator, but it could be transferred to a PLC, and in that case the following are required

PLC: Siemens or other that Accord PLC Library is available for.
Network: using Ethernet.
PLC Editor: (Siemens TIA or equivalent)
OPC Server (Kepware or equivalent)

The aspects of the template can be expanded and the following can be used
Accord Recipe
Accord Plan
Accord Reports
MS Word, Excel

The following steps for restoration of Model (Controller) and HMI may not be necessary if the template is being shipped as part of Accord Installer.
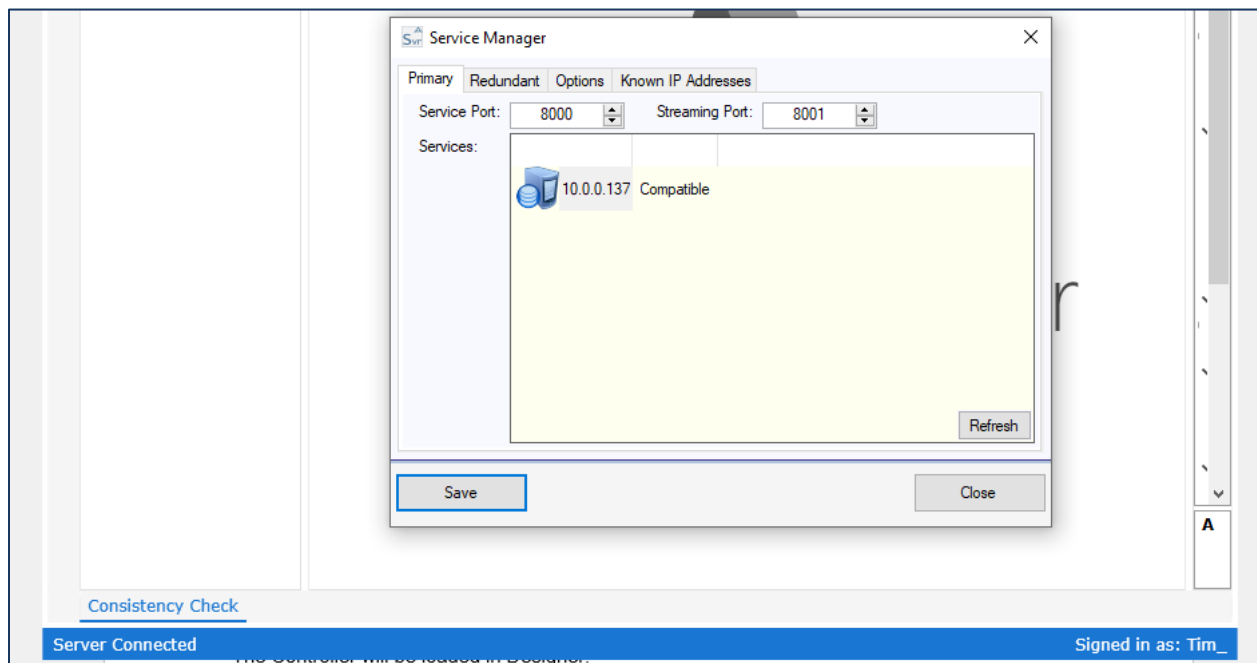
### 3.2   Initial Start of Designer

Start Accord Server and Accord Designer and connect Designer and login to begin loading and editing.
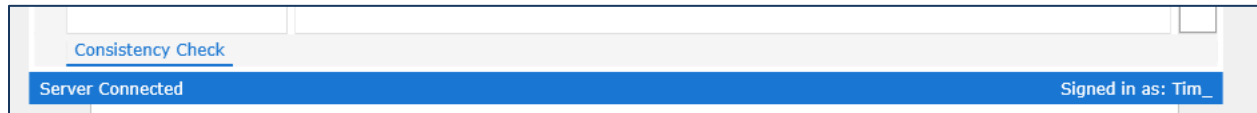


Click on Server area to access the Server search panel.



Click on Refresh if necessary to find the IP of the PC hosting Accord Server. When the required IP appears then double-click to select it.

A login popup will then appear. Engineer1 and password Engineer is available for initial use. The name or password may be changed in Server or Designer later.
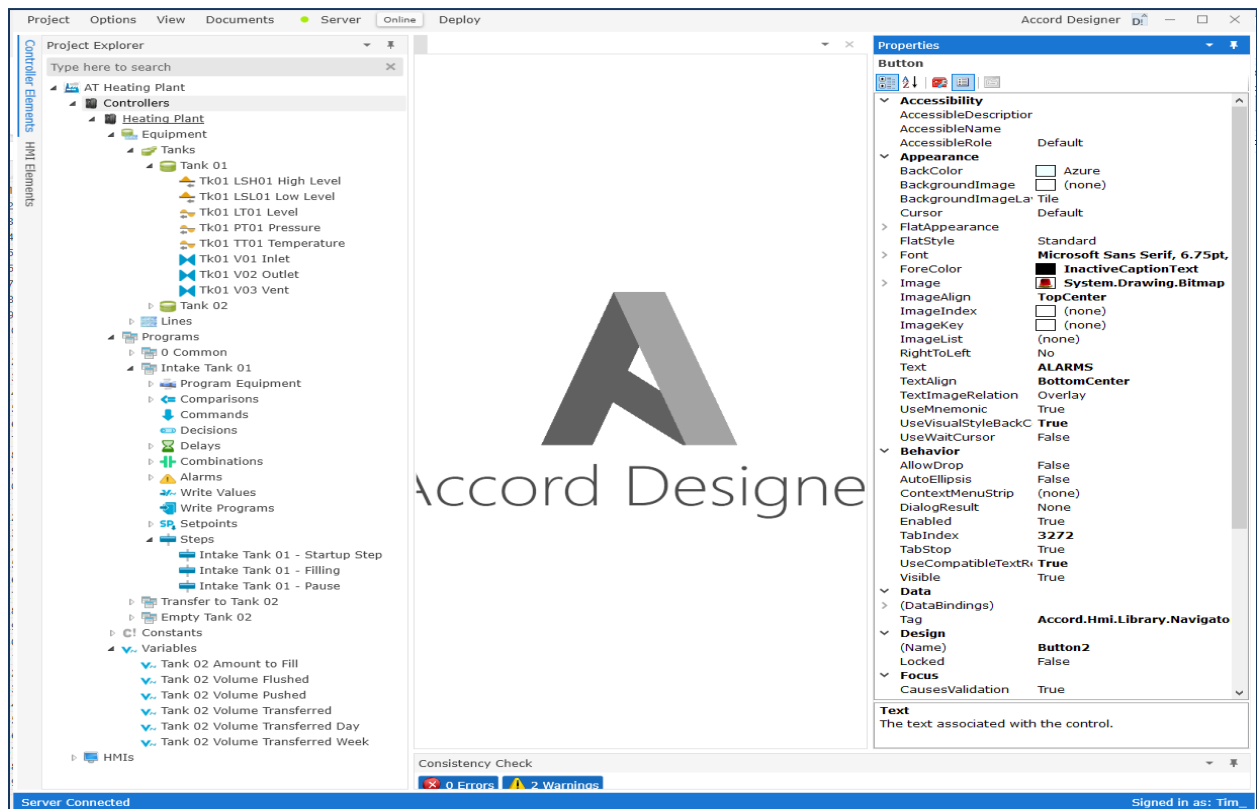
## 3.3 Restoration of Controller in Designer

When Designer is open, then select Restore in Controllers section and browse to and select the AT Heating Plant C1 C R1.0.ctr file and confirm by Open.

The Controller will be loaded in Designer.
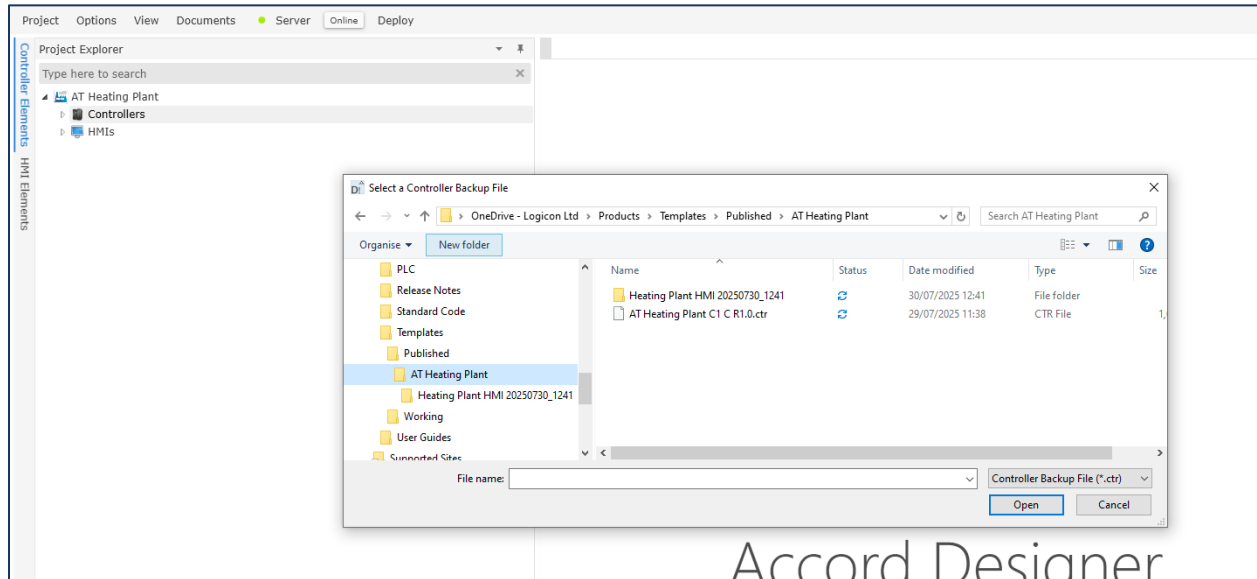
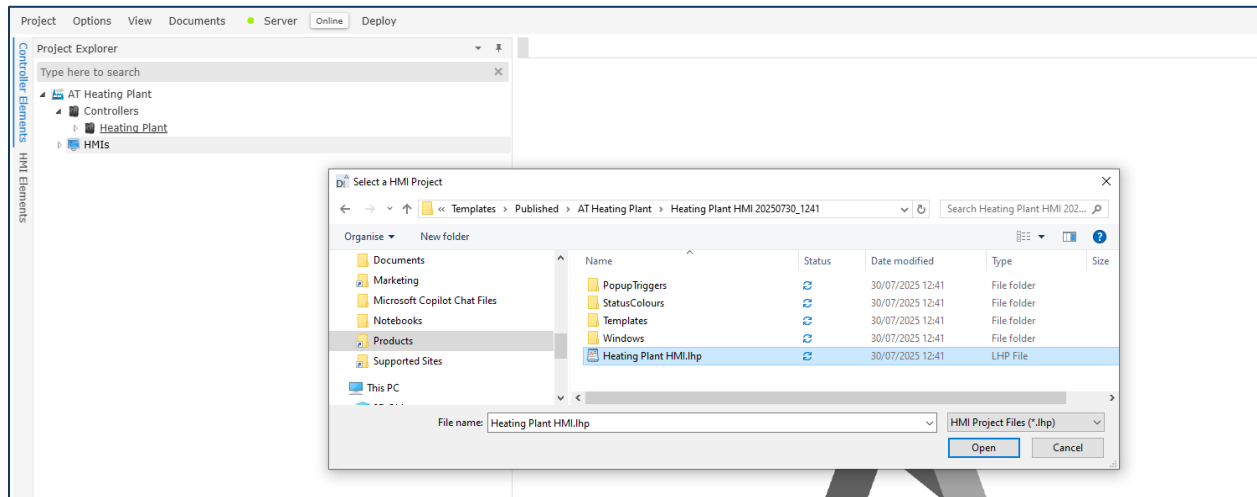Screen showing loaded Controller which may be modified.
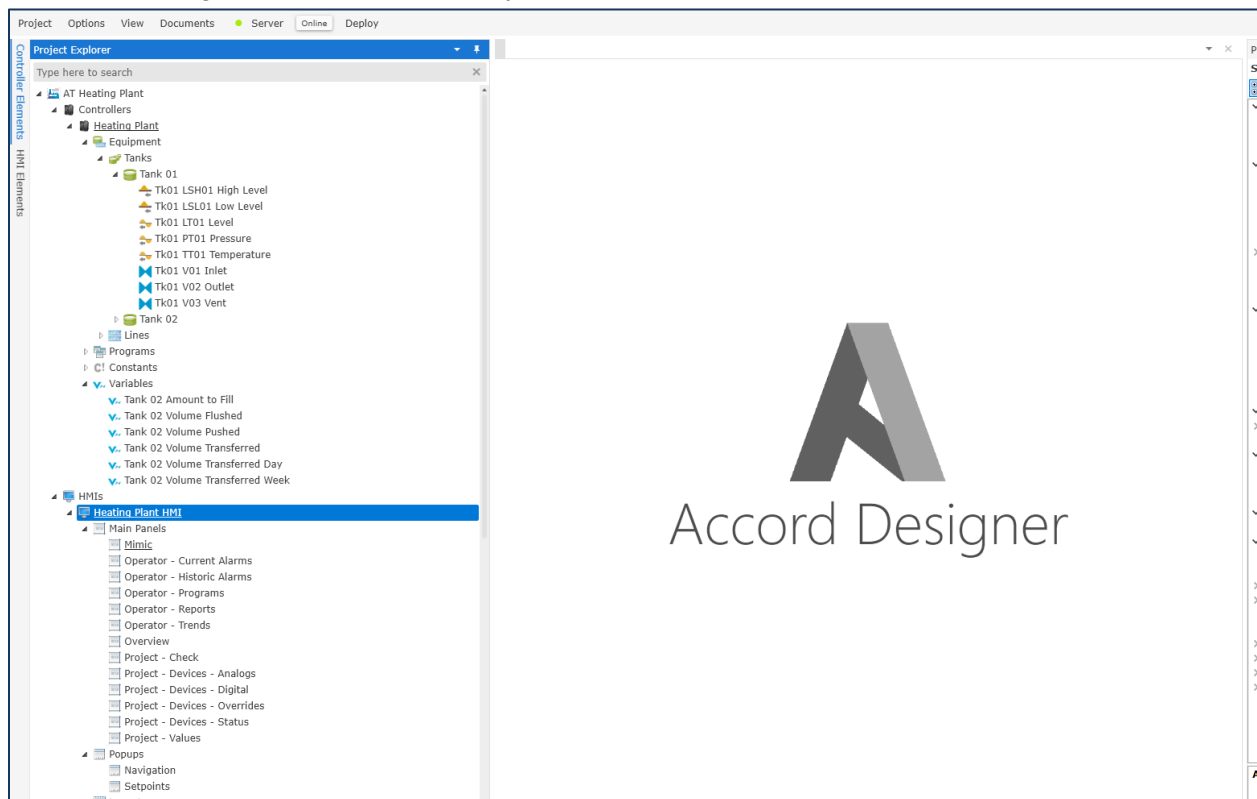
## 3.4   Restoration of HMI in controller

The HMI may be received as a zipped file and needs to be extracted to a folder.

Select Restore in HMI section in Designer and browse to and select the AT Heating Plant HMI folder and select the lhp file and confirm by Open.
The HMI will be loaded in Designer.



Screen showing loaded HMI which may be modified.

## 4. Using the Controller and HMI

The following is for initial information, there is more information in the Designer Manual.

### 4.1 Controller Properties and Deployment.

The Controller needs to be deployed to the Emulator, (or PLC) initially and after changes.

The screen shows the initial set-up, for an Emulator. The Emulator will have to be set up in Server, and selected, if not already set up. See Server / Settings / Emulator

If the Controller process model information is to be downloaded to a PLC, then the Accord PLC Library must be copied into the PLC project and an OPC profile must be setup for communication. Obtain the PLC Library and instructions from vendors. The PLC type would be selected in the dropdown, and the PLC can be selected from an OPC profile, which can be automatically read in by Accord.

Deployment to a PLC, or Emulator, is carried out by Right-clicking and selecting Deploy or Partial Download. A consistency check is performed and advised before the deployment and the summary for changes is presented,



Clicking on the underlined links brings up more information if needed.
Space may be reserved for spare items to be added using Partial Downloads.

The deploy is then completed by pressing Continue.

See Designer and Server Manuals for setting up or changing Logging, User Security, Start-Up Module selection, or other aspects of setting up the Server side.

## 4.2   HMI Properties and Deployment.

The HMI is composed of screens, and objects on the screens.
The initial properties above include the application resolution and the IP Address of the Server that will provide information for the HMI during Runtime. The HMI acts as a client only at all times.



Other common settings may also be configured here.

The Template HMI contains initial screens for a Mimic, an Overview dashboard and list screens for Alarms, and Device States.
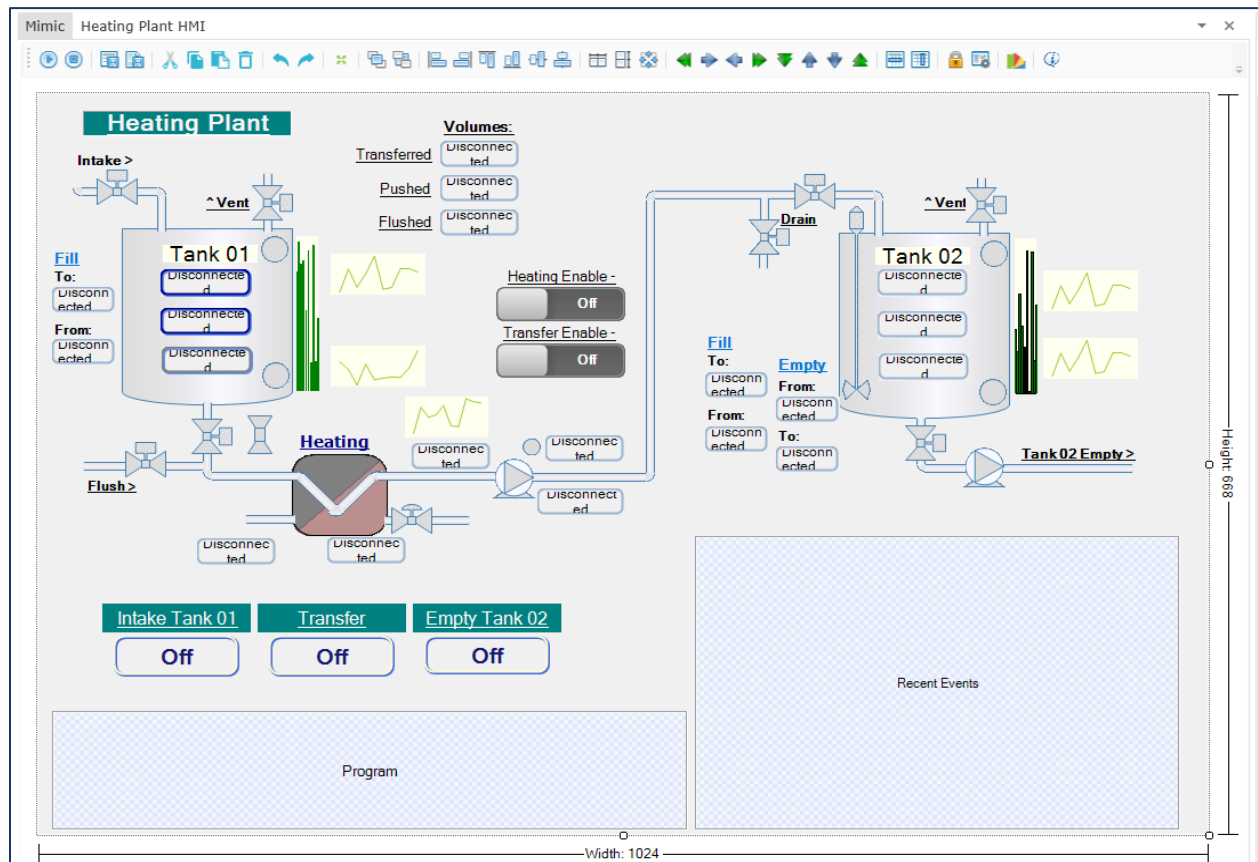
Mimic Screen, showing Tanks, and controls for devices and Programs and Recent Events.

The HMI may be emulated by pressing the Play button the top left hand corner. There are also buttons for alignment and other design aspects and changes may be saved using Save or Save All.

All changes are stored in the Database and available immediately for Runtime client applications. See the HMI Runtime manual for starting a client application.

### 4.3   Customisation

Items in the Controller process model may be easily renamed or changed and the Cross Reference and Consistency Checks will help ensure secure modifications.
Accord is an integrated environment so all changes to Model are available in HMI, Recipe, Reports, as appropriate. Depending on the change, an item may need to be re-assigned using Project Explorer in Accord HMI.

*Data should be uploaded from PLC to Designer Model, using the Sync Function, before modifications.*

Controllers and HMI's can be copied within the project or copied between projects.

4.3.1   <u>Adding an Equipment Item</u>
Equipment Items are: Valve, Motor, Digital In, Digital Out Signal, Instrument or Drive

1.   In the controller:
Drag in the appropriate icon into the unit
Or
Copy an existing item, using right-click copy and paste
Or
Right-click on the Unit and use Add Valve, etc.…

Configure the item and give the new item an appropriate I/O address. Use the I/O Table from the top menu to see all the existing I/O and to modify for the new item if required. Remember that this table can be copied to excel, modified and copied back, if required.

When an Analog Output; a Drive or Control Valve, that has a PID Loop controller, is copied then PID Loop Controller is also copied automatically. The Process Variable for the PID Loop will have to be changed or confirmed.

2.      In the HMI:
The new device will be available for placing on screen as required. The quickest way is to copy an existing device and select the new device name using the built-in HMI Explorer.

### 4.3.2   Adding an Program Item

Program Items are: Program, Step, Setpoint, Alarm, Comparison, Decision, Delay, Combination, Write,

1.      In the controller:

Drag in the appropriate icon into the unit

Or

Copy an existing item, using right-click copy and paste

Or

Right-click on the container and use Add Write, etc.…

Configure the item and add to / enable in Steps etc. as required.

2.      In the HMI:

The new item will be available for placing on screen if appropriate . The quickest way is to copy an existing device and select the new device name using the built-in HMI Explorer.

### 4.3.3   Renaming an Item

Item objects are based in the Controller, so must be renamed there. Renaming can be done by right-clicking on the item and selecting Rename. The new name must not be used already. The new name will be used in all lists and references.

Items must be reselected, or renamed using properties in the HMI also. The Replace Text function can be used for this.

If the values or states of the object were logged in Server, then those records are retained under the original item name in case they are required in Reports. New values will be logged under the new name.

### 4.3.4   Removing or Deleting an Item

An Item can be removed or deleted using Right-ckick and Delete. An item which is removed from the controller must also be removed from the Screens. If an item was being logged, but is removed from the model then the logging of values will be stopped, but values will be retrained.

### 4.3.5   Changing Interlocks or Activations

Interlocks or Activations can be changed by selecting the requried aspect within the Proerties of the object. This applies to Digital Devices and Outputs.

## 5. Simulator

The small plant can be used in Emulator and with the Simulator. The Simulator will modify Analog Transmitter values and Digital Input results, to allow the operation of the plant to be tested. The Simulator can be accessed within Designer as of Release 4.1.



| Row | Used | Type | Project Name | Item | Enabler Type | Enabler Project I | Enabler Item | Check | Check Value | Delay | Write | Change | Period | Limit |
|-----|------|------|--------------|------|--------------|-------------------|--------------|-------|-------------|-------|-------|--------|--------|-------|
| 1 | ✔ | Analog Input | Heating Plant | Tk01 LT01 Level | Valve | Heating Plant | Tk01 V01 Inlet | Active | | 2 | | 0.1 | 1 | 10 |
| 2 | ✔ | Analog Input | Heating Plant | Tk02 LT01 Level | Valve | Heating Plant | Tk02 V01 Inlet | Active | | 2 | | 0.1 | 1 | 10 |
| 3 | ✔ | Analog Input | Heating Plant | TT03 Line Temperature | Analog Output | Heating Plant | CV03 Heating Control | > | 30 | 1 | | 1 | 1 | 50 |
| 4 | ✔ | Analog Input | Heating Plant | FT01 Transfer Flow Rate | Motor | Heating Plant | P01 Product Transfer | Active | | 3 | | 1 | 3 | 20 |
| 5 | ✔ | Digital Input | Heating Plant | Tk01 LSH01 High Level | Analog Input | Heating Plant | Tk01 LT01 Level | > | 9.6 | 1 | | | | |
| 6 | ✔ | Digital Input | Heating Plant | Tk01 LSL01 Low Level | Analog Input | Heating Plant | Tk01 LT01 Level | < | 0.2 | 1 | | | | |
| 7 | ✔ | Digital Input | Heating Plant | Tk02 LSH01 High Level | Analog Input | Heating Plant | Tk02 LT01 Level | > | 9.6 | 1 | | | | |
| 8 | ✔ | Digital Input | Heating Plant | Tk02 LSL01 Low Level | Analog Input | Heating Plant | Tk02 LT01 Level | < | 0.3 | 1 | | | | |
| 9 | ✔ | Variable | Heating Plant | Tank 02 Volume Pushed | Step | Heating Plant | Transfer to Tank 02 - Push to Drain | Active | | 1 | | 0.1 | 1 | 20 |
| 10 | ✔ | Variable | Heating Plant | Tank 02 Volume Transferre | Valve | Heating Plant | Tk02 V01 Inlet | Active | | 1 | | 0.1 | 1 | 20 |
| 11 | ✔ | Analog Input | Heating Plant | Tk01 LT01 Level | Valve | Heating Plant | Tk01 V02 Outlet | Active | | 1 | | -0.2 | 1 | 0 |
| 12 | ✔ | Analog Input | Heating Plant | Tk02 LT01 Level | Valve | Heating Plant | Tk02 V02 Outlet | Active | | 1 | | -0.1 | 1 | 0 |
| 13 | ✔ | Analog Input | Heating Plant | TT03 Line Temperature | Analog Output | Heating Plant | CV03 Heating Control | < | 12 | 1 | | -0.3 | 1 | 10 |
| 14 | ✔ | Variable | Heating Plant | Tank 02 Volume Flushed | Step | Heating Plant | Transfer to Tank 02 - Initial Flush | Active | | 2 | | 0.1 | 1 | 10 |
| 15 | ✔ | Variable | Heating Plant | Tank 02 Volume Pushed | Step | Heating Plant | Transfer to Tank 02 - Push to Tank 02 | Active | | 2 | | 0.1 | 1 | 10 |

Rows may be edited using the Edit button. They may be reordered or removed and new rows may be added. The Profile may be exported and modified in Excel and imported using the arrow buttons.

The Play and Stop buttons provide for the profile to be made Active and Stopped. Rows whose enablers are true are shown in blue when the profile is Active.

# Accord Template Summary

**Accord Simulator**

Profile Name: Heating Plant 1    Status:  Active

| Row | Used | Type | Project Name | Item | Current | Enabler Type | Enabler Project Na | Enabler Item | Check | Check Value | Delay | Write | Change | Period | Limit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Yes | Analog Input | Heating Plant | Tk01 LT01 Level | 0.00 | Valve | Heating Plant | Tk01 V01 Inlet | Active | | 2 | | 0.1 | 1 | 10 |
| 2 | Yes | Analog Input | Heating Plant | Tk02 LT01 Level | 0.00 | Valve | Heating Plant | Tk02 V01 Inlet | Active | | 2 | | 0.1 | 1 | 10 |
| 3 | Yes | Analog Input | Heating Plant | TT03 Line Temperature | 10.00 | Analog Output | Heating Plant | CV03 Heating Control | GreaterThan | 30 | 1 | | 1 | 1 | 50 |
| 4 | Yes | Analog Input | Heating Plant | FT01 Transfer Flow Rate | 0.00 | Motor | Heating Plant | P01 Product Transfer | Active | | 3 | | 1 | 3 | 20 |
| 5 | Yes | Digital Input | Heating Plant | Tk01 LSH01 High Level | | Analog Input | Heating Plant | Tk01 LT01 Level | GreaterThan | 9.6 | 1 | | | | |
| 6 | Yes | Digital Input | Heating Plant | Tk01 LSL01 Low Level | | Analog Input | Heating Plant | Tk01 LT01 Level | LessThan | 0.2 | 1 | | | | |
| 7 | Yes | Digital Input | Heating Plant | Tk02 LSH01 High Level | | Analog Input | Heating Plant | Tk02 LT01 Level | GreaterThan | 9.6 | 1 | | | | |
| 8 | Yes | Digital Input | Heating Plant | Tk02 LSL01 Low Level | True | Analog Input | Heating Plant | Tk02 LT01 Level | LessThan | 0.3 | 1 | | | | |
| 9 | Yes | Variable | Heating Plant | Tank 02 Volume Pushed | 0.00 m3 | Step | Heating Plant | Transfer to Tank 02 - Push to Drain | Active | | 1 | | 0.1 | 1 | 20 |
| 10 | Yes | Variable | Heating Plant | Tank 02 Volume Transferred | 20.00 m3 | Valve | Heating Plant | Tk02 V01 Inlet | Active | | 1 | | 0.1 | 1 | 20 |
| 11 | Yes | Analog Input | Heating Plant | Tk01 LT01 Level | 0.00 | Valve | Heating Plant | Tk01 V02 Outlet | Active | | 1 | | -0.2 | 1 | 0 |
| 12 | Yes | Analog Input | Heating Plant | Tk02 LT01 Level | 0.00 | Valve | Heating Plant | Tk02 V02 Outlet | Active | | 1 | | -0.1 | 1 | 0 |
| 13 | Yes | Analog Input | Heating Plant | TT03 Line Temperature | 10.00 | Analog Output | Heating Plant | CV03 Heating Control | LessThan | 12 | 1 | | -0.3 | 1 | 10 |
| 14 | Yes | Variable | Heating Plant | Tank 02 Volume Flushed | 0.00 m3 | Step | Heating Plant | Transfer to Tank 02 - Initial Flush | Active | | 2 | | 0.1 | 1 | 10 |
| 15 | Yes | Variable | Heating Plant | Tank 02 Volume Pushed | 0.00 m3 | Step | Heating Plant | Transfer to Tank 02 - Push to Tank 02 | Active | | 2 | | 0.1 | 1 | 10 |

Connected

User: Tim