

Air Compressor Control System with Start Stop

Objectives:

To develop skills in the designing, programming, and commissioning of a control system.

Introduction:

The engineering department is developing air compressor control systems for sale in Australia. The supervisor has provided a list of operational requirements.

Operational requirements:

A simple PLC controlled system is required for starting and stopping an air compressor using the Air Management Training System (AMTS). This system will use Direct on Line (DOL) starting and will have the following facilities:

1. Start button
2. Stop button
3. Motor Overload (TOL)

Operational description:

1. The air compressor motor is controlled by start and stop buttons
2. The motor is DOL and runs continuously
3. While the motor is running a lamp is to light
4. The motor is protected by a TOL switch, this switch will open when the motor current exceeds the safe operating range
5. If the protection device operates, the motor is to stop and cannot be restarted until the fault is cleared
6. Once stopped by a fault, the motor will not re-start again without operating the start button

Project Resources:

1. PC with RSLogix 5000 installed
2. Air Management Training System (AMTS)
3. CompactLogix PLC Interface Station
4. AMTSTemplate.acd – RSLogix 5000 File
5. AMTS.dnt – RSNetwork DeviceNet File
6. AMTSMapping.xls – Mapping Document
7. AMTS Electrical Circuit Diagrams
8. AMTSProject101.acd – Project solution

AMTS Device allocation:

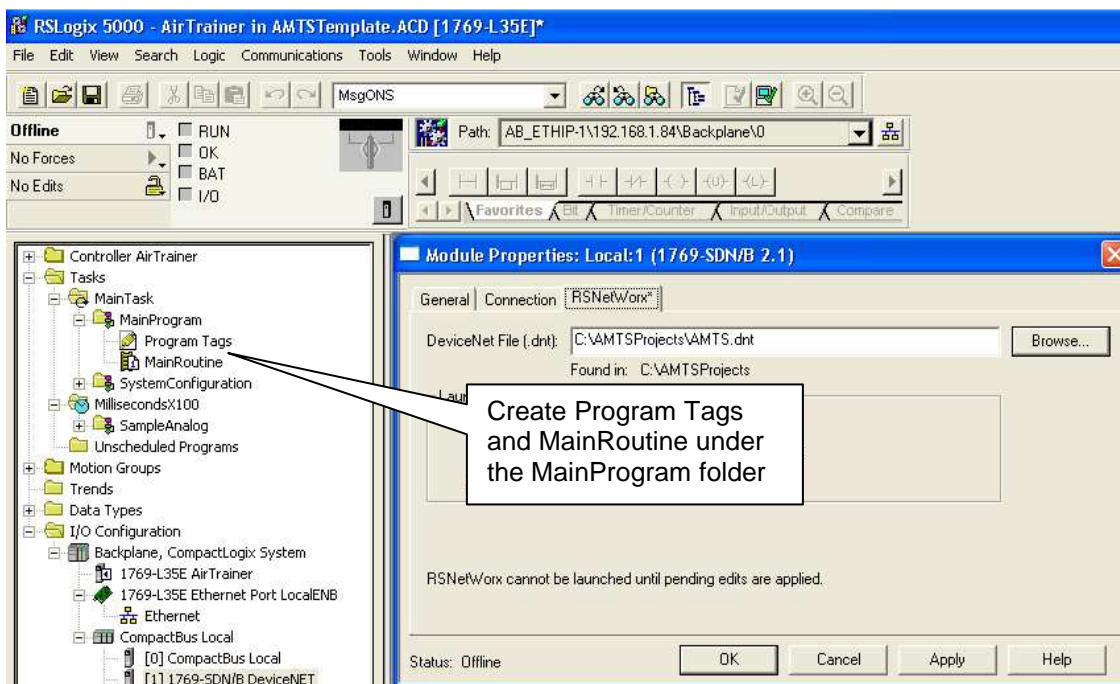
Device	AMTS Label	Controller Tags
Stop Button	Stop 1	Input.12
Start Button	Start 1	Input.13
Compressor Running	Compressor 1 On Load	Output.0
TOL	Simulation 1	Input.0

Note: The AMTS does not require electric motors to function as an air compressor. When your ladder program requires an output for a compressor motor, create a “memory” or Base Program Tag for this purpose.

Getting Started

As many PCs are restored to their original state after re-starting, it is recommended your working files folder be on your home drive or personal storage device

1. Log onto your PC and navigate to the student resources folder, copy AMTSTemplate.acd, and AMTS.dnt to your working folder
 - a) Your instructor will provide you with the path to the student resources folder
2. Open AMTSTemplate.acd using RSLogix 5000
 - a) Use “Save As” to save to a file with a name of your choice
 - b) In the Controller Organizer view right click on the 1769-SDN, choose Properties and click on the RSNetworkx tab in the properties dialog
 - c) Browse to your working folder choose the AMTS.dnt file then click apply



- d) In RSLogix 5000 set the project path to suit your PLC Interface Station

Note: The AMTSTemplate.acd file contains configuration Routines and Tasks that need not be edited or changed. Changes may result in incorrect operation of the background tasks in the AMTS. Therefore, the ladder program should be written solely in the MainRoutine creating Program Tags as required.

3. The AMTS uses industry safety standards, therefore certain conditions apply for correct operation:
- a) The Emergency Stop button disconnects supply to outputs connected to devices external to the AMTS control panel via the Emergency Stop relay
 - b) Use the Reset button to activate the Emergency Stop relay after the Emergency Stop button has been pressed, and after AMTS Power On

Project Requirements, Assessment and Functional Testing

1. Create your project using the operation requirements and description above
2. Project assessment items:
 - a) Working model on the AMTS
 - b) Ladder program
 - c) Program Tags
 - d) Supporting documentation
 - e) Pass for all functional requirements on the checklist

Item	Pass	Functional Requirement
1	<input type="checkbox"/>	Compressor 1 On Load lamp on when Start is pressed
2	<input type="checkbox"/>	Compressor 1 On Load lamp off when Stop is pressed
3	<input type="checkbox"/>	Won't start, or stops running, when TOL (Simulation 1) is off

Summary

On successful completion of this project you have developed and commissioned an actual working Air Compressor control system similar to those found at many industrial and commercial locations.

This basic control system is for classroom activity and PLC familiarisation. For cost and logistical reasons it would not be practical to implement this project using a stand-alone PLC. The system would most likely use a low cost off-the-shelf DOL starter system commonly used for these applications.