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## Documenting PLC Programs

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# KGM REFRIGERATION

INDUSTRIAL REFRIGERATION SOLUTIONS

## Introduction

This article provides a brief introduction into documenting software programs for Programmable Logic Controllers (PLC). Its aim is to provide clear guidance in the program documentation for PLC's.

This article is based on the Ladder Logic format of PLC Programming, but many of the points also related to Instruction List (IL) and Function Block Diagram (FBD).

PLC Programs should be written and documented so that they can be easily maintained and modified others than those who originally wrote the program. All PLC Programming Editors have increased documentation capabilities including Siemens, Modicon, Allen Bradley and Mitsubishi.

## Documenting PLC Software

Early Programmable Logic Controllers had little or no capacity for the documentation of programs. For technicians to understand the logic the program had to be followed from inputs to outputs. This made fault finding or modifications to programs difficult.

As PLC's have developed the programming packages have also improved, allowing for the software to be clearly annotated.

The programming tools available for most PLC's allow for the following documentation.

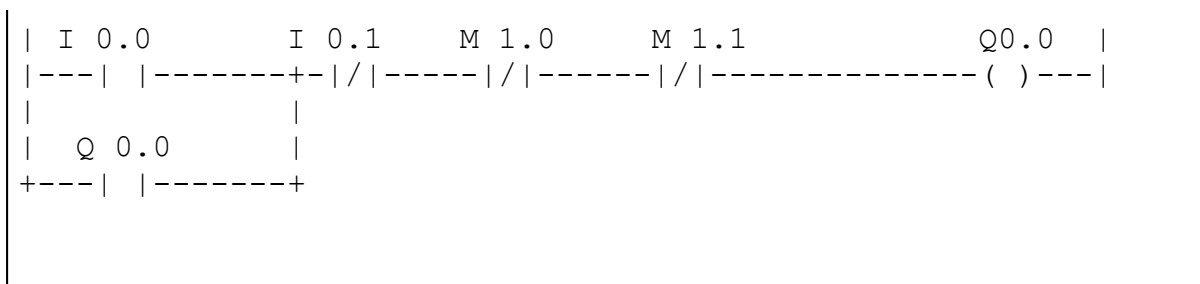
- Rung Title
- Rung Comments
- Symbols and Symbol Comments.

This article provides a practical guide to using these documentation techniques.

## Undocumented PLC Software

The following details a rung of ladder logic for a vacuum pump, without any documentation. To follow the code you would require as a minimum an I/O Schedule or wiring diagram.

**Rung 100 :**

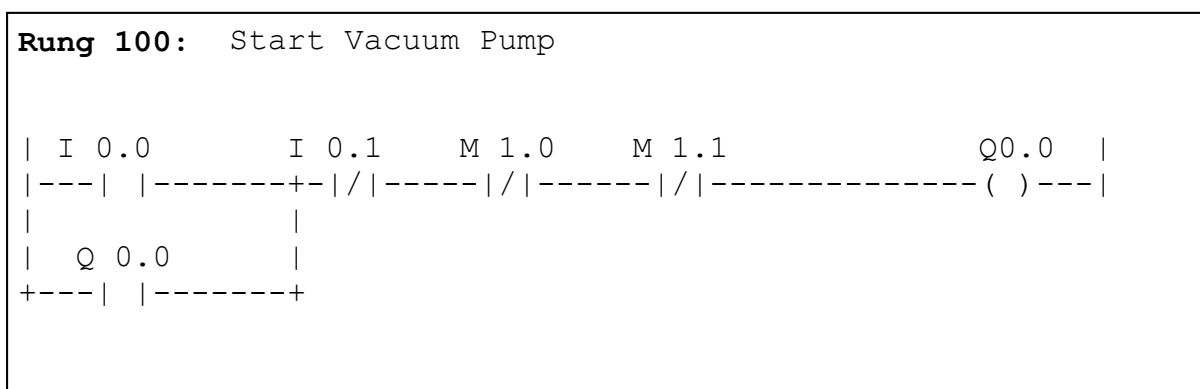


We will be using this rung to demonstrate the advantages and techniques to documenting PLC Software.

## Rung Titles

Every Rung (or Network) should have as a minimum a Title. The Rung Title makes the software readable making the function of the rung recognisable.

The Rung Title will generally be based on the output function of the rung. For example a rung with an output to start a vacuum pump would have the title "Start Vacuum Pump", simple but clear.

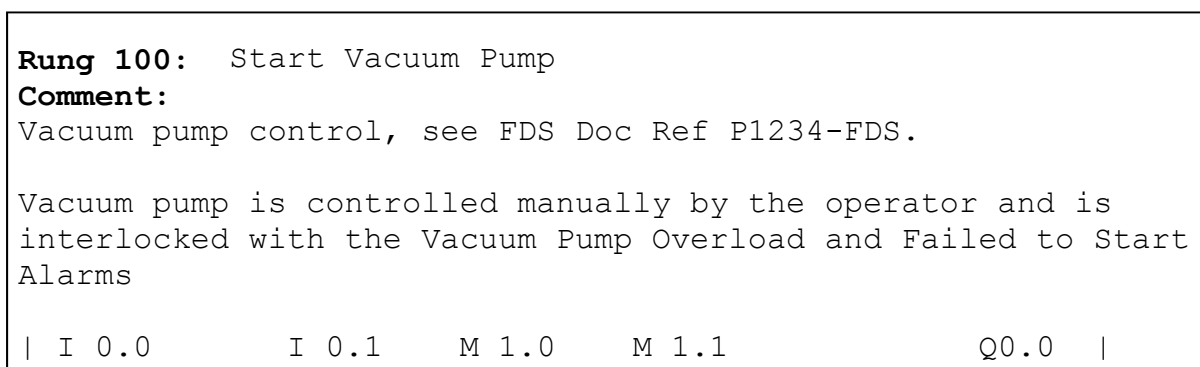


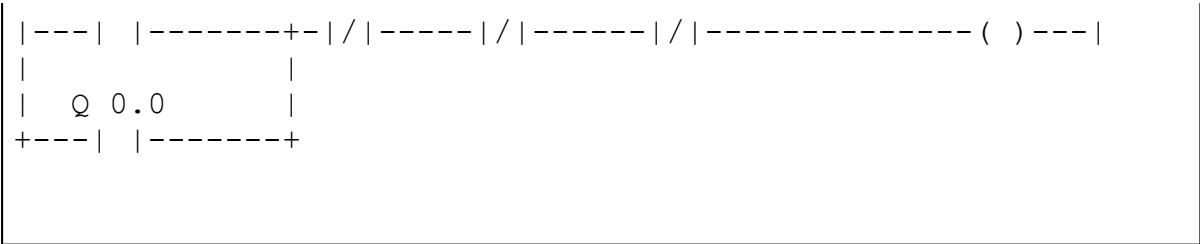
## Rung Comments

The Rung (or Network) Comment is with most PLC Editors is usually free text above each rung. Rung comments should be used to identify blocks of code and to provide additional details of the software. Particularly important for complex routines.

When identifying a the start of the sequence it is useful to add a reference to the section of the Functional Design Specification, where the function of the software is detailed.

Putting the Rung Title and Rung Comments together for our vacuum pump.





This makes the above rung easier to follow. Without the use of the the I/O Schedule or Wiring Schematic the function of the rung can be clearly seen. From the logic you can probably guess that I 0.0 is start push-button and I 0.1 the stop push-button.

**Symbols and Symbol Comments**

The purpose of symbolic addressing is to allow the PLC programmer to write the software using meaningful symbols rather than having to remember addresses.

General rules for Input and Output symbols should be to use the tags from Process and Instrumentation Diagrams (P&ID) or electrical drawing references. Where these are not available use of a simple description should be used.

For the above the following could be used.

Symbol	Address	Description
VAC01_STPB	I 0.0	Vacuum Pump Start Pushbutton
VAC01_SPPB	I 0.1	Vacuum Pump Stop Pushbutton
VAC01_	Q 0.0	Vacuum Pump Run
VAC01_TRAL	M 1.1	Vacuum Pump Trip Alarm (Latched)
VAC01_AL	M 1.1	Vacuum Pump Alarm Latch (Failed to Start/Stop)

Although many program editors can allow for more characters within the symbols it is recommended to keep the symbol short and use the comments to provide further details. Our recommendation is to build the symbols from the blocks of two characters to represent the the meaning and to keep the length less than 10.

With all the above added together the Ladder Logic becomes much more "readable" and useful when viewed, giving other programmers and maintenance personnel understanding of the Ladder Logic.

**Rung 100:**    Start Vacuum Pump

**Comment:**

Vacuum pump control, see FDS Doc Ref P1234-FDS.

Vacuum pump is controlled manually by the operator and is interlocked with the Vacuum Pump Overload and Failed to Start Alarms

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