LadderWorks™ PLC

A Complete Soft PLC Package

Soft Servo
SYSTEMS, INC

Overview

LadderWorks™ PLC, an independent PLC package, is included with and integrated with all of Soft Servo Systems' SMP general motion control products and all ServoWorks CNC products.

LadderWorks PLC includes a real-time soft PLC Engine and the LadderWorks Console — a Win32 application for editing, monitoring, debugging and compiling PLC sequence programs.

Integrated Soft PLC

- Ladder logic
- 0.07 µs/step (Pentium IV 2.4 GHz)
- E-mail and telephone alert
- Max 40,000 steps
- 100 bytes each for X and Y signal addresses; 400 bytes each for F and G signal addresses

LadderWorks PLC Engine

- Real-time soft PLC engine for industry-standard ladder logic control and execution of PLC sequence programs

- Provides control of axis modules — independent and individual positioning of PLC axes — useful for part feeders, tool changers, etc. (available for ServoWorks S-120M, ServoWorks S-140M, ServoWorks S-200M and for all SMP products)

- Seamlessly integrated with the SMP Motion Engine or the ServoWorks CNC Engine into a single motion/machine control application providing uniform API functions

- Operates with Fanuc-compatible ladder logic

- Maximum number of I/O points varies according to the interface system:

  - ♦ VersioBus II: 416
  - ♦ Realtime Express (RTEX): 672
  - ♦ SSCNET : 288
  - ♦ MECHATROLINK II: 608, MECHATROLINK III: 288

- Provides deterministic, real-time performance.

- Operates with a 5 msec standard scan time (8 msec for ServoWorks S-100T)

- Interfaces extensively with the SMP Motion Engine or the ServoWorks CNC Engine: monitors motion status and sends motion commands

- Recognizes 38 function blocks and 12 basic commands, simplifying the programming of complex machine functions and allowing for quick and easy creation of sequence programs
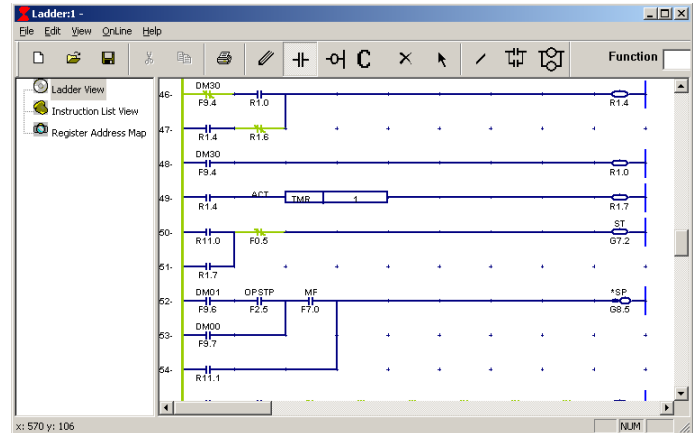
LadderWorks Console[*]

- Easily create, import, edit, compile, verify and monitor PLC sequence programs with ladder diagrams

- Quickly insert functional commands by selecting functions from a pull-down menu, and entering parameters (if any) in pop-up text boxes

- Simply insert basic instructions by pointing and clicking on symbols within the easy-to-use GUI

- View Ladder Diagram (LD) format (with a user-friendly ladder editor) or Instruction List (IL) format

- Meaningfully comment or label components in ladder diagrams

- Search ladder diagrams for addresses or labels

- Force component values while monitoring sequence programs (helpful in diagnosing problems during machine setup and integration)

- Print ladder diagrams

- Execute subprogram routines in sequence programs to eliminate redundant programming with modularization

- View register map (I/O data mapping tables)

- Sort register map by address, label or description

- Export PLC sequence programs in text (IL format) or compile into executable binary code according to the ladder diagram

- Includes PLC utility tools — real-time bit pattern display for any signal address (F, G, X or Y data) and real-time time charts showing the history of specified bit signals in any signal addresses to aid in debugging PLC sequence programs

- Includes extensive documentation and mapping tables (for reference in writing sequence programs)

Basic Commands

#	Command	Function
1	RD	Reads the value of the signal and puts it in ST0.
2	RD.NOT	Reads the inverted value of the signal and puts it in ST0.
3	WRT	Outputs the result (value of ST0) into the specified address.
4	WRT.NOT	Outputs the inverted result (value of ST0) into the specified address.
5	AND	Logical AND (Product). Performs a logical AND with the specified signal and the existing value (ST0).
6	AND.NOT	Inverts the value of the specified signal and performs a logical AND with the existing value.
7	OR	Logical OR (Sum). Performs a logical OR with the specified signal and the existing value (ST0).
8	OR.NOT	Inverts the value of the specified signal and performs a logical OR with the existing value.
9	RD.STK	Shifts the register contents left one bit and puts the value of the signal with the specified address into ST0.
10	RD.NOT.STK	Same as RD.STK, but stores the inverted signal value into ST0.
11	AND.STK	Stores AND of ST0 and ST1 into ST1, then shifts all of the bits in the register to the right one bit.
12	OR.STK	Stores OR of ST0 and ST1 into ST1, then shifts all of the bits in the register to the right one bit.

LadderWorks PLC Utilities

The PLC bit pattern screen is a simple interface, but it details critical information. For any signal address (F, G, X or Y data), the bit pattern screen provides the current bit pattern for that signal.

The PLC time chart utility is a useful utility tool showing the history of any specified bits in any signal addresses to aid in debugging PLC sequence programs.
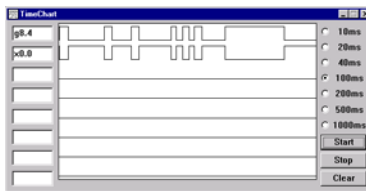
Functional Commands

#	Command	Function
1	TMR	Timer
2	TMRB	Static Timer
3	TMRC	Timer
4	DEC	Decode
5	DECB	Binary Decode
6	CTR	Counter
7	CTRC	Counter
8	ROT	Rotational Control
9	ROTB	Binary Rotational Control
10	COD	Code Transformation
11	CODB	Binary Code Transformation
12	DCNV	Data Conversion
13	DCNVB	Extended Data Conversion
14	MOVE	Masked Data Transfer
15	MOVOR	Bit-Wise Sum Data Transfer
16	SFT	Shift Register
17	JMP	Jump
18	JMPE	Jump Termination
19	COM	Common Line Control
20	COME	Common Line Control Termination
21	PARI	Parity Check
22	COMP	Comparison
23	COMPB	Binary Comparison
24	COIN	Equality Check
25	DSCH	Data Search
26	DSCHB	Binary Data Search
27	XMOV	Index Modify Data Transfer
28	XMOVB	Binary Index Modify Data Transfer
29	ADD	Addition
30	ADDB	Binary Addition
31	SUB	Subtraction
32	SUBB	Binary Subtraction
33	MUL	Multiplication
34	MULB	Binary Multiplication
35	DIV	Division
36	DIVB	Binary Division
37	NUME	Constant
38	NUMEB	Binary Constant