Flexible PLC Salient Features :-

- DIN rail / Back panel mounted compact PLC

- Up-to 2 Serial Ports , 1 USB Device Port

- Expandable up to 8 expansions

- Built-in Digital I/O's (8 In / 8 Out)

- High Speed Counters and Timers

- Support for single phase counter and quadrature counter input

- Support for PWM output

- 32 Bit RISC processor

- Strong Communication capabilities. PLC can be configured as Modbus RTU Master or Slave

- Simple Ladder programming using Windows® based software

- DC powered units (24 V DC)

- CE, UL approved

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The FL010 support standard Programmable Logic Controller features.
The user can implement logic, specific to application using standard Ladder programming.
A PLC logic block can be executed at power up, during every scan, upon a timer interrupt.

Supported Tasks include:
- Write value to Tag
- Subtract a constant value from Tag
- Subtract Tag B to Tag A
- Turn Bit Off
- Copy Tag B to Tag A
- Add a constant value to Tag
- Add Tag B to Tag A
- Turn Bit On
- Toggle Bit
- Swap Tag A and Tag B

This PLC possess powerful programmable logic features. User can implement logic, specific to application using standard Ladder programming. Some of the Key features are as mentioned below :

Expansion module (Digital and Analog)
FL010 I/O can be expanded using modular I/O modules. These modular I/O are Digital and Analog type. User can use Digital / Analog or combination of both. Various combination of Digital expansion modules are available. User can have up to 4 universal analog inputs and 2 analog outputs or 8 analog inputs. Analog inputs are mA, mV, 0-10 VDC, RTD and TC. The Analog outputs are 4-20 mA or 0-10 VDC. User can select appropriate I/O module depending on the application.

Communication
The PLC is designed to have up-to 2 serial and 1 USB communication ports. Serial ports can be defined as Modbus RTU (Master or Slave) or can be connected to various third party devices such as PLCs, Drives, PID Controllers, SCADA etc. Most industry standard protocols are supported. The USB port is used for programming and monitoring the PLC.

Digital I/O
FL010 can have up to 8 digital inputs integrated to the unit. 2 high speed counter inputs can be configured as single phase input (50 KHz) and quadrature input (5 KHz). Digital inputs are high impedance 24VDC. FL010 can also have up to 8 digital outputs integrated to the unit. 2 digital outputs can be configured as normal PWM output (5 KHz). Digital outputs are relay type (NO) and transistor (NPN) type.

High Speed Counters
FL010 supports high speed counter inputs up to 50 KHz. The user can define up to 2 single phase counter inputs or 1 quadrature input with 1X, 2X, 4X modes.

PWM Output-
FL010 supports PWM outputs up to 5KHz. The user can define up to 2 PWM outputs.

USB Ports
It has one USB (Device) port. The USB port can be used as a programming port or for logic monitoring.

Ladder Support
FL010 supports ladder functionality, which are listed below :
1. Math
Instructions such as ADD, Subtract, Multiply and Divide. These instructions could be Single word or Double word, signed or unsigned format.

2. Data compare
Instructions such as Less than, Greater than, Equal to, Less than or Equal to, Greater than or Equal to etc. are supported.

3. Data Transfer Instructions
Data transfer instruction supports word and double word operands, Multiplexer / demultiplexer instructions.

4. Data conversion
Data conversion such as hex to ASCII, ASCII to hex, Binary, BCD, 2's Compliment, 7 segment etc. are possible.

5. Shift / Rotate
Rotate left, Rotate Right, Shift Left, Shift Right for word / double word.

6. I/O Instructions
Normally Open / Normally Closed contacts, positive pulse contact, negative pulse contact, Leading / Falling edge etc. are implemented.

7. Immediate I/O instruction
This instruction can be used to sample instantaneous physical inputs and outputs in PLC ladder.

8. Set / Reset
Coil / Bit / Register Set / Reset Instructions are supported.

9. Program Control
FL010 also support subroutine call, MCS / MCR, JCS / JCR, Enable / Disable Interrupts and step sequence instructions.

10. Functions
The function instructions like Moving average, Digital filter, Function generator, PID , Encode / Decode, Min / Max / Average Value, Lower / Upper Limit, Flip Flop are also supported.

Comprehensive Instructions supported in FL010 :

I/O Instructions -

NO contact	NC contact	Output
Falling Edge	Rising Edge	Inverter
Inverter Coil	Positive Pulse Contact	Negative Pulse Contact
Positive pulse coil	Negative Pulse Coil	

Data Transfer -

MOV word	MOV DWORD	Invert Transfer
Table Initialize	Table Block Transfer	Table Invert Transfer
Data Exchange	Multiplexer	Demultiplexer

Math-

Addition	Subtraction	Multiplication
Division	Addition with Carry	Subtraction with Carry
Increment	Decrement	

Compare -

Greater than	Greater than or equal	Equal
Not Equal	Less Than	Less than or Equal

Logic -

AND	OR	XOR
Shift	Rotate	

Data Conversion -

Hex to Ascii	Ascii to Hex	Absolute Value
7 segment decode	Ascii conversion	Binary Conversion
BCD conversion	2's complement word	
	2's complement Double word	

Timer -

TON	TOFF	TSS

Counter-

Up counter	UP Down Counter

Program Control -

Subroutine CALL	Subroutine RET	For
Next	Master Control Set	Master Control Reset
Jump Control Set	Jump Control Reset	En Intr
Dis Intr	WTR	Step sequence Init
Step sequence Input	Step sequence output	

Function -

Moving Average	Digital Filter	PID1,4
Upper limit	Lower limit	Maximum Value
Minimum Value	Average Value	Function generator

Special -

Device Set	Device Reset	Register Set
Register Reset	Set Carry	Reset Carry
Encode Decode	Bit Count	Flip Flop
Direct I/O	Set Calender	Calender Operation

Configuration Software
FlexiSoft® is a compact, Windows® based software to configure the PLC. Following image from FlexiSoft® shows the snap shot of ladder configuration window:
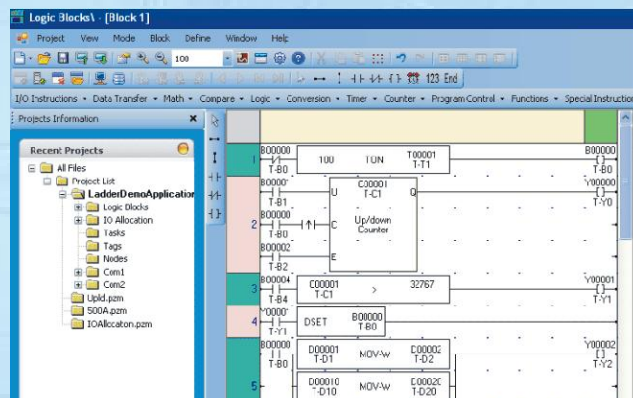
System requirements for FlexiSoft® Software are -

Windows Version	:	Microsoft Windows® 2000 or above
Processor	:	266 MHz PENTIUM or higher
Mouse	:	Required
RAM	:	64 MB or more
Display resolution	:	800 x 600 (VGA) or better
Display colors	:	256 colors minimum
Serial Port	:	1 serial port for FlexiPanels® programming
USB Port	:	1 USB port (Host) for FlexiPanels® programming
Keyboard	:	Required

Protocols Supported for :-

Driver	FL010	Driver	FL010
ABB	✓	Mitsubishi Q Series PLC	✓
Allen Bradley DF1	✓	Modbus Master	✓
Aromat FP Series	✓	Modbus Slave	✓
Baldor	✓	Omron Host Link	✓
Danfoss Drive	✓	Omron Inverter Memobus	✓
Delta	✓	Serial Monitor	✓
Fatek	✓	Toshiba (Link Port) Series	✓
GE SNP	✓	Toshiba Inverters	✓
GE SNP-X	✓	Toshiba T Series	✓
Idec	✓	TriPLC	✓
LG Master K series PLC	✓	Twido	✓
LG Master-K 300S	✓	Unitelway	✓
Mitsubishi FX	✓	Universal Serial (ASCII)	✓

Specifications :-

Functional	
Control Method	Stored program cyclic scan system
I/O Processing	Batch I/O update(refresh) and Direct I/O access
Expansion I/O Capacity	Up to 8 I/O modules, Local I/O's - 16 (8 In / 8 Out)
Programming Language	Ladder
Program Capacity	8K Steps
Memory	Program: Flash Type Data: SRAM and EEPROM
Execution Speed	1.03 ms / contact 1.08 ms / coil 1.85 ms / 16-bit transfer 3.28 ms / 16-bit signed addition

User Data	
Timer Registers	256 Words (R/W)
Counter Registers	256 Words (R/W)
System Registers	256 Words (R/W)
Data Registers	4096 Words (R/W)
Input Registers	400 Words (Max) (R)
Output Registers	400 Words (Max)
Configuration Regs.	1600 Words (Max)
System Coils	100 Points (R/W)
Timer Coils	256 Points
Counter Coils	256 Points
Retentive Registers	1400 Words

Clock-Calendar	Year, month, day, hour, minute, second, & day of the week
Timer	256 timers T0000 to T0255 T0000 to T0060: 10ms T0061 to T0190: 100ms T0191 to T0255: 1s
Communication Interface	1 Port of RS232/RS485 on RJ45 1 Port with 2-wire RS 485 on Terminal Block 1 USB Port for Programming and monitoring (Device)

Electrical	
Power Supply	DC powered units - 24VDC (+/-15%)

Environmental	
Temperature	0 to 55° C (operating), -20 to 85° C (storage)
Humidity	10 to 90 % non condensing
Vibration immunity	IEC60068-2-6
Shock immunity	IEC60068-2-27
Dimensions (mm)	100mm(H) X 36mm(W) X 70mm(D)
Isolation	Isolation between communication ports, power and I/O is 500 V DC for 1 Min.

EMI/EMC	
Immunity to ESD	as per IEC61000-4-2
Immunity to Fast Transients	as per IEC61000-4-4
Immunity to Radiated Electromagnetic field	as per IEC61000-4-3
Immunity to Conducted disturbances	as per IEC61000-4-6
Surge	as per IEC61000-4-5
Radiated emission	as per EN55011

Specifications :-

Hardware Specifications

Processor	32 bit RISC Processor	
Power Supply	Input Voltage	24VDC
	Tolerance	±15%
	Reverse polarity protection	YES
Communication ports	2 Serial ports	COM1 : RS232/ RS422/RS485 2 and 4 wire. RJ45 Connector COM2 : 2 -Wire RS485. 4 pin PBT connector
	1 USB Device port	For Upload, Download and monitoring
	1 Expansion Connection Slot	8 expansion modules / 64 I/O points
Switches	PLC mode Control Switch	RUN/HALT
Memory	User Application	96KB
	Ladder	48KB
	Retentive	1400 words
	Keep memory Area	1000 words
RTC	Type	External
Operating temperature	0 to 55° C	
Storage temperature	-20 to 85° C	
Humidity	10% to 90% (non condensing)	
Approvals	CE, UL (Class 1 Div 2), RoHS	

Functional Specifications

Communication	2 serial ports	COM1 : RS232/ RS422/RS485 2 and 4 wire.	Upload, Download, Monitoring and Serial communication
		COM2 : 2 Wire RS485	2 Wire RS485 Communication
	1 USB Device		Upload, Download and Monitoring
	Expansion	SPI	8 Slots (All FL Expansions)
	Multinode	Serial : 32 nodes	

Digital Inputs

Rated Input Voltage

Rated Input Voltage	For Normal Input 24 VDC (Max is 28 VDC)	For High Speed 24 VDC (Max is 28 VDC)
Impedance	5.4 k	1.2 k

Logic '0' Voltage   : 0 to 3.6 V   Logic '1' Voltage   : 9.6 to 30 V

Rated Input Current at (24 VDC)

	For Normal Input	For High Speed
Rated Input Current	4.2 mA	19 mA

High Speed Inputs

Number of HS Inputs	2
High Speed Channels	X0, X1
Max. input frequency	50KHz
Max. input count	4294967295

Digital Outputs (Open Collector)

Maximum Load current	500 mA NPN. Short circuit protected

Digital Outputs (Relay)

Relay Rating	230 V AC, 2 Amp. (Max) 6 Amp per common
Relay Outputs Channels	Y2, Y3, Y4, Y5, Y6, Y7

High Speed Outputs

Number of HS Outputs	2
High Speed Channels	Y0, Y1
Max. output frequency	5KHz
Maximum Load current	500 mA NPN. Short circuit protected

24V DC Auxiliary Power Supply

|	
Nominal value	24 V DC
Tolerance	-15% / +20% according to EN 61131-2
Safety equipment	Surge voltage, protection against Reversal polarity

Expansion Modules :-

Digital Expansion Modules

Model	Digital I/P	Digital O/P	Details
FLD1600	16	0	16 Digital Inputs
FLD0016P	0	16	16 Digital Outputs (PNP)
FLD0016N	0	16	16 Digital Outputs (NPN)
FLD0016R	0	16	16 Digital Outputs (Relay)
FLD0808P	8	8	8 Digital Inputs, 8 PNP type Transistor Outputs Digital module
FLD0808N	8	8	8 Digital Inputs, 8 NPN type Transistor Outputs Digital module
FLD0808R	8	8	8 Digital Inputs, 8 Relay type Outputs Digital module
FLD-HS-0808P	8	8	8 Digital Inputs, 8 Digital Outputs (PNP), 4 High Speed Inputs (Single phase & Quadrature counter), 2 PWM Outputs
FLD-HS-0808N	8	8	8 Digital Inputs, 8 Digital Outputs (NPN), 4 High Speed Inputs (Single phase & Quadrature counter), 2 PWM Outputs

Analog Expansion Modules

Model	Analog I/P	Analog O/P	Details
FLA0800L	8	0	8 Analog Inputs (0-10 VDC / 4-20 mA), 16 Bits
FLA0402U	4	2	4 Universal Inputs (0-10 V / 0-100 mV / 0-50 mV / 0-20 mA / 4-20 mA / RTD PT-100 / Thermocouple - B, R, S, E, J, K, N, T) 2 Analog Outputs (0-10 V / 4-20mA), 16 Bits
FLA0004	0	4	4 Analog Outputs (0-10 VDC / 4-20 mA), 16 Bits

N: Transistor output (NPN 500mA), R: Relay O/P, (6 Relay + 2 OC) P: PNP output (500mA)

Dimensions :-

FL010 controller module

FlexiLogics® expansion module
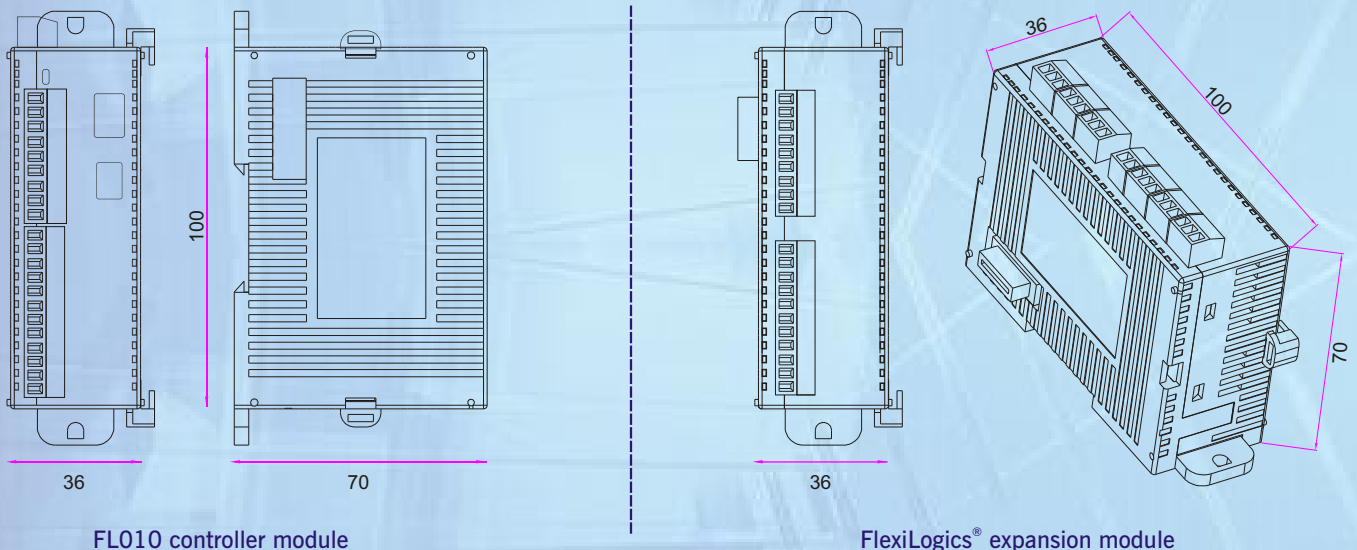
All dimensions are in mm.

Please contact factory for more information. We welcome an opportunity to develop new, custom drivers and customized units.

(Specifications subject to change without prior notice. DS-FL010 Rev.B)