



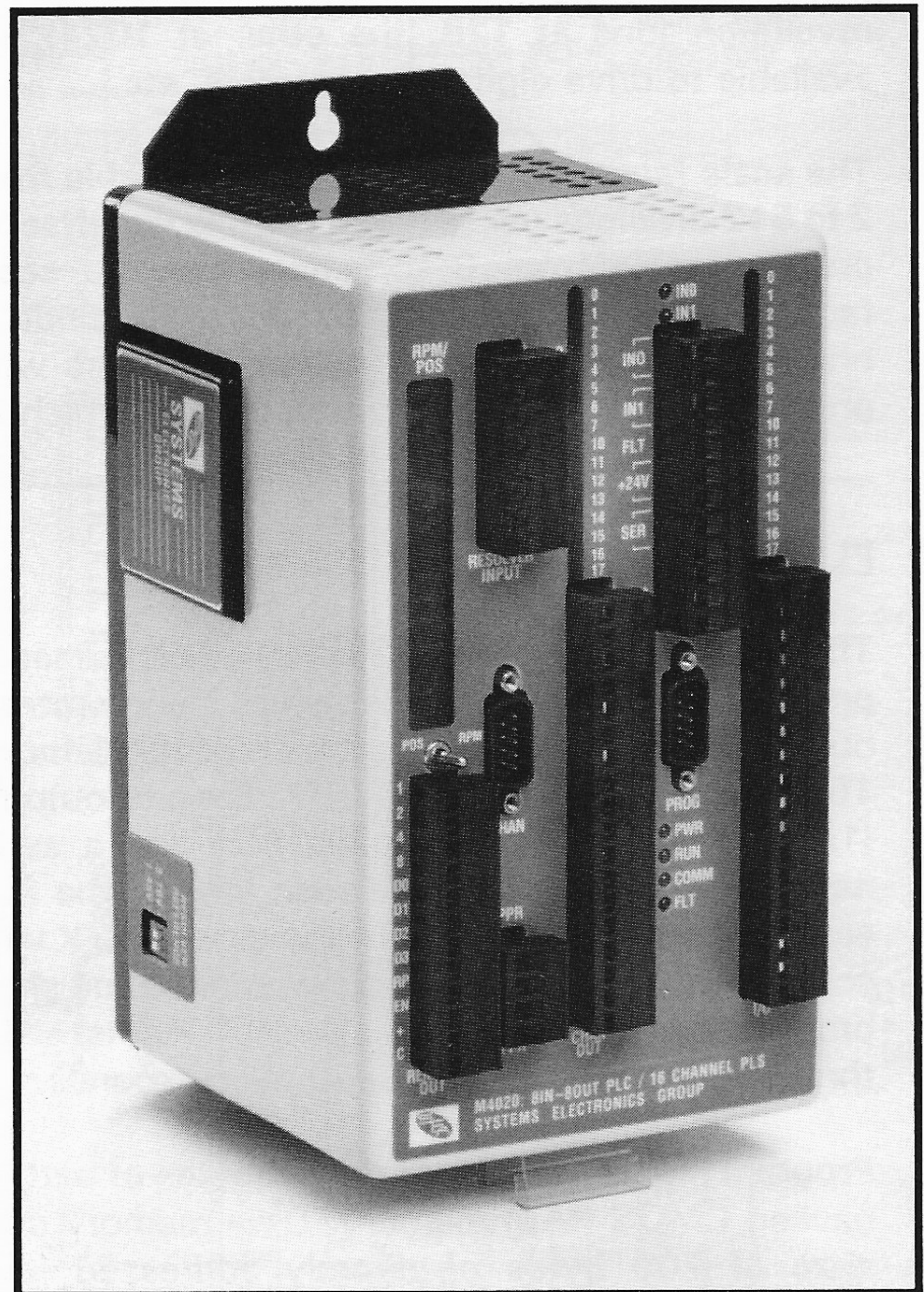
SYSTEMS M4000

INDUSTRIAL CONTROLLER

M4020 INTELLIGENT PLS MODULE

FEATURES:

- INTELLIGENT PROGRAMMABLE LIMIT SWITCH MODULE WITH 16 TIMING CHANNELS, BUILT-IN PROCESSOR, 10-30VDC DIGITAL INPUTS, AND 10-30VDC DIGITAL OUTPUTS
- INTERFACES WITH MACHINE MOUNTED RESOLVERS
- 24K BYTES BATTERY-BACKED CMOS RAM USER PROGRAM MEMORY AND 2K BYTES DATA MEMORY
- HIGH PERFORMANCE: 0.6 MSEC PER K SCAN TIME WITH THROUGH-PUTS AS LOW AS 80 MICROSECONDS. RESOLVER TRACKING RATES UP TO 6,000 RPM WITH CHANNEL UPDATE UNCERTAINTY OF LESS THAN ONE MICROSECOND
- PROGRAMMABLE SCALE FACTOR (2 TO 512) AND OFFSET (0 TO ONE MINUS THE SCALE FACTOR)
- MOTION OUTPUT WITH PROGRAMMABLE LOW AND HIGH SPEED THRESHOLDS
- BRAKE WEAR COMPENSATION ALGORITHM FOR CONSISTENT STOPPING OF PRESSES
- BUILT IN 4-DIGIT RPM/POSITION DISPLAY ALONG WITH RPM/POSITION DISPLAY OUTPUT CONNECTOR FOR REMOTE DISPLAYS OR INTERFACING TO PLCs
- PROGRAMMED WITH SYSdev AND PLSdev: DOS BASED SOFTWARE PACKAGES ALLOW PROGRAM-



MING IN LADDER, HIGH-LEVEL(C), AND ASSEMBLY AS WELL AS ON AND OFF-LINE PROGRAMMING OF TIMING CHANNELS

- REMOVABLE FIELD WIRING CONNECTORS
- SMALL (8" X 4.5" X 5.5") PACKAGE SIZE

GENERAL DESCRIPTION:

The M4020 is a combination of the M4040 PLS module with the processor and 8 in/8 out digital I/O of the M4010. This combination forms a powerful intelligent PLS module which contains

16 timing channels and yet can implement user logic (written in Ladder and High-level(C)) which activates the 8 digital outputs based on the timing channels and 8 digital inputs.

PLS SECTION:

The PLS section is a high speed programmable limit or cam switch which accepts angular position information in the form of resolver format signals and converts these to digital. The module contains 16 timing channels which can be programmed "on" and "off" at user defined position set-points. Two additional outputs with a fixed number of pulses per revolution (one at 128, the other at 1024) are available to drive digital tachometers, etc.

The scale factor of the PLS is programmable from 2 to 512 divisions per revolution while the offset is programmable from 0 to one minus the scale factor. Other programmable features include a brake wear compensation algorithm for use with presses and a motion (speed) output which is

activated "on" and "off" at user defined low and high speeds. Programming of the PLS section is implemented with PLSdev, a DOS based software package which allows the user to program the timing channels both on and off-line, set the PLS configuration, upload and download programs to and from the PLS, etc.

High speed operation of the PLS section is obtained with a resolver tracking rate greater than 6,000 RPM and a timing channel output update uncertainty of less than one microsecond to a change in angular position.

For more details on the PLS section, refer to the M4040/41 data sheet.

PLC SECTION:

The PLC section of the M4020 is a high performance programmable logic controller which incorporates a built in processor, user program and data memory, 10-30VDC digital inputs, 10-30VDC digital outputs (1AMP), RS-232 programming port and a serial network interface port. The scan time of the PLC section is on the order of 0.6 milliseconds per K with scan times as low as 80 microseconds for short programs. Two additional interrupt inputs allow through-puts even less than 80 microseconds.

Program memory consists of 24K bytes of battery backed CMOS RAM memory. Data memory consists of 200 bytes of directly addressed non-

battery backed RAM and 2K bytes of indirectly addressed battery backed RAM.

Programming of the PLC section is implemented with SYSdev, an IBM PC or compatible software package that allows the user to create, document, and compile the user logic program as well as directly interface to the M4020 for program download and on-line monitoring. Complete program print-outs including the user program listing, cross reference, and memory map can also be generated.

See the M4010/11/12 data sheet for more details on the PLC section of the M4020.

SPECIFICATIONS:

Module Size:

Length:	8.0"
Height:	5.5"
Width:	4.5"

Power Requirements:

Supply Voltage:	24VDC +-10%
Supply Current:	0.80 Amps (max)

Temperature Ranges:

Storage:	0 to 60 degrees C
Operating:	0 to 60 degrees C

Relative Humidity:

5 to 95% non-condensing

PLS SECTION (specifications):

Scale Factor:	2 to 512
Offset:	0 to scale factor -1
Number of Timing Channels:	
M4040:	16
M4041:	32
Maximum Number of Set-Points per Channel:	
Arbitrary:	50
Pulse Train:	Scale factor/2
Resolver-to-Digital Converter:	
Resolution:	12 bits
Accuracy:	10 arc mins + 1LSB
Tracking Rate (R-to-D):	10,000 RPM
Tracking Rate (M4040/41):	6,000 RPM
Signal Inputs (SIN and COS):	
Input voltage (nominal):	2 Vrms
Input voltage (max):	8 volts
Input impedance (typ):	100K ohms
Reference Output:	
Output voltage level:	1.45 Vrms or 3.70 Vrms selectable
Output frequency:	2,500 HZ
Timing Channel Outputs:	
Output Type:	True high sourcing
Output Voltage:	
Voltage Range:	10 to 30 VDC
Vout (on-min):	Vcc-2.00 volts
Vout (on-max):	Vcc-0.20 volts
Vout (off-max):	1.5 volts
Output Current (max):	100 milliamps
Short Circuit Protection:	Yes
128/1024 Pulse Per Revolution Outputs:	
Output Type:	Differential line driver (MM88C30)
Output Voltage:	
Vout (on-min):	10.50 volts
Vout (on-max):	12.75 volts
Output Current (max):	50 milliamps
Short Circuit Protection:	No
RPM/POSITION Outputs:	
Output Type:	True Low Sinking (24VDC)
Output Voltage:	
Vout (on-max):	1.50 volts
Vout (off-min):	20 volts
Output Current (max):	50 milliamps
REMOTE ENABLE and RPM SELECT Inputs:	
Input Type:	True high sourcing
Input Voltage:	
Vin (on-min):	12 volts
Vin (on-max):	30 volts
Vin (off-max):	5 volts
Input Current (max):	10 milliamps at Vin = 30 volts

PLC SECTION (specifications):

Memory:

Program:	24K bytes battery backed CMOS RAM
Data:	
indirectly addressed:	2K bytes battery backed CMOS RAM
directly addressed:	(non-battery backed)
Flags (F):	112 bits
Bytes (B):	200 bytes
Words (W):	100 words

Execution Times:

Scan Time:	0.60msec per 1K bytes
Main Program overhead:	60 microseconds
Fixed Scan Time bases:	0.5, 1.0, and 10.0 milliseconds

Interface Ports:

PROG PORT:	
Type:	RS-232
Comm Rate:	9600 BAUD

Serial Network:	
Type:	RS-485
Comm Rate (max):	344KBPS
# of nodes (max):	32
Isolation:	2000 VRMS
Protocol:	Proprietary

Digital Input Voltage:

Vin(on-min):	10.0 volts
Vin(on-max):	30.0 volts
Vin(off-min):	5.0 volts

Digital Input Current (max): 10 milliamps at Vin = 30volts

Digital Input Filter Delay:

min delay:	0.5 milliseconds
max delay:	2.0 milliseconds

Digital Input Optical Isolation: 1500 Vrms

Digital Output Voltage:

Voltage Range:	10-30VDC
Vout (on-min):	VCC - 2.00 volts
Vout (on-max):	VCC - 0.25 volts
Vout (off-max):	1.5 volts

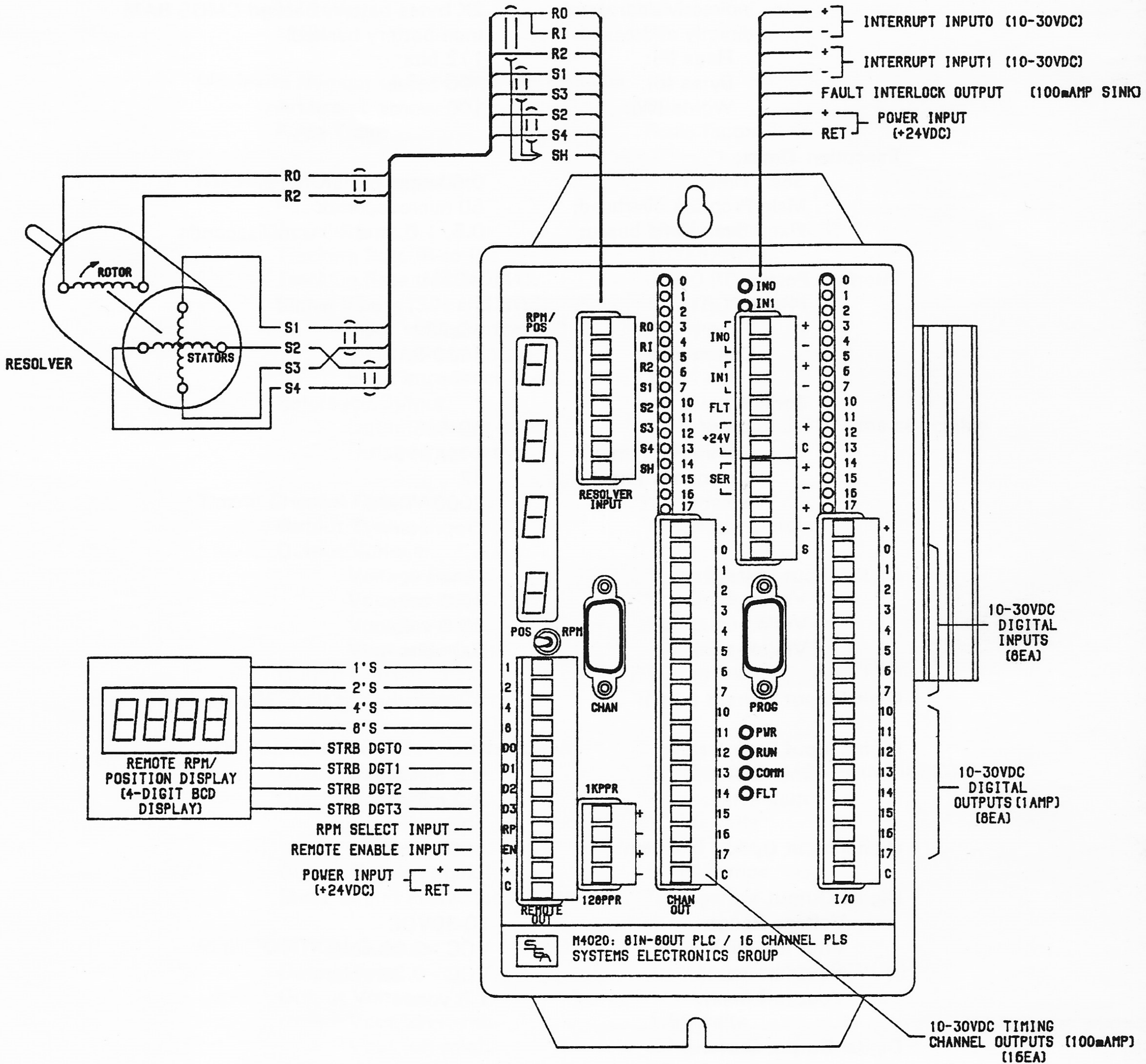
Digital Output Current:

Iout (on max - continuous):	1.00 amp DC
Iout (on max - pulsed):	5.00 amp DC (for 100msec)
Iout (off max - leakage):	100 microamps

Digital Output Response Time:

max on time:	50 microseconds
max off time:	75 microseconds

Digital Output Optical Isolation: 1500 Vrms



M4020
8IN-8OUT PLC / 16 CHANNEL PLS MODULE

