Specifications





# logic controller, Modicon M221, 40 IO, relay

TM221C40R

## Main

Range Of Product	Modicon M221
Product Or Component Type	Logic controller
[Us] Rated Supply Voltage	100240 V AC
Discrete Input Number	24, discrete input IEC 61131-2 Type 1
Analogue Input Number	2 010 V
Discrete Output Type	Relay normally open
Discrete Output Number	16 relay
Discrete Output Voltage	5125 V DC 5250 V AC
Discrete Output Current	2 A

## Complementary

comprenientary	
Discrete I/O Number	40
Maximum Number Of I/O Expansion Module	7 local 14 remote
Supply Voltage Limits	85264 V
Network Frequency	50/60 Hz
Inrush Current	40 A
Maximum Power Consumption In Va	67 VA 100240 V with max number of I/O expansion module 37 VA 100240 V without I/O expansion module
Power Supply Output Current	0.52 A 5 V expansion bus 0.24 A 24 V expansion bus
Discrete Input Logic	Sink or source (positive/negative)
Discrete Input Voltage	24 V
Discrete Input Voltage Type	DC
Analogue Input Resolution	10 bits
Lsb Value	10 mV
Conversion Time	1 ms per channel + 1 controller cycle time analog input
Permitted Overload On Inputs	+/- 30 V DC 5 min maximum)analog input +/- 13 V DC permanent)analog input
Voltage State 1 Guaranteed	>= 15 V input
Voltage State 0 Guaranteed	<= 5 V input
Discrete Input Current	7 mA discrete input 5 mA fast input

Input Impedance	3.4 kOhm discrete input
	100 kOhm analog input 4.9 kOhm fast input
Response Time	35 μs turn-off, I2I5 input
	10 ms turn-on output 10 ms turn-off output
	5 µs turn-on, I0, I1, I6, I7 fast input
	35 µs turn-on, other terminals input
	5 µs turn-off, I0, I1, I6, I7 fast input
	100 μs turn-off, other terminals input
Configurable Filtering Time	0 ms input
	3 ms input
	12 ms input
Output Voltage Limits	125 V DC
	277 V AC
Maximum Current Per Output Common	7 A
Absolute Accuracy Error	+/- 1 % of full scale analog input
Electrical Durability	100000 cycles AC-12, 120 V, 240 VA, resistive
	100000 cycles AC-12, 240 V, 480 VA, resistive
	300000 cycles AC-12, 120 V, 80 VA, resistive 300000 cycles AC-12, 240 V, 160 VA, resistive
	100000 cycles AC-12, 240 V, 160 VA, resistive 100000 cycles AC-15, cos phi = 0.35, 120 V, 60 VA, inductive
	100000 cycles AC-15, cos phi = 0.35, 240 V, 120 VA, inductive
	300000 cycles AC-15, cos phi = 0.35, 120 V, 18 VA, inductive
	300000 cycles AC-15, cos phi = 0.35, 240 V, 36 VA, inductive
	100000 cycles AC-14, cos phi = 0.7, 120 V, 120 VA, inductive
	100000 cycles AC-14, cos phi = 0.7, 240 V, 240 VA, inductive 300000 cycles AC-14, cos phi = 0.7, 120 V, 36 VA, inductive
	300000 cycles AC-14, cos phi = 0.7, 240 V, 72 VA, inductive
	100000 cycles DC-12, 24 V, 48 W, resistive
	300000 cycles DC-12, 24 V, 16 W, resistive
	100000 cycles DC-13, 24 V, 24 W, inductive (L/R = 7 ms)
	300000 cycles DC-13, 24 V, 7.2 W, inductive (L/R = 7 ms)
Switching Frequency	20 switching operations/minute with maximum load
	20 switching operations/minute with maximum load
Mechanical Durability	20 switching operations/minute with maximum load
Mechanical Durability Minimum Load Protection Type	20000000 cycles relay output
Mechanical Durability Minimum Load	2000000 cycles relay output 1 mA 5 V DC relay output
Mechanical Durability Minimum Load Protection Type	2000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A
Mechanical Durability Minimum Load Protection Type Reset Time	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity	2000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up	2000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional)
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction Execution Time Per Instruction	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 µs Boolean
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction Execution Time Per Instruction Execution Time For Event Task	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 µs Boolean 60 µs response time
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Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction Execution Time Per Instruction Execution Time For Event Task	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 μs Boolean 60 μs response time 512 %M memory bits
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Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction Execution Time Per Instruction Execution Time For Event Task	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 µs Boolean 60 µs response time 512 %M memory bits 512 %KW constant words 8000 %MW memory words 255 %C counters
Mechanical Durability Minimum Load Protection Type Reset Time Memory Capacity Data Backed Up Data Storage Equipment Battery Type Backup Time Execution Time For 1 Kinstruction Execution Time Per Instruction Execution Time For 2 Vent Task Maximum Size Of Object Areas	20000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 µs Boolean 60 µs response time 512 %M memory bits 512 %KW constant words 8000 %MW memory words 255 %C counters 255 %TM timers
Mechanical Durability         Minimum Load         Protection Type         Reset Time         Memory Capacity         Data Backed Up         Data Storage Equipment         Battery Type         Backup Time         Execution Time For 1 Kinstruction         Execution Time Per Instruction         Exct Time For Event Task         Maximum Size Of Object Areas         Realtime Clock	2000000 cycles relay output 1 mA 5 V DC relay output Without protection 5 A 1 s 256 kB user application and data RAM 10000 instructions 256 kB internal variables RAM 256 kB built-in flash memory backup of application and data 2 GB SD card optional) BR2032 or CR2032X lithium non-rechargeable 1 year 77 °F (25 °C) by interruption of power supply) 0.3 ms event and periodic task 0.2 µs Boolean 60 µs response time 512 %KW constant words 8000 %MW memory words 255 %C counters 255 %TM timers With

Counter Function	Single phase
	Pulse/direction
	A/B
Integrated Connection Type	USB port mini B USB 2.0
integrated connection type	Non isolated serial link serial 1 RJ45 RS485
	Non isolated serial link serial 2 RJ45 RS232/RS485
	NULLISUIALEU Sellai IIIN SELIAI Z 1943 19232/19403
Supply	Serial)serial link supply 5 V, <200 mA
Transmission Rate	1.2115.2 kbit/s (115.2 kbit/s by default) 49.21 ft (15 m) RS485
	1.2115.2 kbit/s (115.2 kbit/s by default) 9.84 ft (3 m) RS232
	480 Mbit/s USB
Communication Port Protocol	USB port USB - SoMachine-Network
	Non isolated serial link Modbus master/slave - RTU/ASCII or SoMachine-Network
Local Signalling	PWR 1 LED green)
	RUN 1 LED green)
	Module error (ERR) 1 LED red)
	SD card access (SD) 1 LED green)
	BAT 1 LED red)
	SL1 1 LED green)
	SL2 1 LED green)
	I/O state 1 LED per channel green)
Electrical Connection	removable screw terminal block for inputs
	removable screw terminal block for outputs
	terminal block, 3 for connecting the 24 V DC power supply
	connector, 4 for analogue inputs
	Mini B USB 2.0 connector for a programming terminal
Maximum Cable Distance	Shielded cable <32.81 ft (10 m) fast input
Between Devices	Unshielded cable <98.43 ft (30 m) output
	Unshielded cable <98.43 ft (30 m) digital input
	Unshielded cable <3.28 ft (1 m) analog input
In sulation	
Insulation	Between input and internal logic 500 V AC
	Non-insulated between analogue input and internal logic
	Non-insulated between analogue inputs
	Between supply and ground 1500 V AC
	Between sensor power supply and ground 500 V AC
	Between input and ground 500 V AC
	Between output and ground 1500 V AC
	Between supply and internal logic 2300 V AC
	Between sensor power supply and internal logic 500 V AC
	Between output and internal logic 2300 V AC
	Between Ethernet terminal and internal logic 500 V AC
	Between supply and sensor power supply 2300 V AC
Marking	CE
Sensor Power Supply	24 V DC 250 mA supplied by the controller
Mounting Support	Top hat type TH35-15 rail IEC 60715
	Top hat type TH35-7.5 rail IEC 60715
	plate or panel with fixing kit
Height	3.54 in (90 mm)
Depth	2.76 in (70 mm)
Width	6.30 in (160 mm)
Net Weight	1.01 lb/LIS) (0.456 kg)
Net Weight	1.01 lb(US) (0.456 kg)

## Environment

Standards

IEC 61131-2 UL 508 CAN/CSA C22.2 No. 213 IACS E10 ANSI/ISA 12-12-01

Product Certifications	RCM
	LR
	cULus
	DNV-GL
	ABS
	EAC
	CE UKCA
	cULus HazLoc
Environmental Characteristic	Ordinary and hazardous location
Resistance To Electrostatic Discharge	8 kV in air IEC 61000-4-2 4 kV on contact IEC 61000-4-2
Resistance To Electromagnetic	9.14 V/yd (10 V/m) 80 MHz1 GHz IEC 61000-4-3
Fields	2.74 V/yd (3 V/m) 1.4 GHz2 GHz IEC 61000-4-3
	0.91 V/yd (1 V/m) 22.7 GHz IEC 61000-4-3
Resistance To Magnetic Fields	98.43 A/ft (30 A/m) 50/60 Hz IEC 61000-4-8
Resistance To Fast Transients	2 kV IEC 61000-4-4 power lines)
	2 kV IEC 61000-4-4 relay output)
	1 kV IEC 61000-4-4 I/O)
	1 kV IEC 61000-4-4 Ethernet line)
	1 kV IEC 61000-4-4 serial link)
Current With a town	
Surge Withstand	2 kV power lines (AC) common mode IEC 61000-4-5
	2 kV relay output common mode IEC 61000-4-5
	1 kV I/O common mode IEC 61000-4-5
	1 kV shielded cable common mode IEC 61000-4-5 0.5 kV power lines (DC) differential mode IEC 61000-4-5
	1 kV power lines (AC) differential mode IEC 61000-4-5
	1 kV relay output differential mode IEC 61000-4-5
	0.5 kV power lines (DC) common mode IEC 61000-4-5
Resistance To Conducted	10 V 0.1580 MHz IEC 61000-4-6
Disturbances	3 V 0.180 MHz Marine specification (LR, ABS, DNV, GL)
	10 V spot frequency (2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 MHz) Marine
	specification (LR, ABS, DNV, GL)
Electromagnetic Emission	Conducted emissions 79 dBµV/m QP/66 dBµV/m AV power lines (AC))0.150.5
5	MHz IEC 55011
	Conducted emissions 73 dBµV/m QP/60 dBµV/m AV power lines (AC))0.5300 MHz
	IEC 55011
	Conducted emissions 12069 dBµV/m QP power lines)10150 kHz IEC 55011
	Conducted emissions 63 dBµV/m QP power lines)1.530 MHz IEC 55011
	Radiated emissions 40 dBµV/m QP class A 10 m)30230 MHz IEC 55011
	Conducted emissions 7963 dB $\mu$ V/m QP power lines)1501500 kHz IEC 55011
	Radiated emissions 47 dBµV/m QP class A 10 m)200…1000 MHz IEC 55011
Immunity To Microbreaks	10 ms
Ambient Air Temperature For	14131 °F (-1055 °C) horizontal installation)
Operation	1495 °F (-1035 °C) vertical installation)
Ambient Air Temperature For Storage	-13158 °F (-2570 °C)
Relative Humidity	1095 %, without condensation in operation) 1095 %, without condensation in storage)
Ip Degree Of Protection	IP20 with protective cover in place
Pollution Degree	<= 2
Operating Altitude	02000 m
Storage Altitude	0.009842.52 ft (03000 m)
Vibration Resistance	3.5 mm 58.4 Hz symmetrical rail
	3.5 mm 58.4 Hz symmetrical rail
	1 gn 8.4150 Hz symmetrical rail
	1 gn 8.4150 Hz synimetrical rail
Shock Resistance	98 m/s² 11 ms

## **Packing Units**

Unit Type Of Package 1	PCE
Number Of Units In Package 1	1
Package 1 Height	4.30 in (10.92 cm)
Package 1 Width	5.70 in (14.48 cm)
Package 1 Length	8.30 in (21.08 cm)
Package 1 Weight	29.98 oz (850 g)
Unit Type Of Package 2	CAR
Number Of Units In Package 2	12
Package 2 Height	11.57 in (29.4 cm)
Package 2 Width	15.55 in (39.5 cm)
Package 2 Length	21.93 in (55.7 cm)
Package 2 Weight	24.30 lb(US) (11.021 kg)
Unit Type Of Package 3	P12
Number Of Units In Package 3	144
Package 3 Height	41.34 in (105.0 cm)
Package 3 Width	47.24 in (120.0 cm)
Package 3 Length	31.50 in (80.0 cm)
Package 3 Weight	321.88 lb(US) (146 kg)

Apr 25, 2024

Life Is On Schneider

## Sustainability Screen

**Green Premium<sup>TM</sup> label** is Schneider Electric's commitment to delivering products with best-inclass environmental performance. Green Premium promises compliance with the latest regulations, transparency on environmental impacts, as well as circular and low-CO<sub>2</sub> products.

**Guide to assessing product sustainability** is a white paper that clarifies global eco-label standards and how to interpret environmental declarations.

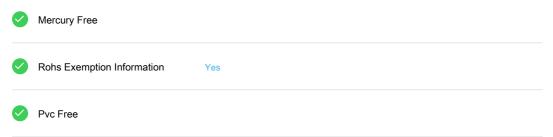
Learn more about Green Premium >

Guide to assess a product's sustainability >



Transparency RoHS/REACh

## Well-being performance

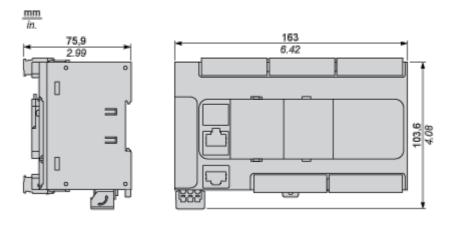


## **Certifications & Standards**

Reach Regulation	REACh Declaration
Eu Rohs Directive	Pro-active compliance (Product out of EU RoHS legal scope)
China Rohs Regulation	China RoHS declaration
Environmental Disclosure	Product Environmental Profile
Weee	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins
Circularity Profile	End of Life Information

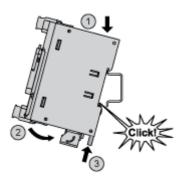
## **Dimensions Drawings**

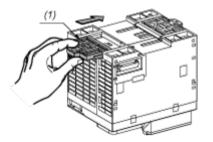
#### Dimensions



Mounting and Clearance

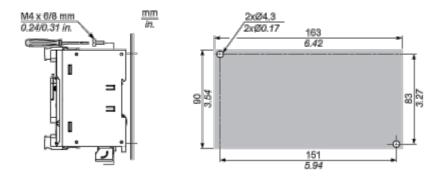
## Mounting on a Rail





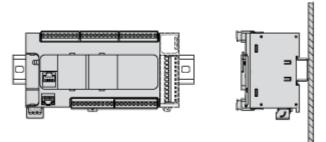
(1) Install a mounting strip

## **Mounting Hole Layout**

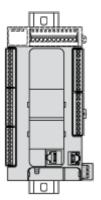


Mounting

**Correct Mounting Position** 

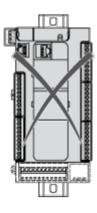


## Acceptable Mounting Position



#### **Incorrect Mounting Position**

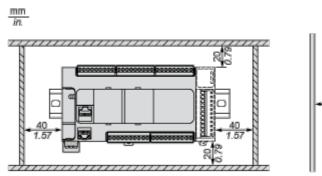


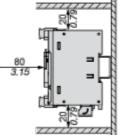




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Clearance

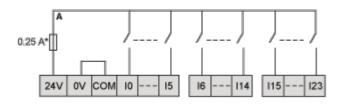




Connections and Schema

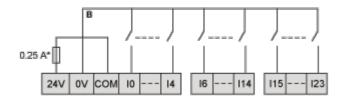
## **Digital Inputs**

## Wiring Diagram (Positive Logic)



(\*) Type T fuse

## Wiring Diagram (Negative Logic)



(\*) Type T fuse

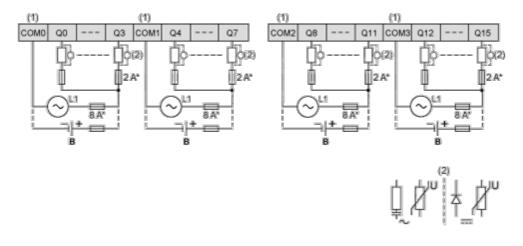
#### **Connection of the Fast Inputs**



10, 11, 16, 17

#### **Relay Outputs**

#### Negative Logic (Sink)

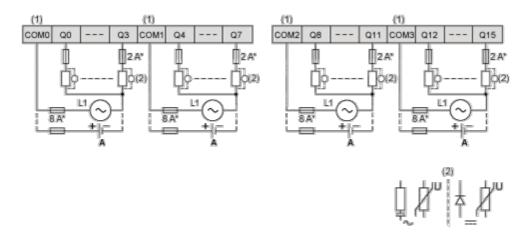


- (\*) Type T fuse
- (1) The COM0, COM1, COM2 and COM3 terminals are not connected internally.

(2) To improve the life time of the contacts, and to protect from potential inductive load damage, you must connect a free wheeling diode in parallel to each inductive DC load or an RC snubber in parallel of each inductive AC load

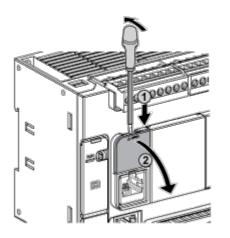
B Sink wiring (negative logic)

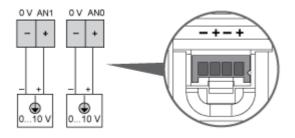
#### Positive Logic (Source)



- (\*) Type T fuse
- (1) The COM0, COM1, COM2 and COM3 terminals are not connected internally.
- (2) To improve the life time of the contacts, and to protect from potential inductive load damage, you must connect a free wheeling diode in parallel to each inductive DC load or an RC snubber in parallel of each inductive AC load
- A Source wiring (positive logic)

#### Analog Inputs

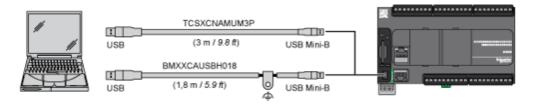




The (-) poles are connected internally.

Pin	Wire Color
0 V	Black
AN1	Red
0 V	Black
AN0	Red

#### USB Mini-B Connection

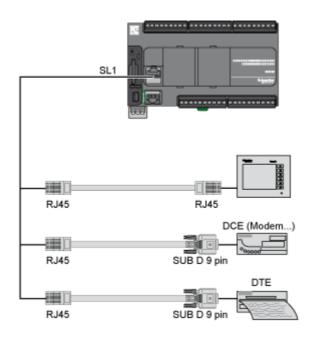




SL1		
Ν°	RS 232	RS 485
1	RxD	N.C.
2	TxD	N.C.
3	RTS	N.C.
4	N.C.	D1
5	N.C.	D0
6	стѕ	N.C.
7	N.C*.	5 Vdc
8	Common	Common

N.C.: not connected

 $^{\star}$  : 5 Vdc delivered by the controller. Do not connect.



#### **SL2** Connection



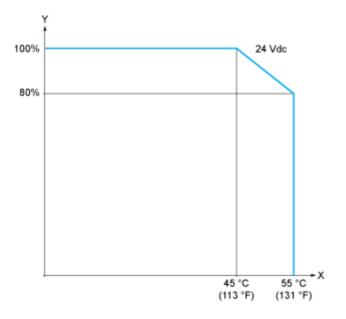
N°	RS 485
1	N.C.
2	N.C.
3	N.C.
4	D1
5	D0
6	N.C.
7	N.C.
8	Common

N.C.: not connected

Performance Curves

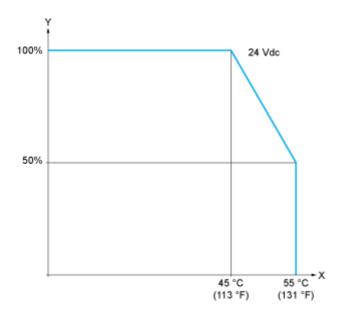
#### **Derating Curves**

## Embedded Digital Inputs (No Cartridge)



- X: Ambient temperature
- Y: Input simultaneous ON ratio

## Embedded Digital Inputs (with Cartridge)



- X: Ambient temperature
- Y: Input simultaneous ON ratio