SmartStix ä

User Manual for the CsCAN Versions (HE550 or HE559) of:

DQM601 DQM606
DQM701 DQM706
DIM610 DIM710
DIQ811 DIQ816
DQM602

Remote I/O for the OCS/RCS Family

For Electronic Information, see www.HornerOCS.com.

28 April 2004 **MAN0519-07 (Web)**

1 Technical Support

For user manual updates and technical assistance, contact Technical Support:
North America: (317) 916-4274 **Europe:** (+) 353-21-4321-266
or visit our website at www.heapg.com. or visit our website at www.horner-apg.com.

2 Installation / Safety

a. All applicable codes and standards need to be followed in the installation of this product.
b. For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.
c. For detailed installation and programming information, refer to the Control Station Hardware Manual.

Warning: Consult user documentation.

Warning: Electrical Shock Hazard.

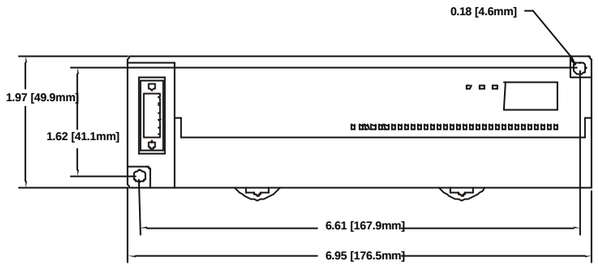
3 Model Numbers

Model Prefix	Description
HE550	CsCAN model with non-removable terminal strip
HE559	CsCAN model with *removable* terminal strip
Long or Short Dimension	**Description**
DIM610 (Short)	16 DC Inputs (24VDC, positive/negative logic)
DIM710 (Long)	32 DC Inputs (24VDC, positive/negative logic)
DQM601 / 606* (Short)	16 DC Outputs (24VDC, negative logic, 0.5A) (Note: If using DQM601 with a non-removable terminal strip, the output rating is 0.1A.) (* DQM606 uses *positive* logic.)
DQM701 / 706** (Long)	32 DC Outputs (24VDC, negative logic, 0.5A) (Note: If using DQM701 with a non-removable terminal strip, the output rating is 0.1A.) (** DQM706 uses *positive* logic.)
DQM602 (Long)	16 Relay Outputs (250VAC, 30VDC, 2.0A)
DIQ811 / 816*** (Long)	16 DC Inputs (24VDC, positive/negative logic) 16 DC Outputs (24VDC, negative logic, 0.5A) (Note: If using DIQ811 with a non-removable terminal strip, the output rating is 0.1A.) (*** DIQ816 uses *positive* logic.)

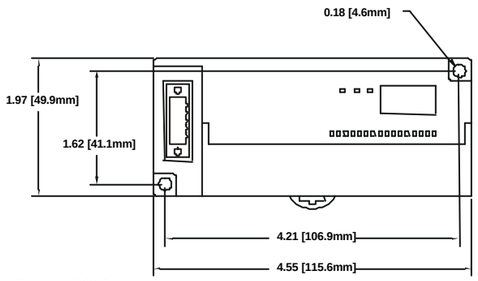
4 Dimensions

a. Long Dimensions

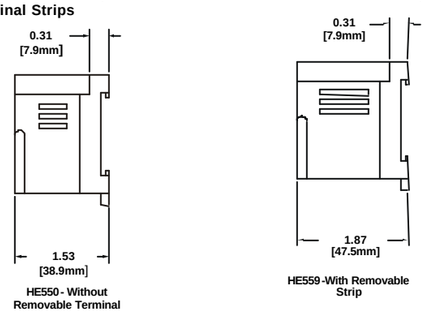
SmartStix modules come in two sizes depending upon the model number. **See Section 3 to determine if a module has long or short dimensions.**



b. Short Dimensions



c. Terminal Strips



5 General Specifications

General Specifications			
Storage Temperature	-25° to 70° C	**Operating and Storage Humidity**	5 to 95% Non-condensing
Operating Temperature	0° to 55° C	**Pollution degree**	2 or lower
Atmosphere	Free from corrosive gases and excessive dust	**Cooling method**	Self-cooling

Vibration			
Occasional Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.075 mm	10 times in each direction for X,Y,Z
57 ≤ f ≤ 150 Hz	9.8 m/s² {1G}	-	
Continuous Vibration			
Frequency	**Acceleration**	**Amplitude**	**Sweep Count**
10 ≤ f < 57 Hz	-	0.035 mm	10 times in each direction for X,Y,Z
57≤ f ≤ 150 Hz	4.9 m/s² {0.5G}	-	

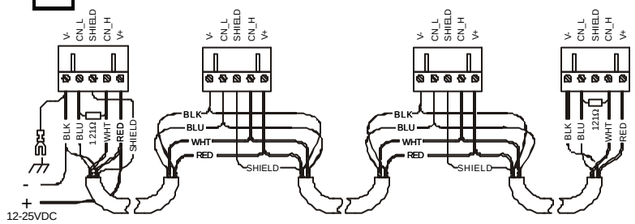
Shocks				
Maximum shock acceleration	147 m/s² {15G}			
Duration Time	11 ms.			
Pulse Wave	Half sine wave pulse (3 times in each of X, Y, Z directions)			
Noise Immunity				
Square wave impulse noise	AC: ± 1,500VDC DC: ± 900VDC			
Electrostatic Discharge	Voltage: 4kV (contact discharge)			
Radiated electromagnetic field	27 – 500MHz, 10V/m			
Fast Transient Burst Noise	**Severity level**	All power modules	Digital I/Os (Ue < 24 V) Analog I/Os Communication I/Os	Digital I/Os (Ue ≥24V)
	Voltage	2 kV	1 kV	0.25 kV

6 Network Cable

For detailed wiring information, refer to the Control Station Hardware Manual. A handy checklist is provided that covers panel box layout requirements and minimum clearances. **See Section 1 for our web address.**

	Pin	Description
RED	1	V+
WHT	2	CAN_H
SHD	3	Shield
BLU	4	CAN_L
BLK	5	V-

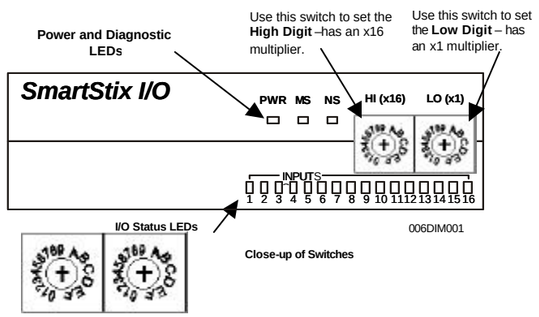
Recommended Cable	
Thick: (Max Distance = 500m)	Belden 3082A
Thin: (Max Distance = 100m)	Belden 3084A



CAN Wiring: Note: 12 - 24VDC must be supplied to the network.

7 ID Switches (Setting CsCAN Network Ids)

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to Section 10, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two *identical* switches. **Note:** The CsCAN Baud Rate for SmartStix I/O is fixed at 125KBaud



8 LEDs

a. Diagnostic LED Indicators

Diagnostic LED	State	Meaning
MS: (indicates fault status of Module)	Solid Red	RAM or ROM test failed
	Blinking Red	I/O test failed
	Blinking Green	Module is in power -up state
	Solid Green	Module is running normally
NS: (indicates fault status of Network)	Solid Red	Network Ack or Dup ID test failed
	Blinking Red	Network ID test failed
	Blinking Green	Module is in Life Expectancy default state
	Solid Green	Network is running normally

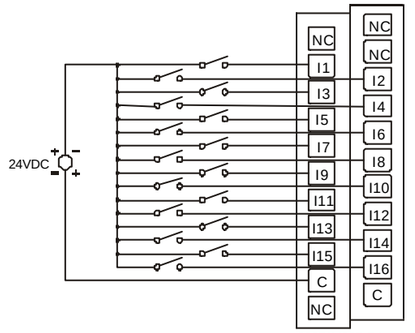
b. Status LED Indicators

The Power Status LED illuminates Red when power is applied to the module. There are I/O Status LED indicators for each of the Digital I/O points, which illuminate Red when an I/O point is ON.

9 SmartStix Modules

a. DIM610: 16 DC IN, Positive / Negative Logic

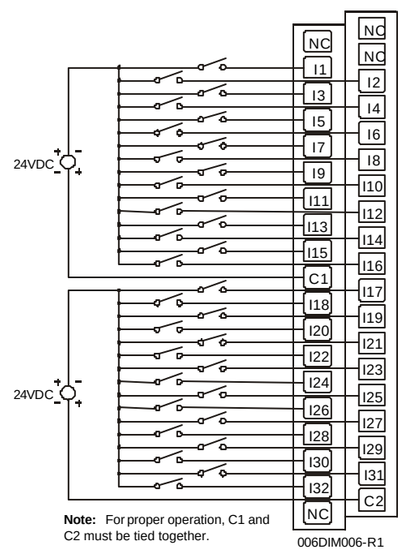
DIM610 Specifications			
Number of input points	16	**OFF to ON Response**	0 - 3ms. or less
Rated Input Current	7mA	**ON to OFF Response**	0 - 3ms. or less
ON Voltage Level	19VDC or less	**Common Terminal**	16 points / COM
OFF Voltage Level	6VDC or less	**Operating Indicator**	LED turns on during ON state of input
Input Characteristics	Bidirectional	**External Connections**	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler	**Altitude for use**	Up to 2,000m
Internal power Consumption (mA)	200mA	**Weight**	5.6 oz. (159 g)



Pin	Signal
	DIM610
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C	Common
C	Common
NC	No Connection

b. DIM710: 32VDC IN, Positive / Negative Logic

DIM710 INPUTS			
Number of input points	32	**OFF to ON Response**	0 - 3ms. or less
Rated Input Current	7mA	**ON to OFF Response**	0 - 3ms. or less
ON Voltage Level	19VDC or less	**Common Terminal**	16 points / COM
OFF Voltage Level	6VDC or less	**Operating Indicator**	LED turns on during ON state of input
Input Characteristics	Bidirectional	**External Connections**	Terminal block connector (M3 x 6 screws)
Isolation Method	Photo Coupler	**Weight**	8.36oz. (237 g)
Internal power Consumption (mA)	300		

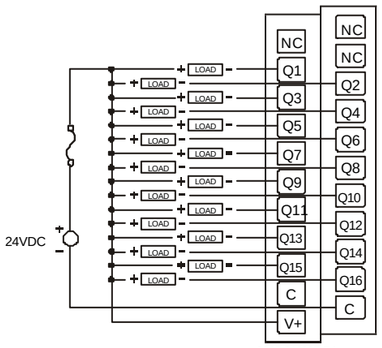


Note: For proper operation, C1 and C2 must be tied together.

Pin	Signal
	DIM710
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
I1	Input 1
I2	Input 2
I3	Input 3
I4	Input 4
I5	Input 5
I6	Input 6
I7	Input 7
I8	Input 8
I9	Input 9
I10	Input 10
I11	Input 11
I12	Input 12
I13	Input 13
I14	Input 14
I15	Input 15
I16	Input 16
C1	Isolated Common 1
I17	Input 17
I18	Input 18
I19	Input 19
I20	Input 20
I21	Input 21
I22	Input 22
I23	Input 23
I24	Input 24
I25	Input 25
I26	Input 26
I27	Input 27
I28	Input 28
I29	Input 29
I30	Input 30
I31	Input 31
I32	Input 32
C2	Isolated Common 2
NC	No Connection

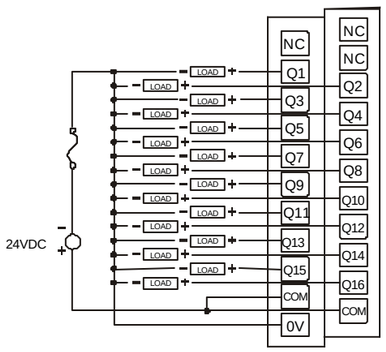
c. DQM601: 16 DC OUT, Negative Logic
DQM606: 16 DC OUT, Positive Logic

DQM601 / DQM606 Outputs						
Number of output points		16	External Power Supply	Voltage		24VDC ± 10%(ripple voltage: 4Vp-p or less)
Commons per Module		1		Current		30mA (TYP, All points ON)
Operating Voltage		24VDC	OFF to ON Response			2ms.
Rated Load Voltage		24VDC	ON to OFF Response			2ms.
Max. Load Current per channel	DQM 601A	0.1A Max. per output 2A per common	Output Type	DQM 601		Sinking
	DQM 601B · DQM 606	0.5A Max. per output 3A per common		DQM 606		Sourcing
OFF Leakage Current		0.1mA or less	Common Method			16 points / COM
Max. Inrush Current per channel	DQM 601	0.4A, 10ms.	Operating Indicator			LED turns on during ON state of output
	DQM 606	1A, 10ms	External connections			Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit		1.5VDC(0.5A)	Isolation methods			Photo Coupler
Internal power Consumption (mA)	DQM601	280	Weight	DQM601		5.7 oz. (161g)
	DQM606			DQM606		6.7 oz. (191g)



006DQM007-R1

Pin	Signal DQM601
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C	Isolated Common
C	Isolated Common
V+	Isolator Power

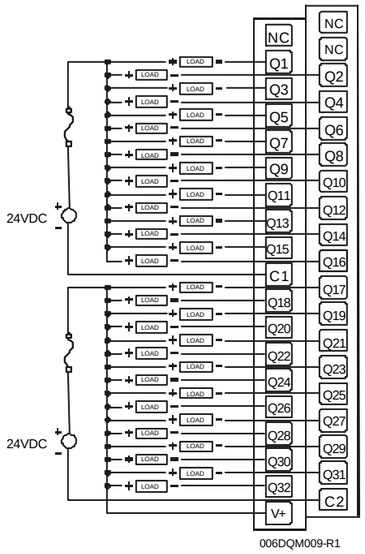


006DQM007-R1

Pin	Signal DQM606
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
COM	Isolated Common
COM	Isolated Common
0V	Isolated Power Negative

d. DQM701: 32 DC OUT, Negative Logic
DQM706: 32 DC OUT, Positive Logic

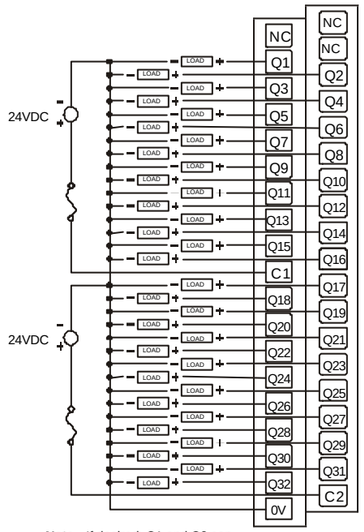
DQM701 / 706 Outputs						
Number of output points		32	External Power Supply	Voltage		24VDC ± 10%(ripple voltage: 4Vp-p or less)
Commons per Module		2		Current		30mA (TYP, All points ON)
Operating Voltage		24VDC	OFF to ON Response			2ms.
Rated Load Voltage		24VDC	ON to OFF Response			2ms.
Max. Load Current per channel	DQM 701	0.1A Max. per output 2A per common	Output Type	DQM 701		Sinking
	DQM 706	0.5A Max. per output 3A per common		DQM 706		Sourcing
OFF Leakage Current		0.1mA or less	Common Method			16 points / COM
Max. Inrush Current per channel	DQM 701	0.4A, 10ms.	Operating Indicator			LED turns on during ON state of output
	DQM 706	1A, 10ms	External connections			Terminal block connector (M3 x 6 screws)
Maximum Voltage Drop during ON circuit		1.5VDC(0.5A)	Isolation methods			Photo Coupler
Internal power Consumption (mA)	DQM701	340	Weight	DQM701		8.47 (240g)
	DQM706	380		DQM706		10.22 (290g)



006DQM009-R1

Pin	Signal DQM701
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C1	Isolated Common 1
Q17	Output 17
Q18	Output 18
Q19	Output 19
Q20	Output 20
Q21	Output 21
Q22	Output 22
Q23	Output 23
Q24	Output 24
Q25	Output 25
Q26	Output 26
Q27	Output 27
Q28	Output 28
Q29	Output 29
Q30	Output 30
Q31	Output 31
Q32	Output 32
C2	Isolated Common 2
V+	Isolator Power

Note: For proper operation, C1 and C2 must be tied together.



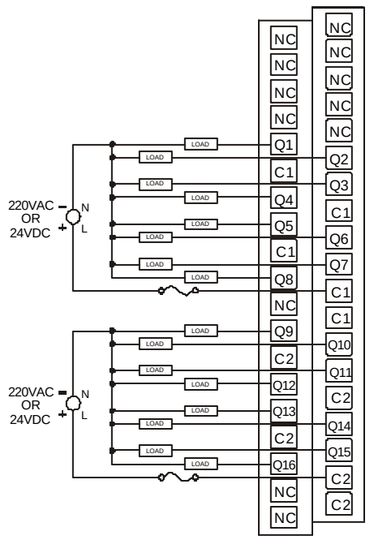
006DQM008-R2

Note: If desired, C1 and C2 can use a single supply.

Pin	Signal DQM706
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q2	Output 2
Q3	Output 3
Q4	Output 4
Q5	Output 5
Q6	Output 6
Q7	Output 7
Q8	Output 8
Q9	Output 9
Q10	Output 10
Q11	Output 11
Q12	Output 12
Q13	Output 13
Q14	Output 14
Q15	Output 15
Q16	Output 16
C1	Isolated Common 1
Q17	Output 17
Q18	Output 18
Q19	Output 19
Q20	Output 20
Q21	Output 21
Q22	Output 22
Q23	Output 23
Q24	Output 24
Q25	Output 25
Q26	Output 26
Q27	Output 27
Q28	Output 28
Q29	Output 29
Q30	Output 30
Q31	Output 31
Q32	Output 32
C2	Isolated Common 2
0V	Isolated Power Negative

e. DQM602: 16 RELAY OUTPUTS

DQM602 Relay Outputs			
Number of output points	16	Maximum Load Current (resistive)	2.0A per channel 5.0A per common
Commons per Module	2	OFF to ON Response	10ms. Max.
Rated Load Voltage	24VDC, 220VAC	ON to OFF Response	12ms. Max.
Minimum load voltage / current	5VDC / 1mA	Output Type	N.O.
Internal power Consumption (mA)	550mA	Weight	9.91oz. (281 g)



006DQM008-R1

Pin	Signal DQM602
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
NC	No Connection
Q1	Output 1
Q2	Output 2
C1	Common 1
Q3	Output 3
Q4	Output 4
C1	Common 1
Q5	Output 5
Q6	Output 6
C1	Common 1
Q7	Output 7
Q8	Output 8
C1	Common 1
NC	No Connection
C1	Common 1
Q9	Output 9
Q10	Output 10
C2	Common 2
Q11	Output 11
Q12	Output 12
C2	Common 2
Q13	Output 13
Q14	Output 14
C2	Common 3
Q15	Output 15
Q16	Output 16
C2	Common 2
NC	No Connection
C2	Common 2
NC	No Connection

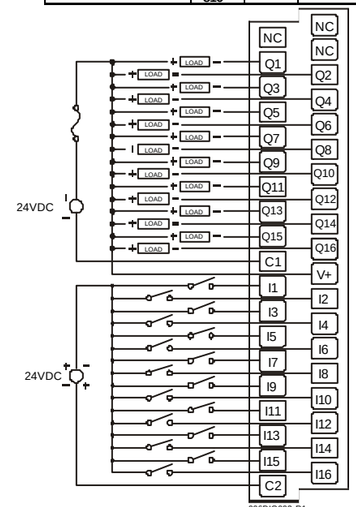
Warning: To protect the module and associated wiring from load faults, use external fuse **(5 A)** as shown.

Warning: Connecting high voltage to any I/O pin may cause high voltage to appear at other I/O pins.

Warning: Wiring the line side of the AC source to loads connected to outputs 0 through 15 and the neutral side of the AC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice.

f. DIQ811: 16 DC IN, Positive/Negative / 16 DC OUT, Negative Logic
DIQ816: 16 DC IN, Positive / 16 DC OUT, Positive Logic

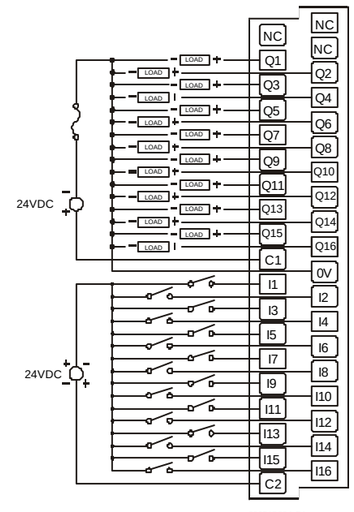
DIQ811 / 816 IN					
Number of input points	16	OFF to ON Response		0 - 3ms. or less	
Rated Input Current	7mA	ON to OFF Response		0 - 3ms. or less	
ON Voltage Level	19VDC or less	Common Terminal		16 points / COM	
OFF Voltage Level	6VDC or less	Operating Indicator		LED turns on during ON state of input	
Input Characteristics	Bidirectional	External Connections		Terminal block connector (M3 x 6 screws)	
Isolation Method	Photo Coupler				
DIQ811 / 816 OUT					
Number of output points	16	External Power Supply	Voltage		24VDC ± 10%(ripple voltage: 4Vp-p or less)
Commons per Module	1		Current		30mA (TYP, All points ON)
Operating Voltage	24VDC	OFF to ON Response			2ms.
Rated Load Voltage	24VDC	ON to OFF Response			2ms.
Max. Load Current per channel	DIQ 811	0.1A Max. per output 2A per common	Output Type	DIQ811	Sinking
				DIQ816	Sourcing
	DIQ 816	0.5A Max. per output 3A per common	Max. Inrush Current per channel	DIQ811	0.4A, 10ms.
				DIQ816	1A, 10ms
OFF Leakage Current	0.1mA or less	Common Method			16 points / COM
Internal power Consumption (mA)	DIQ 811 300	Weight	DIQ811		8.40 oz. (238 g)
	DIQ 816 350		DIQ816		10.16 oz. (288 g)



006DIQ003-R1

DIQ811	
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q3	Output 3
Q5	Output 5
Q7	Output 7
Q9	Output 9
Q11	Output 11
Q13	Output 13
Q15	Output 15
C1	Isolated Common Power
I1	Input 1
I3	Input 3
I5	Input 5
I7	Input 7
I9	Input 9
I11	Input 11
I13	Input 13
I15	Input 15
C2	Isolated Common

DIQ811	
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not connect)
Q2	Output 2
Q4	Output 4
Q6	Output 6
Q8	Output 8
Q10	Output 10
Q12	Output 12
Q14	Output 14
Q16	Output 16
V+	Isolator Power
I2	Input 2
I4	Input 4
I6	Input 6
I8	Input 8
I10	Input 10
I12	Input 12
I14	Input 14
I16	Input 16



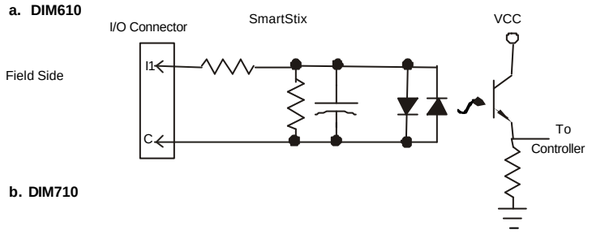
006DIQ004-R1

DIQ816	
NC*	No Connection (*Do not Connect)
Q1	Output 1
Q3	Output 3
Q5	Output 5
Q7	Output 7
Q9	Output 9
Q11	Output 11
Q13	Output 13
Q15	Output 15
C1	Isolated Common Power
I1	Input 1
I3	Input 3
I5	Input 5
I7	Input 7
I9	Input 9
I11	Input 11
I13	Input 13
I15	Input 15
C2	Isolated Common

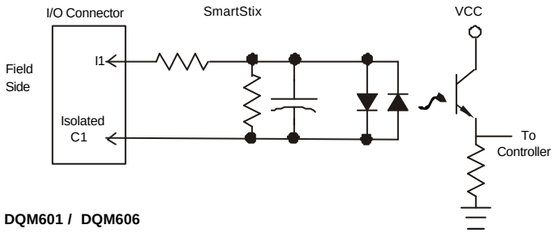
DIQ816	
NC*	No Connection (*Do not Connect)
NC*	No Connection (*Do not Connect)
Q2	Output 2
Q4	Output 4
Q6	Output 6
Q8	Output 8
Q10	Output 10
Q12	Output 12
Q14	Output 14
Q16	Output 16
0V	Isolated Ground
I2	Input 2
I4	Input 4
I6	Input 6
I8	Input 8
I10	Input 10
I12	Input 12
I14	Input 14
I16	Input 16

10 Internal Wiring

a. DIM610

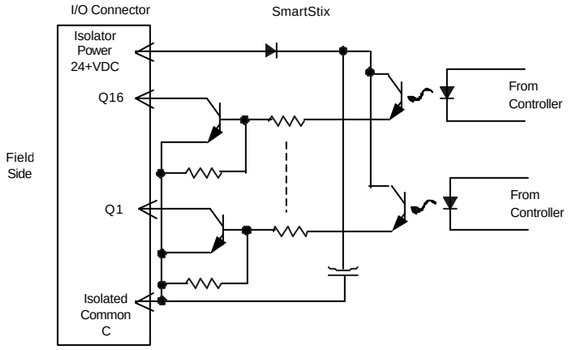


b. DIM710

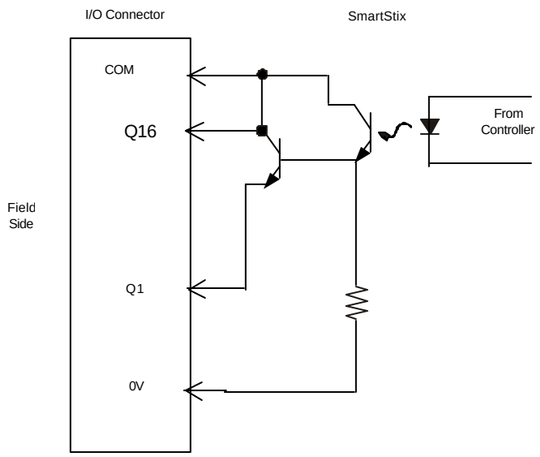


c. DQM601 / DQM606

DQM601

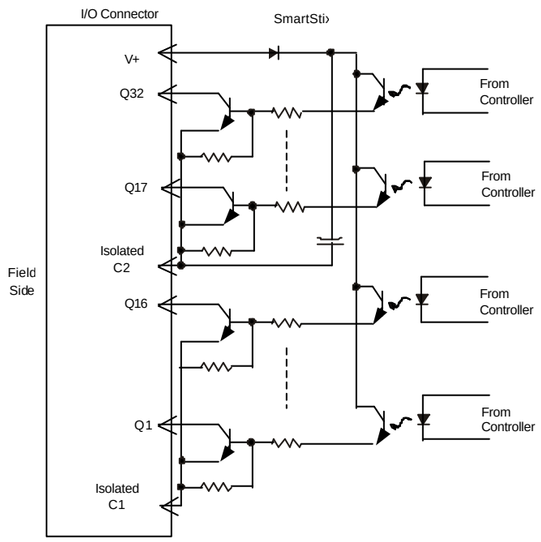


DQM606

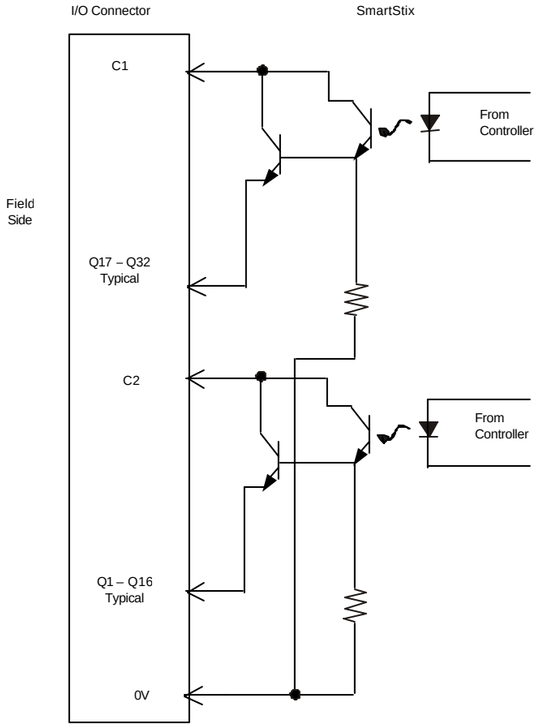


d. DQM701 / DQM706

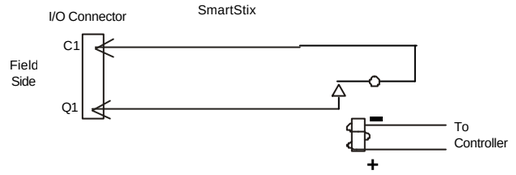
DQM701



DQM706



e. DQM602

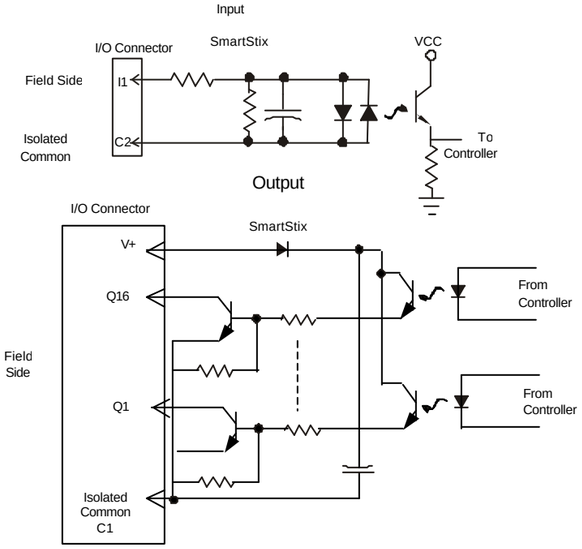


Specification for transient voltage suppressors (transorbs) used on output circuitry is 400VDC, bi-directional 400 watts.

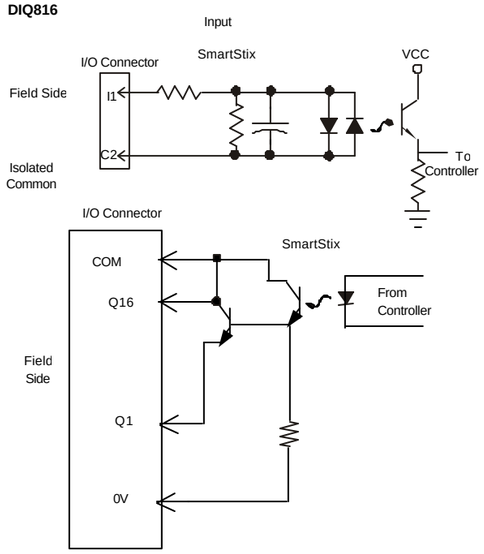
Electro-mechanical relays comply with IEC1131-2.

f. DIQ811 / DIQ816

DIQ811



DIQ816



11 Decimal (Dec) to Hexadecimal (Hex) Conversion Table

Dec	Hex		Dec	Hex		Dec	Hex	
	HI	LO		HI	LO		HI	LO
0	0	0	86	5	6	172	A	C
1	0	1	87	5	7	173	A	D
2	0	2	88	5	8	174	A	E
3	0	3	89	5	9	175	A	F
4	0	4	90	5	A	176	B	0
5	0	5	91	5	B	177	B	1
6	0	6	92	5	C	178	B	2
7	0	7	93	5	D	179	B	3
8	0	8	94	5	E	180	B	4
9	0	9	95	5	F	181	B	5
10	0	A	96	6	0	182	B	6
11	0	B	97	6	1	183	B	7
12	0	C	98	6	2	184	B	8
13	0	D	99	6	3	185	B	9
14	0	E	100	6	4	186	B	A
15	0	F	101	6	5	187	B	B
16	1	0	102	6	6	188	B	C
17	1	1	103	6	7	189	B	D
18	1	2	104	6	8	190	B	E
19	1	3	105	6	9	191	B	F
20	1	4	106	6	A	192	C	0
21	1	5	107	6	B	193	C	1
22	1	6	108	6	C	194	C	2
23	1	7	109	6	D	195	C	3
24	1	8	110	6	E	196	C	4
25	1	9	111	6	F	197	C	5
26	1	A	112	7	0	198	C	6
27	1	B	113	7	1	199	C	7
28	1	C	114	7	2	200	C	8
29	1	D	115	7	3	201	C	9
30	1	E	116	7	4	202	C	A
31	1	F	117	7	5	203	C	B
32	2	0	118	7	6	204	C	C
33	2	1	119	7	7	205	C	D
34	2	2	120	7	8	206	C	E
35	2	3	121	7	9	207	C	F
36	2	4	122	7	A	208	D	0
37	2	5	123	7	B	209	D	1
38	2	6	124	7	C	210	D	2
39	2	7	125	7	D	211	D	3
40	2	8	126	7	E	212	D	4
41	2	9	127	7	F	213	D	5
42	2	A	128	8	0	214	D	6
43	2	B	129	8	1	215	D	7
44	2	C	130	8	2	216	D	8
45	2	D	131	8	3	217	D	9
46	2	E	132	8	4	218	D	A
47	2	F	133	8	5	219	D	B
48	3	0	134	8	6	220	D	C
49	3	1	135	8	7	221	D	D
50	3	2	136	8	8	222	D	E
51	3	3	137	8	9	223	D	F
52	3	4	138	8	A	224	E	0
53	3	5	139	8	B	225	E	1
54	3	6	140	8	C	226	E	2
55	3	7	141	8	D	227	E	3
56	3	8	142	8	E	228	E	4
57	3	9	143	8	F	229	E	5
58	3	A	144	9	0	230	E	6
59	3	B	145	9	1	231	E	7
60	3	C	146	9	2	232	E	8
61	3	D	147	9	3	233	E	9
62	3	E	148	9	4	234	E	A
63	3	F	149	9	5	235	E	B
64	4	0	150	9	6	236	E	C
65	4	1	151	9	7	237	E	D
66	4	2	152	9	8	238	E	E
67	4	3	153	9	9	239	E	F
68	4	4	154	9	A	240	F	0
69	4	5	155	9	B	241	F	1
70	4	6	156	9	C	242	F	2
71	4	7	157	9	D	243	F	3
72	4	8	158	9	E	244	F	4
73	4	9	159	9	F	245	F	5
74	4	A	160	A	0	246	F	6
75	4	B	161	A	1	247	F	7
76	4	C	162	A	2	248	F	8
77	4	D	163	A	3	249	F	9
78	4	E	164	A	4	250	F	A
79	4	F	165	A	5	251	F	B
80	5	0	166	A	6	252	F	C
81	5	1	167	A	7	253	F	D
82	5	2	168	A	8	254	F	E
83	5	3	169	A	9	255	F	F
84	5	4	170	A	A			
85	5	5	171	A	B			