



High Density Mixed DC I/O Module

HE800DIQ935 / HE-DIQ935
24 Vdc In, Positive Logic
24Vdc Out, Negative Logic
50mA Maximum, Non-Inductive

* HE- denotes plastic case.



This datasheet also covers products starting with IC300.

The High Density Mixed DC I/O Module (DIQ935) is used for applications requiring a high number of digital connections and relatively low current such as LED panels and Annunciator panels. Because of the high density of the module, the I/O connectors required are high density D-sub. A list of required parts and supplier information is provided under *Installation/Safety*.

Note: Due to DIQ935's very high density, the amount of protective circuitry is reduced. For applications with a high degree electrical noise, a lower density I/O module (e.g., DIQ711, DIQ716) could be more suitable.

1 SPECIFICATIONS

INPUT		DIQ935	DIQ935	
Inputs per Module		32	Input Impedance	6K Ohms
Input Voltage		24 VDC	Minimum ON Current	3mA
Peak Voltage		35 VDC Max.	Maximum OFF Current	1mA
ON Voltage Level		18 VDC	OFF to ON Response	1ms.
OFF Voltage Level		6 VDC	ON to OFF Response	1ms.

OUTPUT		DIQ935	DIQ935	
Outputs per Module		40	Maximum Leakage Current	100µA
Operating Voltage		5 - 35VDC	Maximum Load Current per output	50mA Max., Non-Inductive
Output Type		Sinking	Maximum Inrush Current	500mA. per channel
Peak Voltage		35VDC Max.	Minimum Load	None
ON Voltage Level		1.5VDC Max.	OFF to ON Response	1ms.
Output Characteristics		Current Sinking	ON to OFF Response	1ms.

General Specifications			
Required Power (Steady State)	0.12W (5mA @ 24VDC)	Operating Temperature	0° to 60° Celsius
Required Power (Inrush)	Negligible	Terminal Type	High Density D-Sub
Relative Humidity	5 to 95% Non-condensing	Weight	9.5oz.
CE	See Compliance Table at http://www.heapg.com/Support/compliance.htm		
UL			

2 WIRING

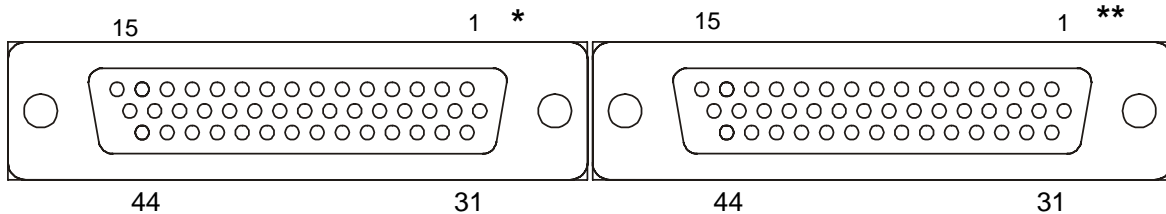
Note: See the following page to read the Wiring Note that follows the P1 and P2 pin-outs *prior* to wiring the system. Also see the pin positions on connectors as marked by * and **.

DIQ935 INPUT Connector (P1)					
Pin	Signal	Pin	Signal	Pin	Signal
* 1	Input Common	16	Input Common	31	Input Common
2	Input 1	17	Input Common	32	Input 2
3	Input 4	18	Input 3	33	Input 5
4	Input 7	19	Input 6	34	Input 8
5	Input 10	20	Input 9	35	Input 11
6	Input 13	21	Input 12	36	Input 14
7	Input 16	22	Input 15	37	Input 17
8	Input 19	23	Input 18	38	Input 20
9	Input 22	24	Input 21	39	Input 23
10	Input 25	25	Input 24	40	Input 26
11	Input 28	26	Input 27	41	Input 29
12	Input 31	27	Input 30	42	Input 32
13	No Connection	28	No Connection	43	No Connection
14	No Connection	29	No Connection	44	No Connection
15	No Connection	30	No Connection		

P1

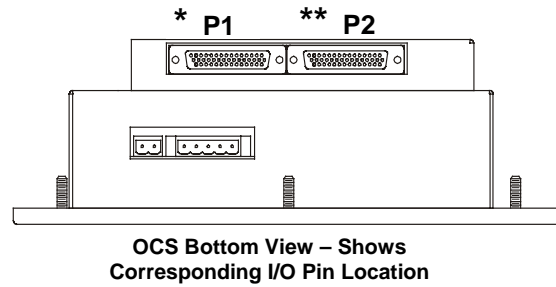
DIQ935

P2



OCS Bottom View – Shows corresponding I/O pin location
(Asterisks denote location of pin 1. Refer to Connector Tables.)

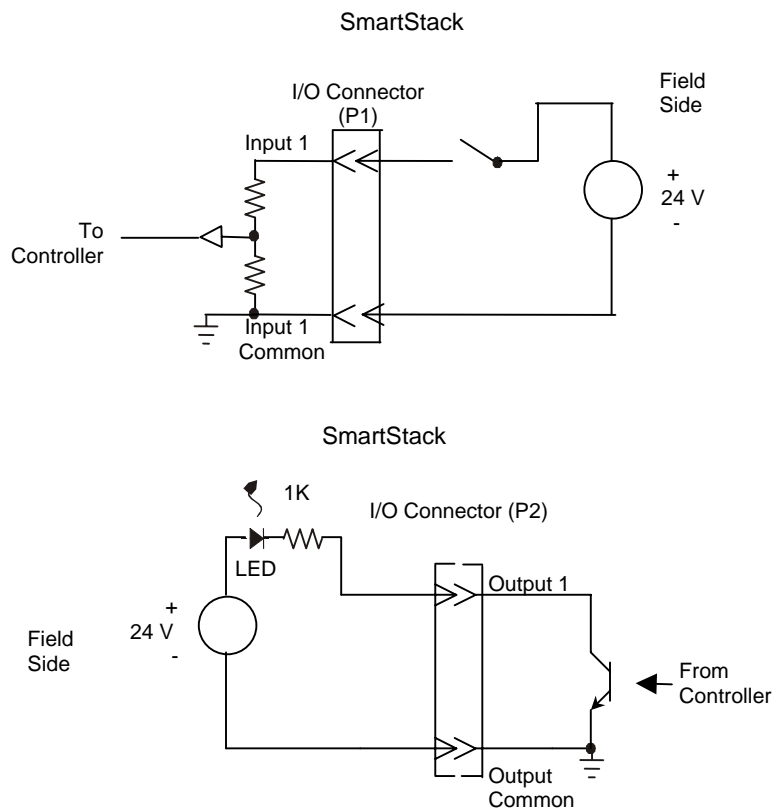
DIQ935 OUTPUT Connector (P2)					
Pin	Signal	Pin	Signal	Pin	Signal
** 1	Output Common	16	Output Common	31	Output Common
2	Output 1	17	Output Common	32	Output 2
3	Output 4	18	Output 3	33	Output 5
4	Output 7	19	Output 6	34	Output 8
5	Output 10	20	Output 9	35	Output 11
6	Output 13	21	Output 12	36	Output 14
7	Output 16	22	Output 15	37	Output 17
8	Output 19	23	Output 18	38	Output 20
9	Output 22	24	Output 21	39	Output 23
10	Output 25	25	Output 24	40	Output 26
11	Output 28	26	Output 27	41	Output 29
12	Output 31	27	Output 30	42	Output 32
13	Output 34	28	Output 33	43	Output 35
14	Output 37	29	Output 36	44	Output 38
15	Output 40	30	Output 39		



Wiring Note

The DIQ935 has two 44-pin connectors. There is an input connector (P1) and an output connector (P2). **All four ground pins on each of the connectors need to be returned directly to the I/O power supply ground connection.**

3 INTERNAL CIRCUIT SCHEMATIC



Warning: Wiring the positive side of the DC source to loads connected to outputs 1 through 40 and the negative side of the DC source to the output common(s) would create a Negative Logic condition, which may be considered an unsafe practice under CE directives.

4 CONFIGURATION

Preliminary configuration procedures that apply to SmartStack™ Modules are contained in the hardware manual of the controller you are using. Refer to the **Additional References** section in this data sheet for a listing of hardware manuals.

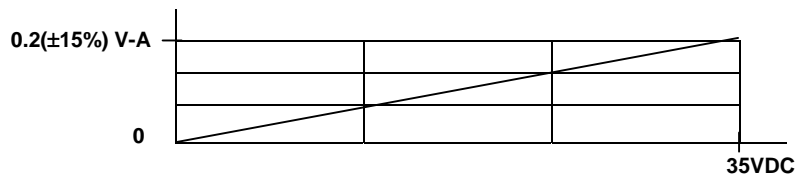
Selecting the **I/O Map** tab provides information about the I/O registers, which are assigned to a specific SmartStack™ Module and where the module is located in the point map. The I/O Map is determined by the model number and location within the SmartStack™. The I/O Map is not edited by the user.

The **Module Setup** is used in applications where it is necessary to change the default states of the outputs when the controller (e.g., OCS100) enters idle/stop mode. The default turns the outputs OFF when the controller enters idle/stop mode. By selecting the Module Setup tab, each output can be set to either turn ON, turn OFF or to hold the last state. Generally, most applications use the default settings.

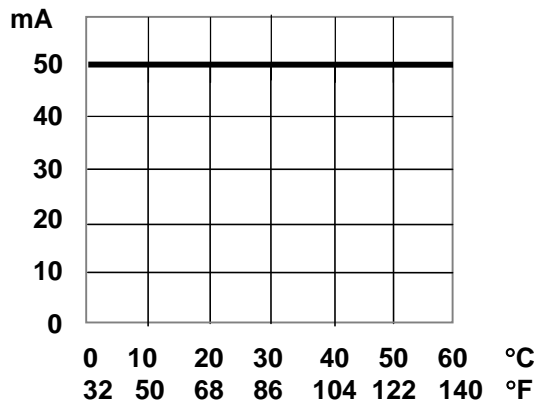
Warning: The default turns the outputs OFF when the controller enters idle/stop mode. To avoid injury of personnel or damages to equipment, exercise extreme caution when changing the default setting using the **Module Setup** tab.

5 INPUT / OUTPUT CHARACTERISTICS

Digital Input Chart



Derating Chart



6 ADDITIONAL REFERENCES

For detailed installation, configuration and other information, refer to the hardware manual of the controller you are using. See the **Technical Support** section in this document for the web site address to download references and to obtain revised editions.

Additional References	
Controller	Manual Number
Operator Control Station Hardware (OCS, OCX) e.g., OCS1XX / 2XX; Graphic OCS250	MAN0227
Remote Control Station Hardware (RCS [except RCS116], RCX) e.g., RCS210, RCS250	
Color Touch OCS Hardware e.g., OCS300, OCS301, OCS350, OCS351 e.g., OCS451, OCS551, OCS651	MAN0465
OCS LX Series Hardware e.g., LX280 / LX300; RCS116	MAN0755
MiniOCS / MiniRCS / MiniOCX / MiniRCX Hardware e.g., HE500OCSxxx	MAN0305
Other Useful References	
Cscape Programming and Reference	MAN0313
DeviceNet™ Implementation	SUP0326
Wiring Accessories and Spare Parts Manual	MAN0347

7 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

North America:
(317) 916-4274
www.heapg.com

Europe:
(+) 353-21-4321-266
www.horner-apg.com

8 INSTALLATION / SAFETY

8.1 General

Warning: Remove power from the OCS controller, CAN port, and any peripheral equipment connected to this local system before adding or replacing this or any module.

- a. All applicable codes and standards are to be followed in the installation of this product.
- b. Use the following wire type or equivalent: Belden 8917, 16 AWG or larger.

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:



Warning: Consult user documentation.



Warning: Electrical Shock Hazard.

8.2 Termination Options

Because of the high density nature of this I/O module, the DIQ935 utilizes high density D-sub connectors for termination. Depending on the application and the relative noise level in the installation, one of a variety of termination options may be selected, including:

- a. Customer construction of a custom wiring harness assembly.
- b. Pre-fabricated round cable, terminated to DIN-rail mount terminal strips.
- c. Pre-fabricated ribbon cables, terminated to DIN-rail mount terminal strips.
- d. Pre-fabricated ribbon cables, terminated to DIN-rail mount signal conditioners.

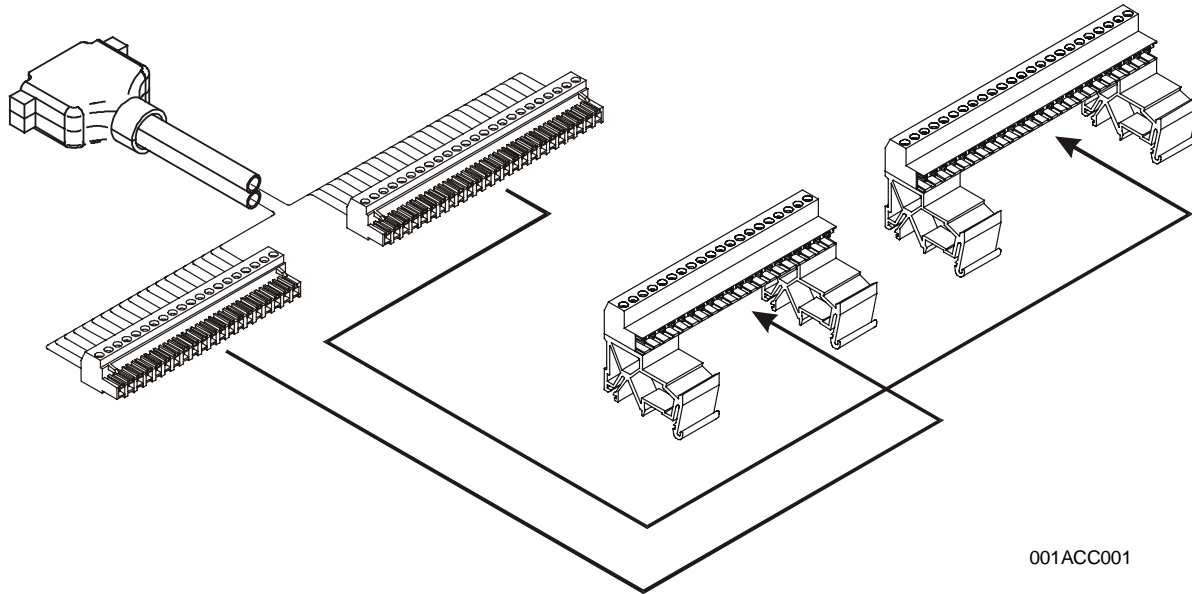
Option A --- Customer Constructed Wiring Harness

For construction of a custom wiring harness, the D-sub connectors and pins can be obtained from a variety of sources including Digi-Key Corporation (1-800-344-4539). The part numbers are:

Description	Manufacturer	Manufacturer Part #	Digi-Key Part #
D-Sub Connector 44 (Male)	AMP	748366-1	A2078-ND
D-Sub Pin for D-Sub Connector (22-28 AWG), 30 μ Gold	AMP	748333-4	A2088-ND

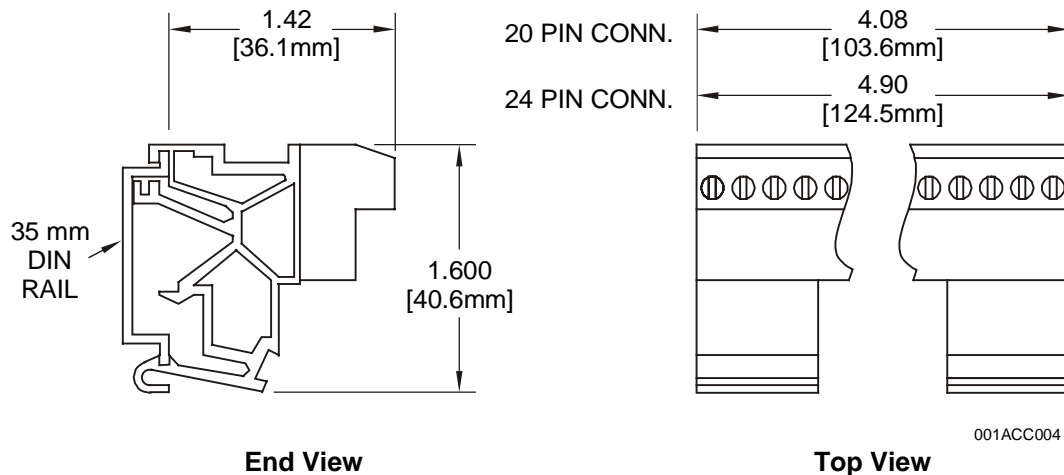
Option B --- Pre-Fabricated Round Cable, Terminated To DIN-Rail Mount Terminal Strips.

For this option, the customer terminates his I/O wiring to passive, DIN-rail mount terminal strips. These strips are connected to the DIQ935 via a round cable 0.5m, 1.0m, or 2.0m in length. To increase the panel layout flexibility of this option, the 44-pins of termination are divided into two DIN-rail mounted terminal strips (24 pin and 20 pin). The required cable is constructed in a "Y" configuration, with a 44-pin D-sub on one end, and a 24-pin connector and 20-pin connector on the other end. The part numbers for the cables and terminal strip are shown in the following table. Note that it takes **two** cables, and **two** sets of ACC544 terminal strips to wire all 32 inputs and 40 outputs of a DIQ935 module. This wiring option is passive. The terminal strips provide no filtering or signal conditioning to improve noise immunity.



001ACC001

Round Cable and ACC544



001ACC004

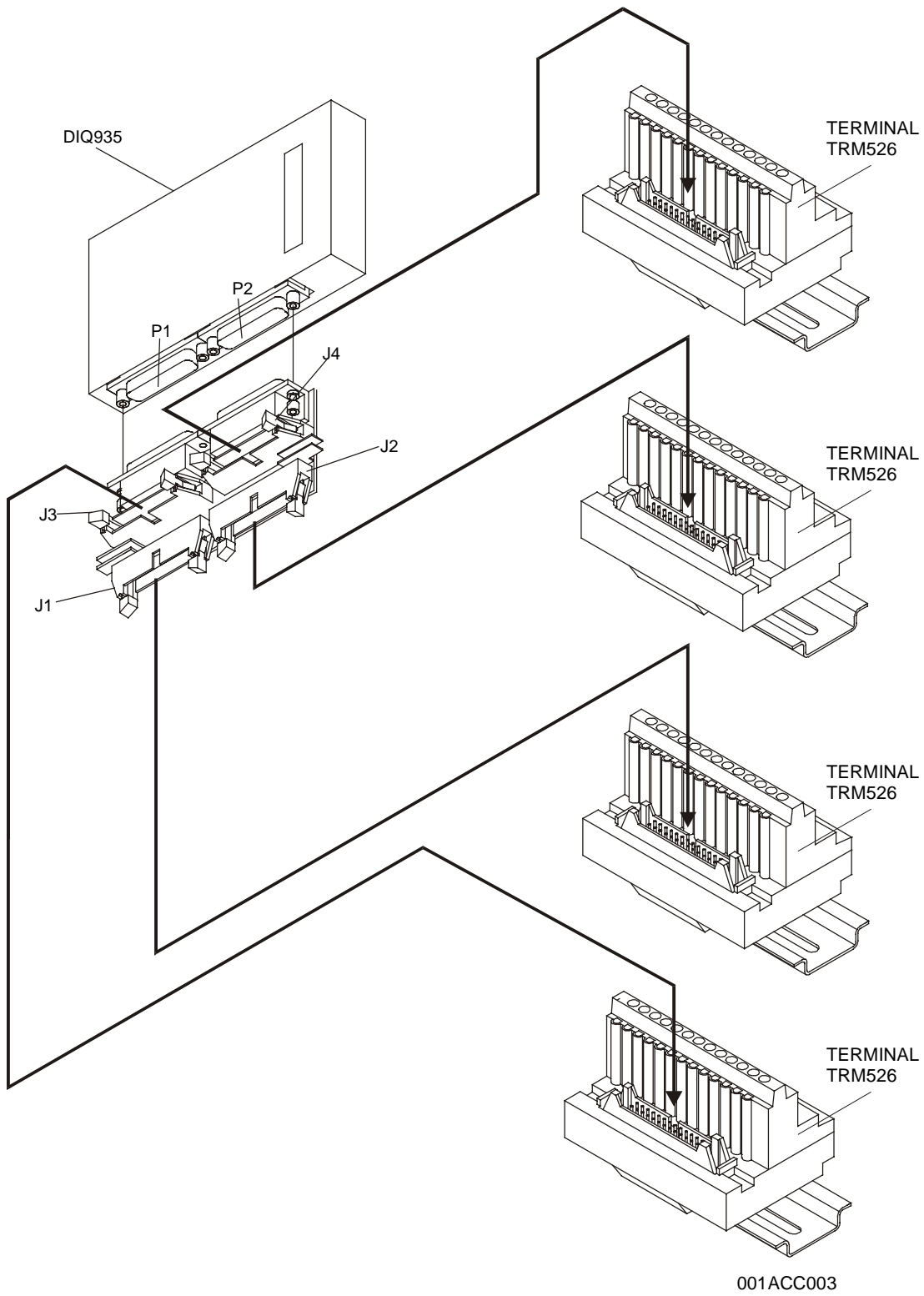
Close-up of ACC544

Pin-out for Connection of HE800CBLx44 between DIQ935 SmartStack Module and HE800ACC544				
DIQ935 I/O Signal Name	ACC544 DIN-Rail Terminal Strip Number		DIQ935 I/O Signal Name	ACC544 DIN-Rail Terminal Strip Number
Common	1		Input/Output 22	23
Input/Output 1	2		Common	24
Input/Output 2	3		Common	25
Input/Output 3	4		Input/Output 23	26
Input/Output 4	5		Input/Output 24	27
Input/Output 5	6		Input/Output 25	28
Input/Output 6	7		Input/Output 26	29
Input/Output 7	8		Input/Output 27	30
Input/Output 8	9		Input/Output 28	31
Input/Output 9	10		Input/Output 29	32
Input/Output 10	11		Input/Output 30	33
Input/Output 11	12		Input/Output 31	34
Input/Output 12	13		Input/Output 32	35
Input/Output 13	14		Input NC/Output 33	36
Input/Output 14	15		Input NC/Output 34	37
Input/Output 15	16		Input NC/Output 35	38
Input/Output 16	17		Input NC/Output 36	39
Input/Output 17	18		Input NC/Output 37	40
Input/Output 18	19		Input NC/Output 38	41
Input/Output 19	20		Input NC/Output 39	42
Input/Output 20	21		Input NC/Output 40	43
Input/Output 21	22		Common	44

Note: To connect to all 32 inputs and 40 outputs of the DIQ935 module, a total of two CBLx44s and two ACC544s are required.

Option C --- Pre-Fabricated Ribbon Cable, Terminated To DIN-Rail Mount Terminal Strips.

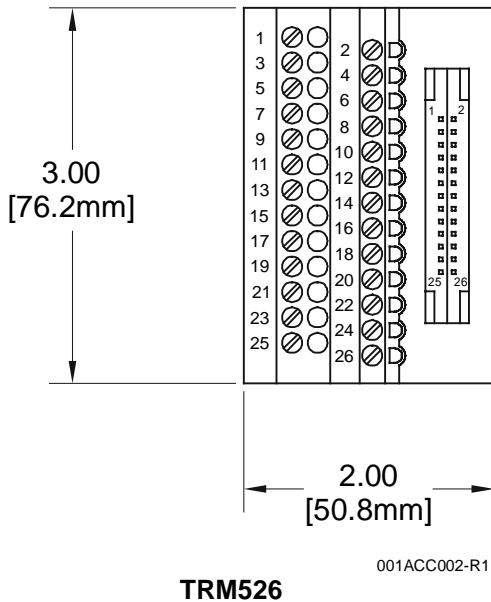
This option is very similar to Option B, but utilizes ribbon cables instead of round cables. In order to support ribbon cables, the use of a Distribution Board (DST935) is required. The Distribution board connects directly to the DIQ935, and provides four 26-pin ribbon connectors. Two of the ribbon connectors are used for inputs (16 inputs each), and two of the ribbon connectors are used for outputs (16 outputs each). Note that with this option, **outputs 33-40 are not accessible**. Because ribbon cables are used, a different DIN-rail mount terminal strip is used also. The part numbers for the distribution board, cables, and terminal strip are shown in the table below. Note that it takes **one** distribution board, **four** ribbon cables, and **four** DIN-rail mount terminal strips to wire 32 inputs and 32 outputs of a DIQ935 module. This wiring option is passive. The terminal strips provide no filtering or signal conditioning to improve noise immunity.



Ribbon Cable connecting DST935 and TRM526

DST935 CONNECTOR PIN-OUT				
Pin	J1	J2	J3	J4
1	Input 1	Input 17	Output 1	Output 17
2	Input 2	Input 18	Output 2	Output 18
3	Input 3	Input 19	Output 3	Output 19
4	Input 4	Input 20	Output 4	Output 20
5	Input 5	Input 21	Output 5	Output 21
6	Input 6	Input 22	Output 6	Output 22
7	Input 7	Input 23	Output 7	Output 23
8	Input 8	Input 24	Output 8	Output 24
9 & 10	Common (GND)	Common (GND)	Common (GND)	Common (GND)
11, 12, 13 & 14	NC	NC	NC	NC
15 & 16	Common (GND)	Common (GND)	Common (GND)	Common (GND)
17	Input 16	Input 32	Output 16	Output 32
18	Input 15	Input 31	Output 15	Output 31
19	Input 14	Input 30	Output 14	Output 30
20	Input 13	Input 29	Output 13	Output 29
21	Input 12	Input 28	Output 12	Output 28
22	Input 11	Input 27	Output 11	Output 27
23	Input 10	Input 26	Output 10	Output 26
24	Input 9	Input 25	Output 9	Output 25
25 & 26	NC	NC	NC	NC

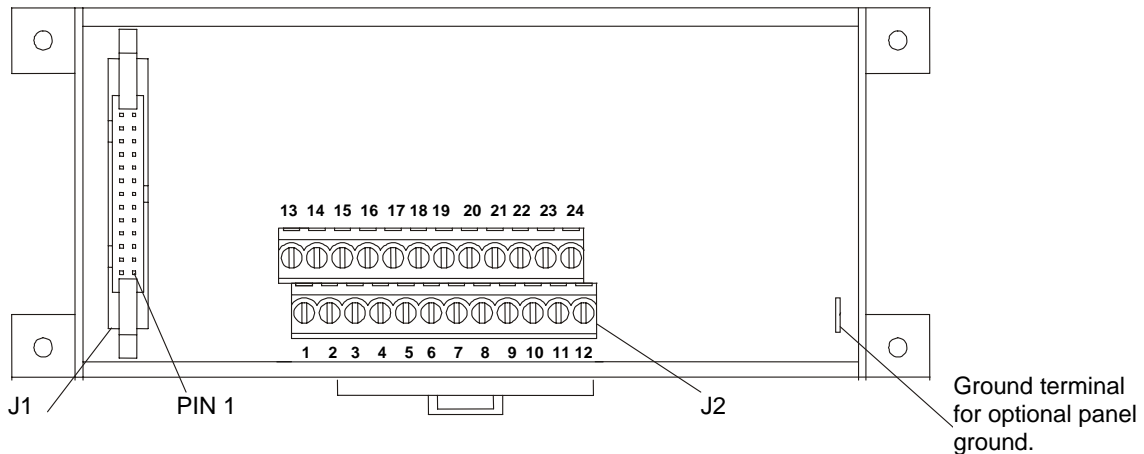
Note: J1 and J2 connect inputs using either INP935 or TRM526 or RLY160.
J3 and J4 connect outputs using the TRM526.



TRM526 PIN-OUT			
Pin	J1	J2	J3
1	Input 1	Input 17	Output 1
2	Input 2	Input 18	Output 2
3	Input 3	Input 19	Output 3
4	Input 4	Input 20	Output 4
5	Input 5	Input 21	Output 5
6	Input 6	Input 22	Output 6
7	Input 7	Input 23	Output 7
8	Input 8	Input 24	Output 8
9, 10	Common (GND)	Common (GND)	Common (GND)
11, 12, 13, 14	NC	NC	NC
15, 16	Common (GND)	Common (GND)	Common (GND)
17	Input 16	Input 32	Output 16
18	Input 15	Input 31	Output 15
19	Input 14	Input 30	Output 14
20	Input 13	Input 29	Output 13
21	Input 12	Input 28	Output 12
22	Input 11	Input 27	Output 11
23	Input 10	Input 26	Output 10
24	Input 9	Input 25	Output 9
25, 26	NC	NC	NC

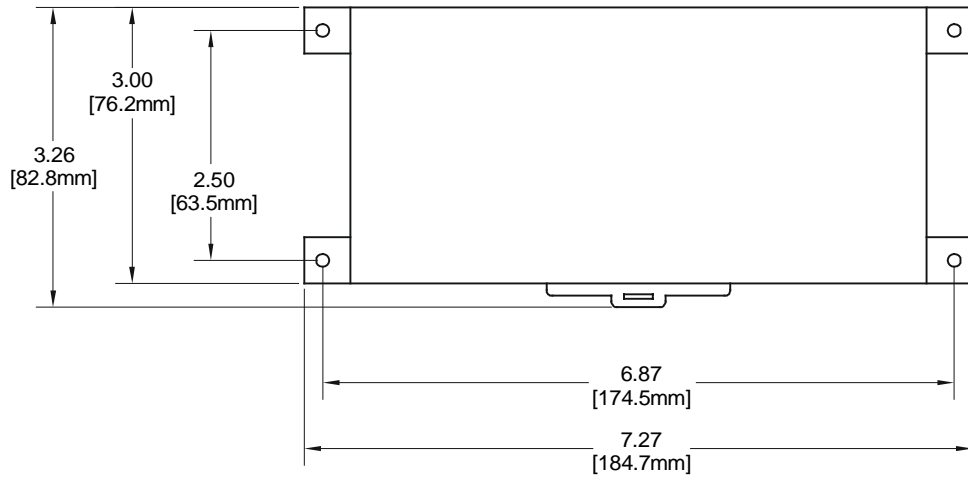
Option D --- Pre-fabricated ribbon cable, terminated to DIN-rail mount signal conditioners and output devices.

This option is very similar to Option C, but it utilizes active signal conditioners instead of passive terminal strips. Once again, the use of a Distribution Board (HE800DST935) is required. The Distribution board connects directly to the DIQ935, and provides the four 26-pin ribbon connectors. Two of the ribbon connectors are used for inputs (16 inputs each). For each set of 16 inputs, a DIN-rail mount input conditioner (HE800INP935) is used. This input conditioner provides protective circuitry for the DIQ935 inputs. Two of the ribbon connectors on the distribution board are used for outputs (16 outputs each). For each set of 16 outputs, a DIN-rail mount relay output device (HE690RLY160) can be used. This output device provides 16 high current relays, each with isolated normally open contacts, which can accept an AC or DC load. Note that with this option, **outputs 33-40 are not accessible**. The part numbers for the distribution board, cables, input conditioners, and relay output conditioner is shown in the table below. Note that it takes **one** distribution board, **four** ribbon cables, **two** input conditioners, and **two** relay output devices to wire 32 inputs and 32 outputs of a DIQ935 module.



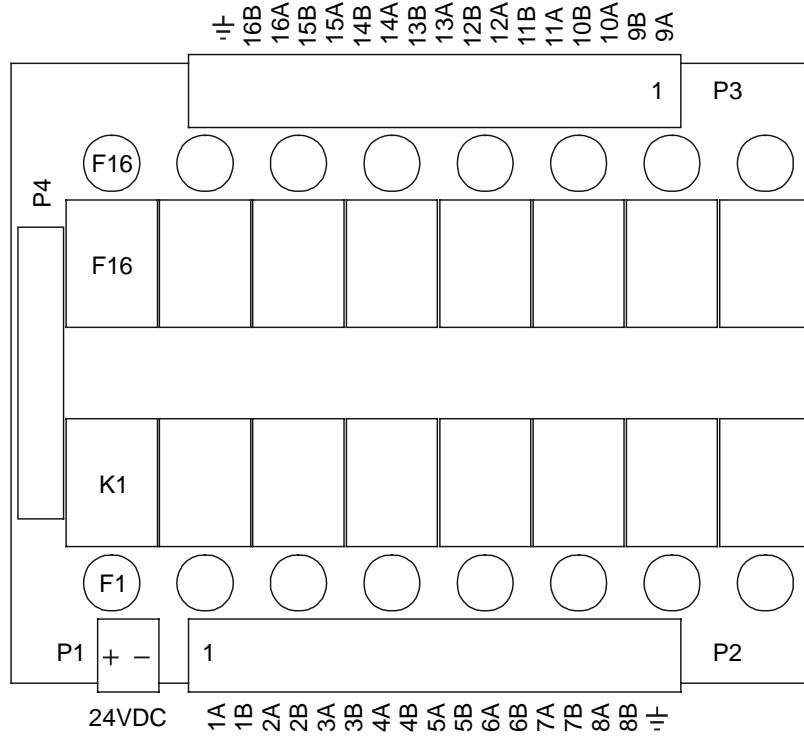
INP935 Connector

Pin-Out for INP935 (J2)				
Pin	Description		Pin	Description
1	Input 1		13	Input 9
2	Input 2		14	Input 10
3	Common (GND)		15	Common (GND)
4	Input 3		16	Input 11
5	Input 4		17	Input 12
6	Common (GND)		18	Common (GND)
7	Input 5		19	Input 13
8	Input 6		20	Input 14
9	Common (GND)		21	Common (GND)
10	Input 7		22	Input 15
11	Input 8		23	Input 16
12	Common (GND)		24	Common (GND)



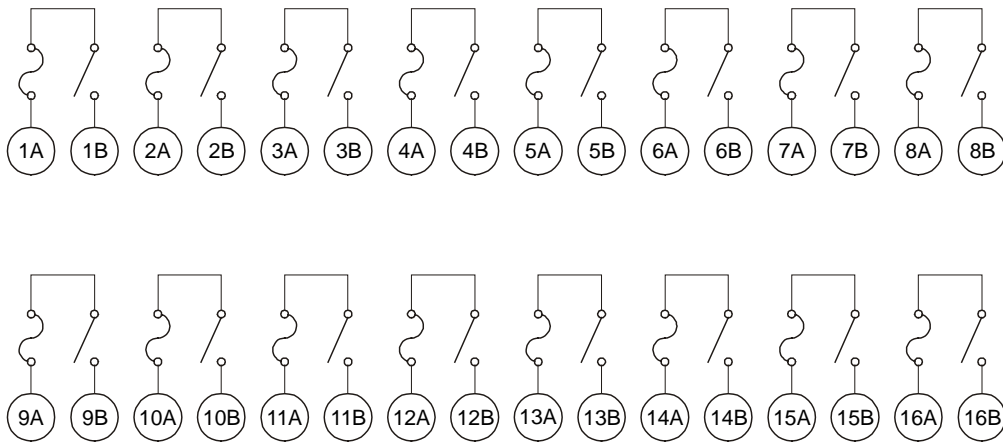
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Dimensions of INP935 Connector



Overview of HE690RLY160

The following is the pin-out for the RLY160.



NOTES