

IDV11-A (M5026) Replacement Controller

Model DCQ-2400



The DCQ-2400 is a form, fit and function equivalent for the Digital IDV11-A (M5026). Like the IDV11-A, the DCQ-2400 is an isolated digital input module for the Qbus. It accepts up to 16 single optically isolated inputs used for monitoring voltages where noise immunity or common mode rejection is important. The 16 bit data are read by programs and transferred to the processor or memory.

The input line bit 15 is selectable by program and generates an interrupt at the leading edge (ON-going signal) and/or at the trailing edge (OFF-going signal).

The standard input range is 24 to 48 Vdc. In this range, the input switching delay can be changed by a programmable contact bounce eliminator to three different values. In addition, a programmable low level input range for low speed, low power 5 Vdc signals and usable for TTL or MOS inputs is selectable.

The design uses DEC I/O interface circuits to interface to the Qbus and user signals plus a high density Field Programmable Gate Array (FPGA) for control circuitry. The FPGA is designed using internal logic symbols in industry standard schematic form. A serial prom loads the schematic symbols into the FPGA following each power up cycle. The use of an FPGA allows ease of design verification through simulation, ease of design improvements and for factory updates when and if needed.

Key Features

- 16 single, optically isolated inputs
- Interrupt capability on input line bit 15
- Interrupt generating signal edge is programmable
- Programmable contact bounce eliminator
- Standard input range from 24 to 48 Vdc
- Programmable low level range for 5 Vdc signals
- Module identification code readable by program

Compatibility

- Connector, signal and diagnostic compatible with Digital I/O test connector module
- MDM diagnostic NAIDAA compatible
- XXDP diagnostic CZIXVxx compatible
- Qbus standard interface circuits (DS8641)
- User interface components are identical to the original design or electrical equivalents
- The internal circuitry is identical to the original Digital design but uses an FPGA to replace the individual gate-level components.
- Follows all Qbus rules and specifications as outlined in Digital's *LSI-11 Bus Spec*, DEC Std 160 17-SEP-81.
- Qbus interrupt priority level jumper compatible with BR5, BR6 (W1, W2)
- Qbus address and vector switch compatible including switch location and settings

Specifications

All specifications are identical to or superior to the IDV11-A. Designed and manufactured using ISO standard 9001-2008 procedures.

Physical	
DCQ-2400-A Controller	Dual-width Qbus card measuring 13.3 cm by 21.3 cm
User Connector (J1)	40-pin Berg header with retainer latches or equivalent
Module Extractors	Single extractor, identical location to IDV11-A
Maintenance LEDs (D1) Two LEDs, one green and one red	Green - Software controlled Red - Indicates module error
Electrical	
DCQ-2400-A	350 mA @ 5.0 volts DC ±12 volts DC not used
Bus Loading	1 DC load, 2 AC loads
Qbus	
MODE Register ID	004 octal
Device Address (E29)	Switch selectable over the 4KW address range. Occupies a 4 word address with one word unused. Identical to the IDV11-A.
Interrupt Vector (E24)	Switch selectable from 000 to 770 octal. Identical to the IDV11-A.
Priority Level Selection (W1, W2)	BR4, Jumper selectable to BR5 or BR6. Identical to the IDV11-A.
Input Circuits	
Number of Inputs	16, two-wire optocoupler
Standard Input Range	24 to 48 Vdc at 2.6 to 5.2mA
ON Voltage	11v minimum
OFF Voltage	4.2V maximum
Input Voltage	60V maximum
CE Compliance	
EMC Directive	2014/30/EU
Safety Standard	IEC EN60950-1:2005-12

Note: Equivalent parts are used when the original parts are obsolete or unavailable.

Contact Bounce Eliminator	
Default Delay	5 millisecc ±30%
Programmable Delays	500 usecc ±60% or 10 msec ±20%
Low Level Input – Program Selectable	
ON Voltage	4.2v minimum @ 0.46mA
Frequency	50Hz on 50% duty cycle
Input Voltage	60V maximum
Hysteresis	Approximately 0.55V for both input ranges
Isolation Voltage	Inputs to Computer GND 1000Vdc or peak ac
Interchannel Isolation	250Vdc or peak ac
Environmental	
Operating Conditions:	
Temperature	10° to 60° C
Relative Humidity	20% to 95% non-condensing
Storage Conditions:	
Temperature	-40° to 66° C
Relative Humidity	10% to 90% non-condensing

User Connector J1 Pinout

Pin	Signal	Pin	Signal
A		B	+5V (Maint.)
C		D	IN0/1 (Bit 0)
E	IN0/2 (Bit 0)	F	IN1/1
H	IN1/2	J	IN2/1
K	IN2/2	L	IN3/1
M	IN3/2	N	IN4/1
P	IN4/2	R	IN5/1
S	IN5/2	T	IN6/1
U	IN6/2	V	IN7/1
W	IN7/2	X	IN8/1
Y	IN8/2	Z	IN9/1
AA	IN9/2	BB	IN10/1
CC	IN10/2	DD	IN11/1
EE	IN11/2	FF	IN12/1
HH	IN12/2	JJ	IN13/1
KK	IN13/2	LL	IN14/1
MM	IN14/2	NN	IN15/1 (Bit 15)
PP	IN15/2 (Bit 15)	RR	
SS	Key (no pin)	TT	+5Vdc Out (Mfg)
UU		VV	GND

Ordering Information

Model	Description
DCQ-2400-AA	Qbus controller and installation manual.
DCQ-2400-A	Qbus controller only.

Address Switch Settings

Switch E29
 Address range 171400-171770
 Factory set to 171400

12	11	10	9	8	7	6	5	4	3
1	0	0	1	1	X	X	X	X	X
ON	OFF	OFF	ON	ON	X	X	X	X	X
S10	S9	S8	S7	S6	S5	S4	S3	S2	S1

Logical 1 = ON
 Logical 0 = OFF

Vector Switch Settings

Switch E24
 Vector range 400-770
 Factory set to 400

8	7	6	5	4	3
1	X	X	X	X	X
ON	X	X	X	X	X
S6	S5	S4	S3	S2	S1

Logical 1 = ON
 Logical 0 = OFF

Block Diagram

