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DeviceNet™ CONFORMANCE TESTED

MODEL DLCN - DUAL LOOP CONTROLLER / DATA ACQUISITION MODULE w/DEVICENET™

USING THIS DOCUMENT

This document is an addendum to the standard DLC bulletin and describes the use of the DeviceNet™ connection to the DLCN. This document should be read in conjunction with the DLC bulletin.

GENERAL DESCRIPTION

The Model DLCN, Dual Loop Controller with DeviceNet, has a similar feature set and specifications as the standard Dual Loop Controller. The DLCN operates as a DeviceNet Slave, providing a connection to a standard DeviceNet network. Once a valid MAC ID and Baud Rate have been established, the supported attributes (see table: ***DLCN DeviceNet SUPPORTED ATTRIBUTES***) can be accessed by a Master, providing control and status functions for each PID loop. The DLCN can also be fully programmed via the built-in RS485 communications port using our Windows® based RLCPro configuration software (refer to the DLC bulletin).

In addition, the model DLCN can be used as a simple analog data acquisition device for monitoring T/C's, RTD's, voltage and current over a DeviceNet network.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
DLCN	Dual Loop Controller, w/ 5 Pin Male M12 connector	DLCN0001
	Dual Loop Controller, w/ 2 analog outputs, 5 Pin Male M12 connector	DLCN1001
	Dual Loop Setpoint Controller, w/ 2 analog outputs, 5 Pin Male M12 connector	DLCN1101
	Dual Loop Controller, w/ COMBICON screw flange connector	DLCN0011
	Dual Loop Controller, w/ 2 analog outputs, COMBICON screw flange connector	DLCN1011
	Dual Loop Setpoint Controller, w/ 2 analog outputs, COMBICON screw flange connector	DLCN1111

PROGRAMMING THE DLCN via RLCPro

In order to program the DLCN via RLCPro, the DeviceNet bus cable must be disconnected from the unit. This causes the internal DLCN communication bus to automatically switch to the front panel Modbus programming port. When programming is complete, the unit may be attached to the DeviceNet bus, thus disabling the front panel port and enabling DeviceNet communications. The DLCN Modbus communication parameters are fixed at 19200 baud, unit address of 247, 8 data bits, no parity, RTU mode. The DIP and Rotary Switches, as described below, are used for DeviceNet settings only.

SETTING THE MAC ID and BAUD RATE

The DLCN DeviceNet MAC ID is set using two rotary switches allowing the ID to be set in standard decimal notation (e.g. MAC ID = 27, SWC = 2, SWB = 7) from 0 to 63. (64-99 are not used.) The baud rate is set with DIP switches. The following table explains the baud rate settings.

DIP SWITCH SETTING TABLE

SWITCH SWA	SETTING
1 off, 2 off	Force 125 K baud
1 on, 2 off	Force 250 K baud
1 off, 2 on	Force 500 K baud
1 on, 2 on	Autobaud Detect (factory default)

Autobaud will match the DLCN DeviceNet baud rate to the network baud rate within 5 seconds every time the DLCN power is cycled. The DLCN must be connected to a bus carrying valid message traffic. In noisy environments autobaud may not be able to properly detect the network baud rate. In this case, manually set the baud rate as required.

***Note**: Configuration of MAC ID and baud rate is not supported over DeviceNet.*

MOD/NET STATUS LED

The MOD/NET Status LED provides a visual indication to the operator of the current status of the DeviceNet interface. The DLCN primary power and DeviceNet power must be applied for correct LED function.

What to look for:

A. Startup:
LED flashes Green for 0.25 sec, then Red for 0.25 sec, then Off.

B. LED Off:
This device is the only device on the network (waiting for an acknowledgment to its duplicate MAC ID check), or this device is not powered.

C. Flashing Red LED:
An I/O connection has timed out, or a recoverable error has occurred.

D. Flashing Green LED:
The device is functioning correctly and is waiting to be commissioned by a bus master.

E. Solid Red LED:
The device has encountered a non-recoverable fault, such as a duplicate MAC ID response, and has removed itself from the bus.

F. Solid Green LED:
The device is on line, functioning correctly and has been commissioned by a bus master.

DeviceNet™ SPECIFICATIONS

POWER SUPPLY

Source: Supplied by DeviceNet bus. The bus does not power the host.
Voltage: 11 to 25 VDC.
Current:
Nominal: 40 mA at 25 VDC.
Inrush: 550 mA for 5 msec at 25 VDC.

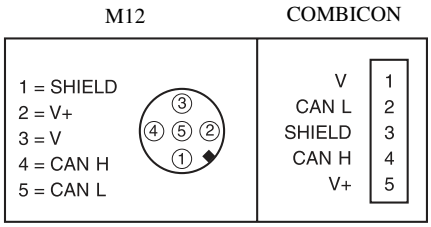
NETWORK SPECIFICS

Compatibility: Group 2 Server Only, not UCMM capable.
Baud Rates: 125 Kbaud, 250 Kbaud, and 500 Kbaud.
Bus Interface: Phillips 82C250 or equivalent with mis-wiring protection per DeviceNet Volume 1 Section 10.2.2.
Node Isolation: Bus powered, isolated node.
Host Isolation: 500 Vrms for 1 minute (50 V working) between DeviceNet and DLC input common.

INSTALLATION INFORMATION

Factory Settings:
Baud rate: Autobaud
MAC ID: 63
Strobe Register: 03h
Swap data flag: Off.

Bus Connection - based on model chosen. See ORDERING INFORMATION, Page 1. For Connection Options, See Diagram on Page 4.



Note: Shield has no internal connection in the DLCN.

Standard Wire Colors:

V+	Red
V-	Black
CAN_H	White
CAN_L	Blue
SHIELD	Bare

CONNECTION SIZES

Device Profile: This product conforms to the DeviceNet specification Volumes I and II of version 2.0.
Device Configuration: No DeviceNet configuration is supported. However, some DLC configuration is supported.

MESSAGE	PRODUCED	CONSUMED
Explicit	4 Bytes	2 Bytes
Polled	4 Bytes	2 Bytes
Bit Strobe	8 Bytes	2 Bytes

SUPPORT CONNECTIONS

Polled Command: The Polled Command produces 4 bytes of data, and is used to get, or set attributes. The device attribute is determined by the value in byte 0 of the data field. Refer to the Supported Attributes table for the appropriate value. Byte 1 determines the action: 0 = get, 1 = set. The next 2 bytes are the new attribute value for the set command. For get commands, enter 2 zeros. The data response from the Polled Command is in the format of a 2 byte hexadecimal number. For the get command (0), the response is the attribute value. For the set command (1), the response is an echo of the data input.

Bit Strobe Command: The data response from the Bit Strobe Command is in the format of a 2 byte hexadecimal number. The register that will be read using the Bit Strobe command is determined by setting Attribute 2, Instance 1, Class 100* (decimal) with a value that represents the desired attribute. Refer to the Supported Attributes table for the appropriate value.

EXPLICIT MESSAGE COMMAND

Get Attribute: The attribute that will be read using the Get Attribute command is determined by setting Service Code 14, Instance 1, Class 100* (decimal), and the attribute with a value that represents the desired meter attribute. Refer to the Supported Attributes table for the appropriate value. The data response from the Get Attribute Command is in the format of a 2 byte hexadecimal number.

Set Attribute: The attribute that will be set using the Set Attribute command is determined by setting Service Code 16, Instance 1, Class 100* (decimal), and the attribute with a value that represents the desired meter attribute. Refer to the Supported Attributes table for the appropriate value. The data field for the Set Attribute Command is entered as a 2 byte hexadecimal number.

OTHER EXPLICIT MESSAGE ATTRIBUTES

Data Byte Swap: (1 byte), Attribute 1, Instance 1, Class 100* (decimal). Data is normally sent and entered as follows: DLC value = 50000 (C350h). 2 byte value sent would be 50C3. Setting the data swap value to 1 would result in the data being sent as C350. This attribute can only be set to 0 or 1, all other values are ignored. The factory setting value is 0. Data byte is saved in EEPROM memory.

Data Update: The DeviceNet interface is continually requesting values from the DLC main processor and updating buffer registers. As such, valid attribute values are always available over DeviceNet at the maximum bus rate.

Vendor Specific Error Responses

CODE ERROR #	ERROR CODE MEANING
1F (General Code)	Vendor Specific Error
1 (Additional Code)	Device Response Time-out
2 (Additional Code)	Vendor Service Not Supported
3 (Additional Code)	Command String Syntax Error

**Class 100 (decimal) is a vendor specific class.*

DLCN DeviceNet SUPPORTED ATTRIBUTES

This subset of registers is supported via DeviceNet communications. Modbus registers are provided for reference only. See the DLC bulletin for complete register and Modbus programming details.

REGISTERS				REGISTER NAME	LOW LIMIT	HIGH LIMIT	FACTORY SETTING	SERVICE CODES SUPPORTED
CHA		CHB						
Modbus Register	Attribute	Modbus Register	Attribute	**DEVICENET SPECIFIC ATTRIBUTES**				
	1	-	-	Data Byte Swap	See description under *OTHER EXPLICIT MESSAGE ATTRIBUTES*			
	2	-	-	Bit Strobe	See description under *SUPPORT CONNECTIONS*			
				CONTROLLING VALUES				
40001	3	40017	8	Process Value	N/A	N/A	N/A	G
40002	4	40018	9	Setpoint Value	-32000	32000	0	G, S
40003	5	40019	10	Alarm 1 Value	-32000	32000	0	G, S
40004	6	40020	11	Alarm 2 Value	-32000	32000	0	G, S
				PID PARAMETERS				
40005	7	40021	12	Output Power	0 or -1000	1000	0	G, S
40007	13	40023	22	Proportional Band	0	9999	40	G, S
40008	14	40024	23	Integral Time	0	9999	120	G, S
40009	15	40025	24	Derivative Time	0	9999	30	G, S
40011	16	40027	25	Auto-Tune Start	0	1	0	G, S
40012	17	40028	26	Auto-Tune Phase	N/A	N/A	N/A	G
40013	18	40029	27	Auto-Tune Code	0	2	0	G, S
				OUTPUT STATUS				
40014	19	40030	28	Control Output OP1	N/A	N/A	N/A	G
40015	20	40031	29	Alarm Output AL1	0	1	0	G, S
40016	21	40032	30	Alarm Output AL2 / OP2	0	1	0	G, S
				CONTROL STATUS				
40041	31	40049	37	Control Mode	0	1	0	G, S
40042	32	40050	38	Disable Setpoint Ramping	0	1	0	G, S
40043	33	40051	39	Setpoint Ramping In Process	N/A	N/A	N/A	G
40044	34	40052	40	Disable Integral Action	0	1	0	G, S
40045	35	40053	41	Ramping Setpoint Value	N/A	N/A	N/A	G, S
40046	36	-	-	Remote / Local Setpoint Select	0	1	0	G, S
				PROFILE OPERATION - SETPOINT CONTROLLER MODEL ONLY				
40065	42	40073	48	Profile Operating Status	0	3	0	G, S
40066	43	40074	49	Profile Phase	N/A	N/A	N/A	G
40067	44	40075	50	Profile Segment	N/A	N/A	N/A	G
40068	45	40076	51	Profile Phase Time Remaining	1	9999	N/A	G, S
40069	46	40077	52	Profile Cycle Count Remaining	1	250	0	G, S
40070	47	40078	53	Advance Profile Phase	0	1	0	G, S
				COOLING (OP2) PARAMETERS				
40141	54	40241	57	Cycle Time	0	250	20	G, S
40142	55	40242	58	Relative Gain	0	100	10	G, S
40143	56	40243	59	Deadband	-32000	32000	0	G, S
				CALIBRATION				
40504	60	-	-	Input Error Status Register (See COILS TABLE for bit definitions)	N/A	N/A	N/A	G
40505	61	-	-	Checksum Error Status Register (See COILS TABLE for bit definitions)	0	N/A	0	G, S

DLCN DeviceNet SUPPORTED ATTRIBUTES, Setpoint Controller Model Only

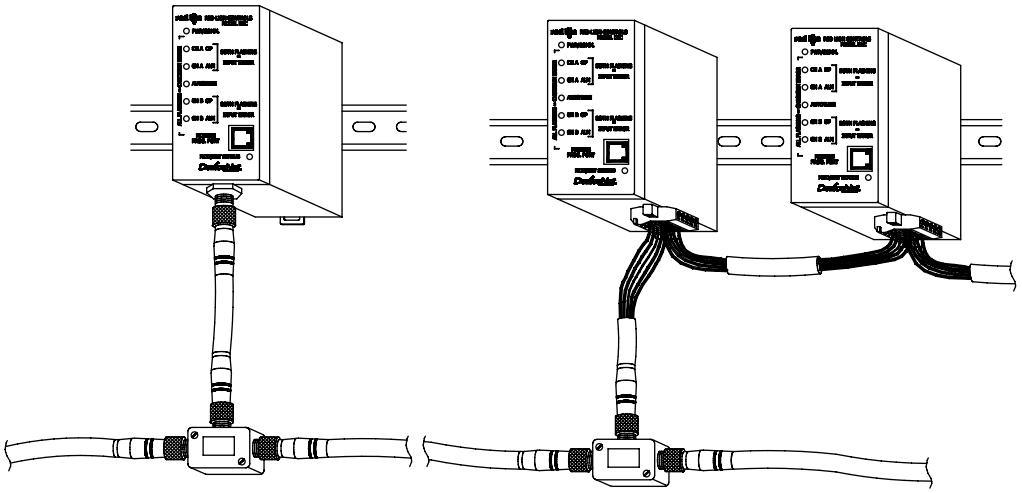
REGISTERS				REGISTER NAME	LOW LIMIT	HIGH LIMIT	FACTORY SETTING	SERVICE CODES SUPPORTED
CHA		CHB						
Modbus Register	Attribute	Modbus Register	Attribute	SETPOINT CONTROLLER PROFILE SEGMENTS - SETPOINT CONTROLLER MODEL ONLY				
40601 to 40620	62-81	40701 to 40720	122-141	Setpoint Value Segment 1-20	-32000	32000	-	G,S
40621 to 40640	82-101	40721 to 40740	142-161	Ramp Rate Segment 1-20	0	32000	-	G, S
40641 to 40660	102-121	40741 to 40760	162-181	Hold Time Segment 1-20	0	9999	-	G, S

COILS TABLE (Cross-Reference to attributes 60 and 61)

COIL ADDRESS		COIL NAME	MIRROR REGISTER	SERVICE CODES SUPPORTED
1		Calibration Checksum Error	40505 (bit 0)	G, S
2		Parameter Checksum Error	40505 (bit 1)	G, S
3		Integral and Offset/Manual Power Checksum Error	40505 (bit 2)	G, S
CH A	CH B			
5	17	Shorted RTD Input Error	40504 (bit 0 / 4)	G
6	18	Open Thermocouple, RTD, or Extreme Process Input Over/Under Range Input Error	40504 (bit 1 / 5)	G
7	19	Signal or Sensor Under Range Input Error	40504 (bit 2 / 6)	G
		Process Value (<-32000) Under Range Input Error	40504 (bit 2 / 6)	G
8	20	Signal or Sensor Over Range Input Error	40504 (bit 3 / 7)	G
		Process Value (>32000) Over Range Input Error	40504 (bit 3 / 7)	G

CONNECTION OPTIONS

M12 **COMBICON**



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