User's Guide

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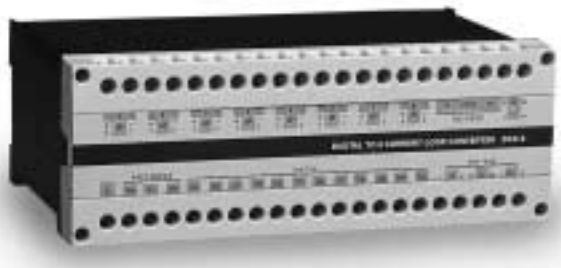

DRA-DCC-8
DIGITAL TO 8 CURRENT LOOP CONVERTER

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Contents

1. MOUNTING INSTRUCTIONS

The DRA-DCC-8 is designed for standard DIN rail mounting.

Place the unit on the upper part of the mounting rail with the fastening tab facing down. Using a suitable flat screwdriver loosen the tab slightly and attach the unit to the rail. Once the tab is loosened, ensure that the unit is fastened securely in place.

2. REPLACING FUSES

In order to replace a blown fuse, the unit has to be disassembled, as follows:

a. Take off both terminal strips by removing the four screws at the edges.

Note: This does not require disconnecting the cables connected to the strips.

b. Remove the front panel using a suitable flat screwdriver. Press down gently on the plastic springloaded tabs located in the slots either side of the unit.

c. Disconnect the flat connector which couples the LED circuit on the front panel.

d. Replace the blown fuse.

WARNING: Never install a fuse rated more than 800mA

3. ASSEMBLY

The DRA-DCC-8 unit includes two printed circuit cards designated as P.N 7041 and P.N 7040. The two printed circuit cards should occupy the slots in the enclosure according to fig 1.

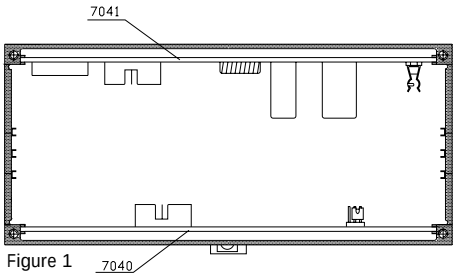

Figure 1

Insert the two printed cards into their slots. Connect the flat cable between them. Connect the front panel flat cable. The panel must be inserted into the grooves on both sides of the case while pressing down until a distinct "click" is heard. Assembly is completed by laying the terminal strips in place.

Note: The terminal strips are polarized and must not be placed backwards.

4. SUPPLY VOLTAGE

The DRA-DCC-8 is powered by a DC power supply at a range of 15-32Vdc. In order to determine the minimum supply voltage, use the following equation:

$$Vmin = 8 + Rload(\Omega) * 0.02$$

where:

Vmin is the minimum required supply voltage.

Rload(Ω) is the maximum output load including the leads resistance.

Note: If Vmin turns to be less than 15V, the minimum required voltage should be 15 Vdc.

5. MODES OF OPERATION

The DRA-DCC-8 unit can be operated in several modes, determined by an internal array of 8 DIP switches as follows:

- 4-20 or 0-20mA output current mode
- Parallel control mode
- Serial control mode
- Self test mode

5.1 0-20 OR 4-20mA OUTPUT CURRENT MODE

Two current output spans are available: 4-20mA or 0-20mA selected by SW6. The DRA-DCC-8 receives 12 bits of data which determine the output current value. A channel data value of 4095 (FFF) is always interpreted as a 20mA output current. A channel data value of 0 (000) will produce a 0mA output current when SW6 is OFF, or 4mA when ON.

5.2 SWITCH SETTINGS

Parallel Control Mode

MODE	S1	S2	S3	S4	S5	S6	S7
0-20mA	OFF	OFF	X	X	X	OFF	OFF
4-20mA	OFF	OFF	X	X	X	ON	OFF

Serial Control Mode

BAUD RATE (BPS)	S1	S2	S3	S4	S5	S6	S7
300	OFF	OFF	UNIT ID CODE			ON=4-20mA	ON
4800	ON	OFF					ON
9600	OFF	ON				OFF=0-20mA	ON
19200	ON	ON					ON

SW5 MSB

Self Test Mode

MODE	S1	S2	S3	S4	S5	S6	S7
SELF TEST#1	ON	OFF	X			X	OFF
SELF TEST#2	OFF	ON	X			*	OFF
SELF TEST#3	ON	ON	X			*	OFF

* according to para #5.2

6. PARALLEL CONTROL MODE

MODE	S1	S2	S3	S4	S5	S6	S7
PARALLEL MODE	OFF	OFF	X			*	OFF

* according to para #5.2

In the parallel control mode, the DRA-DCC-8 unit is controlled via a 15 bit bus. Three Address bits (A0-A3) select the proper current output channel and 12 Data bits (D0-D11) determine its value (A0 and D0 are MSB). The DRA-DCC-8 microprocessor continuously scans the input vector (Address + Data) terminals and updates its memory tables upon recognizing a new vector. The unit is asynchronous in nature. The data should be valid for at least 160 microseconds.

6.1 PLC INTERFACE

The PLC's output modules can be divided into three popular types; TTL output module, 24Vdc sink type and 24Vdc source type.
There is a jumper selector on printed circuit card PN 7040 which selects between Sink/Source input. (TTL output module should usualy be considered as sink type). See figure 2.

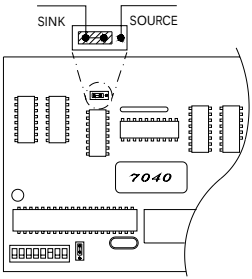

Figure 2.

6.2 THE "E" (ENABLE) TERMINAL

For E="1" the unit is enabled, which means that all input vectors are received and the output is updated. When E="0" the unit ignores any new input vector. The E terminal is recommended to be used as a strobe for parallel data which has a long setup time. In this case the following sequence is recommended: prior to applying a new vector, the E terminal should be set to logical 0 (inhibit state), then the new input vector should be imposed. Once the new data is set, the E terminal should be pulsed.
The E terminal is also used for multidrop configuration. The 15 bit vectors are applied to the units in parallel and the selection is carried out by controlling the "E" inputs.

7. SERIAL CONTROL MODE

7.1 RS232c / RS422 SELECT

he DRA-DCC-8 is equipped with two serial communication ports: The RS232c and the RS422. A jumper switch at the right side of the DIP switch array is used to select the required communication type. See figure 3.

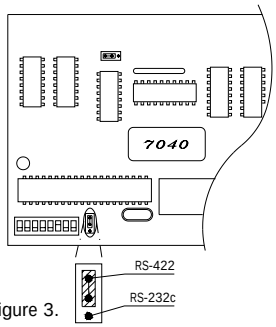

Figure 3.

7.2 RS422 TERMINATION

The SW8's ON state terminates the RS422 receiver terminals with a 100Ω load. In a multidrop configuration, the last (most distant) DRA-DCC-8 unit should be terminated in order to match the transmission lines.

Note: Only one termination load per RS422 communication link is permissible.

7.3 SERIAL CONTROL SWITCH SETTINGS

S1	S2	S3	S4	S5	S6	S7
BAUD RATE		ID CODE			*	ON

* according to para #5.2

7.4 SERIAL COMMUNICATION PARAMETERS

The communication protocol is 8 bit ASCII, even parity, and one stop bit.

7.4.1 BAUD RATE SELECT

SW1 and SW2 select one out of four available baud rates.

	SW1	SW2
300 BPS	OFF	OFF
4800 BPS	ON	OFF
9600 BPS	OFF	ON
19200 BPS	ON	ON

7.4.2 ID CODE

Up to eight DRA-DCC-8s can be connected in a multidrop configuration. Switches SW3, SW4, and SW5 (MSB) set the ID code.

7.4.3 COMMAND FORMATS

Three types of command formats are available:

- Without echo back
  The host computer sends a massage and does not receives an acknowledgment.
- With echo back
  The host computer sends a message and receives an acknowledgment stating the DRA-DCC-8 ID number and the addressed channel number.
- Status report

7.4.3.1. WITHOUT ECHO BACK FORMAT

[A] [ID CODE] [CHANNEL VALUE] [CR]

The character A begins the command block.
The second byte is the ID code (07). The third byte is the addressable channel number (07). Up to four bytes of a channel's value can be in BCD mode (0-4095). Leading zeroes can be omitted. The last byte is [CR] which must terminate the command block.

7.4.3.2. WITH ECHO BACK FORMATS

[C] [ID CODE] [CHANNEL VALUE] [CR]

This format differs only in the opening character. After every command block transfer, the DRA-DCC-8 echoes back the following:

[C] [ID CODE CHANNEL] [LF] [CR]

Note: If the value is omitted it will be treated as zero. Separators such as blanks or commas are not allowed.

Example:

Channel 4 in DRA-DCC-8 no. 7 has to receive the value of 981. Echo back is required The command format is:

[C] [7] [4] [981] [CR]

The echo back will be: C 7 4

Note: The channel numbers on the DRA-DCC-8 front panel are designated from 1 to 8, in binary they are designated from 0 to 7.

Note: When applying the echo back mode, it is advisable to wait for the echo back before transmitting a new command.

7.4.3.3 STATUS REPORT FORMAT

[S] [ID CODE] [CR]

The addressed DRA-DCC-8 unit will respond with the values stored in its eight channels. The response will start with S, ID code, following with eight channel values separated with commas and [LF] [CR] as terminators.

Example:

DRA-DCC-8 unit number 3 has the following stored data: ch1: 300, ch2: 1270, ch3: 0, ch4: 4087, ch5: 2099, ch6: 764, ch7: 3078, ch8: 550. The response from the device will be:

S3,300,1270,0,4087,2099,764,3078,550 [LF] [CR].

Note: Wait until the status report has terminated before transmitting new commands.

8. SELF TEST MODES

The DRA-DCC-8 is provided with three test modes.

MODE	S1	S2	S3	S4	S5	S6	S7
SELF TEST#1	ON	OFF	X			X	OFF
SELF TEST#2	OFF	ON	X			*	OFF
SELF TEST#3	ON	ON	X			*	OFF

* according to para #5.2

8.1 SELF TEST #1 (Communication Ports Test)

In order to test the serial communication ports, this test mode converts the unit to a transponder for ASCII characters. Any transmitted character will be echoed to the host terminal. The host parameters should be set to:

Baud rate : 4800, Word length: 8 bits, Parity: even, Stop bit: 1

8.2 SELF TEST #2 (Same Leve)l

In this test mode, the DRA-DCC-8 unit ignores the address field. All the outputs are set according to the data field only.

8.3 SELF TEST #3 (Saw Tooth)

In this test mode, only one output channel (according to the address setting) will produce a saw tooth wave form in which the whole value range is used.

9. MULTIDROP CONFIGURATION

Up to eight DRA-DCC-8 units can be installed in a multidrop configuration using the RS422 communication port.

The controller's RS-422 transmitter is connected to the units' receivers while the controller's RS-422 receiver is connected to the units' transmitters.

As the communication cable might be several thousand feet long, it is necessary to terminate the end of the line with its characteristic impedance in order to avoid reflections in the transmission line causing data distortion. SW8 in its ON state terminates the Rx inputs with a 100Ω load.

10. PUTTING THE UNIT INTO OPERATION

The DRA-DCC-8 is supplied with a set configuration for parallel control mode. The DIP switch setting is:

MODE	S1	S2	S3	S4	S5	S6	S7
PARALLEL 4-20mA	OFF	OFF	OFF	OFF	OFF	ON	OFF

The communication port selector (see para #7.1) is set to RS232C.

The unit should be set up according to the required configuration.

Before applying voltage to the unit see para #4 for power supply consideration.

The channel LEDs are connected in series with the output current so that they will light only as an indication of a closed current loop.

Note: After every power on, the unit is reset and the initialized default output currents are according to the SW6 setting (see para #5.2).

In the parallel control mode, internal pull-up resistors on each of the input terminals keep them in logical 1 state. The unit will recognize input voltage up to 0.5V as logical 0 and voltages from 4V to 60V as logical 1.

11. DRA-DCC-8 CALIBRATION

Generally there is no need to calibrate the DRA-DCC-8 unit. However if calibration is required, the following steps should be carried out: Two potentiometer trimmers, one for "Zero" and the other for "Span" are located on printed card 7040. The trimmer close to the card edge is the "Zero". Use the following switch setup for switching all the outputs between 4 and 20mA

MODE	S1	S2	S3	S4	S5	S6	S7
ALL CH. = 4mA	OFF	OFF	X	X	X	ON	OFF
ALL CH. = 20mA	OFF	ON	X	X	X	ON	OFF

Note: Set the unit to sink mode (fig.2).

Step 1:

Select one channel (for example ch.#1) for the initial tuning. Set the DIPswitch array to "all 4mA".
Apply supply voltage to the unit. The initial state of all the output currents is 4 mA. Use SW2 to switch all the outputs between 4 and 20mA. Iteratively set the "Zero" and the "Span" trimmers for 4.00mA and 20.00mA.

Step 2:

Monitor all the 8 channels in 4mA state, and calibrate the Zero trimmer so that their average readings is 4.000mA.
Then repeat for 20mA state, and calibrate the Span trimmer so that their average readings is 20.000mA. This procedure should be repeated until calibration is satisfactory.

12. SPECIFICATIONS

INPUTS: PARALLEL INPUTS	Parallel & Serial control inputs 3 - Output current loop address 12 - Output current value (Data) 1- Enable (E)
LOGIC LEVELS:	0<"0"<0.5V, 4 <"1"< 60V
DATA HOLD TIME:	160 microsecond
MAXIMUM PARALLEL INPUT RATE:	6000 updates per second
SERIAL COMMUNICATION	RS232c full duplex RS422 full duplex
BAUD RATES:	300, 4800, 9600, 19200 BPS
PARITY:	Even
STOP BIT:	One
STATUS REPORT:	Reports as interrogated
MULTIDROP CAPABILITY:	Up to eight units
OUTPUTS: OUTPUT CURRENT SPAN: OUTPUT CURRENT SETTLING TIME:	8 continues current loops 0-20mA or 4-20mA (user selected) 4.2 ms max. for 99% of step
POWER SUPPLY:	15-32 Vdc (regulated)
CURRENT CONSUMPTION:	85mA max.
MAXIMUM LOOP RESISTANCE:	According to Rmax(KΩ)= (Vsupply -6)/20
ACCURACY:	±0.1% of span typical, ±0.2% of span max.
RESOLUTION:	0.025% of span typical,0.05% of span max.
INDICATORS:	Yellow Power On LED 8 Red output channel LEDs
AMBIENT TEMPERATURE Operation: Storage:	 -10 to 60 °C (14 to 140 °F) -25 to +85 °C (-13 to 185 °F)
RELATIVE HUMIDITY:	5 to 95%, non condensing
HOUSING Box: Terminals:	Plastic Polycarbonate According to IP 50 DIN 40050 According to IP 20 DIN 40050
MOUNTING:	Standard DIN rail
FUSE:	630mA fast blow (5x20mm)
WEIGHT:	0.7Kg (1.5 lb.)
DIMENSIONS:	73.2H x 200W x 121mmD (2.88"x7.88"x4.76")

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