

Data Acquisition Networks

Installing and Configuring the DM01 Hardware



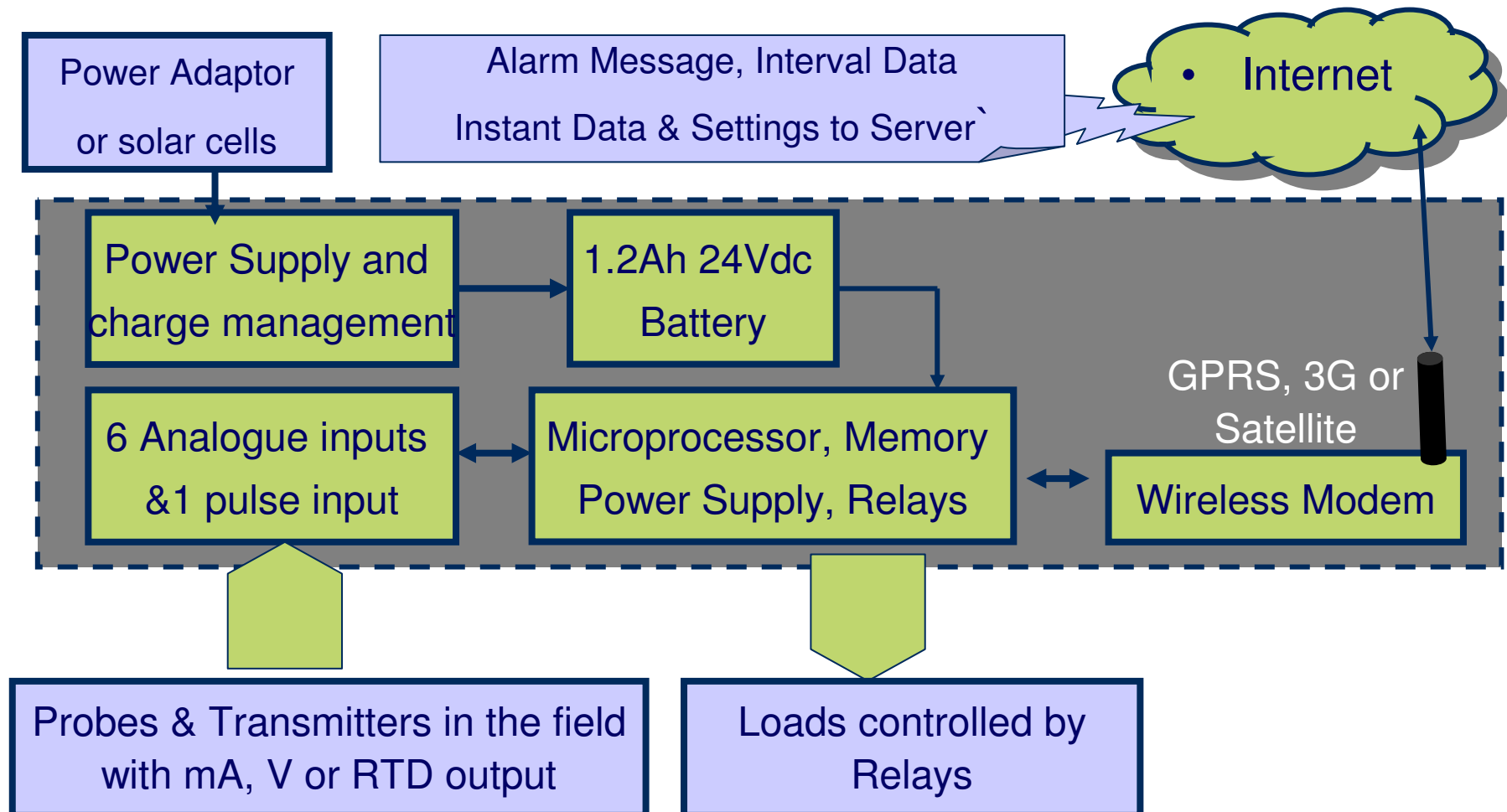
What is the DM01?

- D.A.N developed the DM01-201 to capture 6 analogue measurements and 1 pulse count in the field.
- The Average, Maximum and Minimum of each analogue measurement is determined and updated every second
- The DM01 stores these measurements temporarily and transmits them wirelessly to the D.A.N. Web-server via the internet at user defined intervals (e.g. once per 20 minutes)
- The DM01 can provide local alarm indication or simple control locally as well as transmitting the alarm states to the web-server as soon as they arise.
- The DM01 has an on-board power management system that is powered by a power pack or solar panels depending upon the application.
- The power management system maintains the charge in the 24Vdc lead acid battery which provides the DM01 with uninterrupted power
- The DM01 is in an IP65 enclosure making it suitable for mounting indoors and outdoors, even on buoys in rivers or estuaries.

DM01 Hardware Summary

- 6 analogue inputs set individually to mA, V or RTD direct
- 1 pulse input counter settable to count seconds or pulses
- Analogue Input 1 has inbuilt totaliser
- 3 relays which can be associated with any alarm condition
- 2 alarms per input, counter and totaliser
- Built in GPRS/GSM or 3G modem
- 24V lead acid battery to run system
- Can be charged by mains adapter or solar power
- Housed in IP65 enclosure with hinged lid

Block Diagram of the DM01-201



Installing the DM01

- The DM01 should be installed in the most logical location taking into account the degree of difficulty, the communications, the distance from the probes and access to power (to operate the battery charger)
- If communications are a bit patchy check the location to ensure that a good signal is present for the mobile communications using a normal GSM or 3G phone as long as it's on the same service as the modem.
- Occasionally the service provider might not have implemented GPRS in an area even if GSM is present. If in any doubt, speak to the service provider
- If the signal is generally weak (less than 2 bars on a 5 bar scale) then an external antenna can be fitted. Speak to DAN about ordering this accessory

Installing the DM01 continued

- Install the DM01 using the 4 screw holes on the outside 4 corners of the box. Do not drill fixing holes through the inside of the box anywhere inside the gasket protected area
- Bring cables into the DM01 via cable glands preferably mounted in the underside of the box body. Make sure that the cable glands tighten down onto the cable to form a good airtight seal. If not then use PVC tape on the cable to increase its diameter where it passes through the cable gland
- Since the signal lines are all low voltage and low current, the cables do not need to be heavy duty. 1.5mm² multi-strand would be more than adequate. It is always good practice to use cables with an overall shield

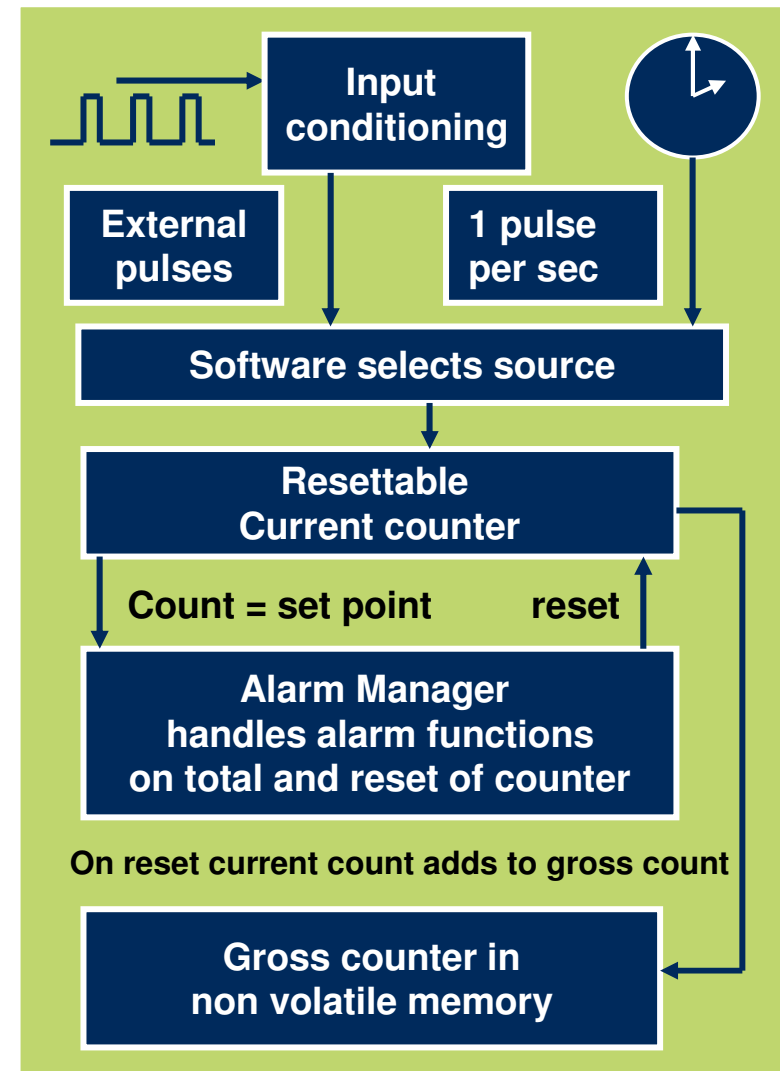
DM01 Analogue Input Features

- 6 Inputs accept mA, V and RTD direct
- All common industrial milliamp and voltage ranges accepted
- RTD standard range is -25 to +125 °C
- If spare, input 5 can be connected to the on-board battery voltage monitoring terminal



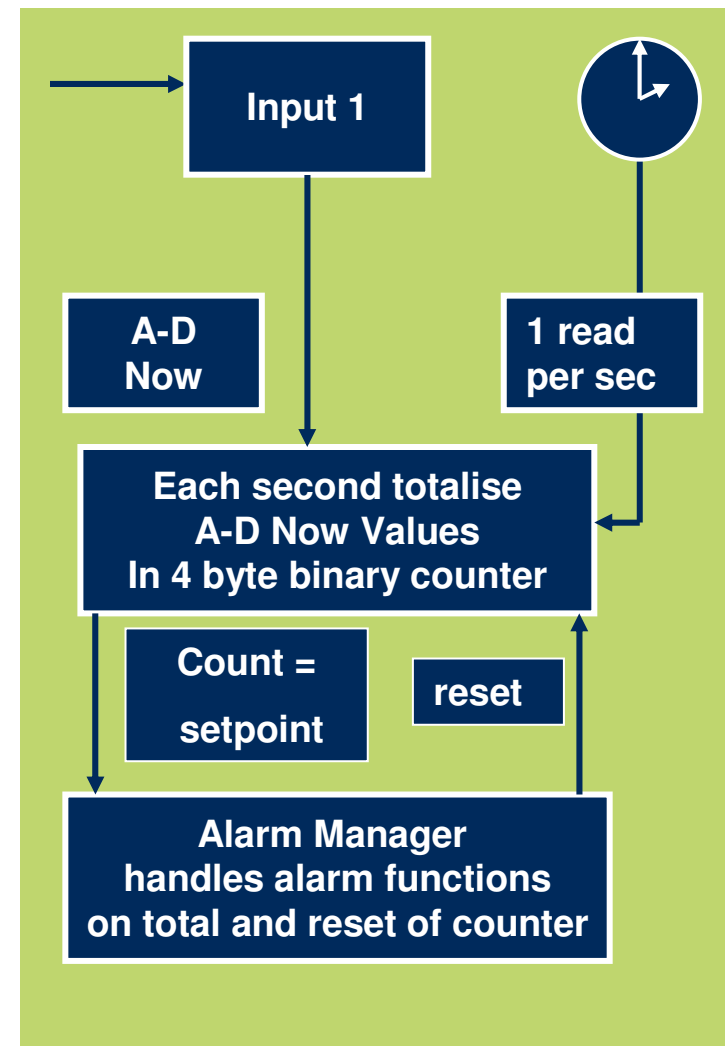
DM01 Digital Input

- Can count external pulses or seconds
- Count up to 4kHz without missing pulses
- Two set-points on total for batching quantities or measuring elapsed time
- Two counters
- Resettable current counter in RAM
- Non resettable gross counter in non volatile EEPROM
- Resettable counter's value transfers to gross counter on reset
- Reset can be configured to occur from any alarm condition or via web-server command
- Resettable counter can reset itself and thus transfer its total to the accumulating gross counter every time the set point is reached



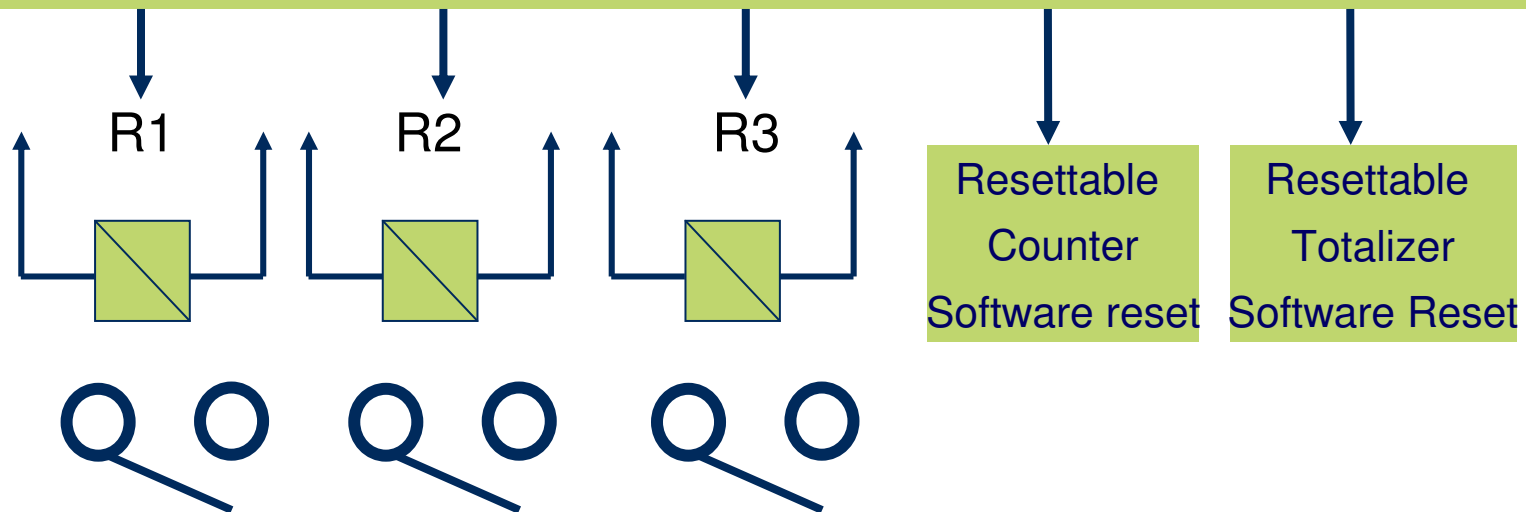
DM01 Totaliser

- **Totalises input 1 if selected**
- **Reads A-D value of input 1 and adds it to the binary counter once per second**
- **Will totalise for 47 days at maximum flow rate before counter overflows.**
- **2 set-points for batching as per standard configuration.**
- **Website calculate the actual flow from the start and end values of the counter each reporting period taking into account calibration values recorded on the website**



Local DM01 Alarms

- 2 alarms per analogue input allow local control
- 2 alarms on counter/timer allow local control
- 2 alarms on totaliser allow local control
- Any of these 16 alarms can be configured to act on any of the relays R1, R2, R3
- Any of the Alarm conditions can also be configured to reset the digital counter/ timer and the analogue totaliser



Alarm Messages by SMS and Email

- These messages are NOT generated by the DM01 units but by the web server. The alarm set points and all other parameters are downloaded and synchronised to the DM01 by the web server automatically during any communication between them.
- SMS messages are sent via Redcoal, a company that DAN has contracted to provide our clients with SMS to anywhere in the world at a rate of approximately 20c per SMS (+GST if applicable) 5 phone numbers can be entered into the system
- The DAN web server sends emails free to any of 5 email addresses including web-enabled mobile phones

The GSM or 3G Modems

- The DM01 main board has a serial communications plug that connects to a GSM or 3G modem.
- The Modem is in packet mode only while it is transmitting and receiving data from the web server.
- At the time of each transmission, the web server will let the DM01 know if there are any settings that have changed.
- The new settings are then downloaded to the DM01 before the communications socket closes again.
- When communications are complete, the modem closes the socket and switches back to GSM mode.

GSM and 3G Modems (cont.)

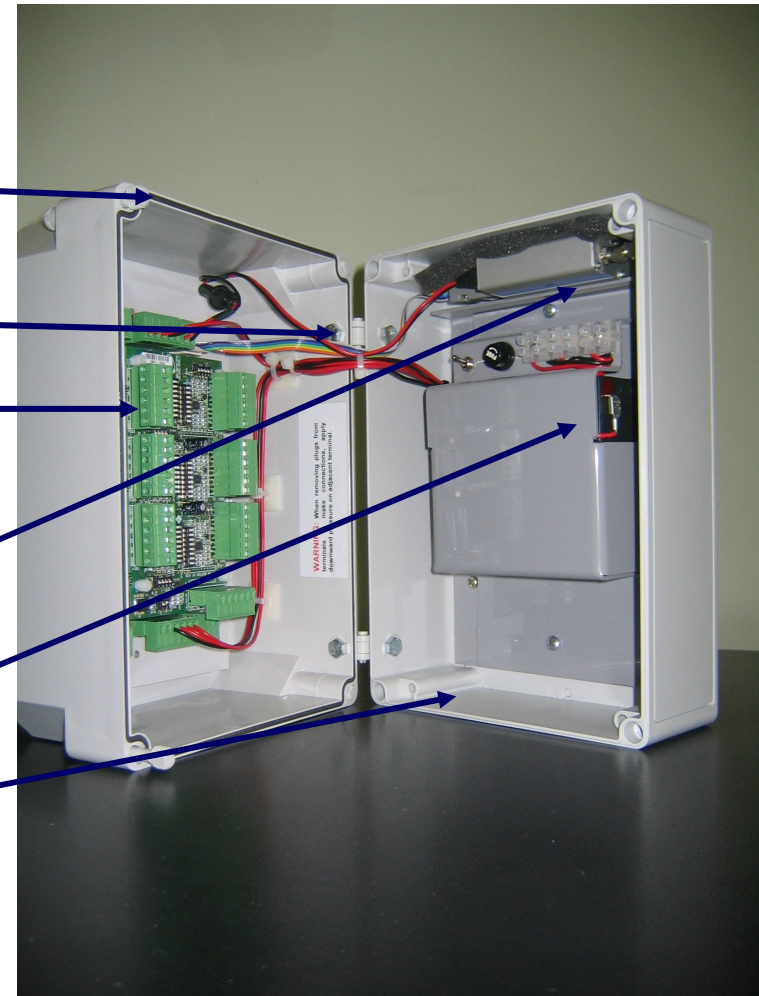
- The modem can then be dialled.
- The DM01 recognises the incoming ring, stores the emanating caller number and counts the number of rings.
- If it counts 2, 3 4 or 5 rings it will grab the latest measurements and send them as instantaneous data to the web server together with the caller id.
- The web-server checks the caller id and if it is registered against that DM01 serial number, it will send the instantaneous data to that caller id via SMS.
- Note that even if there is no SMS service implemented, the data still is present on the web server and can be viewed using Data Search.

Power Supply

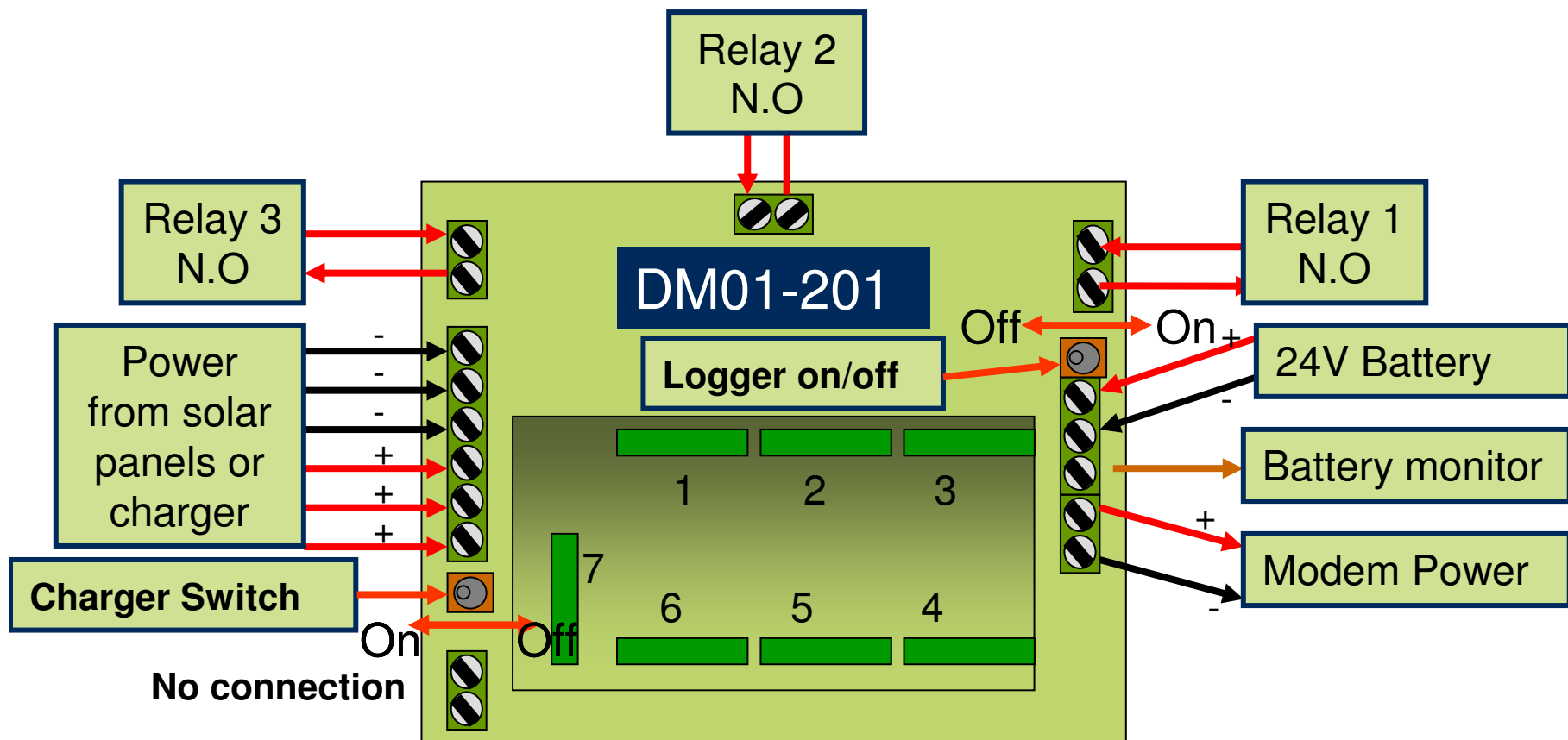
- The DM01 has two sealed 12V lead acid batteries which would run it for between 24 and 60 hours depending upon usage if there was no recharging.
- An isolated charging circuit is included on the main board that can be powered from solar panels or a mains adapter, (10 – 50 VDC).
- As standard a unit without solar power is provided with a 12V plug pack that is connected to any one of the 3 charging input power pairs.)Select one + terminal and one – terminal. Make sure the polarity is correct or there will be no charging
- As noted earlier battery voltage can be monitored if there is a spare input.

DM01 Construction

- Enclosure is suitable for outdoors and is IP65 rated
- It has a hinged lid.
- The electronics circuit is mounted in the lid for easy access to the terminals.
- The modem clips into a bracket mounted on the gear-plate.
- The batteries sit in a recess under a plastic cover
- Space for 10 cable glands to bring in cables through the bottom of the enclosure



DM01 Main Board Connections

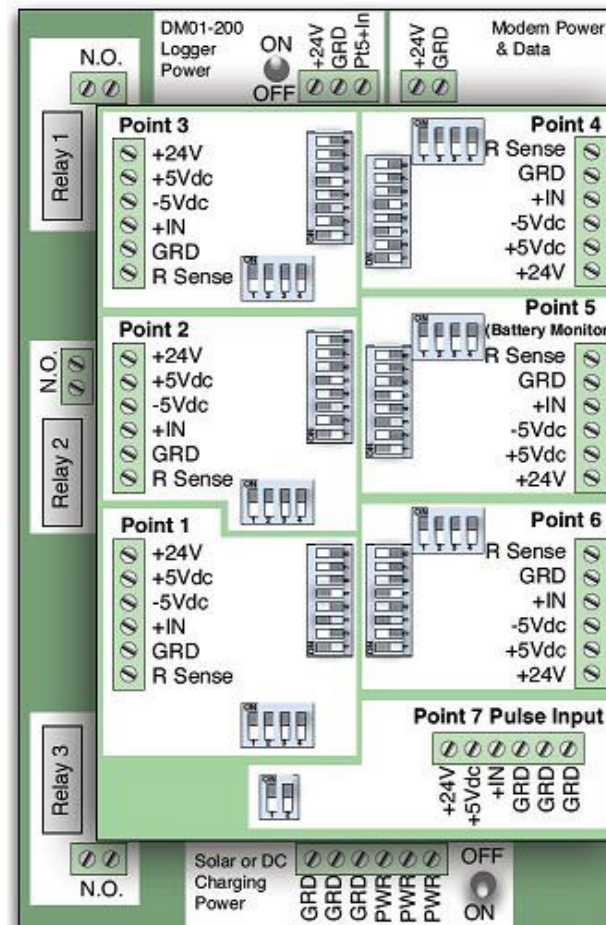


Switch Settings for DM01 Analogue Inputs

Signal	mA, V								Pt100 RTD			
	1	2	3	4	5	6	7	8	1	2	3	4
0-20mA/4-20mA	0	1	0	1	X	1	1	1	0	0	0	0
0—5V/1-5V/0-10V	0	1	0	1	X	0	1	0	0	0	0	0
pH/ORP/-2 to +2V	0	0	1	1	X	1	1	0	0	0	0	0
0-4V	0	1	0	1	X	1	1	0	0	0	0	0
-10 to +10V	0	0	1	1	X	0	0	0	0	0	0	0
-25 to +125oC	0	0	0	0	x	0	0	0	1	1	1	1

DM01 Terminals Designation

- This diagram provides a good overall view of the input and output terminals of the DM01



Setting Up the Inputs to the DM01

- Set the switches on the daughter board to the correct settings .
- Then connect up the inputs as appropriate



Terminal Connections for DM01 Pulse Inputs

Terminal numbers	1	2	3	4	5	6
Type of Input	+24Vdc	+5Vdc	Input	GND	GND	GND
24V Solid State Sensor	+	N/C	Output	0V	N/C	N/C
Contact closure	N/C	N/C	A	B	N/C	N/C
Voltage Pulse	N/C	N/C	A	B	N/C	N/C

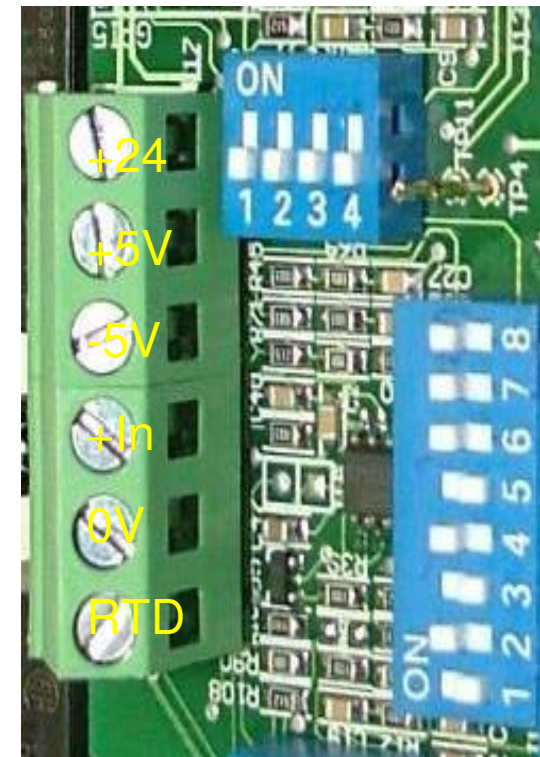
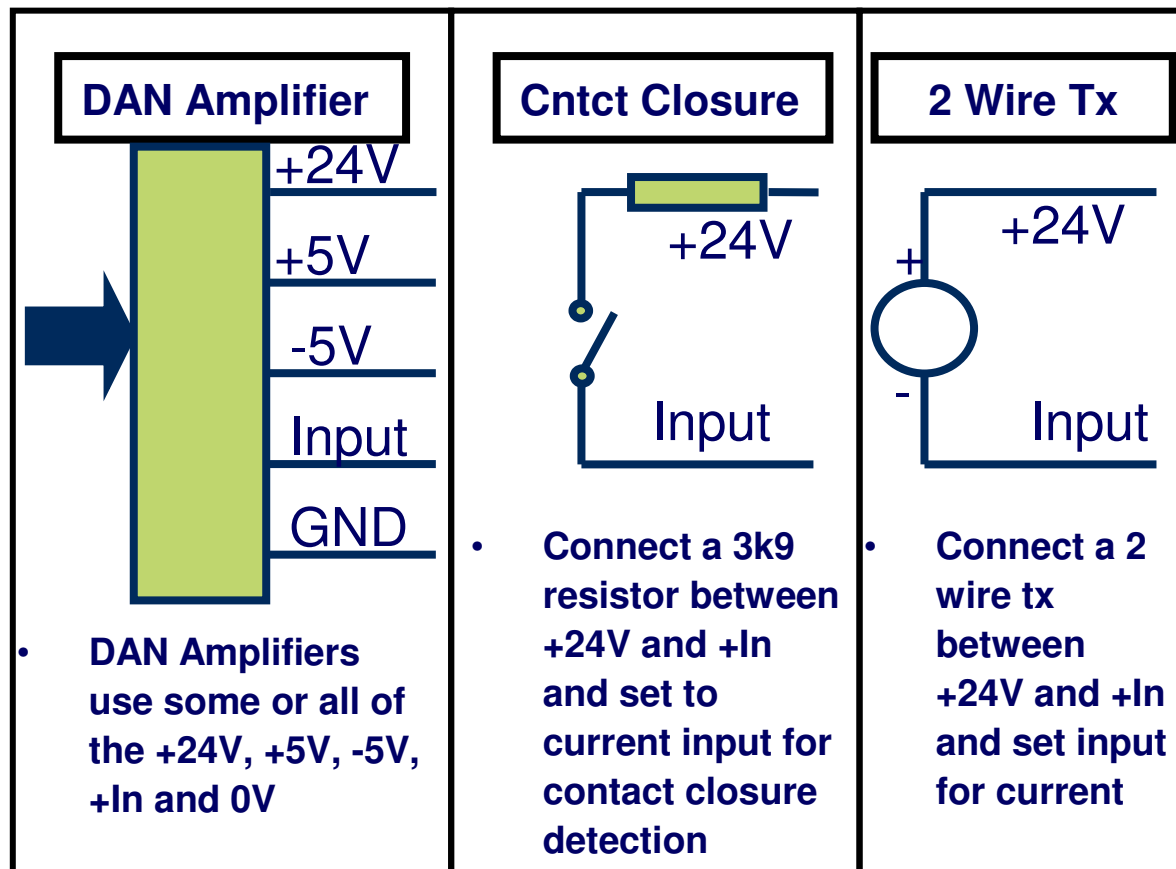


Terminal Connections for DM01 Analogue Inputs

Terminal numbers	1	2	3	4	5	6
Type of Input	+24Vdc	+5Vdc	-5Vdc	+In	GND	RTD
Two wire tx	+ of TX	N/C	N/C	- of TX	N/C	N/C
Current or voltage source	N/C	N/C	N/C	+In	0V	N/C
RTD 2 wire	N/C	N/C	N/C	A	B	Link to 5
RTD 3 Wire	N/C	N/C	N/C	A	B	B Sense
External DAN Amplifier	N/C	+V	-V	Signal	0V	N/C

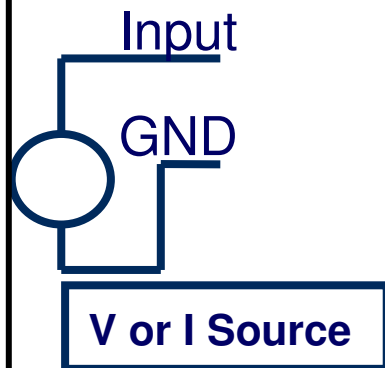


DM01 Analogue Input Connections 1

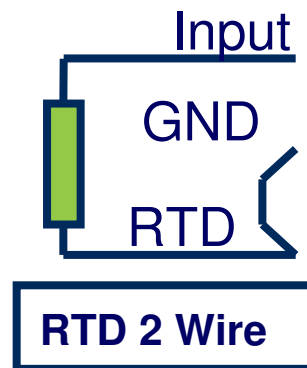


DM01 Analogue Input Connections 2

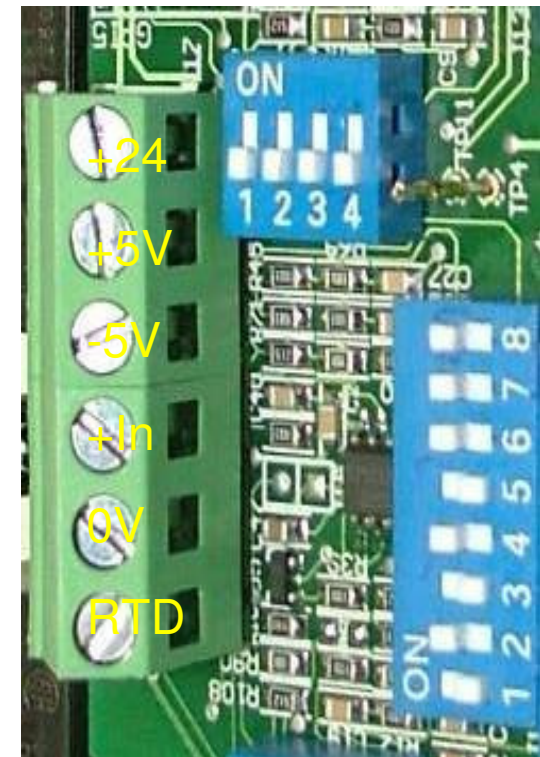
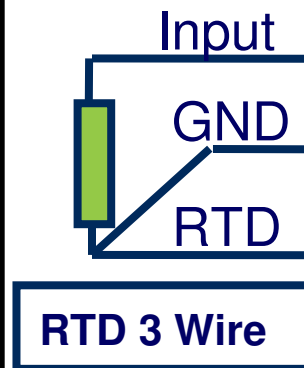
- Connect a voltage or current source between +In and 0V



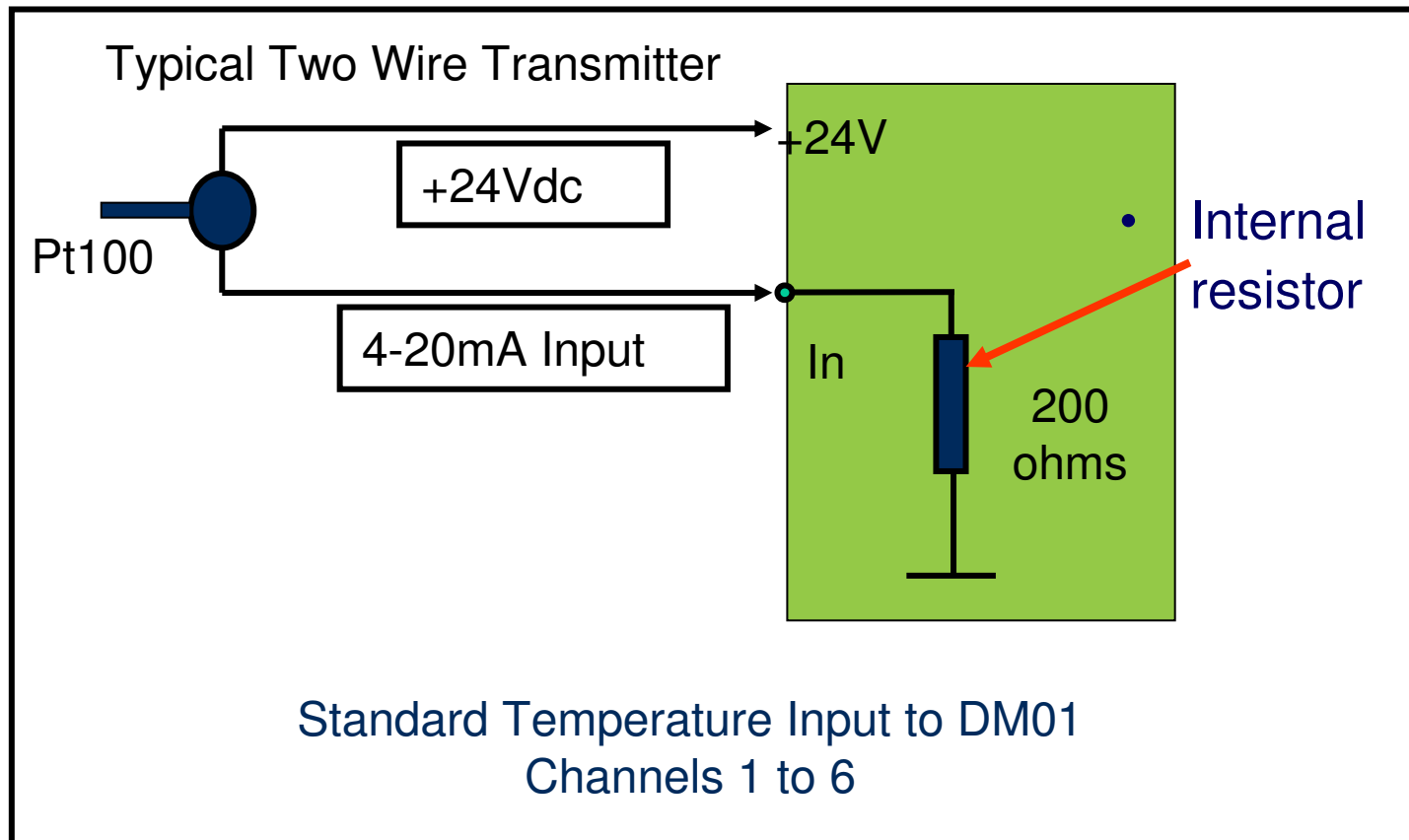
- Connect an RTD between +In and 0V and link RTD and 0V



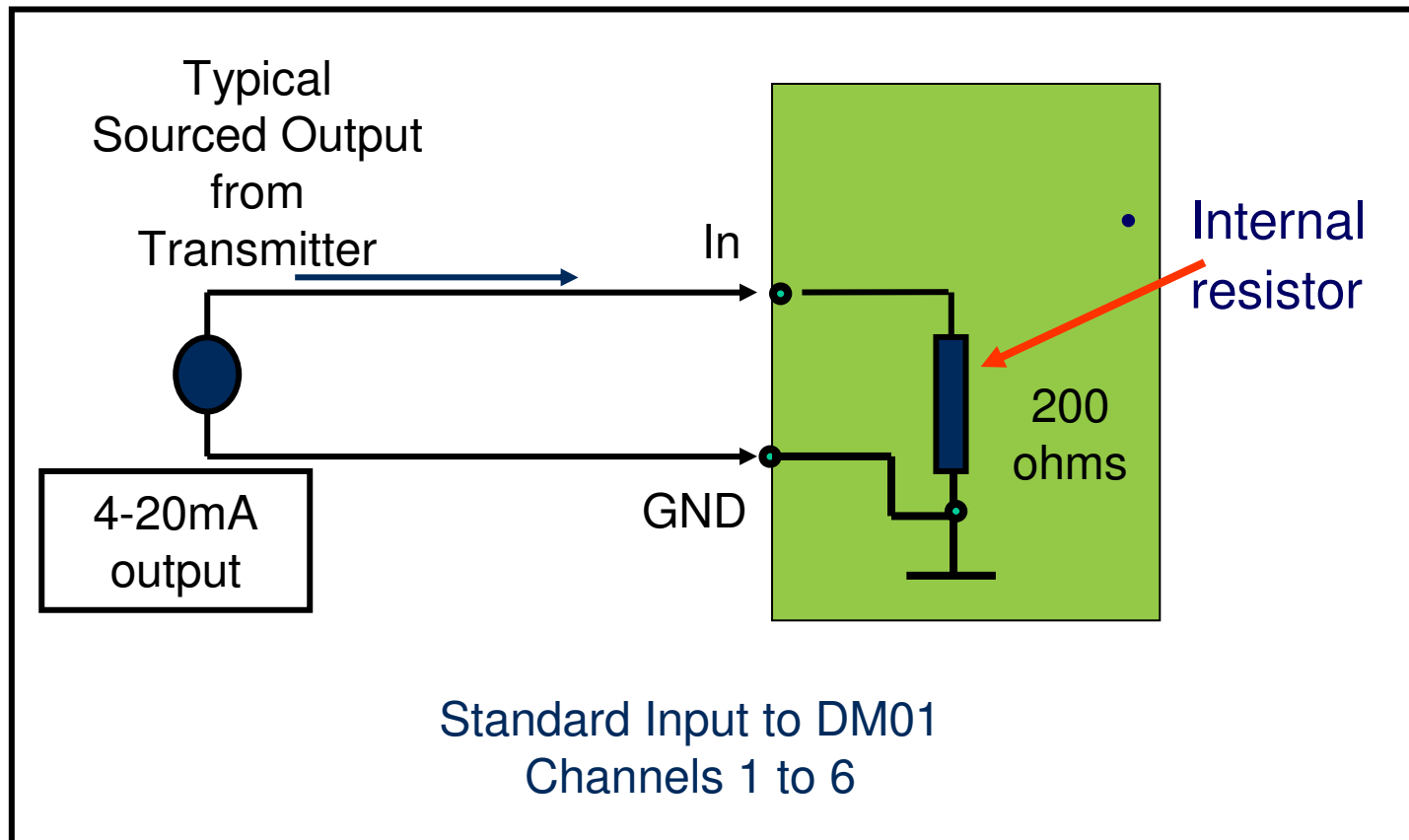
- Connect an RTD between +In and 0V and the lead length compensation wire to RTD



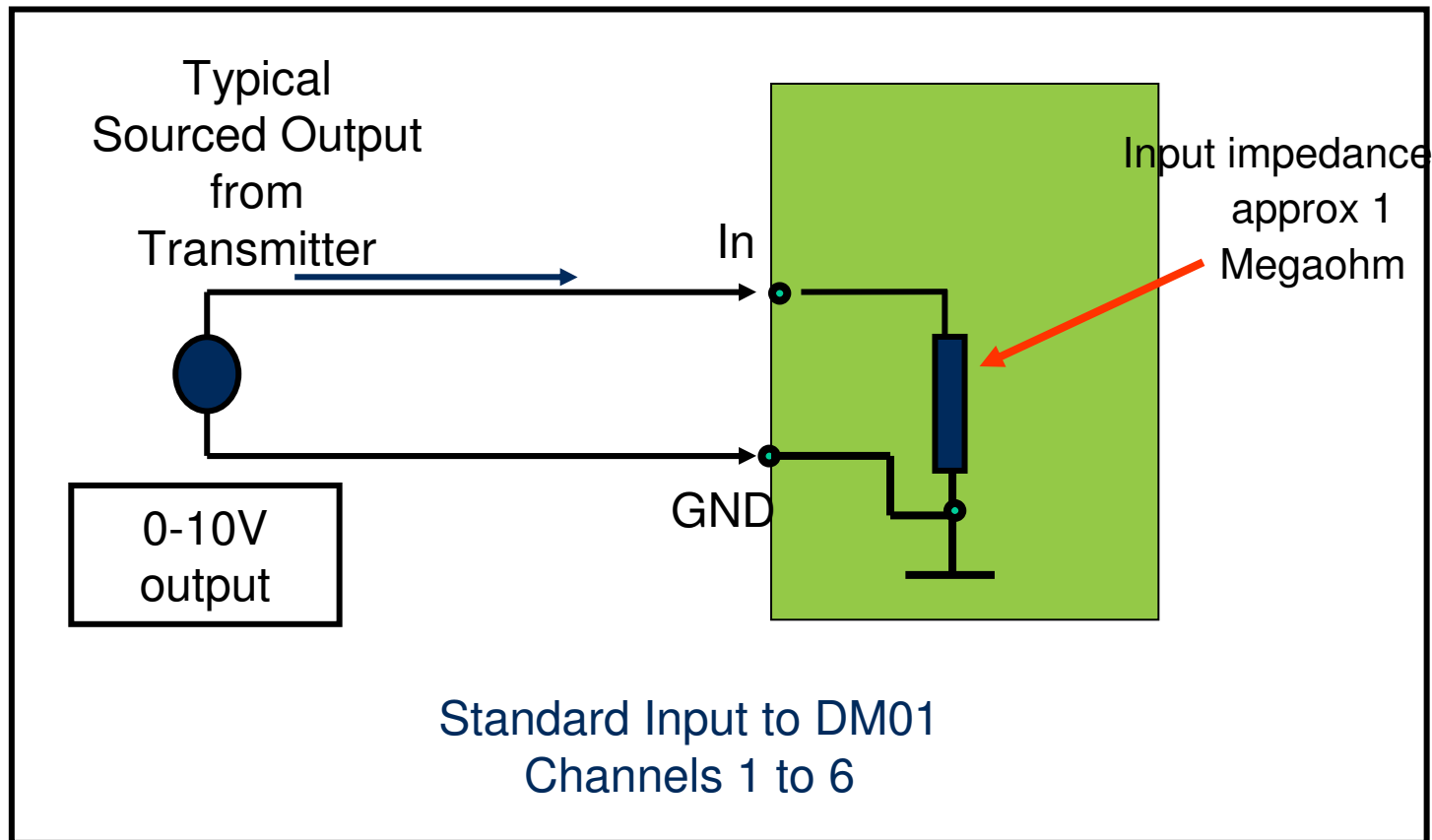
Connecting a Two Wire Transmitter to a DM01



Connecting a Sourced Current Transmitter to a DM01

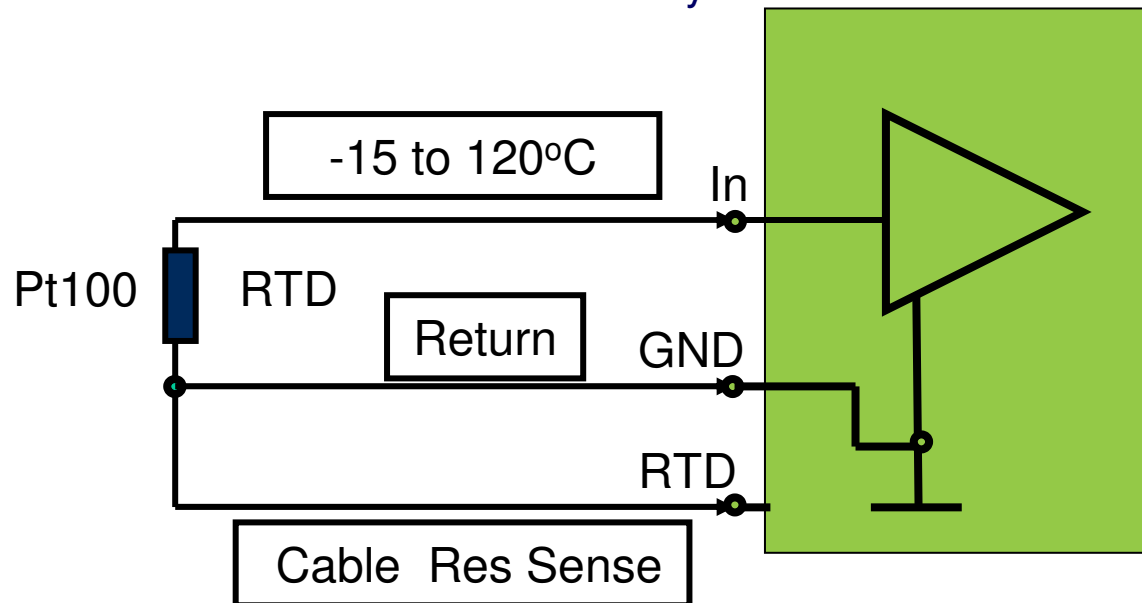


Connecting a Sourced Voltage Transmitter to a DM01



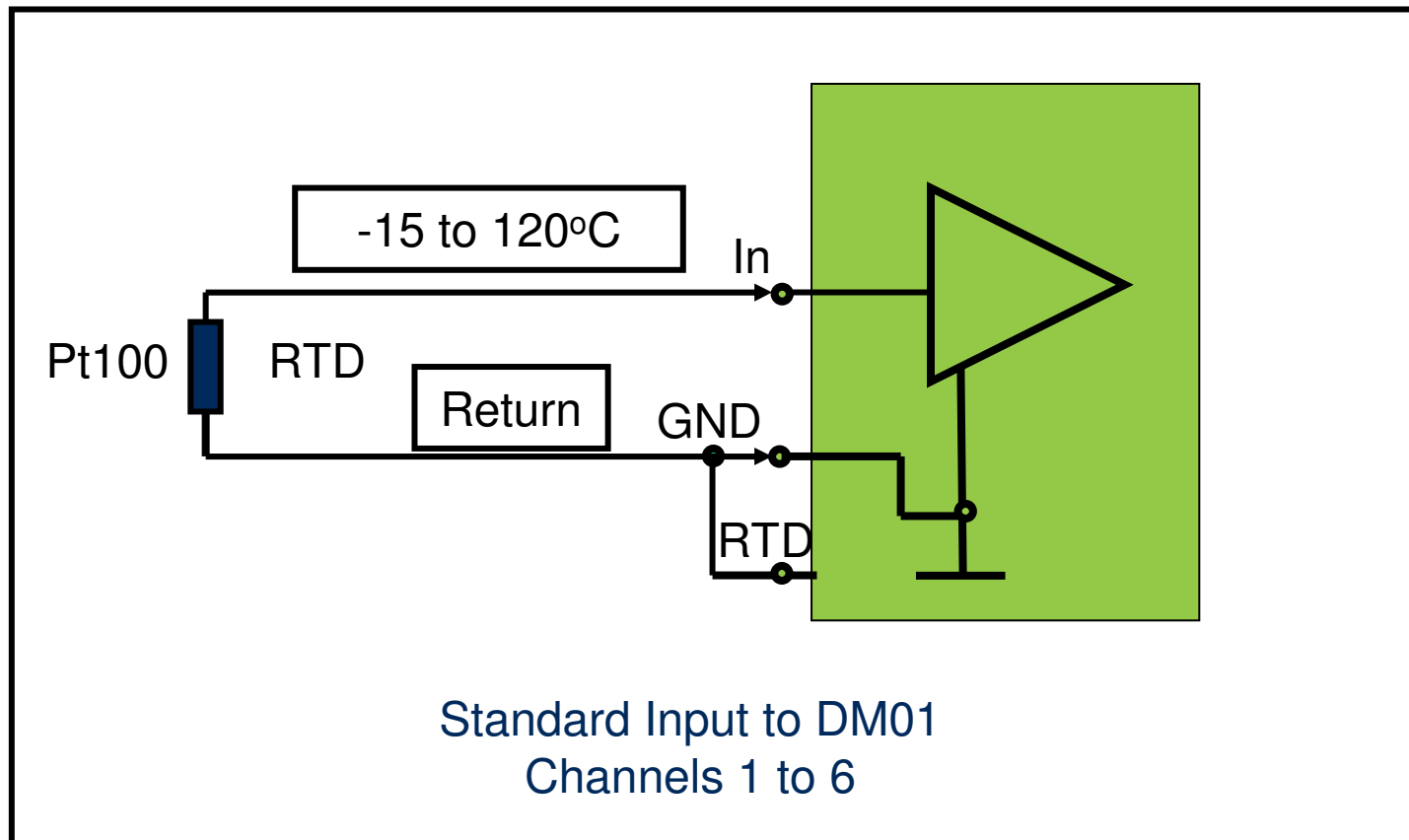
Connecting a 3 Wire RTD to a DM01

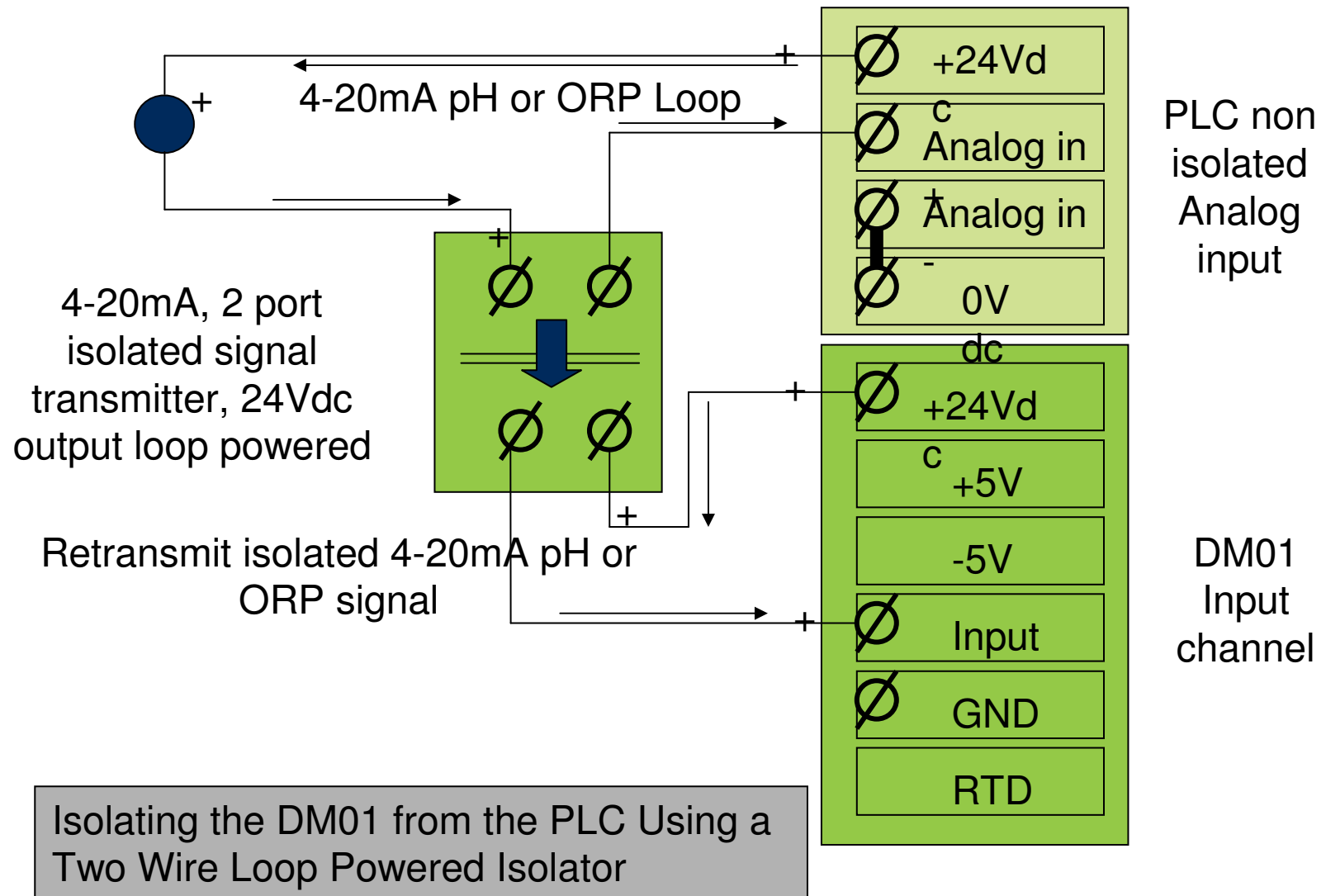
Turn on each channel of the 4 way DIP switch for that channel. Turn off all of the 8 way DIP switches

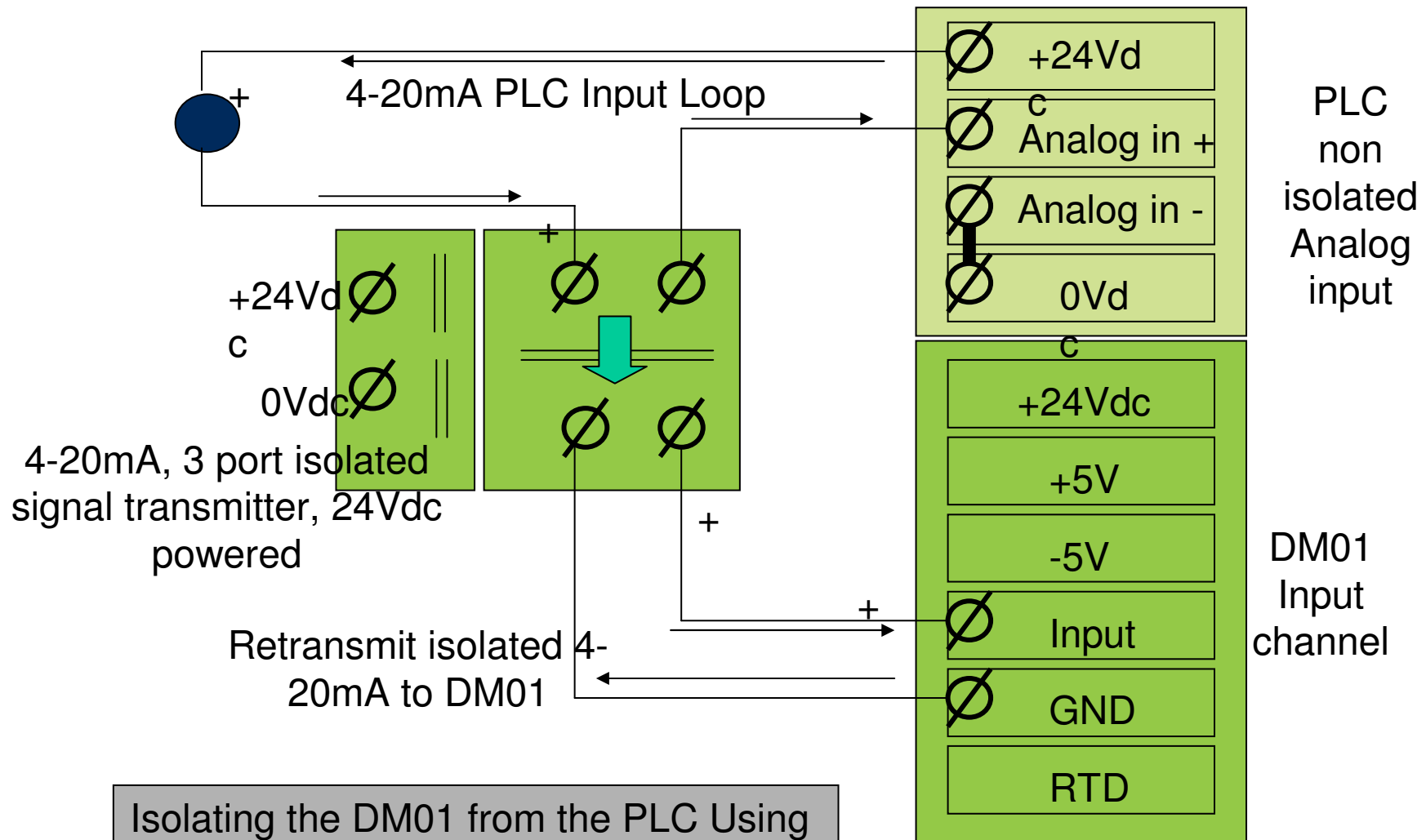


Standard Input to DM01 Channels 1 to 6

Connecting a 2 Wire RTD to a DM01

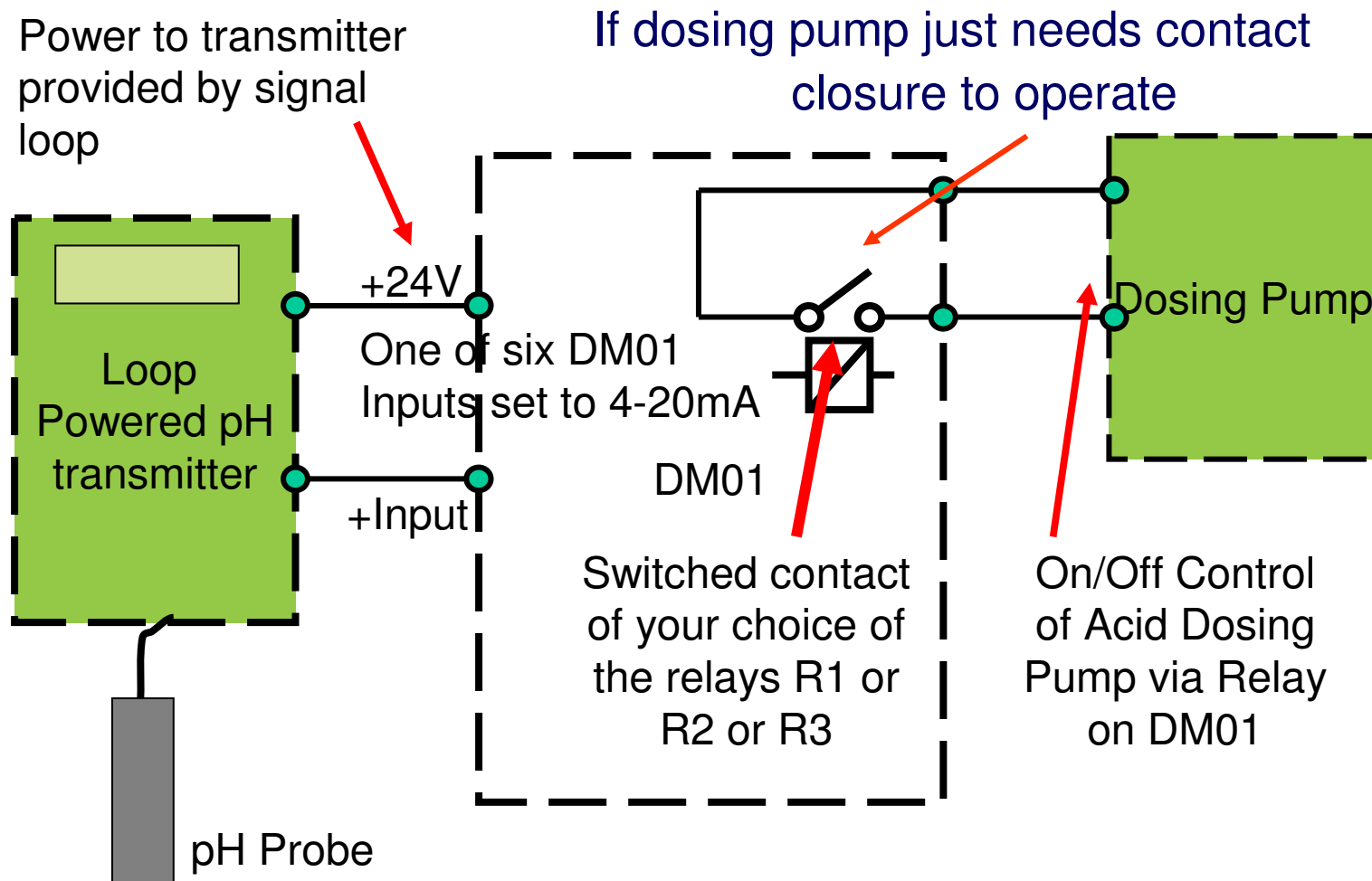




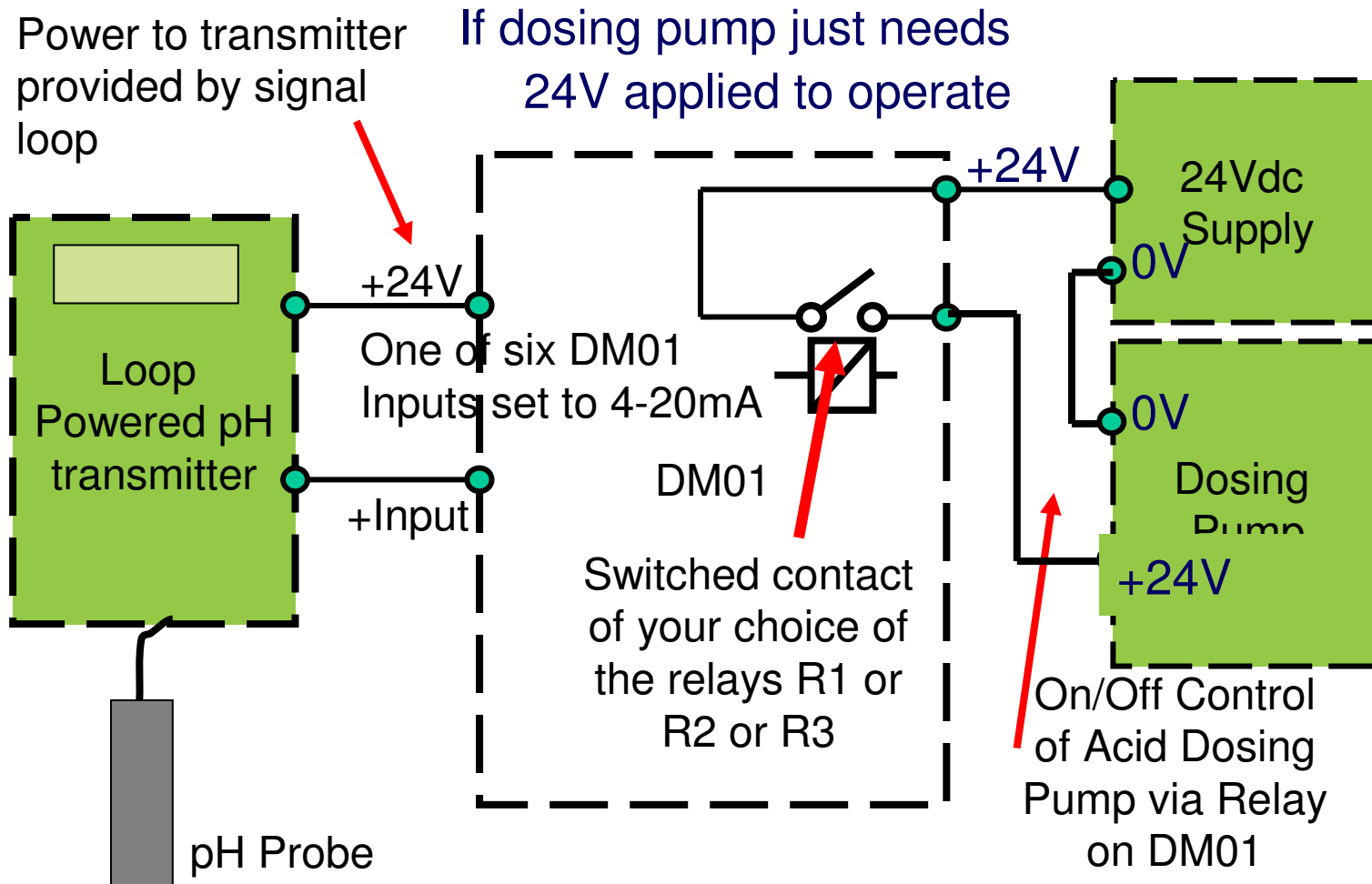


Isolating the DM01 from the PLC Using a 3 Port Isolated Transmitter

Example of Using DM01 to Control Acid Dosing and Log Data

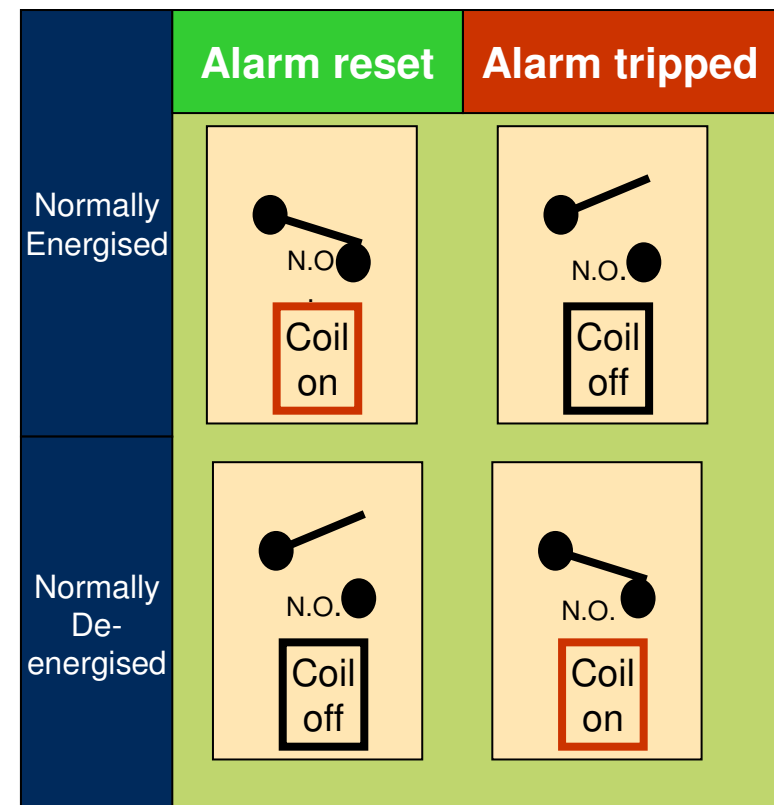


Example of Using DM01 to Control Acid Dosing and Log Data

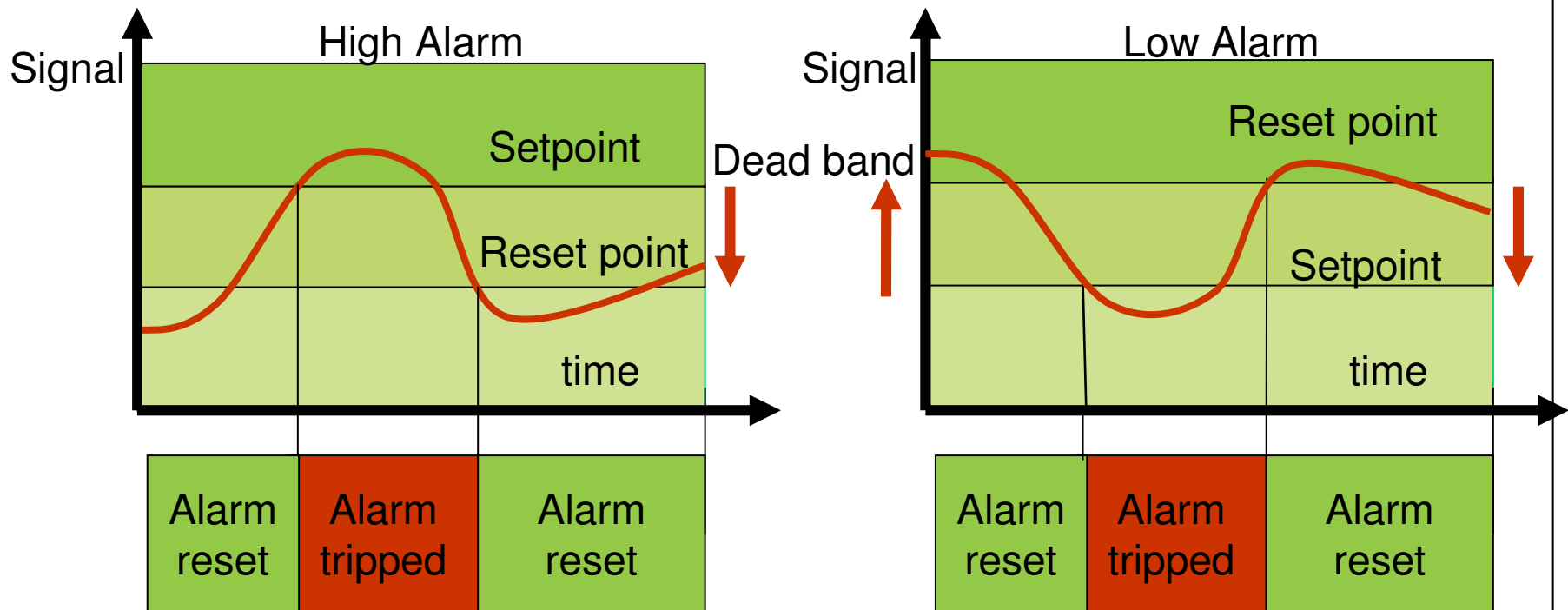


Normally Energised & De-energised Relay Operation

- We define the “Normal” State of an alarm relay as the state it is in when there is no alarm trip condition
- Thus a “Normally Energised” Relay is one which has its coil energised when there is no alarm condition. The coil will become de-energised when an alarm condition occurs. Also called Fail Safe mode because the alarm condition and power failure result in the same relay state
- A “Normally De-energised” Relay is one which has its coil de-energised when there is no alarm condition. The coil will become energised when an alarm condition occurs. If power fails the relay remains de-energised



Alarms



When the signal is greater than or equal to the setpoint then a presently reset alarm will trip.

Once the alarm is tripped it will remain so until the signal decreases to the reset point

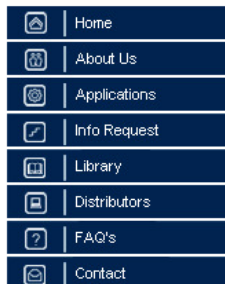
When the signal is less than or equal to the setpoint then a presently reset alarm will trip.

Once the alarm is tripped it will remain so until the signal increases to the reset point



Next Step: See the Presentation “How to Configure the DM01”

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DAN SENTRY is a unique protector and defender of your process or installation and a lot more too

LOW COST, SECURE, EASY TO USE, RELIABLE

ALARM messages are sent to any or all of 5 mobile phones and 5 email addresses.

MONITOR instant data sent to your mobile phone on request.

TREND the measurements. All data is date and time stamped, tabulated and graphed in our secure DATA VAULT.

PROTECT your business. DAN SENTRY will take immediate corrective action on site in response to alarm conditions.

SECURE REMOTE ACCESS of your data from any web-enabled computer.

NO ADDITIONAL SERVERS ON SITE. DAN provides total reliability and security. You don't need to worry about maintaining a secure server with UPS and 24/7 technical backup.

NO SOFTWARE TO BUY OR MAINTAIN. DAN provides you with full access to our own easy to use software via your web browser.

