DPW900 SERIES

INSTALLATION GUIDE

NOTICE

Review this manual and all applicable safety information prior to installing this equipment. Ensure that the ratings of this equipment satisfy the requirements for the location where the equipment will be mounted. This equipment is intended for installation by qualified installers only.

CUSTOMER SUPPORT

ANOVA Customer Support should be contacted for installation support at one of the following numbers:
North America 1-866-626-8425 (7:00AM-6:00 PM EST)
Europe +44-1536-264-777 (8:00-17:00 GMT)
Germany +49-(0)631-205-777-22 (9:30-17:30 GMT)
Asia +60-3-6207-1659 (16:00-24:00 GMT)

PRODUCT DETAILS

The DPW900 series of remote telemetry units (RTU's) consist of an industrial polycarbonate enclosure housing the telemetry electronics, power supply and optional battery mounting facility. Remote telemetry communications are accomplished via worldwide 3G/4G LTE cellular networks. Mounted to the bottom of the unit is a differential pressure sensor for tank level and an optional pressure sensor for recording tank pressure. Sensors and fittings are O2 cleaned.

SENSORS

Differential pressure sensor range is 0-600" W.C. (1493 millibar)
(Optional) Pressure sensor range of 0-600 PSI (41.37 BAR)
Supports any standard 4-20mA loop powered sensor

POWER OPTIONS:

There are four versions of the telemetry equipment available with different power options:

- Universal Mains Only, 100V-240VAC, 0.17A, 50-60Hz
- Mains 85V-265VAC, 0.3A, 50-60Hz with rechargeable Lithium Battery (7.4VDC Nom.) backup
- Solar (9VDC Nom.) with rechargeable Lithium Battery (7.4VDC Nom.) backup
- Primary Lithium Battery (7.2VDC)

MOUNTING OPTIONS:

There are three mounting options available for the telemetry equipment:

- Fixed Mount Stainless Steel plate
- Magnetic Mount
- Magnetic Mount with Extended Solar Panel

ENCLOSURE DIMENSIONS: 5.5" (140mm) X 6.7" (170mm) X 3.75" (95mm) depth

INGRESS PROTECTION: NEMA 4X, IP66

AMBIENT TEMPERATURE RANGE: -20 Degree C to +50 Degree C

FCC CONSIDERATIONS:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Changes or modifications to this device by other than an authorized person could void FCC compliance.

ELECTRICAL COMPLIANCE (for Mains Powered Equipment)

CAUTION! Electrical installation must be carried out by a qualified electrician in accordance with any local codes, standards or regulations.

Only suitably rated and approved supply mains cables should be used with the equipment as per the National Regulations for the country of use. The mains supply cable wires shall be a minimum 16AWG size. If a pluggable cord set is used, the maximum length shall be no greater than 10 feet (3 meters).

An isolating device must be fitted so that the equipment can be disconnected from the mains supply safely.

The supply to the equipment shall be protected by an overcurrent device as specified by the National Electric Code or other local authorities having jurisdiction.

PRODUCT OVERVIEW

The DPW900 series of remote telemetry units (RTU's) provide a one to four channel wireless telemetry solution (expandable to 8 channel) utilizing the worldwide GSM Wide Area Cellular Communications network or the Iridium Satellite network. They are self-contained devices comprising sensing, readout, and transmission functions. Device power is obtained from either a mains supply connection with a sealed rechargeable backup battery, an integral solar panel in combination with a sealed rechargeable battery, or from a high capacity internal lithium battery. No field wiring is required. A weatherproof enclosure rated to NEMA 4X and IP66 enables both indoor and outdoor installations.

The equipment incorporates pre-mounted sensors enabling the remote monitoring of cryogenic level and optional pressure measurements of storage tanks directly to Web based monitoring software viewable anywhere in the world.

Cellular units, fitted with 3G or 4G LTE Data Modules and a suitable SIM card, will automatically operate on cellular GSM networks worldwide. The antenna for the cellular radio is internal to the enclosure and no external connection is required. Devices are supplied with the proper SIM card installed. Devices should be located where a good cellular signal is available and not blocked by large metal objects and away from large motors or other sources of Radio Frequency Interference. Satellite units, fitted with an Iridium Satellite Module, will automatically operate outdoors on the Iridium satellite network worldwide. The antenna for the satellite radio can be placed internal or external to the enclosure. Solar devices should be mounted in an area that has direct sun exposure. The device is shipped pre-configured for the sensors attached and the power source supplied.

DW914 Single Channel, Multi-line Display

This single channel device is fitted with a multi-line 6-digit numeric display enabling a physical parameter to be monitored and displayed. Typically, a differential pressure sensor is fitted to the device factory wired to sense tank level. The sensor is supplied O2 clean.

The unit pictured is configured for single channel operation and a fixed mount.

DW924 Dual Channel, Multi-line Display

The dual channel unit uses the first channel to sense tank level (via differential pressure sensor) and a second channel to sense tank pressure (via pressure sensor).

The unit pictured is configured for dual channel operation and a magnetic mount.

INSTALLATION INSTRUCTIONS

GENERAL CONSIDERATIONS

Only suitably trained service personnel may install units and have access to the internal parts for installation or maintenance. There are no user serviceable parts within the unit with the exception of the battery, if equipped.

EQUIPMENT LOCATION

A suitable location for the installation shall be determined. The mounting surface shall provide sufficient support and mounting hardware options for the unit and enable the process lines to be run without undue interference from other piping or obstacles. Solar powered units need ample direct sunlight for proper long-term operation and need to be mounted in a location that accomplishes this. Avoid locating the unit in areas where there is poor cellular reception or next to large electrical interference generating equipment.

1- MOUNTING INSTRUCTIONS

Units are supplied with an integral Stainless-Steel back plate that is attached to the unit enclosure and for solar powered units, it supports the solar panel as well. This plate has pre-punched holes for direct attachment to a mounting stand, a building, tank, or other equipment structure. The unit should be securely mounted using these holes and suitable user supplied Stainless-Steel hardware.

In all circumstances, NO holes or penetrations should be drilled into the enclosure housing. This would defeat the integrity of the enclosure, destroy its ingress rating, and void the warranty.

As an option, the unit may have been supplied with a magnetic mount system. The unit should be placed upon a clean ferrous metallic surface and checked for a secure mounting that will not move or slide. If the magnetic mounted unit is solar powered, there will be a separate solar panel with magnetic mount as well. This should be placed where ample sunlight will fall on the panel surface and also checked for a secure installation.

2- PROCESS CONNECTIONS

Sensor connections to the process media being monitored should be done in accordance with best practices for the media involved. The use of non-corrosive swage fittings is recommended. Do not grip the sensor or fittings in any way that would stress the process fittings when attaching suitable tubing fittings. Use the sensor flats for making these connections. Failure to do so may stress the sensor to enclosure attachment and possibly crack the enclosure. The right side of the differential pressure sensor which is piped to the pressure sensor will be the gas (-) leg connection. The left side of the differential pressure sensor will be the liquid (+) leg connection. The (+) and (-) designations are etched into the sensor body as well.

3.1- MAINS POWER REQUIREMENTS

Before installation, it is crucial to verify that the site provides clean, stable mains power. If the site is known to have power line quality issues, appropriate corrective measures—such as power line conditioning or filtering—must be implemented to meet clean power standards prior to connecting the unit.

Industrial environments often experience poor power quality, commonly referred to as “dirty power.” This may include voltage fluctuations, harmonic distortion, and electrical noise, all of which can negatively impact the performance and lifespan of the equipment. It is the responsibility of the installer to ensure that the mains power supply is free from excessive electrical noise and distortion.

Where possible, select power circuits that are not shared with heavy machinery, pumps, or other equipment known to introduce power quality issues. Isolating the power supply in this way can help minimize disturbances.

All mains power installations must comply with local electrical codes and regulations. It is the installer’s responsibility to ensure full adherence to all applicable laws and safety standards. A qualified, certified electrician must be consulted and engaged to carry out all mains power connections and related work.

DPW900 AC Power Immunity (Including Protective Earth)

Phenomenon	Test Standard	Test Level	Performance Criteria
Burst	IEC 61000-4-4	±2 kV (5 kHz or 100 kHz)	B
Surge	IEC 61000-4-5	±1 kV line-to-line ±2 kV line-to-ground	B
Conducted RF	IEC 61000-4-6	3 V (150 kHz to 80 MHz), see NOTE	A
Voltage Dip	IEC 61000-4-11	0% during 1 cycle – B 40% during 10/12 cycles – C 70% during 25/30 cycles – C	B / C
Short Interruptions	IEC 61000-4-11	0% during 250/300 cycles	C

- **Performance Criterion A:**

The Equipment Under Test (EUT) shall continue to operate as intended during and after the test. No degradation of performance is allowed beyond specified limits.

- **Performance Criterion B:**

The EUT may have a temporary loss of function or degradation of performance during the test, but it must recover automatically to normal operation after the test is removed.

- **Performance Criterion C:**

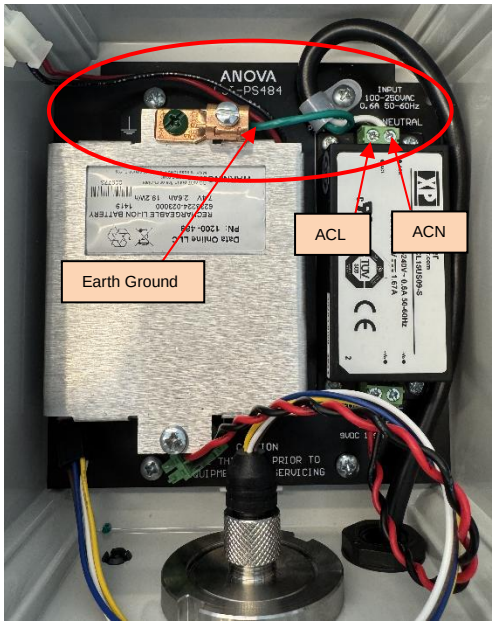
Temporary loss of function is allowed, and manual intervention may be needed to restore normal operation after the test.

3.2- POWER SUPPLY CONNECTIONS *(Mains RTU's only)*

CAUTION:
HIGH VOLTAGE HAZARD

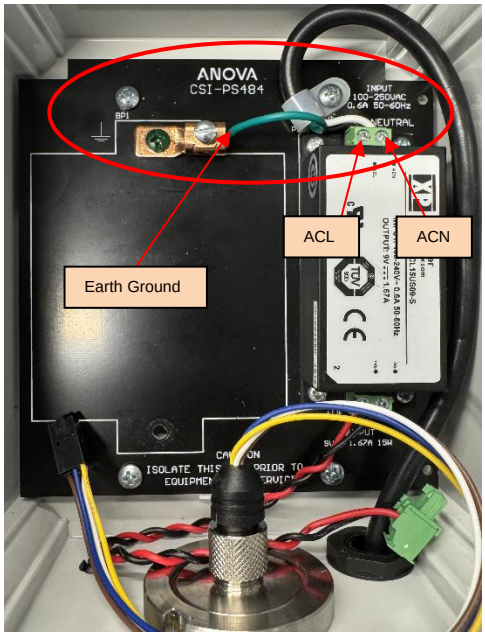
Electrical installation must be carried out by qualified personnel in accordance with local codes, standards, and regulations. Mains Supply must be disconnected at the source, or the mains cord must be unplugged before proceeding. Refer to safety label on side of unit.

Mains & Battery Backup



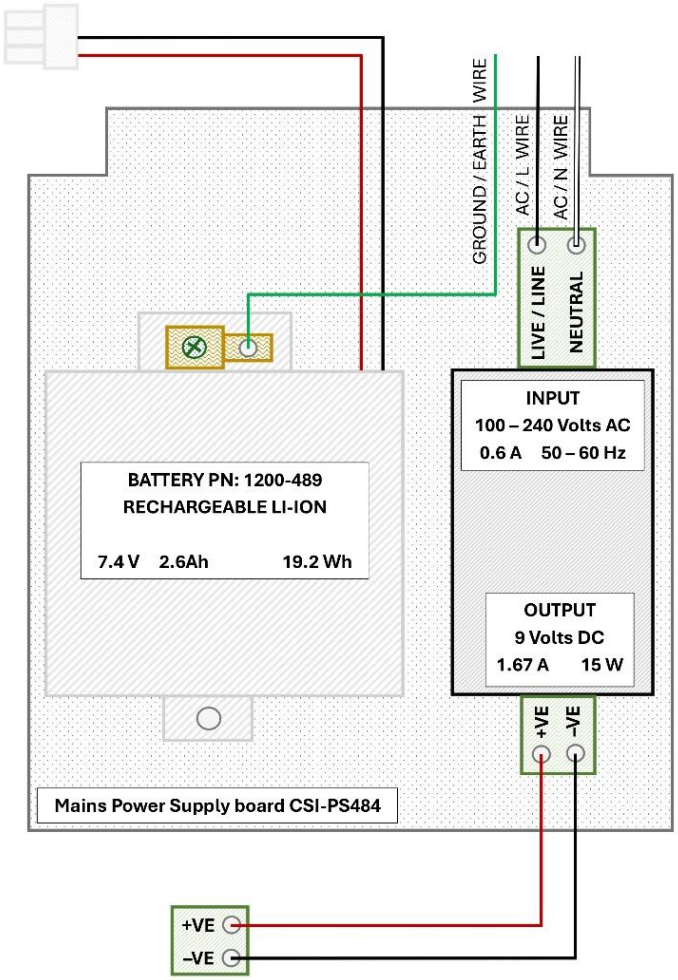
Mains powered units require a proper Mains source connection, rated at 100-240 VAC. The Mains source must have a minimum rating of 1.0A. Insert the mains cable through the empty gland fitting on the bottom of the enclosure. Feed the cable through the internal strain relief before making the electrical connections to the internal power supply. The individual wires should be stripped back approximately 10 mm in length. The ground wire (optional) should be inserted and firmly secured into the ground lug provided. Ensure the mains cable is secured using the nylon clamp, which must grip the cable's outer jacket. Tighten the enclosure gland fitting after making the connections to ensure a weatherproof seal.

Mains Only

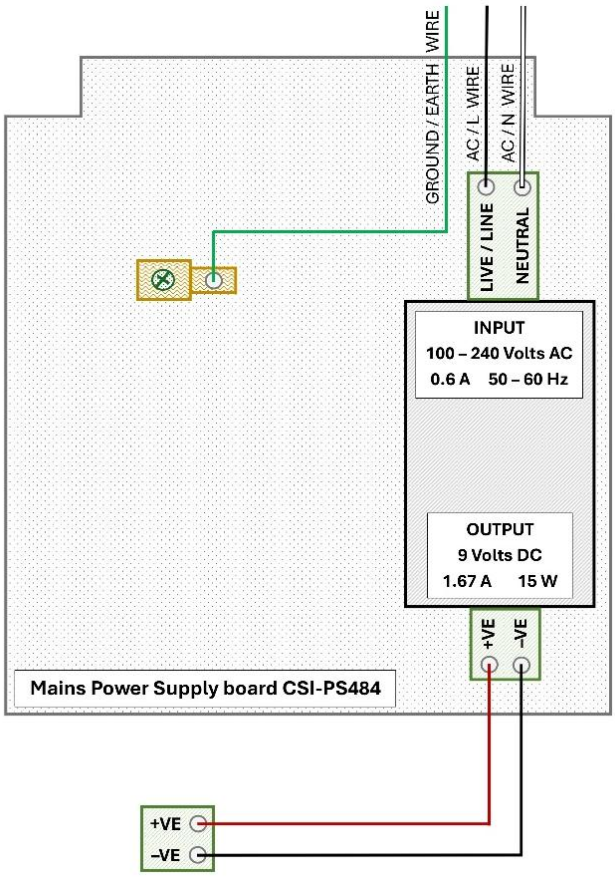


The DPW900 RTU, being double insulated device, does not require the mains earth/ground. The earth ground may be wired to the provided ground lug/terminal or may be removed or properly insulated. The stainless-steel sensor is intentionally isolated from the mains ground to prevent fault currents and noise from ground potential differences. Typically, stainless-steel pilot tubing is bonded to the tank and an earth spike for discharge protection. If non-metallic tubing or isolators are used, the installer must bond the sensor body to the tank ground, not the mains ground.

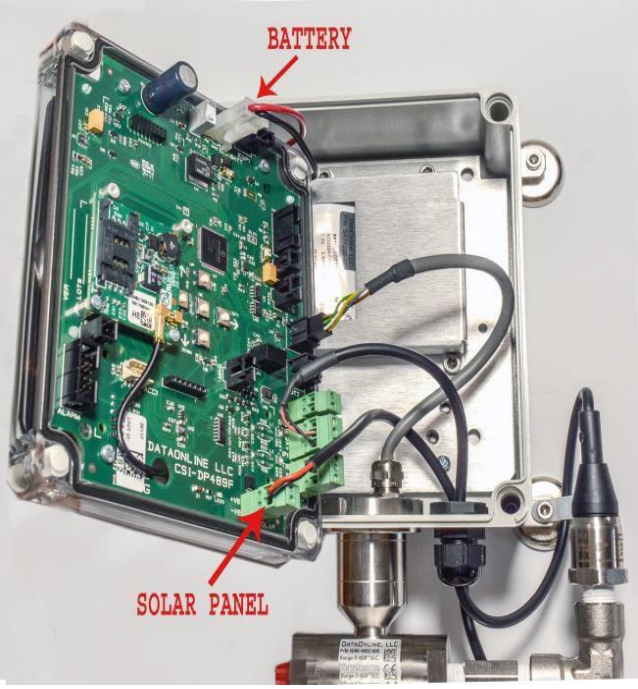
WIRING DIAGRAM
Mains & Battery Backup:



WIRING DIAGRAM
Mains Only:



4- BATTERY & SOLAR PANEL CONNECTIONS (If Equipped)



Primary lithium powered units will need the battery connected prior to operation. Mains powered units with battery backup will need the mains power and the battery connected prior to operation. Solar powered units will need the battery and solar panel connected prior to operation. Connect the battery first and then plug in the solar panel electrical connector.

The battery connector is marked “BATTERY” at the top of the DPW900 Series PCB. The mating 4 pin connector on the battery is wired according to the battery type to prevent improper charging of a non- rechargeable type.

When a rechargeable battery is used the solar panel must be connected to the connector at the bottom of the DPW900 Series unit PCB marked “POWER”. The positive connection (Red) must be made to the screw terminal marked “+VE” and the negative connection (Black) to the one marked “-VE”.

5- SOLAR PANEL ORIENTATION (if equipped)

Devices with solar panels will require the proper orientation of the solar panel for optimum operation.

The panel should be adjusted so that it faces the equator as close as possible.

For equipment with magnetic mounts, the panel should be placed as high as possible to avoid any possible tampering.

6- SIM CARD INSTALLATION (only if required)

Normally the RTU will be supplied with a SIM Card fitted and ready for operation for the area of the world for which it was ordered.

Under certain circumstances the RTU may have been ordered without a SIM card. The SIM card will need to be field installed by sliding the SIM holder top cover in the direction of the arrow and opening the cover.

Insert the SIM, close the cover and slide it back to lock. See picture for the SIM card holder location.

Some units are supplied with an electronic SIM (MIM) which does not require a separate SIM card.

7- PREVENTING MOISTURE INGRESS

The DPW900 series products are fitted with a "GoreTex" breather to prevent the buildup of moisture in the unit over time. This device allows moisture to pass through the breather from the inside to the outside as the internal air expands through ambient heating. It will not allow moisture to pass back into the unit as the internal air contracts upon ambient cooling. Any accidental internal moisture ingress is drawn out of the unit over time. To make sure that this process can maintain a "dry" enclosure, the lid must be fitted correctly to ensure that the lid seal is effective. Following these steps to ensure reliable lid sealing:

- Ensure that all of the internal cabling is routed such that it will not impede the lid from closing fully without the need to apply excessive pressure.
- Close the lid down and ensure that it is fully seated and centrally aligned on the seal.
- Using a ¼ inch or 6mm Phillips screwdriver, lightly tighten diagonally opposite lid screws.
- When all 4 lid screws are lightly tightened, proceed to tighten the lid screws, again in diagonally opposite pairs. Only tighten them "hand tight".

Over tightening of the lid screws can cause the lid to be distorted, opening up the seal in the middle of the two long sides. Obviously under tightening will not cause the lid seal to be compressed enough to be effective.

8- INITIAL TESTING & WEB SET-UP

Devices with batteries may have been shipped in “Shipping Mode” and will need to be activated before use or they may have been shipped with the battery disconnected.

In order to “wake” a unit form “Shipping Mode” the “FILL” button must be pressed and held for greater than 20 seconds. Upon “waking” the unit display will change to the power up routine. The “Fill” button should be released at this time. Upon completion of the power up routine, the display will usually show “0.0”.

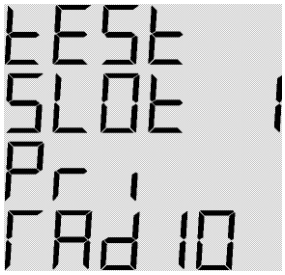
If the sensor has been connected to the process medium, the current reading may now be taken by depressing the “Fill” button till the display changes to FILL, then releasing the button. After the preset “Transducer Wake Up Wait” the display will change to the current reading.

The device now needs to be set up for WEB access in the ANOVA Transcend Platform. Please call our Customer Support Center at 1-866-626-8425 for North America installations (or the closest office as listed on the front cover) for this set-up prior to leaving the site. You will need the Device ID which may be viewed looking through the front clear lid at the bottom. It is also located on the back of the main PCB. It will be an 8 digit serial code starting with E1. You will also be asked to do a test transmission along with providing all of the site details.

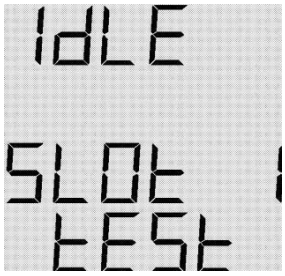
TEST TRANSMISSION

A “Test Transmission” as its name suggests allows the communications interface to the Transcend Platform to be tested. This process delivers the current Analogue measurement values and Digital input states for all active channels, along with the current configuration data.

`To enter “Diagnostic Mode” press and hold both the “Fill” and the “Mode” buttons simultaneously until the “Diag-nostic” prompt appears on the display.

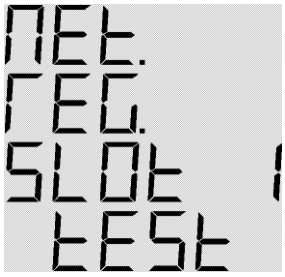


Use the “Mode” button to select the next menu option which is “Test Transmission”, and then press the “Fill” button to select the currently displayed option.



The “Idle” screen is displayed while the DPW900 series device applies power to the modem and performs the required initialisation.

This may take 10 or more seconds depending upon the modem type.

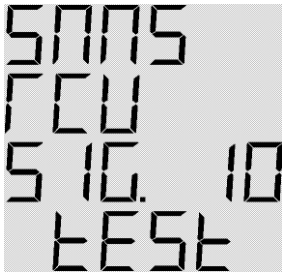


The “Network Registration” screen is displayed while the DPW900 series device attempts to register with the communications network.

This process is usually quick, however it can take a minute or more depending upon the modem type.

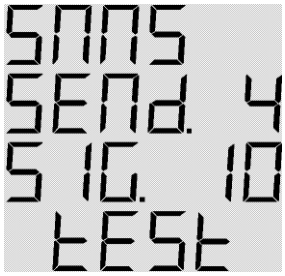
The “Network Ready” indication shows that network registration completed successfully.

The current signal strength is displayed for the remainder of the “Test Transmission” for diagnostic purposes.



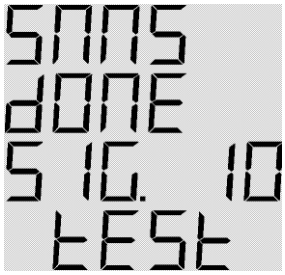
The first task upon contact with the Transcend Platform is to look for any inbound data or configuration requests.

Any requests which are received will be displayed, and an appropriate response will be scheduled.

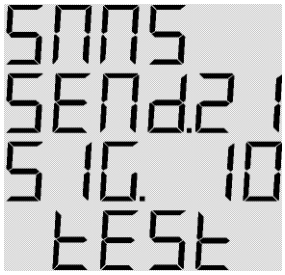


Each “Test Transmission” causes a number of data packets to be sent to the Transcend Platform.

The first of these being a “Type 4” packet. This details the current System Status, Analogue input measurement values and Digital input states for all channels.

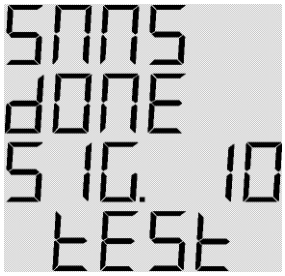


A “Done” message confirms that this data packet was successfully delivered to the Transcend Platform.

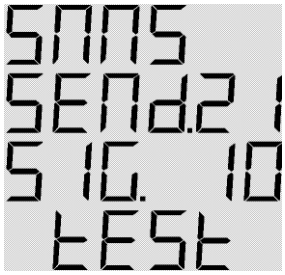


Each active Analogue and Digital input channel will also supply its current configuration state to the Transcend Platform.

A “Type 21” packet is sent for the first Analogue Input channel.

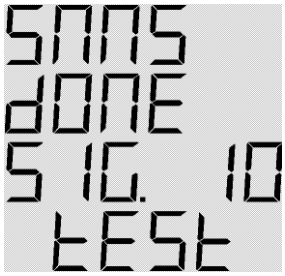


A “Done” message confirms that this data packet was successfully delivered to the Transcend Platform.

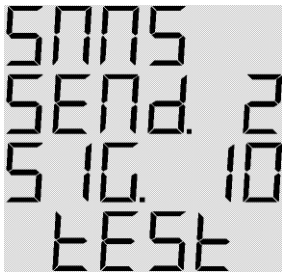


Each active Analogue and Digital input channel will also supply its current configuration state to the Transcend Platform.

A “Type 21” packet is sent for the second Analogue Input channel.



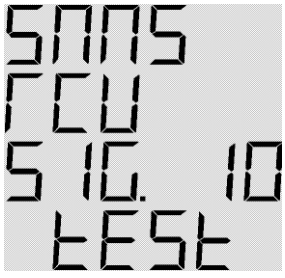
A “Done” message confirms that this data packet was successfully delivered to the Transcend Platform.



If this is the first “Test Transmission” that has been performed the DPW900 series device will use this opportunity to acquire the current time from the communications network.

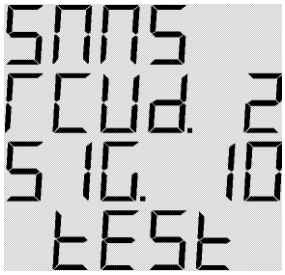
A “Type 2” packet is sent in order to acquire the network time.

A “Done” message confirms that this data packet was successfully delivered to the Transcend Platform.



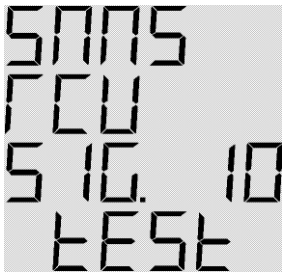
Before the session is terminated, the DPW900 series device performs a final check for any inbound data or configuration requests from the Transcend Platform.

Any requests which are received will be displayed, and an appropriate response will be scheduled.



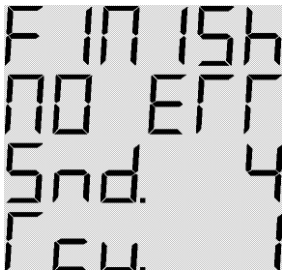
In this case a response has been received to the time request.

This message will be processed and the DPW900 system time will be updated.



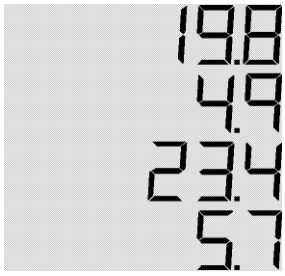
A further check for any final inbound data or configuration requests from the Transcend Platform is performed.

The DPW900 series device will finally de-register with the communications network and shut down the communications device.



A summary screen details the number of messages transmitted and received within this session as well as details of any errors which occurred during the Test Transmission session.

The applicable error code will replace the “No Err” report shown here, and are detailed in the Test & Data Transmission Error Code section below.



When the diagnostic routine has run to completion the display returns to the current measurement values for Analogue Channels 1 and 2,3,4 (if used).

Further Diagnostic functions may be accessed by pressing the “Fill” and ”Mode” buttons again.

TROUBLESHOOTING GUIDE

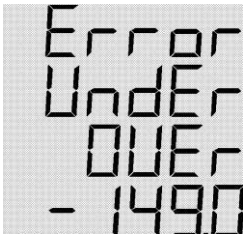
TEST TRANSMISSION Error Codes

Error Code	Description
232	Modem Communications Error (normally a terminal modem hardware failure).
REG	Network Registration Failure.
201	Error Reading SIM Card (SIM not present ?).
202	Modem Initialization Error.
301	SMS Message Transmission Error.
302	SMS Message Transmission Denied.
303	SMS Message Destination Number Error/Missing.
401	Received Device ID mis-match Error (typically Spam SMS).
402	Received Channel Number Error.
403	Received Configuration Error.
404	Received Checksum Error (Iridium Only).
501	GPRS Packet Not Acknowledged.
601	GPRS Registration failed.
602	GPRS Connection failed
603	GPRS Connection Lost (after having a successful connection).

SENSOR SIGNAL OUT OF RANGE Error Codes

Should a signal be detected from a sensor which is outside of the expected signal range for which it has been configured then the display will show one of three configurable indications. The three options are a generic "Error" message, a more specific "Over" and "Under" message combination, or the DPW900 device will attempt to scale the displayed value even though it is out of range.

The screen shot below shows an artificial situation where four 4-20mA sensors monitoring four Differential Pressure transmitters (scaled 0-600 inches Water Column, with 1 decimal place of accuracy) are deliberately mis-wired such that channels 1 & 3 measure 25mA and channels 2 &4 measure 0mA.



Channel 1 shows "Error" as it is measuring a signal of 25mA.
Channel 2 shows "Under" as it is measuring a signal of 0mA.
Channel 3 shows "Error" as it is measuring a signal of 25mA.
Channel 4 shows "-149.9" as it is measuring a signal of 0mA (-149.9 inches is ¼ of the spanned 0-600 inches measurement range below 4mA, hence the negative displayed value).

GENERAL TROUBLESHOOTING NOTES:

NO DISPLAY (Mains powered unit)

Verify Mains power at the internal power supply. If not present, correct issue with power source to unit. Verify 9VDC power output at the internal supply. If 9VDC is not present and Mains power is correct (110-240VAC), replace power supply board.

NO DISPLAY (Solar powered unit)

Verify that battery is connected to the unit. If not, connect. Verify correct battery voltage on the pack. Disconnect battery pack and measure DC voltage. Voltage should be at least 6.5 volts to operate unit. If lower, recharge pack and/or replace with a fully charged (>7.2VDC) pack.

LOW BATTERY (Solar powered unit)

Verify that the solar panel properly is connected, Red is + and Black is -, and that the panel is receiving good sunlight in the installed location. Most low battery issues are caused by insufficient solar panel orientation or location.

FILL MODE ERROR displayed

When pressing the Fill button the resulting reading comes up “Error”. Verify correct sensor wiring to the unit. Be sure the sensor wires of the pressure sensor are not reversed, Red is + and Black is -. See Sensor Signal Out of Range section preceding this section for more details. Verify that the sensor “Wake Up” time programmed into the unit is long enough for the sensor to read correctly.

REG ERROR

This is a failure of the internal radio to contact an allowed cell tower and make a connection. Verify that the type of SIM card and radio module are suitable for the area of the world that the equipment is being installed in. Be sure that there is cell coverage within the installed area that matches the cell carrier of the installed SIM. It is always good practice to verify transmissions from a unit prior to site installation as this will rule out any equipment issue possibilities.

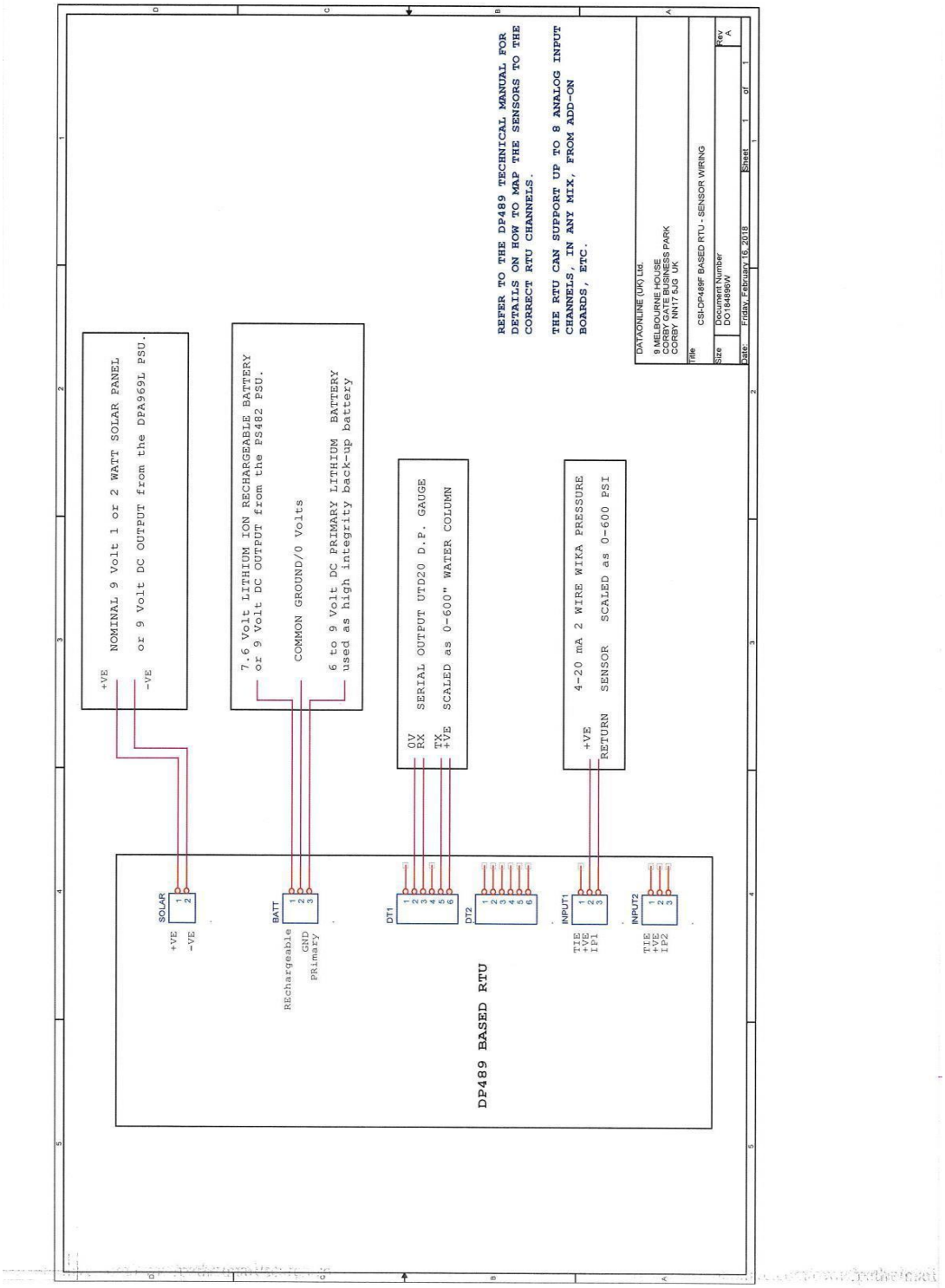
ERROR 401 displayed

When performing a Test Transmission the ERR 401 is displayed during the sequence. This indicates that an incoming message was sent to the unit that was not intended for it. This is usually a welcome or spam message and will be discarded by the unit. This error will not affect the unit operation and may be ignored.

TEST TRANSMISSION ERRORS displayed

When performing a Test Transmission one or more errors are displayed. Refer to the preceding section for a more detailed explanation. Call our Technical Support team at one of the numbers listed on the front cover for in-depth assistance.

WIRING DIAGRAM (Typical 2-channel configuration)



INSTALLATION INFORMATION SHEET

UNIT DETAILS:	Unit ID:	Sensor 1 Span:
Unit Type:	Power Source:	Sensor 2 Span:
Notes:		

SITE DETAILS:	Customer/Site Name:	
Site Address:		
Country:	ZIP/Postcode:	Time Zone:
Site Contact:		Phone No:
Site Contact E-Mail Addresses:		
Notes:		

TANK DETAILS:	Tank Name/ID:	
Tank Type: *Horizontal / Vertical*	Dished Ends: *YES / NO*	Dish Depth:
Tank Height/Length:	Tank Diameter:	Manufacturer:
Notes:		

PRODUCT DETAILS:	Product:	Specific Gravity:
Notes:		

WEB-SITE SETUP:	Preferred Units:	
Re-Order Level:	Critical Level:	High Level:
Level Alarms: *YES / NO*	Alarm Delivery Via: *Email / SMS / Both*	
Email Address:		Mobile No:
Auxiliary Channel: *YES / NO*	Function:	Preferred Units:
Notes:		

LOCAL DISPLAY:	Preferred Units:
Second Display: *YES / NO*	Preferred Units:
Notes:	

CURRENT READINGS:	Level and or Pressure readings taken from existing sensors or gauges.
Current Product Level:	Auxiliary Channel Reading:
Date & Time:	Notes:

"DEBUG" VALUES:	Note the value of the parameters listed here, as viewed in DEBUG mode.		
C1: *mA*	C2: *mA*	bd: *V*	bn: *V*

Document Metadata				
Purpose	Product Installation Manual			
Scope	Hardware Product			
Classification	RESTRICTED. On a need to know basis.			
Use Cases	Customers doing installations or 3rd parties doing installations			
Authors	W Mruck, S Penetra, J Silva, S Santiago, D Costa			
History	Date	Revision	Authors	Approval Signature
	Thursday, April 10th, 2025	1.5	S Penetra, D Costa, S Santiago