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DPW344
USER GUIDE

GSM VERSION

Covering the operation of the following products:

♦ **DPW344 Dual Channel, Single Display.**

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PRODUCT OVERVIEW

The DPW344 (GSM) unit provides a two channel wireless telemetry solution utilising the GSM Wide Area Communications network.

When fitted with either the Motorola g24 or h24 Data Module and equipped with a suitable SIM card, it will automatically operate on 2G GSM networks at 850MHz and 1900MHz (within the U.S.A.) or at 900MHz and 1800MHz (outside of the U.S.A.).

When equipped with a Motorola h24 Data Module it will also operate on 3G GSM networks operating at 850MHz, 900MHz, 1800MHz, 1900MHz, or 2100MHz.

The DPW344 is a dual channel device, fitted with just a single 6 digit numeric display, thus allowing two tank parameters to be monitored, but only one of the parameters may be displayed at any given time (channel 1 by default).

The tank parameter associated with channel two may be displayed by operating the "MODE" button. Whilst the "MODE" button is active, the display will indicate the tank parameter associated with channel 2.

The DPW344 unit is specifically designed packaged for use within an environment with a potentially explosive atmosphere.

Power Supply

The unit is designed to operate from a Lithium Thionyl Chloride battery pack with a capacity of 45Ah at 7V. This power supply is sufficient to operate the unit for up to 5 years.

The actual battery life achieved in use will depend upon the operating conditions and the number of active channels, as well as the type of sensor fitted.

Operation the unit in poor GSM signal conditions, operating the unit with a sensor which requires a settling time of greater than 2 seconds, and operating the unit with both channels enabled will all add to the load on the battery pack, and reduce the actual battery life accordingly.

4-20mA SENSOR INTERFACE

The units 4-20mA sensor interface is programmable, allowing it to provide a loop excitation voltage of either 15V or 23V d.c. The default setting is 15V.

The parameter which controls the "Loop Voltage" may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

The amount of time that the sensor remains energized before a 4-20mA loop measurement is taken is also programmable between ¼ of a second and 1 minute. The default setting is 2 seconds.

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The parameter which controls the "Transducer Wake Up Wait" may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

NOTE: It is good practice to use the lowest 4-20mA loop voltage and the shortest sensor power up wait that will work reliably with the sensor you plan to use. The use of excessive loop voltages and long power up waits present a significant drain on the systems power resources.

CONNECTING TO A TWO-WIRE 4-20mA SENSOR

Connect the sensor 4-20mA loop positive connection to the "+VE" terminal on the 4 way connector marked "IP1". Connect the 4-20mA loop return connection to the "IP" terminal on the same 4 way connector.

The connections for channel 2 are similar, apart from the fact that the 4-20mA loop positive and return connections are made to the terminals marked "+VE" and "IP2" respectively.

DATA LOGGING

The period of time between 4-20mA loop readings is programmable between 15 minutes and 24 hours. The default setting is hourly.

The parameter which controls the "Logging Period" may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

When a reading falls due, the appropriate 4-20mA loop is energized with a programmable loop voltage of either 15V or 23V. Following the programmable "Transducer Wake Up Wait" time, a loop current measurement is taken.

As soon as this process is complete, the loop power is turned off again, and the display will be updated with the new reading (channel 1 only). The measurement is also entered into the appropriate channel's data logging buffer, along with a time stamp relating to the time of the reading.

The log buffer consists of a 27 reading deep circular buffer for each of the two channels on the DPW344 unit.

As the 4-20mA loop is never permanently powered, it is often difficult or even impossible to configure a programmable sensor during the short power up delay of a normal reading cycle.

A better way of programming or configuring such measuring instruments, is provided when the unit is used in Programming Mode. Each 4-20mA loop may be powered individually for extended periods of time in order to facilitate the configuration of devices such as loop powered programmable Ultrasonic Sensors.

See the DPW344Programming Guide for further details.

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REGULAR DATA TRANSMISSION

The period of time between data transmissions is programmable, between 15 minutes and 24 hours. The default setting is every 12 hours.

The parameter which controls the "Transmit Period" may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

A further programmable parameter is used to set the "Primary Transmission Hour" for data transmissions. The first data transmission of each day will occur at this hour, followed by subsequent transmission at the programmed interval. The default setting is (i.e. 03:00 each day).

The parameter which controls the primary transmission hour may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

In order to make the data transmission regime even more flexible, it is possible to limit the number of data transmissions that occur in each 24 hour period to between 2 and 14 transmissions, or this feature may be disabled completely so that an unlimited number of transmissions are allowed. The default setting is an unlimited data transmission regime.

The parameter which controls the "Maximum Transmissions Per Day" may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and is independently configurable for each active channel.

Using a combination of these three parameters it is possible to configure a regime which delivers data in a timely fashion, with the minimum number of "wasted" transmissions.

For example it is possible to configure the unit to deliver data every 3 hours during a 12 hour working shift, beginning at 06:00 and ending at 18:00 each day. In this way the associated web page will contain data that is no more than 3 hours old during the working day, whilst using just 4 data transmissions in order to keep communications costs to an absolute minimum.

UNSCHEDULED DATA TRANSMISSIONS

There are 8 programmable low or high level alarm thresholds for each of the two channels on the DPW344 unit. Each alarm threshold setting has an associated "direction" setting which determines if the alarm is configured as a "rising" or a "falling" event.

Each time that a new 4-20mA loop reading is performed, the signal level is compared with each of these thresholds in turn, and a "Level Alarm" transmission will take place if the level has fallen below, (or optionally risen above) the next applicable threshold.

The signal level must then rise to a half a percent above that threshold, (or optionally half a percent below the threshold) for two or more reading periods before that particular threshold is re-armed.

This is a measure to prevent the continuous transmission of level alarm messages when the

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signal level hovers at or around a level alarm threshold.

Each channel of the DPW344 unit has 8 programmable alarm thresholds, and "direction" controls. This arrangement makes it possible to have high level alarms for tank "over pressure" or "over fill", as well as the more normal "low tank level" and "critical tank level" alarms for example.

These "Channel Alarm Level" settings may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and are independently configurable for each active channel.

FILL MODE

"Fill Mode" is designed to facilitate the more frequent display updates required during a tank filling exercise, such that the operator can judge when the tank is approaching full without the need to refer to any other instrumentation.

Additionally, it provides a trouble free mechanism for triggering the transmission of an end of fill data transmission when the fill cycle is complete, in order to facilitate a timely web page update reflecting the recent tank filling event.

The duration of the "Fill Cycle", and the requirement for a "Fill Alarm" transmission at the end of the fill cycle may be programmed independently for the four channels either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide).

NOTE: The Fill Mode duration should be programmed to be no longer than the time taken to monitor the fill tank. The use of excessive fill mode duration's present a significant drain on the systems power resources.

Activate SW1 magnetic switch until "FILL" appears on the display will initiate a fill cycle on all active channels. The display will blink intermittently to indicate that a fill cycle is in progress, and the value(s) will change in accordance with a changing tank level.

If only one tank is actively filled on a unit monitoring two or more separate tanks, then the tank with a static level will discontinue "Fill Mode" automatically cancel after 15 minutes. To remain in "Fill Mode" the tank level must rise by a half of one percent of span in the first 15 minutes.

At the end of the "Fill Cycle" if "Fill Alarm" transmissions are enabled, an assessment of the change in level within the tank will be performed. A fill event will be deemed to have occurred if the level has risen by more than two percent of span. If this is the case then a data transmission will be scheduled following the next 4-20mA loop reading on that channel.

The display update rate will return to the normal programmed rate at the end of the fill cycle.

LOCAL DISPLAY INDICATION

The display fitted to the DPW344 unit is used to show the current product level, pressure or some

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other parameter related to the tank, or system being monitored.

The numeric value displayed, is controlled by three programmable parameters which set the "Sensor Zero", "Sensor Span" and "Number Of Decimal Places" for the displayed data.

These parameters may be programmed either locally (see Programming Guide), or remotely from the Tank Graph Web page (see Web Configuration Guide) and are independently configurable for each active channel.

The zero adjustment is used to compensate for a signal zero offset which could place the zero reading point at a current slightly greater than 4mA.

The span control sets the value or tank level displayed when a 20mA signal is presented to the DPW344 unit (i.e. the span of the instrument, regardless of the fact that the signal may never actually reach this level).

The number of Decimal Places is adjustable between 0 and 5, and simply illuminates the appropriate decimal point. For this reason the span must be multiplied by an appropriate power of 10 in order that the scaling remains correct.

Currently the display value calculations will only operate correctly where there is a linear relationship between the measured sensor current and volume or other display parameter. This makes it impossible for the unit to accurately display the level in a horizontal mounted cylindrical tank, but a vertical cylinder will operate correctly.

SYSTEM TIME SYNCHRONIZATION

Most functions of the DPW344 series products are time related, and so it will not be a surprise that the system must have some form of internal time base.

In order to allow the unit to initially "synchronize" its internal time base, it has the capability to obtain the correct time from the GSM network. In the case of a unit operating on the GSM network this "synchronization" process may also be triggered remotely should it be noticed that the time base has drifted over a number of years.

A unit operating on the GSM network will only attempt to re-synchronize its time following a power-up cycle, or when a time update is requested remotely (see Web Configuration Guide).

Following a time update the log buffers are cleared of all previously logged data, as the time stamp associated with this data will now be invalid. All periodic tasks are then re-scheduled based upon the new and accurate date and time.
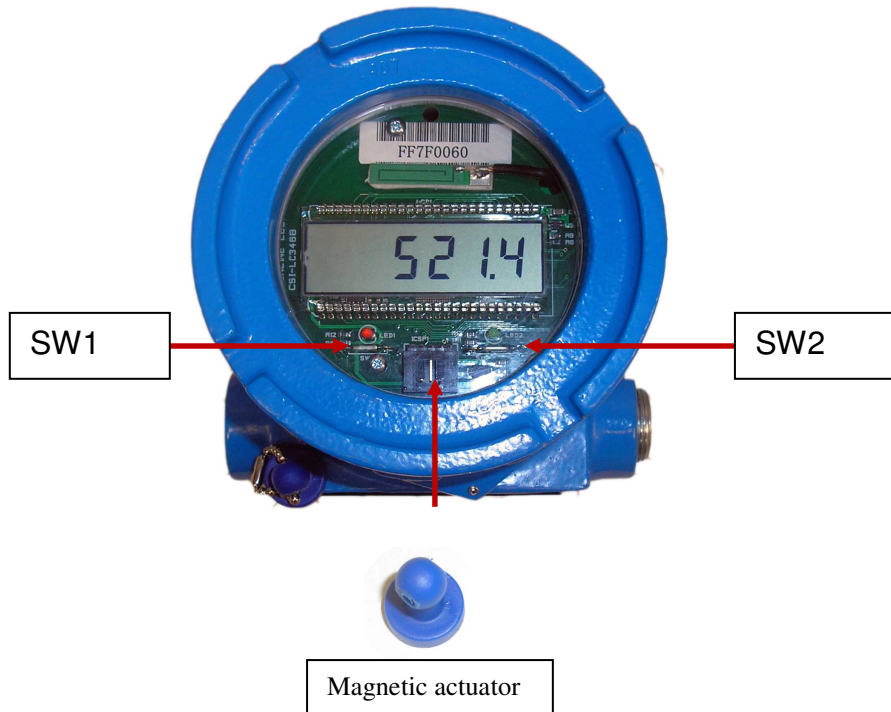
It is important to note that the time and date obtained when the re-synchronisation process is performed is "local time", as seen by the "home" GSM network. That is to say that a unit operating with a U.K. based GSM SIM card, on a U.S. GSM network would have its time base synchronised to U.K. Greenwich Mean Time, and not the time of the local GSM carrier!!

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SHIPPING MODE

"Shipping Mode" as its name suggests, prepares a unit to be stored or shipped by shutting it down into a low power condition, in which it only consumes an average of 180uA. Furthermore it shuts down all periodic level readings on the 4-20mA loops, and suspends all data transmissions.

When a DPW344 unit is placed into "Shipping Mode" the word "ASLEEP" will appear on the display and the unit will appear to be completely inactive. It will not respond to the "FILL" and "MODE" buttons in the normal way.

In order to "wake" a unit form "Shipping Mode" Activate the magnetically operated button.
SW1 & SW2. Positioned the magnet at a central location between the two buttons, where both LED will illuminate simultaneously. Hold the position for 20 seconds or until the unit change the contents of the display as described in the "User Interface Operation" section below.
(See photo)

SW1

SW2

Magnetic actuator

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DPW344 UNIT

USER INTERFACE

GUIDE

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The user interface on the DPW344 unit consists of a single 6 digit LCD numeric displays, as well as a pair magnetically operated buttons (marked FILL and MODE).

The normal function of the LCD display is to simply show the current tank level, or some other measured parameter such as vessel pressure.

In order to access all of the user functions of the DPW344 device a pair of magnetically operated buttons are located below the display. These may be operated both individually and in combination with the supplied magnetic actuator.

In order to operate a single button, bring the magnet into contact with the glass lid close to the appropriate button location, and move it around slightly until the LED illuminates indicating that the button has operated.

Both buttons may be operated simultaneously by moving the magnet into a central location between the two buttons, where both LED will illuminate.

The left hand "FILL" button is used to enter "Fill Mode", where the displayed levels and pressures will be updated more frequently, in order to indicate the progress of a tank re-filling exercise for example. The operation of "Fill Mode" is described more fully below.

The right hand "MODE" button is used to cause the unit to display the level or pressure associated with channel 2 of the DPW344 unit (where channel 2 is used).

As a secondary function, both buttons ("FILL" and "MODE") may be activated simultaneously in order to enter "Debug Mode". In "Debug Mode" the display show various system parameters in turn, in order to aid fault diagnosis. "Debug Mode" is described more fully below.

SLEEP MODE

When a unit is ready to be shipped it is normally placed into "Sleep Mode" where all data transmissions, and level readings are suspended, in order to conserve battery power.

Whilst in "Sleep Mode" the display will show the text "ALSEEP" as shown below.

To bring the unit out of "Sleep Mode" Positioned the magnet at a central location between the two buttons, where both LED will illuminate simultaneously. Hold the position for 20 seconds or until the unit change the contents of the display or until "ASLEEP" disappears from the display.

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WAKE-UP/POWER-UP DIAGNOSTIC MESSAGES

Upon waking from "Sleep Mode" (see above), or at power up, the DPW344 unit will place a series of diagnostic messages on the front panel display.

These messages describe the software versions operating within the display controller and main unit microprocessors, and the maximum number of 4-20mA input channels that the software can support.

They also describe the Wide Area Network (W.A.N.) radio type that the software is expecting to communicate with, and finally the ID stored within the systems EEPROM (which should match that printed on the ID label).

This series of messages which appear at power-up are as follows:

This message details the version number of the software operating within the units display control microprocessor (Display).

This message details the version number of the application software operating within the units main microprocessor (Application).

It is this software which largely defines the unit's functionality and W.A.N. radio compatibility (e.g. GSM/CDMA or Reflex).

This message details the type of Wide Area Network radio that the application software is expecting to communicate with (in this case a Motorola g24/h24 GSM device).

This message details the upper 4 hex digits of the unit ID.

This message details the lower 4 hex digits of the unit ID.

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Finally the display reverts to its normal function, which is to display the measured level/pressure etc.

At this stage the displays will always show 0.0 as no measurements have yet been performed.

NORMAL TANK LEVEL VIEW

When the unit is in its normal operating mode, the display will appear as shown below with the current tank level, level and pressure, or some other measured parameter displayed. The numeric information can be up to six digits in length with up to 5 decimal places of accuracy.

The values displayed by default are configured such that they show the raw sensor reading, ie. Inches Water Column, or Bar for example.

More usefully it is possible to program the unit to show "real world" quantities such as pounds, tonnes or Kg etc.

The value on the display will be updated periodically as new readings are taken on the associated 4-20mA current loop inputs. The rate at which these readings are taken is independently programmable, for each active channel.

The unit may be made to perform continuous and almost instantaneous display updates by entering "Fill Mode". This feature is described more fully below.

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SIGNAL OUT OF RANGE INDICATION

Should a signal be detected from a sensor, which is outside of the expected range of 3.5mA to 22mA then the display will show "ERROR" on that channel as opposed to the tank level or pressure.

This immediately brings the user's attention to the fact that there is a fault, which will most likely be due to a wiring fault (open or short circuit on the 4-20mA loop wiring), or an actual sensor fault.

Error

In this case the sensor connected to channel 1 of the unit is experiencing a fault condition.

It is important to remember, when attempting to resolve such a problem, that the display information is only updated at the logging rate currently programmed into the unit for that channel (by default, hourly).

In order to diagnose such a problem it may be better to enter "Debug Mode", or use "Fill Mode" to ensure that the display will be updated more promptly. In this way you will receive a more timely indication that the problem has been resolved.

If the sensor being used is not a standard 4-20mA device then it may be that the "normal" range of the sensor includes the range below 3.5mA or above 22mA. This can be the case when a modified version of the unit is used to interface with a 0 to 2V sensor for example.

In order to deal with such a situation the "Signal Out of Range" detection may be turned off. This can be done on a per channel basis, so it is possible to disable it for a single channel or for all channels simultaneously.

For more details of how to do this please refer to the DPW421 Web Site Programming Guide in order to change this parameter from the web site.

Alternatively the DPW344 Programming Guide, and specifically the section entitled "Get/Set Error Inhibit Mode", describes how to change this parameter locally using a P.C. and a DPA981 Programming Adapter.

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FILL MODE

Primarily "Fill Mode" is provided to allow the display to be updated more often for a programmable period of time, in order to allow the person filling the tank to judge when it is approaching full.

It may also be used to simply update the local display in between the normal periodic readings, in order to confirm that the displayed level or pressure is actually correct.

To place the unit into "Fill Mode" position the magnet over SW1 button for approximately 3 seconds until red led illuminate and "FILL" appears in the display.

F ILL

"FILL" will appear on the display in response to pressing the "FILL" button.

"FILL" will remain on the display for around five seconds before being replaced with the current tank level data again. For the duration of this fill cycle the display will blink periodically to indicate that "Fill Mode" is active.

"Fill Mode" is triggered on all active channels simultaneously. If the DPW344 unit is used to monitor two tanks, then the tank that is not currently filling will automatically discontinue "Fill Mode" after 15 minutes.

This decision to discontinue "Fill Mode" is based upon the requirement for a half percent rise in level after 15 minutes on an actively filling channel.

This feature is used to prevent "Fill Mode" from continuing to update the display when it was simply used to obtain a current reading rather than at the start of a true tank fill cycle.

If a rise in tank level is detected at the end of the fill cycle, then data may be forwarded to the appropriate web page in order to cause it to show the fill event in a more timely manner.

The duration of the fill cycle, and the requirement for a web page update at the end of the fill cycle are both programmable features. These parameters may also be programmed differently for each active channel.

For more details of how to do this please refer to the DPW344 Web Site Programming Guide in order to change these parameters from the web site.

Alternatively the DPW344 Series Programming Guide, and specifically the sections entitled "Get/Set Fill Mode Time" and "Get/Set Fill Alarm Enable", describes how to change these parameters locally using a P.C. and a DPA981 Programming Adapter.

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DEBUG MODE

In order to allow an engineer on site to perform important diagnostic tests without the need for specialist measurement equipment, the unit may be placed into a mode called "Debug Mode".

Whenever this function is activated, key system parameters are listed on the LCD display, in order to allow the correct operation of the unit to be confirmed, or an operational problem to be resolved.

In order to enter "Debug Mode", Positioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. As soon as the display changes to show the word "DEBUG" remove the magnet.

The following graphics describe the various parameters, which will be shown in turn, each separated by a delay of a couple of seconds or so.

It is possible to exit from "Debug Mode" at any time after "DEBUG" disappears from the display by simply by positioning the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously hold the position until the unit return to level reading then remove the magnet.

It is also possible to skip forward through the different debug parameter groups by making use of the "MODE" button. The "FILL" button allows you to skip backwards.

Note that skipping forwards and backwards is only possible whilst the debug parameter group heading is shown on the display. Whilst "CHAN 1", "CHAN 2", "BATT", "RADIO", "TIME", or "OTHER" are shown you will be able to navigate through the parameter groups, at all other times the "FILL" and "MODE" buttons have no effect individually.

In order to enter "Debug Mode" Positioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously until "DEBUG" appears on the display.

This message confirms that the unit has entered "Debug Mode". You should release both buttons at this point.

Make sure that you release the "FILL" and "MODE" buttons as soon as "DEBUG" appears on the display.

This message confirms that the diagnostic information relating to Channel 1 is about to be displayed.

If Channel 1 is not of interest at this time, you may press the "MODE" button at this point to skip to Channel 2 diagnostics.

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1-rEAd

The system will then power Channel one's 4-20mA, and this message will remain on the display throughout the sensor stabilisation period.

1- 11.36

As soon as the sensor stabilization delay is over, the loop current is measured and then displayed for Channel 1.

The current is shown directly in mA, in this case 11.36mA.

CHAN 2

This message confirms that the diagnostic information relating to Channel 2 is about to be displayed.

If Channel 2 is not of interest at this time, you may press the "MODE" button at this point to skip to Supply diagnostics.

You may return to Channel 1 diagnostics by pressing the "FILL" button.

2-rEAd

The system will then power Channel two's 4-20mA, and this message will remain on the display throughout the sensor stabilisation wait.

2- 11.63

As soon as the sensor stabilization delay is over, the loop current is measured and then displayed for Channel 2.

The current is shown directly in mA, in this case 11.63mA.

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SUPPLY

This message confirms that the diagnostic information relating to the unit's power supply is about to be displayed.

If battery diagnostics are not of interest at this time, you may press the "MODE" button at this point to skip to Radio diagnostics.

You may return to Channel 2 diagnostics by pressing the "FILL" button.

bП- 7.1

The battery voltage is displayed directly in Volts.

rAd IO

This message confirms that the diagnostic information relating to the unit's Wide Area Network radio is about to be displayed.

If the Radio diagnostics are not of interest at this time, you may press the "MODE" button at this point to skip to the Time/Date diagnostics.

You may return to Power Supply diagnostics by pressing the "FILL" button.

SS- 28

In this example the GSM network Signal Strength is displayed as 28, which is a good signal level.

This values varies in the range 00 (low signal) to 31 (high signal).

Values in single digits should give cause for concern !!

П-GSПП

In order to confirm the Wide Area Network radio type that is (or should be) fitted to this unit, the network type is displayed.

In this example the software is expecting a Motorola g24/h24 GSM radio, but this could also indicate a Motorola c18 CDMA radio.

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ᵗ ΙΠΠΕ

This message confirms that the diagnostic information relating to the Time and Date stored within the unit is about to be displayed.

If the Time/Date diagnostics are not of interest at this time, you may press the "MODE" button at this point to skip to the Miscellaneous diagnostics.

You may return to Radio diagnostics by pressing the "FILL" button.

ᵗ- 13.10

In this example the Time is reported as 13:10 in 24 hour format.

d-09.14

The Date is reported as 14th September in U.S. format (i.e Month followed by Day of Month).

The year is reported as 2010.

y-2010

If the date is reported as 1st January 2000, then the system has not yet managed to obtain the time from the Wide Area Network.

To rectify this, perform a TEST Transmission, and then re-check the Date and Time.

ΟᵗΗΕΓ

This message confirms that the diagnostic information relating to the remaining Miscellaneous system functions is about to be displayed.

If the Miscellaneous diagnostics are not of interest at this time, you may press the "MODE" button at this point to skip to the Channel 1 diagnostics.

You may return to Time/Date diagnostics by pressing the "FILL" button.

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tE - 73

This parameter shows the temperature measured within the case in Degrees F.

SU - 1.0

This parameter details the "main unit" application software version.

This software defines the functionality of the unit, including the type of Wide Area Network radio supported.

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FORCING A GSM DATA TRANSMISSION

In order to allow data transmission across the GSM network to be tested, the user can force the DPW344 unit to perform a test transmission on all active channels.

It is also possible to force the unit to perform an immediate periodic data transmission, which will serve as an immediate web data update for all active channels holding "new and undelivered" logging data.

"New and undelivered" simply means that the unit has performed a scheduled reading on the given channel since the last scheduled data transmission or following power up prior to installation.

Both of these functions are accessed via the "Debug Mode" initial screen, via the individual use of the "FILL" and "MODE" buttons.

If by accident you wait too long, and fully enter "Debug Mode" positioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously to exit from "Debug Mode". The unit returns back to a level reading. It is then possible to re-enter "Debug Mode", by repeating the above steps "FILL" and/or "MODE" buttons to trigger the correct function.

The three functions described above are accessed via the following buttons:

"FILL"   – GSM Test Transmission on all active channels.
"MODE"   – GSM Data Transmission on all active channels.

Every GSM transmission cycle will progress through the following phases:

1. Network Registration (always occurs).
2. Message Transmission (always occurs).
3. Search for incoming Messages (always occurs).
4. Response To Incoming Messages (only occurs if valid message(s) were received).
5. Perform A Time Update Transmit And Receive Cycle (only if the unit when time is not set).

The graphics on the following pages will show the sequence of events in each of the three functions described above:

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1. GSM Test Transmission.

In order to send a test transmission positioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. The display changes to show the word "DEBUG" position the magnet over **SW1** the Red Led illuminate the display show TEST remove the magnet.

dEbUG

This message confirms that the unit has entered "Debug Mode".

Slowly slide the magnet to the left over SW1 The red LED illuminate until "TEST" appears on the display remove the magnet. Repeat the steps if necessary
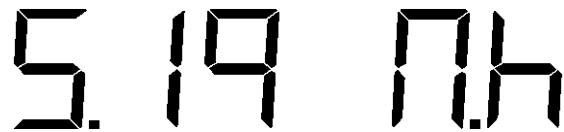
tESt

The "TEST RADIO" indication confirms that the TEST transmission request has been accepted, and the Motorola g24/h24 radio is about to be powered up in order to handle the message transfer.

LOG-ON

"LOG-ON" will remain on the LCD display until the Motorola g24/h24 GSM radio has located a GSM network, and completed the registration process.

If this registration process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

5.19 N.h

As soon as the registration process is completed, the display will indicate the signal strength, and the roaming status of the connection.

Signal strength varies in the range 00 (low) to 31 (high), values in single digits should give cause for concern.

N.h indicates registration on the "home" GSM network, whilst N.r indicates "roaming".

The "SEND" indication confirms that the unit is preparing the data for transmission.

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SENd

t14 C1

This screen details the message type number (in this case 14), and the channel number to which it relates (in this example channel 1) for the data currently being transmitted.

This message will remain on the display until the data is successfully transmitted, or the transmission fails.

dOnE

The "DONE" message indicates that the data has been successfully transmitted in this case.

If the transmission process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

SENd

The "SEND" indication confirms that the unit is preparing the data for transmission on the next channel.

t14 C2

This screen details the message type number (in this case 14), and the channel number to which it relates (in this example channel 2) for the data currently being transmitted.

This message will remain on the display until the data is successfully transmitted, or the transmission fails.

dOnE

The "DONE" message indicates that the data has been successfully transmitted in this case.

If the transmission process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

The "SEND" indication confirms that the unit is preparing the data for transmission on the next channel.

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SENd

The "RECEIV" indication confirms that the unit is preparing to look for incoming configuration change data.

rECE IV

This is a relatively rare event and so normally this message will be followed by the "NO-RCV" indication shown below.

The "NO-RCV" indication shows that there were no "configuration change" data messages pending.

NO-rCV

The Data Transmission example below includes a "configuration change" data message reception and response cycle.

This could   occur as part of a Test transmission too.

If the DPE421 series unit has not yet managed to acquire the time and date from the GSM network (following a recent re-boot or at power up), then the optional time update cycle will be performed as described in the following graphics.

t IME

The Data Transmission example below does not include this cycle as an indication of what "normally" happens.

The process of aquiring the date and time from the GSM network involves sending an SMS message back to the unit's own GSM radio.

SENd

Upon receipt of this message, the "transmission time stamp" can be extracted as a fairly accurate indication of the current date and time.

This screen details the message type number (in this case 6), and the channel number to which it relates (in this example channel 1) for the data currently being transmitted.

Rather than being transmitted to the web data server as normal, this message is routed directly back to this unit by the "home" GSM network.

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t06 C1

dOnE

The "DONE" message indicates that the data has been successfully transmitted in this case.

If the transmission process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

rECE 1U

The "RECEIV" indication confirms that the unit is preparing to look for the message which has just been transmitted.

It will be returned to the GSM radio from the "home" GSM network.

t06 C1

This screen details the message type number which has just been received along with the channel number.

Note that this is exactly the same as the message sent a couple of steps earlier in the time and date update process.

If this process fails the display will show "RE-TRY" to indicate that the process will be repeated when the next data transmission cycle falls due.

See the "Exception and Error Condition" section of this manual for further details.

132.5

Upon completion of the Test Transmission process the display(s) return to their normal function.

The current product level and/or pressure will be shown as they were before the Test Transmission process was initiated.

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2.GSM Data Transmission.

In order to send a Data transmission ppositioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. As soon as the display changes to show the word "DEBUG" position the magnet over **SW2** the Green Led illuminate the display show DATA remove the magnet.

debUG

This message confirms that the unit has entered "Debug Mode".

You should now release both buttons before pressing and holding the "MODE" button until "DATA" appears on the top display and "RADIO" appears on the bottom display.

dAtA

The "DATA" indication confirms that the unit is preparing the data for transmission.

LOG-ON

"LOG-ON" will remain on the LCD display until the Motorola g24/h24 GSM radio has located a GSM network, and completed the registration process.

If this registration process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

5.19 N.h

As soon as the registration process is completed, the display will indicate the signal strength, and the roaming status of the connection.

Signal strength varies in the range 00 (low) to 31 (high), values in single digits should give cause for concern.

N.h indicates registration on the "home" GSM network, whilst N.r indicates "roaming".

SENd

The "SEND" indication confirms that the unit is preparing the data for transmission.

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┝00 ⊏ ¦

This screen details the message type number (in this case 00), and the channel number to which it relates (in this example channel 1) for the data currently being transmitted.

This message will remain on the display until the data is successfully transmitted, or the transmission fails.

d0∩E

The "DONE" message indicates that the data has been successfully transmitted in this case.

If the transmission process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

┌ECE ¦U

The "RECEIV" indication confirms that the unit is preparing to look for incoming configuration change data.

In this example a logging configuration update message is received which will update the data logging parameters for channel 1.

d0∩E

The "DONE" indication as opposed to the more normal "NO_RCV" message shows that an incoming configuration change message has been detected.

This screen describes the message type number which has just been received, (in this case 12) along with the channel number to which the message refers.

┝ ¦2 ⊏ ¦

If the received message cannot be decoded correctly then an appropriate error message will be displayed.

See the "Exception and Error Condition" section of this manual for the correct interpretation of these error messages.

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SENd

If the received message is decoded correctly a message will be sent back in response to indicate that the configuration changes have been accepted.

The "SEND" indication confirms that the unit is preparing this data for transmission.

t13 C1

This screen details the message type number (in this case 13), and the channel number to which it relates (in this example channel 1) for the data currently being transmitted.

This message will remain on the display until the data is successfully transmitted, or the transmission fails.

dOnE

The "DONE" message indicates that the data has been successfully transmitted in this case.

If the transmission process fails, one of the error messages detailed in the "Exception and Error Condition" section of this manual below will be displayed.

132.5

Upon completion of the Test Transmission process the display(s) return to their normal function.

The current product level and/or pressure will be shown as they were before the Test Transmission process was initiated.

GSM Exceptions and Error Conditions

The following graphics show examples of the error and exception messages, which can appear at the various stages of the "Debug Mode" message transmission and reception cycles, as well as G.P.S. fix and transmission cycles.

For each graphic there is a discussion of the cause of the error or exception message, and the scenario under which such an error message will be presented. An attempt is also made to suggest diagnostic tests, which may assist in resolving the root cause of the problem.

1. NO GSM NETWORK REGISTRATION

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

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The error message simply means that the Motorola g24/h24 GSM Modem within the DPW344 unit was unable to register on a GSM network in the area.

The cause of this error could be as a result of any of the following problems:
1. The antenna lead is disconnected from the Motorola g24/h24 GSM Modem, or the antenna, or its cable are badly damaged.
2. These is GSM coverage at the current location, BUT the GSM SIM card fitted to the unit is contractually blocked from registering with that network (e.g. a "roaming bar").
3. There is no GSM coverage at the current location.

NO-REG

"NO-REG" indicates that the unit has not been able to register with a GSM network at the current location.
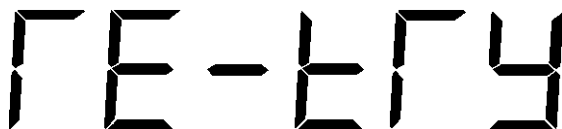
The unit will attempt to register with the GSM network up to 4 times, with each attempt lasting up to 2 minutes.

The "NO-REG" indication will occur after each of the 4 failed registration attempts.

2. TIME UPDATE CYCLE FAILURE
This error message only appears within "Debug Mode" when the unit has failed to acquire the current time and date from the GSM network, following a time update cycle.

The time update process itself is described in the graphics within the "GSM Test Transmission" section above.

RE-TRY

"RE-TRY" indicates that the time update process will be performed again at the next scheduled data transmission, or following a further data/test transmission triggered by the user in "Debug Mode".

3. SIM CARD READER ERROR
This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

The error message simply means that the Motorola g24/h24 GSM Modem on the RM263 GSM radio carrier board within the DPW344 series unit, was unable to communicate with the GSM SIM card.

The most likely cause of the error is that there is actually no SIM card fitted, but it could also be caused by a fault on the RM263 GSM radio carrier board, or the Motorola g24/h24 GSM modem itself.

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Err.201

"ERR.201" indicates that the Motorola g24/h24 GSM modem on the RM263 radio carrier board is having trouble communicating with the SIM card fitted.

The most likely reason is that no SIM card has actually been fitted yet !!

4. MOTOROLA g24/h24 RADIO COMMUNICATIONS ERROR

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

The error message simply means that the DPW344 unit was unable to communicate with the Motorola g24/h24 GSM Modem on the RM263 GSM radio carrier board.

The most likely cause of this error is a problem with the RM236 radio carrier board, or the Motorola g24/h24 GSM modem itself.

Err.232

"ERR.223" indicates that the DPE421 unit was unable to communicate with the Motorola g24/h24 GSM Modem.

5. DATA TRANSMISSION TIMEOUT

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

This error can occur during the data transmission phase of the communication process. It indicates that a timeout occurred whilst the Motorola g24/h24 GSM Modem was awaiting confirmation of message delivery from the GSM network.

The most likely cause of this error is a low battery voltage, which prevents the Motorola g24/h24 GSM Modem from communicating effectively with the GSM network.

Err.301

"Err.301" indicates that the GSM network has failed to acknowledge receipt of the transmitted message during a data transmission cycle.

The most likely cause is an unusually low battery voltage.

6. DATA TRANSMISSION FAILURE

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

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This error can occur during the data transmission phase of the communication process. It indicates that the GSM network refused to accept the message for transmission.

The cause of this error could be a result of any of the following problems:

1. A low battery voltage, which prevents the Motorola g24/h24 GSM Modem from communicating effectively with the GSM network.

2. An incorrectly programmed SMS Service Center Number, which will in turn attempt to direct the message to a non-existent SMS Service Center on the GSM Network. Check that the SMS Service Center Number programmed in to the DPW344 unit is the correct one for the SIM card fitted.

Err.302

"Err.302" indicates that the GSM network refused to accept the message for transmission.

A low battery voltage, or an incorrectly programmed SMS Service Centre Number are the most likely causes of this error.

7. DATA RECEPTION ERROR (ID MISMATCH)
This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

This error can occur during the data reception phase of the communication process. It indicates that the GSM network supplied a message, which contained an ID not matching that of the DPW344 unit (or a message containing no ID at all in fact !!).

This error message is normally seen as a result of a rogue unsolicited SMS message being received by a DPW344 series unit. One example of such a message would be a network information or advertising message ("spam") sent to many GSM network users.

A more significant appearance of this error message results from a mis-matched DPW344 unit ID, and GSM telephone number, within the web based configuration database. In this scenario the configuration change message is sent to the wrong telephone number, and as a result the unit ID stored within the message does not match that of the DPW344 unit which received it.

Err.401

"Err.401" indicates that an SMS message was received containing an ID which did not match that of the DPW400 series unit itself.

Normally this occurs as a result of receiving unsolicited "spam" messages from the GSM network.

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8. DATA RECEPTION ERROR (ILLEGAL CHANNEL NUMBER)

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

This error can occur during the data reception phase of the communication process. It indicates that the GSM network supplied a message, which had a matching unit ID, but referred to a channel number greater than 4.

Err.402

"Err.402" indicates that an SMS message was received referring to a channel number greater than 4.

This is a very rare occurrence indeed.

8. DATA RECEPTION ERROR (ILLEGAL DATA FORMAT)

This error message can occur at any point in "Debug Mode" where the unit has been triggered to connect to the GSM network in order to perform the transmission of a test message, logged data message, or a G.P.S. fix message.

This error can occur during the data reception phase of the communication process. It indicates that the GSM network supplied a message, which had a matching unit ID, but an error was detected within the content of the configuration message itself.

Err.403

"Err.403" indicates that an SMS message was received containing invalid configuration information

Again this is a very rare occurrence indeed.

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DPW344

TECHNICAL

SPECIFICATIONS

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DPW344:	Specification	Options
Power Source:	Lithium Tyionyl Chloride Battery Pack 7V @ 45Ah.	
Supply Voltage:	N/A	
Battery Life:	5 years typical.	
Temperature Range:	-20 DegC to +50 Deg C Ambient Temperature.	
Enclosure Type:	Ex-Proof Enclosure 210mm x 140mm x 140mm	
Enclosure Material:	Aluminium/Glass.	
Enclosure Rating:	IP67	
Clamping Plate:	60mm x 60mm mounting boss (4 x M5 bolt fixings).	
CE Compliance:	EN 50082-2 immunity, EN 55011 emission, EN 61010-1 safety.	
LCD Display:	One, 6 digit 7 segment LCD displays.	
User Buttons:	Two, multi-function magnetic buttons.	
Calibration:	Pre-calibrated - post calibration available on DataOnline website.	
Security:	Password protection on all access to DataOnline website.	
Analog Input:	2 Analogue Inputs 4-20mA, loop voltage settings of 15V and 24V available.	
Memory:	27 data point FIFO buffer per channel.	
Remote Reporting:	GSM messaging protocol to DataOnline Web Site. Reporting period programmable from once every 15 minutes to once every 24 hours (separately programmable for each channel).	
Logging Period:	Logging period programmable from once every 15 minutes to once every 24 hours (separately programmable for each channel).	
Alarms:		
Direct Connection:	RS232C to P.C. or P.D.A. via DataOnline supplied programming adaptor.	Optional programming adaptor.
Empty Cable Gland:		
Sensor Support:		
Sensor Specifications:		
Fittings:		

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Quick Reference Guide

FILL MODE

To place the unit into "Fill Mode" position the magnet over SW1 button for approximately 3 seconds or until red led illuminate and "FILL" appears in the display.
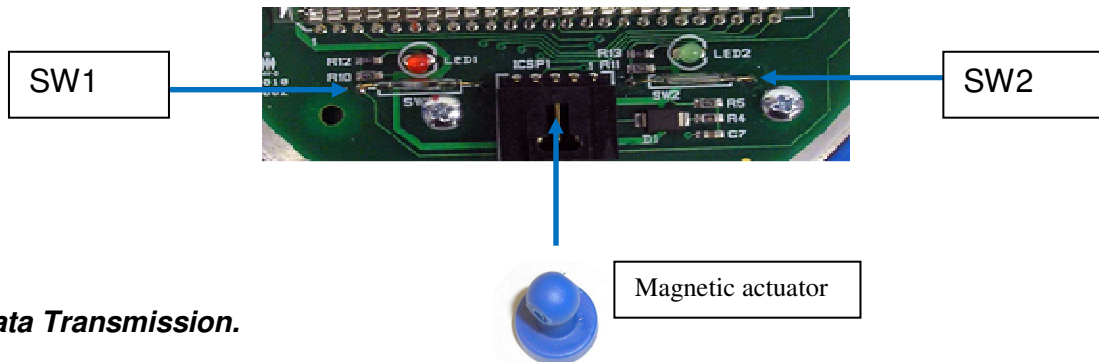
Magnet over SW1
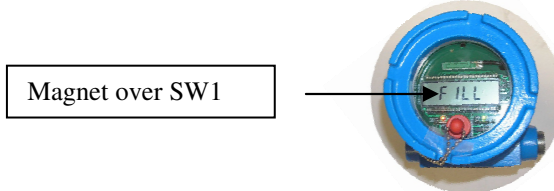
DEBUG MODE

In order to enter "Debug Mode", Positioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. As soon as the display changes to show the word "DEBUG" remove the magnet.

1. GSM Test Transmission.

In order to send a test transmission ppositioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. As soon as the display changes to show the word "DEBUG" position the magnet over **SW1** the Red Led illuminate the display show TEST remove the magnet.
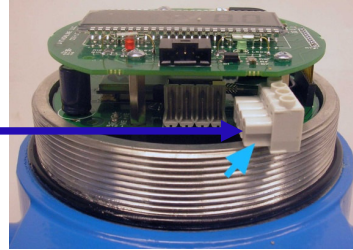
SW1

SW2

Magnetic actuator

2.GSM Data Transmission.

In order to send a Data transmission ppositioned the magnet at a central location between the two buttons, SW1 & SW2 both LED will illuminate simultaneously. As soon as the display changes to show the word "DEBUG" position the magnet over **SW2** the Green Led illuminate the display show DATA remove the magnet.
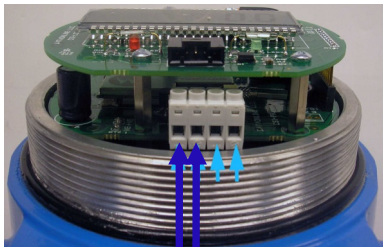
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Connecting Sensors

- Remove sensor connector (see example)

Remove Connector

- Connect Sensor (see example)

WHITE | **+ -** | BLACK

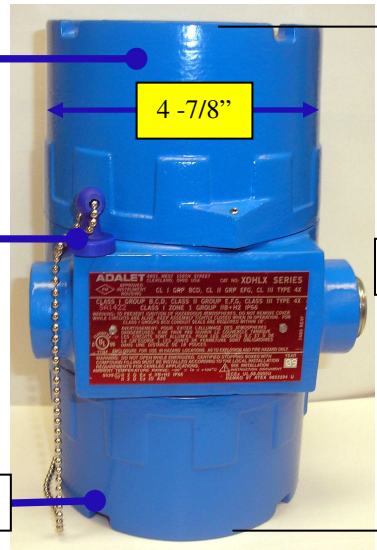ID FFXXXXXX

SW1 FILL

SW2 MODE

ATTENTION
To operate the magnetic button find the magnetic actuator and position it on the top glass.

(See quick reference guide)

Replacing the Battery

Open the battery compartment release the battery clip, attach the new replacement battery.
Perform a test transmission.

Top Cover

4 -7/8"

Magnetic actuator

8 -1/4"

Battery Compartment