



# **MODEL 2882-OWS**

## **Oil/Water Separator & Sump Alarm**

### **User Manual**

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<i>MODEL:</i>	
<i>HARDWARE NO.:</i>	5.0
<i>SOFTWARE NO.:</i>	
<i>SERIAL NO.:</i>	

## TABLE OF CONTENTS

1.0	INSTRUMENT OVERVIEW .....	3
1.1	Features .....	5
1.2	Model Number vs. Voltage Input .....	5
1.3	Specifications .....	5
2.0	INSTALLATION.....	7
2.1	Controller Installation.....	7
2.2	Probe Installation.....	7
2.3	Electrical Installation.....	8
2.4	Glossary of Symbols .....	9
3.0	STARTUP AND CALIBRATION .....	10
3.1	Startup.....	10
3.2	Menu Flow Chart Background Information.....	10
3.2.1	Menu Description .....	10
3.2.2	Menu Flow Chart.....	10
3.2.3	Data Entry .....	11
3.3	2882 Controller Calibration.....	11
3.3.1	Site Calibration .....	11
4.0	SETUP and ALARMS .....	12
4.1	2882 Controller Setup .....	12
4.2	2882 Controller Alarms.....	13
4.3	2882 Controller Network.....	13
4.3.1	Modbus Configuration .....	13
4.3.2	2800 Series Modbus Register Mapping .....	14
5.0	TROUBLESHOOTING .....	15
6.0	FLOW CHARTS .....	16

## TABLE OF FIGURES

Figure 1	– Typical 2882-OWS Oil / Water Separator Application .....	3
Figure 2	– Typical 2882-OWS Sump Application.....	4
Figure 3	– Probe Installation .....	7
Figure 4	– Electronics PCB Overview .....	8

## 1.0 INSTRUMENT OVERVIEW

The Arjay Oil/Water Separator & Sump Alarm provides a means for detecting the accumulation of oil in oil/water separators, sumps, or similar vessels. The Arjay probe has an active capacitance sensor at the probe tip that monitors the water at the depth of the active probe end. Water has a high dielectric constant, which results in a high capacitance reading. Oil (or a similar hydrocarbon or low dielectric liquid) separates to the surface of the water and eventually accumulates to a depth that the oil/water interface crosses the active probe tip. The dielectric of the oil is substantially lower than water, which results in a dramatic decrease in capacitance.

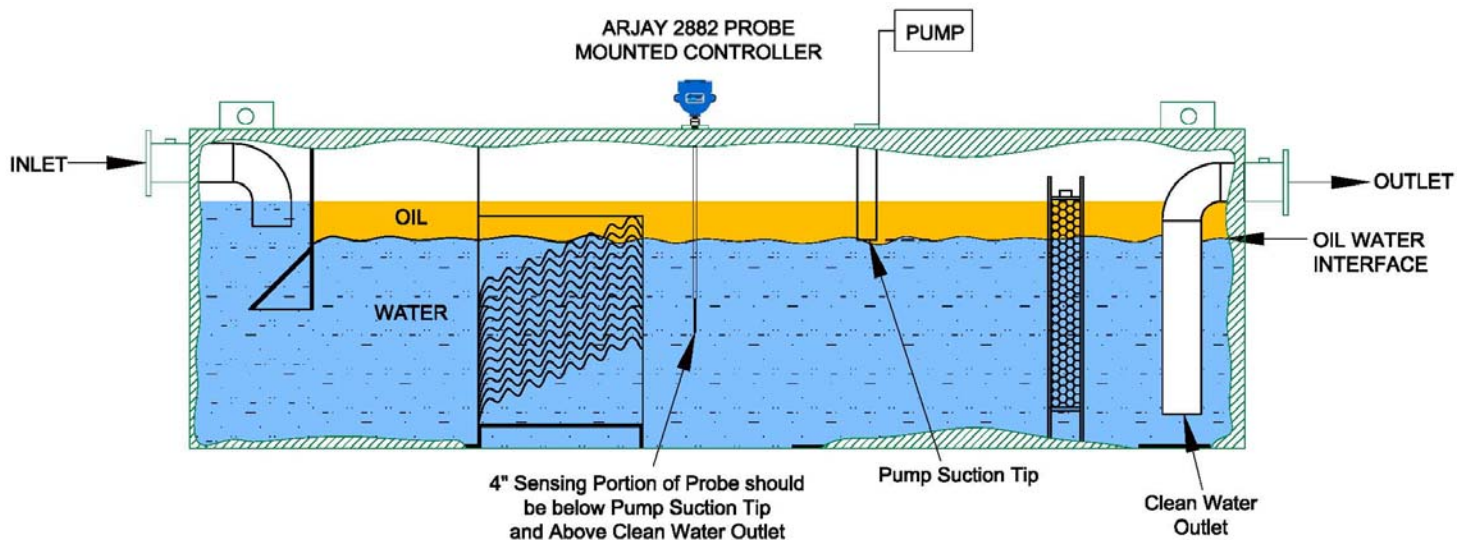
The Probe mounted Arjay 2882 controller monitors the capacitance change of the probe and activates a relay contact for use with alarms, pumps, valves, etc. The sensor requires at least 6 mm of oil to cross the active probe to indicate an alarm. Emulsified separations may require more coverage of the probe tip to initiate an alarm. The active probe tip is made to 100mm to accommodate for these emulsified interfaces.

The complete 2882-OWS system consists of the probe and the 2882 controller. The standard probe is constructed of a Teflon coated probe with SS inactive sheath.

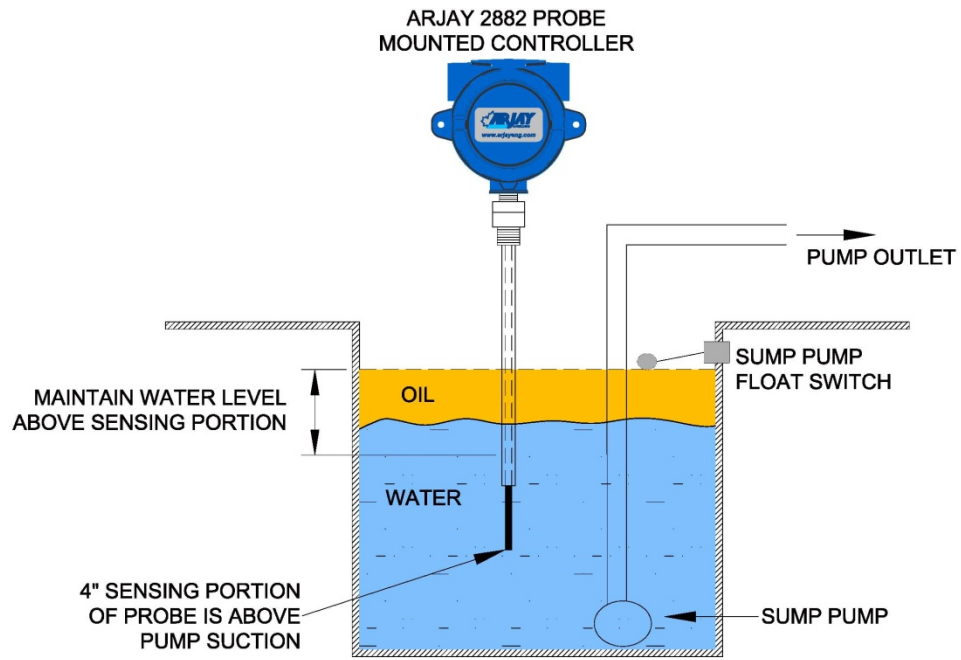
The Oil/Water Separator must be of the type that is permanently filled with water. The clean water is gradually displaced from the vessel as oily water is introduced. The active sensing tip of the probe is positioned below the oil suction pipe and above the clean water discharge pipe. When the oil/water interface reaches the probe tip, the alarm activates.

Sumps normally have a pump with the suction on the pit bottom. The liquid level of the sump is maintained above the probe tip with a separate level device so that the probe tip is continuously in liquid. If there is sufficient accumulation of oil that it risks suction by the pump, the alarm activates.

A dry probe tip condition in either application will indicate an alarm.



**Figure 1 – Typical 2882-OWS Oil / Water Separator Application**



**Figure 2 – Typical 2882-OWS Sump Application**

## 1.1 Features

- Microprocessor based capacitance Controller
- Relay and 4/20mA alarm output
- Modbus protocol via RS-485 for access by Arjay handheld, Central Access Panel or compatible system
- Local Auto calibration or remote calibration via network
- User specified custom features may be added by contacting Arjay Engineering Ltd.

## 1.2 Model Number vs. Voltage Input

- 2882-OWS-1 100-240 VAC power input
- 2882-OWS-3 12 VAC power input
- 2882-OWS-4 24 VAC power input

## 1.3 Specifications

**Power Input:** 24 VDC or 12 VDC, 250mA maximum  
100-240 VAC, 50/60 Hz, 150mA maximum

**Note:** DC input models must be supplied by Limited Energy power source. Limited Energy means compliance with one of the following requirements:

- Class 2 circuit according to Canadian Electrical Code, Part, I, C22.1;
- Class 2 circuit according to National Electrical Code, NFPA-70;
- Limited Power Supply (LPS) according to IEC 60950-1;

Limited-energy circuit according to IEC 61010-1.

### User Interface:

Display & Keypad Two line LCD with display of Alarm Condition and menus  
Select menu or enter values by keypad

Communication Interface: RS-485 Modbus

### Analog /Relay Outputs:

mA Signal Output 4 mA during Normal and 20 mA during an alarm condition, 900 Ohms max (24VDC),

Relay Output 2 SPDT relay, dry, N.O. Contact 5 A @ 250 VAC (Resistive) and N.C. Contact 3 A @ 250VAC (Resistive), selectable failsafe or non-failsafe, selectable high or low acting alarm, programmable time delay: 0 – 600 seconds

\*\*Note: If Isolation is ordered then relays are not available.

### Instrument Performance:

Setpoint Range Submerge active probe tip to desired alarm point  
0 - 1000 pF (most applications are 100pF to 500pF)

Accuracy 0.2% of setpoint based on clean interface

Resolution 0.05% of setpoint via network display  
0.002% of Full Scale capacitance via network display

Calibration single point Auto calibration

**Environmental:**

Operating Temperature      -20 to +55 °C Controller  
   -60 to +260 °C Probe

Relative humidity              0 to 95% (non-condensing)

Installation Category        II

Pollution Degree             2

**Mechanical Specification:**    Refer to dimensional drawing

## 2.0 INSTALLATION

**NOTE:** If any damage to the instrument is found, please notify an Arjay Engineering representative as soon as possible prior to installation.

### 2.1 Controller Installation

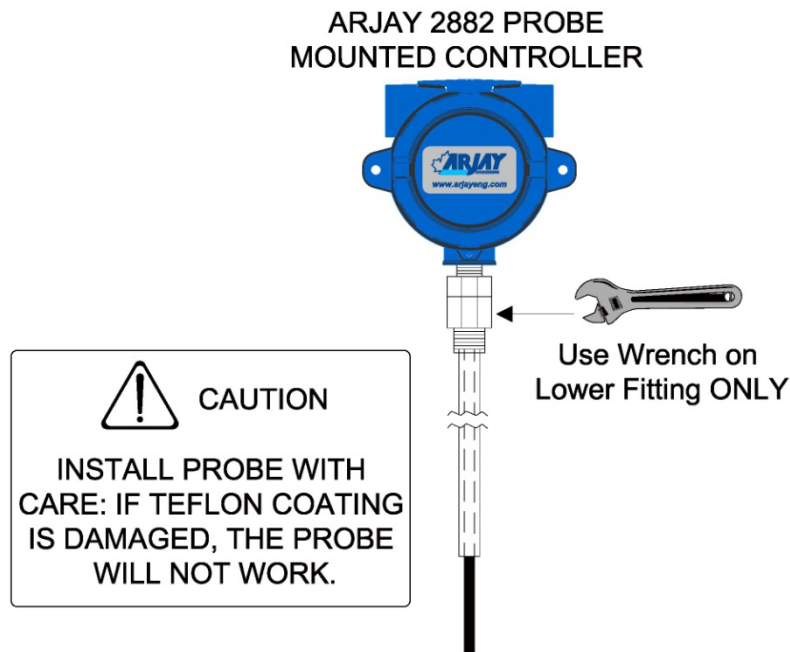
Choose the mounting location in accordance with good instrument practice. Extremes of ambient temperature and vibration should be avoided (see specifications and installation drawing).

**Important Note: The controller operates in a Failsafe mode.** This means that the relays are in an energized state during normal operation. The N.O. relay contact will be held closed and the N.C. relay contact will be held open during a normal condition. This will allow the relay to return to it's non-energized (shelf) state during an alarm, fault or power failure condition. Wire accordingly.

### 2.2 Probe Installation

The probe length is custom ordered to the tank or sump requirements. Determine the probe length so that the alarm point is approximately 50 mm above the probe tip (halfway point on the active probe). The active probe is the exposed 100 mm white Teflon probe.

**The controller should be mounted above the water surge level and in a protected area.**



**Figure 3 – Probe Installation**

**NOTE:** To ensure proper operation and electrical safety, make sure the 2882 enclosure is electrically grounded.

## 2.3 Electrical Installation

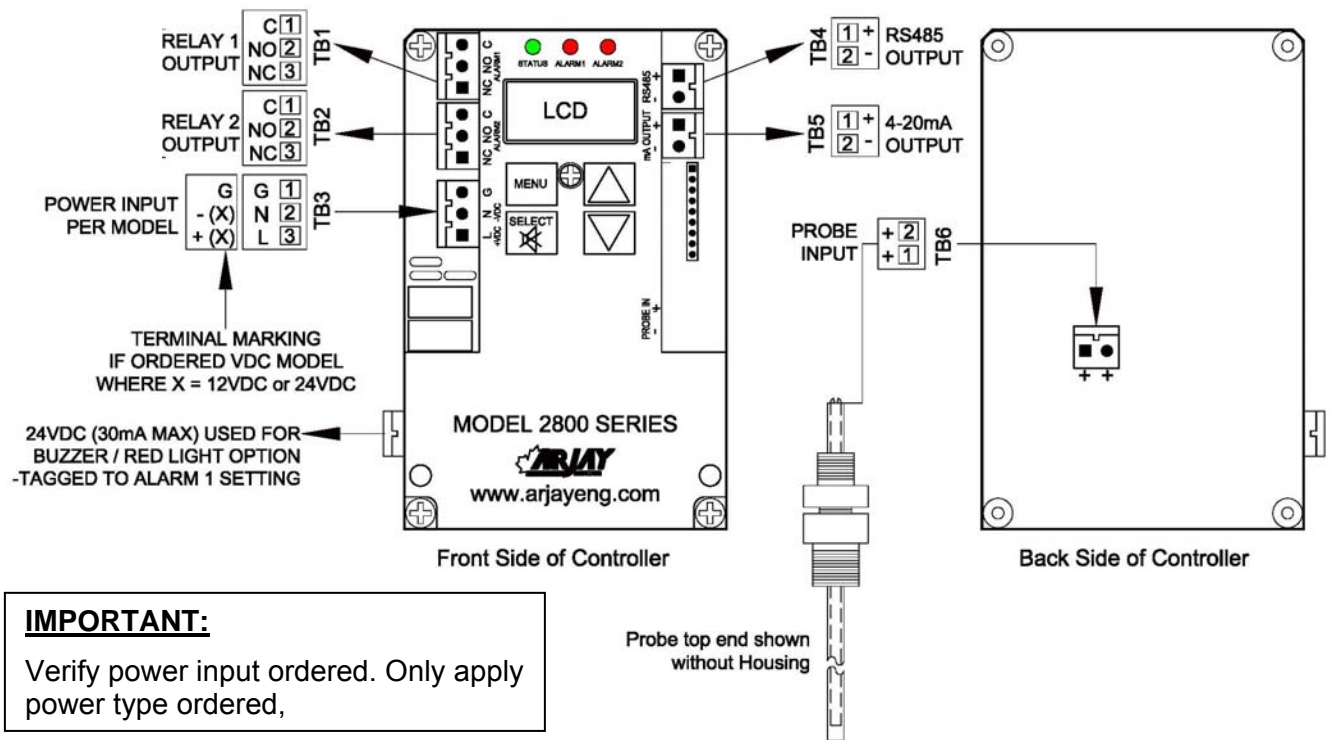


Figure 4 – Electronics PCB Overview

### TB1/TB2 - Relay Output

2 SPDT relay, Dry, N.O. Contact 5 A @ 250 VAC (Resistive) and N.C. Contact 3 A @ 250VAC (Resistive), selectable failsafe or non-failsafe, selectable high or low acting alarm, programmable time delay: 0 – 600 seconds

### TB3 - Power Input

Power input as per Model. Check if ordered AC or DC. Earth ground is connected to G.

### TB4 - Network Output

Connect RS485 + and – to the network D+ and D-.

### TB5 - 4/20 mA Output



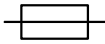
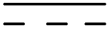




The 4/20 mA is a sourced output referenced to Ground. It is not loop powered.  
 4mA = Normal                      20mA = Alarm

### TB6 - Probe Input

Probe input is wired by the factory. The terminal block is disconnected during shipment for static reasons and has to be re-connected during installation. TB6 has two “+” connections. Either is acceptable.



## 2.4 Glossary of Symbols

	Attention, consult accompanying documents Attention, veuillez consulter les documents ci-joints.		
	Protective Earth Terre de protection		Fuse Coupe-circuit; fusible
	Direct Current (DC) Courant continu		Normally open relay contacts Contacts travail
	Normally closed relay contacts Contacts Repos		Power off Arrô (mise hors tension)
	Power on Marche (mise sous tension)	<b>L</b>	Live Sous tension
<b>N</b>	Neutral Neutre	<b>G</b>	Ground Terre

## 3.0 STARTUP AND CALIBRATION

### 3.1 Startup

Check the power wiring. Confirm that probe is hooked up to TB6 (Probe Input) as per Figure 4 and is wired in accordance with the electrical installation drawing.  
Power On the unit.

The Status LED on the controller circuit board should be green. A red Status LED indicates a fault condition. If red, check the Troubleshooting section 5.0.

**The unit is pre-configured and tested at the factory. However, a quick field calibration is required after power up to tune the sensor to the installation and cable conditions. See section 3.3 to calibrate the 2882-OWS .**

### 3.2 Menu Flow Chart Background Information

#### 3.2.1 Menu Description

The 2882 has a password protect feature. The default password is 2000. Since the 2882 controller has a compact LCD, some menu descriptions may be in short form. The following are the menu descriptions:

<i>Alrm:</i>	<i>Alarm</i>
<i>Alrm Lvl:</i>	<i>Alarm level</i>
<i>Alrm Del:</i>	<i>Alarm Delay</i>
<i>ALRM CAL:</i>	<i>Alarm Calibration</i>
<i>Cal:</i>	<i>Calibration point</i>
<i>Cal Err:</i>	<i>Calibrate err</i>
<i>Cal Ok:</i>	<i>Calibrate ok</i>
<i>Cal only:</i>	<i>Calibrate Only</i>
<i>Cal Pt:</i>	<i>Calibration Point</i>
<i>Diags:</i>	<i>Diagnostics</i>
<i>mA out:</i>	<i>mA output</i>
<i>Sec:</i>	<i>Seconds</i>
<i>SENSTVITY:</i>	<i>Sensitivity</i>
<i>^SP:</i>	<i>Relay Setpoint Hi action</i>
<i>vSP:</i>	<i>Relay Setpoint Low action</i>

#### 3.2.2 Menu Flow Chart

The 2882 controller will display **Normal** in its normal operating condition and **Alarm** during an oil alarm or dry sensor condition.

From the main menu, you can select **Cal Only, View, and Change**.

**Cal Only** allows a calibration based on a factory or custom pre-configuration. In most applications, this is the only menu item required after the initial power-up. The calibration is required at site after power up or anytime a component or sensor is changed out. A password is required to enter this and is described in the calibration section.

**View** allows an operator to view the **Calibration** setpoint in pF, the **Alarms** settings such as low or high action, failsafe or non-failsafe and the 0-600 second delay, the **Diagnostics** of raw readings and the **Setup** values such as sensitivity and ID address. This can be viewed without a password and without risk of changing any values. This information may be requested during technical assistance inquiries.

**Change** is password protected and allows an operator to change the configuration set-up values indicated in the View. Changes could be required for special applications or to re-set the values to the factory default.

### 3.2.3 Data Entry

Data Entry

Press <▲> / <▼> key to increase / decrease the digital value.

Press <SELECT> key to move the cursor.

Press <MENU> key to abort certain screens

## 3.3 2882 Controller Calibration

Power up the 2882 Controller. The status LED should be green. The LCD should go to the standard operating screen as below after a series of the following. It may read **Normal** or **Alarm** until a calibration is performed.



### 3.3.1 Site Calibration

A factory pre-configuration and set-up has been defaulted into the 2882-OWS. As such, a user set-up is not required in the field. A basic calibration is only required.

As per the Flow Chart, press and hold the Menu key for 5 seconds to enter the main menu. The display will read the first menu item **Cal only**. Press select key, enter password "2000". A pF reading of the sensor will be displayed. Press select to acknowledge and then press select to accept the new calibration. To abort, press the <MENU> key.

If the calibration is successful, the display will return to the main operating display.

To verify the sensor and electronics are responsive, where the installation permits, the probe can be lifted above the water for at least 30 seconds to verify that the control unit alarms. The air simulates an oil condition.

The Alarm1 and Alarm2 LEDs on the circuit will activate red. Place the sensor back into the water and the alarm will clear.

**THIS COMPLETES THE SETUP AND CALIBRATION PROCEDURE FOR THE  
2882-OWS Oil/Water Separator and Sump Alarm**

## 4.0 SETUP AND ALARMS

### 4.1 2882 Controller Setup

The 2882 controller has the following Setup parameters:

#### 1. Sensitivity

The sensitivity determines the amount of pF change required to cause an alarm. The factory default setting is 3.0 pF. Increasing the pF value will increase the amount of oil required to cause an alarm. Since different oils and the conditions of the oil/water separation can affect the pF change, a direct pF to alarm point relationship cannot be factory determined. If this is changed in the field, it should be tested to confirm an alarm.

#### 2. Alarm Calibration above or below setpoint

This setting advises the controller if the calibrated pF value is above or below the alarm setpoint. For the OWS, the calibration pF value is above the setpoint because the unit is required to alarm at a lower pF value, which indicates oil. The factory default is Above Setpoint.

#### 3. Defaults

Factory settings are pre-configured into the unit based on the most typical set-up required for this application. This provides for a quick and easy calibration at site but can be changed for special applications. If the setup has been changed, selecting default will reset the factory defaults.

#### 4. Net ID

The ID number is used only for network applications. To communicate on a network, each controller must have a unique ID number. The factory default ID number is 1.

Important: If multiple units on a network have the same address, network errors will result.

#### 5. Filter

Data filtering is used to smooth data from a sudden change and minimize fluctuating readings. For example, a 5 second setting means the calculated value of the capacitance and resulting values of pF will start to respond immediately but will take 5 seconds to reach their final values. The factory default is 0 to provide an immediate and active response. This can be user selected from 0 – 99.9 seconds.

## 4.2 2882 Controller Alarms

The two relays on the 2882 operate together. The follow parameters are available as a common setting to the two relays:

1. **Delay.** Minimum time in seconds for an alarm to exist before the relays change to an alarm state. The relay alarm state depends on the Relay Action and Failsafe settings. The factory setting is 20 seconds to suppress false alarms due to sudden of intermittent flows or disturbances in front of the sensor.
2. **Action.** This determines if the Alarms LEDs should activate when the pF reading rises above or below the setpoint. The factory default is below the setpoint because the application of water to oil is a decrease in capacitance.
3. **Failsafe.** Failsafe typically means that the relay is held in an energized state when in a normal operating condition as opposed to an alarm condition. In an alarm condition, the relay de-energizes which is identical to when the instrument power is shut off. The rationale is that the alarm condition should match the Power Fail condition. The factory default is Yes for Failsafe.

## 4.3 2882 Controller Network

The 2882-OWS Controller may be monitored and calibrated via RS-485 protocol compatible digital communications.

Typical features are:

### 1. Ease of wiring in multiple level point monitoring:

Up to 255 Model 2882's (or other Arjay 2800 Series level monitors) may be connected together in a daisy chain (2 wire communication plus power wiring) connection to an Arjay Remote Access monitor or customer control system which allows viewing data and setup of any of the transmitters on the network. The relay and analog outputs may still be used if necessary.

### 2. Setup for the 2882 for network operation:

Each 2882 transmitter must have a unique ID number to connect in a network system.

### 4.3.1 Modbus Configuration

Parameter settings: 9600 Baud Rate; Even Parity, 8 Data Bits and 1 Stop Bit.

Wiring connection: RS485 (+) connect to D+; RS485 (-) connect to D-.

### 4.3.2 2800 Series Modbus Register Mapping

REG	Zero Based	DESCRIPTION	TYPE	No. of Reg
40001	0	Serial Number	float	2
40003	2	Hardware Rev / Software Rev	byte	1
40004	3	Sensitivity / Mode	byte	1
40005	4	Instrument Status	int	1
40006	5	Model / Modbus Address	byte	1
40007	6	Relay2 Setup / Relay 1 Setup	byte	1
40008	7	Password	int	1
40009	8	XA "A" cal parameter	float	2
40011	10	XK "K" cal parameter	float	2
40013	12	XC "C" cal parameter	float	2
40015	14	Filter	float	2
40017	16	Slope – pF per % level	float	2
40019	18	Offset – pF for empty vessel	float	2
40021	20	mA output span value	float	2
40023	22	mA output Zero value	float	2
40025	24	mA output Trim Slope value	float	2
40027	26	mA output Trim Offset vlaue	float	2
40029	28	Cal1 PV: 1st calibration point level value in %	float	2
40031	30	Cal2 PV: 2nd calibration point level value in %	float	2
40033	32	Cal1 pF: 1st calibration point capacitance value in pF	float	2
40035	34	Cal2 pF: 2nd calibration point capacitance value in pF	float	2
40037	36	Relay 1 : Differential High Alarm [% Level]. Only used for Linear Level type. Not used for Single Point Alarm application	float	2
40039	38	Relay 2: Differential High Alarm [% Level]. Only used for Linear Level type. Not used for Single Point Alarm application	float	2
40041	40	Relay 1: Differential Low Alarm [% Level] OR Single Point Alarm [pF]. Single Point Cal: used as captured pF during cal	float	2
40043	42	Relay 2: Differential Low Alarm [%Level]. Only used for Linear Level type. Not used for Single Point Alarm application	float	2
40045	44	Relay 1 On delay [in seconds]. Only used for Linear Level or Single Point Alarm application	int	1
40046	45	Relay 2 On delay [ in seconds]. Only used for Linear Level type. Not used for Single Point Alarm application	int	1
40047	46	mA Analog Output	float	2
40049	48	Oscillation Frequency	float	2
40051	50	Frequency	float	2
40053	52	Capacitance	float	2
40055	54	Filtered Capacitance	float	2
40057	56	Level	float	2

## 5.0 TROUBLESHOOTING

CONDITION	DO THIS
1. Status LED is OFF and the LCD display is off	Check the power to the unit. If the unit is a 24/12VDC model, check the external source is 24V/12VDC. Make sure the polarity is correct. If the unit is a 100-240VAC model, then check the Line, Neutral and Ground wiring is correct.
2. If the status LED is RED	<p>This indicates a major error such as memory failure, no probe signal etc. Check the following:</p> <ul style="list-style-type: none"> <li>• Ensure JP3 jumper is set for internal setting.</li> <li>• Make sure probe wire is connected to TB6 on back of electronics (see Fig. 2.1).</li> <li>• Microprocessor may have lost its parameters due to a surge in the line. Go to View Menu (see Flow Chart) to check the Calibration values, as well as frequency and capacitance values in Diagnostic Menu.</li> <li>• Call Arjay Technical Support.</li> </ul>
3. False Alarms	<ul style="list-style-type: none"> <li>• Add some time delay in the unit</li> <li>• Make sure there is no external interference and electrical noise such as agitators, high voltage interference, turbulent flow, etc</li> <li>• Adjust the sensitivity to the next higher value. Test after any changes to confirm an alarm</li> <li>• Make sure the active probe end is in water.</li> </ul>

### ARJAY ENGINEERING TECHNICAL SUPPORT

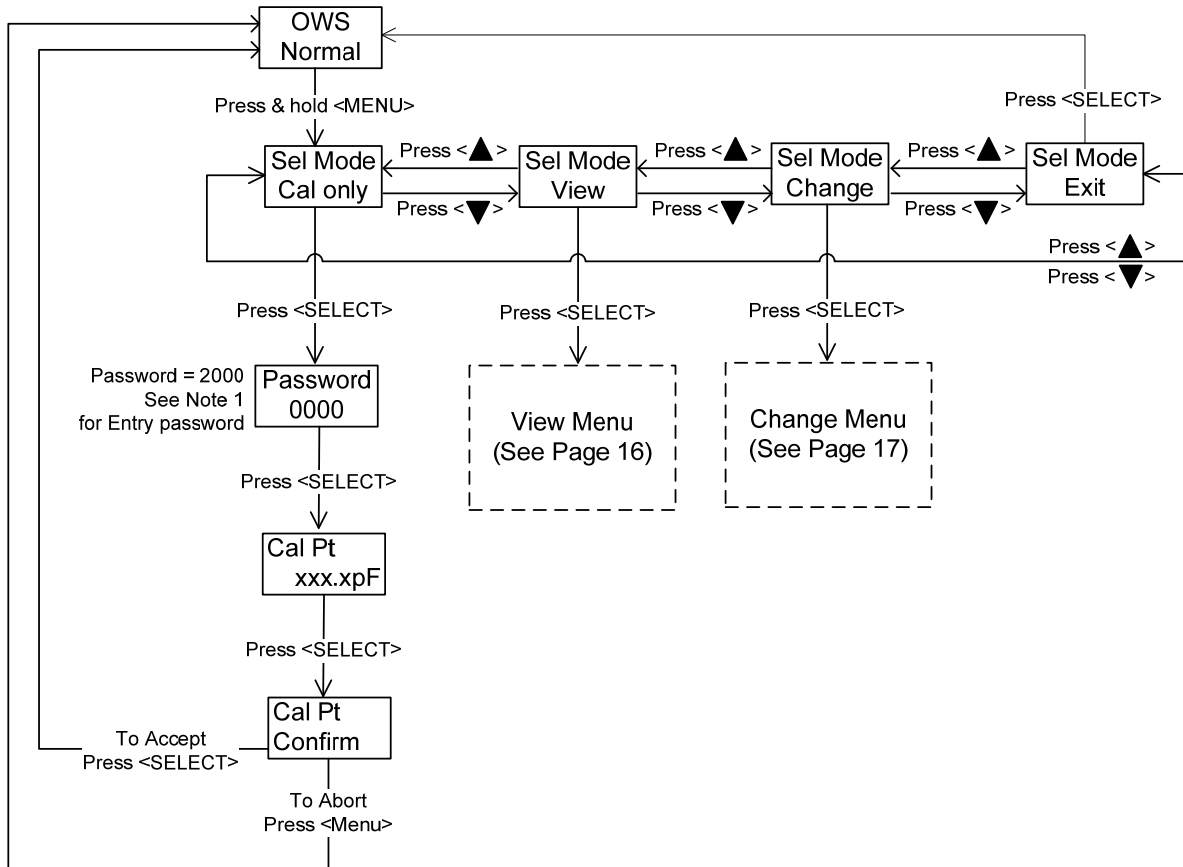
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## 6.0 FLOW CHARTS

### NORMAL OPERATING DISPLAY

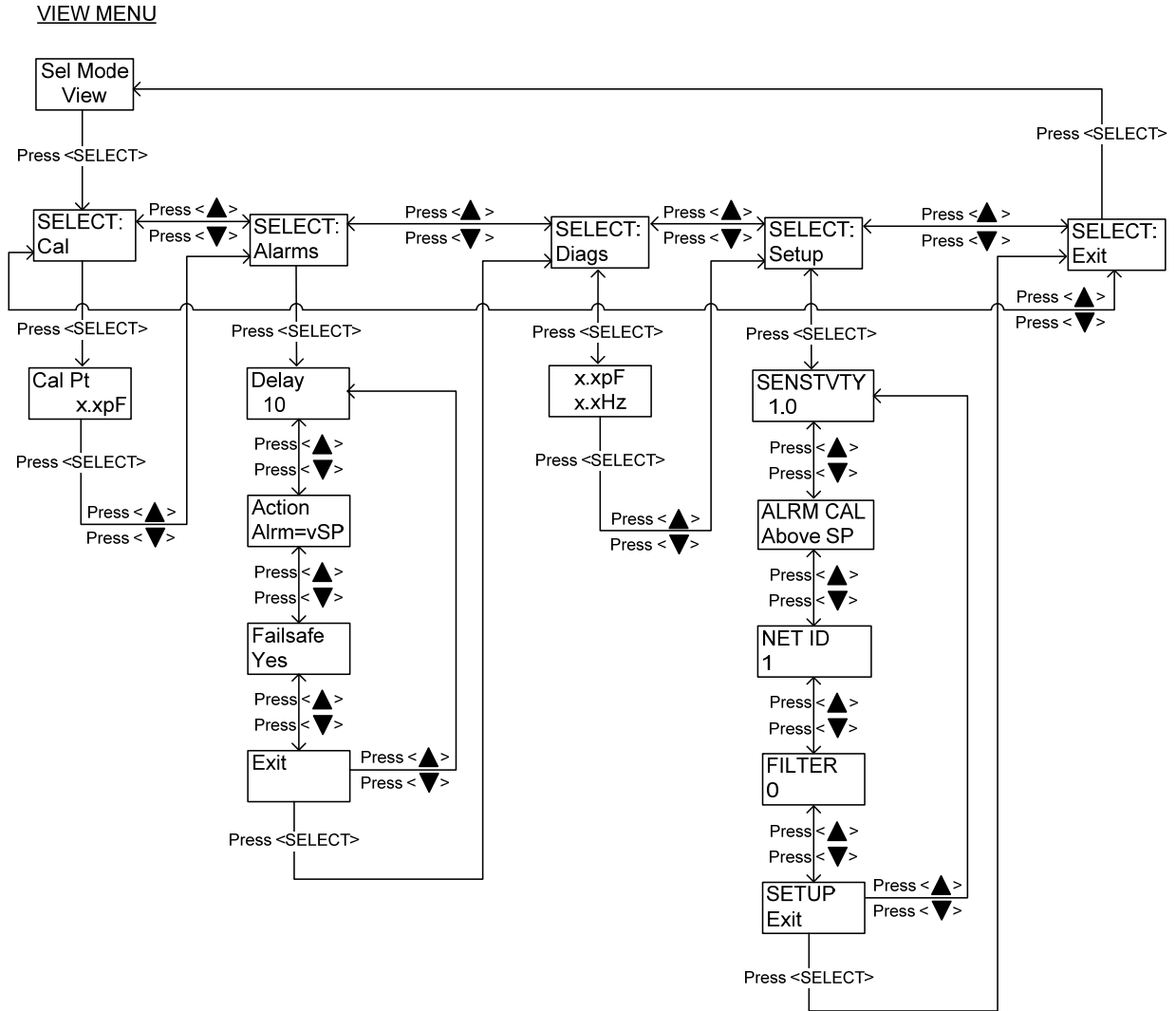


Note 1: Data Entry

Press <▲> / <▼> key to increase / decrease the digital value.

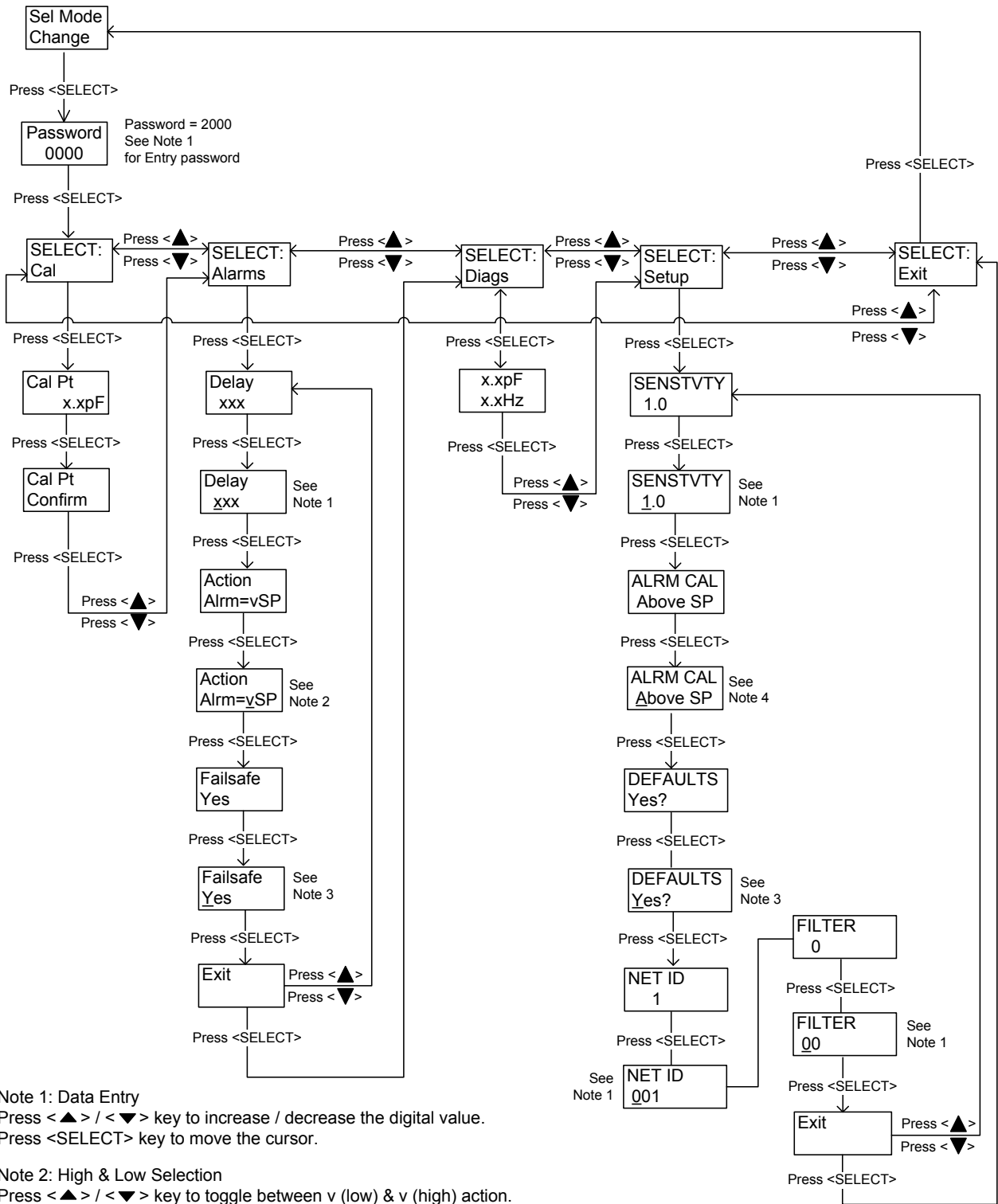
Press <SELECT> key to move the cursor.





Note 1: Data Entry  
 Press <▲> / <▼> key to increase / decrease the digital value.  
 Press <SELECT> key to move the cursor.

**CHANGE MENU**



**Note 1: Data Entry**  
 Press <▲> / <▼> key to increase / decrease the digital value.  
 Press <SELECT> key to move the cursor.

**Note 2: High & Low Selection**  
 Press <▲> / <▼> key to toggle between v (low) & v (high) action.

**Note 3: Yes & No Selection**  
 Press <▲> / <▼> key to toggle between Yes & No action.

**Note 4: Above & Below Selection**  
 Press < > / < > key to toggle between Above & Below action.