



# SPECIFICATION - DOLPHIN CATHODIC PROTECTION REMOTE MONITORING AND CONTROL SYSTEM

## 1 INTRODUCTION

### 1.1 Background

ACE Contracting specialises in the manufacturing and installation of cathodic protection devices for pipelines.

### 1.2 Scope

The Dolphin interfaces to the TRU and provides the functionality to remotely monitor and control the device. The monitoring and control functionalities are remotely performed using a GSM GPRS connection between an internet server and the Dolphin outstations.

## 2 INTERFACES

### 2.1 Analogue Inputs

The ranges for the analogue inputs can be selected during production.

#### 2.1.1 *Analogue Input 1*

Voltage measurement for the DC output of the protection device in the range 0VDC to +100VDC. Resolution is 12bits.

#### 2.1.2 *Analogue Input 2*

Voltage measurement across a current shunt for the range 0mVDC to +100mVDC. Resolution is 12bits. If a measurement is to be taken across the shunt, this input is coupled directly to the shunt. If AC measurements are to be taken, this input can be connected to a LEM device with 0V-5VDC output after a factory modification (a component value change).

#### 2.1.3 *Analogue Input 3*

Voltage measurement between the pipeline being protected and a grounded reference probe for the range -20VDC to +20VDC. Resolution is 12bits.

### 2.2 Digital Inputs



### **2.2.1 Digital Inputs 1 to 4**

Four opto-isolated digital inputs with a common floating ground reference. In order to switch an input, the input is grounded to the floating ground.

## **2.3 Potentiometer Output**

### **2.3.1 Potentiometer Output 1**

The digital equivalent of a  $10\text{k}\Omega$  potentiometer. Resolution is 8bits. Two jumpers can supply the potentiometer with 5V and ground (the same supply as the opto-isolated inputs).

## **2.4 Digital Outputs**

### **2.4.1 Digital Output 1**

A normally open relay (5A @ 250VAC) contact output controlled by a timer function (ON time and OFF time), or remotely by the user.

### **2.4.2 Digital Output 2 to 6**

A relay (5A @ 250VAC) with NO, NC and common contacts controlled remotely by the user.

## **3 FUNCTIONALITY**

### **3.1 Analogue Inputs**

Each analogue input has a 12 bit high alarm set-up value and a 12 bit low alarm set-up value. When the analogue value goes outside the range as defined by these set-up values, the unit will report the event via SMS to maximum three cell phone numbers.

### **3.2 Digital Inputs**

Each of the opto-isolated inputs will report toggle events via SMS to maximum three cell phone numbers.

### **3.3 Potentiometer output**

The potentiometer can be set to any of 256 values between  $0\Omega$  and  $10\text{k}\Omega$ . The output can also be a voltage between 0V and 5V. This voltage is referenced to the ground of the opto-isolated inputs.

### **3.4 Digital Outputs**

#### **3.4.1 Digital Output 1**



By setting the ON-time and the OFF-time, the user can control the time that the relay will be switched on and off. The time is selectable with a resolution of 1 minute.

### **3.4.2 Digital Outputs 2-6**

The user can remotely switch these relays on or off.

## **3.5 Real Time Clock**

A real time clock is included onboard. The time can be set to facilitate synchronisation between terminals for Relay 1. The time is set via the web interface as follows :

- 1) The user enters the year, month, day, hour, minute and second in the fields provided
- 2) On a mark from the users PC, he clicks the "Set Date and Time button  
Accuracy is estimated at the latency of the communication channel.

## **3.6 Measurement Logging**

Measurements of all the inputs can be taken and logged in non-volatile memory along with the status of the outputs. The values that are logged as well as the logging period can be configured. When the data is retrieved from the built-in web page, this logging buffer will be reset.

## **3.7 Other Functionality**

The unit will report power down events (only if a backup battery is installed and charged).

# **4 INTERFACE SETUP PARAMETERS**

## **4.1 Analogue inputs**

Each of the analogue inputs has the following set-up parameters:

1. Low alarm value
2. High alarm value
3. Delay period (seconds)
4. Hysteresis (%)
5. Text (SMS) Reporting numbers and email addresses.

## **4.2 Digital inputs**

Each of the digital inputs has the following set-up parameters :

1. Delay period (seconds)
2. Text (SMS) Reporting numbers and email addresses.
3. Text message for reporting number 1



4. Reporting number 2
5. Text message for reporting number 2
6. Reporting number 3
7. Text message for reporting number 3

### **4.3 Analogue Output**

The analogue output has the following set-up parameter:

1. Output value

### **4.4 Digital Output**

#### **4.4.1 Relay 1**

Relay 1 has the following set-up parameters:

1. Time to switch on
2. Time to switch off
3. Override ON
4. Override OFF

#### **4.4.2 Relays 2-6**

Relays 2-6 have the following set-up parameter:

1. State : ON/OFF

## **5 THE WEB INTERFACE**

All functionality is controlled via a web interface via a standard Internet Browser.

All current and historical data is stored on the server and can be interrogated and analysed via the browser interface or downloaded as a .csv file (or other format as specified by the end-user.)

The data can be manipulated to demonstrate trends such as "Time Protected," "Time Available," etc.

## **6 POWER SUPPLY**

### **6.1 Mains**

110VAC or 220VAC manufactured to order.

### **6.2 Battery Backup**

On-board battery charger with 6V output for a 2.5 Ah sealed lead-acid battery (Cyclon Monobloc).



## 7 ENCLOSURE

The enclosure is made from polycarbonate and is equipped with DIN rail mountings. Terminals are exposed for easy access.



**Dolphin I/O specifications:****An Input 1:**

Type	Rectifier Voltage	
Range	0V -> 100V	
Input Imp. (DC)	1.02 M $\Omega$	
Input Protection:	Metal Oxide Varistor (MOV)	150V clamp / 35ns response
Accuracy	<0.5%	
Resolution	97mV	10bit

**An Input 2:**

Type	Rectifier Current	
Range	0V -> 50mV	
Input Imp. (DC)	500 k $\Omega$	
Input Protection	Transient Voltage Suppression (TVS) Diodes	+7.5V clamp @ 60A pulse
Accuracy	<1.5%	
Resolution	48 $\mu$ V	10bit

**An Input 3:**

Type	Pipe Potential	
Range	-20V -> +20V	
Input Imp. (DC)	11.1 M $\Omega$	
Input Protection	Transient Voltage Suppression (TVS) Diodes	+/- 25V clamp @ 16A pulse
Accuracy	<1.5%	
Resolution	39mV	10bit

**An Output 1:**

Type	Digital Potentiometer	
Range	10k $\Omega$	
Output Protection	Opto-Isolated DC-DC PSU	6kV protection 2kV protection
Resolution	39 $\Omega$	8bit

**Dig Input 1 -> 4:**

Type	Potential Free	
Input Protection	Opto-Isolated DC-DC PSU	6kV protection 2kV protection

**Dig Output 1 -> 6:**

Type	Potential Free	
Output Capabilities	N/O or N/C selectable	250V 5A