

## 1.0 INTRODUCTION

The Ruelco Model 38C2 (2" NPT Mount) and Model 39C2 (Flange Mount) are electric level switches which provide point level indication of fluid in a tank or pressurized vessel. The 38C2 and 39C2 are typically directly mounted onto a tank or vessel as well as in an external cage (Figure 1) for bridle type mounting as shown in Figure 4. Hangdown type displacers may be used in some direct mount and flange mounted configurations.

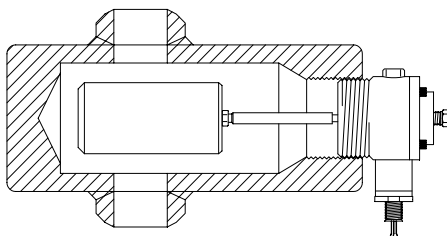
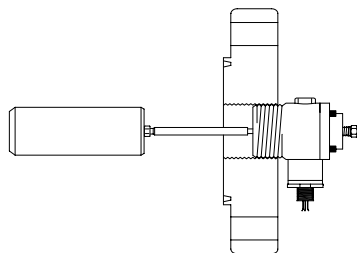


FIG. 1  
MODEL 38C2 SHOWN IN MODEL 3C01  
CAGE

FIG. 2  
MODEL 38C2 SHOWN IN MODEL 3F01  
FLANGE



FLANGE

These sensors operate an electric switch when a liquid in a tank or a pressurized vessel reaches a predetermined level. The "FLEX-LEVEL" operation mode as either a

high or low level sensor is selected without changing the switch position or orientation. Electric switching selection as either N.O. or N.C. for high or low detection depends only upon the wiring configuration utilized. The Models 38C2 and 39C2 are offered with S.P.D.T. or D.P.D.T. snap acting dry contacts approved for use in hazardous locations.

## 2.0 OPERATION (See Fig. 3)

### 2.1 PRINCIPLE OF OPERATION

The Ruelco Models 38C2 and 39C2 "FLEX-LEVEL" liquid level sensors are multi-functional liquid level switches. Depending on the mode of operation selected they will operate as a normally open (N.O.) or normally closed (N.C.) electric switch that will actuate when a liquid level rises above or falls below a fixed point in a tank or a pressurized vessel. The switch senses a change of buoyancy of a displacer assembly (1) inside a tank or vessel and uses a pivoting action to transmit that change of buoyancy through the tank or vessel wall. The I.D. of the cone (16) contacts a precision machined pivot point (15) on the end of the pivot body (10). A statically sealing O-ring (4) provides a pressure tight seal between the body and the shaft of the cone protruding through the O-ring.

Pressure, if any, inside a vessel acting on the cone shaft diameter forces the cone against the pivot point. The position of this point, near the center of the O-ring, allows the displacer or float assembly to move up and down. This motion is kept in-line with the switch push rod (13) by two vertical tabs on the pivot body that fit inside two notches on the cone. The vertical motion of the displacer assembly is transmitted by the cone to the push rod which operates the switch assembly (14).

### 2.2 HIGH LEVEL OPERATION

Selection Of the “FLEX-LEVEL” to function as either a high or low level sensor is accomplished by using the appropriate switch contact type and not the position of the switch assembly. For example, if high liquid level detection is to open a switch contact, the N.C. switch contacts are used. As the liquid level rises on the displacer, the vertical motion of the displacer is transmitted through the cone and push rod to operate the electric switch. The N.C. contracts will open and at the same time the N.O. contacts will close.

### 2.3 LOW LEVEL OPERATION

When low level detection is to open a switch contact, the N.O. switch contacts are used. Low level operation requires that the displacer be submerged in the liquid being detected. In this position the cone will be depressing the push rod against the switch assembly and the switch contacts will be in their reverse position (i.e. the N.C. contacts will be open and the N.O. contacts will be closed). As the liquid level falls below the displacer, its downward movement will allow the push rod to move away from the switch assembly and the N.O. contacts, that were closed, will open and the N.C. contacts will close.

### 3.0 INSTALLATION

#### 3.1 MOUNTING EXTERNAL CAGE TO VESSEL

The “FLEX LEVEL” may be installed in an external cage, as shown in Fig. 2, for maintenance and testing reasons.

One recommended piping schematic for mounting an external cage to a vessel is shown in Fig. 4. The valves above and below the cage are required for testing and maintenance purposes. If a cage with butt weld connections is used, the level switch should be removed from the cage before welding. This will prevent weld sparks from damaging the displacer assembly. Remove the switch from the cage as per instructions in paragraphs 5.2.1. through 5.2. of the FULL DISASSEMBLY section of this manual. After welding install the level switch as per instructions in Section 3.2, LEVEL SWITCH INSTALLATION.

If the cage has threaded or flanged process connections, the level switch does not have to be removed before mounting the switch to the vessel. Cages with 1” NPT process connections may be installed on the vessel with 1”, ¾”, or ½” o.d. piping. CAUTION: Be sure the pressure rating of all pipe, valves, and pipe fittings meets or exceeds the working pressure of the vessel they are to be installed on. Adequate support for long pipe runs should be provided to prevent excessive vibrations of the level switch.

It is recommended that external cages be installed with the process connections as close to vertical and the cage length as close to horizontal as possible. This will insure the proper liquid flow into and out of the cage.

#### 3.2 LEVEL SWITCH INSTALLATION

TOOLS REQUIRED: adjustable wrench or pipe wrench with a 2 – 3/8” minimum opening.  
3.2.1 clean any dirt or debris from inside the cage and the 2” NPT pipe threads.

