

# Tidal Series 5



Level Control For Dry Bulk Materials

## Introduction

Members of the Schenck Process Group, Stock Redler Ltd are leading providers of feeding, automation and bulk solids handling solutions.

The Schenck Process Group are global market leaders for solutions in measuring and process technologies in industrial weighing, feeding, screening and automation. Always close to the customer, with an unrivalled global network of operating companies we are your competent global partner for weighing, feeding, screening and automation solutions throughout the process industries.



### Our philosophy is based on...

- ◆ Continuous product development
- ◆ Best practice approach to applications
- ◆ Raising industry standards



### Capabilities

- ◆ Single machine
- ◆ Multiple machines
- ◆ System solutions
- ◆ Installation & commissioning
- ◆ Plant layout & integration
- ◆ Engineering & contract management
- ◆ Professional customer service approach



### Industries

- ◆ Power, Coal, Steel, Cement, Mineral, Chemical, Grain Processing, Brewing/Malting, Flour/Feed, Food, Particle Board, Water Treatment

The Schenck Process Group develops, manufactures and markets a full range of solutions, products and turnkey systems on the basis of combining process engineering expertise, reliable components and field-proven technology.

### Members of the Schenck Process Group are:

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## **How the Tidal Operates**

The Tidal Control Unit consists of a diaphragm whose movements are transmitted by a lever to an electrical switch which is enclosed in a housing of which the diaphragm forms one side. Bolted to the side of the chute, hopper or bunker, the movement of the diaphragm caused by accumulation of material, is used to actuate the switch to stop or start machinery or operate signal lamps and hooters.

Units are readily available for working in conjunction with most powdered or granular materials up to 40-50mm (1½" -2") in size with a minimum loose bulk density of approximately 300kg/m<sup>3</sup> (20lb/ft<sup>3</sup>).

The characteristics of the material should be such that it will flow sufficiently well to exert a side pressure against the diaphragm without any tendency to cling or bind together and that it will fall freely away without undue sticking or caking over the diaphragm as the level of the material drops in the bin. The largest lumps of material should not be so large as to be likely to bridge across the diaphragm.

The customer should satisfy himself that his particular material fulfils the above requirements but should there be any doubt we would be pleased to supply a unit on 'sale or return' for test purposes.

The diaphragm reacts to air pressure and we do not recommend the use of these units for pneumatically fed installations unless a customer is satisfied that he can satisfactorily balance the pressure both sides of the diaphragm.

**Specifications**

**The housing**

The housing is of aluminium to BS 1490:1988, the body to LM25 and the cover to LM6, both of which are gravity die castings having a high resistance to corrosion, painted a silver grey hammer finish. An epoxy painted version for additional protection against corrosion is also available to order.

One conduit entry is provided tapped M20 x 1.5. The breather hole adjacent to the conduit entry is tapped 1/8" BSP enabling client to fit a pipe between the housing and the bin, via a manometer or other form of dust trap, to balance any differential pressure such as with pneumatically fed installations. A filter is usually fitted in the breather hole to prevent the ingress of dust from a normal atmosphere. This should be removed when making pipe connections. A gasket and four M10 x 16 hex. set screws are supplied for mounting.

**Diaphragms**

◆ Nitrile Rubber Diaphragms

For general use within the range of -20°C to + 100°C (intermittent +130°C). Resistant to mineral and vegetable oils and acids; odourless, tasteless and suitable therefore for use with foodstuffs.

◆ Silicone Rubber Diaphragms

Suitable for use within the range -70°C to +205°C (intermittent +250°C). Resistant to animal, vegetable and heavy lubricating oils.

◆ Polyurethane Diaphragms

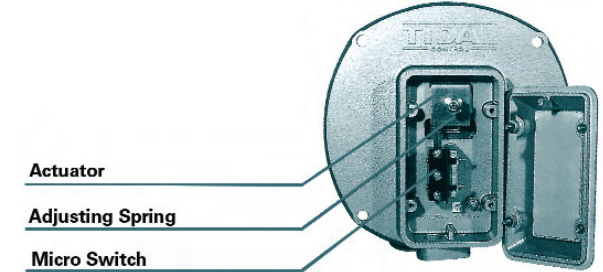
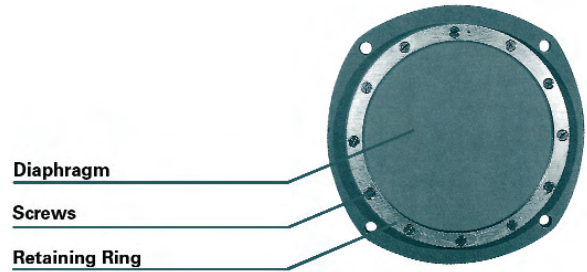
Abrasion resistant material with dry temperature range -40°C to +80°C (intermittent +100°C). For moist environments the temperature should not exceed 50°C Resistant to petrol and lubricating oils, grease, most solvents and weak acids.

Diaphragms are normally secured to the face of the housing by a polypropylene ring but mild steel rings are also used with silicone rubber and polyurethane diaphragms.

**The Switch**

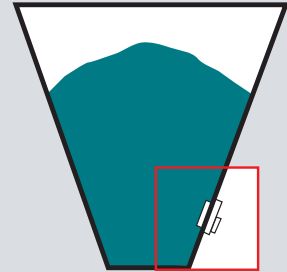
Both the standard switch and the heat resisting switch are single pole changeover micro switches. Each has three contacts, two fixed and one movable which alternately contacts one or other of the fixed contacts. One fixed contact is normally closed, the other normally open. Pressure on the Tidal Control diaphragm opens the normally closed circuit and closes the normally open circuit. Release of the diaphragm permits the switch automatically to return to its original position. The appropriate connections are marked on the switch.

The standard switch is suitable for the temperature range of -40°C to +85°C. A heat resistant switch up to +250°C is also available. Although units can be supplied to order fitted with two standard micro switches it is difficult to ensure simultaneous operation on both switches and it is therefore recommended that relays are employed to obtain any additional contacts.

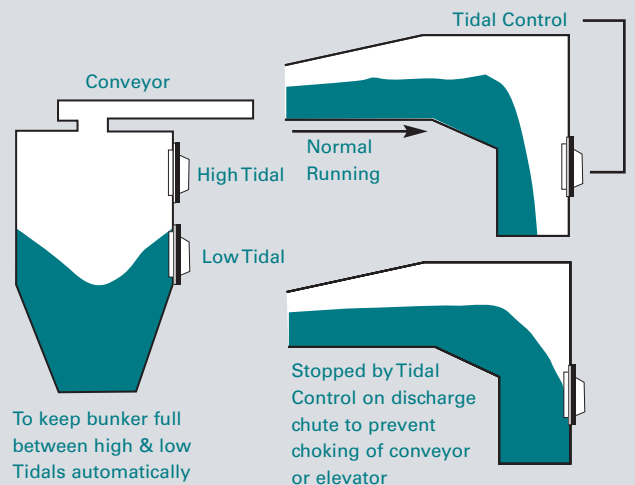
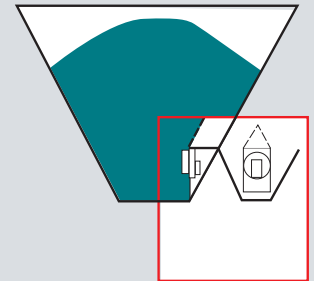


**Typical Installation Arrangements**

This method is satisfactory with a low head of material, but the feed to the hopper should be arranged so that lumps cannot drop on to the Tidal Control diaphragm.

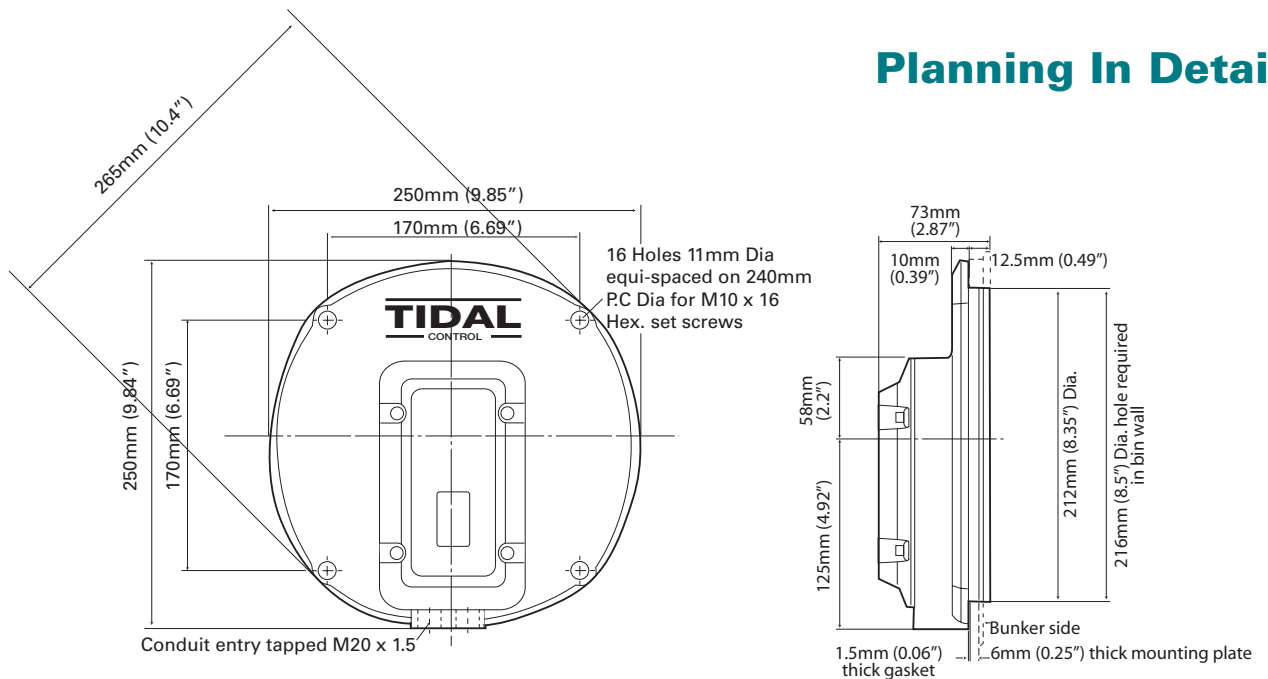


When considerable pressure is expected the unit may be mounted vertically. The shelf above the unit can be hooded to prevent accumulation of "dead material".

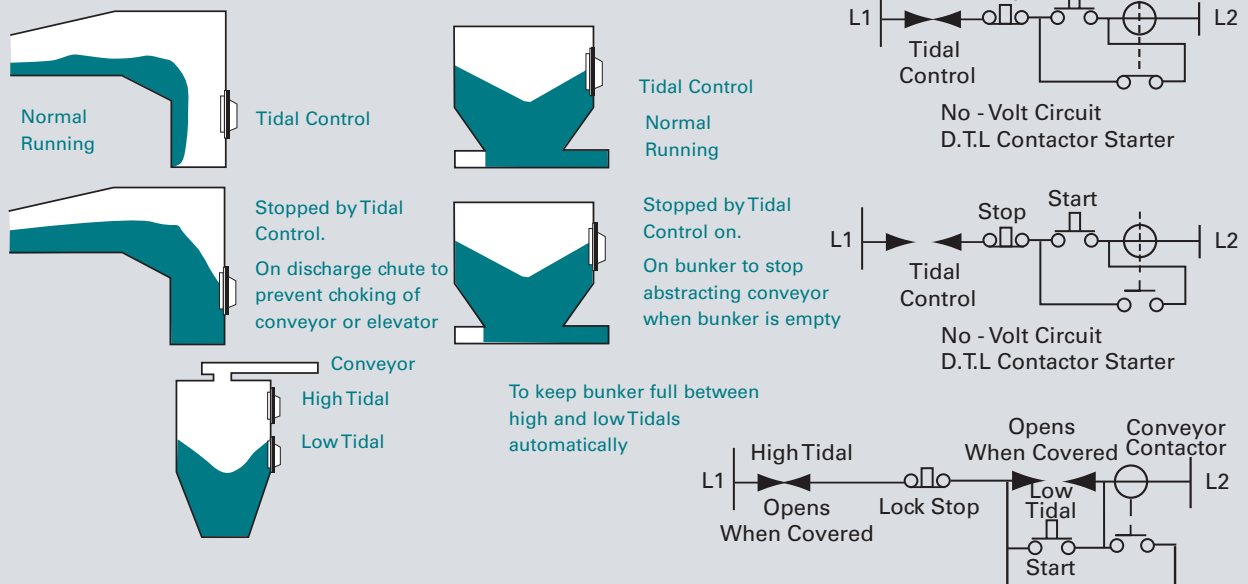


Loads (amps)			
Switch Type	Volts	Resistive	Inductive
Standard	up to 250 AC	15	15
	380 AC	15	5
	480 AC	15	4
	up to 15 DC	15	10
	30 DC	5	5
	50 DC	1.25	1.25
Heat Resisting	75 DC	0.75	0.30
	125 DC	0.50	0.05
	250 DC	0.25	0.03
	up to 480 AC	1	1
	up to 75 DC	1	1
Heat Resisting	125 DC	0.5	
	250 DC	0.25	

The decision to use the Tidal Control Unit for low level indication must take into account the fact that low level units are covered for much of the time by material. Some materials have the ability to agglomerate and interfere with the free movement of the diaphragms, and also low level units are subjected to rapid wear by the frequent sliding of abrasive materials across their diaphragms



## Typical Wiring Diagrams



### Features and Benefits

- ◆ Control flow and storage of product within a bulk handling system.
- ◆ Assists with the control of product
- ◆ Readily fitted
- ◆ Robust aluminium body
- ◆ Choice of diaphragms
- ◆ Adjustable for operational pressure
- ◆ Low cost installation

### Important Safety Information



#### Caution:

- ◆ The Tidal Control Unit is not suitable for wash down with high pressure water jets.
- ◆ The unit is not certified as flameproof or as conforming to the requirements of ATEX. However where conditions allow the use of intrinsically safe apparatus, the Tidal Control may be used in these areas providing it is connected to an approved intrinsically safe circuit.



### Tidal Unit Control Range

Diaphragm Type	Retained By	Micro Switch Type	Unit Assy. Ref. No. with	
			One Switch	Two Switch
Nitrile Rubber	Polypropylene Ring	Standard	042/0172	042/0178
Silicone Rubber	Polypropylene Ring	Standard	042/0175	042/0181
Silicone Rubber	Mild Steel Ring	Standard	042/0174	042/0180
Polyurethane	Mild Steel Ring	Standard	042/0173	042/0179
Silicone Rubber	Mild Steel Ring	Heat Resistant	042/0182	-

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## Installation

The Tidal Control Unit should be mounted either on a vertical face or at an inclination such the accumulating material will exert sufficient pressure to depress the diaphragm and receding material will freely gravitate clear. Units mounted on an inclined face are suitable with a limited head of material but the feed should be such that the material does not drop directly on to the diaphragm. The gasket provided should be fitted between the Tidal Control Unit and mounting face.

- ❖ The Tidal Control Unit **MUST** be electrically earthed, a suitable earthing point is provided and marked in the unit, and the circuit to which the unit is connected **MUST** be suitably protected.
- ❖ The Tidal Control Unit **MUST** be positioned with the cable entry pointing downwards and if a cable gland is used it must be sized to suit the cable.

## Maintenance

- ❖ The Tidal Control Unit **MUST** be electrically isolated before removing the cover to access the limit switch or adjust the pressure spring.
- ❖ If the unit is used on a silo, ensure the material level in the silo is below the mounting position **BEFORE** removing the unit from its fixings.
- ❖ Periodic inspection should be carried out, particularly of the diaphragm, which should be replaced if wear or loss of flexibility is apparent. The diaphragm is secured by a ring screwed to the face of the housing, one hole of which is offset to ensure that the position of the ring remains constant and when refitting a diaphragm it is therefore important to ensure that all holes match before inserting the screws.
- ❖ The breather vent provided adjacent to the cable entry is essential for correct operation of the unit. Check regularly for any dust build-up that impair its efficiency.

## Adjustment for Pressure

- ❖ A coil spring maintains a constant pressure against the lever operating the switch and frees the switch actuator lever when the depressed diaphragm is relieved of pressure. The pressure of the spring is variable by means of a nut. When the Tidal Control has been installed the nut may be adjusted, if necessary, so that the switch or switches operate when the diaphragm is between a half and three quarters covered with material.
- ❖ The Tidal Control Unit **MUST** be electrically isolated before removing the cover to access the limit switch or adjust the pressure spring.



Drop Forged Chain For Conveyors & Elevators



RoCon Rotational Control Unit



Container Loading System



Circular Bin Discharger



Bulk Reception Unit



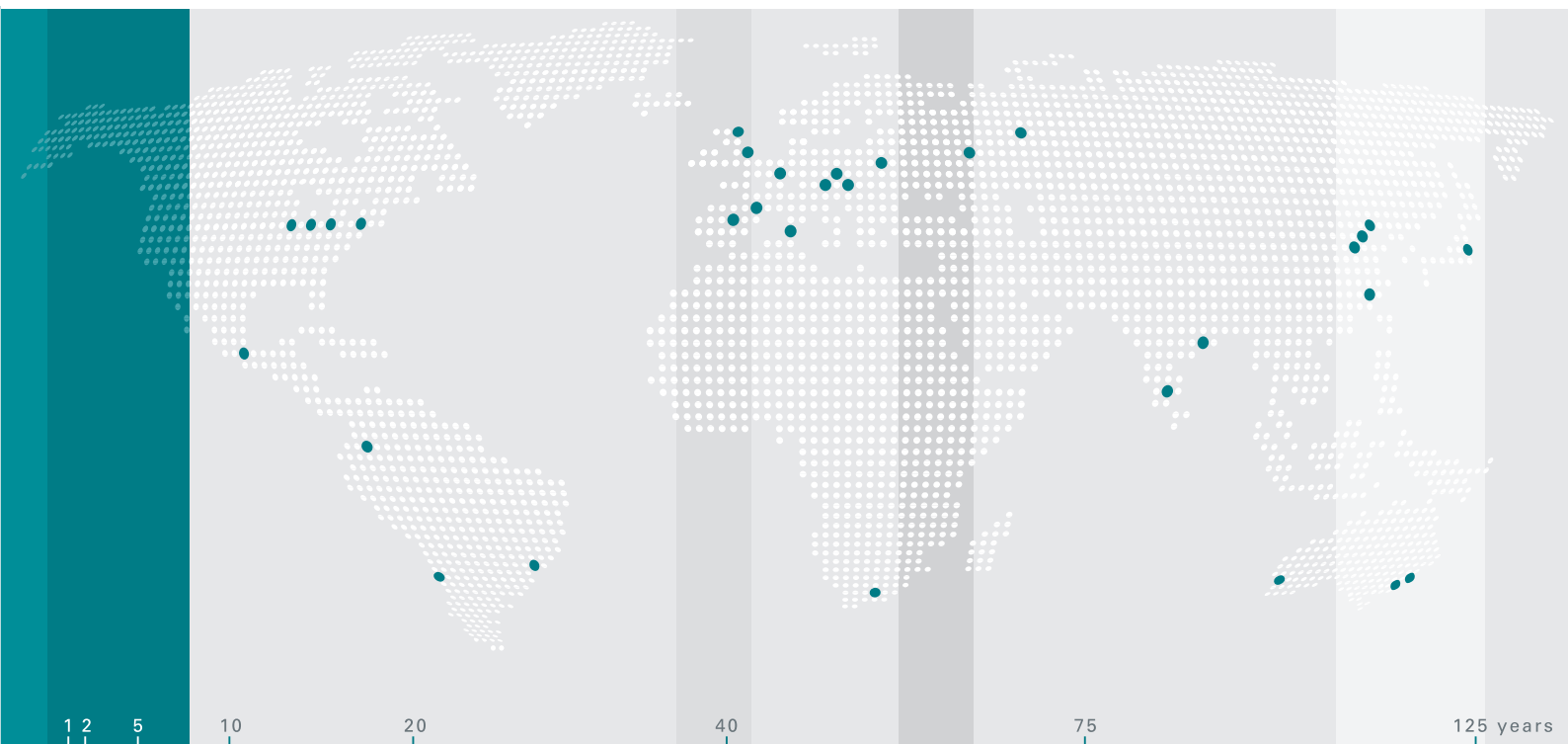
Tidal Control Unit

weighing

feeding

conveying

automation



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