



INTRODUCTION

Rotary paddle accessories are used for a variety of reasons;

- ✓ Paddles are the extension of the rotary bin level indicator shaft into the material and this device contacts the material in the bin when present. The density and particle size relate directly to the paddle to be used, along with mounting criteria.
- ✓ Couplings provide a method for connecting the rotary unit output shaft to the paddle when a fixed paddle is to be used.
- ✓ Mounting plates are accessory items that aid in the installation of the rotary paddle bin level indicator assembly utilizes a non-insertable paddle (cannot be inserted through the process connection coupling on the bin wall due to its physical size and shape.

The proper choice and use of a paddle and other type of accessory is important to the success of your installation. This technical information document is designed to provide information that will assist in the selection and use of each accessory item.

PADDLE SELECTION GUIDE

Introduction

The selection of the proper paddle is an important task that can substantially impact the success of your application. Incorrect selection can lead directly to a failure of the rotary paddle bin level indicator to detect the presence or absence of the material. The following impact the choice of paddle:

1. Bulk Density of the target material
2. Particle size
3. Material flow
4. Mounting on the bin

Bulk Density:

Knowing the bulk density of the target material is important as this relates directly to the operation of the rotary paddle bin level indicator. The material present at the paddle resists the rotation of the paddle. The heavier the material (higher bulk density) the less surface area of the paddle (smaller paddle) is required. The lighter the material the more surface area (larger paddle) is required.

Bulk density is the name for the ratio of the weight of an untapped volume of material. This is typically expressed in terms of pounds/ft³ (English units) or kg/m³ (Metric units). Other engineering units for bulk density also exist but there are the most commonly used.

The range of bulk densities for powder and granular bulk solids can be categorized into three ranges; Heavy, Medium and Light.

- ✓ Heavy: materials greater than 65lbs/ft³ (1,041kg/m³)
- ✓ Medium: between 25 and 65lbs/ft³ (400 and 1,041kg/m³)
- ✓ Light: between 5 and 25lbs/ft³ (80 and 400kg/m³)
- ✓ Ultralight: < 5lbs/ft³ (80kg/m³)

Note that materials < 5lbs/ft³ are typically too light for rotary paddle bin level indicators unless in a low level application. Vibrating element type sensors are best suited for light and ultralight materials.

Particle Size:

Particle size categories are as follows:

- ✓ Very Fine: Minus 100 mesh (149 microns) and less
- ✓ Fine: 100 mesh to 1/8" (149 microns to 3mm)
- ✓ Granular: 1/8" to 1/2" (3 to 13mm)
- ✓ Lumpy: ≥ 1/2"
- ✓ Irregular: Fibrous, stringy and other irregular shaped materials

Material Flow:

The flow of bulk solid materials is a science in and of itself but flow characteristics can impact the choice of a paddle for success. Basically we need to understand the material "flowability" of the material, how well does it flow within the container or bin that it will be in. Obviously properties related to the bin itself can impact this. Here are the categories for flowability of the target bulk solid material:

- ✓ Very free flowing: Virtually "flows like water", such as dried grain, coffee beans. May present with a flatter material surface profile than most all other materials.
- ✓ Free flowing: Flows freely but not fast, materials like plastic pellets, fly ash. Narrow or limited angle of repose.
- ✓ Sluggish: Difficult to flow, perhaps because of particle shape such as charcoal and wood chips and these materials may provide increased resistance to the rotation of the paddle. May present with a steep material angle of repose within the bin.

The more sluggish a material is to flow, the more increased resistance to the rotating paddle the material will have. The more freely the material flows, the less resistance to the paddle rotation.

Mounting on the bin:

Choosing a sensing point in the bin for your high, low or intermediate application relates to choosing the mounting location and orientation (top or side; straight-wall or cone), as well as the method of mounting.

Mounting Orientation/Location; High level detection applications can be mounted on the top or side of the bin. Top mounted installations on the bin roof can be angled or flat. Avoid sharply angled roof mounting unless a nozzle is used. Side mounted installations for High level detection are usually in a straight wall section.

Intermediate level detection can also be top or side mounted, depending on the distance down from the top that is required for the sensing point. Extension lengths for the rotary paddle bin level indicator should not exceed 144" (3.6m) in length.

Low level applications are usually side mounted in either a straight wall or cone section at the sensing point required.

Try to select a mounting point for the rotary paddle bin level indicator on your vessel where the paddle will be out of the direct flow of incoming and discharging material in the bin to prevent damage that may be caused by the flow of material. If this is not avoidable then the installation of a protective baffle around the rotary paddle bin level indicator may be required.

Top mounted installations typically require extension accessories to place the sensing point at the appropriate point below the top of the bin roof where the unit is mounted. Side mounted units generally install without extensions.

Top mounted installations may require the installation of a guard pipe, typically when the extension length is >24" in length. Top mounted installations always require the use of a flexible coupling to connect the RH/RHX rotary paddle shaft to the extension shaft.

Mounting Method; Installation requires a 1-¼" NPT process connection. This can be achieved by either of two methods, 1) a welded coupling on the bin wall or roof, or 2) attaching a mounting plate which has an appropriate coupling.

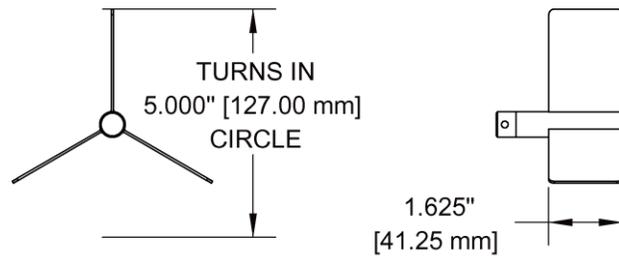
For top mount installations use a FULL coupling. For side mount installations always use a HALF coupling. A full coupling allows threading from both ends to facilitate the use of a guard pipe if needed. A half coupling allows threading from one end and will not allow a cavity to be created on the side that will be inside the bin. This is important so that material does not pack inside a *cavity that could be created if using a full coupling on a side mount installation.*

If attaching the paddle to the bin level indicator from inside the bin is not desirable or practical, then select either an insertable paddle or use a mounting plate for installation. Fixed or folding insertable paddles can simplify installation.

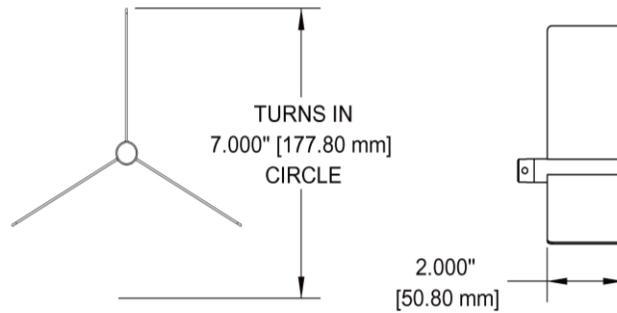
Selection (pictures and dimensions follow)

PADDLE PN	LIGHT MATERIAL	MEDIUM MATERIAL	HEAVY MATERIAL	INSERTABLE	DIRECT SHAFT CONNECTED	COUPLING CONNECTED
<u>410000</u> Standard 3-Vane		X	X			X
<u>410001</u> Large 3-Vane	X	X				X
<u>410003</u> 2-Vane Folding		X	X	X	X	
<u>410004</u> 1-Vane Folding		X	X	X	X	
<u>410015</u> 1-Vane "Banana"		X		X		X
<u>410016</u> 1-Vane Heavy Duty			X	X		X
<u>410019</u> 2-Vane Heavy Duty		X	X			X
<u>410020</u> 4-Vane Heavy Duty		X	X			X

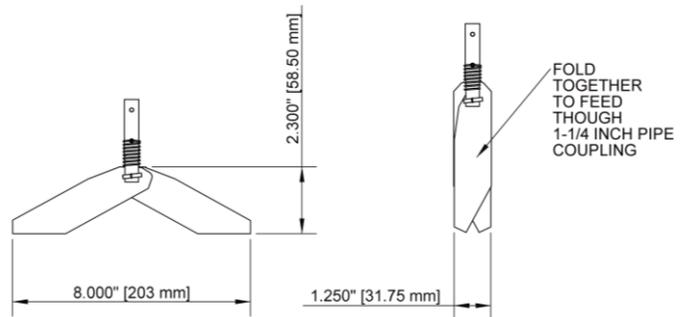
PN 410000 3-VANE STANDARD PADDLE:



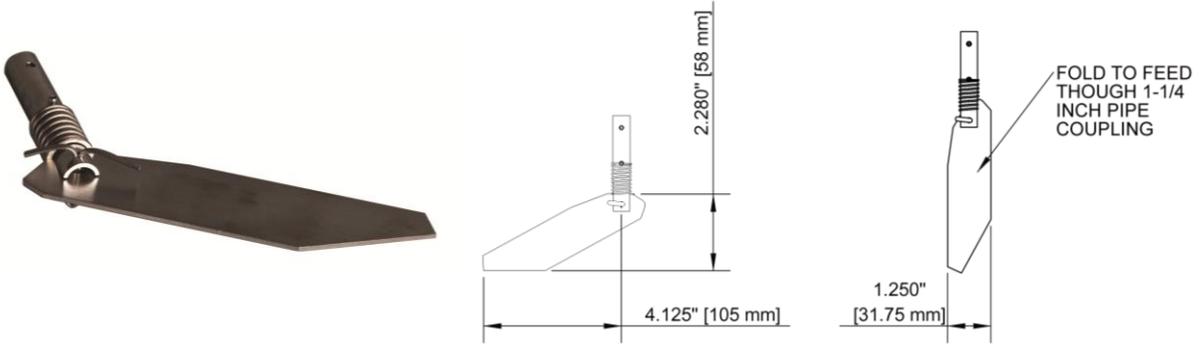
PN 410001 3-VANE LARGE PADDLE:



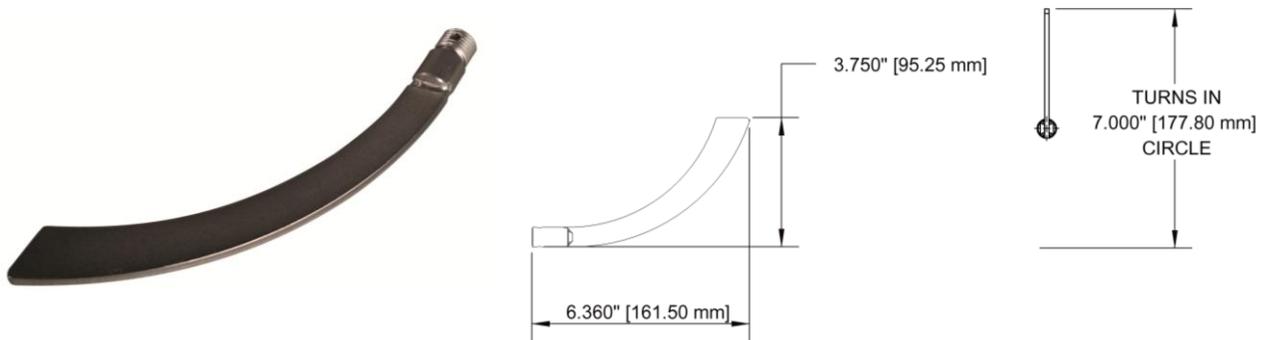
PN 410003 2-VANE FOLDING PADDLE:



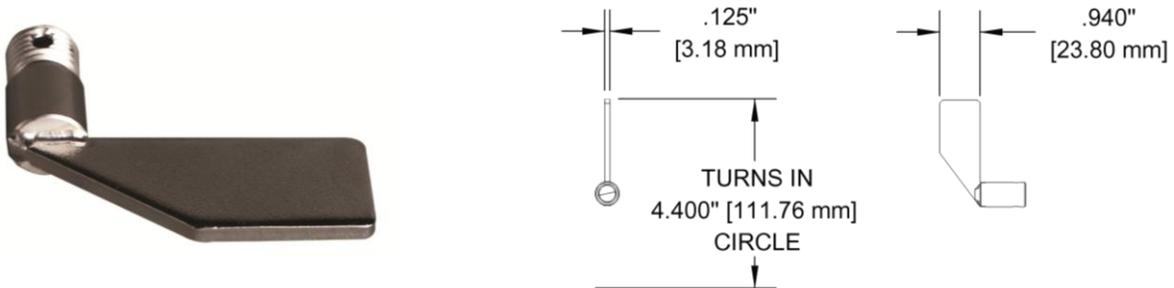
PN 410004 1-VANE FOLDING PADDLE:



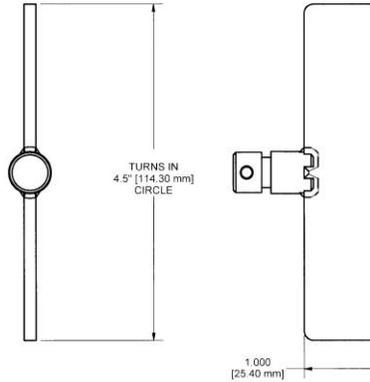
PN 410015 1-VANE "BANANA" PADDLE:



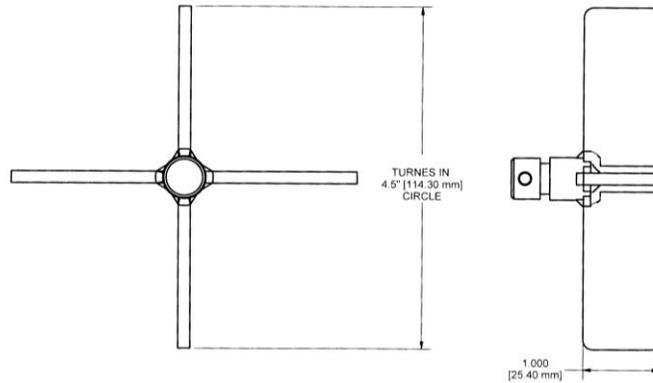
PN 410016 1-VANE HEAVY DUTY PADDLE:



PN 410019 2-VANE HEAVY DUTY PADDLE:



PN 410020 4-VANE HEAVY DUTY PADDLE:





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Form 436
TI 40-1XXX-XXX Rev. 002 12/12