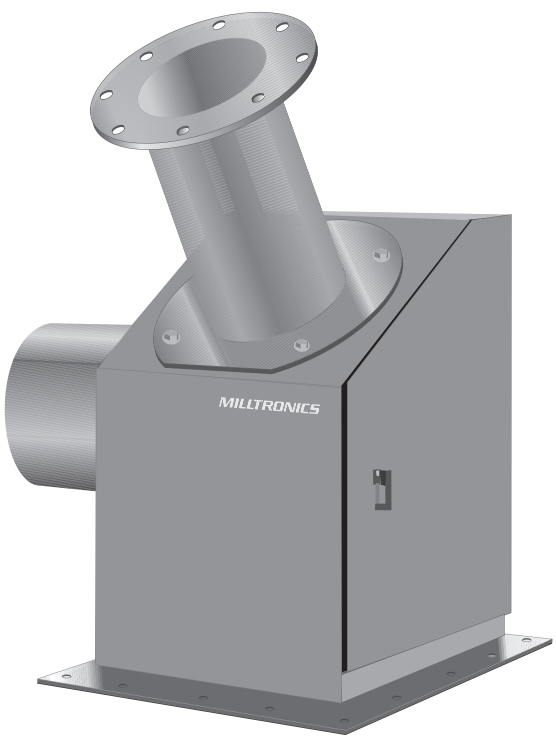
MILLTRONICS

E-SERIES SOLIDS FLOWMETERS

Instruction Manual PL-392 January 2001



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Rev. 1.2

E-SERIES SOLIDS FLOWMETERS

Safety Guidelines

Warning notices must be observed to ensure personal safety as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by a clarification of the level of caution to be observed.

Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual. Qualified personnel are only authorized to install and operate this equipment in accordance with established safety practices and standards.

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

Contact SMPI Technical Publications at the following address:

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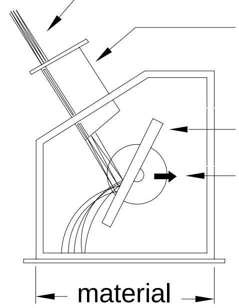
ABOUT THE "E" SERIES FLOWMETER

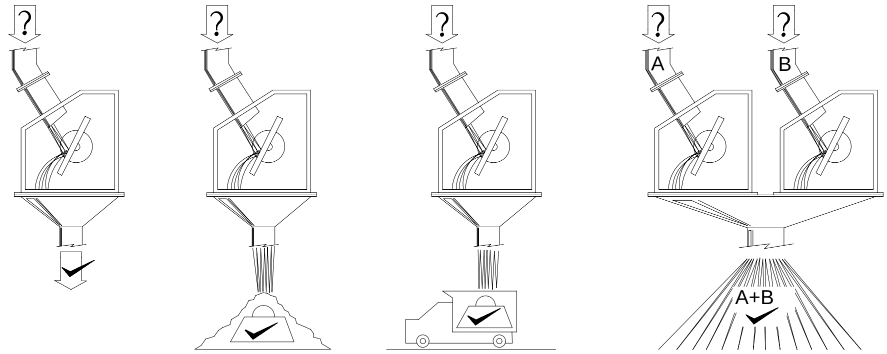
The Milltronics *"E" Series Flowmeter* is used for continuous in-line weighing of powdered or granular dry bulk solid materials. This flowmeter is designed for general purpose usage with a wide range of materials. The sloped flowguide design conditions the material into a repeatable flow pattern.

The E-40 flowmeter is equipped with an ILE-37 sensing head and is suitable for material flowrates up to 40 TPH. The E-300 flowmeter, with an ILE-61 sensing head, is suitable for up to 300 TPH.



The flowmeter sensing head LVDT output signal is processed by the flowmeter integrator (ordered separately) to:

- » monitor material flow
- » maintain accurate material inventory
- » provide batch control for process or loadout purposes *
- » control the ratio of materials in continuous blending processes *



* additional equipment required

The following components are included with each Milltronics "E" Series flowmeter system.

- » "E" series flowmeter housing and flowguide
- » ILE-37 or ILE-61 sensing head
- » stainless steel sensing plate
- » electronic flowmeter integrator
- » installation kit (wrenches, spare damping fluid and filler bottle, mounting bolts)

SPECIFICATIONS

MILLTRONICS "E" SERIES FLOWMETER

Model:		» E-40
		» E-300
Product:		» fine powder to 25 mm (1")
Product Temperature:		» -40 to 232°C (-40 to 450°F)
Ambient Temperature:		» -40 to 60°C (-40 to 140°F)
Accuracy:		» ±1% of full scale
Repeatability:		» ± 0.2%
Operating Range:	» E-40	» 0 to 0.5 TPH min, 0 to 40 TPH max (to suit application)
	» E-300	» 0 to 20 TPH min, 0 to 300 TPH max (to suit application)
Construction:		» painted mild steel flowguide and housing
		» sensing plate (to suit application)
	» E-40	» ILE-37 sensing head
	» E-300	» ILE-61 sensing head
Classification:		» CSA certified, general purpose
Options:		» 304 or 316 stainless steel housing
		» Teflon or Abrasion Resistant flowguide lining
		» Class I - groups C & D, Class 2 - groups E, F, & G

INSTALLATION

GENERAL

The Milltronics "E" Series Flowmeter should be installed in an area that is suitable for the system classification rating. Maintain sufficient clearance to permit:

» opening the housing door for sensing plate access
» removing the sensing head rear cover for calibration purposes

The flowmeter inlet and outlet mounting surfaces should be free from vibration. If vibration is expected, a base mounted sensing head should be used.

1. Position the flowmeter into the desired location.

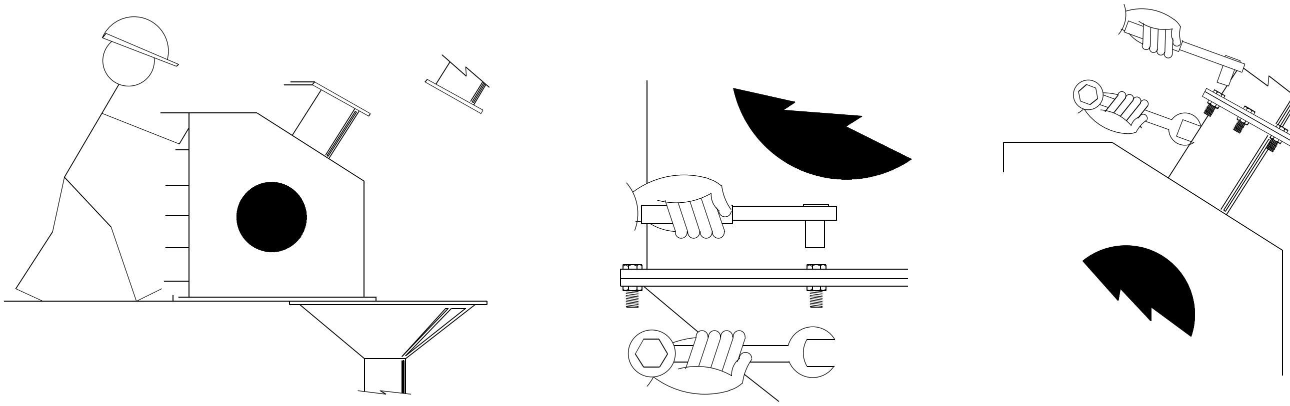
2. If necessary, shim the housing base to establish level in all planes.

3. Fasten the housing discharge to the downstream material chute.

4. Fasten the flowguide to the material infeed chute.

5. Refer to PL-374 for ILE-37 or PL-376 for ILE-61 sensing head installation, levelling, sensing plate installation, and integrator interconnection instructions.

Ensure sufficient mechanical support is provided for the flowmeter and chutework for all operating conditions.



To prevent accidental damage, temporarily remove the sensing head (side mount versions only) if the flowmeter cannot be easily positioned.

APPLICATIONS

Experience dictates, the operational performance and maintenance requirements of a flowmeter application are directly related to the care and consideration given to material compatibility and flow patterns.

MATERIALS

The following material characteristics are considered ideal:

- » low cohesion (flows well through chutes, similar to a liquid)
- » low adhesion (does not stick to surfaces)
- » low abrasion (will not wear out chutes, flowguide or sensing plate)
- » low causticity (will not damage internal flowmeter components)

Most materials with low moisture content have excellent flow and adhesion characteristics. In processes where material moisture content varies, select a flowmeter location where the moisture content is lowest. Sensing plate and flowguide non-stick linings are often used for:

Ammonium Nitrate, Cocoa, Fertilizer, Flour (Wheat), Glutton, Laundry Detergent, Salt Cake, Soap Powder, Starch, Sugar, Urea, and other materials with similar properties.

Abrasive materials are best monitored at low velocity. Sensing plate and flowguide abrasion resistant linings are often used for:

Alumina, Asbestos, Barley, Carbide, Corn, Clinker, Limestone, Perlite Ore, Salt Cake, Soya Beans, Steel Shot, Wheat, and other materials with similar hardness, and particle mass.

Standard flowmeter components are resistant to chemical reaction with most materials. Special paint or coatings on exposed flowmeter components are often used for:

Ammonium Nitrate, Carbide, Fertilizer, Phosphate, Salt, Sodium Chloride, Sodium Sulphate, Urea, and other materials with similar properties.

MATERIAL FEED

The following material in-feed characteristics are considered ideal:

- » material velocity is constant and relatively low
- » material flowrate is uniform (not pulsing)
- » air flow through the flowmeter is negligible
- » flowguide is always 1/6 to 1/2 full during operation

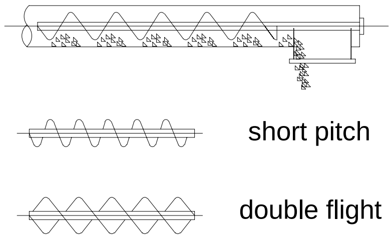
Material from an elevated bin, gravity fed to the flowmeter, generally produces excellent results. In many cases however, this arrangement is not practical, or the material is to be monitored after some process has been performed. In these cases, material is often fed to the flowmeter by some mechanical means. The device used, can have a considerable affect on flowmeter performance. In general, the feeder which provides the most consistent material flow is the best choice.

When high or variable velocity feeder material discharges are anticipated a *reverse flowguide transition* should be considered. (Refer to Flowmeter Infeed Chutes.)

A heavier flowmeter sensing head range spring and/or viscous damper fluid may be used to compensate for slight to moderate material pulsing at greater than 1 pulse per second. For heavily pulsing feeder discharges, at less than 1 pulse per second, consult Milltronics or your local distributor.

The flowmeter discharge chute must be such that material cannot back up into the flowmeter housing.

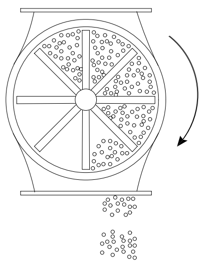
SCREW CONVEYOR



The screw conveyor is the most common type of material feeder.

Short pitch and/or double flight screws are preferred. These will reduce the batch size (and increase the frequency) of the material discharge pulses. Alternatively, the flights of a standard screw may be cut back, ending before the discharge opening. A reverse flowguide transition should be considered for variable operating speeds or constant speeds above 40 rpm.

ROTARY FEEDER

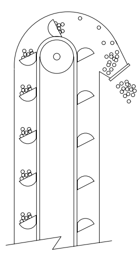


Rotary feeders provide an air seal between the upstream and/or downstream process, and the flowmeter. This may be required if:

- the material is pneumatically conveyed.
- flowmeter/process isolation is required.

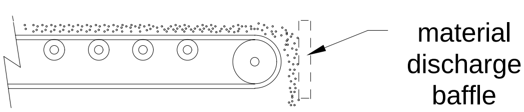
A reverse flowguide transition should be considered for variable operating speeds or constant speeds above 10 rpm.

BUCKET ELEVATORS



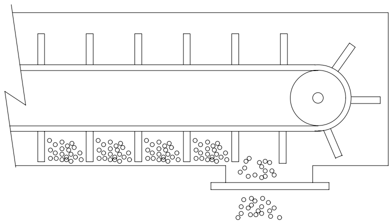
Bucket elevators are common for grain applications. Slow elevators (typically chain drive) generally produce heavily pulsing material discharge, requiring feeder discharge damping. Fast elevators (typically re-inforced belt drive) often require a deadbox to reduce material velocity.

CONVEYOR BELTS



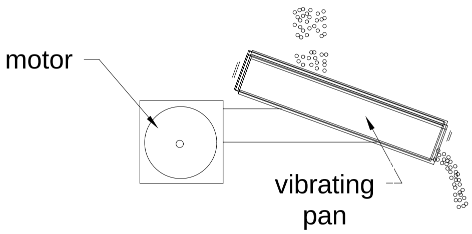
Conveyor belts generally produce a non-pulsing material discharge, ideal for flowmeter operation. A reverse flowguide transition (and/or material discharge baffle) is often required for variable belt speeds or constant speeds in excess of 1 m/s (200 feet/minute).

DRAG CONVEYORS



Drag conveyors often operate at a constant (and relatively low) velocity. While a reverse flowguide transition is not normally required, feeder discharge damping or a discharge baffle should be used to minimize the pulsing material discharge.

VIBRATORY FEEDER

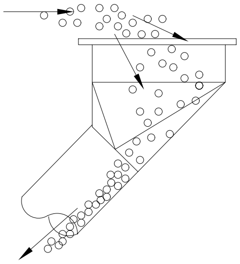


Vibratory (pan) feeders produce a non-pulsing material discharge. A reverse flowguide transition should be considered, for variable speed varieties.

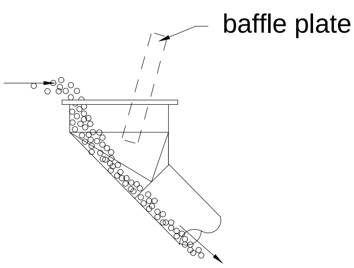
FLOWMETER IN-FEED CHUTES

The flowmeter in-feed chute, delivers the material from the bin or feeder discharge to the flowmeter flowguide. The ideal in-feed chute pre-conditions the material flow to minimize the effect of abrasion, velocity variation, feeder discharge trajectory variation, and pulsing.

FEEDER/FLOWGUIDE TRANSITION

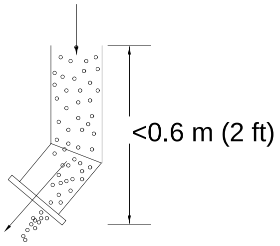


A *reverse flowguide transition* reverses the direction of the bin or feeder material discharge before the material enters the flowmeter flowguide. Reversing direction, forces the material into a desirable flow pattern, as opposed to permitting material to be flung from the feeder, directly into the flowguide. This transition is especially important for high or variable speed feeders.

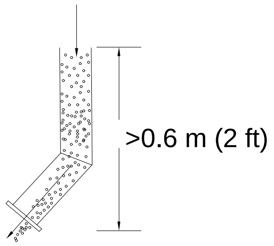


A *forward flowguide transition* maintains the material in the same direction between the bin or feeder discharge and the flowmeter flowguide. This transition is acceptable for a low and constant velocity feeder. If a forward flowguide transition must be used for a high or variable speed feeder application, a baffle plate may be installed.

SHORT/LONG FALL CHUTES

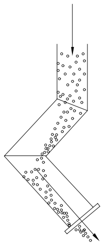


A material in-feed chute, where the bin or feeder discharge to flowmeter flowguide fall is less than 0.6 m (2 ft), is referred to as a *short fall chute*. This chute is ideal, as material velocity due to gravity is minimum. The chute centreline and angle should coincide with that of the flowguide, for a distance greater than or equal to the flowguide diameter (before the flowguide inlet).



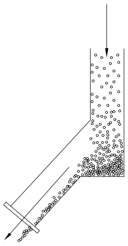
A *long fall chute* describes a material in-feed where the bin or feeder discharge/flowguide fall is more than 0.6 m (2 ft). The long fall chute is less desirable than the short fall chute, as material velocity is increased. Increased material velocity, increases flowmeter component abrasion. Greater distances after chute angle changes, (to settle material into desirable flow patterns), are also required.

DOGLEG



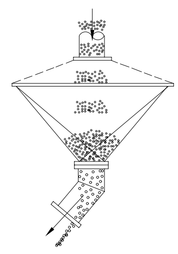
A dogleg may be used to reduce the detrimental effect of high, or variable material velocity. The dogleg is especially important when a long fall chute must be used. If the material is abrasive, the chute should be lined with an abrasion resistant material, or an in-feed deadbox should be used.

DEADBOX

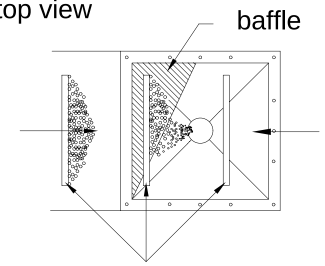


A deadbox may be installed where the chute angle changes. This will cause the material to impact upon itself, rather than the chute surface. Deadboxes should be used when the feeder discharge velocity is high, variable, where long fall chute angles change, and especially if the material is particularly abrasive.

PULSING FEEDER DISCHARGE DAMPING

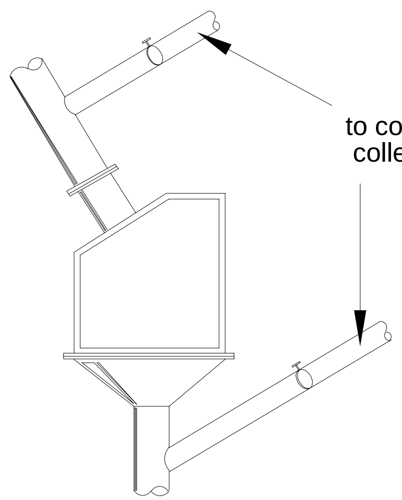


A temporary holding bin may be installed to receive pulsing material discharge from a feeder. The material may then be gravity fed from the bin to the flowmeter flowguide. Manual or automatic control should be provided to ensure the holding bin is neither emptied, nor overfilled while the feeder is in operation. The same bin used for this purpose, could also be used for the integrator on-line calibration, (if so equipped). Refer to the integrator instruction manual for bin requirements.



For drag conveyors, it is recommended that a baffle plate be installed at the conveyor discharge to reduce the heavy material pulsing associated with this type of feeder.

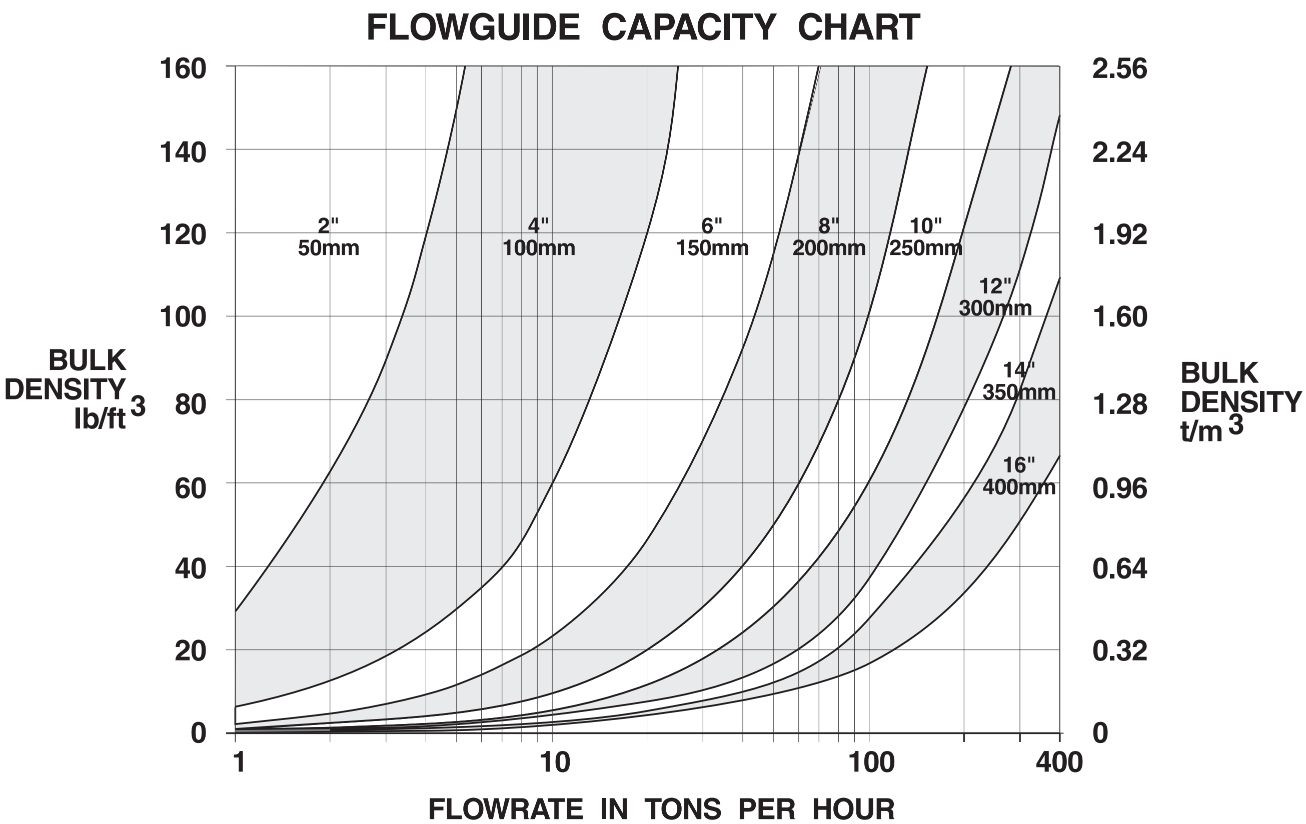
IN-FEED/DISCHARGE AIR PRESSURE



If a material in-feed/discharge differential air pressure is anticipated, and rotary airlock feeders are not utilized, the in-feed and discharge chutes should be vented to a common dust collector. A tuning gate may be installed in each vent to balance the air pressure. If a dust collector is not utilized, an air bypass chute may be installed between the flowmeter in-feed and discharge chutes.

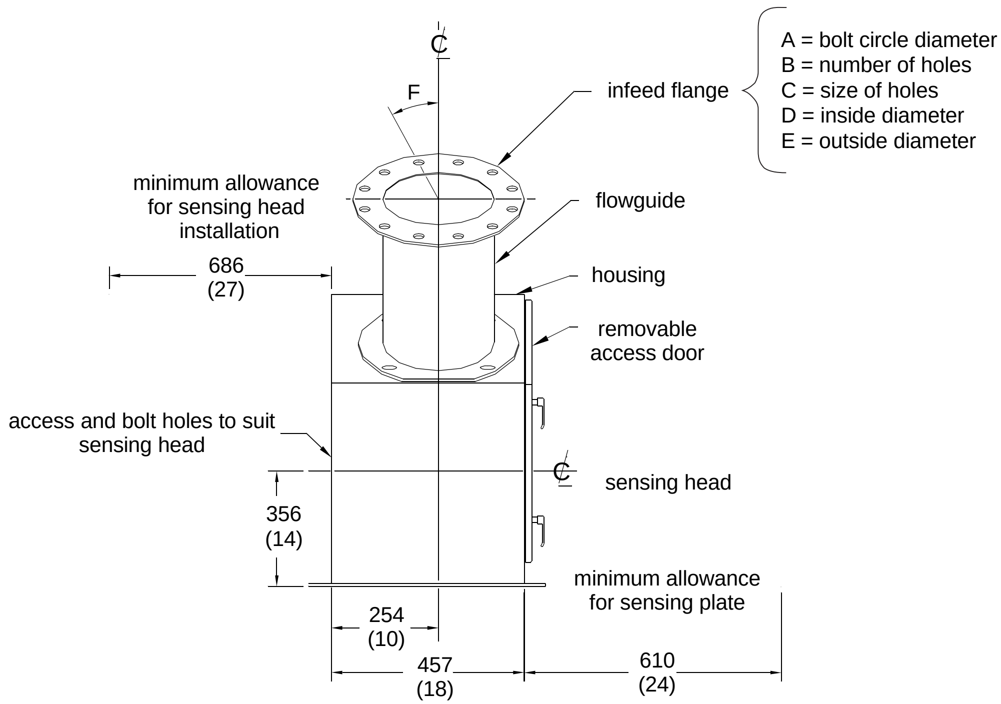
FLOWGUIDE CAPACITY

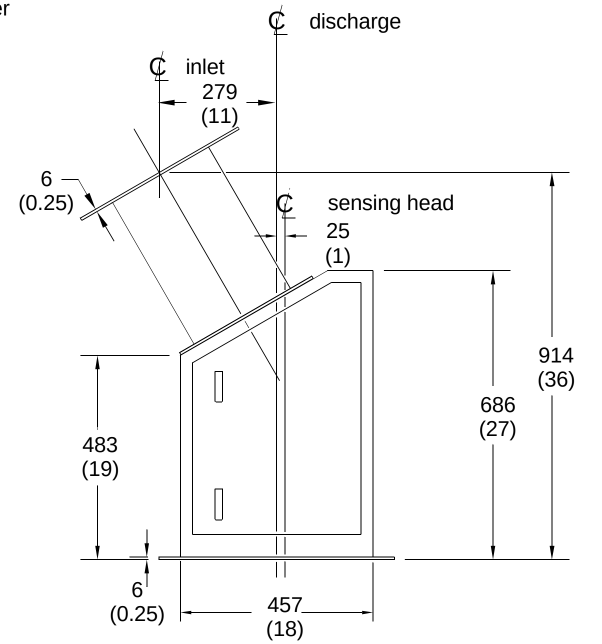
Refer to the following chart, to ensure the flowguide capacity is suitable.



Should the material bulk density and flowrate be near a flowguide diameter upper limit, choose the next larger flowguide diameter.

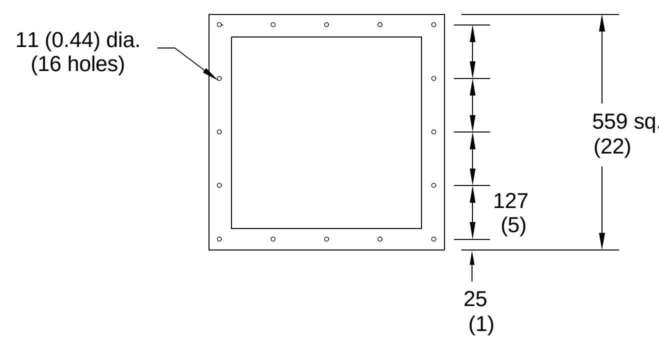
E - 40 OUTLINE AND MOUNTING





FLOWMETER INFEED FLANGE

SIZE	A	B	C	D	E	F
1	121 (4.75)	4	19 (0.75)	51 (2)	152 (6)	45°
2	191 (7.5)	8	19 (0.75)	102 (4)	229 (9)	22.5°
3	241 (9.5)	8	22 (0.88)	152 (6)	279 (11)	22.5°
4	298 (11.75)	8	22 (0.88)	203 (8)	343 (13.5)	22.5°
5	362 (14.25)	12	25 (1)	254 (10)	40 6 (16)	15°

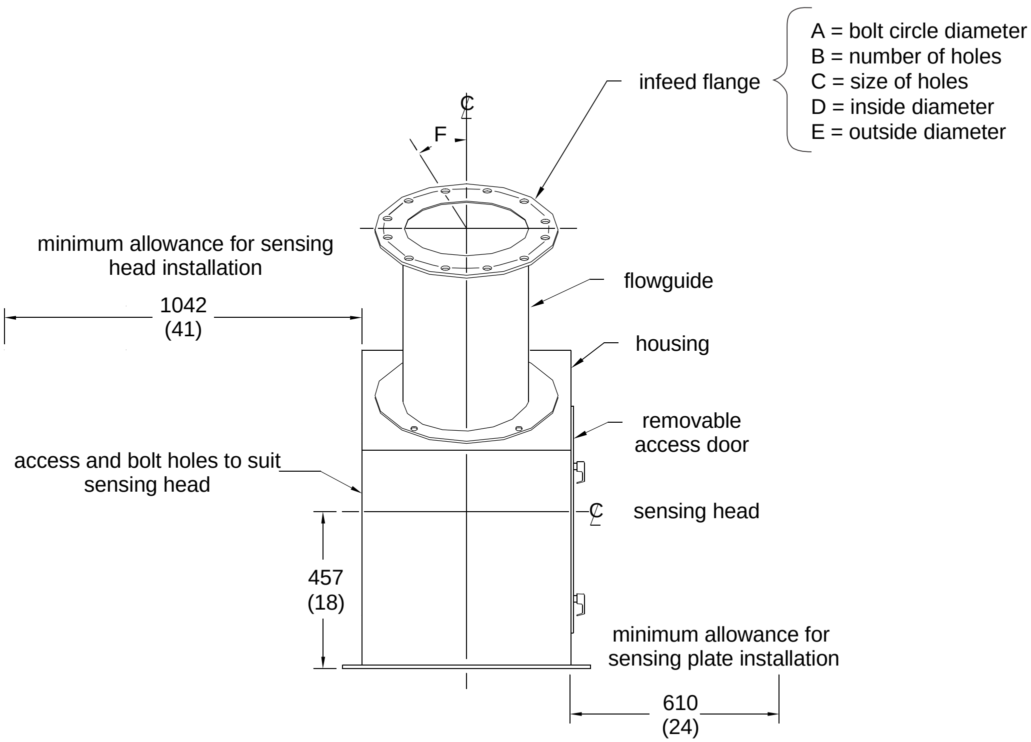


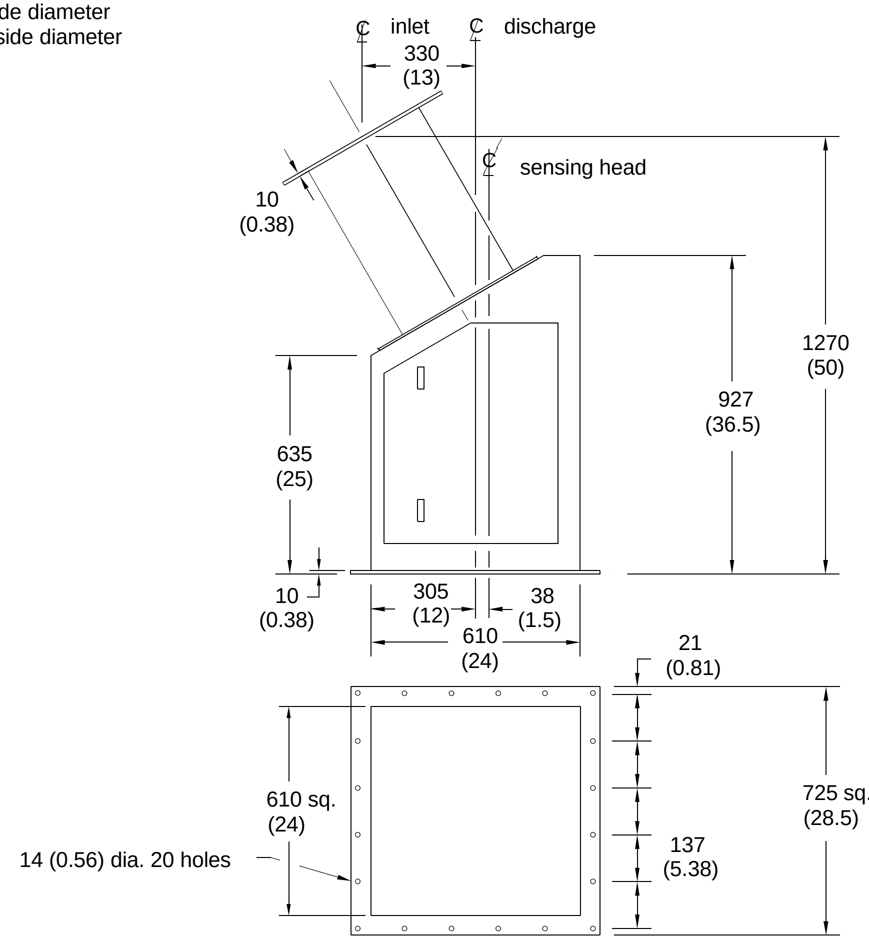
NOTES:

1. Mild steel or stainless construction.
2. Flowmeter support should be rigid and independent of enclosure.
3. All dimensions in millimetres.
   ( ) Denotes dimensions in inches.

Fig. 1

E - 300 OUTLINE AND MOUNTING





FLOWMETER INFEED FLANGE

SIZE	A	B	C	D	E	F
1	241 (9.5)	8	22 (0.88)	152 (6)	279 (11)	22.5°
2	298 (11.75)	8	22 (0.88)	203 (8)	343 (13.5)	22.5°
3	362 (14.25)	12	25 (1)	25 4 (10)	406 (16)	15°
4	432 (17)	12	25 (1)	30 5 (12)	483 (19)	15°
5	476 (18.75)	12	29 (1.13)	356 (14)	533 (21)	15°
6	540 (21.25)	16	29 (1.13)	406 (16)	597 (23.5)	11.25°

NOTES:

1. Mild steel or stainless construction.
2. Flowmeter support should be rigid and independent of enclosure.
3. All dimensions in millimetres.
   ( ) Denotes dimensions in inches.

Fig. 2

MILLTRONICS

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