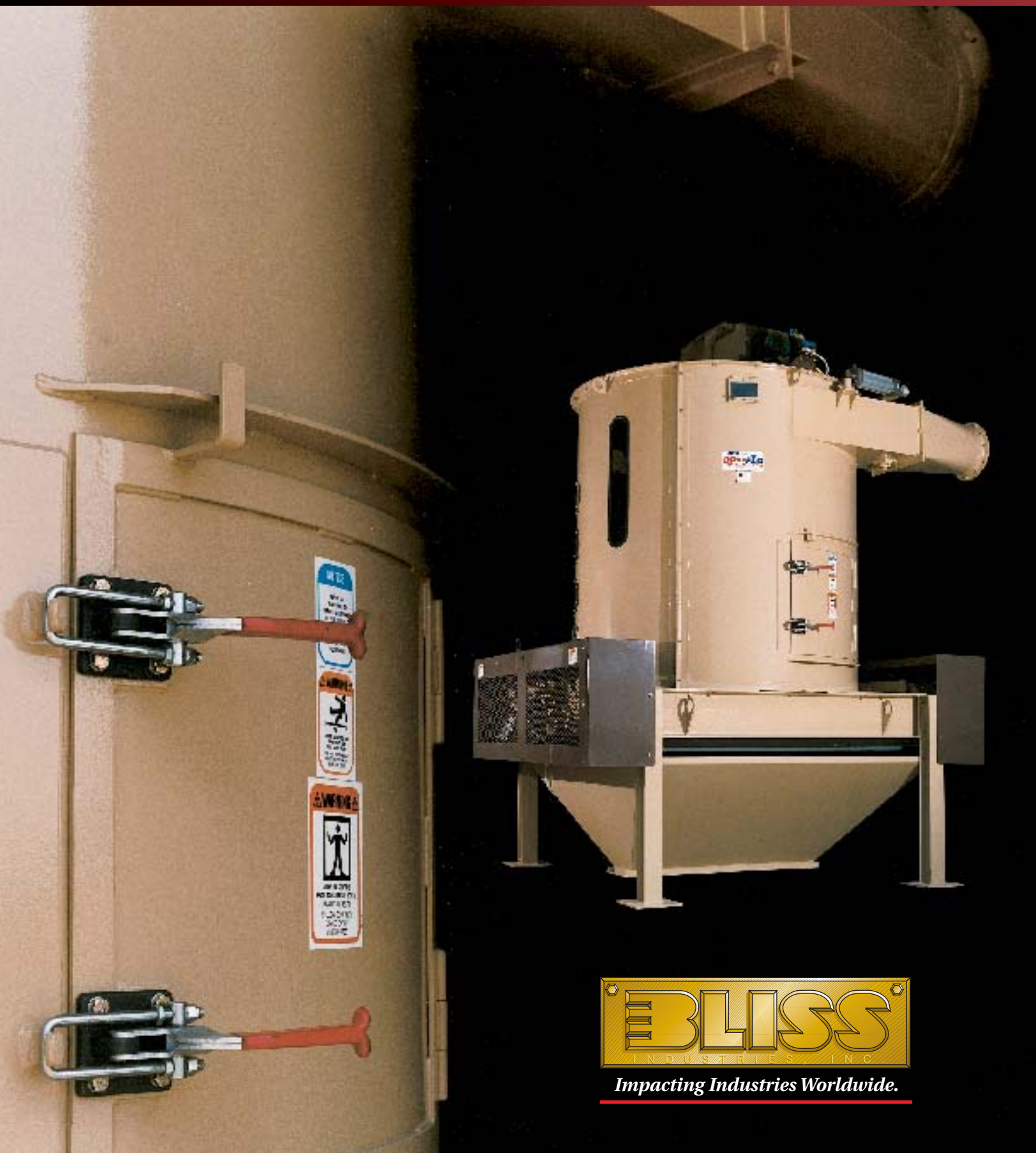
OP-FLO COOLERS

The circular solution to counterflow cooling.



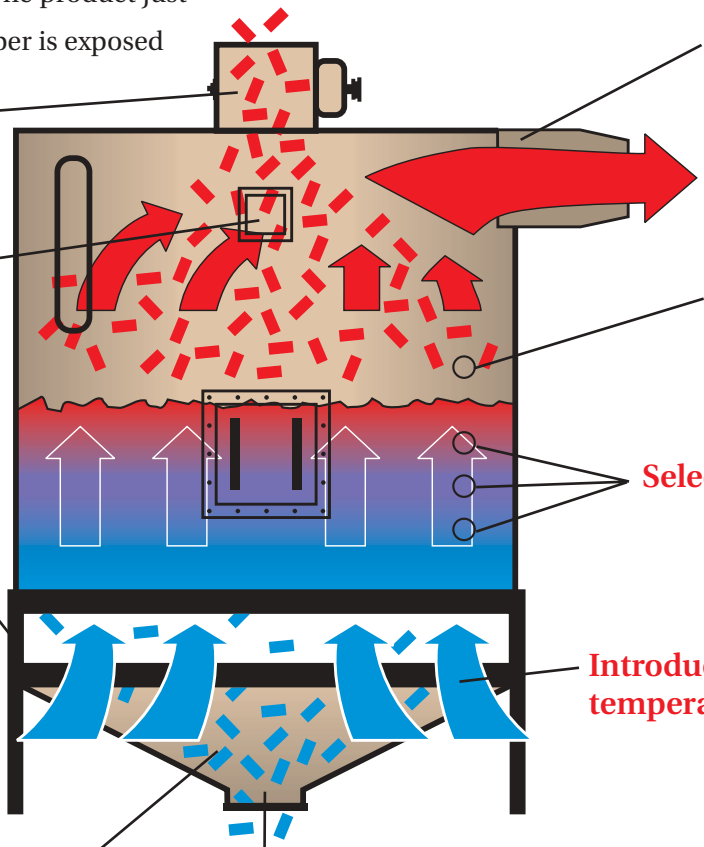
BLISS INDUSTRIES, INC

Impacting Industries Worldwide.

OP><FLO THEORY

The OP><FLO Principle

The OP><FLO (Opposite Flow) or Counterflow process is the refined technology of exposing processed product to an upward moving stream of ambient airflow. As the air rises through the product, it is warmed, increasing the moisture carrying capability of the air. The product just entering at the top of the cooling chamber is exposed to the warmest air available within the cooler minimizing temperature shock. The product exiting the bottom of the unit is cooled to within 5-10° of the ambient air temperature. The product and air have "opposite flows". The gradual heat transfer greatly enhances the product quality and reduces stressing and fines.



Simple Excellence

Bliss Coolers are available in either a rectangle, square or circular cooling chamber design, the latter being the newest technology. The circular design enables product to be evenly distributed throughout the unit, increasing cooling uniformity. The round design eliminates all poorly filled corners. A distinct advantage of the OP><FLO cooling process is the compact "footprint", or base size. Most system installations encounter limited space situations and the minimal "footprint" with OP><FLO coolers provide invaluable versatility in system design.

The "Simple Excellence" of the OP><FLO cooler is in its highly efficient design which produces a uniformly cooled product with a low operating and installation cost compared to other conventional type coolers.

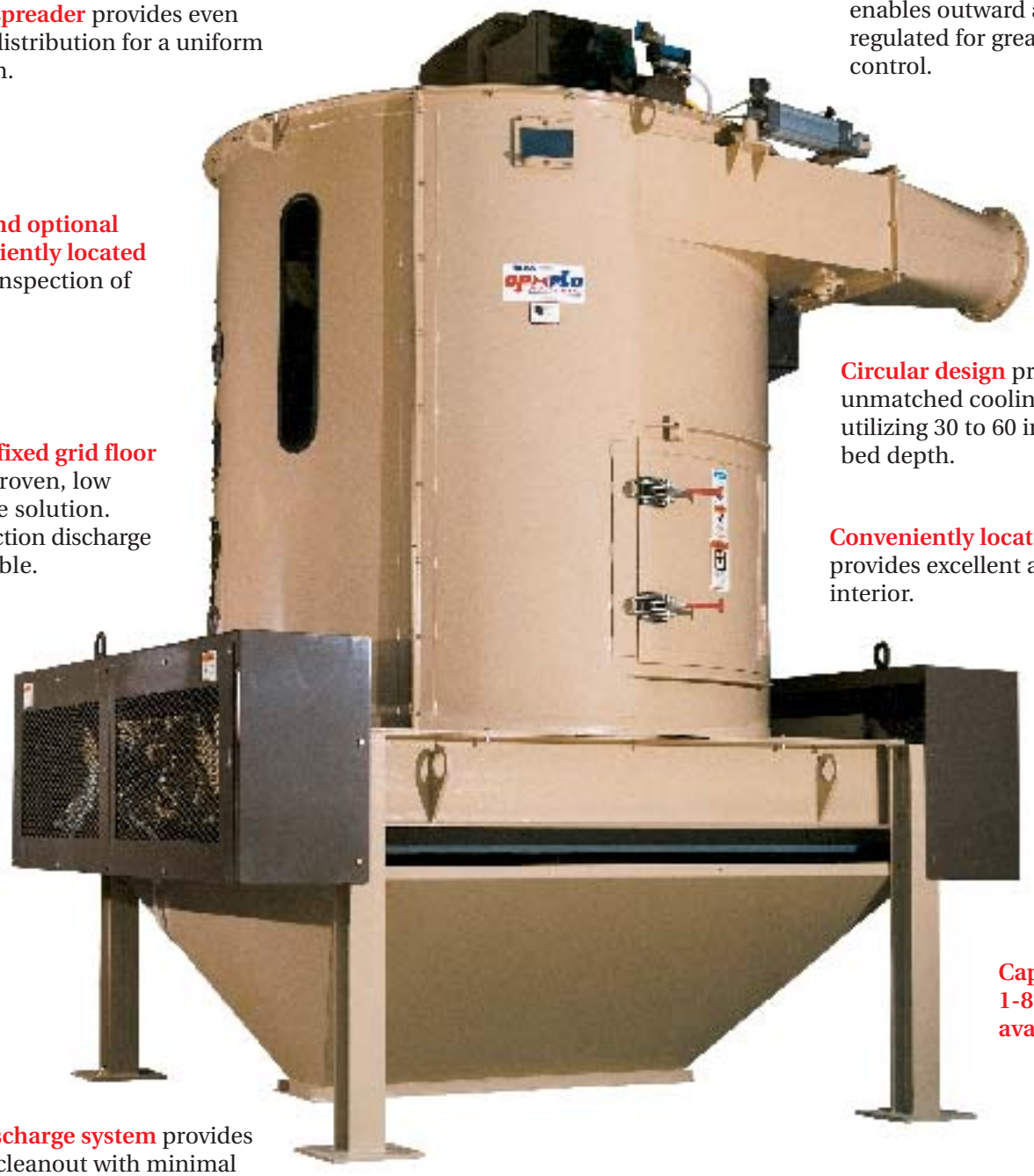
OPTIFLO FEATURES

Electric motors or air cylinders are used to regulate air exhaust and operate discharge louvers.

Rotary valve feeding system and product spreader provides even product distribution for a uniform bed depth.

Optional air exhaust damper enables outward airflow to be regulated for greater cooling control.

Sightglass and optional light conveniently located for internal inspection of cooler.



Circular design provides unmatched cooling consistency utilizing 30 to 60 inch product bed depth.

Heavy-duty fixed grid floor is the field proven, low maintenance solution. Full or live action discharge floors available.

Conveniently located door provides excellent access to interior.

Capacities of 1-80 TPH available.

Louver discharge system provides complete cleanout with minimal number of moving parts.

Compact footprint or base sizes are ideal for limited space installations.

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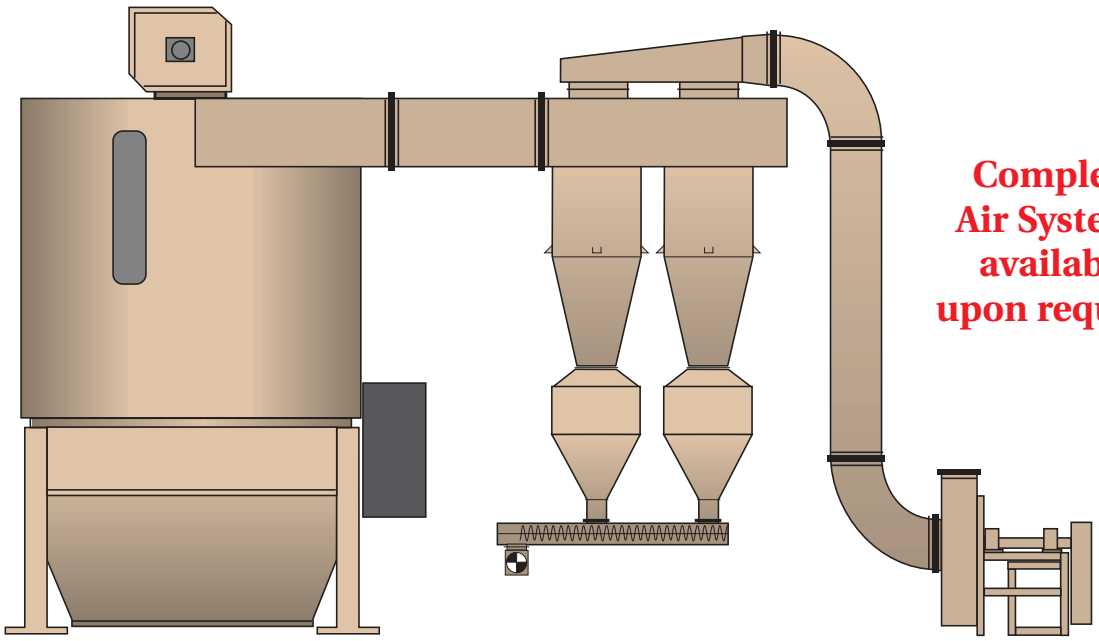
OPFLO SUMMARY

SIMPLE EXCELLENCE — SIMPLY STATED.

- Low operating cost (50% energy savings)
- Low Maintenance
- Low Product Degradation
- Low Condensation in cooling chamber
- Minimal Space Requirement (per ton of capacity)
- Minimal Contamination: Total cleanout on louver discharge system.
- Low electrical requirement
- 1 HP — S.S. combo feeder/spreader
  1/2 HP or 3/4 HP — Louver discharge system
- Electric and Air Operated Units available
- Low product shock — stress, (tempered evaporation cooling)
- Low profile discharge systems available (Custom fabricated to customer's requirements)
- Electric Control Panels available for operational control and measurement of a wide variety of variables
- Minimal "caking" of sticky product at start-up
- Cooling/drying many products efficiently
- Flow rates adjustable from control room
- Multiple product sizes adjustable from control room
- Multiple sensors for multiple sizes of product
- Rotary valve feeder helps control air distribution
- Proven field testing ensures proper sizing of your cooler
- Corten and 304 SS construction available
- Capacities 1-80+ TPH available
- Double deck units allow product rotating: (faster and more efficient cooling)
- Low investment and installation cost
- Minimal working parts
- Dryer units available
- Combo Vibratory Hopper/Screener available.
- Intermediate floors available for starting next batch during current batch cleanout

Typical Installation



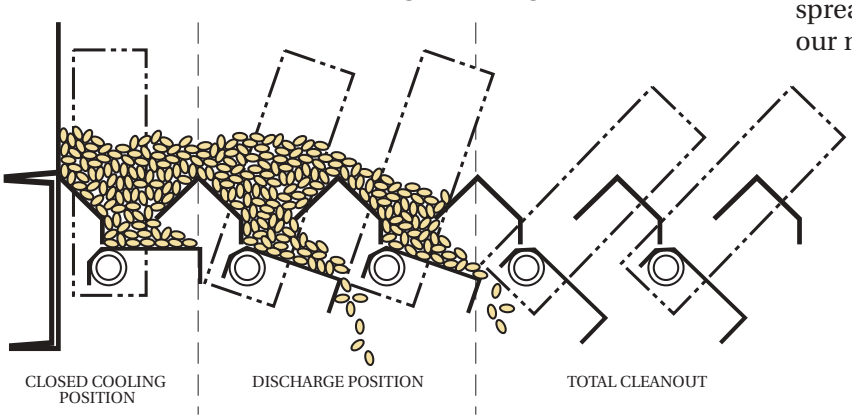
Complete Air Systems available upon request.

NOTE: Every Cooling Operation is benefited by minimizing the length of air piping.

QUALITY FEATURES

Louver Discharge System and Fixed Grid Floor

Our Fixed Grid Floor resembles an upside-down "V". This design carries the weight more efficiently than a horizontal surface. There is little to no weight bearing on the louvers.



The louvers resemble a pivoting stairstep that allows product to flow through easily when open and completely stops flow when closed. The discharge system works equally well on 1/8" dia. pellets as it does on 1" dia. x 4" long cubes. The design also allows for complete clean-out at the end of a production run. Once the product leaves the fixed grid floor it flows through a single layer of movable panels controlling the discharge. Louvers pivot on heavy-duty regreasable bearings powered by air cylinders or electric motors. Full or live action discharge floors available.


Guard removed for viewing.

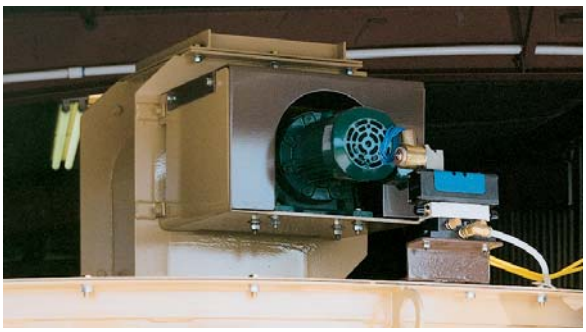
Electric and Air Operated

The OP><FLO Cooler can be used in a number of product applications including: pet food, fish food, livestock feed pellets, soy collets, meat and bone meal, wood pellets, plastic, dried fruit, berries and flaked grains. The dryer-cooler is used in applications requiring high moisture removal. Products differ in size and shape from granular meals to pellets and chips.

WARNING LABELS
"Industry Standard" Safety Warning Labels are applied as recommended and prepared by the AFIA Equipment Manufacturers Council.

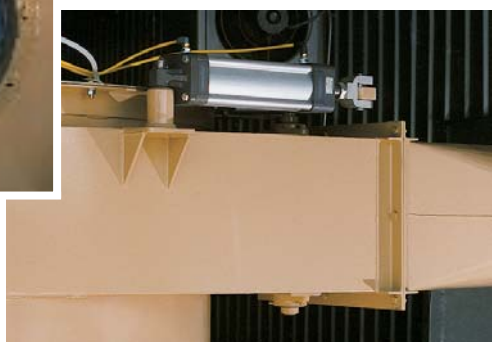
Rotary Valve Feeder

The rotary valve feeder supplies an even-flow of product to the cooling chamber. Circular Bliss Coolers feature a product-driven spreader that provides even product dispersion over the entire cooling chamber. Optional powered spreaders are available for special applications. Ask about our new combo feeder/spreader.



Optional Air Damper at Cooler Exhaust

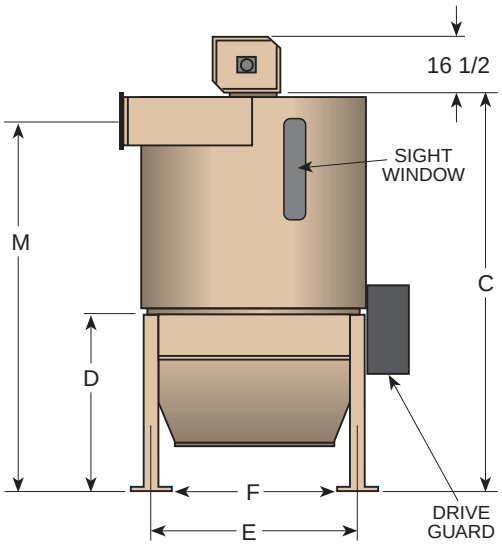
The Air Damper is operated by a level sensor in the cooling chamber. The damper is in the closed position at the start and the end of a production run. This keeps the full air flow from shocking, stressing and degrading the product. Also, it allows for complete product clean out.

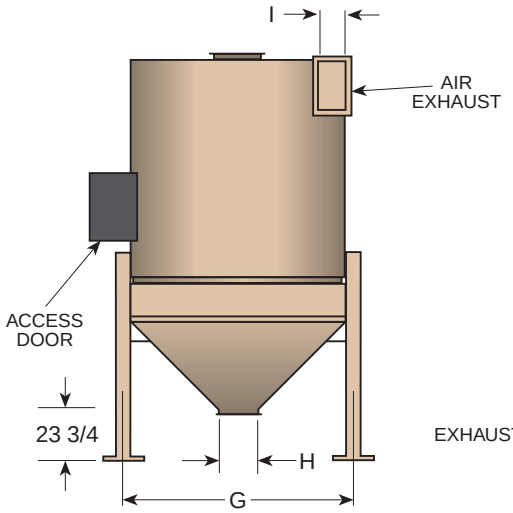


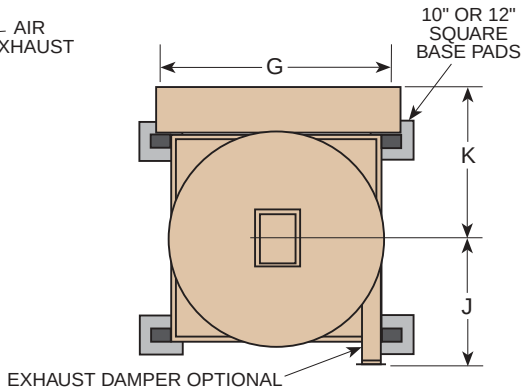
Selectable Level Sensors

Bliss Coolers feature automated level sensors that activate when the bed level reaches the preselected depth. Once activated, the sensors operate the louvers allowing product to be released. A "fail-safe" detector is permanently mounted near the top of the cooler for prevention of an overflow if sensors are not set properly.

SPECIFICATIONS







INDUSTRIAL MODEL COOLERS

AVERAGE VALUES = **10 MINUTE RETENTION**
40 POUNDS PER CUBIC FOOT
400 CFM'S PER TON

NOTES:
1. Below dimensions are in inches and subject to change without obligation or notice.
2. Certified prints available on request.
3. Standard hoppers have 45° corners.
4. G dimension supplied for electric drive upon customer request.

COOLER MODEL	VOL. (FT^3)	A BIN DIA. (IN)	AVERAGE TONS/HOUR	B AVERAGE CFM'S	OUTLET AREA (IN^2)	C O.A.H. HEIGHT (IN)	D LEG HEIGHT (IN)	E LEG CTRS LENGTH (IN)	F HOPPER LENGTH (IN)	G LEG CTRS WIDTH (IN)	H HOPPER WIDTH (IN)	I EXHAU. WIDTH (IN)	J PLAN LENGTH (IN)	K PLAN LENGTH-2 (IN)	L TOTAL WEIGHT (LB)	M DAMPER CTR HEIGHT (IN)
RBR-34-4	34	43.5	4.13	1700	67.50	125.50	66.125	45.00	23.5	53.00	11	13.5	30.125	37.50	1400	119.50
RBR-43-5	43	43.5	5.16	2100	81.00	137.25	66.125	45.00	23.5	53.00	11	13.5	30.125	37.50	1500	131.00
RBR-52-6	52	43.5	6.19	2500	99.00	149.125	66.125	45.00	23.5	53.00	11	16.5	31.75	37.50	1600	140.125
RBR-49-4	49	52	5.90	2400	96.00	130.875	70.375	53.50	32	61.50	11	16.5	33.50	40.75	2000	123.37
RBR-61-5	61	52	7.37	2900	119.00	143.125	70.375	53.50	32	61.50	11	17	34.125	40.75	2100	135.125
RBR-74-6	74	52	8.85	3500	140.00	155.25	70.375	53.50	32	61.50	11	20	36.00	40.75	2200	148.50
RBR-67-4	67	60.5	7.99	3200	140.00	136.375	74.625	62.00	40.5	70.00	11	20	39.375	45.00	2700	128.375
RBR-83-5	83	60.5	9.98	4000	154.00	147.575	74.625	62.00	40.5	70.00	11	22	40.687	45.00	2800	140.875
RBR-100-6	100	60.5	11.98	4800	192.00	161.375	74.625	62.00	40.5	70.00	11	24	42.125	45.00	2900	150.50
RBR-87-4	87	69	10.39	4200	168.00	141.875	78.875	70.50	49	78.50	11	21	43.25	49.25	3500	134.375
RBR-108-5	108	69	12.98	5200	208.00	154.375	78.875	70.50	49	78.50	11	26	47.25	49.25	3600	146.875
RBR-130-6	130	69	15.58	6200	248.00	167.50	78.875	70.50	49	78.50	11	31	45.25	49.25	3700	159.00
RBR-109-4	109	77.5	13.10	5200	208.00	148.25	83.125	79.00	57.5	87.00	11	26	50.375	53.50	4400	140.75
RBR-136-5	136	77.5	16.38	6600	248.00	161.50	83.125	79.00	57.5	87.00	11	31	48.937	53.50	4500	154.00
RBR-164-6	164	77.5	19.66	7900	315.00	174.75	83.125	79.00	57.5	87.00	11	35	50.812	53.50	4600	166.75
RBR-134-4	134	86	16.14	6500	261.00	153.875	87.50	85.50	66	97.50	11	29	50.00	57.75	5400	143.1875
RBR-168-5	168	86	20.17	8100	324.00	167.375	87.50	85.50	66	97.50	11	36	54.50	57.75	5500	154.9375
RBR-202-6	202	86	24.20	9700	360.00	180.00	87.50	85.50	66	97.50	11	36	54.50	57.75	5600	170.50
RBR-162-4	162	94.5	19.48	7800	306.00	159.25	91.75	94.00	74.5	106.00	11	34	56.687	62.00	6500	148.00
RBR-203-5	203	94.5	24.35	9700	390.00	173.25	91.75	94.00	74.5	106.00	11	39	52.00	62.00	6600	160.00
RBR-244-6	244	94.5	29.22	11700	468.00	187.125	91.75	94.00	74.5	106.00	11	39	52.00	62.00	6700	177.625
RBR-193-4	193	103	23.15	9300	370.00	164.875	96.00	102.50	83	114.50	11	37	62.75	66.25	7700	156.375
RBR-241-5	241	103	28.93	11600	468.00	179.00	96.00	102.50	83	114.50	11	39	63.875	66.25	7800	168.75
RBR-289-6	289	103	34.72	13900	540.00	193.25	96.00	102.50	83	114.50	11	45	63.187	66.25	7900	183.75
RBR-226-4*	226	112	27.12	10800	450.00	170.25	100.25	111.00	91.5	123.00	11	45	68.00	70.50	9000	160.75
RBR-283-5*	283	112	33.90	13600	546.00	184.875	100.25	111.00	91.5	123.00	11	42	65.50	70.50	9100	174.875
RBR-339-6*	339	112	40.68	16300	650.00	199.375	100.25	111.00	91.5	123.00	11	50	68.437	70.50	9200	188.375
RBR-262-4*	262	120	31.42	12600	504.00	175.875	104.50	119.50	100	131.50	11	42	68.50	74.75	10500	166.875
RBR-327-5*	327	120	39.27	15700	624.00	190.625	104.50	119.50	100	131.50	11	48	71.875	74.75	10600	180.625
RBR-393-6*	393	120	47.12	18800	700.00	205.50	104.50	119.50	100	131.50	11	50	70.875	74.75	10700	195.00
RBR-300-4*	300	129	36.02	14400	546.00	181.25	108.75	128.00	108.5	140.00	11	42	71.562	79.00	12000	171.25
RBR-375-5*	375	129	45.03	18000	700.00	196.50	108.75	128.00	108.5	140.00	11	50	76.125	79.00	12100	185.00
RBR-450-6*	450	129	54.04	21600	840.00	211.625	108.75	128.00	108.5	140.00	11	56	79.00	79.00	12200	200.625
RBR-341-4*	341	137	40.95	16400	644.00	186.875	113.00	136.50	117	148.50	11	46	76.937	83.25	13600	176.375
RBR-427-5*	427	137	51.18	20500	825.00	202.25	113.00	136.50	117	148.50	11	55	78.875	83.25	13700	191.25
RBR-512-6*	512	137	61.42	24600	992.00	217.75	113.00	136.50	117	148.50	11	62	81.062	83.25	13800	206.25
RBR-385-4*	385	146	46.19	18500	750.00	193.875	117.25	145.00	125.5	157.00	11	50	82.375	87.50	15400	182.875
RBR-481-5*	481	146	57.73	23100	928.00	210.00	117.25	145.00	125.5	157.00	11	58	83.937	87.50	15500	197.50
RBR-577-6*	577	146	69.28	27700	1116.00	226.25	117.25	145.00	125.5	157.00	11	62	84.625	87.50	15600	213.75

* Indicates Dual Drive Guard which is not illustrated in above drawing — consult Bliss Engineering Department.

Represented by:

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