Acrison®

Weigh Feeders

'Weight-Loss'
Model 403 Series

For Dry Solid Materials and Liquids



Advanced Design Technologies for Superior Performance and Operational Reliability.

Acrison®

Model 403 Series

'Weight-Loss' Weigh Feeders

For Dry Solids and Liquids

Proven in thousands of worldwide installations, Acrison's various model *'Weight-Loss'* Weigh Feeders provide superior operational performance, unexcelled reliability, minimal maintenance requirements and unrivaled longevity.



Model 403-105Z

For Continuous or Batch Weigh Feeding Applications

Background

Designed, developed and perfected by Acrison, the Model 403 was the first commercially successful continuous 'weight-loss' weigh feeder produced in the United States. It was initially designed to meter dry solid ingredients at very low feed rates (i.e., pounds per hour), since prior to its introduction in 1970, weigh feeding at such low feed rates was next to impossible to obtain from conventional type weigh feeders. Then as users began to recognize the extraordinary performance capabilities of Acrison's Model 403 Weigh Feeders, and in particular, their ability to provide accurate and dependable continuous operation, requests for higher capacity 'weight-loss' weigh feeders were numerous. And in response, such weigh feeders were designed.

Strong, Time-Proven Weighing Technology

Specifically designed by Acrison for 'weight-loss' weigh feeder operation, Model 403 Weighing Systems consist of technologically advanced dynamic lever weighing mechanisms (scales), well-known for their strong durable construction, operational stability and ability to remain precise without the need for recalibration and/or adjustment. And they also boast an unrivaled track record for bare minimal maintenance requirements and exceptional longevity.

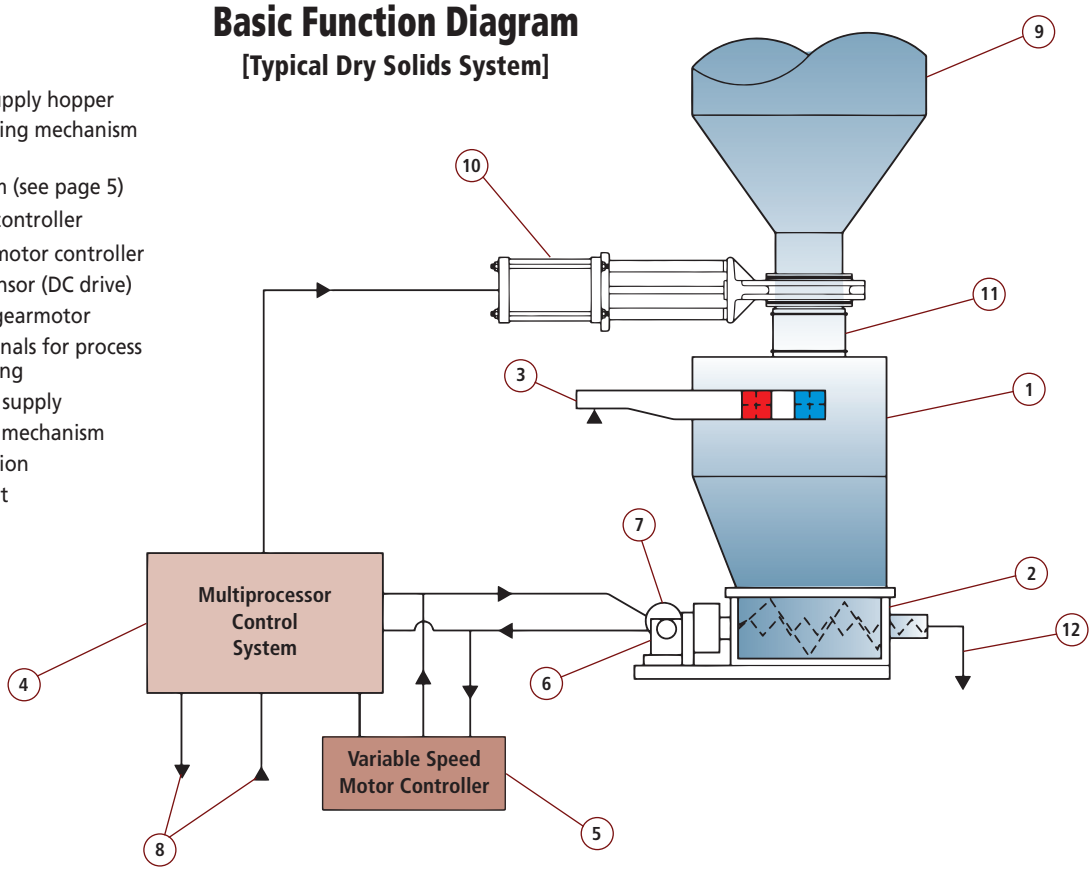
High resolution weight sensing is produced by Acrison's unique Ratiometric Digital Weight Resolver (not a load cell) that instantaneously generates an unamplified, non-integrated, 'real time' weight signal (as weight is added or removed from the 'scale'). This signal is serially transmitted to the weigh feeder's multi-processor controller for all controlling functions (see page 5 for more information).

For Continuous or Batch Weigh Feeding Applications

Basic Function Diagram

[Typical Dry Solids System]

1. Weigh feeder supply hopper
2. Dry solids metering mechanism (auger type)
3. Weighing system (see page 5)
4. Multiprocessor controller
5. Variable speed motor controller
6. Digital speed sensor (DC drive)
7. Variable speed gearmotor
8. Input/output signals for process control interfacing
9. Product storage supply
10. Automatic refill mechanism
11. Flexible connection
12. Weighed output



Principles of Operation

As product discharges (feeds) out of the scale-mounted metering mechanism, Acrison's high resolution Ratiometric Digital Weight Resolver transmits precise *'loss-of-weight'* data to the feeder's controller on a *'real-time'* basis (no signal lag). In turn, the controller instantaneously calculates the rate at which product is discharging out of the feeder's metering mechanism and compares that rate to the feed rate selection.

Simultaneously, the variable speed drive of the metering mechanism is continuously modulated to maintain the weighed output precisely at the selected feed rate. Response of the metering mechanism is also instantaneous, thereby producing optimum metering performance, both short and long-term.

Unlike weigh feeders that utilize one or more load cells for sensing weight, the weight signal of Acrison weigh feeders is not integrated (averaged) or in any way manipulated for stabilization purposes; it is inherently stable for direct use by the feeder's control system. Integration of a weigh feeder's weight signal, while giving the impression of good stability, can severely hamper the feeder's ability to respond quickly to changes in its output (weight), compromising metering accuracy.

Easily capable of withstanding the harshest industrial environments, Acrison's time-proven, rugged duty weighing systems are unsurpassed in precision, durability, reliability and longevity. In addition, they are also permanently calibrated and virtually maintenance-free.

The *'weight-loss'* principle for continuous weigh feeding requires periodic refilling of the feeder's supply hopper (or tank for liquid applications) as an operational requirement, which is usually a completely automatic function.

The maximum number of refills (e.g., per hour) is determined by the maximum feed rate and size of the feeder's supply hopper. The number of refills within a given period of time must remain within operational parameters that will ensure weigh feeding integrity (i.e., operating under 'weight-loss' control the vast majority of the time).

All Acrison *'Weight-Loss'* Weigh Feeder control systems include 'Acri-Lok'®, an Acrison innovation that ensures accurate product delivery should the feeder's weighing system sense an abnormal disturbance during operation.

Continuous metering accuracy typically ranges between +/- 0.25 to 1 percent or better (error) at two sigma, based on a given number of consecutive one minute weighments.

'Weight-Loss' Weigh Feeders

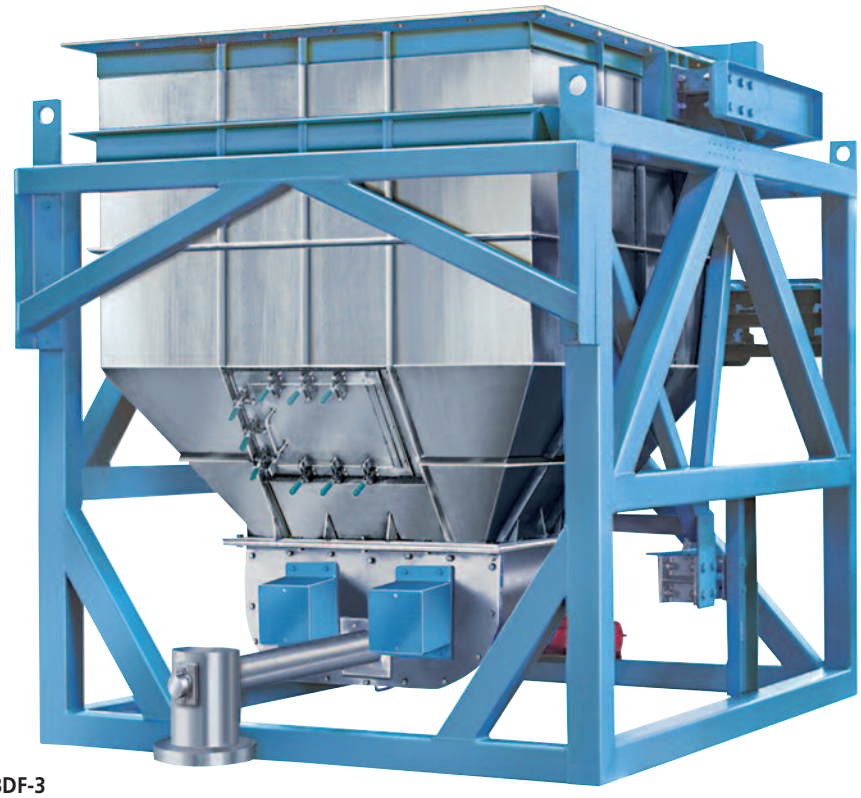
Because the functional parameters of a 'weight-loss' weigh feeder are totally different than those utilized by all other type weigh feeders, its weighing system must be specifically designed for such usage to ensure optimum metering performance and long-term trouble-free operation.

Unmatched in precision, ruggedness and reliability, Acrison 'weight-loss' weigh feeders are designed with permanently calibrated, adjustment-free, non-temperamental weighing systems that will not falter even under the harshest operating conditions. They are virtually maintenance-free mechanisms that carry a five-year warranty, and boast a minimum life expectancy of 30 years.

The weighing systems utilized with Acrison's Model 403 '*Weight-Loss*' Weigh Feeders have been robustly constructed to endure the many adversities common to most industrial manufacturing environments, yet are fully capable of producing a high degree of weight-sensing resolution without amplification (amplifying a weight signal does not increase its resolution), *see page 6*. In addition, the weighing system of a 'weight-loss' feeder must be capable of tolerating the never-ending 'impacts' associated with refills, especially feeders with large hoppers, without damage or loss of calibration.

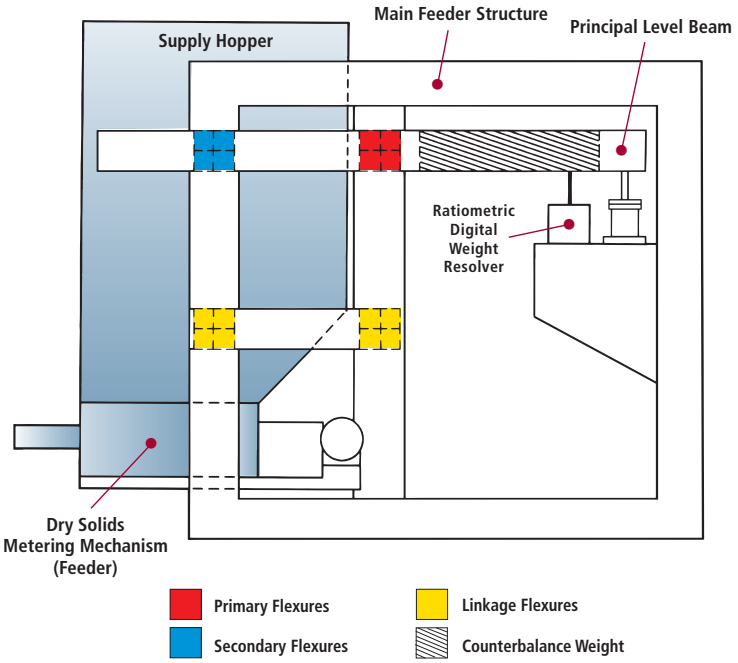
In differing from the common variety of load cell based 'weight-loss' weigh feeder weighing systems, the physical sensing element of Acrison's Ratiometric Digital Weight Resolver does not physically attach to any part of the lever network and therefore, cannot be damaged by any amount of shock, overload, and/or abuse that the weighing system may experience. *In addition, the entire weighing mechanism, including the Ratiometric System, is completely calibration and adjustment-free.*

As an indication of Acrison's confidence level in the weighing systems of their various model weigh feeders, all Acrison weighing systems are covered by an unconditional five year warranty, which also includes the electronics associated with the weighing systems.



Model 403-BDF-3

Acrison's 'Overhead' Weighing Systems



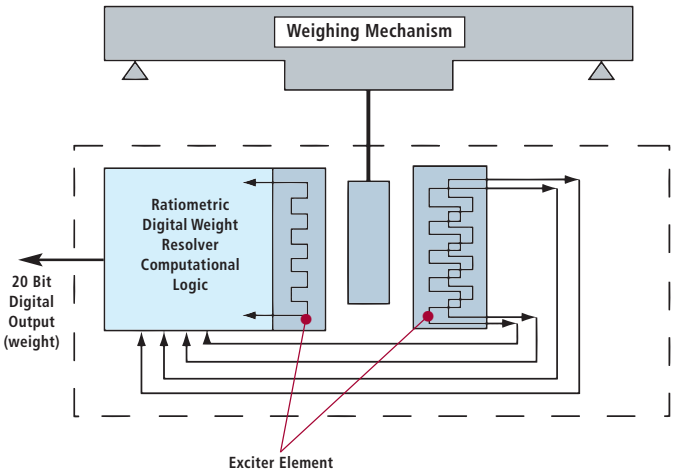
NOTE: For liquid feeders, the dry solids supply hopper is replaced with a tank and the dry solids metering mechanism with a pump.

The Model 403 Series of Weigh Feeders utilize *'Overhead'* weighing systems specifically designed by Acrison for 'weight-loss' weigh feeding applications. These technologically advanced dynamic weighing mechanisms are frictionless in operation, extremely stable, ruggedly constructed and very precise in their ability to sense weight. They are also *'counterbalanced'* so that only the net weight of material in the metering mechanism and its supply hopper (or tank for liquids) is weighed.

Operationally, as weight is added or removed from the scale-mounted metering mechanism and its supply hopper (or tank for liquid feeders), the lever network 'moves' in an extremely precise relationship to that weight. This movement (or displacement) is sensed by Acrison's Ratiometric Digital Weight Resolver and instantaneously converted into an unamplified, non-integrated 'real-time' signal directly proportional to weight.

The entire weighing mechanism, including the Ratiometric Digital Weight Resolver, is completely calibration and adjustment-free, and guaranteed for five years.

Ratiometric® Digital Weight Resolver System



Acrison's Ratiometric Digital Weight Resolver, used with all Acrison Weigh Feeders, computes movement of the weighing mechanism into a serially transmitted data stream having a discrete resolution of 20 bits (or the ability to sense 1 part in 1,048,576). This extraordinarily precise displacement measurement technique basically consists of a power supply, a sensing element and computational logic. The Ratiometric System compares relative measurements rather than absolute values, and its power source can vary as much as +/- 30% without affecting performance. The Ratiometric Weight Resolver System is linear to within 0.01% and repeatable to 0.005%.

One of the unique features of the Ratiometric System relates to the manner in which 'movement' of the weighing mechanism is sensed, whereby the physical sensing element does not attach to (or contact) the lever weighing network. This novel design eliminates the possibility of damaging the Weight Sensor should the weighing system experience any type of shock or overload, regardless of the magnitude. And this includes the continual 'impacts' associated with refilling a 'weight-loss' feeder, especially larger units.

The Ratiometric System is FM (Factory Mutual) Approved and Listed for operation in hazardous environments.... Classes I, II and III; Divisions 1 and 2; Groups C, D, E, F and G, and also complies with hazardous area classifications ATEX 3D or IECEX (Zone 22), 3G (Zone 2) and 2D (Zone 21).

Model 403 Standard Design Features

- **Continuous metering or batch weighing on a 'weight-loss' basis –** Acrison's 'weight-loss' operational concepts and equipment designs combine rugged-duty, permanently calibrated,adjustment-free state-of-the-art weighing systems with the most versatile dry solids metering/handling mechanisms and related controls to provide users with an unsurpassed level of highly reliable overall performance.
- **Accuracy –** All Acrison continuous weigh feeders typically provide metering accuracies ranging between ± 0.25 to 1 percent or better (error), at two sigma, based on a given number of consecutive one minute weighments.

  Batch accuracies typically range between ± 0.1 to 0.5 percent or better (error), at two sigma, based on a given number of consecutive weighments.
- **Feed output capacity –** Depending upon the model and size, the overall feed rate output capability for the various model 'weight-loss' weigh feeders described in this Bulletin ranges from several pounds up to approximately 20,000 pounds per hour.
- **Feed range –** As standard, all Acrison 'weight-loss' weigh feeders are capable of an overall feed range of 100:1.
- **Weighing System –** *Please see page 5.* Designed with very high service factors, Acrison's various 'weight-loss' weighing mechanisms are by far the most reliable, sensitive and accurate in the industry. The advanced technologies encompassed within these frictionless, ultra-high resolution, counterbalanced, lever weighing systems allow unrivaled operation, even in the typically adverse industrial environments. Also, once calibrated (factory completed), these novel weighing systems do not require re-calibration or adjustment; in fact, such provisions do not exist. They are permanently calibrated.
- **Ratiometric Digital Weight Resolver –** Acrison's Ratiometric Digital Weight Sensing System utilizes synchro-resolver technology and innovative electronics to produce a digital weight signal having extraordinary performance specifications. This unamplified, non-integrated, highly precise and stable weight signal is a count ranging from 0 to 1,048,576 (20 bits), capable of use by any of Acrison's multiprocessor weigh feeder controllers. *Please see page 5 for additional information.*
- **Unaffected by typical in-plant vibration and dust –** Typical in-plant vibrations do not affect Acrison weigh feeders as proven in scores of worldwide installations. The novel overall mechanical design of Acrison's various weighing mechanisms inherently provides excellent resistance to in-plant vibrations without the need to integrate the actual weight signal for stability purposes.

  Also, based on the 'weight-loss' principle of operation, dust accumulation onto any part of the weigh feeder will not present any operational problems whatsoever.
- **Controls –** Acrison offers several cutting-edge multi-processor controllers and a supervisory control system to operate its various weigh feeders. These controllers and control system are designed with numerous standard features and a variety of optional features. *Please see pages 10 and 11.*
- **No response lag –** Acrison's various metering mechanisms respond instantaneously upon command from the weigh feeder's controller to alter the feed output. Absolutely no lag exists since product discharge is directly out the scale-mounted metering device.
- **No rezeroing –** Acrison's 'weight-loss' principle of operation does not require a zero reference point: thus, the need for rezeroing the weighing system is never required.
- **Acri-Lok® –** All Acrison 'weight-loss' weigh feeders include a unique operational feature... *Acri-Lok*... developed and patented by Acrison to ensure accurate metering whenever the weighing system is disturbed in any manner that would adversely affect the accuracy of the metered output.
- **Batch-Lok® –** In addition to *Acri-Lok*, should an abnormal disturbance be detected by the weighing system of an Acrison 'weight-loss' weigh feeder operating in a batching mode, a supplementary feature... *Batch-Lok*... is provided to ensure the highest possible degree of batch accuracy.
- **Automatic refilling –** All Acrison 'weight-loss' weigh feeder control systems provide for automatically refilling the feeder's integral supply hopper (or tank). When automatically refilled, the controller initiates a refill command upon sensing low hopper (or tank) level provided the feed rate output is within pre-established tolerances.

  During the refill period, the feeding mechanism operates in a volumetric mode, returning to gravimetric control after refill and when the controller senses a normal 'weight-loss' condition.

  Although refill is generally rapid, Acrison 'weight-loss' controllers include a number of very effective operational features specifically designed to ensure optimum metering accuracy during all phases of refill, when the feeder is not in gravimetric control.
- **Totally enclosed product zone –** Because of the completely enclosed design of all Acrison 'weight-loss' weigh feeders, product remains totally confined, thus assuring a clean dust-tight operation.
- **Minimum of moving parts –** All Acrison 'weight-loss' weigh feeders have been designed with a minimum number of moving parts to ensure the highest possible degree of dependabililty with lowest maintenance requirements. Longeviety is exceptional.
- **Silent operation –** All Acrison weigh feeders are virtually silent when operating.
- **Ambient operating temperature –** As standard, Acrison 'weight-loss' weigh feeders will operate within an ambient temperature range of -20 to 150 degrees Fahrenheit.
- **Product temperature –** As standard, Acrison 'weight-loss' weigh feeders will handle products that range in temperature from -20 to 150 degrees Fahrenheit.

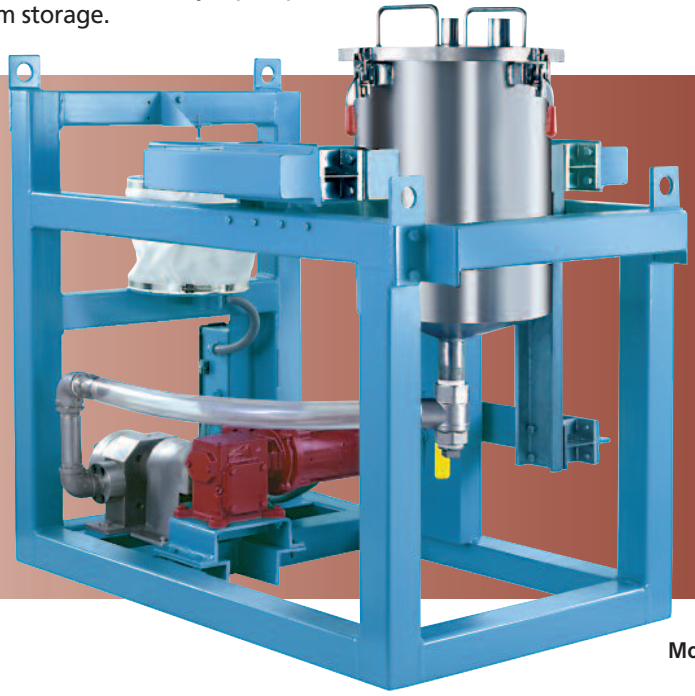
Liquid Weigh Feeders

Model 403 Liquid *'Weight-Loss'* Weigh Feeders utilize the same identical weighing systems used with Acrison's Model 403 Dry Solids '*Weight-Loss*' Weigh Feeders. The only difference is that the dry solids metering mechanisms and their supply hoppers are replaced with liquid metering pumps and supply tanks.

Also, and like a dry solids 'weight-loss' weigh feeder, refilling the integral supply tank of a liquid 'weight-loss' weigh feeder is usually a completely automatic function, typically handled by either an automatically operated valve attached to the bottom of a storage tank (mounted above the feeder), or by a pump that transfers product from storage.

Metering pump selection is based upon applicable user specifications, product characteristics, and feed rate requirements. Depending upon application parameters, the metering pump may either be mounted on the feeder's weighing mechanism or supplied as a separate assembly.

The feeder's integral supply tank can be provided in various materials of construction to suit the specifics of a given application.



Model 403L-15

Optional Weigh Feeder Construction

- **Sanitary Construction** — Special construction with easy access to all product contact surfaces, including quick removable components (where applicable) to suit food, pharmaceutical and similar sanitary requirements is available with Model 403 *'Weight-Loss'* Weigh Feeders. Complies with USDA/FDA requirements.
- **High Temperature Construction** — Certain Model 403 Weigh Feeders are available for use with elevated product temperatures above 150 degrees F.
- **Quick Disassembly Construction** — Certain Model 403 Weigh Feeders are available with quick removable components for accessibility to primary internal areas of the metering mechanism, typically for cleaning purposes.
- **Hazardous Areas Construction** — Model 403 *'Weight-Loss'* Weigh Feeders are available with electrical construction to meet hazardous areas Classes I, II and III, Divisions 1 and 2, Groups D, E, F and G. In addition, Acrison weigh feeders can be manufactured to conform to most International hazardous area classifications.

Models GP403-101 and GP403-130 '*Weight-Loss*' Weigh Feeders

For metering free-flowing, granular dry solid materials.

Utilizing a modified Acrison Model 101 Metering Mechanism, the Model GP403-101 is capable of a feed output capacity ranging from several pounds per hour up to approximately 75 cubic feet per hour. The Model GP403-130, designed with a modified Acrison Model 130 Metering Mechanism, is capable of a feed output capacity ranging from about 15 pounds up to approximately 200 cubic feet per hour.

Please reference Design Specifications 1-200-0479.

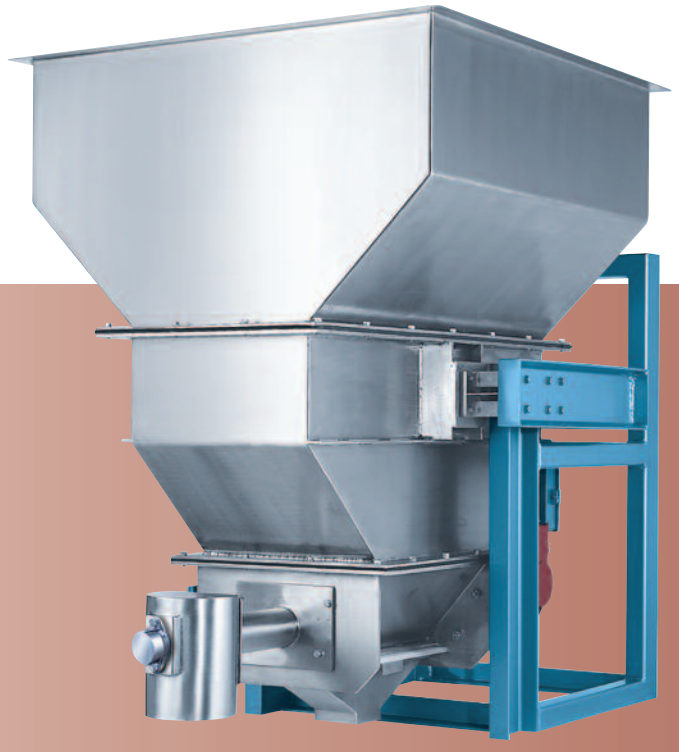
Models GP403-101 and GP403-130

Designed with advanced weighing and control system technology, these particular model weigh feeders offer an economical and compact means to accurately and dependably meter most free-flowing granular or pelletized dry solid materials. Their single auger metering mechanisms also include a bottom discharge slide gate for rapid, complete, and easy clean-out/emptying.

Like all Acrison Model 403 *'Weight-Loss'* Weigh Feeders, the Models GP403-101 and GP403-130 have been specifically designed for the industrial environment with an exceptionally rugged, permanently calibrated weighing mechanism that never requires recalibration, adjustment or rezeroing.



Model GP403-101



Model GP403-130

Model 403 Series

Model 403 *'Weight-Loss'* Weigh Feeders are available with a number of Acrison's dry solids metering mechanisms, the selection of which is based upon product characteristics and application parameters.

- **Single auger metering mechanisms** ***[Model 130 Series]*** for use with granular or pelletized free-flowing dry solid materials. *Reference Equipment Specification 1-200-0479.*
- **Double Concentric Auger Metering Mechanisms** ***[Models 105 and 140 Series]*** for use with a variety of materials. *Reference Equipment Specifications 1-200-0480.*
- **Single auger/agitator, self-emptying metering mechanisms** ***[Model 1015 Series]*** for use with a variety of materials. *Reference Equipment Specifications 1-200-0481.*
- **Flat bottom, self-emptying metering/hoppering mechanisms** ***[Model 170 Series]*** for use with a wide variety of materials. *Reference Equipment Specifications 1-200-0525.*
- **Bin Discharger Feeders** ***[Models BDF-1.5, BDF-2, BDF-2.5, BDF-3, BDF-4, BDF-5 and BDF-6]*** for use with a very wide variety of materials, especially those classified as 'difficult-handling'. *Reference Bulletin 712.*



Model 403-1015Z



Model 403-BDF-2.5

Model SBC-3000 Weigh Feeder Controllers mounted on the exterior of NEMA 12 Enclosures. They are also optionally available with Multi-Feeder Supervisory Control Systems with Color-Graphics Touchscreen Displays (Acri-Data®).







Model SBC-3000 Weigh Feeder Controllers and Control Systems

Model SBC-3000 Weigh Feeder Controllers encompass leading-edge technologies and functional algorithms that provide unexcelled weigh feeder performance to satisfy the most demanding process requirements across a very broad range of applications. And with an unprecedented number of standard and optional features, accessories, and interfacing capabilities (including native Ethernet and Profibus connectivity), these controllers also provide unparalleled versatility, ease of use, and operational reliability. In particular, they are ideally suited for those applications that require central computer control with minimal hardware.



Model SBC-3000-DSP Controller

The Model SBC-3000-DSP Controller operates a single Acrison Weigh Feeder. Its design integrates a Model SBC-3000-CM Control Module with a bright, state-of-the-art TFT color graphics display measuring 7" diagonally. The assembly, designed for panel mounting, is dust-tight/water-tight.

Equipment Specifications 1-200-0091.

Model SBC-3000-CM Controller

The Model SBC-3000-CM Controller operates a single Acrison Weigh Feeder. It consists of a single circuit board (module) designed for applications that utilize a central computer, PLC or DCS for monitoring and control, which do not require a local operator interface. The Model SBC-3000-CM Controller is typically supplied in a card rack, the size of which depends upon how many SBC-3000-CM Controllers will be required for a given application. A local Keyboard/Display unit is available as an option.

Equipment Specifications 1-200-0091.



Multi-Feeder Supervisory Control System (Acri-Data®)

Operation of the Models SBC-3000-DSP and SBC-3000-CM Controllers can be monitored and controlled by Acrison's ***Acri-Data Multi-Feeder Supervisory Control System***. It is most commonly utilized in conjunction with Model SBC-3000-CM Controllers.

Operating with a 17 or 21 inch color touchscreen, Acri-Data is capable of supervising the operation and control of up to 20 Acrison Weigh Feeders while displaying real-time data and screen updates. It is also capable of master/slave and ratio-proportioning operation, unlimited recipe and storage and retrieval, trending, event and alarm logging, automatic shut-down configurability and more.

Acri-Data is hosted on a Microsoft Windows® operating platform (e.g., panel-mounted embedded PC, or a desktop/laptop PC). A user's PLC or DCS can also serve as a host for any of the above Weigh Feeder Controllers.

Equipment Specifications 1-200-0627.



All Acrison controllers are certified to UL, CSA and EC specifications.

Discover the difference!

We cordially invite you to witness a test in Acrison's state-of-the-art Customer Demonstration Facilities handling your actual product(s) with the specific equipment we recommend for the application. Usually, there is no cost or obligation for this service.

Discover the difference in technology, quality and performance of Acrison equipment.



Empire Boulevard Facility
Moonachie, NJ USA



Joseph Street Facility
Moonachie, NJ USA

Acrison products...

- Models 101 and 130 Volumetric Feeder Series
- Models V-101 and V-130 Volumetric Feeders
- Model 1015 Volumetric Feeder Series
- Model 105 Volumetric Feeder Series
- Model W-105 Volumetric Feeder Series
- Model 120 Volumetric Feeder
- Model 140 Volumetric Feeder Series
- Model 170 Volumetric Feeder Series
- Model 905-18 Volumetric Feeder
- Bin Discharger Feeders
- Model 200 Weigh Belt Feeder Series
- Model 203B Weigh Auger Feeder Series
- Model 270 In-Line Weigh Feeder Series
- Models 402 and 404 Series, 405, 406, 407X, 408 and 410 'Weight-Loss' Weigh Feeders
- Model Series 403 'Weight-Loss' Weigh Feeders
- Model 403B(D) Batch/Dump Weighing Systems
- Model 404BZ(BU) Bulk Bag Unloader Batch Weigher
- Models 350 and 301 Continuous Blenders and Blending Systems
- Multiple Auger Bin Dischargers and Multiple Auger Bin Discharger Hoppering Systems
- Vibratory Bin Discharger Hoppering Systems
- Model 170-BD-30 Bin Discharger
- Model 800 Series Bulk Bag Unloaders
- Models 500, 515, and 580X Polyelectrolyte Preparation Systems
- Water and Waste Water Treatment Systems
- Volumetric and Gravimetric Feeder Controllers and Control Systems
- Silo Systems
- Accessory Equipment for Acrison Products
- Systems Engineering

"Visibly Different... Measurably Better"

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