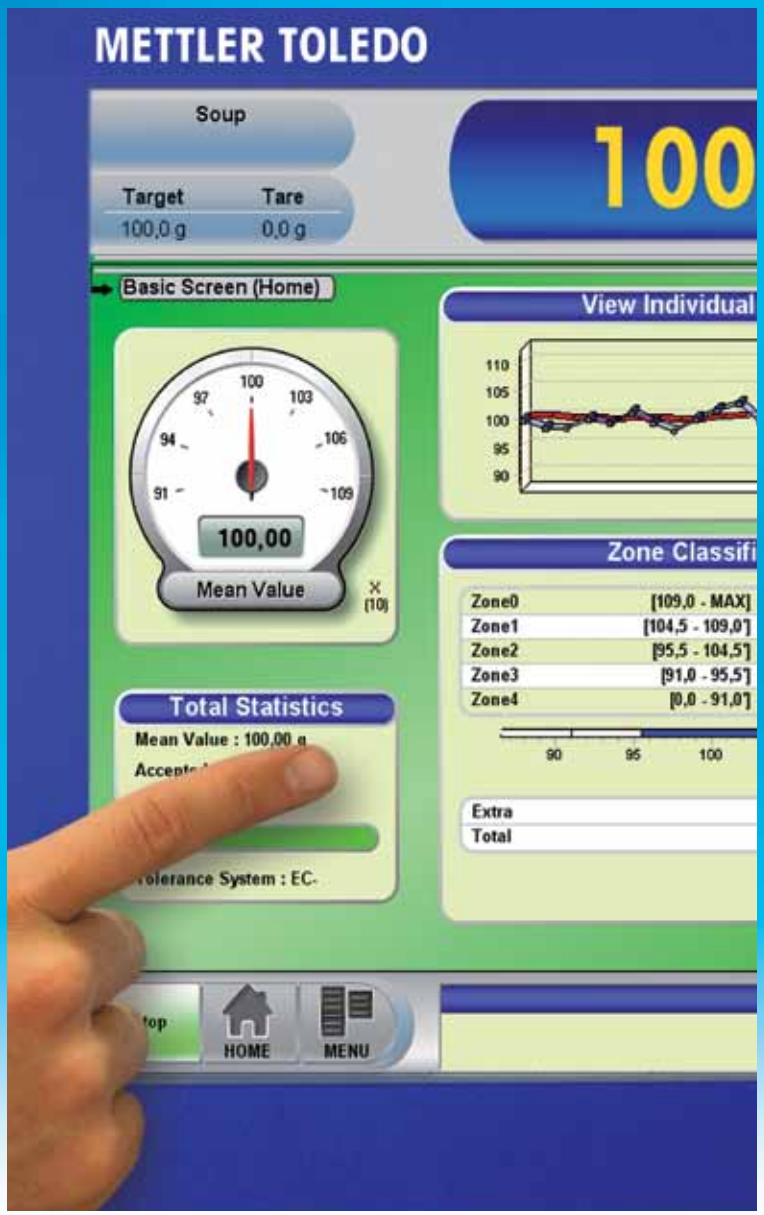
Checkweighing



Overview of checkweighing software features and options to increase productivity

Control Features
Connectivity Solutions
Fill Level Control
Product Handling
Data Security
Basic Functions
Enhanced Operations

Checkweigher Software Compendium

Features and Options to Increase Productivity

METTLER TOLEDO

Introduction

The need for checkweighers in the food, pharmaceutical, cosmetics, beverage and transport/logistics industries as well as in chemical, automotive and metal industries is recognised as a key element to an effective quality assurance regime. Checkweighers are instrumental in an increasingly competitive marketplace to fulfil customer needs and in complying with local Weights and Measures standards and regulations.

This compendium has been written to inform manufacturers of the important software features and options which are available for checkweighing.

Making the right choice of software options will provide protection against product failure and recalls, help to comply with local Weights and Measures guidelines and reduce overall operating costs, increasing productivity and efficiency.

The available software features and options are only outlined in this compendium and detail the main benefits as well as a brief description of the feature/ option functionality. All the features and options mentioned are also available separately as detailed applications notes.

To request the full application notes visit
www.mt.com/garvens-app
and complete the request form.
For more details see Page 33

Contents

Chapter 1
Control Features and Benefits

This chapter describes the main features of the X Series checkweighers. It concentrates on the ease of use of the multilingual touchscreen human machine interface (HMI).

One of the main differences between checkweigher manufacturers is the usability of the user interface. With the increase of multinational work forces and reduction of highly specialised production line staff, simple-to-use equipment is becoming a major requirement for production line managers. The X Series HMIs have been designed to be as simple as possible to use whilst still offering all the technical solutions required on modern production lines.

1.1 Checkweigher Control Attributes
Understanding the Differences

Application Note 36

METTLER TOLEDO offers the widest range of checkweighing solutions to meet customer specific requirements no matter how basic or complex the application.

Our checkweighers offer 3 types of human machine interface (HMI) control. Application note 36 describes the differences between the control attributes and functions of the XC, XE and XS Series checkweighers.

A very brief insight into these differences is shown in the table below:

Model	XC	XE	XS
User Interface	5.7" colour touchscreen, IP65 (aluminium)	5.7" colour touchscreen, IP65 (aluminium or stainless steel)	15" colour touchscreen, IP69k (stainless steel)
Product Zones	Three weight zones	Three weight zones as standard, with option for five zones, variable with each product	Three weight zones as standard with option for up to seven zones, variable with each product

For more information visit www.mt.com/garvens-app and request application note 36

1.2 Display Functions
Intelligent "Easy to Use" Design

Application Note 35

Customer benefits:

- Clear and simple navigation to reduce operator input errors
- Speeds up product changeovers to reduce downtime
- 28 standard languages available to overcome language barriers
- Individual configurations for each account or profile for added security

The XS display is not only the largest of its kind for checkweighing on the current market, it has also been designed to give producers the maximum flexibility for production line processes.

The information on the large and bright touchscreen is clearly visible from a long distance and displays all relevant production data, making it "easy to use" with an exceptionally high degree of operator acceptance.

Below are some standard features on the XS control display which clearly underline "easy to use" and give a real competitive advantage:

- Clearly structured basic screen optimised for best navigation speed
- One-touch navigation (shortcuts)
- Individual user languages (28 languages) to reduce operating errors. Languages can be predefined for each user profile
- Large buttons allow navigation while wearing gloves
- Data is grouped instead of listed and supported by graphics for a better production overview
- Screen-saver to disable touchscreen during cleaning to avoid mis-operation
- Product setups with pictures for visual verification that the correct product has been selected
- Configurable to individual requirements for maximum flexibility

"Golden touch" button

The golden touch button is displayed on the main screen showing the name of the operator currently logged in. When the operator presses his golden button he will automatically be taken to a screen showing one-touch action buttons to the functions or production activities he has authorisation to change.

For more information visit www.mt.com/garvens-app and request application note 35

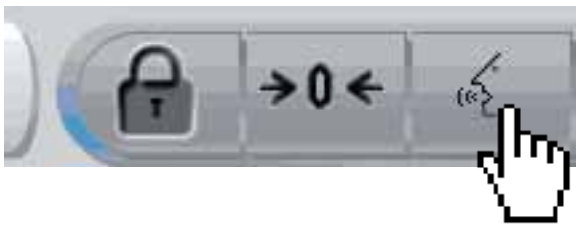
1.3 Multilingual Support
We Speak Your Language

Application Note 39

Customer benefits:
- Reduces operator errors caused by language barriers
- Allows global deployment of standard solutions
- Languages can be assigned to individual user profiles
- All languages have been proof read by native speaking users

X Series checkweighers are pre-programmed with 28 standard interface dialogue languages which can be changed within seconds by touching the screen only three times.

Language-related errors can easily occur in multination companies employing operators from many different countries. For these companies it is essential that the operator is comfortable using the checkweigher control and is able to understand statistical data without the need to learn a new language.



Languages Available

English	Portuguese (x2)	Taiwanese
Polish	Russian	Korean
German	Hungarian	Thai
Italian	Dutch	Greek
French	Romanian	Slovenian
Spanish	Finnish	Serbian
Swedish	Turkish	Croatian
Czech	Chinese	Danish
Norwegian	Slovakian	Arabic

For more information visit www.mt.com/garvens-app and request application note 39

1.4 User Documentation
Quick Access to Critical Information

Application Note 66

Customer benefits:
- Complete technical overview of the X Series checkweigher
- Reduction in operator training time and costs
- Enables quick look-up for even infrequently required information
- Clear and easy to understand warning notes ensure operator safety

X Series checkweighers are delivered with extensive, well-structured, and easily understandable user documentation to guarantee quick access to critical information and help the user get familiar with all functions and operations.

Good user documentation encourages operators to accept new machinery far more quickly. It actively promotes a more efficient work approach which in turn reduces accidents and production errors. The standard X Series user documentation describes the standard checkweigher configuration as well as standard operations, features, functions, and options. In addition the documentation will include sections detailing the customer specific configuration.

For more information visit www.mt.com/garvens-app and request application note 66

1.5 3 Weight Zones
Optimising Process and Quality Control

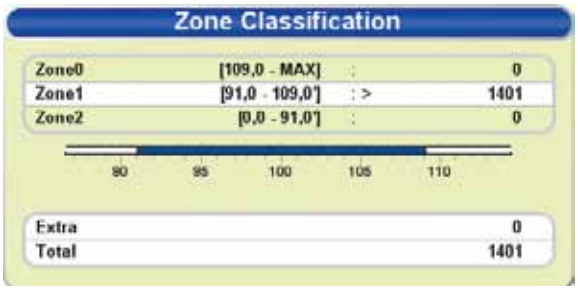
Application Note 41

Customer benefits:

- Process control for product handling
- Increasing quality control
- Setting limits to regulate sorting/rejecting
- Saving raw materials

A weight zone is the area of weight values between weight limits specified by the operator during product setup. The specification of these limits and the resulting zones depend on checkweigher accuracy, packaging regulations and the company objectives and control processes.

All X Series checkweighers have at least 3 weight zones available as standard. These are normally designated to "Good" or "Accept" Products, "Overweight Products" and "Underweight Products". Each of these zones can be assigned to a separate action, counter or function which allows separate processes to be automatically initiated for products with different weights.



For the exact setting of zone limits there are many factors which need to be taken into account. If in any doubt about how to set and adjust zone limits then it is advised to contact a local service representative. He can guide through and explain the process in detail depending on the specific production requirements.

For more information visit www.mt.com/garvens-app and request application note 41

Notes:

Chapter 2
Connectivity Solutions

This chapter outlines the connectivity solutions offered by an X Series checkweigher. The large range of solutions reflects the complexity and diversity of factory network requirements.

Each factory has its very own data network infrastructure. To avoid additional time and unnecessary costs it is extremely important that a checkweigher can be easily integrated into the production line without having to change this infrastructure. The X Series connectivity options have been designed for easy integration whatever the network, data protocol or production flow management system requirements.

2.1 Checkweigher Communication
Determining the Right Options

Application Note 27

Customer benefits:

- Centralised collection of statistical data for full process documentation
- Reliable communication with upstream and downstream equipment, process control systems and connection to factory networks
- Optimal data communication for quality control systems

Garvens checkweigher controls have the widest and most complete offering of communications options in their class, to match the data needs of modern production lines.

These simple steps are a guide to determine which communications options are required.

1. **Target hardware** – Identify the next device that the checkweigher control will communicate with.
2. **Information/Data content** – Determine information needs (e.g. weight data).
3. **Product** – Select the communications product that best matches the hardware and information/data needs.
4. **Medium and interface** – Verify the communication medium that will be used, and describe the physical interface that should be provided.

The wide variety of serial communication, Ethernet, and proprietary formats available are shown below.

Customer Target Hardware	Capabilities					X Series Product	Medium	Physical Interface
	Weight Data	Statistics	Product Management	Product Change	Line Integration			
PC or PC Network	☑					Weight Data Interface	RS 232 RS 422 RS 485	DB9
							TCP/IP	RJ45
	☑	☑	☑	☑		GARECO	RS 232 RS 422 RS 485	DB9
							TCP/IP	RJ45
PLC	☑	☑		☑	☑	FIM (Fieldbus Interface Module)	Device Net	5 Position term. strip
							Control Net	BNC Connector
							Ethernet IP	RJ45
							Modbus TCP	RJ45
							ProfibusDP	DB9
SCADA	☑	☑		☑	☑	OPC Server	OPC DA 2.05A	RJ45

For more information visit www.mt.com/garvens-app and request application note 27

2.2 Weight Data Interface
Serial and Ethernet Communications

Application Note 17

Customer benefits:
- Acquisition of real-time weight data
- Weight data is available for further processing and evaluation
- Data can be formatted as per customer requirements

The X Series Weight Data option provides a real-time interface from the checkweigher showing weight and other selected information for each package crossing the weighing conveyor.

The Weight Data option can be used in many ways. It is primarily a tool for evaluating and optimising production line performance. Whether used in conjunction with customer-developed data collection and retrieval applications or an off-the-shelf software solution, information from every package crossing the weighing conveyor can be viewed, evaluated, or saved for further processing.

Blocks of production data can be used to make decisions, satisfy regulatory requirements or as input for measurement of production line effectiveness.

Garvens checkweighers have 12 standard output formats. Regardless of which weight data interface is chosen, the X Series controls transmit the weight data in simple common ASCII format.

For more information visit www.mt.com/garvens-app and request application note 17

2.3 Binary Product Indication
Basic Communications

Application Note 13

Customer benefits:
- Enables communication with other production line equipment
- Very simple, fast and reliable communication system
- Allows the PLC to request checkweighing information
- Most economical connectivity solution for small and simple applications

This function permits the output of the current checkweigher product number to be used to control other production line equipment and processes. The output can be read by a PLC and has two operation modes:

Operating mode 1: Binary output
Uses a 7 figure string of "0"s and "1"s to communicate the product – 127 combinations.

Operating mode 2: Single select output
Uses a set 8 figure string of seven "0"s and one "1" to communicate the product – 8 combinations.

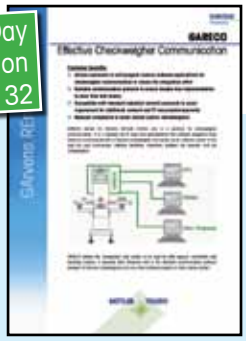
1: 24V
0: 0V

Out7	Out6	Out5	Out4	Out3	Out2	Out1	Out0	
0	0	0	0	0	0	0	0	All outputs "open",invalid
0	0	0	0	0	0	0	1	Art.1
0	0	0	0	0	0	1	0	Art.2
0	0	0	0	0	1	0	0	Art.3
0	0	0	0	1	0	0	0	Art.4
...	...	...	...	...	...	...	...	...
1	0	0	0	0	0	0	0	Art.8

For more information visit www.mt.com/garvens-app and request application note 13

2.4 GArvens REmote COntrol
Effective Checkweigher Communication

Application Note 40



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Customer benefits:
- Allows customers to self-program custom software applications
- Reliable communication protocol to ensure trouble-free implementation, reducing the integration effort and saving time and money
- Reduces complexity to allow central control of checkweighers

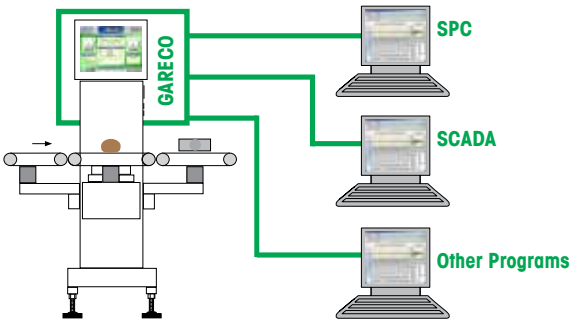
GARECO stands for GArvens REmote COntrol and is a protocol for checkweigher communication.

GARECO is a detailed set of rules and specifications that software programs must follow to communicate with a Garvens checkweigher.

GARECO defines the "vocabulary" and syntax to be used for data request, commands and handling routines. It specifies data structures and is the standard communication protocol between all Garvens checkweighers and any other software program or data capture system.

Network connectivity

The GARECO communication can be established using Ethernet TCP/IP or simple serial communication over TTY, RS232, RS422 and RS485.



For more information visit www.mt.com/garvens-app and request application note 40

2.5 Fieldbus Interface Module (FIM)
Connectivity to Fieldbus Networks

Application Note 12

Customer benefits:
- Quick installation through standardised communication interfaces
- Reduced network maintenance requirements
- Increased connectivity, reliability and flexibility
- Improved system performance

The checkweigher Fieldbus Interface Module (FIM) facilitates communication between an X Series checkweigher and Fieldbus networks.

FIMs are available for the following Fieldbus networks:

• Profibus • Ethernet/IP • DeviceNet • ControlNet
• Modbus/TCP

Each of these FIMs is targeted to the relevant factory automation Fieldbus.

A major advantage of Fieldbus, and the one that is most attractive to the end user, is its ability to reduce capital expenditure. The savings attained by the user stem from three main areas: initial savings, maintenance savings, and savings due to improved system performance.

For more information visit www.mt.com/garvens-app and request application note 12

2.6 OPC Data Server
Seamless Factory Floor Integration

Application Note 08

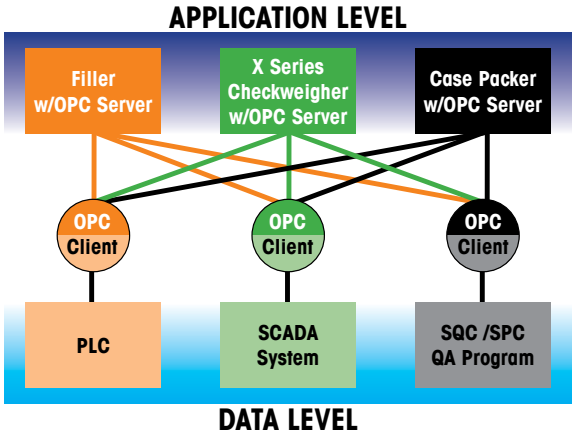
Customer benefits:

- Enables seamless connection to SCADA
- Not dependent on equipment manufacturer
- Reduces complexity to centrally control checkweigher
- Reliable transmission and storage of weight data

Integration of various devices within a packaging line or large plant process can be a daunting task that can take significant time, effort, and cost to implement. The Garvens OPC Data Acquisition Server option for the XE and XS checkweigher control platform can simplify this.

Garvens offer an OPC DA 2.05A (Data Acquisition) Server as a standard option for the XE and XS checkweighers. The option provides the user with a wide variety of data, setup, and line integration choices by which the checkweigher can be remotely monitored and controlled.

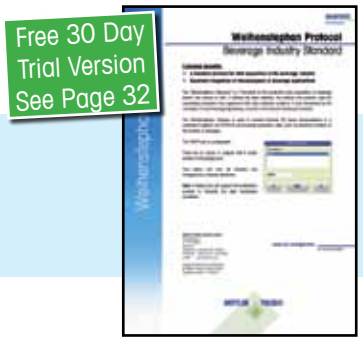
The OPC Server option provides the capability for the checkweigher to communicate with a factory floor automation or Supervisory Control and Data Acquisition (SCADA) network.



For more information visit www.mt.com/garvens-app and request application note 08

2.7 Weihenstephan Protocol
Beverage Industry Standard

Application Note 11



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Customer benefits:

- A standard protocol for data acquisition in the beverage industry
- Seamless integration of checkweighers in beverage applications

The "Weihenstephan Protocol" is a standard for the acquisition of production data at beverage plants.

The Weihenstephan interface is used to connect XS Series checkweighers to a customer's network via TCP/IP to communicate production data, such as machine condition or the number of packages.

For more information visit www.mt.com/garvens-app and request application note 11

2.8 Statistical Process Control (SPC)
More Control for Better Performance

Application Note 06

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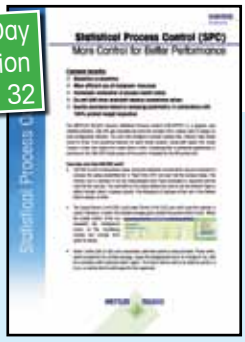

Customer benefits:

- Reduction in downtime and more efficient use of manpower resources
- Immediate notification of process health status
- Cp and CpK show the statistical measure of process capability
- Quality control through 100% weight inspection

Statistical Process Control (CW-SPC™) is a graphical user interface function. CW-SPC will calculate and plot the sample X-bar (mean) and R (range) in user-configurable intervals.

The user can configure a specific sample size, interval type (piece count or time), and sampling intervals for each stored product, along with upper and lower caution limits, and upper and lower action limits. Sampling data is presented graphically in real-time on the CW-SPC trend screen of the control.

CW-SPC is part of the product setup. Since the statistical requirements vary from product to product, the setup parameters for a "Real-Time SPC" are built into the product setup.

Action limits with alarm signals can be tied to an external control, a horn, or similar item to alert the line supervisor.

With CW-SPC, the measurements are "real-time", and the colour aspect brings visible attention to the situation. CW-SPC is not meant to replace operational process measurements, it is intended to augment that very important activity. CW-SPC allows the line operator to easily monitor the process.

The value of real-time CW-SPC is that the on-screen tool can automatically, and much more frequently, perform measurements that are normally done by hand.

Control

Correction

Action

For more information visit www.mt.com/garvens-app and request application note 06

2.9 Garvens Sartorius Pro Control
SPC Connectivity Solution

Application Note 14

Customer benefits:

- Allows connectivity to Sartorius SPCfWin software
- Remote retrieval of checkweigher statistical data
- Data integration in Sartorius SPCfWin reports
- Allows integration into a Sartorius SPCfWin network

The Sartorius Pro Control option enables data from a Garvens checkweigher to be transmitted to, stored and processed in the Sartorius SPC software program SPCfWin.

The checkweigher is simply connected to the local production line network using a standard Ethernet cable.

For more information visit www.mt.com/garvens-app and request application note 14

Notes:

Chapter 3
Fill Weight Control

This chapter outlines checkweighing options to optimise fill weights. Fill weight control is the easiest way to reduce costs and produce more from limited raw materials.

With the cost of raw materials on the rise, the effective use of these resources is a major factor in calculating profit margins. By reducing overfill by just 1 gram per product enormous savings can be made. Fill weight control options also protect your brand and ensure end customer satisfaction. The fill weight control options have been designed to give you piece of mind that your production line is manufacturing high quality and consistent products whilst still remaining very efficient and profitable.

3.1 Feedback Control Function
Overfilling Does Not Pay

Application Note 04

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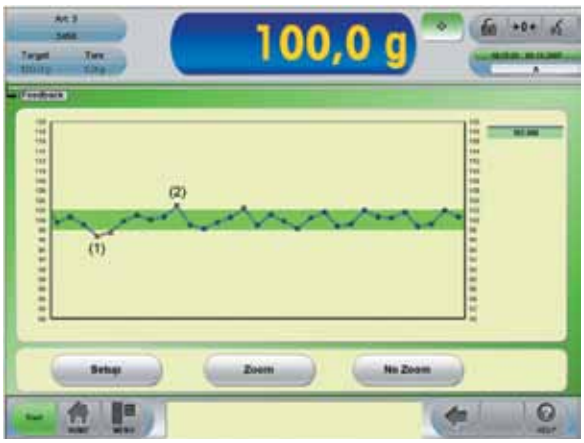
Customer benefits:
- Optimisation of filling processes
- Reduction of product giveaway, scrap and over and underfilling
- Compliance with net content laws and regulations
- Higher and more consistent product quality

The feedback control function minimises product weight errors and giveaway through proactive feedback, keeping filler heads properly adjusted.

Filler drift can be effectively combatted using feedback control from a checkweigher to minimise product weight errors and product giveaway. The drift may be caused by gradual changes in the environment, the product characteristics or a filler problem.

The filler feedback control function is based on the calculation of a mean weight value of a preset number of weighings during a set period. If a deviation is detected between the target weight and this mean value then the deviation value is translated into a control signal which is sent to the filler to adjust the fill weights.

The checkweigher and filler are in permanent communication, ensuring that if a weight drift is detected it can be rectified before it has a negative influence on production.



For more information visit www.mt.com/garvens-app and request application note 04

3.2 Extended Feedback Control Function
Flexible, Powerful, Adjustable

Application Note 03

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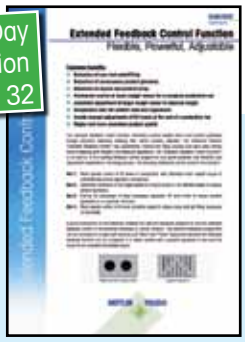


Customer benefits:

- Permanent control of mean weight values for a complete production run
- Automatic adjustment of target weight closer to labelled weight
- Avoids manual adjustments of fill weights at the end of a production run
- Higher and more consistent product quality

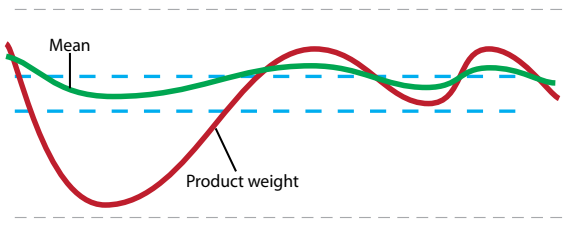
The "Extended Feedback Control Function" is an add-on to the standard feedback control programme and gives powerful new flexibility and adjustment capabilities to the filling process.

The standard feedback control function minimises product weight errors and giveaway through proactive feedback, keeping filler heads properly adjusted. The additional function "Extended Feedback Control" can substantially improve the filling process and save extra money whilst complying with Weights and Measure regulations.

A good comparison for the difference between the standard feedback programme and the extended feedback control is the technical advances in music systems. The standard feedback programme can be compared to a radio with dials for just "Bass" and "Treble" adjustment whereas the extended feedback function can be compared to a stereo system with a graphic equaliser to fine tune the music for an excellent and perfect sound.

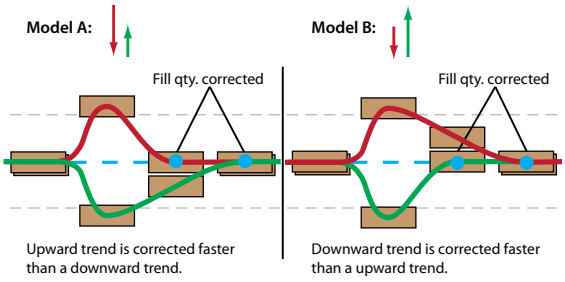
This option contains 4 main enhancements:

Extension "Combination Statistics"
This includes the statistic mean values in the feedback calculation to ensure at the end of the production run there will never be a too low "statistic mean value".

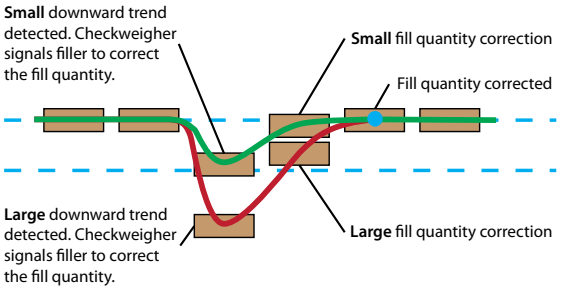


Extension "Optimal overfill"
This function permanently calculates the optimum mean value and target weight. Once production begins the target weight is automatically adjusted to take maximum advantage of local packaging regulations.

Extension "2 Control Factors"
This function allows two separate control factors for increasing and decreasing the fill volume. The speed at which both overfills and underfills are corrected depending on product characteristics can be set individually.



Extension "Differential control"
The standard control factor determines the value "by how much the filler is controlled". An additional (second) control factor serves as an "amplification factor" and allows the control factor after a measurement series to be strengthened. The algorithm on which controlling is based allows the controller, in cases of extreme under or overfilling, to get back to the target weight much more quickly.



For more information visit www.mt.com/garvens-app and request application note 03

3.3 Gliding Limits
Keeping Control of Unstable Products

Application Note 05

Free 30 Day Trial Version See Page 32

Customer benefits:

- Compensates for changes in environmental conditions
- Compensates for changes in product characteristics
- Compensates where large but acceptable product weight fluctuations occur or can be expected

"Gliding Limits" provides the capability to adjust the tolerance limits in direct relationship to the running average of the product.

This functionality is often used when packages are sold by count and the item count per package must remain constant, whereas the weight of the individual items within the package may vary over time due to environmental or other factors.

Gliding Limits will guard against the false rejection of product with the correct item count, by adjusting the zone limits to compensate for long term changes in the mean value of the product being weighed. Gliding Limits will automatically raise or lower the preset zone tolerances within limits predetermined by the operator during product setup.

For more information visit www.mt.com/garvens-app and request application note 05

3.4 Fill Head Test
Optimise Processes and Save Money

Application Note 16

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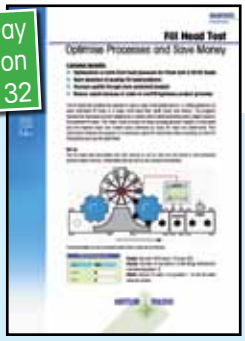

Customer benefits:

- Optimisation of processes for fillers with 2-30 fill heads
- Early detection of pending fill head problems
- Increases quality through more consistent product
- Reduces rejects because of under or overfilling and reduses giveaway

The fill head test enables the operator to test the performance i.e. filling behaviour of each individual fill head in a large multi-head filler.

The program records the individual product weights for a certain period while allocating every weight value to the applicable fill head. The mean value of every fill head (average product weight) is calculated and the highest and lowest values achieved by every fill head are recorded. This information enables the operator to individually adjust fill heads that need correcting, so that the filling behaviour can be optimised.

For more information visit www.mt.com/garvens-app and request application note 16

3.5 In Process Test
Reliable and Consistent Testing Procedures

Application Note 37

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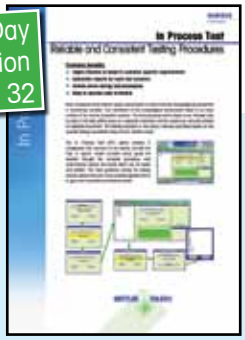


Customer benefits:

- Highly flexible to adapt to customer specific requirements
- Automatic reports for each test scenario
- Avoids errors during test procedures
- Easy to operate and easy to handle

Most companies have internal quality requirements to check that their checkweighing equipment is functioning correctly. These test procedures are sometimes very labour intensive and rely heavily on the operator testing consistently every time for reliable results. This verification of the checkweigher functionality needs to be done outside of the normal production process.

The In Process Test (IPT) option enables 3 configurable test scenarios to be carried out with the help of special screen prompts which guide the operator through the complete procedure, and automatically record the results which can be saved and printed.

IPT – Determine nominal weight
This test is carried out to determine the nominal weight of a fixed number of individual weights. It is for use if, for example, the density of the product will change during a batch.

IPT – Weight test
This test verifies the correct detection of good, underweight and overweight products. It is used to confirm the correct rejection of "bad" products and to check the weight range of the "good" products.

IPT – Camera test
This test is used to verify the correct functionality of a vision system. It can only be carried out if both printer and vision system are set as "active" in the individual product parameters.

For more information visit www.mt.com/garvens-app and request application note 37

Notes:

Chapter 4
Advanced Product Handling

This chapter outlines the many different product handling features and options available for checkweighers to keep your production processes up and running.

Every product has its own very unique characteristics and the forces exerted on these products can vary greatly and constantly change during production. Correct product handling keeps your process under control and reduces downtime. Product handling options have been designed to detect the most common packaging errors and ensure that when they occur, they cause the minimum disruption possible. In addition these options prevent damage to downstream equipment and ensure production line integrity.

4.1 Askew Package Detection
X Series Package Handling Solution

Application Note 01

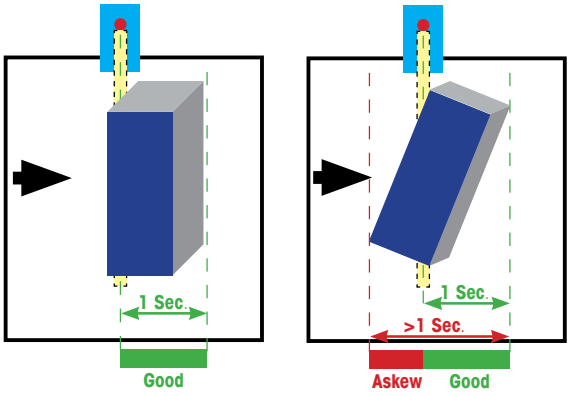
Customer benefits:

- Avoids product backup and protect production line equipment
- Efficient system for monitoring the package orientation
- Very simple and economic solution to avoid unplanned downtime

Packages that are not aligned properly i.e. askew against the direction of travel may cause problems in critical processes before weighing or following weighing.

The X Series "Askew Package Detection" option uses a photoelectric sensor that is positioned so that it can detect packages "skewed" against the direction of travel and handle them appropriately. A package is detected as "askew" if it interrupts the photoelectric sensor for a longer time than has been entered during product setup.

In the majority of applications the askew package sensor is mounted on the outfeed conveyor to protect downstream equipment such as bundle packers or other sorting devices. The askew package sensor can also be mounted on the infeed conveyor to protect sensitive marking and vision equipment and ensure a more accurate weighing result when the weighing conveyor length and weighing time required have been calculated for maximum throughput.



For more information visit www.mt.com/garvens-app and request application note 01

4.2 Open Flap Detection
Avoid Unexpected Line Stoppages

Application Note 44

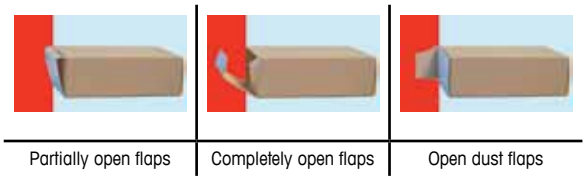
Customer benefits:

- Increases uptime by reducing unexpected line stoppages
- Reliable detection and rejection of cartons with open flaps
- No additional space required if mounted on the mechanical transfer unit
- Protection of downstream equipment for maximum productivity

On high performance production lines processing cartons with unintentionally open flaps can cause considerable damage to downstream equipment and be a cause of expensive and prolonged downtime events.

Two photoelectric sensors are set at the width of the carton being produced and are pointed down to special reflective foils. If a carton enters the checkweigher with an open flap it will interrupt one of the light beams. The checkweigher immediately begins to track the carton using a third photoelectric sensor which is synchronised with the reject station. As soon as the carton reaches the reject station it is rejected.

The open flap detection option can detect the following occurrences:



For more information visit www.mt.com/garvens-app and request application note 44

4.3 Reject Countercheck
Ensuring Correct Rejection

Application Note 24

Customer benefits:

- Ensures that out-of-range products have been rejected
- Failsafe process control
- Fulfils 21 CFR Part 11 requirements for pharma companies

The X Series option Reject Countercheck is used to determine whether a package that should have been rejected was actually rejected.

Reject Countercheck uses a sensor placed across the reject path or inside the catch bin to verify that rejected packages have entered the bin. If the reject countercheck sensor does not register a passing product within a pre-defined time delay after the rejection has been initiated the default checkweigher function will send a signal to the machine fault output and the message "Reject Missing" will be displayed on the main control screen. The end user can, if desired, configure the checkweigher to stop the conveyors in the event of a reject fault.

For more information visit www.mt.com/garvens-app and request application note 24

4.4 Countercheck
Complete Production Path Monitoring

Application Note 29

Customer benefits:
- 100% monitoring of the product flow
- Reliable detection of bad products in the good path
- Identification of products missing from the good path
- Highest degree of product security against tampering

Countercheck monitors the flow of product going across the checkweigher, ensuring the accurate handling of classified packages.

Countercheck is most often used in applications where the value of the product being weighed is significant. It is also used where accounting for each package produced is an absolute requirement. Countercheck can be used to ensure accurate handling of every package produced and also provides a high degree of protection against tampering.

The Countercheck option typically uses a photoelectric sensor located in the normal flow of packages downstream of the reject mechanism.

There are three modes of operation, each one guarding against common product classification and handling problems encountered in processing.

1. **Bad products in good path** – This mode monitors the production flow for bad products which have not been correctly rejected.
2. **Good products missing from good path** – This mode monitors the production flow for missing good products.
3. **Total flow check** – This mode monitors for bad products in the good path, checks that all good products remain in the good path and that unexpected or foreign items have not entered the good path.

For more information visit www.mt.com/garvens-app and request application note 29

4.5 Additional Weight Zone
Optimise Process and Quality Control

Application Note 34

Customer benefits:
- Increases process control for product handling
- Increases quality control
- Sets additional limits to regulate sorting/grading
- Saves raw materials

There are many applications and production lines which require more than the 3 standard weight zones to allow more flexibility for sorting/grading, rejection and re-working of products.

With the additional weight zone option it is possible to add up to 4 additional zones. Each of these zones can be connected to a separate action or counter which allows separate processes to be automatically initiated for products lying within the different zones.

For more information visit www.mt.com/garvens-app and request application note 34

4.6 Digital Position Control
Highest Precision Adjustment

Application Note 38

Customer benefits:

- Reduces time for component adjustments
- Prevents incorrect adjustment by operator
- Allows full validation of mechanical settings
- Machine can only be started when all parameters are correct

During changeovers, it is often necessary to make mechanical adjustments on the system depending on the product characteristics.

There can be many different adjustments which need to be made during product changeover. Using analogue position indicators, automatic validation is not possible.

Digital position controls can be used on process critical components. These indicators are connected to the main control. The actual setting will be sent back in real time to the checkweigher and prevents incorrect adjustment by the operator. They have good visual readability and considerably reduce the time needed for adjustments as both target and actual values are clearly indicated directly where the adjustment needs to be made. With this exact process control, automatic validation of mechanical settings is possible.

For more information visit www.mt.com/garvens-app and request application note 38

Notes:

Chapter 5
Data Security

This chapter focuses on checkweigher security options for data, access and control to ensure compliance with regulations and safeguard critical production line processes.

On many production lines it is required that data is protected, access is controlled and a log is maintained of all production line changes and events. Garvens security options comply with 21 CFR Part 11 and ensure the safety of production processes at all times. These options ensure at all times that only authorised operators have access to sensitive areas and their actions are entered into a security protocol.

5.1 LogIn-Server
Complete Access Control Protocol

Application Note 31

Customer benefits:

- Controls access to checkweigher functions
- Ensures that only qualified employees have checkweigher access
- Logs all operator entries made on the checkweigher
- Centralised database for all checkweighers

The LogIn-Server is the software solution for controlling checkweigher access and logging all operator entries on a remote PC.

The LogIn-Server provides facilities for creating and maintaining a database of those individuals who have access to the checkweighers and for recording log files of access events.

Authorisation of employees is administered using a combination of a unique, personal ID (PID) and level access permissions (operator, supervisor or engineer) on a standard Windows® PC. The PC stores in a central database a log of all entries made by the users/operators on the checkweigher. The information recorded in the database can be processed using any standard PC program for producing custom reports and statistics.

Login-Server has two modes of operation:

1. Login through the central database on a remote PC via a local Ethernet network; local login to the checkweigher if the remote PC is temporarily unavailable across the network.
2. A local database on the checkweigher where no local network is available.

For more information visit www.mt.com/garvens-app and request application note 31

5.2 Windows Domain Log-in Server
Simple Management of Passwords

Application Note 15

Customer benefits:
- Only "ONE" password for everything
- Use of normal network log-in name and password
- Eliminates separate 3rd party software programs for user management
- Enables compliance with 21 CFR Part 11 requirements

The Windows® Domain Log-in Server option for the XS checkweigher controller allows the customer to use accounts and passwords which have been issued by the their IT department at the network level to provide user access to the checkweigher.

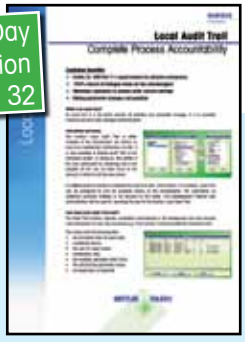
The windows® Domain Log-in Server enables all authorised personnel to enter their standard windows® user name and password to login to the checkweigher. If an operator is permitted as a "User" in one of the authorised domain groups then his login is automatically carried out on the checkweigher with the rights or profile assigned to this domain group. Membership of the user within the domain group is automatically verified by the checkweigher.

For more information visit www.mt.com/garvens-app and request application note 15

5.3 Local Audit Trail
Complete Process Accountability

Application Note 07

Free 30 Day Trial Version See Page 32



Customer benefits:
- Fulfils 21 CFR Part 11 requirements for pharma companies
- 100% record of changes made on the checkweigher
- Motivates operators to always enter correct settings
- Hiding of parameter changes is not possible

An audit trail is a record of all activities and parameter changes. It is a complete historical record of who changed what and when.

The Audit Trail function operates completely automatically in the background and records the following data:
- an (invisible) index with date/time stamp
- the user-ID (login name)
- modification area
- the modified parameter detail name
- the old and new parameter values
- an explanation (if required)

Audit trail reports can be displayed and exported via USB by authorised users:

For more information visit www.mt.com/garvens-app and request application note 07

5.4 Backup/Restore Option
Complete System Data Protection

Application Note 33

Customer benefits:
- Additional complete system and data restore option
- Complete computer hardware failure protection
- Highest level of protection for critical system and product data

The additional backup/restore option is for companies who require the highest level of data protection to cover all possible eventualities.

This option enables the checkweigher owner to restore all data even if all checkweigher computer system components fail simultaneously.

The backup/restore option includes a special USB "SG-Lock" dongle with an encrypted serial number.

During the initial option setup, the dongle serial number will be noted in the system and saved on the normal backup USB stick during all following standard backup routines.

It is then possible to replace both the flash card and IPC and restore all data from the backup stick.

For more information visit www.mt.com/garvens-app and request application note 33

5.5 PrintStick Reader
Data Management Tool

Application Note 25

Customer benefits:
- Exports checkweighing data without a local network
- Enables the checkweigher data to be processed on a PC
- Enables customised printing and analysis of checkweigher data
- Allows long-term storage of historical production data

The PrintStick Reader PC Software program is a powerful tool for collecting and managing production information from XC, XE, or XS controls.

With PrintStick Reader important production data can be collected, viewed, saved, printed or exported for further processing. PrintStick Reader is a simple PC application that is installed on a customer's local computer. The data is encrypted to ensure security and integrity of information.

PrintStick Reader is a cost effective way to collect and manage production data in facilities where a plant-wide communication network does not exist.

For more information visit www.mt.com/garvens-app and request application note 25

Notes:

Chapter 6
Functions and Operations

This chapter outlines additional options, functions and operations. The use of these is very dependent on the application and products being weighed.

The combination of industry, product characteristics, legal requirements, company goals, and quality control procedures makes every checkweighing application unique. These options and functions have been designed to address the great majority of manufacturing requirements. Whether used singularly or in combination they will all assist in streamlining production and ensure efficient and effective processes.

6.1 Control Statistics
Optimise Quality Control Processes

Application Note 26

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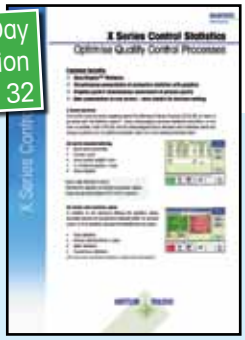


Customer benefits:

- Data-Graphic™ Statistics
- Simultaneous graphical presentation of production statistics
- Graphics permit instantaneous assessment of process quality
- Data presentation on one screen – more details for decision making

Each X Series checkweigher has a standard set of statistics which are always available and an additional "Statistic" option for more detailed statistical data.

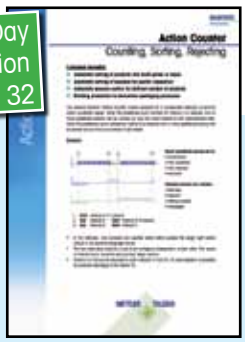
Every checkweigher provides statistical information in one form or another. In addition to the standard offering the statistics option provides records of production intervals either by product count or time duration, and permits identification by batch.

- Total statistics
- Interval statistics by time or piece
- Batch statistics
- Current hour statistics
- Data-Graphic™ enhancements (only XS)
- Accept/reject pie chart (only XS)

For more information visit www.mt.com/garvens-app and request application note 26

6.2 Action Counter
Counting, Sorting, Rejecting

Application Note 09



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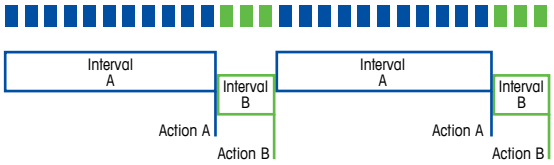
Customer benefits:
- Automatic sorting of products into multi-packs or cases
- Automatic sorting of routine samples for quality inspection
- Automatic process control for defined number of products
- Divides production to streamline packaging processes

The optional function "Action Counter" counts products for 2 consecutive intervals (A and B) which constantly repeat.

When the predefined count number for interval A is reached, one or more predefined actions will be carried out and the count interval B will automatically start. When the predefined count number for interval B is reached one or more predefined actions will be carried out and the count interval A will restart.



For more information visit www.mt.com/garvens-app and request application note 09

6.3 Sample Function
For Additional Quality Control

Application Note 20

Customer benefits:
- Samples can be safely removed from the running production
- Sample products are not included in the checkweighing statistics
- Results are displayed on screen and can also be printed
- Very simple, operator-friendly procedure

The Sample Function allows the operator to remove a specified number of products from the production line for further evaluation. This is achieved by using a rejecting device without stopping the production process or causing unnecessary downtime.

The weight of each rejected sample is recorded. The recorded weights are labelled with consecutive numbers and are shown on the screen. When the sampling process has been completed the results can be previewed and printed.

For more information visit www.mt.com/garvens-app and request application note 20

6.4 Print Function Options
Fulfils Audit Documentation Requirements

Application Note 18

Customer benefits:
- Hardcopies of statistical and production data
- The checkweigher does not need to be connected to a network
- Data can be exported onto a USB stick
- Printouts fulfil audit documentation requirements

The X Series controls have tremendous flexibility when it comes to print options, allowing users to access, save or print data at their convenience.

The X Series controls can print on demand or be programmed to capture production data at the end of an event such as a time interval, piece count or batch interval and save the data in the stored printouts database. These stored printouts can then be selected, previewed, printed on an internal, external or Bluetooth printer, copied to a PrintStick or deleted at the user's convenience.

There is internal memory for up to 400 printouts on an X Series control (depending on model).

These printouts are identified by date, time, type of data and product.

The following is a list of the available standard printouts:

- Versions
- Metrological
- Sample
- Zone Classification
- Product setup
- Records
- Messages
- Items
- Network
- Active Options

In combination with the "Statistics" option an additional set of printouts becomes available:

- Total Statistics
- Final Evaluation
- Interval Statistics
- Batch Statistics
- Current Hour

For more information visit www.mt.com/garvens-app and request application note 18

6.5 PINYIN Editor
Navigation for Chinese Characters

Application Note 10

Customer benefits:
- Allows use of Chinese characters
- Optimal for use where only Chinese is spoken
- Reduces operator errors due to language barriers
- Speeds up product changeovers and checkweigher input

The PINYIN Editor enables the input of simplified Chinese characters for product names, zone description, etc. This option is exclusive to METTLER TOLEDO.

PINYIN is the official system for transcribing Chinese characters into the Roman alphabet and is used as an input method to enter Chinese characters into computers.

For more information visit www.mt.com/garvens-app and request application note 10

6.6 Counting Function
Measuring the Number of Objects

Application Note 32

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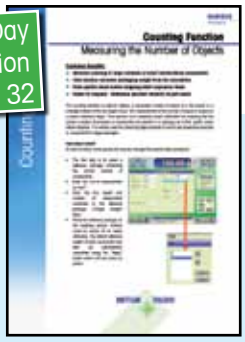


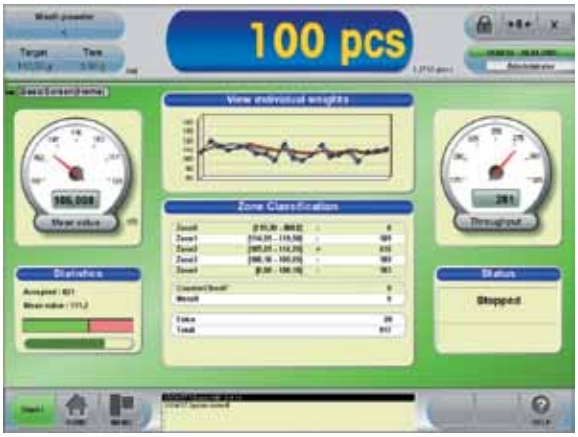
Customer benefits:

- Reliable counting of large numbers of small standardised components
- Tare function excludes packaging weight from the calculation
- Final quality check before shipping small expensive items
- Faster to respond – Enhanced operator visibility of part count

The counting function is used to display the calculated number of pieces in a package instead of the weight value.

The measurement of the number of pieces is based on a known reference object. This function is an essential visual verification for ensuring that the correct number of products or components is present in a package as a final quality check before shipping. It is mainly used for checking large quantities of small and expensive products or components in larger packages.

During production, as each package passes over the weighing platform, the checkweigher will weigh, deduct the tare and then divide the net weight by the calculated reference weight of each component. The screen will then display the result as a number of pieces.



For more information visit www.mt.com/garvens-app and request application note 32

6.7 Volumetric Filling
Making Liquid Fill Quantities Visible

Application Note 49

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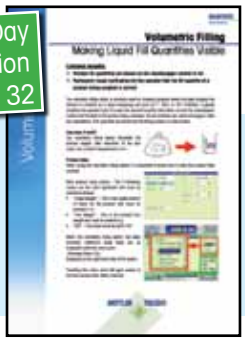


Customer benefits:

- Product fill quantities are shown on the checkweigher control in millilitres
- Provides a permanent visual verification for the operator that the fill quantity of a product being weighed is correct

The volumetric filling option is primarily used for checking products where the label displays the volume of contents as a liquid measuring unit.

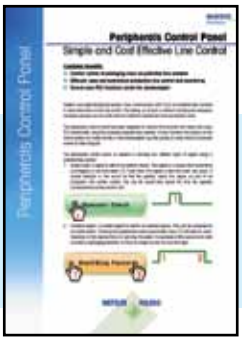
The volumetric filling option translates the product weight, after deduction of the tare value, into a liquid measurement in millilitres. It greatly simplifies the operator's job if the same fill quantity information is visible on both the checkweigher control and the label of the product.

The fill level of the product will be displayed at the top of the screen. The entered specific density of the liquid is also shown.

For more information visit www.mt.com/garvens-app and request application note 49

6.8 Peripherals Control Panel
Simple and Cost Effective Line Control

Application Note 67



Customer benefits:
- Central control of packaging lines via potential-free contacts
- Efficient, easy and centralised production line control and monitoring
- Covers easy PLC functions inside the checkweigher

The peripherals control panel has been designed for use on small and straightforward production lines. It replicates basic PLC functionality using the available potential-free contacts.

The peripherals control panel is capable of sending two different types of signal using a potential-free contact:

1. A signal pulse is sent to an external device. This is a single short pulse and triggers a one time event.
2. A constant signal is sent to an external device. Touching the button once will start an event Touching for a second time will stop the event.

The X Series peripherals control panel allows 8 potential-free contacts to be configured. These can be used to send command signals to any other part of the production line or monitoring device.

For more information visit www.mt.com/garvens-app and request application note 67

6.9 Product Length Check
Maximum Process Safety

Application Note 55

Customer benefits:
- Better process management due to more insight in the product stream
- Prevents costly downtime, labour and machine damage
- Identifies downstream jams before they can cause expensive downtime
- Easy identification of faults before a jam or product spill occurs

Product length measurement is a standard checkweighing function. It calculates the length of a product by measuring the time it takes for the product to pass in front of a photoelectric sensor.

This function is used to calculate the optimal moment to weigh the product for maximum accuracy.

This simple function can also be effectively used for detecting:
- If tall products have fallen over
- If products have been fed to the checkweigher with the wrong orientation
- Overlapping products
- End-to-end products
- Wrong products

For more information visit www.mt.com/garvens-app and request application note 55

6.10 X out of Y
Successive Errors Detection

Application Note 61

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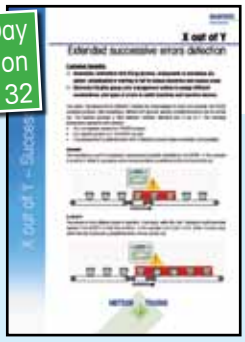


Customer benefits:

- Immediate notification that filling devices, components or processes are defective, maladjusted or starting to fail, reducing downtime and minimising wastage
- Extremely flexible group error management system to assign different combinations and types of errors to safety functions and rejection devices

The "Successive Errors Detection" enables the checkweigher to count and evaluate products classified as "not GOOD"' classified products. After exceeding a defined limit, predefined actions can be carried out.

The function provides 2 fault detection variants: "Standard" and "X out of Y".

1. **Standard** – This maintains a count of successive errors. When X successive errors occur an action will be triggered.
2. **X out of Y** – This allows a more effective mode of operation. When X errors occur within the last Y products, an action will be triggered.

It is also possible to define multiple groups of errors. This is a typical option for the pharma industry where applications can be complicated and involve multiple processes.

For more information visit www.mt.com/garvens-app and request application note 61

6.11 End-of-Cycle Events
Automation of Routine Processes

Application Note 50

Customer benefits:

- Easy control and monitoring of production cycle events
- Automatic reporting and printing of statistical information
- Automatic triggering of actions at regular intervals
- Manual triggering of preset actions at the end of production cycles

On many production lines there is a need to define certain actions which are to recur at regular intervals.

These automated actions can be used as part of a quality or service plan. They reduce human error, ensure that routine procedures are reliably carried out and make more efficient use of available manpower resources.

There are four end-of-cycle events. Each of these events can be configured to automatically trigger any combination of predefined actions:

1. End of production hour
2. End of interval
3. End of batch
4. After final evaluation

For more information visit www.mt.com/garvens-app and request application note 50

Chapter 7
Additional Useful Information

This chapter offers additional useful information to anyone who is considering purchasing a checkweighing solution.

Investing in a checkweighing solution is a major financial commitment and should be well thought through and calculated. METTLER TOLEDO is committed to offering the maximum value possible on all its products. This also includes supplying comprehensive documentation and information to aid all levels of management in making the correct decision.

7.1 Factory Testing Procedures
Quality Assurance Prior to Delivery

Application Note 19

Customer benefits:
- Assurance that the checkweigher performs correctly before delivery
- Additional quality assurance
- Reduces initial on-site commissioning and setup time

METTLER TOLEDO is dedicated to providing the highest quality products and services available.

A key element in this process is the rigour by which we test new checkweighers prior to shipment, to ensure that on delivery they meet the application and performance requirements originally specified.

This document outlines the following factory testing procedures and options:

Standard factory test (SFT), including tests on:
- Accuracy
- Rejection devices
- Sensors
- Product handling
- Safety
- Security
- Electrical components

Factory acceptance test (FAT), a customer-specified test including:
- Review of the FAT at the time of order to assess requirements
- Setup of the machine by a technician
- Assistance of one technician for the testing duration
- Dismantling the machine for shipment

For more information visit www.mt.com/garvens-app and request application note 19

7.2 Why You Need a Garvens Checkweigher
Making Every Gram Count

Application Note 22

All checkweighers will pay for themselves by reducing waste and helping to produce more consistent products.

Below are the top 10 reasons why you need a Garvens checkweigher:

1. **Garvens checkweighers make you more money!**
2. **Machines for every budget!**
3. **Solutions that work and conform to your needs!**
4. **Award winning solutions!**
5. **Package handling expertise!**
6. **METTLER TOLEDO weighing performance!**
7. **Data and line integration ready!**
8. **At your service!**
9. **Local or global – it's your choice!**
10. **A culture of innovation!**

For more information visit www.mt.com/garvens-app and request application note 22

7.3 Overall Equipment Effectiveness (OEE)
Measuring Operational Performance

Application Note 21

Overall Equipment Effectiveness (OEE) is an effective method of measuring and quantifying the performance of a production line. For the majority of manufacturers, OEE represents "best practice".

$$\frac{\text{Actual Good Output}}{\text{Maximum Capable Output}} = ?\%$$

There are 3 primary factors which need to be taken into consideration when calculating OEE.

- **Availability** – is the actual operating uptime shown as a percentage of planned production time.
- **Performance** – is the actual throughput shown as a percentage of the maximum or specified throughput. Performance is a measurement of a production line's ability to run at its maximum specified throughput.
- **Quality** – is the quantity of good products shown as a percentage of all products produced.

"World Class" OEE status is considered to be 85%.

We have listed below some of the ways that METTLER TOLEDO products and services can improve OEE:

- X Series touchscreen controls reduce changeover times thereby increasing "**Availability**".
- Preventative maintenance programs maintain "**Performance**".
- Weighing technology provides tighter tolerances, to improve "**Quality**".

For more information visit www.mt.com/garvens-app and request application note 21

7.4 Building a Checkweighing Programme

The Garvens "Principles of Checkweighing" Guide serves as a definitive reference work providing an insight into all aspects of checkweighing, from basic principles to implementation of a comprehensive programme.

This FREE 70 page guide has been written to assist manufacturers in the setting up of such a checkweighing programme and is essential reading for everyone involved with checkweighing and weight inspection.
www.mt.com/cwguide

7.5 Free 30 Day Trial Version

The software options marked with "Free 30 Day Trial Version" can be activated on your checkweigher at any time for the trial period. This will enable comprehensive option testing under production conditions to assess their value before making a purchase decision.

The software trial activation is very quick and simple but can only be done by an authorised METTLER TOLEDO service technician. The full unrestricted version of the option will be available for the complete trial period and will automatically deactivate after 30 days.

Free 30 Day Trial Version

For more information on activation and deactivation please contact your local service representative. For pricing and permanent activation please contact your local sales representative.

7.6 White Papers

Overall Equipment Effectiveness
This white paper describes OEE in detail and shows, using a simple calculation, how you can improve productivity whilst also reducing costs.
www.mt.com/garvens-oee

Principles of Hygienic Design
This white paper covers all aspects of checkweigher sanitary design. The final chapter includes a tool for assessing your sanitary design requirements.
www.mt.com/garvens-hygiene

Pharmaceutical Serialisation
This white paper addresses in detail the questions that must be asked when choosing a serialisation equipment supplier.
www.mt.com/garvens-serialisation

Filler Optimisation
This white paper explores common filling problems and gives advice and solutions to optimise fill levels to increase quality and profitability.
www.mt.com/garvens-filler

7.7 Calculators

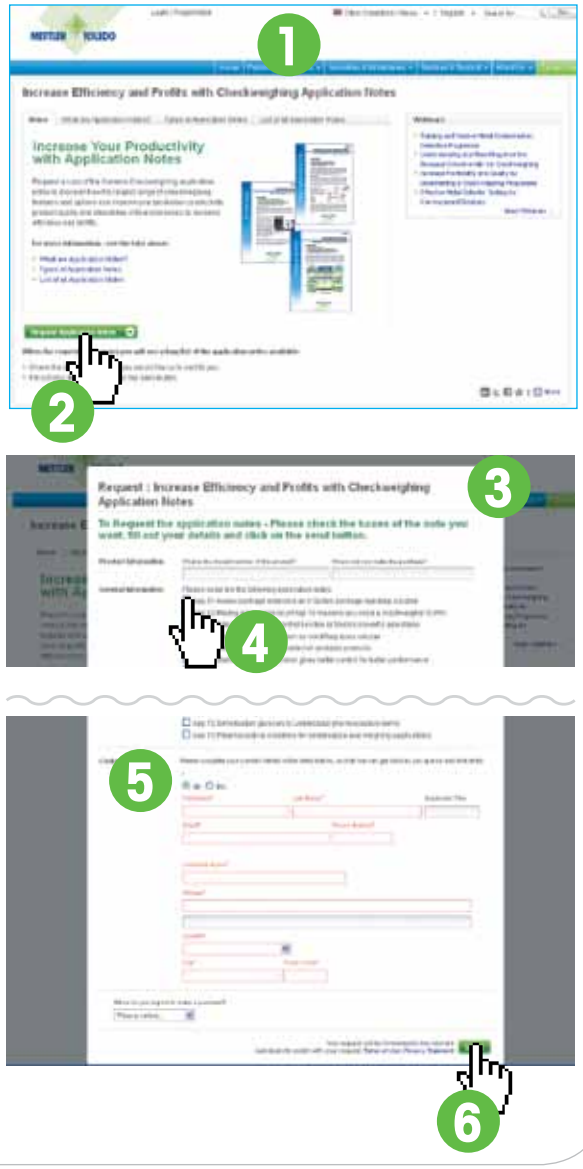
Calculating Checkweigher ROI
This calculator enables you to work out how much you can save by reducing overfilling and scrap, and includes an ROI calculation.
www.mt.com/garvens-roi

Manual vs. In-Line Weighing
This calculator enables you to calculate how much you can save by replacing a static scale with an in-line checkweighing solution.
www.mt.com/garvens-dynamic

7.8 Request Application Notes

Below are instructions on how to request a full copy of any application report outlined in this document:

1. Go to: **www.mt.com/garvens-app**
2. Click on the green button: **"Request Application Notes"**
3. A new window will open with a list of the available applications notes.
4. Check the boxes of the application notes you would like.
5. Fill in your contact details at the bottom of the list.
6. Press the "send" button.
7. Your local METTLER TOLEDO representative will send you a copy of the application notes requested.



7.9 On-Demand Webinars

On-Demand webinars can be viewed 24 hours a day to provides the most convenient and flexible access.

Obtain specific information about applications and products, learn about industry trends and standards, and receive useful and informative presentations without added sales pressure.

www.mt.com/pi-ondemand

Below are the available checkweighing webinars:

The European Directive 2004/22/EG (MID = Measuring Instrument Directive)

Effective Checkweighing For Challenging Times

High Performance Checkweighing for Maximum OEE

Pharmaceutical Serialisation - Choosing the Right Equipment Supplier

Using Weight Measurement to Improve your Product and Processes

Contact

For more information about checkweighing solutions please contact your local METTLER TOLEDO representative:

Australia – Mettler-Toledo Ltd., Victoria 3207
Austria – Mettler-Toledo GmbH, 1230 Vienna
Belgium – N.V. Mettler-Toledo S.A., 1932 Zaventem
Brazil – Fabrima Máquinas Automaticas Ltda., Guarulhos, SP
Bulgaria – Romy Tech, 8, Prelom St., 1113 Sofia
China – Mettler-Toledo International Trading Co., Ltd., Shanghai 200233
Croatia – Mettler-Toledo d.o.o., HR-10000 Zagreb
Czech Republic – Mettler-Toledo spol, s.r.o., 100 00 Praha
Denmark – Mettler-Toledo A/S, 2600 Glostrup
Egypt – Anasia - Egypt for Trading S.A.E, 11361 Cairo
Finland – Oy G. W. Berg & Co. AB, 01511 Vantaa
France – Division Product Inspection S.A., 78222 Viroflay cedex
Germany – Mettler-Toledo Product Inspection, 31180 Giesen
Greece – NEFTON TECHNOLOGIES SA, 15344 Gerakas, Attica
Hungary – Mettler Toledo Kft., 1139 Budapest
India – Mettler Toledo India Private Limited, Mumbai 400 072
Indonesia – PT. Mitra Pack, Jakarta, 10730
Israel – Agentek (1987) Ltd., 61580 Tel-Aviv
Italy – Mettler-Toledo S.p.A., 20026 Novate Milanese
Korea – Mettler-Toledo (Korea) Ltd., Seoul 137-130
Malaysia – Mettler-Toledo (M) Sdn.Bhd., 40150 Shah Alam, Selangor
Malta – Labo Pharm Ltd, ATD 1400
Mexico – Mettler-Toledo, S. A. de C. V., 11570 Mexico D.F.
Netherlands – Mettler-Toledo Product Inspection BV, 5215 ML´s Hertogenbosch
New Zealand – J.L. Lennard Ltd., Auckland 1644
Norway – Mettler-Toledo AS, 0581 Oslo
Philippine – L+H Automation, INC, Mandaluyong City 1550
Poland – Mettler-Toledo Sp.z.o.o., 02-822 Warszawa
Romania – O.F. Systems s.r.l., Bucharest
Russia – Mettler-Toledo Vostok, 101000 Moskow
Saudi-Arabia – Anasia Trading Co. Ltd, Jeddah 21533
Serbia – Trim d.o.o., 35000 Jagodina
Singapore – Mettler-Toledo (S) Pte. Ltd., Singapore 139959
Slovakia – Mettler-Toledo spol, s.r.o., 83103 Bratislava
Slovenia – Mettler-Toledo d.o.o., 1261 Ljubljana Dobrunje
South Africa – Microsep (PTY) LTD., Bramley 2018
Spain – Mettler-Toledo S.A.E., 08908 Barcelona
Sweden – Mettler-Toledo AB, 12008 Stockholm
Switzerland – Mettler-Toledo GmbH, 8606 Greifensee
Taiwan – Mettler-Toledo Pac Rim AG, Taipei 114
Thailand – Mettler-Toledo (Thailand) Ltd., Bangkok 10320
Turkey – Mert Teknik Mühendislik Ve, 34235 Esenler, Istanbul
United Arabian Emirates – Himatrix ME LLC, 119396 Dubai
United Kingdom – Mettler-Toledo Ltd., Leicester, LE4 1AW
United States – Mettler-Toledo Hi-Speed Inc., Ithaca, NY 14850
Vietnam – Mettler-Toledo (Thailand) Ltd., Ho Chi Minh City

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For more information

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