

# EVALUATION CERTIFICATE

**No. 0200-WL-05860**

**Object name**            **ZM505 / ZM510 / ZM605 / ZM615 Series**  
**Object type**            **Weighing indicator for an automatic gravimetric filling instrument**  
**Issued by**              **Force Certification A/S**

Issued in accordance with the requirements in WELMEC Guide 8.8:2017 "Guide on General and Administrative Aspects of the Voluntary System of Modular Evaluation of Measuring instruments".

**In accordance with**   OIML R61:2004, OIML D11:2013, WELMEC Guide 2.8:2012, WELMEC Guide 7.2:2015 and WELMEC Guide 8.8:2017.

**Issued to**                **Avery Weigh-Tronix**  
Foundry Lane  
Smethwick  
West Midlands B66 2LP  
UNITED KINGDOM

**Manufacturer**        **Avery Weigh-Tronix**

**In respect of**         A weighing indicator tested as a module for an automatic gravimetric filling instrument.

**Characteristics**        The ZM505 / ZM510 / ZM605 / ZM615 indicators have the following characteristics:

Weighing range:	Single-interval
Number of VSIs:	$n \leq 10,000$ using $10 V_{EXC}$
	$n \leq 6,000$ using $5 V_{EXC}$
Reference class, $Ref(x) =$	0.05 using $10 V_{EXC}$
	0.1 using $5 V_{EXC}$
Verification scale interval (d):	$\geq 0.5$ g
Minimum input voltage per VSI:	0.5 $\mu V$ using $10 V_{EXC}$ ,
	0.8 $\mu V$ using $5 V_{EXC}$

The essential characteristics are described in the annex.

**Description and documentation**    The weighing indicator is described and documented in the annex to this certificate.

**Remarks**              The conformity was established by the reports listed in the annex.

This evaluation certificate cannot be quoted in an EU type examination certificate without permission of the holder of this certificate mentioned above.

The annex comprises 13 pages.

**Issued on**            **2019-03-22**

FORCE Certification references:

Task no.: 119-23235.90.25 and ID no.: 0200-WL-05860

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## Descriptive annex

### 1. Introduction

The indicating device (weighing controller) is designated the ZM505 / ZM510 / ZM605 / ZM615. It is designed to be used in conjunction with a material feed device and a weighing unit with appropriate discharge devices to form an Automatic Gravimetric Filling Instrument.

### 2. Description

#### 2.1 Construction

The indicator construction is dependent on the model number, the designation follows the following format: "Prefix-XYZ", with

- Model Number Prefix:  
ZM505, ZM510, ZM605 or ZM615 = Standard Indicator
- First Digit X – Enclosure material  
S = Stainless enclosure
- Second Digit Y – Mounting orientation  
D = Desktop  
P = Panel Mount
- Third Digit Z – Display Type  
3 = IBN with dot graphic – Black background with Green Digits  
4 = Dot graphic – Green background with Black Dots (capable of negative image)  
5 = Large dot graphic – Green backlight with Black Dots (capable of negative image)

The ZM505, ZM605 and ZM615 feature 29 operational keys, including a numeric keypad and 5 "soft keys" (F1 to F5), the current functions of which are shown above them on the display.

The ZM510 features 48 operational keys, including a QWERTY keypad and 5 "soft keys" (F1 to F5), the current functions of which are shown above them on the display.

#### 2.2 Devices

The ZM505 / ZM510 / ZM605 / ZM615 Weighing controller is provided with the following,

##### Operational features:

- Net or Gross weighing
- Semi-automatic zero setting device ( $\leq 4\%$  of Max)
- Zero tracking ( $\leq 4\%$  of Max)
- Automatic tare weighing (when part of automatic weighing process)
- Preset Tare
- Semi-automatic tare weighing device (subtractive)
- Memory for storing target weights
- Digital outputs for controlling external devices
- Material in-flight correction
- Printing
- PLUs
- Alibi storage device
- Event counters
- Gravity compensation

- Real time clock
- Command via external device (PC)
- Gross, Net, Tare, Preset tare, Print, Zero, Motion, Accumulation, Over/Under weight, Network and Battery indicators
- Connection to up to 4 load receptors, with load receptor number indicator
- Connection to digital load cells

## **2.3 Operation**

### **2.3.1 Gross weighing**

For gross weighing, the indicator is associated with a load receptor without a discharge device (hopper) for weighing directly into bags.

The operator selects the predetermined (target) weight set points and other operational inputs (in-flight correction, recipe, and delay time between ingredients) via the keyboard on the front of the controller. The indicator operates the feeding device via its digital outputs, in response to the digital input signals from the load cell(s) and plant sensors (e.g. bag in place, etc).

In-flight correction compensates for the quantity of an ingredient (which is falling from an auger or other feeding device) that reaches the scale after the auger or feeder is shut off. There will always be material in "free-fall" after the material feed is shut off, so the indicator will automatically compensate for this by shutting off the feed a calculated time before the target weight is reached.

The feeding device is stopped when the target weight (less the material in-flight) is reached, and a signal is provided to release the bag.

The display on the front of the controller shows the predetermined weight and the actual weight of the weighing unit when the machine is operating.

### **2.3.2 Net weighing**

For net weighing, the indicator is associated with a load receptor incorporating a discharge device for weighing of target weights in a weigh hopper.

The operator selects the predetermined (target) weight set points and other operational inputs (in-flight correction, recipe, and delay time between ingredients) via the keyboard on the front of the controller. The indicator operates the feeding device via its digital outputs, in response to the digital input signals from the load cell(s) and plant sensors (e.g. bag in place etc). Material in-flight connection operates as described in section 2.4.1.

The feeding device is stopped when the target weight (less the material in-flight) is reached, and a signal is provided to discharge the product from the weigh hopper.

The display on the front of the controller shows the predetermined weight and the actual weight of the weighing unit when the machine is operating.

## 2.4 Software

The software complies with Welmec Guide 7.2:2015, Risk Class B, Type P, Extensions L and T.

### 2.4.1 Program segregation

The ZM505 / ZM510 / ZM605 / ZM615 software comprises of two segregated programs, the firmware operating system (OS) and a user application (written in LUA or GSE Macros or Weigh-Tronix Basic).

The OS is a self-contained system that stores the NAWI mode of operation. All legally relevant scale functionality is included in the OS and cannot be modified.

The user application, downloaded at installation, comprises non-legally relevant data and functionality, which calls on the legally relevant scale functionality from the OS.

### 2.4.2 Security

The software is held on the Flash Memory and the OS cannot be modified by the user. The calibration, legally relevant parameters and ability to download user applications are protected via physical or software means.

A jumper located on the main board prevents all access to the legally relevant parameters and prevents the download of user applications or firmware.


Alternatively, software sealing may be used to protect the calibration, legally relevant parameters and software. Two non-editable event counters, designated CAL and CONFIG, are incremented each time the calibration and legally relevant parameters respectively are modified, or if a new user application is downloaded with access to these parameters being password-protected. The counters' values and designations must be written on a tamper-evident label on or near the rating plate.

### 2.4.3 Verification information

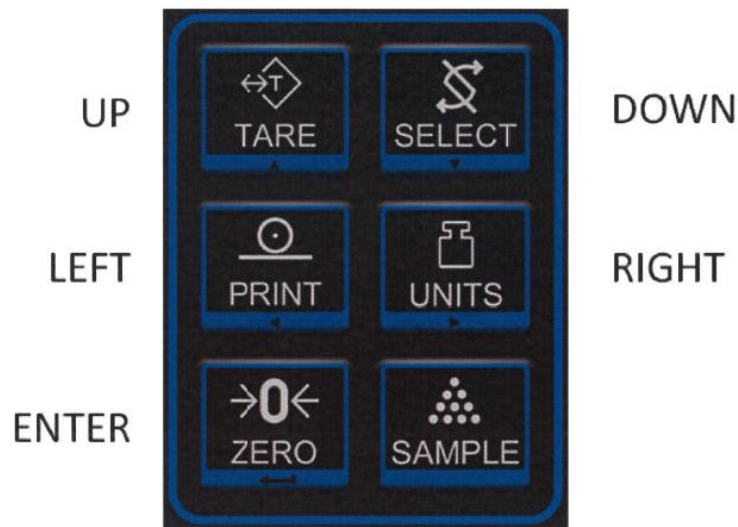
Verification information may be accessed using the blue navigation keys, the layout of which depends on the indicator:

#### ZM510 Navigation Key Layout




Additionally the  key on the QWERTY keyboard and the F1 to F5 "soft keys" may be used in some menus.

**ZM505 / ZM605 / ZM615 Navigation Key Layout**



Additionally the F1 to F5 "soft keys" may be used in some menus.

To access the menus, with the indicator powered up and in normal operating mode, press and hold the SETUP key until the password entry screen appears.

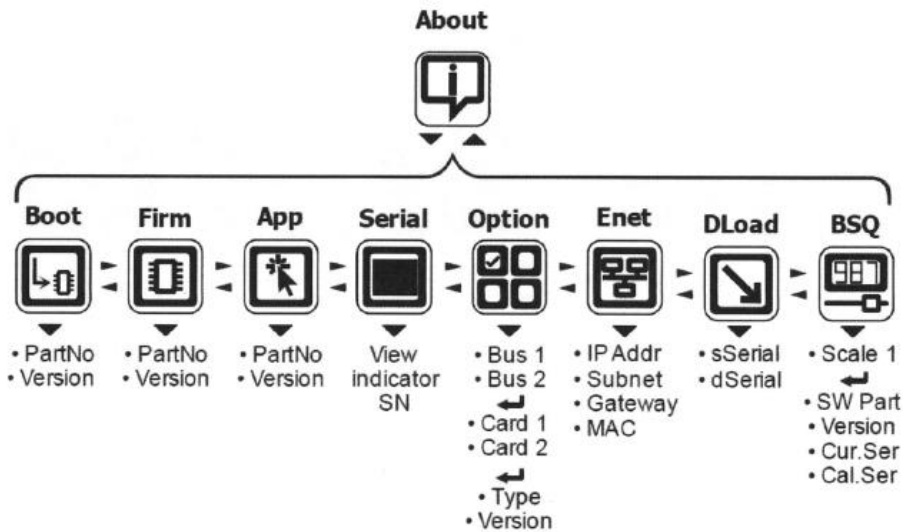
Key in 111 by using the numeric keys, and press the ZERO  to accept it. **Busy** and a scrolling flashing \* will be displayed initially, followed by the following screen:



**2.4.3.1 Software identification of indicator**

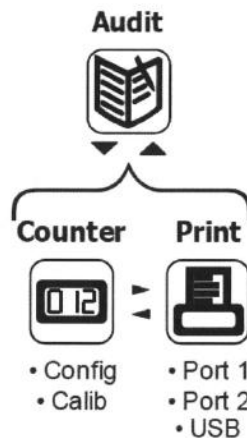
The Indicator software is designated AWT30-500208 version 2.x.x.x (where x.x.x refers to the identification of non-legally relevant software, which may be modified by the manufacturer).

To display the software part number and version number, scroll through the options using the ► or ◀ key, until **About** is displayed. Select this option by pressing the ▼ key, then navigate through the menu structure below, to display either the software part number (**PartNo**) or version number (Version), under the **Firm** submenu:



### 2.4.3.2 Event counters

To display the CALIB and CONFIG event counters' values, scroll through the options using the ► or ◀ key, until **Audit** is displayed. Select this option by pressing the ▼ key, then navigate through the menu structure below, to display either the CALIB or CONFIG event counter values:



Pressing ZERO ◀ while **Config** is displayed shows the value for the CONFIG counter  
Pressing the **Esc** soft key returns to the "Config" menu.

Pressing ZERO ◀ while **Calib** is displayed shows the value for the CAL counter.  
Pressing the Esc soft key returns to the "Calib" menu.

### 2.4.3.3 Returning to normal weighing mode

To exit back into normal weighing mode press the **SETUP** key until "**SAVE no**" is visible, then press the **ZERO** ◀ key.

### 3. Technical data

#### 3.1 Weighing indicator

Type:	ZM505 / ZM510 / ZM605 / ZM615
Reference class:	Ref(0.05) for indicators using 10 V <sub>EXC</sub> , Ref(0.1) for indicators using 5 V <sub>EXC</sub>
Weighing range:	Single-interval
Weighing mode:	Static
Maximum capacity (Max):	= n × e
Minimum fill (MinFil):	See tables in section 3.2
Excitation voltage:	5 VDC or 10 VDC
Maximum number of Verification Scale Intervals (n):	≤ 10000 (class III) using 10 V <sub>EXC</sub> , ≤ 6000 (class III) using 5 V <sub>EXC</sub>
Verification scale interval (e):	≥ 0.5 g
Minimum input voltage per VSI:	0.5 μV using 10 V <sub>EXC</sub> , 0.8 μV using 5 V <sub>EXC</sub>
Initial zero-setting range:	20 % of Max
Maximum subtractive tare effect:	-Max
Fractional factor (p <sub>i</sub> ):	0.5
Circuit for remote sense:	Active (see below)
Minimum input impedance:	10.9 ohm, ZM6xx indicator using 10 V <sub>EXC</sub> , 14.5 ohm, ZM5xx indicator using 10 V <sub>EXC</sub> , 58.3 ohm, using 5 V <sub>EXC</sub>
Maximum input impedance:	1100 ohm
Connecting cable to load cell(s):	See Section 3.1.1
Electromagnetic class:	E2
Humidity:	Non-condensing
Mains power supply:	110-240 VAC, 50/60 Hz, (Desktop models) 12-36 VDC via mains adapter or external battery pack (Panel mount models)
Operating temperature range:	-10 °C / +40 °C
Peripheral interface(s):	See Section 4

#### 3.1.1 Connecting cable between the indicator and analogue load cell / junction box for analogue load cell(s)

##### 3.1.1.1 4-wire system

Cable between indicator and load cell(s):	4 wires (no sense), shielded
Maximum length:	The certified length of the load cell cable, which shall be connected directly to the indicator.



### 3.1.1.2 6-wire system

Cable between indicator and a junction box (J-box) for load cell(s): 6 wires (sense), shielded.

Maximum cable length between indicator and junction box, if any: 212 m/mm<sup>2</sup> ZM6xx with 10 V<sub>EXC</sub>  
143 m/mm<sup>2</sup> ZM5xx with 10 V<sub>EXC</sub>  
196 m/mm<sup>2</sup> using 5 V<sub>EXC</sub> (limited to 30m)

## 3.2 Minimum filling (MinFill)

### 3.2.1 ZM505, ZM510 and 10V EXC load cell option card

Minimum values of MinFill.

d [g]	X(0.05)	X(0.1)	X(0.2)	X(0.5)	X(1)	X(2)
0.5	8000d	4000d	2000d	267d	67d	34d
1	8000d	4000d	2000d	400d	134d	34d
2	X	4000d	2000d	800d	200d	67d
5	X	6000d	2000d	800d	400d	200d
10	X	6000d	3000d	800d	400d	200d
20	X	6000d	3000d	1200d	600d	200d
50	X	6000d	3000d	1200d	600d	200d
100	X	6000d	3000d	1200d	600d	300d
200	X	6000d	3000d	1200d	600d	300d
≥ 500	X	6000d	3000d	1200d	600d	300d

### 3.2.2 ZM605, ZM615 and 10V EXC load cell option card

Minimum values of MinFill.

d [g]	X(0.05)	X(0.1)	X(0.2)	X(0.5)	X(1)	X(2)
0.5	2667d	667d	222d	44d	22d	11d
1	2667d	1333d	333d	44d	22d	11d
2	2667d	1333d	667d	89d	22d	11d
5	4000d	1333d	667d	267d	67d	22d
10	4000d	2000d	667d	267d	133d	33d
20	4000d	2000d	1000d	267d	133d	67d
50	4000d	2000d	1000d	400d	133d	67d
100	4000d	2000d	1000d	400d	200d	67d
200	4000d	2000d	1000d	400d	200d	100d
≥ 500	4000d	2000d	1000d	400d	200d	100d



### 3.2.3 10V EXC load cell option card

Minimum values of MinFill.

d [g]	X(0.1)	X(0.2)	X(0.5)	X(1)	X(2)
0.5	667d	223d	45d	23d	12d
1	1334d	334d	45d	23d	12d
2	1334d	667d	89d	23d	12d
5	1334d	667d	267d	67d	23d
10	2000d	667d	267d	134d	34d
20	2000d	1000d	267d	134d	67d
50	2000d	1000d	400d	134d	67d
100	2000d	1000d	400d	200d	67d
200	2000d	1000d	500d	200d	100d
≥ 500	2000d	1000d	500d	200d	100d

## 4. Interfaces

### 4.1 Load cell interface

Refer to Section 3.1.1.

### 4.2 Peripheral interfaces

The indicator is equipped with the following communication and I/O interfaces,

- 3 × RS-232
- 2 × USB Host
- 10/100 Ethernet
- 3 × logic level inputs
- 3 × open collector outputs

### 4.3 Optional Interface & PCBs

The instrument may be fitted with up to four of the following optional boards, providing additional protected interfaces:

- i. Analogue output card, providing 0-10 VDC and 4-20mA outputs
- ii. Current loop card, providing 4-20mA loop and RS485 / RS422
- iii. Internal Wireless LAN card, providing an 802.11b/g wireless link
- iv. USB Device card, providing USB interface to PC
- v. Load cell interface board, with 5V Excitation (to allow the connection of a second platform, maximum 6 load cells). Refer to section 3.1 for full technical data.

- vi. Load cell interface board, with 10V Excitation (to allow the connection of a second platform, maximum 16 load cells). Refer to section 3.1 for full technical data.
- vii. Bluetooth card, providing a Bluetooth wireless link
- viii. DeviceNet card, providing one DeviceNet Fieldbus interface.
- ix. Profibus card, providing one Profibus Fieldbus interface
- x. Ethernet to PoE Supply side card, providing an Ethernet pass-through interface, with Power over Ethernet available on the output port.
- xi. Quad DC input card, providing four 4-30VDC Opto-Isolated inputs
- xii. Quad DC output card, providing four 3-60VDC Solid State Relay outputs
- xiii. Quad AC input card, providing four 120-240VAC Opto-Isolated inputs
- xiv. Quad AC output card, providing four 20-240VAC Solid State Relay outputs
- xv. External I/O Expansion Card, providing interfaces to legacy installations previously fitted with External I/O or SSCU8 cards
- xvi. Programmable Digital I/O card with eight programmable logic level inputs or outputs, providing pulse counter, frequency measurement, Quadrature decode, and PWM output functionality.

#### **4.4 Peripheral devices**

The instrument may be connected to any peripheral device that has been issued with a Parts Certificate by a Notified Body responsible for Annex II, Module B under Directive 2014/32/EU and bears the CE marking of conformity to the relevant directives; or

A peripheral device without a Part/Evaluation certificate may be connected under the following conditions:

- it bears the CE marking for conformity to the EMC Directive;
- it is not capable of transmitting any data or instruction into the measuring instrument, other than to release a printout, checking for correct data transmission or validation;
- it prints measuring results and other data as received from the measurement instrument without any modification or further processing; and
- it complies with the applicable requirements of Paragraph 8.1 of Annex I

#### **5. Marks and inscriptions**

The instrument shall bear the following legends:

- Evaluation Certificate number
- Manufacturer's mark or name

#### **6. Location of seals and verification marks**

Components that may not be dismantled or adjusted by the user (e.g. load cell connections) will be secured by a wire and seal solution, a tamper evident label and securing mark or common serial numbers. The securing mark may be either:

- a mark of the manufacturer and/or manufacturer's representative, or
- an official mark of a verification officer.

## 7. Pictures



**Figure 1** ZM505-SD3 indicator



**Figure 2** ZM505-SP3 indicator



**Figure 3** ZM510-SD4 indicator



**Figure 4** ZM510-SP4 indicator



**Figure 5** ZM605-SD4 indicator



**Figure 6** ZM605-SP4 indicator



**Figure 7** ZM615-SD5 indicator



**Figure 8** ZM615-SP5 indicator