Application Note 004e

AED / FIT®

Notes on the static adjustment of a scale with FIT and AED

I1698-1.1 en

Content

1 Introduction

Once the FIT® digital load cell or the digital transducer electronics from the AED family are connected to a computer (PC, PLC, etc.) and communication is successfully initialized, static adjustment is the first step. The information given here is viewed as supplementary to the comprehensive operating manuals with their detailed descriptions of the individual commands. The static adjustment of a scale basically uses the following commands:

LDW (Load Dead Weight):	The zero value of the characteristic curve
LWT (Load Weight):	The full scale of the characteristic curve
CWT (Calibration Weight):	The calibration weight
NOV (Nominal Value):	The max. capacity or weighing range

Pay attention to the overview of the commands used here for the various AED / FIT® types!

For the change of these parameters the legal for trade switch has to be switched off (LFT0).

2 AED / FIT® characteristic curves

The FIT® digital load cell and the electronics from the AED product family are calibrated at the factory with the aid of a calibration standard at 2 points (0 mV/V and 2 mV/V or 0 and the max. capacity of the FIT® digital load cell) using the commands **SZA** and **SFA**. With this factory characteristic curve**,** the measured values are initially output as raw data in “digits” (2 mV/V = 1000000 d and max. capacity = 1000000 d for the FIT® digital load cell).

A scale, comprising one or more load cells, only uses part of the range (e.g. 50 %) of this characteristic curve as the weighing range or max. capacity of the weigher (**NOV**). The “rest” is the dead load or overload reserve. A static adjustment is necessary to prevent loss of resolution for the weighing range and also to obtain a numerically correct measurement output in measurement units (g, kg, t, ...). This is usually done with calibration weights or by entering calculated values. The resultant user characteristic curve (commands **LDW** and **LWT**) is independent of the factory characteristic curve and spreads the weighing range internally back to 1000000 d.

3 Adjusting the characteristic curve of a scale with max. capacity

a) Using the AED Panel32 software

- Starting the AED Panel32 software
- “SELECTION” menu: Enter the desired baud rate/parity (factory default 9600/Even *“Parity”*) and click on *“BusScan”*
- “MEASUREMENT” menu: Set the sampling rate and the digital filters to low values for a steady display. The panel software *“Display scaling”* must be set to 1,000,000!
- “PARAMETERS” menu: Enter the desired unit (g, kg, t, ...) and click on *“Write”*
- Select the “ADJUSTMENT” menu: Enter the factory default max. capacity **NOV** = 0 and calibration weight **CWT** = 1000000 (= 100 %) and click on *“Write”*
- Scale unloaded at standstill: ***„LDW"*** Click on (zero value) and wait for the ***”LWT"*** button (full scale) to become active
- Load the scale with the calibration weight, wait for standstill: Click on ***”LWT”*** (full scale)
- Enter the weigher max. capacity **NOV** and click on *“Write”*
- Enter all the other weigher parameters in accordance with the required application

b) Direct use of ASCII commands, using a terminal program, for example

- Set up the connection (factory default is 9600 Bd, even parity)
- Set the password: **SPW**"AED"; or **SPW**"HBM";
- If the password has changed or is unknown, define and set a password: e.g. **DPW**"AED"; then **SPW**"AED";
- Set the sampling rate **ICR** and the digital filter **ASF** to low values for a steady display, e.g. **ICR**6; and **ASF**5;
- Enter the desired unit (g, kg, t, ...), e.g. **ENU**“kg”**;**
- Enter the factory default max. capacity **NOV0;** (=scaling off) and calibration weight **CWT**1000000; (= 100 %)
- Scale unloaded at standstill: Enter **LDW;**
- Load the scale with the calibration weight, wait for standstill: Enter **LWT**;
- Enter the weigher max. capacity **NOV**, e.g. **NOV**5000;
- Use command **TDD**1; to store all the setup parameters in the EEPROM safe from power failure
- Get the measured value for testing: **MSV**?; change, beforehand if necessary, the output format for the measured value to ASCII, e.g. **COF**3;
- Enter all the other weigher parameters in accordance with the required application and use the command **TDD**1; to store them safe from power failure

4 Adjusting the characteristic curve of a scale with partial load

a) Using the AED Panel32 software

- Starting the AED Panel32 software
- SELECTION menu: Enter the desired baud rate/parity (factory default 9600/Even Parity) and click on *"BusScan"*
- Set the sampling rate and the digital filters to low values for a steady display. The panel software *"Display scaling"* must be set to 1000000!
- Enter the desired unit (g, kg, t, ...) and click on *"Write"*
- Select the "ADJUSTMENT" menu: Enter factory default max. capacity **NOV** = 0 and calibration weight in the range of **CWT** = 200000 (=20 %) to **CWT** = 1200000 (= 120 %) and click on *"Write"*
- Scale unloaded at standstill: *„**LDW**"* Click on (zero value) and wait for the *"**LWT**"* button (full scale) to become active
- Load the scale with the calibration weight, wait for standstill: *„**LWT**"* on (full scale)
- Enter the weigher max. capacity **NOV** and click on *"Write"*
- Enter all the other weigher parameters in accordance with the required application

b) Direct use of ASCII commands, using a terminal program, for example

- Set up the connection (factory default is 9600 Bd, even parity)
- Set the password: **SPW**"AED"; oder **SPW**"HBM";
- If the password has been changed or is unknown, define and set a password: e.g. **DPW**"AED"; then **SPW**"AED";
- Set the sampling rate **ICR** and the digital filter **ASF** to low values for a steady display, e.g. **ICR**6; and **ASF**5;
- Enter the desired unit (g, kg, t, ...), e.g. **ENU**“kg”**;**
- Enter the factory default max. capacity **NOV**0; (= scaling off) and calibration weight in the range from **CWT**20000; (= 20 %) to **CWT**1200000; (= 120 %)
- Scale unloaded at standstill: Enter **LDW**;
- Load the scale with the calibration weight, wait for standstill: Enter **LWT**;
- Enter the weigher max. capacity **NOV**, e.g. **NOV**5000;
- Use command **TDD**1; to store all the setup parameters in the EEPROM safe from power failure
- Get the measured value for testing: **MSV**?; change, beforehand if necessary, the output format for the measured value to ASCII, e.g. **COF**3;
- Enter all the other weigher parameters in accordance with the required application and use the command **TDD**1; to store them safe from power failure.

5 Adjusting the characteristic curve of a scale via an mV/V curve

For weighing applications that are not under an obligation of verification or that cannot be calibrated with calibration weights, it is also possible to have a computerized “**mV/V adjustment**”. This is less accurate compared to calibration with calibration weights, although this does not usually matter.

Container weigher example:

Three load cells connected in parallel, each with max. capacity 10 t = 2 mV/V

Tare weight 6 t

Weighing range 15 t

With factory characteristic curve 2 mV/V = 1000000 d, there is the following correlation:

The three load cells connected in parallel produce a total load of 30 t = 2 mV/V = 1000000 d

The tare weight then corresponds to 6 t = 0.4 mV/V = 200000 d

The weighing range is calculated as 15 t = 1 mV/V = 500000 d

The correct numerical data output for the weighing range should be 15000 kg

Which produces the values for the user characteristic curve:

LDW = 200000 (tare weight in digits)

LWT = 700000 (full scale in digits from tare weight =200000 d plus weighing range=500000 d)

NOV = 15000 (weighing range in units of measurement)

ENU = kg (unit of measurement)

a) Entering the calculated LDW/LWT values with the AED Panel32 software

- Starting the AED Panel32 software
- "SELECTION" menu: Enter the desired baud rate/parity (factory default *"9600/Even Parity"*) and click on *"BusScan"*
- "MEASUREMENT" menu: The panel software *"Display scaling"* must be set to 1000000!
- "PARAMETERS" menu: Enter the on *"Write* unit "kg" and click *"*
- Select the "ADJUSTMENT" menu: Enter the factory default max. capacity **NOV** = 0 and calibration weight **CWT** = 1000000 (= 100 %) and click on *"Write"*
- Enter **LDW** (zero value) 200000
- Enter **LWT** (full scale) 700000
- Click on *"Write"*
- Enter **NOV** (weighing range) 15000 and click on *"Write"*
- Enter all the other weigher parameters in accordance with the required application

b) Entering the calculated LDW/LWT values with ASCII commands, for example, using a terminal program

- Set up the connection (factory default is 9600 Bd, even parity)
- Set the password: **SPW"AED"**; oder **SPW"HBM"**;
- If the password has changed or is unknown, define and set a password e.g. **DPW"AED"**; then **SPW"AED"**;
- Enter the unit “kg“: Command **ENU"kg"**;
- Enter the factory default max. capacity **NOV**0; (= scaling off) and calibration weight **CWT**1000000; (= 100 %)
- Enter the calculated zero value: Command **LDW**200000;
- Enter the calculated full scale: Command **LWT**700000;
- Enter the weighing range: Command **NOV**15000;
- Use command **TDD**1; to store all the setup parameters in the EEPROM safe from power failure
- Get the measured value for testing: **MSV**?; change, beforehand if necessary, the output format for the measured value to ASCII, e.g. **COF**3;
- Enter all the other weigher parameters in accordance with the required application and use the command **TDD**1; to store them safe from power failure

If it is not possible to accurately determine the tare weight by computation, it can also be measured (in the above example, with an empty container). As already shown above, the settings of the AED / FIT® must correspond to the factory characteristic curve, that is to say:

LDW = 0

LWT = 1000000

CWT = 1000000

NOV = 0

The accurate tare weight will then be directly displayed in the AED Panel32 software in “digits”. In the terminal program, the tare weight will be output accordingly after the command **MSV?;** if the output format has previously been set to **COF = 3**.

If the measured display for the tare weight (see example above) were now, for example, 220000 d, **LDW** = 220000 and **LWT** = 720000 would have to be entered. The weighing range is unchanged at **NOV** = 15000.

6 Using zero on startup

This function is activated with the ZSE command:

ZSE0;	Zero on startup deactivated
ZSE1; to **ZSE**4;	The range for zero on startup is from ±2 % to ±20 % of the **NOV** value

In a lot of weighing applications, zero balancing is performed automatically when the operating voltage cuts in (for example large truck scales).

This is on condition that the scale is unloaded.

First use the **ZSE** command to define the required range for zero on startup. After the voltage cut-in, when there is a *RESET* or after the **RES** command, zeroing is executed in the selected range at “standstill” after about 2.5 s.

If there is no standstill or if the gross value falls outside the selected zero on startup range, there is no zeroing.

7 Using the zero tracking function

This function is activated with the **ZTR** command:

ZTR0;	Zero tracking deactivated
ZTR1;	Zero tracking activated

Automatic zero tracking occurs when the gross or net measured value <0.5 d. The reset speed is 0.5 d/s when the scale is at a standstill in the range ±2 % of the nominal value of the weigher (**NOV**).

The use of automatic zero tracking is therefore restricted to static scale applications!

8 Using standstill detection

This function is activated with the **MTD** command:

MTD0;	Standstill monitoring deactivated
MTD1; to **MTD**5;	Standstill monitoring from ±0.25 d/s to ±3 d/s of the **NOV** value

By definition, the measured values of a scale are only valid when they meet the standstill condition defined above. For example, ±1 d/s means that to meet the condition, the measured value must change by no more than 1 within one second.

Information about whether the measured values during a second fall within the selected standstill range, is transferred in the measurement status information (bit 3, value 8). If standstill monitoring is deactivated, this does not happen and the measurement status information is set to *“standstill”*.

9 Restoring the SZA/SFA factory characteristic curve

Only applicable to AD103 and FIT® (second and third generation)

If the **SZA/SFA** factory characteristic curve has been changed inadvertently, once the password has been entered (**SPW**), you can use the command **TDD**0; to call it again from a second, write-protected EEPROM. This will, however, also reset all the other parameters to the factory default. The settings for communication, such as address (**ADR**) and baud rate (**BDR**), as well as the user characteristic curve are not reset.

For the change of these parameters the legal for trade switch has to be switched off (LFT0).

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I1698-1.1 en

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