CONVEYOR BELT SCALE

USER'S MANUAL

MDK-EBAN-011297

CONTENTS

I - PREFACE

The conveyor belt scale indicator is designed for measuring the material passing over a conveyor belt without stooping the material for weighing process. On the displays, both measured simultaneous values and the cumulative net totals can be seen on two different displays. Besides, by setting some values, the measured values can be sent to outside devices like electro-mechanical counters, pulse counters etc.

As well al showing the material passed, the rate of flow of material [Kg/second], [ton/hour], Belt speed [meter/second], Load [Kg] Distributed load [Kg/meter] and Cumulative net total [ton] can be seen live on the red numeric display.

Two different flow rates can be set for giving relay outputs as alarm conditions.

The rate of flow is output in ratio of maximum carrying rate from the analog 4-20mA or 0-10V.

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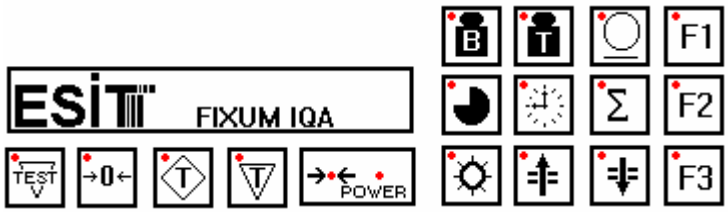
Printouts from printers for all displayed quantities can be taken.

Whenever the device is out of order or any error is felt, a general alarm output is produced.

II - KEYS



II-1. RESET

This key makes the indicator stop everything and perform the reset sequence, as if it is first powered up. Reset sequence consists of lighting all segments in red numeric LED display, clearing the LCD display and the acoustic BEEP signal together with lighting all function LED's. After all these are executed, the device goes into the normal weighing process.

This key is always effective and whichever routine is executed, it can be used.

When the operator wants to enter the weight calibration and calibration parameter entry routines, either should press the test key or unplug the system from the mains and re-plug it again.

II-2. ZEROING

When key is pressed, if this key was enabled, the weight on the conveyor belt is reset to zero.

II-3. TARE (TEST FOR WEIGHT CALIBRATION)

During weighing process, without interrupting the work, calibration control can be done by pressing the TARE key. When this key is pressed, the display is set to zero and when the calibration weight is placed on its place, the weight should be seen as its value. If the displayed value is not correct, then calibration should be accomplished again. If the displayed value is correct, then there is no need for weight calibration, pressing the tare key second time will exit the calibration control routine.

NOTE: During test procedure, the test weight is not aggregated on the cumulative total and the indicator will continue adding after the test procedure is executed. For this reason, the user should accomplish the test procedure as fast as possible and not forget to quit the routine at the end.

II-4. PARAMETER

The parameters effecting the working conditions of the conveyor belt scale can be seen/edited by this key. The parameters can be changed only after the correct password is entered.

II-5. DISPLAY

Used for selecting the unit to be displayed on the numeric RED Display. On this display, the weighing units capacity [Kg/second], capacity[t/h], speed [m/second], load [Kg], total weight [ton] and distributed load [Kg/m] can be selected to be displayed. When key is pressed, the units will shuffle one after the other. The unit of the value is shown on the bottom line of LCD display.

II-6. CLOCK

When the time and date seen on the LCD should be set, this key is used. When the key is pressed, first the cursor will blink on the date section and the operator may enter the date. After correct date is entered AE key is pressed to enter the value and pass to time adjustment. When the time is entered, AE key is pressed to exit the date-time adjustment procedure.

II-7. CLEARING CUMULATIVE TOTAL

Used for clearing one of the cumulative totals displayed on the LCD. When this key is pressed, on the LCD display the following message is displayed:

```
TOPLAMLARI SIFIRLAMAK İCİN 1/2 VE E TUSU
FOR CLEARING THE TOTALS PRESS 1/2 AND E KEY
```

If the operator wants to clear one of the totals, the relevant key is pressed followed by the AE key. If the key was pressed accidentally and the operator does not want to clear the totals, any other key then 1 or 2 is pressed followed by the AE key.

II-8.CALIBRATION PARAMETER and ADJUSTING 4-20mA

This key is used for entering parameters for weight calibration during reset sequence (will be explained in detail in WEIGHT CALIBRATION section). Also 4-20mA output adjustment is done by using this key (will be explained in section VIII).

II-9. CALIBRATION

This key is used for entering weight calibration during reset sequence (will be explained in detail in WEIGHT CALIBRATION section)..

II-10. DYNAMIC ZEROING

After weight calibration is finished, the conveyor is run empty and dynamic zeroing is done by using this key.

II-11. PRINTER

Used for taking print-outs for the weighed, measured and displayed values. When this key is pressed, whichever unit is displayed on the display, the print-out can be taken from the printer.

II-12. CLEAR

Used for clearing the entered values or canceling an operation.

II-13. ENTER

Used for entering the values written..

III-14. PRINTER PARAMETER

Used for selecting printer parameters during reset sequence.

III- WEIGHT CALIBRATION

Weight calibration is accomplished in two steps:

a- Entering the corrects calibration parameters

b- Real weight calibration.

III-a. CALIBRATION PARAMETERS

When the device is first powered up or test key [TEST] is pressed, the device enters the reset sequence. When the [F2] key is pressed, the following message is displayed on the displays:

```
    SETUP1        KALİBRASYON KODUNU GİRİNİZ
SETUP1        ENTER PASSWORD FOR CALIBRATION
```

By entering numeric keys:4 5 6 calibration parameters entry will be entered.

III-a.1. CAPACITY

On the displays following messages will be seen:

```
CAP       ÖLÇÜLECEK MAKSİMUM DEGERİ GİRİN
                60000
    CAP       ENTER MAXIMUM ALLOWABLE VALUE
                60000
```

The conveyor belt scale will use this value for safety reasons. If any value above this entered value is placed on the weighing platform, the device will warn the operator and do not make measurements.

The capacity value is entered by using the numeric keys. During entry, the value is displayed on the red LED display. The rightmost five digits are used. When the value is entered and [AE] key is pressed, the value is stored in the non-volatile memory. If the previously entered value is correct, simply pressing the [AE] key will make the user pass to next parameter.

III-a.2. MAXIMUM CONVEYING CAPACITY

On the displays following messages will be seen:

```
CAP       MAKSİMUM TASIMA KAP. [T/H]: 00.000
    CAP       MAXIMUM CONVEYING CAP. [T/H]: 100.000
```

This value is used for the analog output calibration. The current or voltage output given by the scale is adjusted by this value. The value is in ton per hour units. The value is entered by using the numeric keys. During entry, the value is displayed on the red LED display. The rightmost five digits are used. When the value is entered and [AE] key is pressed, the value is stored in the non-volatile memory. If the previously entered value is correct, simply pressing the [AE] key will make the user pass to next parameter.

III-a.3. WEIGHING STEPS

On the displays following messages will be seen:

CARP02 YÜRÜME ADIMI
STEP02 WEIGHING STEPS

This parameter shows the minimum displayable weight. The parameter is selected according to 1/10000, 1/2000, 1/1000 or 1/500 accuracy.

The value is entered by using the numeric keys. When the value is entered and AE key is pressed, the value is stored in the non-volatile memory. If the previously entered value is correct, simply pressing the AE key will make the user pass to next parameter.

III-a.4. DECIMAL POINT

On the displays following messages will be seen:

DOT NOKTANIN YERİNİ GİRİNİZ (0-3)
(SAYI NOKTANIN SAGINDAKİ HANE SAYISIDIR)
DOT ENTER PLACE OF DECIMAL POINT (0-3)
(THE VALUE IS NUMBER OF DIGITS ON RIGHT SIDE)

The values may need to have decimal points is the values should be in kilograms. For example if the maximum capacity is 50kg and weighing step is 10 grams, then the value of decimal point should be 2 and weighing step should be 1. When this is adjusted, the value 17kg 150 grams is displayed as **17.15** on the red LED display. if the maximum capacity is 50kg and weighing step is 5 grams, then the value of decimal point should be 3 and weighing step should be 5. When this is adjusted, the value 17kg 150 grams is displayed as **17.150** on the red LED display.

III-a.5. DIGITAL FILTER

On the displays following messages will be seen:

ORT ORTALAMA SAYISI
FILTER DIGITAL FILTER

This parameter is used for filtering the measured value. If there is too much vibration or wind affect is seen on the display, by using digital filter these effects can be minimized. Since in a conveyor belt there is always vibration, it is advised to set the digital filter to 7.

III-a.6. COEFFICIENT of CORRECTION

This parameter is used for correcting the effects which are not seen during calibration but found out later when the real process is done. To start with this parameter is set to 1.0000 value. During weighing process if the weight passing over the conveyor belt is not consistent with the real value, this parameter is set accordingly. The effect of this parameter on the displayed weight is shown below:

[Corrected value] = [Calibration weight] X [Coefficient]

III-a.7. ALLOWING USE OF ZEROING KEY

This parameter will enable or disable the usage of zeroing key [→0←]. As explained above, this key is used for resetting the weight on the display to zero. Since this procedure affects the measured weight directly, it may be disabled against accidental pushes.

On the displays following messages will be seen:

```
      SIFIRLAMA TUSUNA İZİN  YOK ••
      (CALISMA SIRASINDA)
PERMISSION TO ZEROING KEY  NO ••
(DURING OPERATION)
```

The parameter can be selected as YES (VAR) by pressing [1] key, as NO (YOK) by pressing [0] key. After the selection enter [AE] key is used for storing the value.

This last step terminates the parameter entry procedure. The device will first performs the reset sequence and go back to normal weighing routine.

III-b. PERFORMING WEIGHT CALIBRATION

When the device is first powered up or test key [TEST] is pressed, the device enters the reset sequence. When the [F3] key is pressed, the following message is displayed on the displays:

```
    CAL      KALİBRASYON KODUNU GİRİNİZ
CAL      ENTER PASSWORD FOR CALIBRATION
```

By entering numeric keys:1 2 3 calibration parameters entry will be entered.

On the numeric display a number is displayed and on the LCD screen "LOADCELL SIFIR" "LOADCELL ZERO" message is displayed. This is a value displayed for the use of a technician. To pass this message enter [AE] key is pressed.

On the numeric display another number is displayed "LOADCELL SENSE" message. This is a value displayed for the use of a technician. To pass this message enter [AE] key is pressed.

On the displays following messages will be seen next:

```
    SIFIR     PLATFORMU BOSALTIP >0< TUSUNA BASIN
              YÜKÜ KOYUP DEGERİNİ GİRİP TUSUNA
BASIN
    ZERO      EMPTY PLATFORM PRESS >0< KEY
              PLACE LOAD. ENTER VALUE. PRESS E
```

When this message is on the display, the conveyor belt scale is emptied and the no-motion indication LED is waited to be lit. When the above mentioned situation is settled, →0← key is pressed. This procedure is called the ZERO CALIBRATION and is used for introducing the dead-weight to the device. When zero key is pressed, the numeric display message turns to "KILO" "LOAD"

After zeroing is performed, a calibration weight with known value is placed on the platform. For the health of the calibration, it is advised to have a calibration value as near as the capacity. After loading is finished and no-motion state is met, by using the numeric keys, the value of the calibration weight is written followed by the AE key.

NOTES:

Possible problems that can be confronted during calibration process.

i) After zeroing is done, load is placed on the platform and value is entered if the following message is displayed:

"YÜRÜME ADIMI BÜYÜTÜLMELI"
"INCREASE WEIGHING STEPS"

this means the weighing steps value is not enough with the load placed and the value to be displayed. To clear the message AE key is pressed and on the screen the device will ask for a bigger weighing step value. If the indicator performs reset sequence after the new step value is entered, then this means calibration is performed. When the indicator displays the same message given above, the step value should be increased one more time.

ii) If the device behaves as item (i) but never accepts the calibration no matter how much it is increased, then this means the weight placed on the platform is not enough for a healthy calibration, so it should be increased.

IV - ENTERING PARAMETERS

During normal weighing process, [⚙] key is pressed for parameter editing. To prevent unauthorized personnel to make changes, there exists a password which can be defined by the operator. When the password is asked, Clear [CE] key is pressed to exit the process. The factory set password is 1 2 3 4.

NOTE: Changing password.

If the previously entered password is forgotten or s desired to be changed, during password inquiry, 4 special keys are pressed in order. These keys are given to an authorized person. When these four keys are pressed, the device will ask for a new four digit password. The password may consist of any keys except the test key [TEST] and the clear key [CE].

IV-1. WHEEL STEP LENGTH

When the correct password is entered the first parameter is edited with the following message:

SİSTEM PARAMETRELERİ
TEKERLEK ADIM MESAFESİ[MM] :06.123
SYSTEM PARAMETERS
WHEEL STEP LENGTH[MM] :06.123

This parameter gives the perimeter of the wheel by dividing the encoder pulse count per revolution. In general, encoders of 50 pulses are used if the conveyor speed is not too slow. This parameter is in millimeter units and found by dividing the perimeter length by 50. The number is entered by using numeric keys and [AE] key is pressed.

IV-2. WEIGHT MEASURING LENGTH

On the displays following message will be seen:

SİSTEM PARAMETRELERİ
AĞIRLIK ÖLÇME MESAFESİ[MM] :2000.0
SYSTEM PARAMETERS
WEIGHT MEASURING LENGTH[MM] :2000.0

a)When single roller type system is used this length is the half of the distance between two adjacent roller on each side of the roller where the loadcell is placed,

b)When multi-roller type system is used, then this length is the total of the loadcell carrying roller plus the half of the length of the distance between the leftmost loadcell-carrying roller and the fixed one next to it, plus the half of the length of the distance between the rightmost loadcell-carrying roller and the fixed one next it. The unit of the parameter is in millimeters. The number is entered by using numeric keys and [AE] key is pressed.

IV-3. WEIGHT FOR EXTERNAL COUNTER

On the displays following message will be seen:

```
          SİSTEM PARAMETRELERİ
DIŞ SAYAÇ İÇİN AĞIRLIK [TON]:01.000
          SYSTEM PARAMETERS
          WEIGHT FOR EXTERNAL COUNTER
```

The indicator produces relay output pulses to activate an external, generally mechanical counters. With this parameter, the weight value of one pulse for the external counter is entered. When this value is reached by the indicator, a pulse is produced. The number is entered by using numeric keys and AE key is pressed.

IV-4. ELIMINATING THE VIBRATIONS OF EMPTY BELT

On the displays following message will be seen:

```
          SİSTEM PARAMETRELERİ
BOŞ BANTDAKİ SALLANMA  [KG] :0003.0
          SYSTEM PARAMETERS
          VIBRATION OF EMPTY BELT  [KG] :0003.0
```

When the belt is moving with no load, but some value is produced by the indicator as if some material is passing over, the operator may set a limit which is used for assuming the empty belt. This value is accepted as negative and positive. If the weight on the platform is within the limits specified by this value, the indicator will assume no load is carried over the belt.

To find this value, the conveyor belt is run empty, the numeric display is visualized for the fluctuations. The maximum value seen during this test is entered by numeric keys and AE key is pressed.

IV-5. UPPER LIMIT RELAY OUTPUT

On the displays following message will be seen:

```
          SİSTEM PARAMETRELERİ
          KAPASİTE ÜST LİMİT [T/H]   : 075.000
          SYSTEM PARAMETERS
          RELAY UPPER LIMIT [T/H]   : 075.000
```

When the value carried over the conveyor belt exceeds the specified limit, the indicator produces a relay output to be used as an alarm or closing a gate etc. This value cannot be over the maximum carrying limit. The value is in tons per hour unit. It is entered by using numeric keys and AE key is pressed.

IV-6. LOWER LIMIT RELAY OUTPUT

On the displays following message will be seen:

```
SISTEM PARAMETRELERİ
KAPASİTE ALT LİMİT [T/H]  : 075.000
SYSTEM PARAMETERS
RELAY LOWER LIMIT [T/H]   : 075.000
```

When the value carried over the conveyor belt is below the specified limit, the indicator produces a relay output to be used as an alarm or opening a gate etc. The value is in tons per hour unit. It is entered by using numeric keys and AE key is pressed.

This last parameter ends the system parameters and the indicator turns back to normal weighing mode.

V - DYNAMIC ZEROING

Conveyor belt scale's weighing principle is processing two basic units: weight and speed. In ideal systems these two amounts has no effect on each other. In real case, however, the speed will affect the weight on the platform. This effect is seen as an extra pressure on the loadcell. When the system is in motion, the effect of belt is a periodic effect and the period is one tour of the belt.

To reduce this effect as low as possible, is to determine the effect of empty belt on the system for multiples of one tour of the belt. This procedure is called the DYNAMIC ZEROING. Before the weighing is started, this should be performed. Besides, this should be repeated as time goes by to reduce the effects of time and change of the working conditions.

V-a. PERFORMING DYNAMIC ZEROING

* 2 key is pressed
  - "DİNAMİK SIFIRLAMA İCİN E TUSU"
  - "FOR DYNAMİC ZEROING PRESS E"

message is displayed.

* E key is pressed
* " -00- " is displayed on red LED display and

```
"BANT TUR SÜRESİ (SN) : 00040"
"BELT TURNING PERIOD(SN) : 00040
```

message is displayed.

The belt turning period is the time passed during one rotation of the belt. It is entered in units of SECONDS and AE key is pressed.

```
"SIFIRLAMA İSLEMİ YAPILIYOR"
"ZEROING PROCEDURE IN PROGRESS"
```

message is displayed and device will wait in the loop for the given time. At the end of the this specified time, the indicator turns back to normal indication mode. **Note:** During dynamic zeroing process, if the operator wishes to quit the loop, i key should be pressed.

VI- WEIGHING PROCESS

After weight calibration is performed and parameters are entered, the device starts the weighing process. After the reset sequence, on the numeric red LED display, the rate of flow of the material in tons per hour unit is displayed. On the LCD display, on the upper line date and time, on the lower line the unit of the quantity shown on LED display and two cumulative net totals are displayed. These two net totals can be reset to zero by the operator. The values are updated every 10-15 seconds.

If the operator wants to visualize any other parameter then should press the B key repeatedly until the desired unit is displayed. The unit can be seen on the left hand side of the lower LCD line. the display sequence of the units are as follows:

Rate of flow	**[t/h]**	**; ton/hour**
Belt speed	**[m/sn]**	**; meter/second**
Load	**[Kg]**	**; kilogram**
Distributed load	**[Kg/m]**	**; kilogram/meter**
Rate of flow	**[Kg/sn]**	**; kilogram/second**
Total	**[ton]**	**; 1.total cumulative weight (6 digits)**

The display unit does not effect the measurement. The indicator will continue adding the cumulative totals no matter which unit is on the red LED display.

VII- PERFORMING PRINTOUTS

During normal weighing mode, whenever the printer key is pressed, the unit displayed on the numeric red LED display is printed via the printer.

Taking printouts of cumulative net totals and clearing them

* Press Σ key

* To take printout and clear the first cumulative net total, press 1, to take printout and clear the second cumulative net total, press 2.

* The selected total will be printed via the printer and cleared.

* Press AE key to turn back to normal weighing mode.

In all printouts, date and time is printed together with the amount.

VIII- 4-20 mA Current output

The indicator produces analog output relative to the rate of flow. The maximum rate of flow amount will produce 20mA, no flow will cause 4mA.

Adjusting 4-20 mA:

The adjustment of the analog output is done in the factory before the shipment. However, in some cases, maybe accidentally the calibration is changed or the device which receives this analog value may need minor modifications. To make the adjustment the following steps should be performed:

To start with, an analog current meter is needed.

- The probes of the meter is connected to the current lines.
- Calibration parameter key [F2] is pressed.
- The device will ask for the password.
- The correct four digit password is entered.
- "4-20 MA CIKIS KALİBRASYONU "
  "YESİL OKLAR İLE ALT DEGERİ AYARLAYIN"
  "4-20MA OUTPUT ADJUSTMENT"
  "SET LOWER VALUE USING GREEN ARROW KEYS"

message is displayed and the function LED under the calibration parameter key is lit..

- On the current meter a value is seen which should be around 4mA.
- By using Up [=↑=] and Down [=↓=] arrow keys the value should be set to exact value.
- During this adjustment, on the LED display a number is displayed between 0 to 4095.
- If Calibration [F3] key is pressed, fine adjustment can be done.
- After the lower value is set, [AE] key is pressed.
- "4-20 MA CIKIS KALİBRASYONU "
  "YESİL OKLAR İLE UST DEGERİ AYARLAYIN"
  "4-20MA OUTPUT ADJUSTMENT"
  "SET UPPER VALUE USING GREEN ARROW KEYS"
- On the current meter a value is seen which should be around 20mA.
- By using Up [=↑=] and Down [=↓=] arrow keys the value should be set to exact value.
- After the upper value is set, [AE] key is pressed. This will finish the adjustment procedure and the device will turn back to normal weighing mode.

IX -PRINTER PARAMETERS

During reset mode, Printer Parameter [F1] key is pressed.

"BİLET İÇİN ŞİFREYİ GİRİNİZ"
"ENTER PASSWORD FOR TICKET"

message is displayed.

By entering numeric keys:7 & 9 printer parameters entry procedure will be entered.

"PARALEL PRINTER •• VAR ••"
"1:VAR 0:YOK"
"PARALLEL PRINTER •• YES ••"
"1:YES 0:NO "

message is displayed

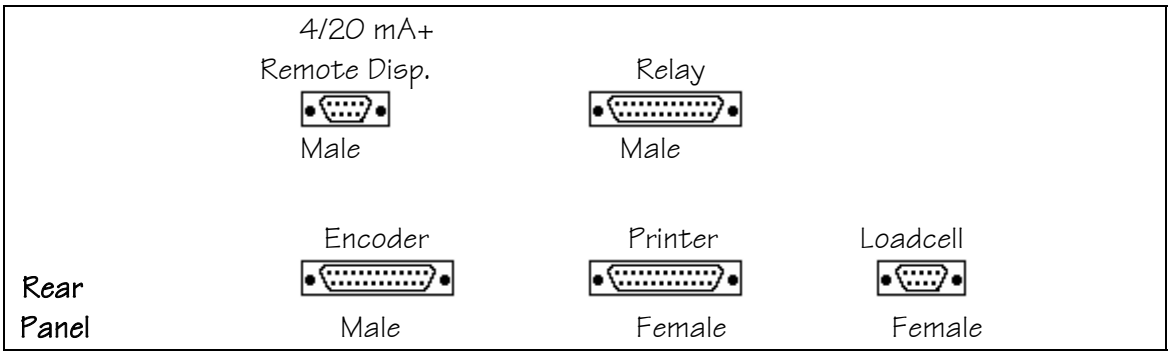
On the upper line the previously set value is seen. If the printer connected to the indicator is a standard centronics input printer, then this parameter should be set to 1=YES (VAR), otherwise 0=NO(YOK). After the selection [AE] key is pressed to store the selection.

Next the indicator will ask whether the system has Serial Printer or not by displaying:

"SERI PRINTER •• YOK ••"
"1:VAR 0:YOK"
"SERIAL PRINTER •• NO ••"
"1:YES 0:NO "

After the correct selection [AE] key is pressed to store the selection and the printer parameter entry is quitted by turning back to reset sequence.

X - CONNECTORS AT THE REAR PANEL



X-1. Encoder connection: 25-D MALE

Pin No.	Explanation
8	+15V (Red)
9	Ground(Green)
10	-15V (Black)
11	Signal(White)

X-2. Loadcell Connection : 9-D Female

Pin No	Explanation	For ESİT loadcells cable colors
1	Ground	Orange
2	Ground	Blendage
3	+Output	White
4	-Excitation	Black
5	+Excitation	Green
6	Ground	
7	-OutputRed	
8	-Sense	Yellow
9	+Sense	Blue

Note: If on the loadcell cable no sense cables are existing then **+sense(9)** is short circuited to the **+Excitation(5)** pin on the connector and **–sense (8)** is short circuited to the **-Excitation pin(4)** on the connector.

X-3. 4/20 mA (0-10 V) Output + REMOTE DISPLAY: 9-D MALE*

Pin No:	Explanation:	
1	4/20 mA output	(0-10V :output)
3	4/20 mA Input	(0-10V :Gnd)
5	Remote Display-Tx(RS 232)	
9	Remote Display-GND	

X-4. RELAY OUTPUT :25-D MALE*

Output for FIXUM 4 set relay board: FIXUM Relay board outputs
1.Output: Electro-mechanic counter pulse output.
2.Output: Upper relay output.
3.Output: Lower relay output.
4.Output: General alarm output.

X-5. PRINTER OUTPUT:25-D FEMALE*

Standard centronics parallel printer output.