FLINTEC

REMOTE DISPLAY TERMINAL

FDT

VERSION A/B

TECHNICAL -REFERENCE MANUAL

Flintec GmbH
Bemannsbruch 9
74909 Meckesheim
Germany
Tel. +49 6226 92400
Fax. +49 6226 924099
www.flintec.net
germany@flintec.net

FLINTEC

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1. INTRODUCTION

FDT is a Remote Display Terminal specifically designed for use as remote weight indicator for Digital Junction Box weigh systems (FAD-1 or FAD-4).
The unit maybe operated in the Master mode where it will poll all (max 30) FAD's connected to it, or in the Slave mode where it will only display information from a selected FAD.
Setup and Calibration of FAD's is performed via FDT in the Master mode.
When several (max 30) FAD's and FDT's are connected on one cable, only one FDT is allowed to poll the FAD's. Communication in a master/slave network is based on LESIP serial interface protocol.
The unit may also be used as remote display for numeric indicators with continuous weight output mode (LECW _ 2 format).
FDT may be used for legal for trade applications when connected with one or more weigh scales, since calibration data is stored in the FAD.
The basic configuration VERSION A includes:

1. Serial port RS485A with network capability.
2. Front panel with 6 digit LED display plus 5 annunciators and 6 membrane keys.
3. Non volatile memory for system parameters and calibration data.
4. The setting of the unit is done through a guided keyboard operation, enabling the adaptation to operating environment and system requirements. Two setup procedures are executed. Fn 49 for calibrating the FAD and Fn 46 for setting up operation mode and communication parameters of FDT.

The advanced configuration (VERSION B) includes additionally:

1. Real time clock calendar with rechargeable battery backup.
2. Serial port RS232 adapter for printing weighing data on a serial printer and /or bidirectional communication with a host computer.
3. Non volatile memory for storage of 10.000 weights.(Electronic tally roll or Alibi memory).

OPTIONS

OP.5 230 VAC to 9 VAC/ 500mA, mains power adapter.
OP.7 RS232C/RS485A converter including power adapter 230 VAC to 8 VAC/ 500mA.
OP.8 Bracket (Table top Wall mount) for the panel version.
OP.9 Custom software on request.

ENCLOSURES

P	Panel mount	72 x 144 x 70 mm
S	Stainless steel	180 x 108 x 60 mm.

EXTENT OF SUPPLY

The standard supply includes:
The connection plug for the communication cable. The reference manual.
Prior to unpacking the equipment, examine the carton for exterior shipping damage.
If any notify the carrier immediately. Remove the equipment from the carton and plastic bag.
Inspect extent of supply for any sign of damage. Save packaging material.

2. FRONT PANEL DESCRIPTION

1. WEIGHT DISPLAY
6 digit LED for the display of measured weight (gross or net), and error messages.
Digit height approx. 14mm.
OVERARANGE is indicated by **v v v v v v**
UNDER-RANGE is indicated by **u u u u u u**
Scale not level will be indicated by **E tilt**

2. NET INDICATOR
If lights up when the scale has been tared and the display is in NET mode.

3. TARE INDICATOR
It indicates that a tare value is being displayed.

4. NO MOTION INDICATOR
It lights up when the scale is stable.

5. CENTER OF ZERO INDICATOR
It lights up when the scale weight is stable and within 1/4 division of actual zero.

6. SCALE A INDICATOR
In 'dual scale mode' it indicates the weight from scale A is displayed.
ON = Scale A is displayed OFF = Scale B is displayed

7. SCALE B INDICATOR
In 'dual scale mode' it indicates the weight from scale B is displayed.
ON = Scale B is displayed OFF = Scale A is displayed

When both scale A & B LEDs are illuminated the sum of the weight A+B is displayed.

8. **ZERO / CLEAR ERROR / ESCAPE KEY**

- It is used to reset the weight display to zero. Zeroing will be effective only if the scale is stable, in gross mode, and the weight is within ± 2% of max weighing capacity.
- If an error is present on the display press this key to acknowledge.

9. **TARE KEY** (toggle)

It is used to tare the scale. Taring will be effective only if the scale is stable and within the weighing capacity.

- If the scale has already been tared depression of the key will cause the tare to be cancelled and the weight display to return to Gross mode.

10. **TARE RECALL KEY**

- Pressing this key will cause the tare memory to be displayed briefly.
- In "DUAL SCALE" mode the key switches between scale A or scale B or SUM (A+B).

11. **PRINT – ACCUMULATE**

It is used to transmit weight data to peripheral devices via the serial port 1.
The transmitted weight will also be accumulated. The weight will be printed only if it is stable and within the weighing range of the indicator.
Printing and / or accumulation will take place only if enabled in set up.
The weight data printed is selectable in SET UP 2. 2t. Refer to the technical manual for details.

12. **TOTAL KEY**

It is used to display the current accumulated total.
Press again to see the number of weighings.
Press again to end the total display or
Press to print/delete the total.

13. **FUNCTION KEY**

Enables a selection of software utilities 00 – 99.
Fn 00 appears on the display. Use keys to increment the flashing digit, to change digit.
When the correct number is displayed press . The selected function will be activated.
Refer to chapter 6 Function menu for details of available utilities.

3. INSTALLATION

3.1. Mounting

The mounting location must be such that the instrument is not subject to excessive vibrations, heat or humidity. Avoid direct sunlight on the front of the instrument.
The unit has to be installed at the right height to allow an easy reading of the display and keyboard operation.

3.2 Wiring

Use 4 x 0,34 mm^2 screened for RS232C connection and 2x0,34 mm^2 twisted pair and shielded for RS485A connection.

PANEL MOUNT
All connections to the instrument are made through the rear panel connector. Strain reliefs are supplied with the connectors. See connector diagram in Annex A.

STAINLESS STEEL
-Remove the rear panel by undoing the 4 screws. Lift the rear panel carefully.
-Insert cables via the cable glands. Strip and connect the power leads to J1, the RS485 leads to J2 and RS232 leads to J3. (See connector diagram in Annex A). Connect the shields of the cables on the ground tag provided.
-Re-install the rear panel. Tighten the screws until the rear panel touches the front panel.
-Tighten the strain relief's to ensure a firm grip on the cables.

3.3. Power

As the instrument is computer controlled it requires clean power for reliable operation.
Power supplied should come from a source that is isolated from other process equipment.
A main adapter of 7,5 – 10 VAC / 500 mA is recommended for operation of both the FDT and FAD-4.

3.4 Power up

When the unit is powered up it goes through a series of self tests after which the following is displayed in sequence.

- Version code
- Revision date
- All display segment are turned on then off for 1 sec. Then it goes into the operating mode. If an error is encountered it will be displayed in the form E xx . Refer to chapter 7 Errors for details.

CAUTION : ***Do not run signal cables together with power cables.***
Connect the shielding where indicated on the drawing only.
Never use a megger to check wiring.
Be sure the AC power socket outlet is properly protected.
For optimum EMC performance, keep the length of shield inside the enclosure as short as possible.

4. OPERATING MODES

FDT may be configured according to the applications, to be operated in 4 different modes.

4.1 REMOTE DISPLAY - CONTINUOUS WEIGHT INPUT

The unit displays information received from the serial port(s) according to LECW_2 format (P + 123.45 "CR"). RS485A may be received from port 1 (Version A or B). Baudrate and data bits are programmable in SETUP 3.
RS232C may be received from port 2 (Version B only). Baudrate is fixed at 1200 baud. No or even parity and 7 or 8 data bits are programmable in SETUP 2. 20 mA , current loop passive may be connected to the RS232 port (Tx+ to Tx and Tx– to Rx).

SET UP	REQUIREMENTS (Port 1 9600, E, 7, 1 or Port 2 1200, E, 7, 1)
1	Don't care
2	2d = 17, the rest set to Zero
3	3t = 01, 3b = 96, 3d = 17

Upon power up a search is performed by the unit for input data from each serial port. If data is input from port 1 it will be displayed. Else it will search port 2. If no data is received by any port E30 will be displayed until data reception is restored.

DO NOT CONNECT BOTH PORTS SIMULTANEOUSLY.

4.2 MASTER DISPLAY & KEYBOARD FOR FAD(S)

In this mode of operation the FDT polls the FAD(s) and displays their data. Commands such as "Zero", "Tare" etc. are issued to the FAD via the FDT's keyboard.
Calibration of the FAD is also possible through a dialogue in the FDT. A number of FADs may be connected in a network with one FDT acting as the master. The FAD address whose data is displayed, is keyboard selected with Fn 01 to Fn 30 corresponding to FAD A to ^.
The default address is A ie the first FAD in the network.

SETUP	REQUIREMENTS (9600, E, 7, 1, FAD address A, Nr of FADs = 4)
1	Application dependent
2	Application dependent
3	3t = 02, 3b = 96, 3d = 17, 3.n = 4, 3E = 65.
4	

The FDT always polls FADs in sequence, starting from address A and increments the address until the programmed number of FADs (set up 3.n) where it circles back to A. The cycle is repeated as long as the FDT is in the weight display mode. Polling is paused while in the function menu or printing etc. The selected (Fn 01 to Fn 30) FAD may displayed or calibrated via the FAD calibration procedure in the FDT while all FADs are polled. This however limits the response time of the selected FAD. Refer to chapter 5 for details of set up and calibration procedures.

4.3 SLAVE DISPLAY FOR FAD

The unit is connected in a FAD network. FAD unit(s) are scanned by a master unit which may be a personal computer or another FDT. The slave FDT will display all data (weight and messages) originating from the FAD with the same address.

SETUP	REQUIREMENTS (9600, E, 7, 1, FAD address A)
1	Don't care
2	Don't care
3	3t = 03, 3b = 96, 3d = 17, 3E = 65, the rest don't care.

Keyboard operation is normal except that no commands are transmitted to FAD's and printing or totalizing is inhibited. The unit may display data from any of 30 FADs in a network . the selection is performed by Fn 01 to Fn 30 corresponding to FAD address A to Z (41h to 5Eh).
Only polled FADs are displayed, so the master in the network must have been set up to poll all FADs, accordingly. The master may poll the addressed FAD units sequentially or in any order of frequency. The FDT will pick up the selected FAD data and display it.

4.4 DUAL FAD MASTER MODE (SCALE A/B)

The FDT polls two FADs A and B connected to loadcell scales. The unit may display the weight from scale (A) or from scale (B) or the sum of the two weights (A+B). Individual scale weights or the sum of the two may be printed or totalized or transmitted to PC. If scale A or scale B is selected the operation is normal single scale where the display and keyboard operate for this scale only. If (A+B) is selected display and keyboard operation is similar but with few specific limitations.

Selection of A or B or A+B is performed by key I and is indicated in the front panel by the Annunciators L ; . (A+B)=Both illuminated.
The (A+B) mode has the following operational characteristics:

- If any of the two scales is out of range the (A+B) is out of range.
- For the "NO MOTION" condition both scales must be stable.
- For the :CENTER OF ZERO" condition both scales must be within 0,25 division.
- Switching to Net mode is supported provided both scales are in Gross or Net mode.
  If any of the scales is in NET mode it will automatically be switched to GROSS mode.
- If any of the FADs displays a message instead of weight, this message will be displayed on the FDT.
- The Fn key is not operational in (A+B) mode.

For approved scales if A+B mode is used the scales must have the same display step.

5. SET UP AND CALIBRATION

The chapter refers to both the FDT and the FAD setting up.
The FAD is configured with Fn 49 procedure. The RTD–52 is calibrated with Fn 46 procedure.
For setup and calibration of the FAD the unit must have been connected and the correct communication protocol installed in both the FAD and FDT.
It is advisable to leave the default settings [(9600, E, 7, 1) , address A].
If there is no communication, perform Fn 33 to "auto tune" the FDT to the FAD communication speed and address code. In the setup dialogue the following two numeric scroll edit procedures are used.

1. SCROLL

I = DISPLAY NEXT SELECTION
P = ACCEPT DISPLAYED VALUE

2. NUMSCROLL EDIT

T = SELECT DIGIT (CYCLIC)
I = INCREMENT FLASHING DIGIT
P = ACCEPT DISPLAYED NUMBER

5.1 FDT CONFIGURATION

To enter the configuration procedure of FDT press a . The display shows Fn 00.
Use "NUMSCROLL EDIT" until the display shows Fn 46, then press P .
Display shows SETUP . Press I to step through SETUP, STORE, INIT dialogues.
Press O key to exit the menu or press P to enter the displayed item.

SETUP SUBMENU.
Press I to scroll through SETUP 1, SETUP 2, SETUP 3, SETUP.
Press P to enter the displayed dialogue.

SETUP 1 (OPERATIONAL PARAMETERS).

1.1	Totalizing memory	0 = No	1 = Yes	Enables the totalizing of printed weights.
1.2	Alibi memory	0 = No	1 = Yes	enables the electronic tally roll. (B only)(see chapter 4.2 & 4.4)
1.3	Reserved			
1.4	Date format	0 = d-m-y	1 = m-d-y	
1.5	Reserved			
1.6	Real time clock & ram totaliser	0 = No	1 = Yes	Enables date time and totalizing in battery backed ram. (B only)
1.7	Reserved			
1.8	Reserved			
1.t	Display off timer	00-99 minutes	00=Disabled.	Time for the display to turn off automatically if the weight is zero and no key is pressed.

SETUP 2 (SERIAL PORT 2 / PRINT PARAMETERS)

2.t	PRINT TYPE :	00	PORT DISABLED.
		01	TICKET PRINTOUT (Date, time, Nr, weight).
		02	CONTINUOUS TRANSMISSION OF WEIGHT.
		05	TICKET GROSS, TARE, NET, (quadruple size).
		06	SINGLE LINE NUMBER AND GROSS, TARE, NET.
		09	HOST COMPUTER MODE.
		20	CUSTOM PRINTS . Format 1 in Gross (Max 512 b). Format 2 in Net (Max 512 b).
2.d	DATA BITS SERIAL CHANNEL 1		17 = 7 data bits / even parity 08 = 8 data bits / no parity
2.E	ADDRESS OF FDT–52 (A-Z)		
2.L	PAGE LENGTH		Ticket length in linefeeds
2.r	PAPER REVERSE		Number of reverse linefeeds before printout
2.A	LEFT MARGIN		Number of spaces from left margin
2.F	PAGE HEADER		Number of linefeeds before printout
2.1	RESERVED		
2.2	RESERVED		
2.3	PRINT BELOW / MIN. CAPACITY	0=NO 1=YES	Printing is inhibited if the weight is less than min (20 scale division) and the display show Lo CAP briefly.
2.4	RESERVED		
2.5	RESERVED		
2.6	WAIT UNLOAD	0=NO 1=YES	Inhibits further prints until the weight falls below min.
2.7	PRINTER ERROR / CONTROL	0=NO 1=YES	Printer error or paper out will display Err 20 and transmission will be inhibited.
2.8	RESERVED		

SETUP 3 (SERIAL PORT 1 & MODE)

3.t	MODE OF OPERATION Use I to select and P to accept and proceed.	01 = Remote display for continuous weight input. Instruments (LECW_1 protocol ie. P + 12.345 CR) 02 = FAD mode – Master. Polls FAD's connected and displays FAD data. 03 = FAD mode – Slave. Displays data from FAD. Polling of the FAD's must be done by another Master (FDT or PC). 04 = Dual FAD mode – Master. SCALE A/B.
3.b	BAUD RATE Use I to select and P to accept and proceed.	24 = 2400 baud 38 = 38400 baud 96 = 9600 baud 57 = 57600 baud 19 = 19200 baud 11 = 115 kbaud
3.d	DATA BITS & PARITY Use I to select and P to accept	08 = 8 data bits, no parity 17 = 7 data bits, Even parity
3.n	NR OF POLLED FAD;	Key in the number of connected FAD's (decimal 01–63) Polling always starts with address A (41h or 65d).
3.E	FAD DISPLAY ADDRESS	Use "DIGIT ENTRY" to key in the FAD address to be displayed (65–127) by the FDT (decimal).

DIALOGUE STORE (Save in EEPROM)

Press P to permanently save all the calibration data.
Program exits setup / calibration and reinitialises. (up to 100.000 storage cycles allowed).
The data will be stored in the FDT EEPROM.

DIALOGUE INIT

It initialises the FDT to factory default values.

SET UP 1	SET UP 2		SET UP 3
1.1 = 1	2.t = 01	2.1 = 0	3.t = 02
1.2 = 1	2.d = 17	2.2 = 0	3.b = 96
1.3 = 0	2.E = 65	2.3 = 0	3.d = 17
1.4 = 0	2.L = 01	2.4 = 0	3.n = 01
1.5 = 0	2.r = 00	2.5 = 0	3.E = 65
1.6 = 1	2.A = 00	2.6 = 0	
1.7 = 0	2.F = 00	2.7 = 0	
1.8 = 0		2.8 = 0	
1.t = 00			

5.2 FAD CONFIGURATION

To enter the set up & calibration of FAD press A . The display shows Fn. 00 .
Use "NUMSCROLL EDIT" until the display shows Fn 49, then press P .
Display shows PAR .
Use I to scroll through PAR , CAL , SETUP , INIT , STORE , PIN dialogues.
While in the CAL menu, press I to select S-CAL or E-CAL submenus.

A "CAL LOCK" (calibration lock hardware jumper inside the FAD), is provided , required by Weights & Measures Authorities so that calibration can be sealed . In addition to the "CAL LOCK" jumper an A.T.CNT (Audit Trail Counter) is provided for Weights & Measures Authorities to check if any calibration attempt has been made since the last inspection.
The A.T.CNT (6 digits) is incremented when a weight parameter is changed, or a corner or scale calibration is attempted, regardless if the changes are saved in EEPROM or not. The position of the "CAL LOCK" jumper and the A. T. CNT number may be inspected with Fn 48(chapter 6).
In addition a software PIN (personal identification number), logically OR connected is provided for the technical staff in order to avoid accidental scale calibration attempts.
If the CALLOCK is inserted access to PAR, CAL, INIT menus is limited to read operations only. Any attempt to modify the metrological characteristics is denied and ERR 91 or ERR 33 is returned.
If the PINLOCK is activated access is limited to PIN , STORE menus only. Use PIN dialogue to set / reset the pinlock.

While displayed, each dialogue or submenu may be accessed with P .
Press O to exit setup / calibration procedure.

DIALOGUE PIN

Enables activation or de-activation of the PINLOCK.
Press I to scroll through **Unloc , Loc** . Unlock deactivates the PIN so that entry to setup and calibration menus is possible. However it does not override the hardware lock in the FAD.
Press P to enter the displayed item.
The display shows 000000. Key in the PIN number and press P .
If the number entered was correct the display shows PASS briefly and returns to the calling menu.
If the number entered was incorrect the display shows FAIL briefly and returns to the calling menu.
The selected Lock or Unlock position is not automatically saved in EEPROM but following a subsequent STORE operation. (See Fn 40 for instructions on how to change PIN)
After the calibration of the unit is completed return to PIN dialogue to lock.

DIALOGUE Par (Scale Parameters of FAD)

The dialogue PAR is used to select scale parameters. When PAR is selected RTD-52 uploads the parameters in use in the connected FAD. The parameters are defined as follows :

2.P	=	Position of decimal point (Nr of decimal digits).		(0-4)
3.P	=	Display resolution		(1-50)
4.P	=	Two first digits of weighing range		(00-99)
5.P	=	Digital filter. (If entry is x then samples = 2^x).		(0-4), (0-2 for FAD-4)
6.P	=	A/D converter speed		(1-4)
		1 = 8 / n , 2 = 20 / n , 3 = 40 / n , 4 = 80 / n conversions per second.		
		n = Nr. of load cells. The max. conversions per second can not exceed 40 for FAD-4.		
7.P	=	No motion samples. (If entry is x then samples = 2^x).		(1-7)
8.1	=	Autozero maintenance	0 = NO	1 = YES
8.2	=	Autozero on power up	0 = NO	1 = YES
8.3	=	Dual digital filter	0 = NO	1 = YES
8.4	=	Reserved		
8.5	=	Reserved		
8.6	=	Leading zero blank	0 = NO	1 = YES
8.7	=	Reserved		
8.8	=	Loadcell excitation (DWI only)	0 = AC	1 = DC
0.P	=	Dual interval		(00-99)
		The first two digits of the weighing range for which the lower display division will be selected automatically. 00 = Dual interval not active.		
GAIN	=	Loadcell amplifier adjustment	0 = 2 mV/V	1 = 4 mV/V
LCNR	=	Nr. of loadcells connected		(1–4)

Upon exit from PAR, the new parameters are downloaded automatically to the connected FAD, but not saved in non volatile memory. The calibration audit trail counter will be incremented.

MENU CAL (Scale calibration of FAD)

Used for Zero, Span calibration and “corner” correction.

Press P to enter the menu. Press I to scroll through S-CAL, E-CAL, CAL .

Press P to enter the displayed dialogue.

If the scale is calibrated for the first time or a loadcell is changed the sequence Corner, Zero, Span should be followed. Subsequent calibration may include only Zero or Zero and Span.

Be aware that CAL does not automatically save the calibration constants in non volatile memory. It must be done by the user with the STORE dialogue.

DIALOGUE S-CAL (Standard Calibration of FAD with weights)

Display shows CORNER Press I to scroll through ZERO, SPAN , CORNER or press O to exit to S-CAL. Press P to enter the displayed dialogue.

CORNER CORRECTION (Scale corner adjustment)

Display shows E Scl . Make sure that the scale is empty and press P .

The display shows WAIT… for about 15 sec . Then it shows CORNER.1 .

Place test weight in CORNER.1 and press P .

The display shows WAIT… for about 15 sec . Then it shows CORNER.2 .

Place test weight in CORNER.2 and press P .

The display shows WAIT… for about 15 sec . Then it shows CORNER.3 .

Place test weight in CORNER.3 and press P .

The display shows WAIT… for about 15 sec . Then it shows CORNER.4 .

Place test weight in CORNER.4 and press P .

Press P to proceed. If there is an error (insufficient resolution, wrong corner) the dialogue does not proceed to the next corner. As the corner adjustment is done with internal resolution a 10% of capacity corner load is sufficient. However observe weights and measures regulations on eccentric loading.

ZERO CALIBRATION (Deadload adjustment)

Press P to enter the dialogue.

The display shows E SCL (Empty Scale). Press P to balance the dead load or press O to exit to S-CAL.

The display shows WAIT… for about 5 sec and then it zeroes.

Press I to exit to S-CAL menu.

SPAN CALIBRATION

Display shows SPAN . Press I to go to Zero or press O to exit to S-CAL.

Press P to enter the dialogue. Place the calibration weight on the platform.

Display shows C xxxxx where xxxxx = Maximum capacity of scale.

Enter the calibration weight already on the platform, using the NUMSCROLL EDIT procedure .

The display shows WAIT… for about 5 sec. , then the calibration weight.

Repeat the SPAN procedure if the calibration is not accurate.

Press O to exit to SPAN. Press I twice to exit to CAL.

E-CAL DIALOGUE *(Electronic calibration of FAD with mV/V from loadcell data sheets)*

Display shows CORNER. Press P to calibrate corners.
Display shows 000000 . Enter the rated output (in mV/V) of loadcell in corner 1.
(Example : If R. O of Loadcell 1= 1,9793 mV/V then enter 019793).
The display shows CORNER.2 . Press P . Enter the rated output (in mV/V) of loadcell in corner 2.
The display shows CORNER.3 . Press P . Enter the rated output (in mV/V) of loadcell in corner 3.
The display shows CORNER.4 . Press P . Enter the rated output (in mV/V) of loadcell in corner 4.
Display shows WAIT… for about 5 sec. Then it shows weight.
Press O . Display shows CORNER. Press I . Display shows ZERO.
Press P . Enter the overall mV/V of the deadload. (Loadcell zero balance + scale deadload).
Display shows WAIT… and then it displays weight.
Press O then I .
The display shows SPAN. Press P .
The display shows C xxxxx . Enter the rated capacity of each loadcell.
The display shows WAIT… and then it displays weight.
Press O , O , I to exit .

SET UP SUBMENU

Press I to scroll through SET UP 1, SET UP 2, SET UP.
Press P to enter the display dialogue.

SET UP 1 (operational parameters of FAD)

1.c = Tilt switch	0 = NO	1 = N.C
1.t = Debounce time	0 – 9 sec	

If both 1.c = 0 and 1.t = 0 the tilt function is disabled.

SET UP 2 (COMMUNICATION PARAMETERS OF FAD)

Display shows SEt UP2 . Press P to enter the dialogue.

2.b	BAUD RATE Use I to select and P to accept and proceed.	24 = 2400 baud 96 = 9600 baud 19 = 19200 baud	38 = 38.4kbaud 57 = 57.6kbaud 11 = 115kbaud
2.d	DATA BITS & PARITY Use I to select and P to accept	08 = 8 data bits, no parity 17 = 7 data bits, Even parity	
2.A	FAD ADDRESS (65 – 127)	Use “DIGIT ENTRY” to key in the FAD network address (decimal).	

DIALOGUE STORE (Save in EEPROM)

Press P to permanently save all the calibration data.
Program exits setup / calibration and reinitialises. (up to 100.000 storage cycles allowed).
The data will be stored in the FAD EEPROM.

DIALOGUE INIT (Installation of Default Parameters)
It downloads default calibration data for checking purposes.
The weight display will act as a mV/V meter of the Loadcell output.
Press P to activate the initialization procedure.
Press O to exit the init mode.
Be aware that the default parameters and calibration constants will remain in memory.
If a subsequent StorE operation is performed previous calibration data will be lost.
The default parameters are as follows :

Par 2.P = 4	8.1-8.8= 0 0 1 0 0 1 0 0
3.P = 1	0.P=00
4.P = 40	
5.P = 2	GAIN = 1
6.P = 2	LCNR = NOT CHANGED
7.P = 2	

DEADLOAD=0 mV/V~0,0000
SPAN 2 mV/V ~ 2,0000 on weight display
SET UP 2 / 2.b = 96 , 2.d = 17 , 2.A = 65
SETPOINT 1 = 0,0200 SETPOINT 2 = 4,0000

5.2 CUSTOM PRINT FORMATS

These are data strings for transmission to a printer. The formats are edited by the user (any ASCII editor) and downloaded to the unit via the serial port RS232. When a print operation takes place the FDT will insert the scale variables in selected positions in the string specified with [!123], where 123 is the decimal code of the variable. E.g. scale variable 40 (Net) should be inserted as [!040].
Non printable characters may be inserted in the string specified as [@123], where 123 is the decimal equivalent of the character code. E.g Esc E (1Bh, 45h)is inserted as [@027]E.
This may be repeated as many times are required in the string.
The following scale variables are implemented in the FDT.

A/A	DESCRIPTION	LENGTH
007	Weigh number	4 digit
008	Totaliser	7 digit + decimal point
030	Date	8 digit
032	Time	5 digit
036	Tare	5 digit + decimal point
038	Gross	5 digit + decimal point
040	Net	5 digit + decimal point

Two formats may be downloaded, 1 & 2 , 512bytes each. Format is transmitted in Gross mode, while format2 is transmitted in Net mode. For the user defined formats to operate SETUP2/2.t=20.
The formats are downloaded to FDT using the Fn 41 , Fn 42 procedures (see chapter 6)
or command F (see chapter 8.2)

A test printout should be performed to validate the format.

6. FUNCTION MENU

The function menu enables the selection of a number of software programs indirectly. Press key A . Display shows Fn 00 . Key in the function code desired (using NUMSCROLL entry procedure).

NUMSCROLL EDIT

T = MOVE ONE DIGIT TO THE RIGHT (CYCLIC)

I = INCREMENT FLASHING DIGIT

P = ACCEPT DISPLAYED NUMBER

The corresponding program will be activated.To exit the function selection, press P while Fn 00 is displayed. The following functions are available.

Fn 01 -30 SELECT FAD ADDRESS

When P is pressed FAD xx is displayed briefly if the selection is within the range of FADs programmed. The default setting will be re-installed after power up.

Fn 31 EDIT SETPOINTS

Display shows SetP 1 briefly, then the existing setpoint value key in the desired value (using NUMSCROLL entry procedure).
Display shows SetP 2 briefly, then the existing setpoint value key in the desired value (using NUMSCROLL entry procedure).

Fn 32 EDIT & STORE SETPOINTS IN EEPROM

Identical to Fn 31. In addition the setpoints will be automatically saved in non volatile memory.

Fn 33 AUTOTUNE

Searches all baudrates and data bits/ parity combination until communication is established with a FAD. The FDT will search all FAD addressess (starting from A) with each combination of baudrate / data bits. It will exit when the first FAD is found. Communication setup data of this FAD may be observed with Fn 46. If no FAD is responding the routine is executed until power down or O is pressed.

Fn 35 SET DATE – TIME – SERIAL Nr. (Enabled only if SETUP 1.6 = 1)

-Display shows: DDMMYY or MMDDYY (depends on setup 1.4)
DD=Day, MM=Month, YY=Year. Use NUMSCROLL to edit the date.
-Display shows: HHmmSS. HH=Hour, mm=minutes, SS=Seconds. Edit the time.
-Display shows: nnnnn, the print serial number. Edit the print number.
The program ends and returns to weight display.

Fn 40 PIN CHANGE

Used to change the current Personal Identification Number that enables access to the calibration procedure. (The unit is factory set so that the PIN is not active ie 000000).
The display shows Pin 0 briefly then 000000. Key in the old pin and P .
The display shows Pin 1 if the pin was correct else the unit is reset. Key in the new Pin and P .
The display shows Pin 2. Key in the same Pin for validation and P . The new pin is stored and the display shows PASS briefly. If the two entries are not the same, FAIL is displayed briefly and the program returns with the old pin remaining in memory.

WARNING : Make sure you do not loose the code entered. If the code is lost the unit must be returned to the factory to initialise the Pin and a fee will be charged.

Fn 41 DOWNLOAD CUSTOM PRINT FORMAT . 1

The display shows For 1 indicating that it is ready to receive format 1.
Begin the transmission. When the transmission ends press P . the display shows Prn 1 briefly when the format is saved in non volatile memory. A max of 512 bytes may be stored. If more characters are received they will be lost.

Fn 42 DOWNLOAD CUSTOM PRINT FORMAT . 2

The display shows For 2 indicating that it is ready to receive format 2.
Begin the transmission. When the transmission ends press P . the display shows Prn 2 briefly when the format is saved in non volatile memory. A max of 512 bytes may be stored. If more characters are received they will be lost.

Fn 46 SETUP OF FDT (Refer to chapter 5)

Fn 48 VIEW CALIBRATION AUDIT TRAIL COUNTER

SEALEd is displayed if the CAL LOCK jumper inside the FAD is inserted. Press P to continue.
CALPin is displayed if the software PIN calibration lock has been activated. Press P to continue.
The 6 digit AUDIT TRAIL counter is displayed. Press to P to exit.
The audit trail counter is incremented every time a weight parameter or calibration is changed regardless if the change was saved in EEPROM or not.

Fn 49 SETUP & CALIBRATION OF FAD (Refer to chapter 5)

Fn 55 VIEW ALIBI MEMORY LOCATION / PRINT 10 NEXT SERIAL NUMBERS

The display shows n 1 2 3 4 where 1234 is the serial number of the last record.
Key in the 4 digit serial number desired and / or press P . The display flashes the weight of this record. Press P to print the serial number displayed plus the next nine locations or press O to exit.

Fn 56 PRINT ALL ALIBI MEMORY

Automatically prints a list of the contents of the Alibi memory. The printer must be capable of printing on 80 columns paper compressed mode.
Empty locations are printed - - - - - - .
Corrupted locations are printed * * * * * * .
The program exits when the printout is completed or O pressed.

Fn 57 CHECK ALIBI MEMORY

A checksum is performed on each Alibi memory record. If an error is found E77 is displayed.
Press O to exit. If all is OK PASS is displayed briefly.

Fn 80 LOADCELL MV METER

The actual mV/V output of the scale sensors is displayed.
To act as a mV/V meter the unit loads default calibration data.
Press O to end. The unit will restart.

Fn 81 DISPLAY INTERNAL A/D COUNTS

The display shows Corn 0 briefly. Then it shows the sum of the corrected loadcell output(s) in internal resolution. Press I .
The display shows Corn 1 briefly, then loadcell 1 output raw A/D. Press I .
The display shows Corn 2 briefly, then loadcell 2 output raw A/D. Press I .
The display shows Corn 3 briefly, then loadcell 3 output raw A/D. Press I .
The display shows Corn 4 briefly, then loadcell 4 output raw A/D. Press O to exit.

Fn 82 DISPLAY CORNER FACTORS

Displays the calculated corner factors for the connected loadcells.
The display shows FAct 1 briefly, then loadcell 1 correction factor. Press I .
The display shows FAct 2 briefly, then loadcell 2 correction factor. Press I .
The display shows FAct 3 briefly, then loadcell 3 correction factor. Press I .
The display shows FAct 4 briefly, then loadcell 4 correction factor. Press O to exit.

Fn 99 SOFT RESET FAD (Similar to FAD power on).

7. ERRORS

If an error occurs during the operation, it will be displayed in the form Err xx , where xx is the Error code. Program is halted. Press O momentarily to acknowledge the error and proceed as indicated in the
error operator response. Errors may occur during set-up, programming, power-up and during operation.

FAD-4 ERRORS

ERROR DISPLAY	POSSIBLE CAUSE	ACTION TO BE TAKEN
Err 01	SYSTEM ROM : Faulty ROM	Contact manufacturer
Err 02	DATA RAM : Faulty RAM	Contact manufacturer
Err 04	CALIBRATION DATA : Faulty EEPROM	Recalibrate or contact manufacturer
Err 05	SCALE or A/D CONVERTER	Check scale, loadcell cables, contact manufacturers
Err 15	System has been initialized due to power failure or soft reset.	Zero scale
ERR90	During span calibration weight is not enough	Recalibrate
ERR91	During calibration procedure calibration lock jumper is inserted.	

FDT ERRORS ****=Version B only***

ERROR DISPLAY	POSSIBLE CAUSE	ACTION TO BE TAKEN
E 01	SYSTEM ROM : Faulty ROM	Contact manufacturer
E 02	DATA RAM : Faulty RAM	Contact manufacturer
E 04	CALIBRATION DATA : Faulty EEPROM	Recalibrate or contact manufacturer
* E 16	SYSTEM DATE – TIME WRONG	Enter new date – time.
* E 20	PRINTER IS NOT ON LINE	Check printer, cables. Press P to retry or ` to abort.
E 30	COMMUNICATION ERROR	Check connections and communication parameters
E 33	PROTOCOL NOT ACK OR CALIBRATION LOCK	Check connections and communication parameters
E 67	CORRUPTED TOTALISER	After clearing the error the totaliser is reset to O
E 69	TOTALISER OVERFLOW	Print / clear totalisers. Overflow is not critical, but remember that 1 total capacity must be added to the indication, each time an overflow occurs.
* E 77	CORRUPTED ALIBI MEMORY LOCATION	The weighing memory can not be cleared but next records will be corrected.

To exit from error display press O .

8. COMMUNICATIONS

Version A has one communication port RS485A (SERIAL PORT 1). This is the port used for connection to FAD(s) and for networking.
Version B has in addition to serial port 1 an RS232C port (SERIAL PORT 2), used for connection with printers or personal computers.

8.1 SERIAL PORT 1 (RS485A)

The port operates in half duplex mode. Communication is based on “LESIP” master / slave serial interface protocol. (See “LESIP” with FAD appendix for details).
Baudrate and databits are configured in FDT setup 3.
Cable connections are shown in Annex A “CONNECTOR & CABLE DIAGRAM”.

8.2 SERIAL PORT 2 (RS232C , VERSION B ONLY)

The port operates if full duplex mode. Baudrate is fixed at 1200 bits/sec. 7 data bits, even parity or 8 data bits no parity may be selected in FDT SET UP 2.d. The functionality of the port is also programmed in set up 2. The different modes of operation are detailed below:

8.2.1 CONTINUOUS WEIGHT OUTPUT

The indicated weight and status information is transmitted continuously. No handshake is required.
Data is output from Pin 3 = Tx and Pin 5 = GND

SET UP	REQUIREMENTS (1200, E, 7, 1)
1	Don’t care
2	2.t = 02, 2.d = 17 the rest don’t care
3	According to application

DATA BLOCK COMPOSITION (P +123.45 CR)

BYTE	NAME	DESCRIPTION		
1	WEIGHT STATUS	Bit0	0=NORMAL	1=NO WEIGHT DISPLAY
		Bit1	0=GROSS	1=NET
		Bit2	0=	1=AUTO ZERO
		Bit3	0=WITHIN RANGE	1=OUT OF RANGE
		Bit4	0=NO STANDSTILL	1=STANDSTILL
		Bit5	0=NORMAL	1=UNDER MIN. WEIGHING RANGE
		Bit6	ALWAYS 1 TO OBTAIN PRINTABLE CHARACTERS	
		Bit7	ZERO OR PARITY	
2	POLARITY	"+" OR "-"		
3-8	WEIGHT DIGITS	6 DIGITS DEPENDING ON D 500 N SET UP INCLUDING DECIMAL POINT IF ANY		
9	SYNC	CR (0d hex) FOR SYNCHRONISATION		

8.2.2 PRINTER OUTPUT

The weight and date time may be printed on.
A serial printer connected with DTR protocol (See Annex A for connection details).
Several print possibilities maybe selected in FDT SETUP 2. In addition two custom print formats may be created and downloaded to the FDT via the serial interface RS232. (Refer to function menu, chapter 6, Fn 41, Fn 42).

SET UP		REQUIREMENTS
1		Application specific
2		2.t = 01 (Date, time, number, weight)
	or	2.t = 05 (Gross, Tare, Net, quadruple size)
	or	2.t = 06 (Single line Nr, Gross, Tare, Net)
	or	2.t = 20 (Custom format 1 in Gross mode, Custom format 2 in Net mode)
3		3.t = 02 or 04 The rest are application specific.

Standard formats may be displaced on the paper by selection of formatting parameters in set up 2.
Parameter 2.3 in set up 2 may be selected to inhibit printing weights below min.
Parameter 2.6 in set up 2 may be selected to inhibit further printouts until the scale weight falls below min in order to avoid double printing and / or totalising.
Printed weights may be totalized if set up 1.1 = 1.
Parameter 2.7 in set up 2 enables a paper out or printer error to be detected.
Printing is initiated by key P provided that the weight is stable positive and within weighing range.

8.2.3 HOST COMPUTER MODE

This mode is used to communicate with a Host computer. The Host transmits a command and the FDT replies with the required data or executes the command.

SET UP	REQUIREMENTS (1200, E, 7, 1, A)
1	Application specific
2	2t = 09, 2d = 17, 2E = (A-Z)
3	3t = 02 or 04. The rest are application specific.

For approved installations the “ALIBI MEMORY” must be active (set up 1.2).

The following commands have been implemented.

A . SCALE A

Select scale A in a multi scale network.
Master transmission:

STX	ADD	A	BCS2	BCS1	ETX

FDT response:

STX	ADD	ACK	BCS2	BCS1	ETX

B . SCALE B

Select scale B in a multi scale network.

Master transmission:

STX	ADD	B	BCS2	BCS1	ETX

FDT response:

STX	ADD	ACK	BCS2	BCS1	ETX

C . SCALE A+B

The sum of the weights on scales A and B is returned.

Master transmission:

STX	ADD	C	BCS2	BCS1	ETX

FDT response:

STX	ADD	ACK	BCS2	BCS1	ETX

F . FORMAT CUSTOM DOWNLOAD

The commands is used to download custom print formats to FDT.

Master transmission: where 1=format1

STX	ADD	F	1	BCS2	BCS1	ETX

FDT response:

STX	ADD	ACK	BCS2	BCS1	ETX

To indicate that it is ready to receive a continuous string.
When ACK block from the FDT is received the master should start transmittion of the string.
The FDT remains in the receive mode until P is pressed on the keyboard.
No characters exceeding the full length (512b)will be received.

? UPLOAD WEIGHT

Returns the current displayed weight plus status or with a message if bit0 of status byte is '1'.
In the normal state the FDT will respond within 3-4 character times.
(e.g. With 9600baud, the character time ≈ 1 msec, the master should expect reception of STX from the FDT within 5 msec after the ETX was transmitted from the master).

Master transmission

STX	ADD	?	BCS2	BCS1	ETX

FDT response

STX	ADD	?	STATUS BYTE	x x x x x x	BCS2	BCS1	ETX

where ? is replaced in scale A,B mode. 1=scale A, 2=scale B, 0=A+B
and xxxxxx = Weight if bo of status byte is zero , or Message if bo of status byte is one.

STATUS BYTE

b7	b6	b5	B4	b3	b2	b1	b0
Zero or Parity	1	Sign of weight 0=+ 1=-	No Motion 0=NO, 1=YES	Out of range 0=NO 1=YES	Autozero 0=NO 1=YES	0=Gross 1=Net	0=Normal Weight 1=No Weight Display

P . PRINT

The scale weight is printed in the internal electronic tally roll.
The command returns the weight and sequence number of the Alibi memory.
Master transmission:

STX	ADD	P	BCS2	BCS1	ETX

FDT response:

STX	ADD	P	yyyyyy	xxxx	BCS2	BCS1	ETX

If printing was succesful where xxxx = 4 digit serial number and
yyyyyy: 6 digits weight including decimal point or ------ (empty) or ****** (corrupted data).
or FDT response:

STX	ADD	NACK	BCS2	BCS1	ETX

If print conditions were not met (Motion, -ve weight etc).

R . REPRINT

Returns the last weight and sequence number stored in the Alibi memory.
Master transmission:

STX	ADD	R	BCS2	BCS1	ETX

FDT response:

STX	ADD	R	yyyyyy	xxxx	BCS2	BCS1	ETX

yyyyyy: 6 digits weight including decimal point or ------ (empty) or ****** (corrupted data).
xxxx: 4 digits serial number.

S . SELECT FAD

Selects one of the scales in a multi scale network.
Master transmission: XX= FAD address

STX	ADD	S XX	BCS2	BCS1	ETX

FDT response:

STX	ADD	ACK	BCS2	BCS1	ETX

Err 30 will be displayed if the FAD address is not programmed for polling by the FDT (set up 3).

T. TARE/GROSS

Tares the weight on the scale and switches the FAD-4 to net weight mode.
Master transmission:

STX	ADD	T	BCS2	BCS1	ETX

FDT response: NONE.
Execution of the command should be checked by examining the next status string.

Z . ZERO SCALE

Sets the scale to zero, if the weight is stable and within 2% of scale capacity .
Master transmission:

STX	ADD	Z	BCS2	BCS1	ETX

FDT response: NONE.
Execution of the command should be checked by examining the next status string.

9. SPECIFICATIONS

9.1. *Environmental And Electrical Considerations*

AMBIENT TEMPERATURE	Storage - 10 °C to + 70 °C. Operating - 10 °C to + 40 °C No direct sunlight to fall on the equipment.
HUMIDITY	40% to 90% RH (non condensing)
AIR	The surrounding air should be dust free and not contain any corrosive gases or materials which could adversely affect the equipment.
VIBRATION	Severe vibration can affect the accuracy of weighing and damage electric / electronic components.
PROTECTION	IP 40 for front panel.
ELECTROMAGNETIC/ FIELDS	Heavy electrical equipment should not be installed close to the weighing equipment.
POWER SUPPLY	7.5 - 10 VAC 50 Hz or 6 – 12 VDC. Consumption 1,8 Wmax.
INCOMING AND/ OUTGOING SIGNALS	Relays and contactors connected to the equipment must have reliable and effective interference suppression. Cabling must be performed according to normal practice.
NOTES	WELDING on or in the vicinity of weighing equipment is prohibited. STATIC loads, caused by thunderstorms, must be prevented from developing by use of reliable lightning conductors. ENSURE that the cooling of the equipment is not obstructed.

9.2. *Technical Specifications*

DIGITAL PART	VERSION A	MCU 89C55, 20K ROM, 64W serial EEPROM.
	VERSION B	MCU 89C55, 20K ROM, 64W serial EEPROM, 32K serial FLASH, battery backed real time clock and totalising RAM.
SELF DIAGNOSTICS		Hardware and Software, MCU watchdog. Memory failure.I/O failure.Program check.
COMMUNICATIONS		Serial port RS232C FULL DUPLEX.(1200 baud) (Version B) Serial port RS485A HALF DUPLEX. (2400-115.000 baud).
DISPLAY		6 digit LED plus annunciators for NET, NO MOTION, TARE, SP1, SP2. Colour red. Height 14 mm.
KEYBOARD		6 key membrane type.
ALIBI MEMORY		Capacity 10.000 records. Cyclic overflow (FIFO). Display an print operations. Checksum for each record.
EMC COMPATIBILITY		Meets or Exceeds EN 45 501 requirements.
DIMENSIONS / WEIGHT		PANEL 144 (L) x 72 (H) x 70 (D) / 450 gr. INOX 180 (L) x 108 (H) x 60 (D) / 1,2 kg.

9.3 *MAINTENANCE*

The unit does not require any routine maintenance. It may be necessary to perform periodic checks of the calibration of the scale due to mechanical reasons. The frequency of the calibration checks depends on the application condition and on the required measuring accuracy.
It may happen that, in exceptional conditions, the unit locks on a wrong memory location and it is not possible to restart because the keyboard is not operative.
To restart it is necessary to switch the power OFF then ON again.

9.4. *SERVICE*

There are no serviceable parts. The unit may be repaired by trained personnel only.
The user may check cable connection(s) and power supply.