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Service Manual
Medical Chair scale

KERN MCN-M

Type TMCN 200K-1M-A

Version 2.0
05/2022
GB



GB

KERN MCN-M

Version 1.0 – 05/2022

Servicemanual

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1 Basic Information

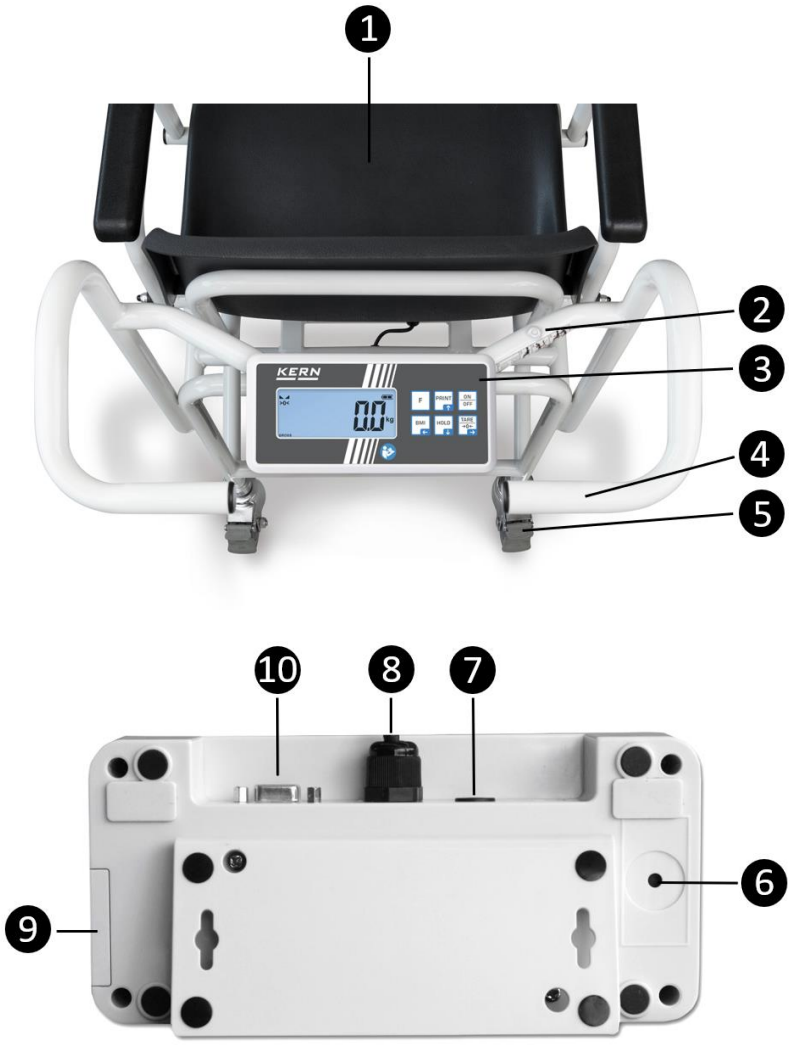
The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification). The service manual is obligatory for repair work. After repair, original conditions of the device must be restored. Only original spare parts should be used.

Instructions about conformity-evaluated scales:
Repair must be carried only at 100% compliance with the type approval. A violation of this specification will result in a loss of the type approval! After successful repair the balance will have to be reverified before it can be used again in a statutorily regulated field.
The operation and configuration of each scale is described in the accompanying manual of the scale. Any safety information in respect for verification are also described in the accompanying manual

2 Introduction

This service manual covers the MCN chair scale series and is edited for the authorized servicing personnel.
Note all rights are reserved. Copying any part of this manual is prohibited without our permission.

3 Appliance overview



1. Seat pan
2. Bubble level
3. Display Unit
4. Manipulations
5. Parking brake
6. Adjustment switch
7. Terminal power supply unit
8. Connection cable "Display - Chair"
9. Battery compartment
10. KUP interface (Kern Universal Port)

Details:





Parking brake open



Parking brake closed



Footrest and adjustment foot

Folding arm rests



3.1 Feature overview

- Large LCD, 6-digit H=25mm, VA=100x40mm, no backlight
- Stable, zero, battery level, gloss/net weight indications
- Weighing unit: kg only
- 6 buttons operated
- Tare up to Max
- Pre-Tare function, with 4 memories
- BMI function
- Display Hold function
- Print function
- Application menu
- Setup menu
- Service menu
- Kern Communication Protocol (KCP)
- Kern Universal Port (KUP) interface, VGA-15 female connector
- Built-in WiFi interface
- Optional internal Memory / Real Time Clock module
- Optional external RS-232 interface through KUP
- Optional external USB device interface through KUP
- Optional external Bluetooth BLE interface through KUP
- Multi-Plug (EU/UK) Power adaptor, 6V 1A
- Optional Alkaline Batteries, 6xAA size
- Optional rechargeable battery pack, Li-ion 3.7V 3700mAH

3.2 Keyboard overview

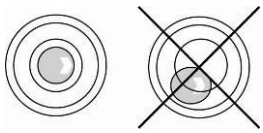


Button	Designation	Function
ON OFF	ON/OFF button	Turn on/off
HOLD	HOLD button	Hold function/Calculation of a stable weight value **In menu:** • Select menu items **For numeric entry:** • Lowering numeric value
BMI	BMI button	Calculation of the Body Mass Index **In menu:** • Return to weighing mode
PRINT	PRINT button	Data transfer via interface **In menu:** • Select menu items **For numeric entry:** • Increase numerical value
F	Function key	Function quick key Quick call-up of a function stored before
TARE →0←	Zeroing key	Weighing scale will be reset to „0.0“ **In menu:** • Confirm selection **For numeric entry:** • Change decimal digit • Confirm entry
	TARE key	Tare balance

3.3 Installing the chair scales



- ⇨ Place scales on an even surface.
- ⇨ Check if the air bubble of the level is within the prescribed circle.



- ⇨ If the air bubble of the bubble level is **not** in the required circle, level the balance using the adjustment feet as specified.
- ⇨ Check levelling regularly.

3.4 Levelling

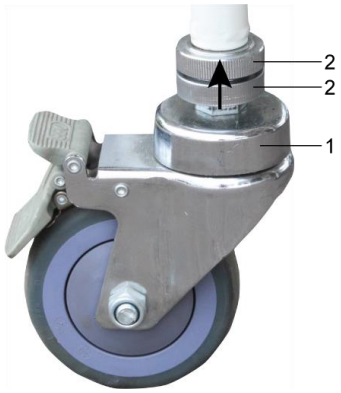
- Levelling is restricted to specialist staff possessing well acquainted with the workings of weighing scales.

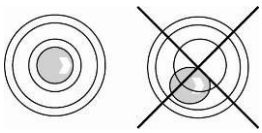
⇨ Place scales on an even surface.

⇨ Lock brakes

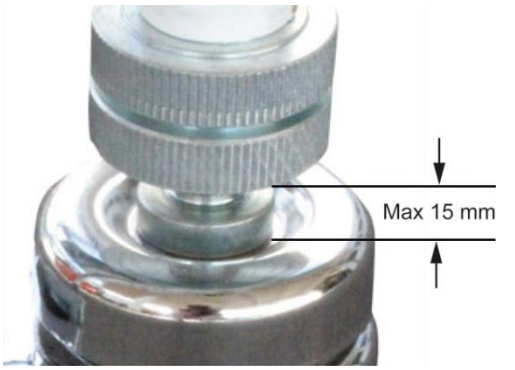


⇨ Turn the wheel (1) until the air bubble of the bubble level is in the black circle

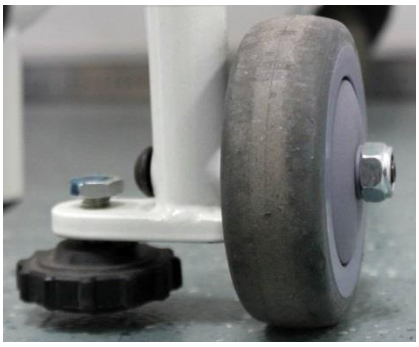




⇨ Turn the counter nuts (2) right to the top

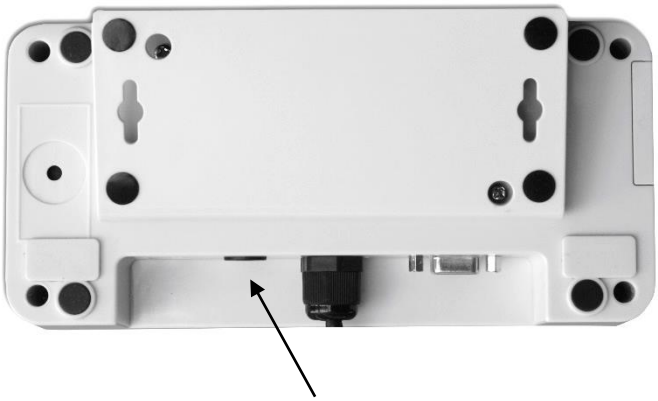


Gap width must not exceed 15 mm!



Use the adjustment feet to fix the chair at the front wheel.

3.5 Mains connection



Terminal power supply unit

Power is supplied via the external mains adapter. The specified voltage must correspond to the local voltage.

Only approved genuine KERN power supply units may be used in compliance with Directive EN 60601-1.
The small sticker attached to the side of the display unit indicates the power port.

3.6 Safety cable

Safety cable for strain relief of the mains cable.

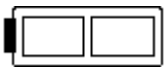
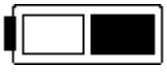


Application:
Installation for strain relief between mains cable (plug-in power supply unit) and display unit.

3.7 Rechargeable battery operation with an optional battery power pack



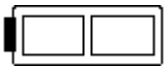
Open the battery compartment cover (1) at the base of the display unit and insert the rechargeable battery. Charge the battery for at least 12 hours before initial use.
The appearance of the symbol  in the weight display indicates that the rechargeable battery is almost exhausted. The weighing scale will remain ready for operation for a few more minutes before switching off automatically in order to save the rechargeable battery. Charge rechargeable battery.

	Voltage has dropped below prescribed minimum
	Rechargeable battery very low
	Rechargeable battery completely recharged

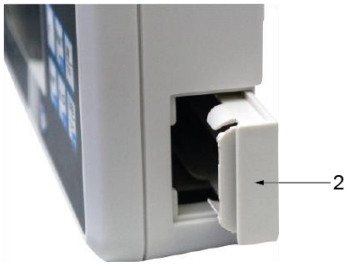
	• If the rechargeable battery is exhausted, „LobAt“ is displayed. The rechargeable battery is charged via the provided plug-in power supply unit (charging time 12 h for a complete charging). • If the balance is not used for a longer time, take out the rechargeable battery and store it separately. Leaking liquid could damage the balance.

3.8 Battery operation

As an alternative for the rechargeable battery operation, the balance offers also the possibility to be operated with 6x AA-batteries.
Open the battery cover (1) at the lower side of the display unit and insert the batteries according to the example shown below. Lock again the battery compartment cover. If the batteries are exhausted, the symbol  and „Lo bAt“ is displayed on the balance; replace the batteries. To save the battery, the balance switches automatically off.

 + **Lo bAt**	Capacity of batteries exhausted.
	Capacity of batteries will soon be exhausted.
	Batteries completely charged

3.9 Insert batteries

Remove the battery compartment cover at the side of the display unit (1)	
Remove the battery holder (2)	
Insert the batteries into the battery holder	

Insert batteries with the battery holder into the battery compartment and lock it with battery compartment cover.	

Insert batteries in the battery container and lock them with battery compartment cover.	

3.10 Initial Commissioning

In order to obtain exact results with the electronic balances, the balance may only be used after the operating temperature is reached. During this warming up time the balance has to be connected to the power supply (mains, accumulator or battery) and be switched on.

The accuracy of the balance depends on the local acceleration of gravity.
The value of gravity acceleration is shown on the type plate.

4 Calibration and sealing information

4.1 General introduction:

According to EU directive 2014/31/EU balances must be officially verified if they are used as follows (legally controlled area):

a) For commercial transactions if the price of goods is determined by weighing.
b) For the production of medicines in pharmacies as well as for analyses in the medical and pharmaceutical laboratory
c) For official purposes
d) For manufacturing final packages
e) Determination of mass in the practice of medicine that is, weighing patients for reasons of medical supervision during medical surveillance, examination and treatment

In cases of doubt, please contact your local trade in standard.

4.2 Verification notes:

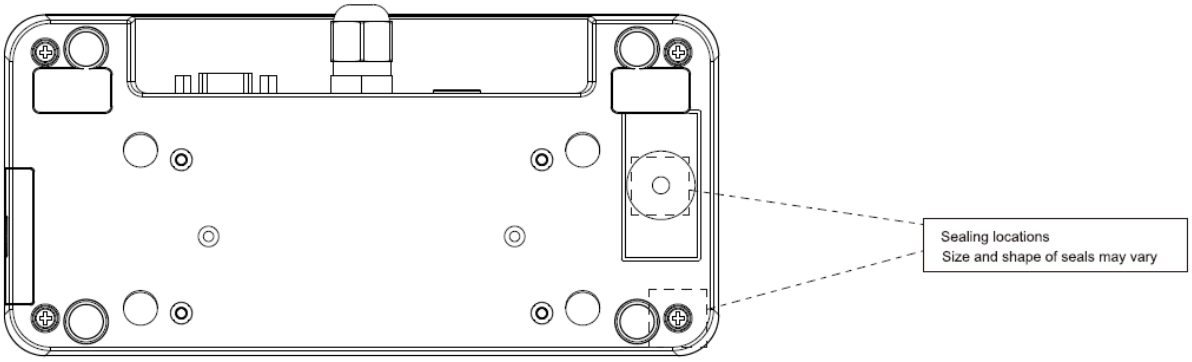
An EU type approval exists for balances described in their technical data as verifiable. If a balance is used where obligation to verify exists as described above, it must be verified and re-verified at regular intervals.
Re-verification of a balance is carried out according to the respective national regulations. For verification validity period.
The legal regulation of the country where the balance is used must be observed!

Verification of the balance is invalid without the seal.
The seal marks attached on balances with type approval point out that the balance may only be opened and serviced by trained and authorised specialist staff. If the seal mark is destroyed, verification loses its validity. Please observe all national laws and legal regulations. In Germany a re-verification will be necessary.

Balances with obligation to verify must be taken out of operation if:

- **The weighing result of the balance is outside the error limit.** Therefore, in regular intervals load balance with known test weight (ca. 1/3 of the max. load) and compare with displayed value.
- **The reverification deadline has been exceeded.**

4.3 Position adjustment switch and seals:



4.4 Verification validity period (current status in G)

Personal scales (including chair and wheelchair scales) in hospitals	4 year
Personal scales, when not located in hospitals (for example, doctor's offices and nursing homes)	unlimited
Baby weighing scales and mechanical birth weight scales	4 year
Bed scales	2 year
Scales in dialysis stations	unlimited

Rehab clinics and health authorities are treated as hospitals.
(4 years of verification validity)

Not treated as hospitals (verification validity not limited) are dialysis stations, nursing homes and doctor’s surgeries.

(Details derived from: „Information by the verification authority, weighing scales applied in medical use“)

5 Service Menu

Press the verification button to enter Service Menu (may need to break the seal)
Press ➔ button to select / confirm / shift right
Press ← button to go back / exit / shift left
Press ↓ button to scroll down / decrease digit value
Press ↑ button to scroll up / increase digit value H 10

H 10	turn ON/OFF X10 mode (for verified=on only)
AdJuSt	adjustment
CAL	adjustment function (as in User Menu)
CALEHt	adjustment at predefined weight: zero, put ld, wait…
CALEud	enter adjustment weight (SI unit only: g/kg), update predefined weight then perform adjustment
GrAAdJ	set gravity of adjustment location
GrAuSE	set gravity of use location
L inEAr	Linearization
3Po int	3 points
5Po int	5 points
ZEro	zero calibration
CrEEP	creep compensation (at load)
PArAMS	scale parameters
UEr iFd	Legal verification: ON/OFF
rnGtYP	Range type: 1 range, multi-range, multi-interval
nuMrnG	Number of ranges: 2
rAnGE 1	Range #1
MAH	Capacity in base unit
d	divison in base unit
E	e = number of d (only for single range and last digit = 1)
rAnGE2	Range #2
MAH	Capacity in base unit
oUErLd	overload counter
MEM	view counter
oUrEr	erase overload count
MEMorY	
1St id	ID of starting memory
in it	Initialize memory
rEcord	number of records in memory
inFo	information querry
SEr iAL	Serial number
UEr	Software version B 1.2.16
UErA	Software version approved a 1.0.0
AdUALu	show A/D value
rESEt	reset
ALL	reset all

5.1 Software identification

For the control purposes, the version management of the software in KMG/KMH medical indicator which is used for MPN-, MWN- & MCN-series is divided into two parts:

- Part I: Weighing system version
  Program parts and data that form the software subject to legal control.
- Part II: Application version
  Program parts and data that form the software not subject to legal control.

To check the software version, press any button during the display check at start up.

- Software version for legally relevant software identification: Ax.x.xx
- Software version for non-legally relevant software identification: Bx.x.xx

Software history:

- 2022-05: A1.0.00 B1.3.05 (initial release version)

5.2 Adjustment

As the acceleration value due to gravity is not the same at every location on earth, each display unit with connected weighing plate must be coordinated - in compliance with the underlying physical weighing principle - to the existing acceleration due to gravity at its place of location (only if the weighing system has not already been adjusted to the location in the factory).This adjustment process must be carried out for the first commissioning, after each change of location as well as in case of fluctuating environment temperature. To receive accurate measuring values it is also recommended to adjust the display unit periodically in weighing operation.

	• Prepare the required adjustment weight. The adjustment weight to be applied depends on the capacity of a weighing scale. Carry out adjustment as closely as possible to admissible maximum load of weighing scale. Information about test weights can be retrieved on the KERN website (http://www.kern-sohn.com). • Observe stable environmental conditions. For warm-up time required for stabilisation MCN-M Instruction manual.

	Access to service menu is locked in verified balances. To disable the access lock, destroy the seal and actuate the adjustment switch. **Attention:** After destruction of the seal the weighing system must be re-verified by an authorised agency and a new verification wire/seal mark fitted before it can be reused for applications subject to verification.

5.3 Adjustment procedure

1. Turn the scale on and allow the scale to acclimatize and stabilize for sufficient time.
2. Press the verification button to enter Service Menu (may need to break the seal). Display shows H 10.
3. Press ↓ or ↑ to scroll to AdJuSt
4. Press →, display show CAL.
5. Press →, display show CALEHt.
6. Press →, display show the first selectable calibration weight.
7. Press ↓ or ↑ to scroll to other selectable calibration weights.
8. Press →, display show ZEro, then PtLd, then display calibration weight.
9. Place the calibration weight onto the scale gently.
10. Press →, display show WAIt, then rEMULd. Remove the calibration weight. Scale will return to the weigh mode and display weight.

Note:

- In step 10, in case WronG is displayed, this indicates a calibration error. Turn the scale off and then on and repeat the procedures.
- Press ↓↑ to scroll. Press ← to esc/exit. Press → to enter/confirm.
- In case the scale will be used at different location, set the gravity of adjustment location and gravity of use location. Follow the paths below in the Service Menu:

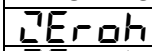
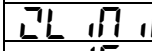
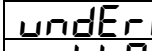
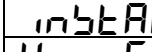
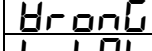
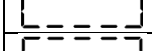
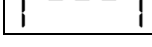
  Service Menu → AdJuSt → CAL → GrAAdJ
  Service Menu → AdJuSt → CAL → GrAuSE

6 Maintenance

6.1 Service, maintenance

The appliance may only be opened by trained service technicians who are authorized by KERN.
Disconnect the scales before opening.

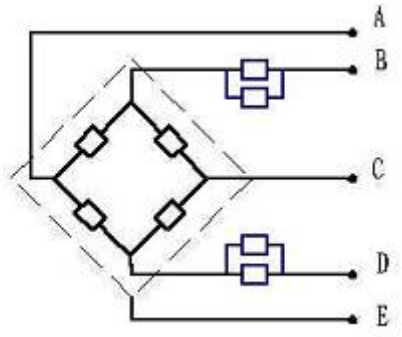
6.2 Error Codes

Error message	Explanation
	Zero too high at power up
	Zero too low at power up
	Over zeroing range
	Under zeroing range
	Unstable weight
	Adjustment error
	Batteries / rechargeable battery exhausted
	Over weight
	Under weight

6.3 Check the Load cell

- Remove power from the system and disconnect the PCB from the Load cell.
- Check the moisture, or foreign material inside.
- Make sure all leads are connected and correctly.
- Check load cell for proper input and output resistances

Load Cell Connections



Signal + Green
Supply + Red

Signal - Black

Supply - White

Shield

Measuring Points	Resistance
Red (+ Exc) to White (–Exc)	420 ±20Ω
Green (+Sig) to Black (–Sig)	350Ω ±5Ω

6.4 Checking the different Voltages

If the problem is in the PCB, use a multimeter to check the following voltages

AC Power
Check the AC power socket output voltage.

Adaptor Voltage
Check the adaptor output cable connecter voltage
Compare the value with the name plate on the scale

PCB Input Voltage
Check the PCB input power connecter voltage
Voltage must be minimum 6VDC into the pin AD+

6.5 Trouble Shooting

Power on

↓

Full Segments?
If no display,

- check battery / power adaptor,
- check connection between keyboard—main board,
- check connection between battery / power adaptor—main board.

If missing segments,

- check fixing of LCD frame, zebra connector under LCD.

↓

Display Zero?
If display [*L0 bat*], check battery >6.5V, power adaptor ~6V.
If display [*zerohi*] or [*zerolo*] check the load cell connections,
load cell damaged?
If display [instab] check weighing platform, overload stopper, load cell and wires, environment and stable floor.

↓

Proper readout?
If unstable reading, check weighing platform, overload stoppers, loadcell and wires, environment and stable floor.
If always zero, check ADC. Linearization if necessary.

↓

Correct reading?
If not accurate, perform adjustment or linearization.
If cannot reach full capacity, check weighing platform, overload stopper, load cell.

↓

Buttons functioning?
If some buttons not working, check connection wires. Replace keyboard if needed.

↓

Interface functioning?
If interface not working, check the connection wires.

↓

Normal operation.

7 Exchange of components

7.1 Spare parts list

2.51.01.16850100	Main board TKMH
2.51.03.16850100	Main board TKMG
6.01.45.16850001	Overlay TKMG TKMH
6.01.45.16850100	Overlay TKMH back
4.25.01.01002000	EVA foot
4.37.06.16850200	Battery door
2.40.03.16850200	Battery holder 6xAA TKMG TKMH
1.15.1684030	Rechargeable Battery Pack TYMR-01-A (RC 193650)
1.15.1684040	Wall mount stand kit TKMG
5.90.06.10009100	Power adaptor 6V 1A UES06WZ-060100SPA

7.2 Opening the device

To open / close the device, break the seal, and unscrew / screw in the 4 tap. screws, M4x16, on the bottom housing.
Note: Open the housing of the KMH gently to avoid damaging the connection between main board and back display board.

7.3 Exchange of components

Below components can be replaced without opening the indicator:

6.01.45.16850001	Overlay TKMG TKMH
6.01.45.16850100	Overlay TKMH back
4.25.01.01002000	EVA foot
4.37.06.16850200	Battery door
2.40.03.16850200	Battery holder 6xAA TKMG TKMH
1.15.1684030	Rechargeable Battery Pack TYMR-01-A (RC 193650)
1.15.1684040	Wall mount stand kit TKMG
5.90.06.10009100	Power adaptor 6V 1A UES06WZ-060100SPA

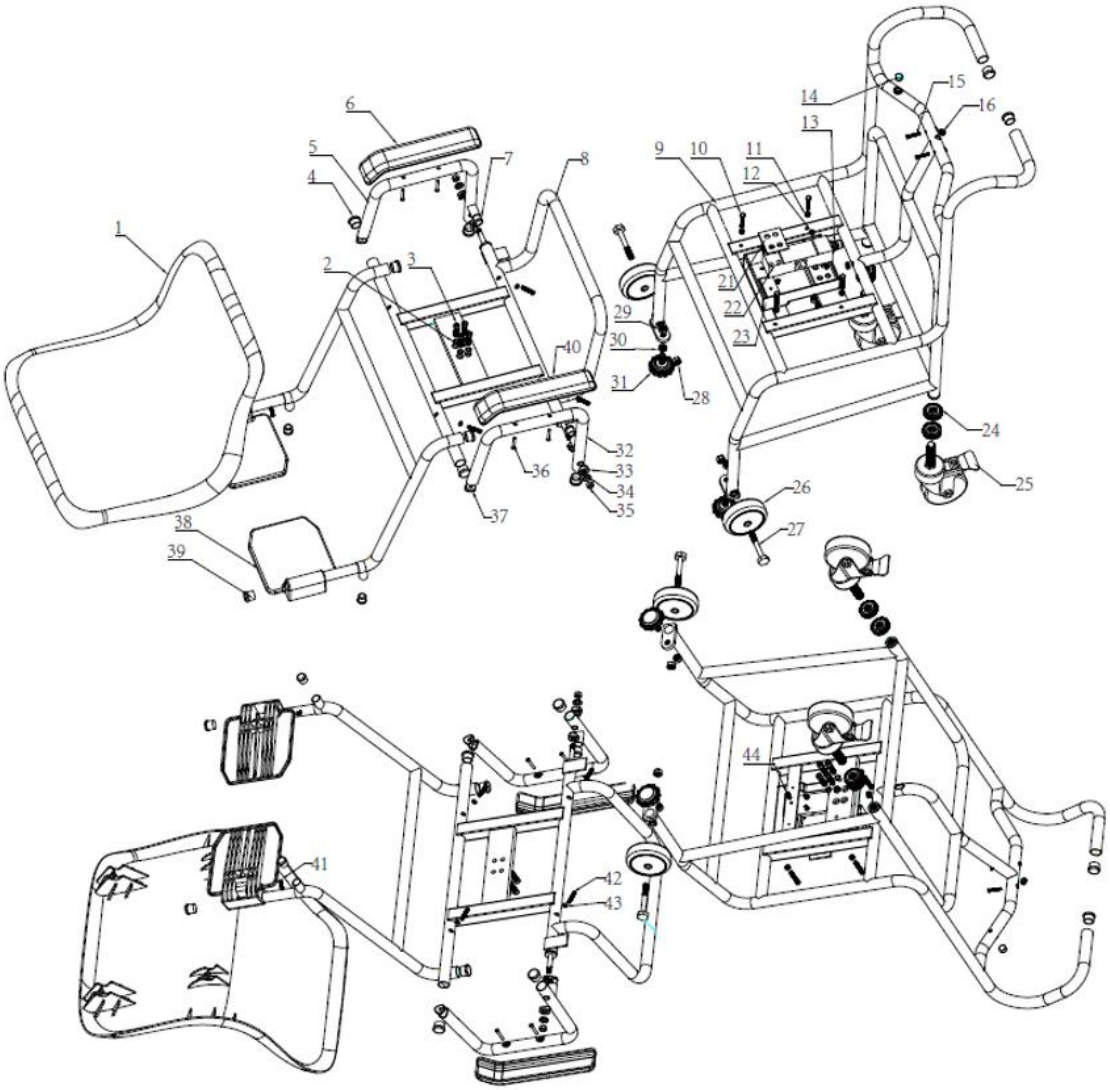
7.4 Replacement of the main board

1. Open the device by removing the 4 screws of the indicator housing
2. Disconnect the connections to the main board
3. Remove the 6 M3x8 tap. screws
4. Replace a new main board
5. Fix the main board with the 6 screws
6. Connect the main board as per the Wiring Diagram
7. Install the 4 screws to close the device
8. Perform Linearization and Adjustment
9. Seal the indicator

2.51.01.16850100	Main board TKMH
2.51.03.16850100	Main board TKMG

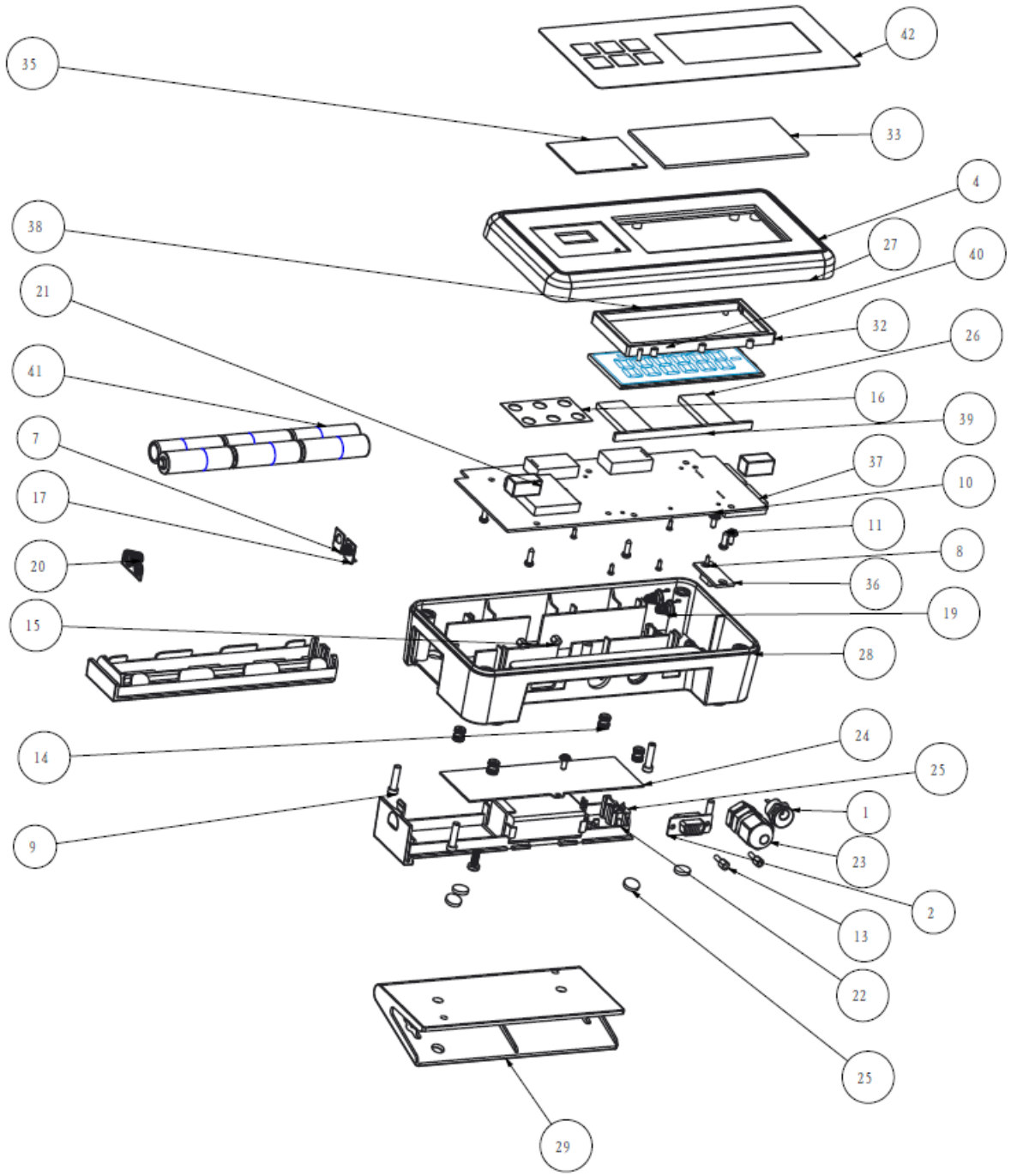
8 Technical drawings

8.1 Exploded view chair construction



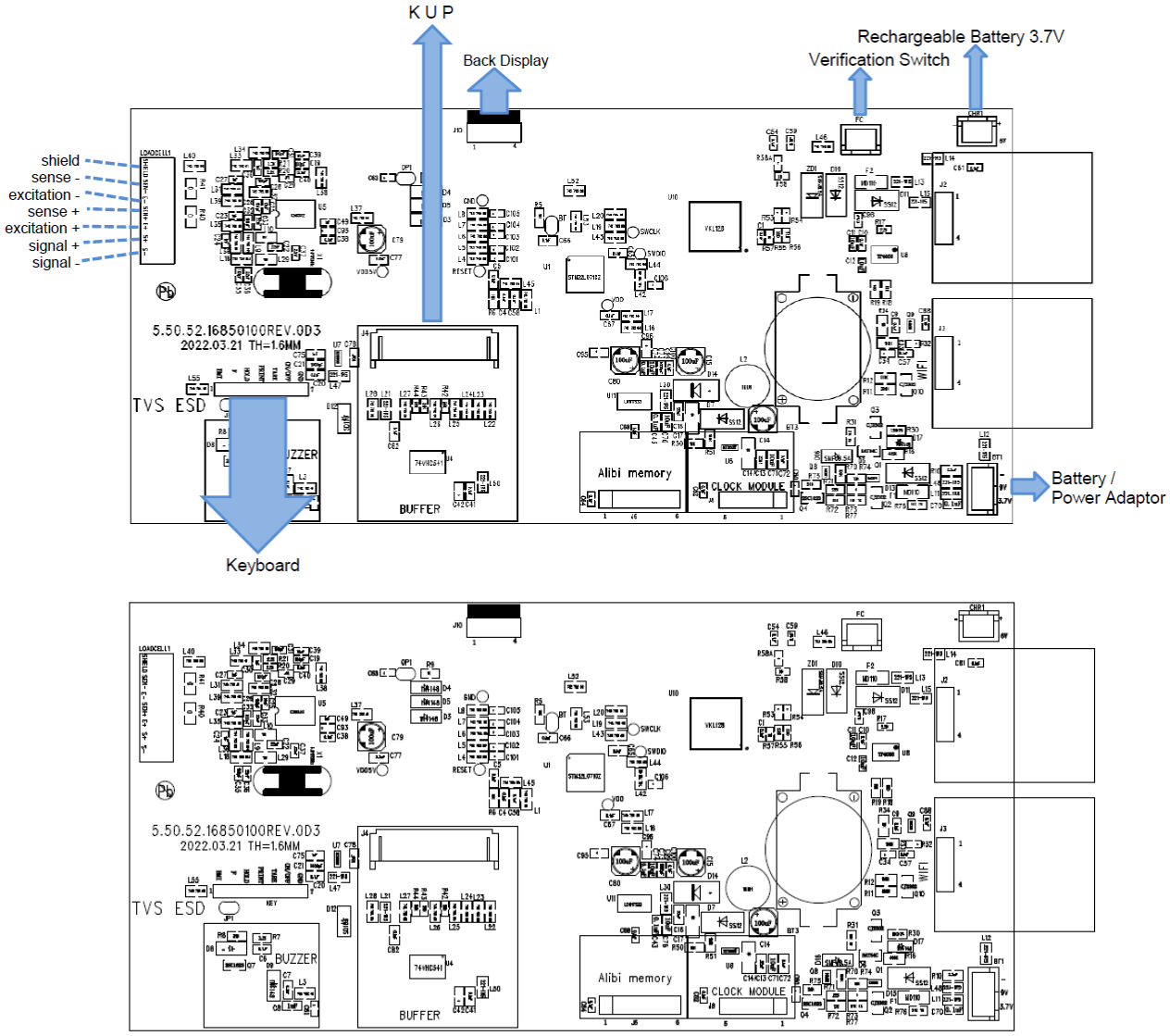
ITEM	NAME	QUANTITY	MATERIAL	REMARK
1	Chair face	1	PP	
2	φ8 Spring washer	8	spring steel	φ8
3	Internal hexagon screw	8	carbon steel	M8*30
4	Pipe plug	8	PE	
5	Handrail support(right side)	1	φ25x1.2 steel tube	
6	Handrail(right side)	1	PU	
7	3/4′Pipe plug	4	PE	
8	Upper platform	1	φ25x1.2 steel tube	
9	Nether platform	1	φ25x1.2 steel tube	
10	Hexagon screw	4	carbon steel	M6*40
11	Nut	5	carbon steel	M6
12	“+” screw	5	carbon steel	M4x8
13	Waterproof connector	1	Nylon	
14	Level bubble（Φ 14.0）	1		
15	Internal hexagon screw	2	carbon steel	M4x30
16	Line protect ring	2	PVC	φ13.9xφ10.3xφ7.2x1.6x4
21	L6G load cell gasket	2	aluminium alloy	
22	Load cell	1	aluminium alloy	
23	Load cell protect box	1		
24	Nut	4	carbon steel	M16
25	Omni-directional wheel	2	carbon steel	
26	Omni-directional wheel	2	carbon steel	
27	Hexagon screw	2	carbon steel	M10x80
28	Nut	2	carbon steel	M10
29	Hexagon Nut	2	carbon steel	M10
30	Hexagon Nut	2	carbon steel	M10
31	Foot	2	carbon steel+PP	M10
32	Handrail support (left side)	1	φ25x1.2 steel tube	
33	Gasket	2	Nylon	
34	Gasket	2	carbon steel	
35	Nut	2	carbon steel+Nylon	M8
36	“+” screw	4	carbon steel	M5x35
37	R12.7 gasket	6	Nylon	
38	18′pedal	2	Nylon	
39	7/8′pipe plug	2	PE	
40	Handrail(right side)	1	PU	
41	“+”round self thread screw	2	carbon steel	M5x15
42	“+”round self thread screw	4	carbon steel	M5x40
43	φ5 washer	4	carbon steel	
44	Internal hexagon screw	1	carbon steel	M6*25

8.2 Exploded view indicator

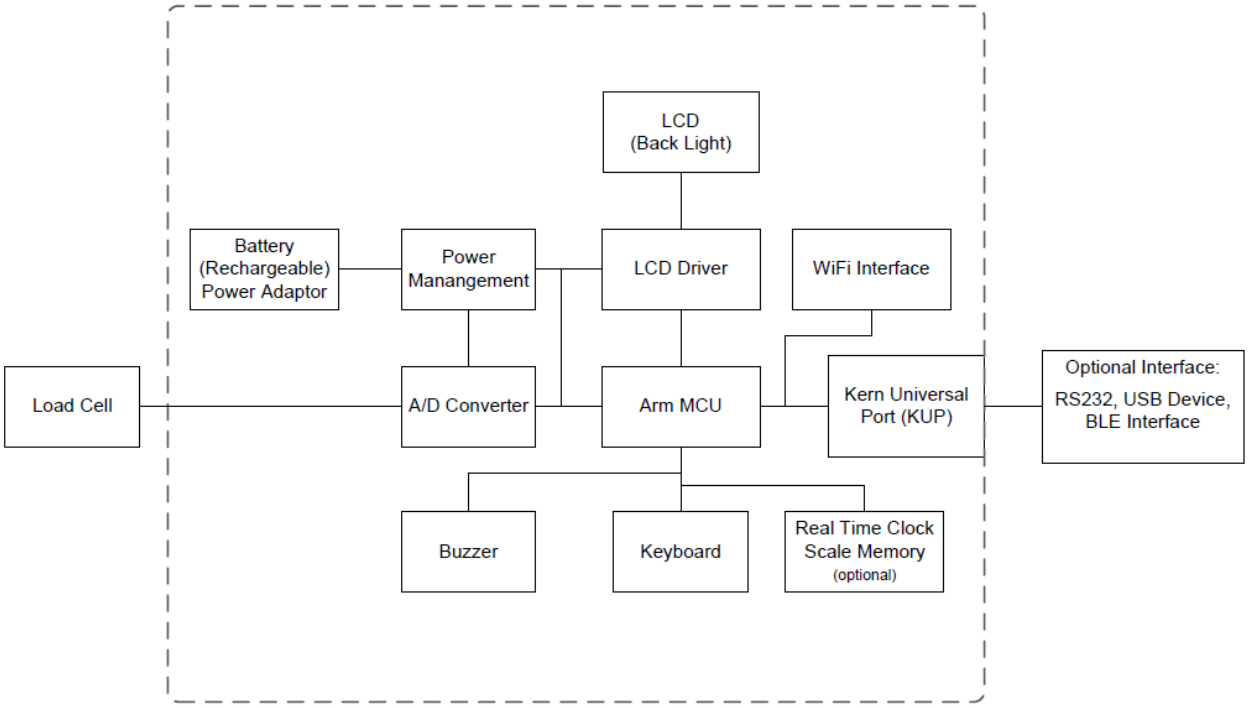


ITEM	PART NO.	NAME	MATERIAL	QUANTITY	REMARK
1	5.	Dc power socket（DC-022)		1	
2	5.	VGA-DR-S315-M		1	
3	2.40.00.16840000	Medical Indicator		1	
4	2.40.01.16850200	INDICATOR TOP ASM		1	
5	2.40.03.16850200	BATTERY SCOOP ASM		1	
6	2.40.04.16850200	6AA RECHARGEABLE BATTERY		1	
7	3.03.51.03622100	BATTERY CONTACT (A)+	STEEL	2	P-Ni
8	3.11.10.00206100	SCREW M2*6	MATERIAL	5	
9	3.11.10.01716100	TAP SCREW M4x16mm PAN HEADD6.0	STEEL	4	P-Ni
10	3.11.17.00508100	screw M3*8	A3	3	
11	3.11.1O.00508100	SCREW M3*8 A3 6 P-Ni			
12	3.12.10.00710100	MAC SCREW M4x10 H.S. HEAD/D6.7	A3 2	2	
13	3.12.48.01909100	MAC_SCREW_HEXAGON_M3	STEEL	2	
14	3.19.11.00479001	CASTLE NUT M4x0.7 H=7.9	Cu	4	
15	3.19.18.00902100	HEXAGON_NUT_M3	STEEL	2	
16	3.23.02.16850000	KEY DOME D8		1	
17	3.26.51.03620100	BATTERY CONTACT (-) SPRING STELL		1	P-Ni
18	3.27.08.06573100	BATTERY SPRING NEGATIVE	STEEL（t=0.5)	1	
19	3.27.12.01109100	SPRING NEGATIVE	WIRE D0.6	2	
20	3.27.12.01111100	CONTACT SPRING (+/-)	SPRINGSTEEL	1	P-Ni
21	3.29.20.20105100	magnet steel	magnetic N35	2	P-Ni
22	3.36.01.02380100	LUG PLATE	STEEL(T=0.3)	1	P-Ni
23	4.21.16.16840000	CABLE JOINT(PG-09/M16) black		1	black
24	4.23.01.16850000	damper plate	PMMA or pastic plate	1	
25	4.25.01.01003000	RUBBER FOOT	RUBBER(BLACK)	8	
26	4.32.19.00404000	EVA PAD(40*19*4)	EVA	2	
27	4.37.01.16850200	top cabinet	ABS	1	
28	4.37.02.16840200	BOTTOM CABINET	ABS	1	
29	4.37.03.16840200	HOOK	ABS	1	
30	4.37.03.16850200	BATTERY SCOOP01	ABS	1	
31	4.37.04.16850200	RECHARGEABLE BATTERY SCOOP	ABS	1	
32	4.37.05.16820300	LCD COVER	ABS	1	
33	4.37.05.16850000	lens	pc	1	
34	4.37.06.1685000	BATTERY DOOR	ABS	1	
35	5.50.52.16850000	KEY	PCB	1	
36	5.51.01.16820300	ON/OFF PCBA		1	
37	5.51.01.16850000	PCBA01		1	
38	5.51.02.16850000	LCD DISPLAY ASM 1		1	
39	5.85.03.03010000	ZEBRA	Rubber	1	
40	5.87.40.06267201	LCD DISPLAY 104x45x2.8mm		1	
41	5.94.23.01510601	BATTERY SUPPER HEAVY DUTY AA		6	
42	6.01.45.16850000	OVERLAY01	PC	1	

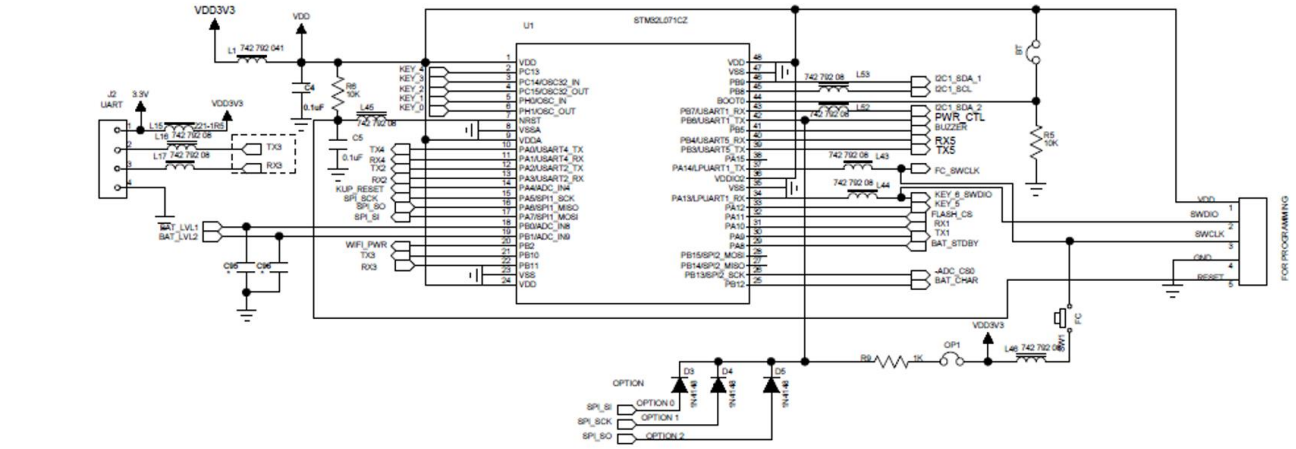
8.3 TKMG/TKMH Wiring Diagram

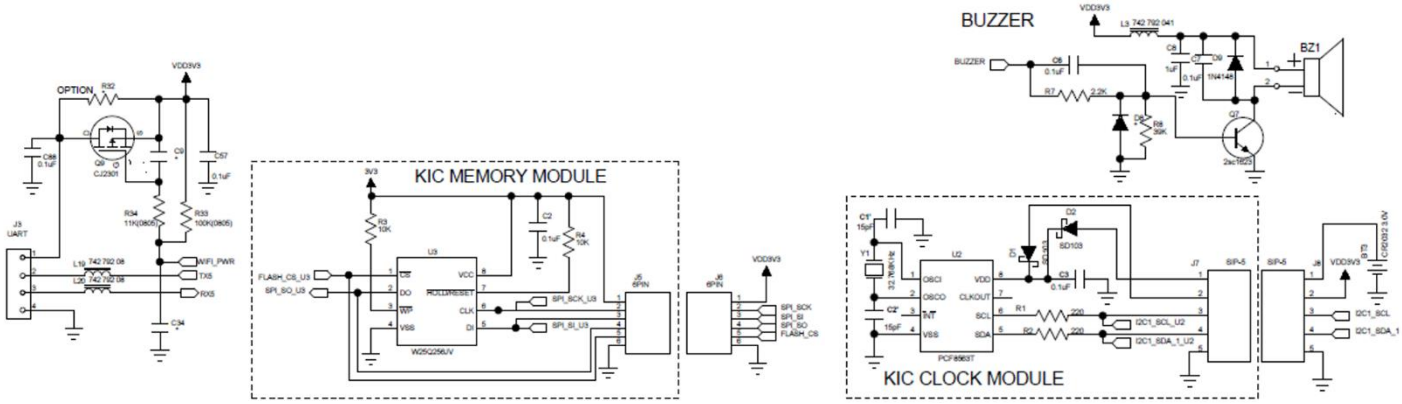


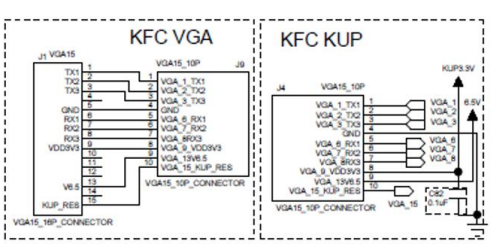
8.4 TKMG/TKMH Functional Block Diagram

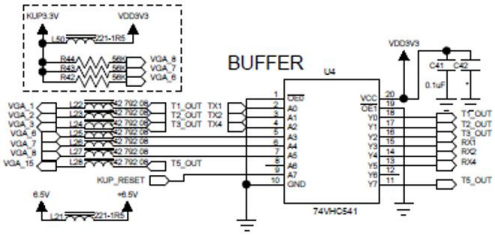


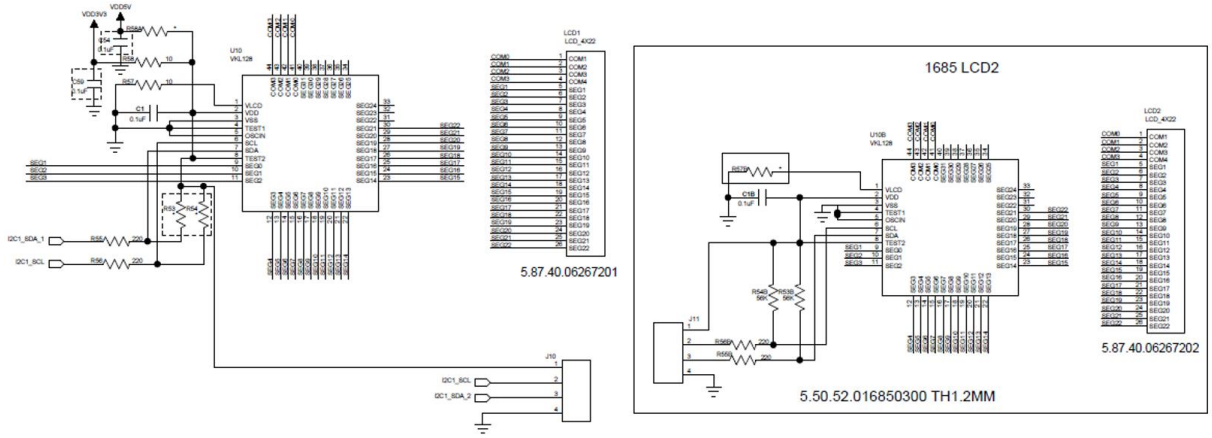
8.5 TKMG/TKMH Schematic Diagram

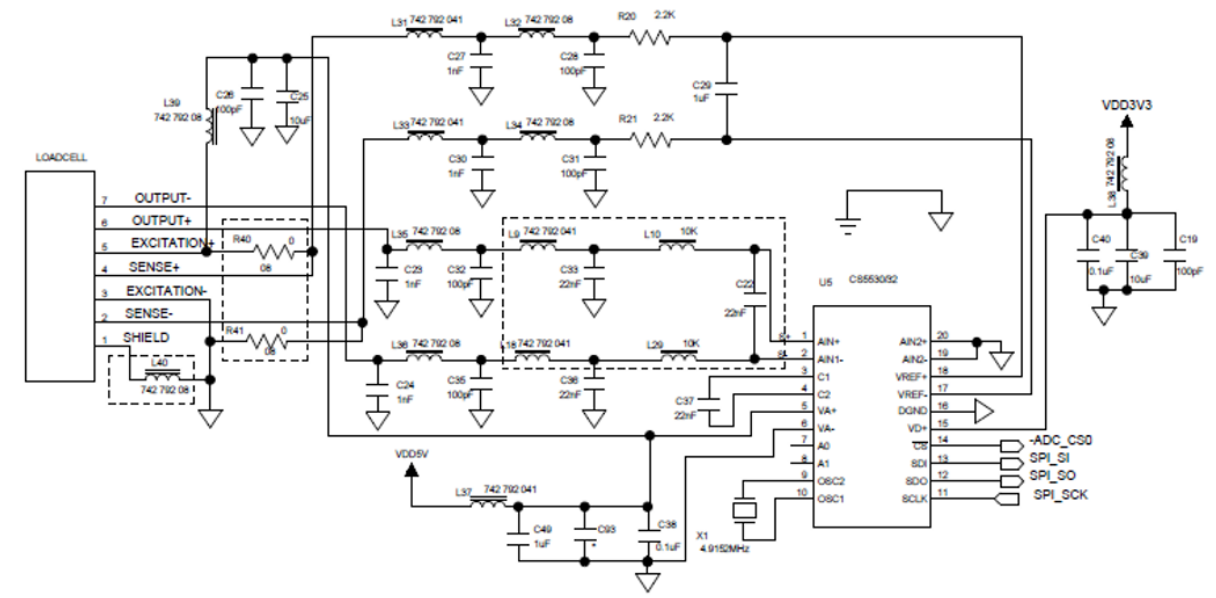


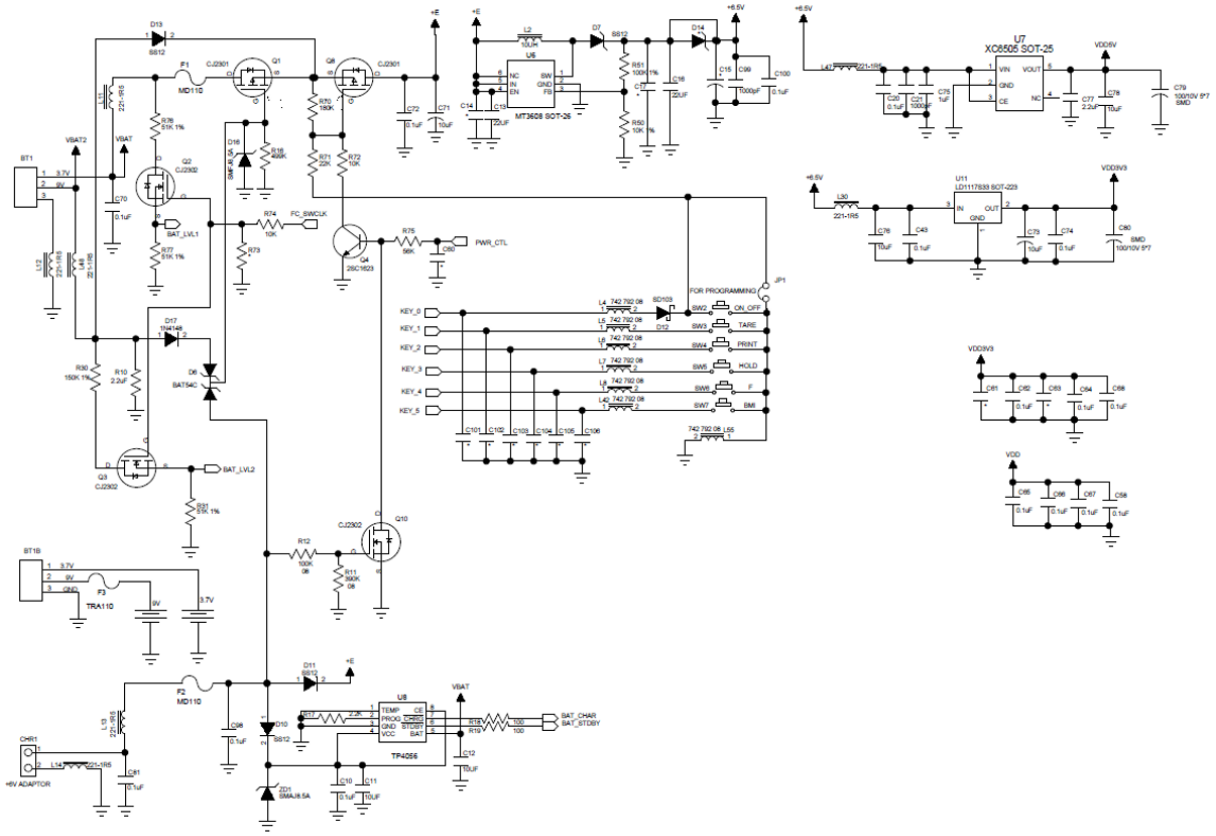









LOADCELL
OUTPUT-
OUTPUT+
EXCITATION+
SENSE+
EXCITATION-
SENSE-
SHIELD
VDD3V3
VDD5V
U5
C8553092
AIN+
AIN1-
C1
C2
VA+
VA-
A0
A1
OSC2
OSC1
AIN2+
AIN2-
VREF+
VREF-
DGND
VD+
SDI
SDO
SCLK
-ADC_CS0
SPI_SI
SPI_SO
SPI_SCK
X1
4.9152MHz


U7
XC6505 SOT-25
VDD5V
U11
LD1117S33 SOT-223
VDD3V3
FOR PROGRAMMING
ON_OFF
TARE
PRINT
HOLD
F
BAT_LVL1
BAT_LVL2
PWR_CTL
FC_SWCLK
TRA110
MT3608 SOT-26
TP4056
BAT_CHAR
BAT_STDBY
+6V ADAPTOR