

VOT18E

## **CENTRAL BATTERY UNIT**

### ***Installation and maintenance instructions TKT4144 and TKT4188***



**KEEP IN A SAFE PLACE FOR LATER USE**

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## 1. Product properties

### 1.1. Manufacturer

Teknoware Oy  
Ilmarisentie 8  
FI-15200 Lahti  
[www.teknoware.fi](http://www.teknoware.fi)

### 1.2. Type

TKT4144      Max 8 circuits, 24V AC/DC  
TKT4188      Max 16 circuits, 24 V AC/DC

### 1.3. General description

The TKT4144/88 central battery unit is based on the Teknoware TKT central battery unit product family. This product family is designed and manufactured according to the EN 50171 standard.

In normal situations, the central battery unit operates from 230 VAC electrical network, by maintaining the charge in the batteries and by feeding the maintained circuits with a voltage of 24 VAC. When the mains voltage is interrupted, or it drops under 160 V, the central battery unit switches to battery use. This connects a voltage of 24 VDC into the non-maintained circuits, and the feed switches to direct-current voltage, 24 VDC. The battery feed operates as long as the network voltage is unavailable, or the battery voltage is lowered to the deep discharge limit (19.2 V).

All the functions related to the use of the central battery unit can be performed from the control panel, which also includes display LEDs, which indicate the status of the central battery unit. The panel functions are presented in *Appendix 1*.

### 1.4. Technical specifications

Mains connection:      230 VAC 50 Hz 1~  
Mains fuse:              automatic fuse 16 A, C curve  
Output voltage:        using mains voltage: 24 VAC, with battery use 24 VDC  
Battery voltage:        24 VDC  
Battery charging time: 12 h  
Input power:            300 VA  
Use temperature range: +10 ... +30°C  
Input fuse:              flat fuse 10 AT  
Charging fuse:         flat fuse 10 AT  
Circuit fuses:         flat fuse 10 AT  
Battery fuses:          flat fuse 15 AT

The maximum load capacity of the maintained circuits is in total 1,050 VA.

Central battery unit type	Input from the network	Maintained circuits	Non-maintained circuits	Total load capacity with 1 h and 3 h operating time	Maximum battery capacity	Battery cabinet, if using batteries of over 38 Ah
TKT4144	1,300 VA	8 x 120 W Max 1,050 VA	190 W / circuit	1 h: 1,370 W 3 h: 565 W	100 Ah	65 Ah / TK4100 100 Ah / TK2310
TKT4188	1,300 VA	16 x 120 W Max 1,050 VA	190 W / circuit	1 h: 1,370 W 3 h: 565 W	100 Ah	65 Ah / TK4100 100 Ah / TK2310

The central battery unit is equipped with a network fuse F1 (10 AT) in the connecting terminal, and with battery fuses F2 (10 AT). The fuses F1-F8 for the maintained and non-maintained circuits are on a separate relay card TS10 and TS11. The charging system of the central battery unit is equipped with the temperature compensation of the battery charging voltage, which is ca. 0.06 V/°C (5 mV/°C/cell).

The luminaires used with the central battery unit should be suitable both for alternating and direct-current voltage.



## 1.5. Directives and standards

The following directives and standards were respected when designing and manufacturing the central battery unit:

Quality:	ISO 9001:	2000	(certified quality system)
Environment:	ISO 14001:	1996	(certified environment system)
Electrical safety:	72/23/EEC, 93/68/EEC		LVD directive
Device standard:	EN 50171:	2001	Central power supply systems
	EN 50272-2	2001	Safety requirements for secondary battery installations Part 2: Stationary batteries
Electromagnetic compatibility:	89/336/EEC, 92/31/EEC		EMC directive
	EN 50081-1:	1992	Residential, commercial and light industry, generic emission standard
	EN 61000-6-2:	1999	Part 6-2, Generic standards – Immunity for industrial environments

## 2. Functional description

### 2.1. Purpose of the central battery unit

In normal mode, the central battery unit's task is to monitor the mains voltage and to charge the batteries, as well as to feed the maintained luminaire circuits. During a power failure, the central battery unit feeds the non-maintained and maintained luminaire circuits with the energy stored in the batteries.

Explanations of the signal LEDs and buttons are described in *Appendix 1*.

### 2.2. Circuit outputs

The central battery unit outputs can be connected on the "Mode" connectors (see *Appendix 4*) in steps of 2 circuits, either as maintained or non-maintained circuits, in the following way:

"Mode" loop connected: Maintained luminaire circuit (continuous)

"Mode" loop not connected: Non-maintained luminaire circuit (functions only during a power failure)

### 2.3. Charging

After a power failure, or after installing the central battery unit, the central battery unit charges the batteries with a standard current. The charging current can be selected from the controller card with a DIP switch. See section *4.1 Setting the charging current*.

*Mains oper.* LED is lit, when the battery is charging

### 2.4. Mains voltage limits

When the mains voltage drops below 160 V, the central battery unit switches to battery use.

*Battery oper.* LED is lit

When the network supply returns or is higher than 170V, the central battery unit changes back to network use again and starts to charge the batteries.

*Mains oper.* LED is lit



## 2.5. Battery voltage limits

If the battery voltage rises over 28.8 V in normal mode, an over voltage alarm is given.

*Mains oper.* LED is lit

*Over voltage* LED is lit

If the battery voltage drops below 25.3 V in normal mode, an under voltage alarm is given.

*Mains oper.* LED is lit

*Under voltage* LED is lit

When the central battery unit is in battery use, and the battery voltage falls below 19.2 V, the central battery unit goes into deep discharge mode, where the battery discharge is stopped.

*Deep discharge* LED is lit

*Deep discharge* LED stays lit until it has been reset with the *reset/test* button.

The central battery unit can be changed to battery mode also remotely, if this mechanism is adopted.

*Mains oper.* LED is lit

*Battery oper.* LED is lit

If the batteries are not in place, the charger does not charge, the battery fuse is blown, or if the batteries do not take in charging current, the following alarms are displayed on the control panel:

*Mains oper.* LED is lit

*Over voltage* and *Under voltage* LEDs are lit at the same time

## 2.6. Alarm relay outputs

Malfunction alarm: - Alarms, when a malfunction is detected.

Functional alarm: - Alarms when the central battery unit is in battery use.

## 2.7. Remote control

Remote control on: - *Mains oper.* and *Battery oper.* LEDs are lit

## 3. System installation

**Only a qualified electrical worker may perform system installation and implementation. No connections in the central battery unit should be made with voltage on!**

System installation takes place according to the electrical design or the electrical work explanation.

In the starting phase, the main switch must be in position 0 and the battery fuses should not be connected. The batteries are placed inside the central battery unit ( $\leq 38$  Ah), or inside a separate battery cabinet ( $> 38$  Ah). In the battery cables there are alternatives for two different connectors. The excess in the battery cables is cut off and the peeled cables are connected into the battery fuses. The batteries are connected in series (2 x 12 V) into the + (red) and – (black) cables reserved for them. The battery **temperature sensor is placed between the batteries**. Check the battery polarity.

The feeding cable is brought to the connectors L, PE and N. After this, the maintained and non-maintained circuits are connected to TS10/Circuits 1-8 and (in TKT4188) to TS11 / Circuits 1-8. The circuit fuses are located in the fuses F1-F8 (see *Appendix 4, Connections*). The central battery unit outputs are connected with the "Mode" wire loops (see *Appendix 2, Connections*) in steps of two circuits, either as maintained or non-maintained circuits, in the following way:

"Mode" loop connected: Maintained circuit

"Mode" loop not connected: Non maintained circuit



"Mode" loop always controls two output circuits.

"Mode 1" circuits 1-2

"Mode 2" circuits 3-4

"Mode 3" circuits 5-6

"Mode 4" circuits 7-8

At the factory, all the circuits in the central battery unit are set as maintained. The circuits, that are required to be used in non-maintained mode, must have their "Mode" wire loop removed.

**Disconnecting the "Mode" wire loops is performed in the following way: grab the insulator of the wire loop connector with needle-nose pliers and pull the connector off. The wire loop should not be pulled off of the wire or removed by pressing on the connector, because this may damage the connector.**

The alarms and the remote control switch are connected to the connectors as shown in *Appendix 4*. The only allowed light source for the remote control signal light is a LED with power consumption of below 30 mA.

## 4. Implementation

**Only a qualified electrical worker may execute system installation and implementation.**

**The type label located inside the central battery unit should be marked with the total load capacity connected to the central battery unit, and the time at rated load should be marked in the two empty columns.**

At the factory, the central battery unit and the luminaires are subjected to bleeding, resistance insulation and grounding tests according to the low voltage directive. For the duration of the real-state insulation resistance testing of the cables, the central battery unit network input and circuit outputs must be short-circuited.

When the necessary installation and cabling checks and tests have been performed, turn the network feed on using the main switch S1, and turn the battery fuse F2 in position 1.

*Mains oper.* LED is lit.

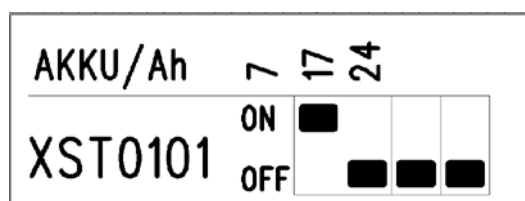
### 4.1. Setting the charging current

The charging current is set if the factory for the minimum value.

**The charging current must be set/checked in the following way:**

Set the current using the DIP switch on the charging card XST0101, as indicated in the instructions. NOTE! Charging must be set according to the number of ampere hours (Ah) of the batteries used. If the value has not been set correctly, the batteries may be damaged. When all the DIP switches are in the OFF position, the charging current is set for 17 Ah batteries. Other battery sizes are according to the label. The label below shows the 17 Ah charging current setting, as an example.

**NOTE! ALWAYS SET THE CHARGING CURRENT WITHOUT VOLTAGE!  
ONLY ONE DIP SWITCH CAN BE SWITCHED ON!**



## 5. Use

According to the EN 50172 standard, a visual check of the indicators of the emergency lighting system must be done daily, in order to make sure that the central battery unit works without problems. It is also recommended to check the functioning of the maintained exit luminaires visually each day. If the maintained luminaires connected into the central battery unit do not work and an alarm LED is lit on the monitoring panel of the central battery unit (see *Appendix 1*), the person responsible for servicing the system should be notified.

## 6. Maintenance

Maintenance of the emergency lighting system should be arranged according to the requirements of the local authorities. The maintenance of the central battery unit should be performed according to the EN 50172 standard.

Only a professional electrician may perform maintenance tasks that require opening of the central battery unit or the battery cabinet.

### 6.1 Maintenance procedures must be executed according to the EN 50172 standard

- the indicators of the emergency lighting system must be visually inspected daily
- the functioning of all the emergency and exit luminaires connected to the central battery unit must be tested with battery power every month
- once a year, the functioning of the luminaires must be tested with battery power for the nominal duration of at least 1 h, or longer if required
- tests and inspections made must be reported in the system maintenance manual, which must be shown to the authorities when requested

### 6.2. Changing the batteries

Batteries should be changed in the following order:

- remove the cover of the central battery unit
- remove the cover of the battery cabinet (if in use)
- turn the battery fuse F2 into position 0 (*Mains oper. LED, Over voltage and Under voltage LEDs are lit at the same time*)
- turn the main switch S1 into position 0 (display LEDs turn off = the central battery unit has no voltage)
- disconnect the battery cables from the batteries
- remove the batteries and install new ones
- place the temperature sensor of the batteries between the batteries
- connect the battery cables (*note the polarity and insulation distances*)
- turn the battery fuse F2 into position 1
- attach the cover of the battery cabinet (if in use)
- attach the cover of the central battery unit
- turn the main switch S1 to position 1

**After changing the batteries and performing a functional test, it is normal that *Under voltage LED is lit. If alarms have been connected, the central battery unit also gives a malfunction alarm. Under voltage LED and alarm stop when the battery voltage rises to 25.3 V.***

## 7. Removing from use

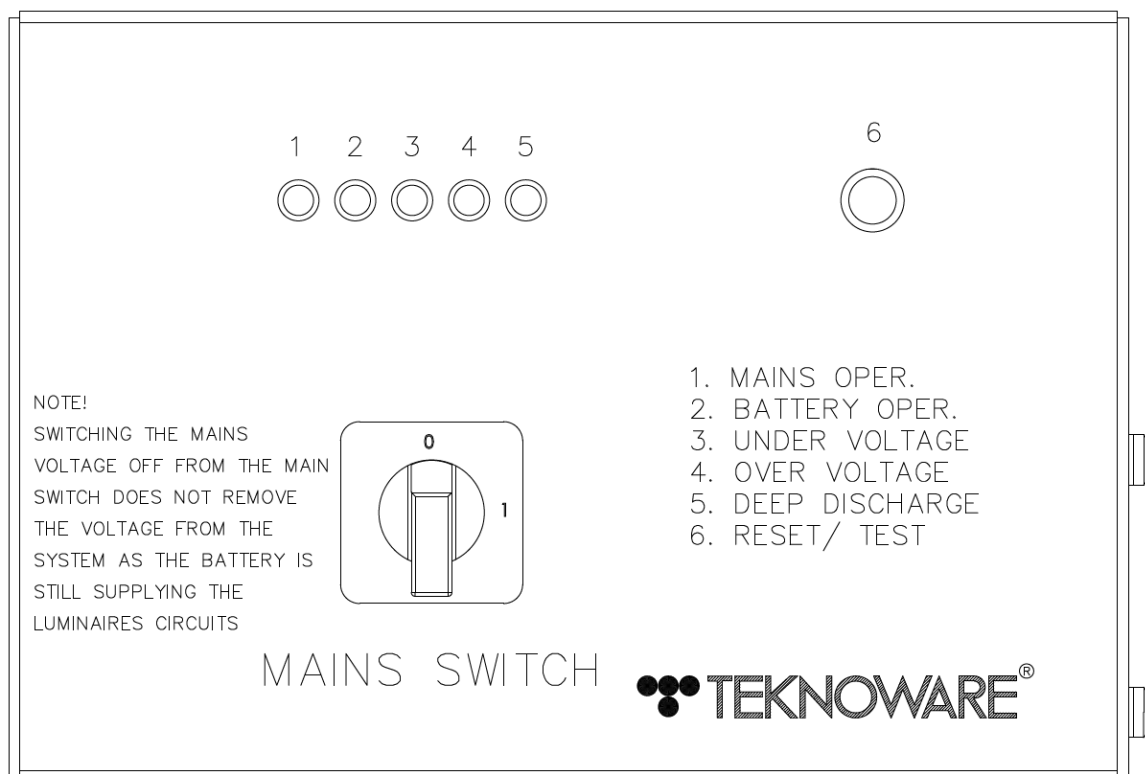
When removing the central battery unit system and its components from use, the following must be taken into consideration:

Batteries and fluorescent lamps are hazardous waste. Metallic parts can be delivered to aluminium or steel waste. Wires, connectors and printed board assemblies are electronics waste. Plastic parts should be sorted according to material markings.



## APPENDIX 1

## Central battery unit control panel



## Explanations of the LEDs:

Signal LED	Explanation:	Normal mode with network use:
MAINS OPER.	- The central battery unit works normally from the electrical network - The batteries are charged	LED lit
BATTERY OPER.	- The central battery unit is in battery use	LED is not lit
OVER VOLTAGE	- The battery voltage is higher than normal (over 28.8 V)	LED is not lit
UNDER VOLTAGE	- The battery voltage is lower than normal (under 25.2 V)	LED is not lit
DEEP DISCHARGE	- The deep discharge protection of the battery has tripped (the voltage has dropped under 19.2 V during a power failure)	LED is not lit
MAINS OPER. AND BATTERY OPER. LEDS ARE LIT	- The central battery unit is in battery use mode (the central battery unit has a remote switch connected and turned on, or a wire loop is missing from the remote control connectors 7-8)	-
OVER VOLTAGE, UNDER VOLTAGE AND MAINS OPER. LEDS ARE LIT	- There is a malfunction in the charging circuit (batteries are not charging)	-

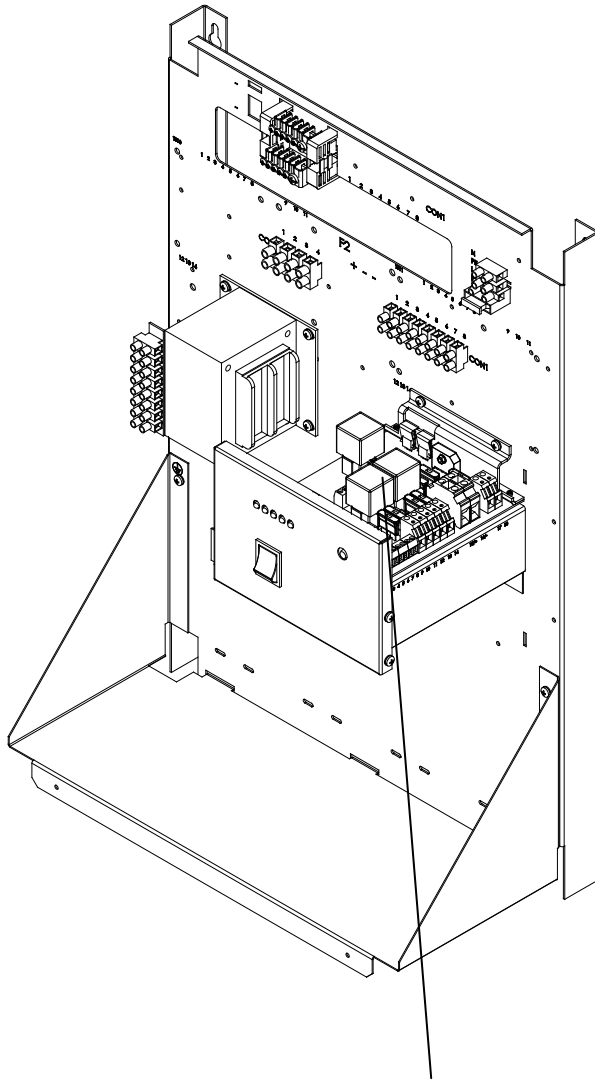
## Buttons

Reset/Test	Deep discharge protection alarm reset / the button for the short-time battery use test (the central battery unit stays in battery use while the button is pressed)
Mains switch	Disconnects the electrical network feed from the central battery unit. The duration test of the batteries can be performed by turning the mains switch to position 0.



## APPENDIX 2

### Placement of the components

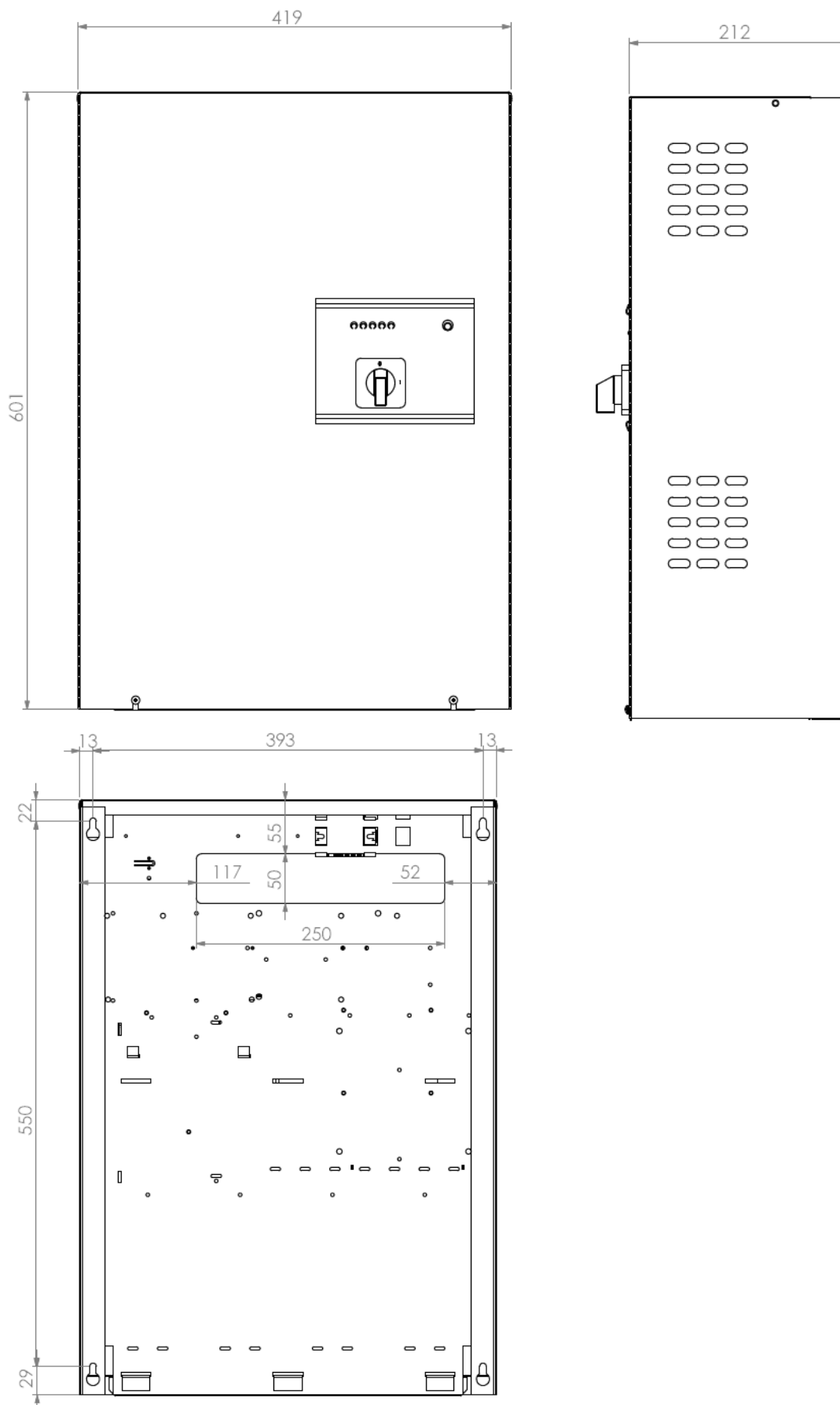


XST0102 controller card with the current-setting DIP switch

AKKU/Ah	7	17	24
ON	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
XST0101	OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

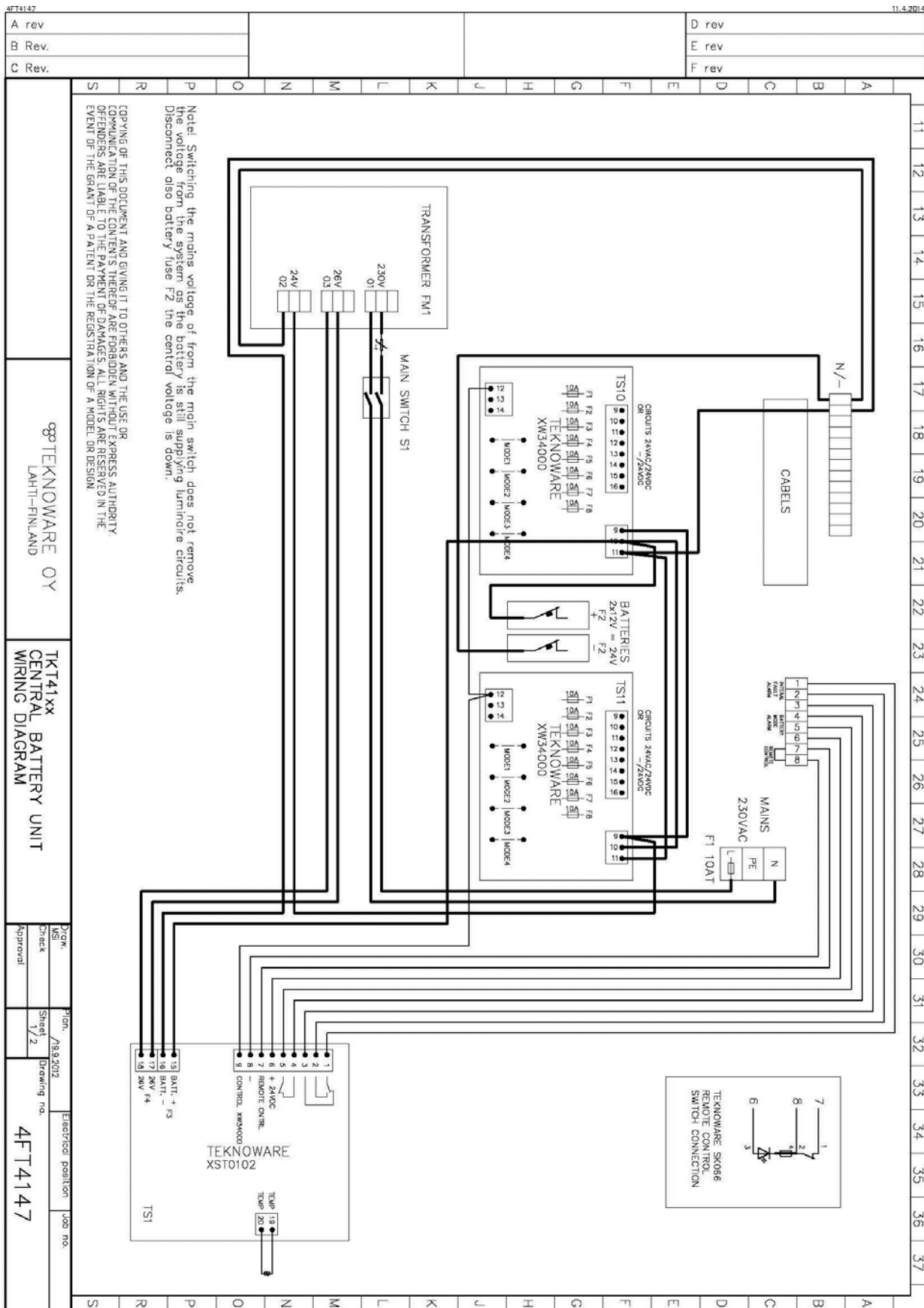
## APPENDIX 3

## Mechanical measurements



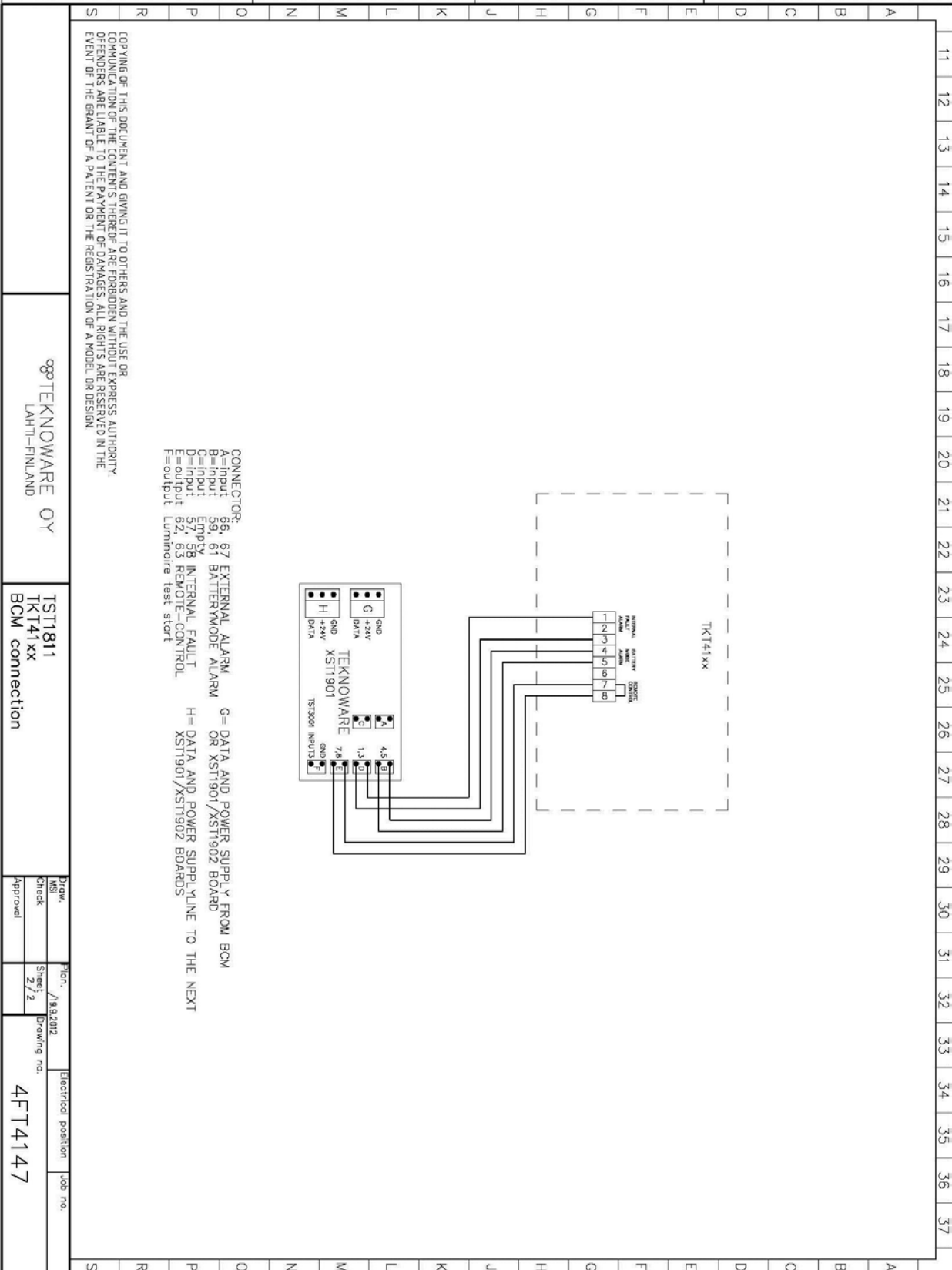
APPENDIX 4

Connections



4FT4147

A rev		D rev
B Rev.		E rev
C Rev.		F rev



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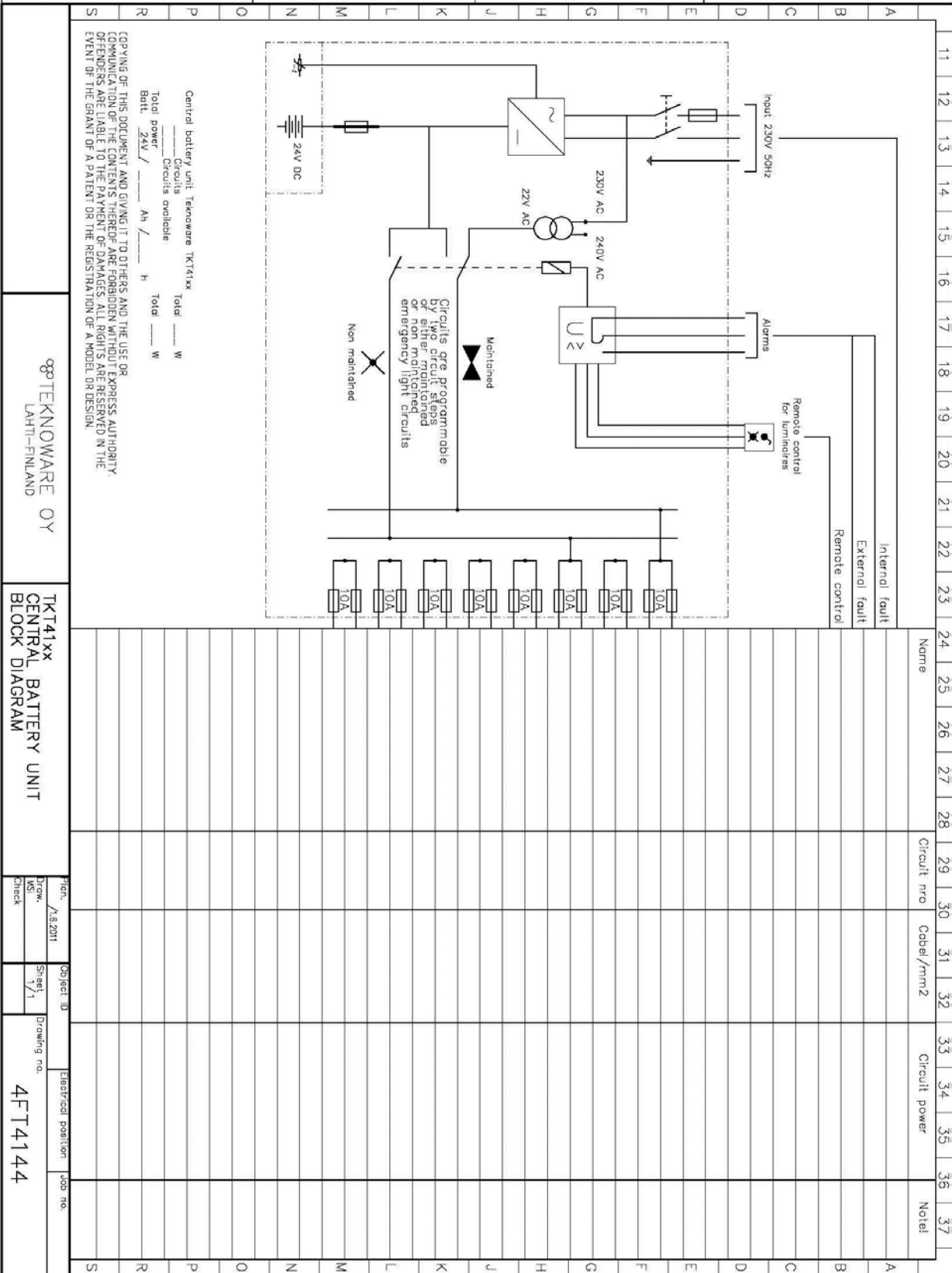
TST1811  
TKT41xx  
BCM connection

Dwg. No.	Proj.	Electrical position	Job no.
Check	/19.9.2012		
Approval	Sheet 2/2	Drawing no.	4FT4147



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A rev	D rev
B Rev.	E rev
C Rev.	F rev



Name	Circuit nro	Cable/mm2	Circuit power	Note1
Internal fault				
External fault				
Remote control				
Alarms				

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LAHTI-FINLAND

TKT41xx BATTERY UNIT  
CENTRAL BATTERY UNIT  
BLOCK DIAGRAM

Drawn: /13.2011	Object ID:	Electrical position:	Job no.:
Check:	Sheet: 1/1	Drawing no.:	
		4FT4144	



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