

Kraftaggregat SM8420E

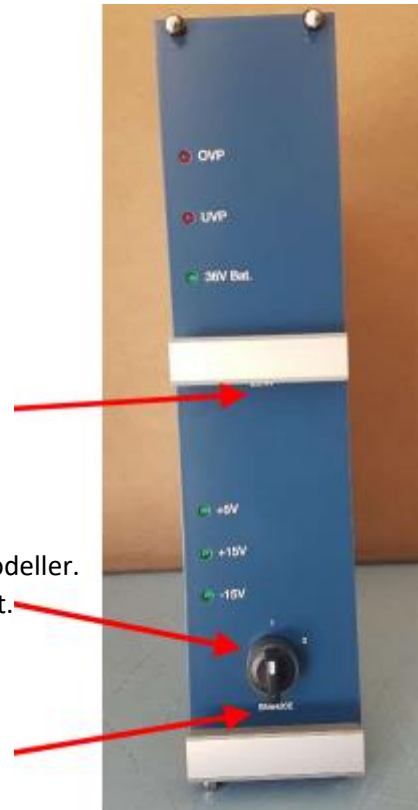
Funktionen för SM8420E är i grund och botten samma som för SM8420D, vars tekniska specifikationer beskrivs i faktablad för SM8420D (03.08.1994). SM8420E skiljer sig på några punkter som beskrivs nedan.

Täckplatta

På täckplattan står information om att kraftkortet innehåller en säkring på 6,3 AT.
(Säkringen är av typen 5x20mm 6,3A Trög, se text nedan.)

En vridknapp har ersatt nyckelbrytaren som fanns på tidigare modeller.
"1" betyder att kraftkortet är påslaget och "0" att det är avstängt.
(Vridknappen vrids 60 grader mellan de två lägena.)

På täckplattan står modell på kraftkortet: **SM8420E**.



Säkring

Säkringen är monterad högst upp på kraftkortet mot uttaget på baksidan. Den sitter i en hållare med bajonettfattning. Vrids kvarts varv och dras ut, så följer säkringen med. Utformningen av kretskortet har gjorts för att underlätta åtkomsten till säkringen.

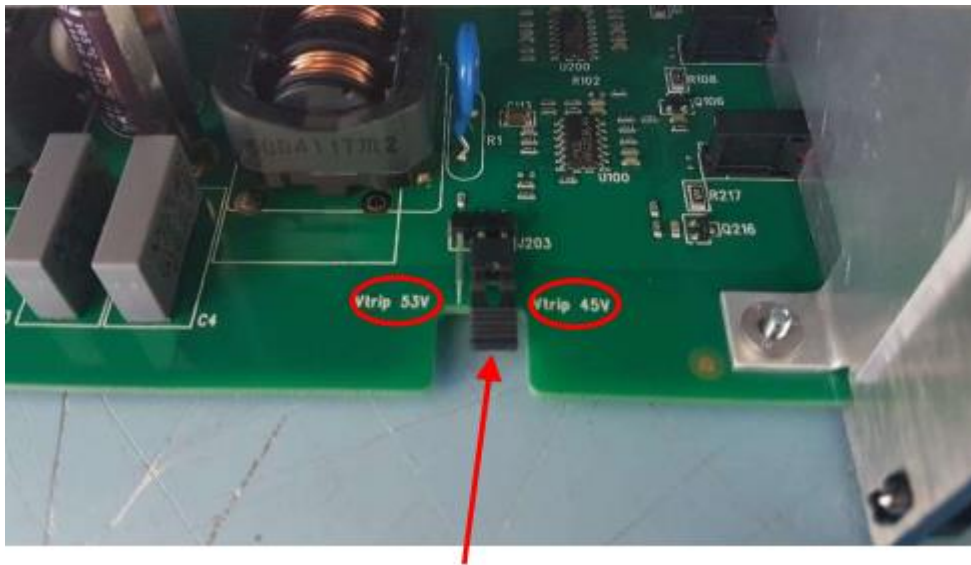
Säkringen är av typen 5x20mm 6,3A Trög.



Elektriska parametrar

Spänningsområdet för **SM8420E** har utökats till 36VDC -20% / +45% (29- 52VDC).

Liksom tidigare modeller har **SM8420E** ett larm för över- och underspänning. Det går ut via uttaget på baksidan till FST-skåpet som **SM8420E** sitter i.



En nyhet jämfört med tidigare modeller är att det är möjligt att välja en övre spänningsgräns på antingen 53VDC eller 45VDC (45VDC är det fasta värdet i tidigare modeller).

Detta görs med flyttbar bygel som sitter till höger på toppen av kraftkortet. Ställs flyttbar bygel till höger löser alarmet ut vid ca 45VDC. Om det istället ställs till vänster löser alarmet ut vid ca 53VDC. (Vid leverans är **SM8420E** inställt på 45VDC eftersom det bäst motsvarar tidigare modeller.)

EMC (Elektromagnetisk kompatibilitet)

SM8420E har testats av erkänt laboratorium och uppfyller följande standarder:

Emission: Product family standards, Railway applications Electromagnetic compatibility Part 4: command and control Apparatus EN 50121-4:2016

Immunity: Product family standards, Railway applications Electromagnetic compatibility Part 5: Fixed power supply Apparatus EN 50121-5:2017.

Sidorna 0, 1-4, 6-7 och 10 angående SM8420D från faktablad från NKT / Danica Supply ligger med som bilaga.

SM8420D

NKT A/S.

SM8420D/TPS 150

36/5/15/15

SAG 159

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Introduction.

The NKT SM 8420D power supply is housed in an Europa-card plug-in module. The housing is rugged and steady against hard environmental conditions. The parts in it consist of coated and anodized aluminium components screwed together so adjustments and repairs are easily carried out.

The power module consist of one printed circuit board, a mother board, with all components included. On the rear panel two 15 pin DIN 41612 connectors transmit all inputs and outputs from the power supply module.



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Specification

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Input : 36 V DC (29 - 44 V DC).

Outputs : OUTPUT 1. OUTPUT 2. OUTPUT 3.

+ 5 V $\pm$ 2 % + 15 V $\pm$ 5 % - 15 V $\pm$ 5 %

15 A. 2 A. 1 A.

Line regulation : < 10 mV < 20 mV < 150 mV

Load regulation :
 3 - 15 A < 5 mV
 0.5 - 2.0 A < 250 mV
 0.1 - 1.0 A < 250 mV

Ripple : Maximum 100 mV peak-peak measured at 20 MHz band width.

O.V.P. : < 7.2 V

Alarm Circuits : The alarm circuit is turned on for voltage higher than + 45 V, and for voltage lower than + 29V. ON connects P01.28 with P01.26. OFF connects P01.28 with P01.30.

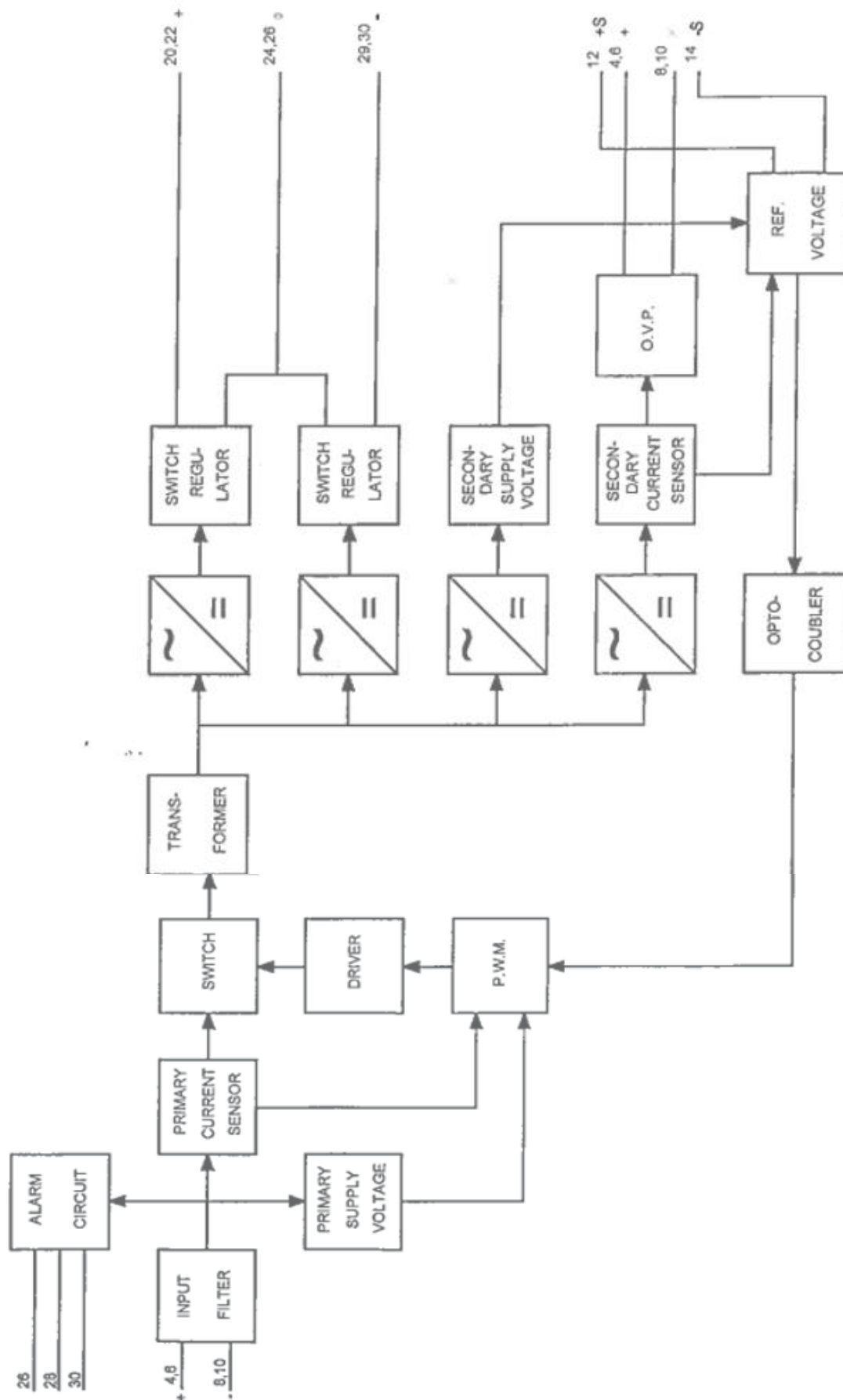
Sensing circuit : Remote sensing of the + 5 V output voltage is available on.

Connectors : Two DIN 41612 form H15 connectors are positioned on rear panel.

Dimensions : Depth : 175 mm. Width : 60 mm. Height: 262

Weight : The weight is approx. 1.4 kg.

Standards : The DANICA TPS 150 power supply meets the " Cirkulære 32 af Statens Teleråd " specification : EMI/EMC : ER 10.2 and ER 12.2, EE20.1 and P&T (Post- og Telegrafvæsenet) standards for DC powersupply (Appendix 2 Climatic environment KR 32.2, KR 45.1 and extended climatic range (70 °C).
 Mechanical environment MR 50.1, MR 56.1 and MR 58.
 The MTBF rate (Mean Time Between Failure) is calculated to minimum 100.000 hours (MIL-HDBK-217 D, PARTS STRESS GF 45 °C).



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Operational principles

This section refers to

Alarm circuit function

Block diagram

Circuit diagram mother board

Siemens TDA 4718

Danica TPS 150 power supply is designed for operation on a 29 - 44 V DC input voltage. The switch mode circuitry principles is used for maximum efficiency and reliability generating a + 5 V (8 A), a + 15 V (2 A), a - 15 V (1 A) voltage. The switching frequency is set to 50 kHz.

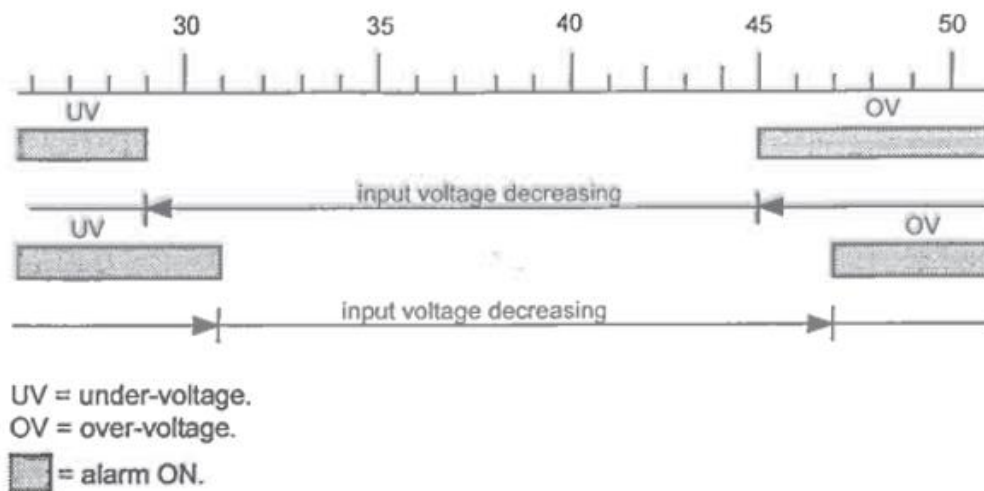
A Pulse width modulator integrated circuit U1 operates as the basic control circuit, where the R6 resistor and the C6 capacitor set the switching frequency. For further understanding of how the U1 operates - see page 11.

The slope of the ramp generator is controlled by the R5 resistor. The R11 and R12 resistors divide the current limiter voltage. The voltage across the current sense transformer controls the primary current limiter. The C4 capacitor sets the so-called " soft start time". A section of the circuitry U1 controls all 3 output voltages. If the voltage on pin 6, pin 10 (- V_{REF}), and pin 11 (- V_S) is below level the complete system shuts down and the soft start-up will come. The U2 integrated circuit functions as a buffer for the two FET-switches Q4 and Q5. The + 5 V output voltage is controlled via U8 and U9. The U9 also functions as a current limiter using the resistor R35 voltage drop as reference. The control signal is sent via the U6 opto-coupler back to primary control U3 and U1.

The + 5 V, + 12 V, and - 12 V outputs are protected with constant current limiting circuits. Further the + 5 V main output is protected against transients with the Q61 thyristor.

The input voltage level is supervised by a built-in circuitry. The over-voltage alarm level is set to (45) / (47) V. The under-voltage alarm level is set to (29) / (31) V. Figure 1 demonstrates the alarm function, which is indicated by LEDs and relay switching. The alarm signal is controlled by the U100 integrated circuit, the Q102 transistor and the K1 100 relay. The relay-switches are connected to the output connector P01.

Figure 1 : Alarm circuit function. When the function is ON either the over-voltage or the under-voltage control lamp light and the relay switches.



The + 15 V and - 15 V step-down converters (switch regulators) are controlled by the U201, U301 circuits. These are monolithic integrated circuits which feature P.W.M. (Pulse Width Modulation) control of switch-mode power supplies. The control current is lead to the U203, U303 transistors.

The Q203, Q303 emitter current charges the C211-213, C311-313 capacitors via a choke. With Q203, Q303 turned on the transistor functions as a current source. With Q203, Q303 turned off the charging current is supplied via the free-wheeling diode D203, D303. The switching frequency is set to 24 kHz.

The integrated circuit U201, U301 function as a current limiter. The voltage across the current sensing resistor R215, R315 is compared with an internal reference voltage. The Q205, Q305 input voltage level increases when V_{R315} , V_{R415} reaches V_{REF} . Then U201, U301 shuts down and reduces the pulse width of the Q203, Q303 switching transistor.



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Connections

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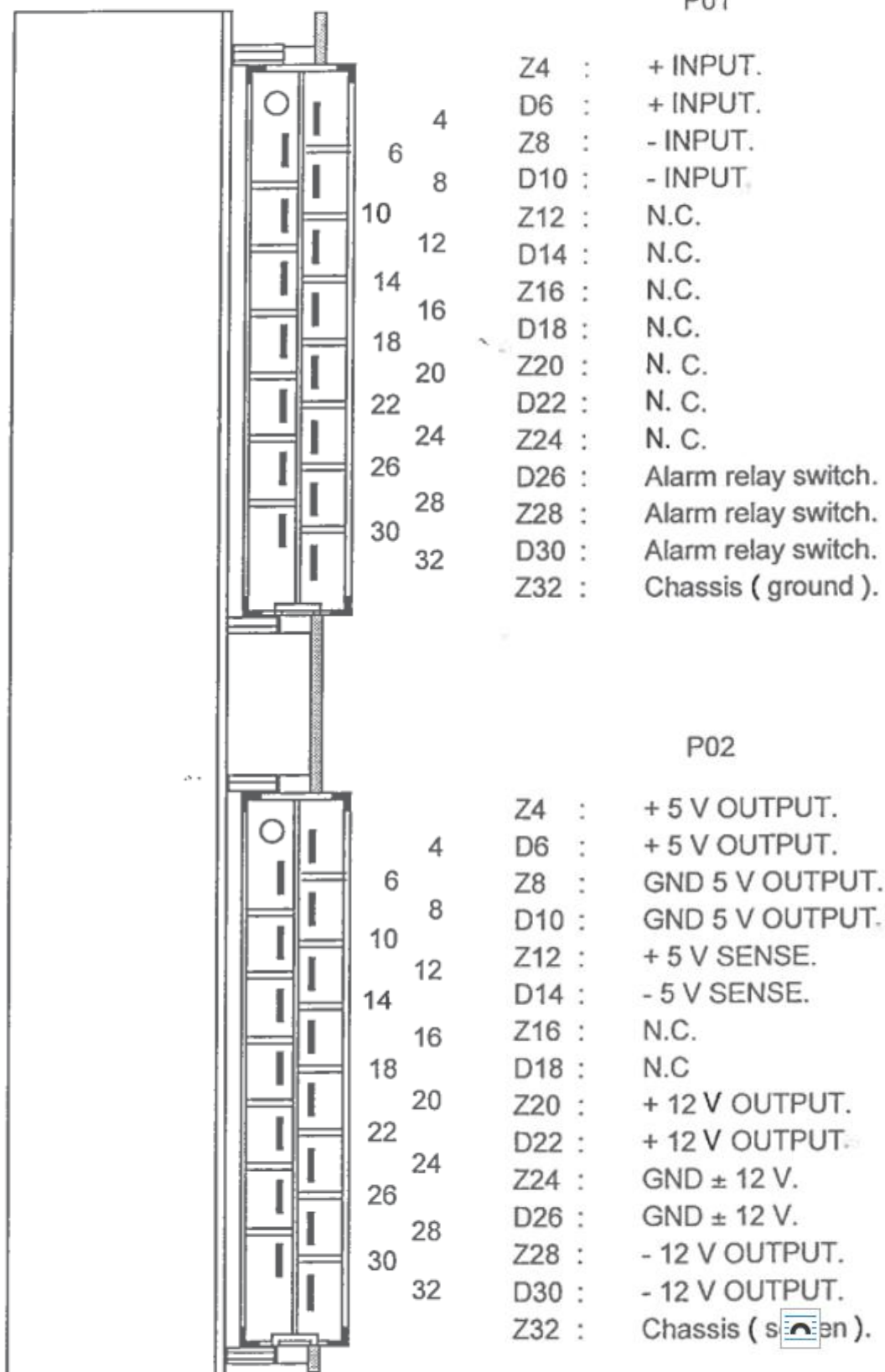


Figure 2.