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the HULK inode
Specification

Revisionshistoria - *Revision history*

Rev	**Namn - *Name***	**Datum - *Date***	**Ändring - *Change***
PA2	Åke Hedman	2001-10-15	Transfer of document to /LaTex and using the inode protocol instead of M.U.M.I.N.
PA1	Åke Hedman	2000-07-11	Start of version 2

Contents

1 What it is

This document describes the HULK an inode that is used to control a bioenergy system that controls the heat in a house. The inode measure the boiler temperature and also, as a security measure, the fuel screw temperature.

For this implementation an Atmel AVR 2313 processor is used.

2 inode register definitions

2.1 Registers

Address	*Description*
0x00	SmartTemp sensor core degrees centigrade. Read only.
0x01	SmartTemp sensor core. Absolute minimum value. Stored in EEPROM.
0x02	SmartTemp sensor core. Absolute maximum value. Stored in EEPROM.
0x03	SmartTemp sensor core. Control register. Stored in EEPROM.
0x04	SmartTemp sensor core. Alarm low threshold. Stored in EEPROM.
0x05	SmartTemp sensor core. Alarm high threshold. Stored in EEPROM.
0x06	SmartTemp sensor transport degrees centigrade. Read only.
0x07	SmartTemp sensor transport. Absolute minimum value. Stored in EEPROM.
0x08	SmartTemp sensor transport. Absolute maximum value. Stored in EEPROM.
0x09	SmartTemp sensor transport. Control register. Stored in EEPROM.
0x0A	SmartTemp sensor transport. Alarm low threshold. Stored in EEPROM.
0x0B	SmartTemp sensor transport. Alarm high threshold. Stored in EEPROM.
0x0C	SmartTemp sensor room in degrees centigrade. Read only.
0x0D	SmartTemp sensor room. Absolute minimum value. Stored in EEPROM.
0x0E	SmartTemp sensor room. Absolute maximum value. Stored in EEPROM.
0x0F	SmartTemp sensor room. Control register. Stored in EEPROM.
0x10	SmartTemp sensor room. Alarm low threshold. Stored in EEPROM.
0x11	SmartTemp sensor room. Alarm high threshold. Stored in EEPROM.
0x12	Output pin values.
0x13	Input pin values.
0x14	Temperature hysteresis in degrees centigrade.
0x15	Preset core temperature in degrees centigrade.
0x16	State of internal state machine.

2.2 Temp control register definitions

Bit	*Description*
Bit 0	Reserved for future use.
Bit 1	Reserved for future use.
Bit 2	Reserved for future use.
Bit 3	Reserved for future use.
Bit 4	Reserved for future use.
Bit 5	Low level alarm active.
Bit 6	High level alarm active.
Bit 7	Alarm Flag.ăThis flag is reset by a register read.

3 Alarm

An alarm condition exists until it is cleard by the host reading the alarm bit.

4 Pin usage on the AVR 2313

Pin	*Description of usage*
PD0 - 2	Reserved for future use.
PD1 - 3	Reserved for future use.
PD2 - 6	2504 PIO output.
PD3 - 7	1-wire data line.
PD4 - 8	Reserved for future use.
PD5 - 9	Reserved for future use.
PD6 - 11	Temperature, room.
PB0 - 12	Temperature fuel transport.
PB1 - 13	Temperature boiler.
PB2 - 14	Fuel transport motor control.
PB3 - 15	Fan control (primary air supply).
PB4 - 16	Alarm output.
PB5 - 17	Critical temperature.
PB6 - 18	Fuel level low.
PB7 - 19	Fuel level high.

5 Flat cable usage

Pin	*Description of usage*
1	No connect.
2	No connect.
3	No connect.
4	Solid state relay 2 (Stoker fan).
5	Solid state relay 1 (Fuel motor).
6	Alarm.
7	Plint 01 - Core temperatur (Smarttemp output).
8	Plint 02 - Min fuel level stoker (10K pull-up).
9	Plint 03 - Max fuel level stoker (10K pull-up).
10	Plint 04 - Fuel transport temperature.
11	Plint 05 - No function.
12	Plint 06 - Boiler max. temp switch (10K pull-up).
13	Plint 07 - Critical temp input.
14	1-Wire data.
15	1-Wire ground.

6 Plint cable usage

Slot	*Description of usage*
R	380 V R phase.
S	380 V S phase.
T	380 V T phase.
0	380 V neutral.
U	380 V R phase to fuel transport motor (After relay).
V	380 V S phase to fuel transport motor (After relay).
W	380 V T phase to fuel transport motor (After relay).
1	230V to solid state relay 1 (Fuel transport motor).
2	230V to solid state relay 2 (Stoker fan).
01	Flat cable 6 - Alarm.
02	Flat cable 7 - Boiler core temperatur.
03	Flat cable 8 - Stoker min. fuel level.
04	Flat cable 9 - Stoker max. fuel level.
05	Flat cable 10 - Fuel transport temperature.
06	Flat cable 11 - Reserved.
07	Flat cable 12 - Max. boiler temp switch.
08	Flat cable 13 - inode 1-wire data.
09	Flat cable 14 - inode 1-wire ground.
10	inode GND
11	inode +5V

7 Cable to/from stove level sensors

Control unit side	emphContact side	*Description of usage*
26	4	Reserved for future use.
21	5	Low fuel level switch.
25	1	High fuel level switch.
23	2	High fuel level switch.
22	3	Reserved for future use.
24	6	Low fuel level switch.

8 Boiler temp unit

This unit is located on top of the boiler and have sensors for critial temperature (absolute maximum temperature) and manual preset temperature and a Smarttemp sensor in the boiler for boiler water temperature.

Color	*Description of usag*
green	0V
white	The maxumim temp this temperature is gone down.
blue	0V.
white	0V if boiler core te ture. Will float othe
orange	+5V to boiler core
white	Boiler core tempera
Sock	Ground.

9 Working states

9.1 OFF_STATE

- Fan off
- Motor off

9.2 ON_STATE

- Fan on
- Motor on if NOT high level fuel switch active.
- Motor off if high level fuel switch active.
- GOTO WAIT_STATE if temp>=preset temperature

9.3 WAIT_STATE

- Fan off
- Motor off
- GOTO KEEP_ALIVE_STATE if low fuel level switch active.

9.4 KEEP_ALIVE_STATE

- Fan on
- Motor on if NOT low level fuel switch active.
- Motor off if low level fuel switch active.
- GOTO WAIT_STATE if high level fuel switch active (Error condition).
- GOTO ON_STATE if temp < preset temperature - hysteresis.