Manual extension

Crate ECH 228 x or 328 x to

Crate ECH 238 x or 338 x and option UPS

with CAN-Control

The crates ECH 238x and ECH 338x are supplied with a controller for remote and monitoring control via CAN-bus.
Option UPS:
together with an UPS and a battery back up, short term power failure (<10s) can be bridged and in case of longer AC power failure a defined shut down procedure for the HV modules is guaranteed.

Installation

After unpacking the crate has to be installed under the described condition.
For crates with UPS option the 16A fuse which is included has to put into the fuse holder on the rear side.
Afterwards the battery is activated.
With AC line ON the crate is in Stand-by mode.

Technical Data version 1.	
CAN bus speed	20, 50, 100, 125 and 250 kbit/s
Analogue functions	ADC with 10-Bit resolution, control of supplies voltages and temperature of this crate.
Digital functions	ON – and OFF switch of internal supply voltages via CAN-Bus in Stand-by mode
Power-ON/OFF	Power cable connected and AC line is ON, now the crate is in Stand-by mode. In Stand-by mode the internal DC supply voltages can be switched ON and OFF with help of a push button, even if no CAN-control is present.
With option UPS	In case of AC power failure the internal voltages are saved by the acc. battery. If the power is failing more than 10 sec. a signal will be provided , which is going to start a defined shut down procedure. (HLH- impulses on each module-slot, Pin b13). The bridge time for the battery is 1 min at least.

CAN-Interface

The CAN-control is completely configurable via software. Structures corresponding to CAN-Open (CAL-based Draft Standard 301 / release 3.0) will used.

After Power_ON-Reset the controller is running into CAN-Status “Initialisation“. During this state Write access is possible to all EEPROM-cells via the sub identifier. If control is already configured (e.g. from factory), control is running into CAN-status “Pre-operational”.

Only in these both states it is possible to work with services Network-Management (NMT) and Distribution - Management (DBT).

iseg Spezialelektronik GmbH
Bautzner Landstr. 23
D - 01454 Radeberg / Rossendorf
Email: sales@iseg-hv.de
http://www.iseg-hv.com
Germany
Phone ++ 49 (0)351 / 26 996 - 0
Fax ++ 49 (0)351 / 26 996 - 21

CAN-Status “Pre-operational“ is necessary for the further description.

In order to allow the control of the crate via CAN-Bus, with global command „START“ the CAN-Status „Pre-operational“ will be switched into CAN-Status “Operational“:

Services	ID (with RTR=0)	DLC	DATA_1
Network - Management (NMT)			
START / STOP / RESET global	0	1	Bit 0 = 1 ⇒ Start Bit 1 = 1 ⇒ Stop Bit 2 = 1 ⇒ Reset CAN-interf. Bit 3 = 1 ⇒ Reset Controller

Now control can work via two identifier (see ID - Distribution):

1. Control (EMCY-ID)

The internal supply voltages will be controlled cyclically (V_{Meas} ca all 100 ms). The voltage control is factory fixed with $\Delta V = \pm$ 5% given through tolerance values $V_{Trehsold}$ in an EEPROM. If the thresholds of voltage and/or temperature will be exceeding then the controller is sending a message with EMCY-ID to the Bus (send only).

Controls of EMCY-ID´s are working only after the controller has been set into Operational mode with NMT-Start.

ID	RTR	DLC	Voltage	DATA_2	DATA_3	DATA_4	DATA_5			
EMCY-ID	0	5	0 0 0 0 0 x x x	12-bit unsigned ADC-word: V_{Meas}		12-bit unsigned ADC-word: $V_{Threshold}$		xxx:	000 001 010	+ 24 V = $V_{Nominal\ 0}$ + 5 V = $V_{Nominal\ 1}$ $24V_{Battery}$ = $V_{Nominal\ 2}$
				V_{Meas} resp. $V_{Threshold} = V_{Nominal\ x} * ADC\text{-word} / 2048$						

ID	RTR	DLC	Temperature	DATA_2	DATA_3	DATA_4	DATA_5			
EMCY-ID	0	5	0 0 0 0 0 x x x	0	T_{Meas} [°C]	0	$T_{Threshold}$ [°C]	xxx:	011 100 101 110	temperature sensor 1 (24V-DC PS) temperature sensor 2 (Back plane) temperature sensor 3 temperature sensor 4 (3 and 4: reserved)

ID	RTR	DLC	AC line power failure signal	DATA_2	DATA_3	DATA_4	DATA_5			
EMCY-ID	0	5	0 0 0 0 0 x x x	0	0	7	7c	xxx:	111	AC line power failure

2. Subidentifier (Sub-ID)

E-command	ID	RTR	DLC	r/w								DATA_n	Remarks
Multiplex-command	Sub-ID	0	x	x	0	x	x	x	x	x	x		multiplexed DAC/ADC – work on channels of selected module (Sub-ID)
ADC	Sub-ID	0	1	1	0	1	0	0	x	x	x		Read Access, (call from host)
	Sub-ID	0	3	1	0	1	0	0	x	x	x	2 Byte ADC-word	$V_{Meas} = V_{Nominal\ x} * ADC\text{-word} / 2048$ xxx: 000 + 24 V = $V_{Nominal\ 0}$ 001 + 5 V = $V_{Nominal\ 1}$ 010 $24V_{Battery}$ = $V_{Nominal\ 2}$
	Sub-ID	0	4	1	0	1	0	0	x	x	x	2 Byte ADC-value 1 Byte fan status	ADC-value = Temperature [°C] Bit b0 for fan 1 (DC-PS) and bit b1 for fan 2 to 4 (on the rear) Fan status in b0/1: 0: stage 1, 1: stage 2, full cooling xxx: 011 temperature sensor 1 (Back plane) 100 temperature sensor 2 (24V-DC Power supply) 101 temperature sensor 3 110 temperature sensor 4 (3 and 4: not installed)
	Sub-ID	0	3	1	0	1	0	0	1	1	1	1. Byte AC line power status 2. Byte crate power status	Status AC line power 1: AC line power OK 0: AC line power wrong Capture status if voltages were out of range. Bit b7=1 temperature to high Bit b5=1 +24V to high Bit b4=1 +24V to low Bit b3=1 +5V to high Bit b2=1 +5V to low Bit b1=1 24V battery voltage to high Bit b0=1 24V battery voltage to low
	Sub-ID	0	3	0	0	1	0	0	1	1	1	1. Byte AC line power status 2. Byte crate power status	In order to reset the AC power line status it have to be set bit 0 to one in DATA_1. In order to reset the corresponding bit of the crate status it have to be set in the DATA_2.

<table>
<tr><td rowspan="4">Module-command

EEPROM

/Tolerances</td><td>Sub-ID</td><td>0</td><td>x</td><td>x</td><td>1</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td></td><td colspan="5">Use module functions of selected module (Sub-ID)</td></tr>
<tr><td>Sub-ID</td><td>0</td><td>2</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>EEPROM-address</td><td colspan="5">Read / Write access, (call from host)</td></tr>
<tr><td>Sub-ID</td><td>0</td><td>3</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Data_1:
EEPROM-address</td><td colspan="5">Byte oriented reading of tolerances from EEPROM-address:
<table><tr><td>V</td><td colspan="2">Higher ADC-threshold</td><td colspan="2">Lower ADC-threshold</td></tr><tr><td></td><td>High</td><td>low</td><td>high</td><td>low</td></tr><tr><td>+ 24 V</td><td>0x3d</td><td>0x3e</td><td>0x3f</td><td>0x40</td></tr><tr><td>+ 5 V</td><td>0x41</td><td>0x42</td><td>0x43</td><td>0x44</td></tr><tr><td>$24V_{Battery}$</td><td>0x45</td><td>0x46</td><td>0x47</td><td>0x48</td></tr></table></td></tr>
<tr><td>Sub-ID</td><td>0</td><td>3</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Data_1:
EEPROM-address
Data_2:
tolerance high/low</td><td colspan="5">-byte oriented writing of tolerances on above EEPROM-address, tolerance = word ADC-threshold
-tolerance = (calculated set-ADC-value) $*$ $(1 \pm \Delta V)$</td></tr>
</table>

E-command	ID	RTR	DLC	r/w	Command							DATA_n																				Remarks
Module-commands	Sub-ID	0	x	x	1	x	x	x	x	X	x																					Use module function of selected modules (Sub-ID)
ON/OFF	Sub-ID	0	1	1	1	0	0	0	0	0	1																					Read / Write Access, (call from host)
	Sub-ID	0	3	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	1					x=0... switched on x=1... switched off Read/Write Access
ON/OFF	Sub-ID	0	3	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	x	0	0	0	0	0	0	0	1					x=0... switched on x=1... switched off Write Access
Bit rate	Sub-ID	0	1	1	1	0	0	0	0	1	1																					Read / Write Access, (call from host)
	Sub-ID	0	2	1	1	0	0	0	0	1	1	Data_0																				Bit rate [kBit/s] Read/Write Access
Bit rate	Sub-ID	0	2	0	1	0	0	0	0	1	1	Data_0																				New bit rate: only 20, 50, 100, 125 for bit rate [kBit/s] is allowed! Write Access
Unit-ID	Sub-ID	0	6	1	1	0	0	0	1	1	0	3 Byte BCD-unit-no. and 2 Byte BCD-software-release																				

These identifiers will be fixed by ID - Distribution (DBT) Service:

ID - Distribution (DBT) Service	ID	DLC	DATA_1	DATA_n							remarks
DBT - Master - Request	2024d 7E8h (RTR=1)	0									Call from host only by connected module: message address and ID´s of module
DBT - Slave - Service	2023d 7E7h (RTR=0)	8	mod.-addr.	2	3	4	5	6	7	8	Message with module address and corresponding ID´s
DBT - Master - Service	2024d 7E8h (RTR=0)	8	mod.-addr.	ADC -ID		EMCY -ID		Sub-ID		t	Allocate new ID´s t ... Inhibit-time: t ≈ 15 ∗ (ADC mux) ∗ t ms
DBT - Master - Service ⇓	2024d 7E8h (RTR=0)	2	0x80	module-addr.							Call from host to module address: message of ID´s to address
DBT - Slave - Service	2023d 7E7h (RTR=0)	8	mod.-addr.	2	3	4	5	6	7	8	Message with module address and the corresponding ID´s

Example:

	ID	RTR	DLC	Data
DBT-Master-Request send to crate	0x7E8	1	0	
recive from crate	0x7E8	0	8	0x30 0x00 0x00 0x40 0x00 0x60 0x00 0x00

mod.-addr. 0x30
EMCY-ID 0x400
SUB-ID 0x600

The remote control module will be configured with help of Network-Management (NMT) Service:

Network - Management (NMT)	ID	DLC	DATA_1	remark
NMT - Slave - Service (only in initialising mode)	2025d 7E9h	2	Mod.-addr. (0xFF)	After stop of CAN-Status (0x20): 0x80: Operational 0x40: Pre-operational 0x20: Initialisation
NMT - Master - Service	2026d 7EAh	2	Mod.-addr. old	Mod.-Adr. new, **Addr. 0x80 forbidden !**
Start / Stop / Reset	0	1	Bit 0 = 1 ⇒ Start Bit 1 = 1 ⇒ Stop Bit 2 = 1 ⇒ Reset CAN-Interf. Bit 3 = 1 ⇒ Reset Controller	

Maintenance

The crate and the included battery are free from any support. If the crate is not in use for more than half a year it has to be connected to mains and switched ON for at least 8 hours, so that the batteries will be charged to full capacity again. After 5 years time the batteries have to be replaced by new ones.