INSTRUCTION MANUAL

External Master Clock **C**hange **O**ver Unit ECO
for
ETC 24R, NMC, MTS,
DTS 480x.masterclock and
DTS 4135.timeserver

Certification of the Producer

STANDARDS

The device has been developed and produced in accordance with the EU Standards 89 / 336 / EWG.

Applied standards:
EN 61000-6-2
EN 61000-6-4

CE

References to the Instruction Manual

1. The information in this Instruction Manual can be changed at any time without previous notice.
2. This Instruction Manual has been composed with utmost care, in order to explain all details in respect of the operation of the product. Should you, nevertheless, have questions or discover errors in this Manual, please contact us.
3. We do not answer for direct or indirect damages, which could occur, when using this Manual.
4. Please read the instructions carefully and start the setting-up of the product, only once you have correctly understood all information for the installation and of the operation.
5. The installation must only be carried out by skilled staff.
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Content

Introduction

The ECO (External Master clock Change Over Unit) is a changeover unit designed for the master clock EuroTime Center ETC 24R, MobaTime Server MTS (ECO-MTS), Net Master Clock NMC, DTS480x, DTS4135. It allows the changeover of all the important peripheral functions in a redundant equipped system with two master clocks. It can be used in a similar way for NMC (Network Master Clock) and MTS (Moba Time Server).

1. System components

A standard installation contains two master clocks e.g. ETC 24R with active running reserve battery (24 V, 2.3 Ah) and one ECO. Please refer to the instruction manual (ETC BE-800337, MTS BE-800196, NMC BE-800400, DTS480x BD-800652, DTS4135 BD-800729) of the master clocks for installation, commissioning and configuration.

1.1 ECO block diagram

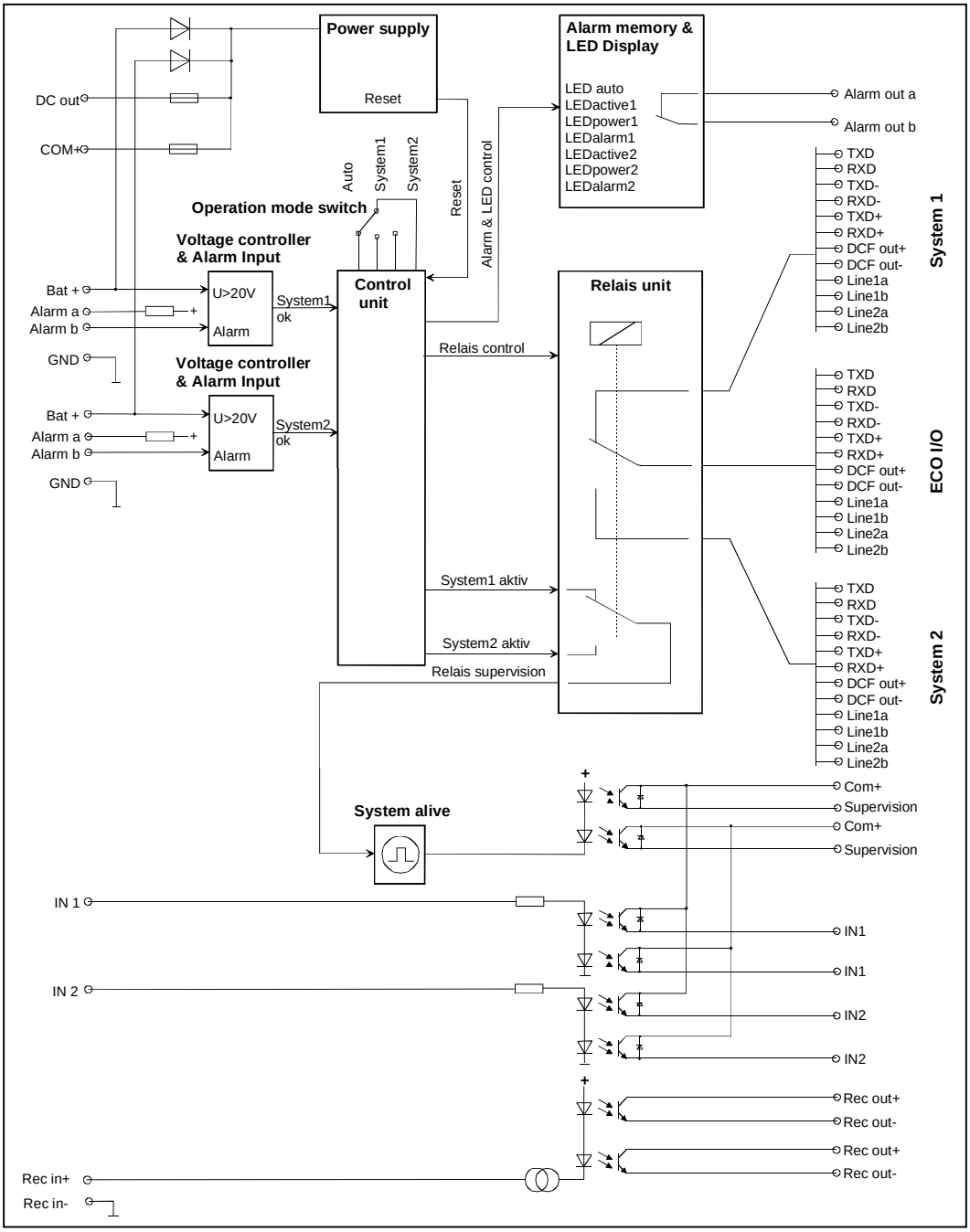


Fig. 1

2. Dimensions

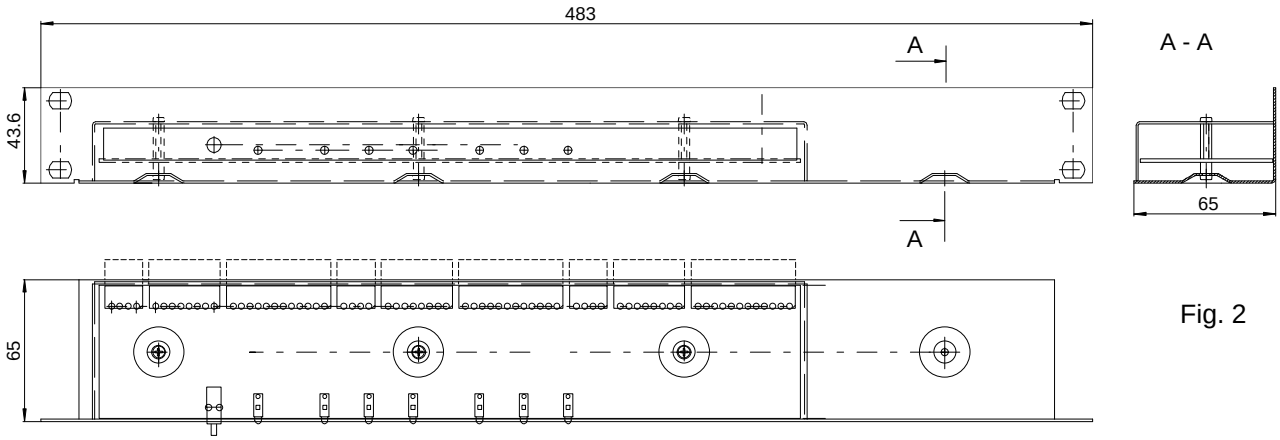
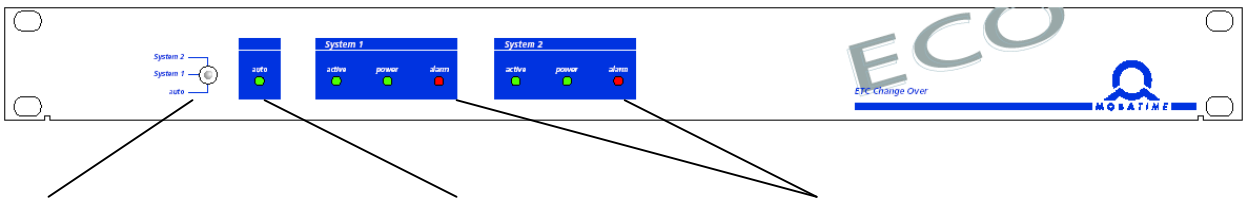


Fig. 2

3. Operation



Operation mode selection:

System 2
System 1
auto

Operation mode

LED on: auto

State system 1 / 2:

active
power
alarm

Fig. 3

Selection of operation mode:

Switch Position:	**Meaning:**
System 2	Master clock 2 is permanently selected as the active system
System 1	Master clock 1 is permanently selected as the active system
auto	Master clock 1 is working as the active system. In case of disfunction the ECO will change to master clock 2 automatically unless there is a disfunction too.

State indication (LED):

LED:	**State:**	**Meaning:**
auto	on	Operation mode ”auto” selected
	off	Operation mode ”System 1” or ”System 2” selected
active	on	System is currently active
	off	System is currently inactive
power	on	Power supply is available
	off	Power supply is not available
	flashing	Power failure occurred in the past (only in mode “auto”)
alarm	on	Active alarm on system reported
	off	Normal operation
	flashing	Alarm occurred in the past (only in mode “auto”)

Confirmation of stored alarms (only in mode “auto”):

A flashing LED (alarm or power) is either indicating a past alarm or a past power failure. If the switch position is changed the LED will stop flashing and all stored alarms will be confirmed.

4. Connections

	Terminal	Connector	Description
System 1	1	Alarm a	Input for external alarm, if the contact opens the unit change to system2
	2	Alarm b	
	3	Bat+	Supervised power supply input, if the voltage drops below 20V the unit change to system2
	4	GND	
	5	nc	Not used
	6	TXD	Changeover contact
	7	RXD	Changeover contact
	8	GND	GND connection
	9	TXD-	Changeover contact
	10	RXD-	Changeover contact
	11	TXD+	Changeover contact
	12	RXD+	Changeover contact
	13	Rec out-	Output to synchronize the system 1
	14	Rec out+	
	15	DCF OUT-	Changeover contact
	16	DCF OUT+	Changeover contact
	17	COM+	Power supply for IN
	18	IN1	Output for signal IN 1
	19	IN2	Output for signal IN 2
	20	Supervision	Output supervision 10 Hz Signal
	21	Line 1b	Changeover contact
	22	Line 1a	Changeover contact
	23	Line 2b	Changeover contact
	24	Line 2a	Changeover contact

ECO I/O	1	Alarm out a	Alarm output contact opens at alarm
	2	Alarm out b	
	3	nc	Not used
	4	GND	Power supply for GPS
	5	DC out	
	6	TXD	Changeover contact common
	7	RXD	Changeover contact common
	8	GND	GND connection
	9	TXD-	Changeover contact common
	10	RXD-	Changeover contact common
	11	TXD+	Changeover contact common
	12	RXD+	Changeover contact common
	13	Rec in-	Input for receiver
	14	Rec in+	
	15	DCF OUT-	Changeover contact common
	16	DCF OUT+	Changeover contact common
	17	COM+	Power supply for IN 1, IN 2
	18	IN1	Input for signal IN 1
	19	IN2	Input for signal IN 2
	20	nc	Not used
	21	Line 1b	Changeover contact common
	22	Line 1a	Changeover contact common
	23	Line 2b	Changeover contact common
	24	Line 2a	Changeover contact common

System 2	1	Alarm a	Input for external alarm, if the contact opens the system2 is not working and the changeover is disabled
	2	Alarm b	
	3	Bat+	Supervised power supply input, if the voltage drops below 20V the system2 is not working and the changeover is disabled
	4	GND	
	5	nc	Not connected
	6	TXD	Changeover contact
	7	RXD	Changeover contact
	8	GND	GND connection
	9	TXD-	Changeover contact
	10	RXD-	Changeover contact
	11	TXD+	Changeover contact
	12	RXD+	Changeover contact
	13	Rec out-	Output to synchronize the system 2
	14	Rec out+	
	15	DCF OUT-	Changeover contact
	16	DCF OUT+	Changeover contact
	17	COM+	Power supply for IN
	18	IN1	Output for signal IN 1
	19	IN2	Output for signal IN 2
	20	Supervision	Output supervision 10 Hz Signal
	21	Line 1b	Changeover contact
	22	Line 1a	Changeover contact
	23	Line 2b	Changeover contact
	24	Line 2a	Changeover contact

5. Reasons for changeover

The alarm outputs (terminals Alarm a and Alarm b) and the supply voltage (terminals Bat.+ and GND) of both master clocks must be connected to the ECO (refer to drawing Fig. 6, page 7 for an example with ETC 24).

As soon as a disfunction on the first master clock (system 1) is reported, the alarm contact will be opened and the ECO will release a changeover to system 2 (conditions: operation mode ”auto” is selected and system 2 is working).

As soon as the supply voltage of system 1 is falling below 20 VDC, the ECO will release a changeover to system 2 (conditions: operation mode ”auto” is selected and system 2 is working).

6. Switched lines

In case of a changeover the following lines will be switched by the ECO:

Interfaces:	RS 232 (COM1):	TXD
		RXD
	RS 422 (COM2):	TXD-
		RXD-
		TXD+
		RXD+
Slave clock lines:	Line 1 [1)]	
	Line 2 [1)]	
Time code output:	DCF out-	
	DCF out+	

[1)] Note: The slave clock lines of the master clocks must run in mode MOBALine. A changeover for impulse lines is not recommended due to possible lost of impulses.

7. Supervision of ECO

7.1 Configuration with ETC24-Masterclocks

One of the control inputs of the master clocks can be configured to supervise the ECO. As long as the ECO is working properly it displays a control signal at the terminal “Supervision” (frequency: 10 Hz). An ETC 24R working as a sub-master clock can for example report the failure of the ECO to the master clock (e.g. via CAS or CAN communication to MTC). The alarm from supervision of the ECO must be masked on the ETC 24R to avoid an alarm loop. See chapter 8.4.2 for details.

The ECO contains further a relay contact to indicate any type of alarm. E.g. failure of system 1 or system 2. In case of alarm the contact is open.

7.2 Configuration with DTS 480x.masterclocks

With DTS 480x the ECO alarm relay output can be used for the feedback signal. The alarm output of ECO has to be connected to one of the four alarm inputs of both DTS 480x. In the sample input 4 was used. To avoid a alarm loop the Alarm input bit must be masked on the alarm mask for the alarm relay on every DTS, for details see chapter 11.3.1.

7.3 Configuration with DTS 4135.timeserver

With DTS 4135 the ECO alarm relay output can be used for the feedback signal. The alarm output of ECO has to be connected to the alarm inputs of both DTS 4135. To avoid a alarm loop the Alarm input bit must be masked on the alarm mask for the alarm relay on every DTS, for details see chapter 12.3.1.

8. Installation with ETC 24

8.1 System overview with ETC

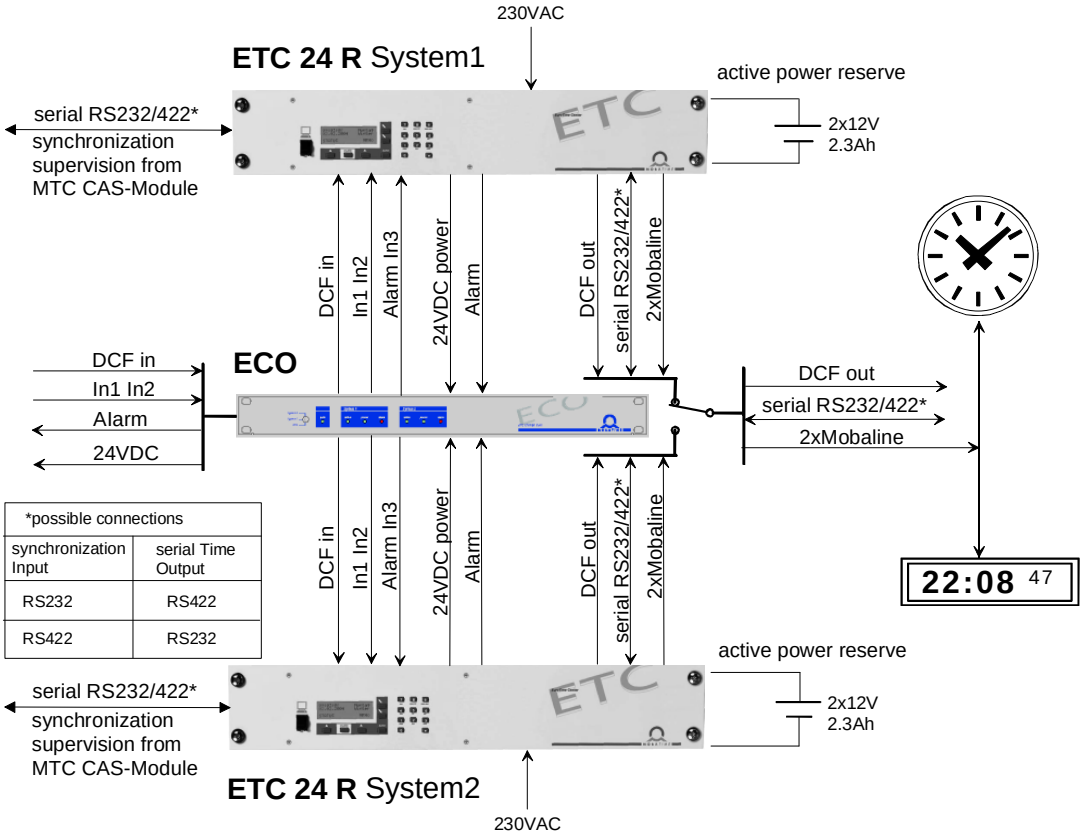


Fig. 4

8.2 Basic cabling

The terminals of the ECO are to a large extend identically to those of the ETC 24R. This allows a simple direct connection of the master clocks with the ECO. Basically all terminals can be connected together like shown Fig 1 below. It is not necessary to connect all terminals in some cases. Please refer to the ETC-manual BE-800337 if you have two receivers or two sources of serial synchronization for redundancy.

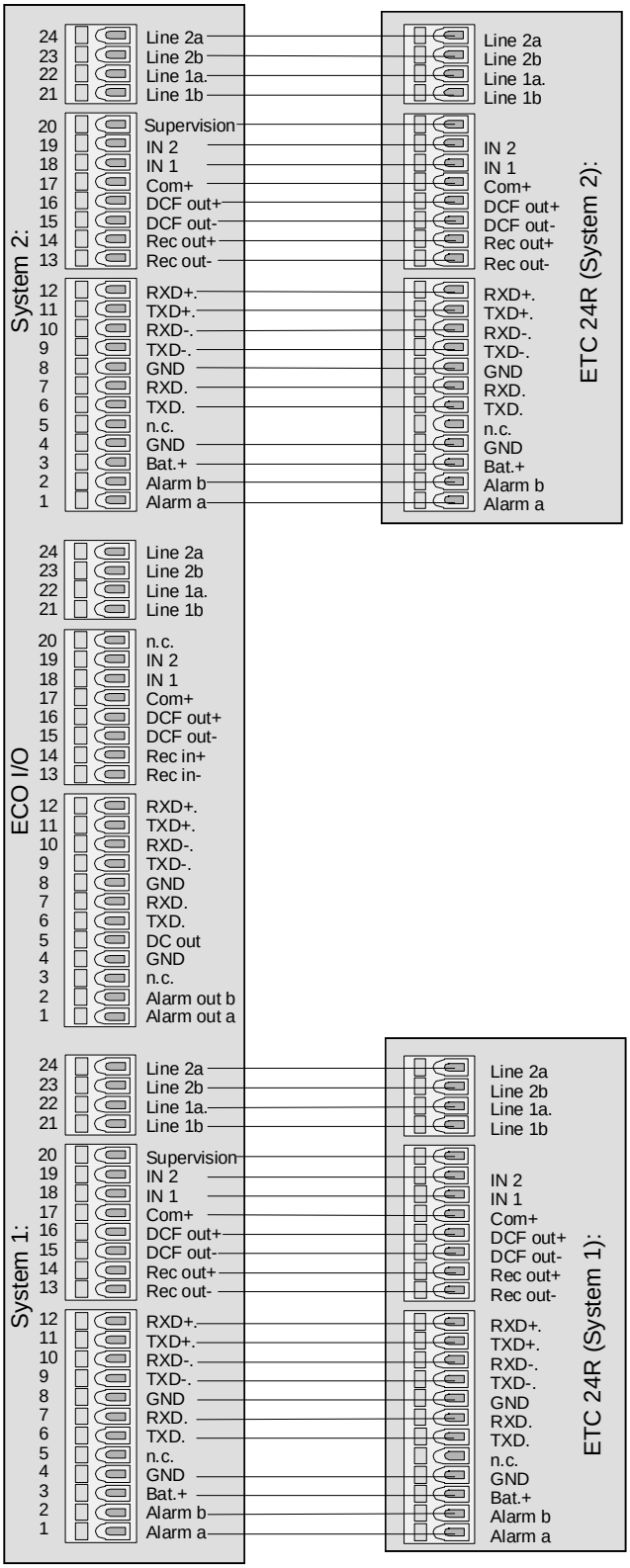


Fig. 5

8.3 Sample cabling

ECO with two ETC 24R with battery
Synchronization: RS-485
Switch over: Line 1, Line 2

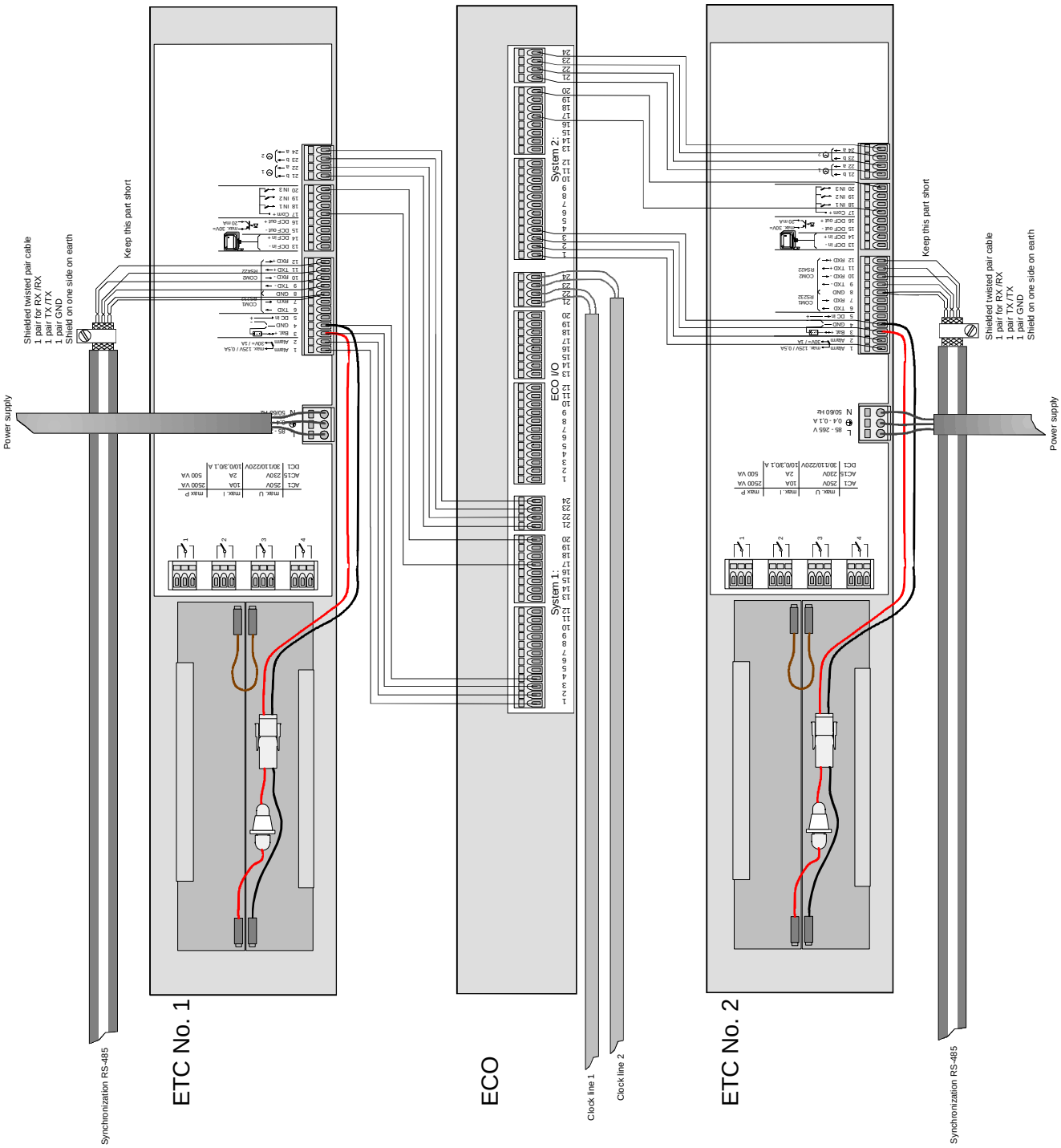
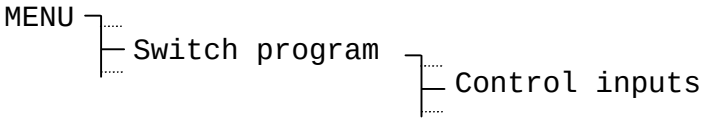


Fig. 6

8.4 Configuration ETC:

8.4.1 Control input

The control input IN3 is used for control of ECO and must be configured. The setting has to be done in the following menu:



Control inputs:

```
Combination:       AND
Input 1
Input 2
Input 3
```

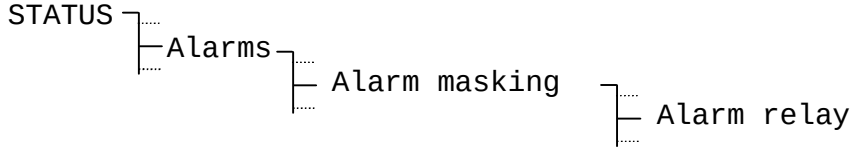
The setting for input3:

```
Function:          dyn.
State:           [---]
Channel:           00
Al. timeout [s]:   02
```

Function:	Has to be set to dyn. (dynamic) for using as Alarm with ECO. The ECO sends a square wave signal 10 Hz.
State:	Shows the current state of the control input. If the control input is used for supervision of an external device the input state will be inhibited ([- - -]).
Channel:	If the control input is used for supervision of an external device the channel is not relevant.
Al. timeout [s]:	Setting of delay until the ETC shows an alarm. Possible settings 1..60s.

8.4.2 Alarm masking

In case of a failure of ECO a switch over is not recommended. To disable this the alarm mask is to set on the ETC. The setting has to be done in following menu:



Masking for ETC until software version 1.09

```
Alarm relay:   [BFFF]
CAS comm.:     [FFFF]

BACK                EDIT
```

The mask for the alarm relay is to set to BFFF.

Masking for ETC valid from software version 1.09

```
Alarm relay
  ABCDEFGHIJKLMNOP
  ****************_*
BACK                EDIT
```

To set the mask for the alarm relay disable the alarm coded with letter O.

For details please see in the ETC manual.

9. Installation with MTS

For MTS the type ECO MTS with additional DC/DC converter must be used.

9.1 System overview with MTS

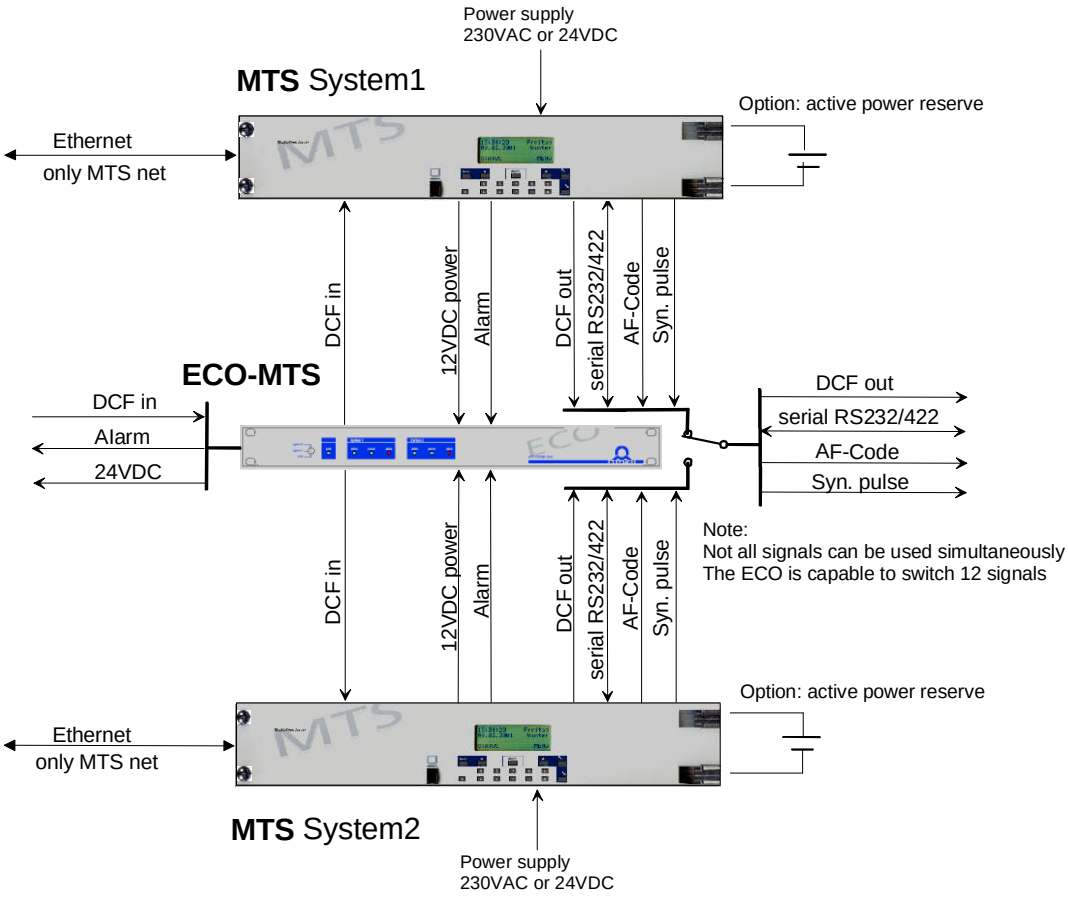


Fig. 7

9.2 Basic cabling

Below are two samples of cabling with MTS. The ECO is capable to switch over 12 signals. Depending upon need the signals must be wired.

9.2.1 AF-Code switch over (IRIG, AFNOR, DCF-FSK)

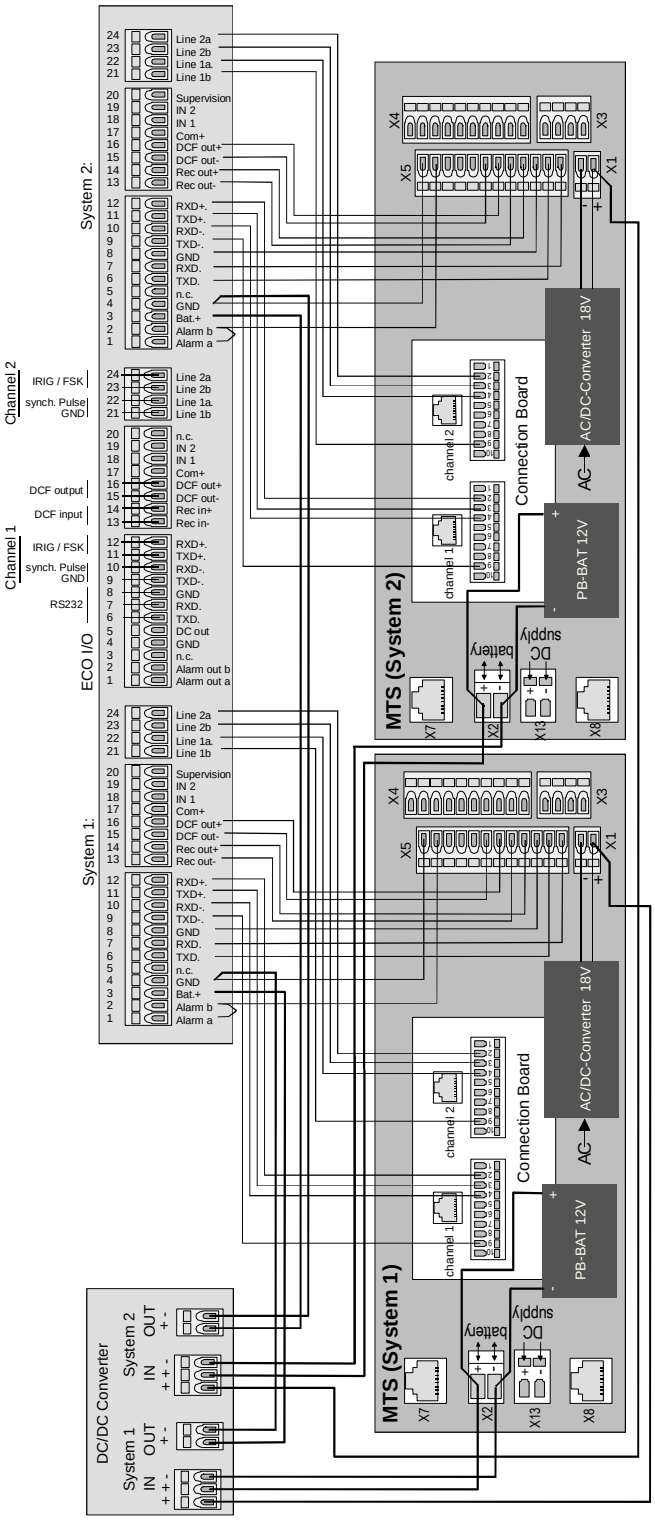


Fig. 8

9.2.2 RS-422 switch over

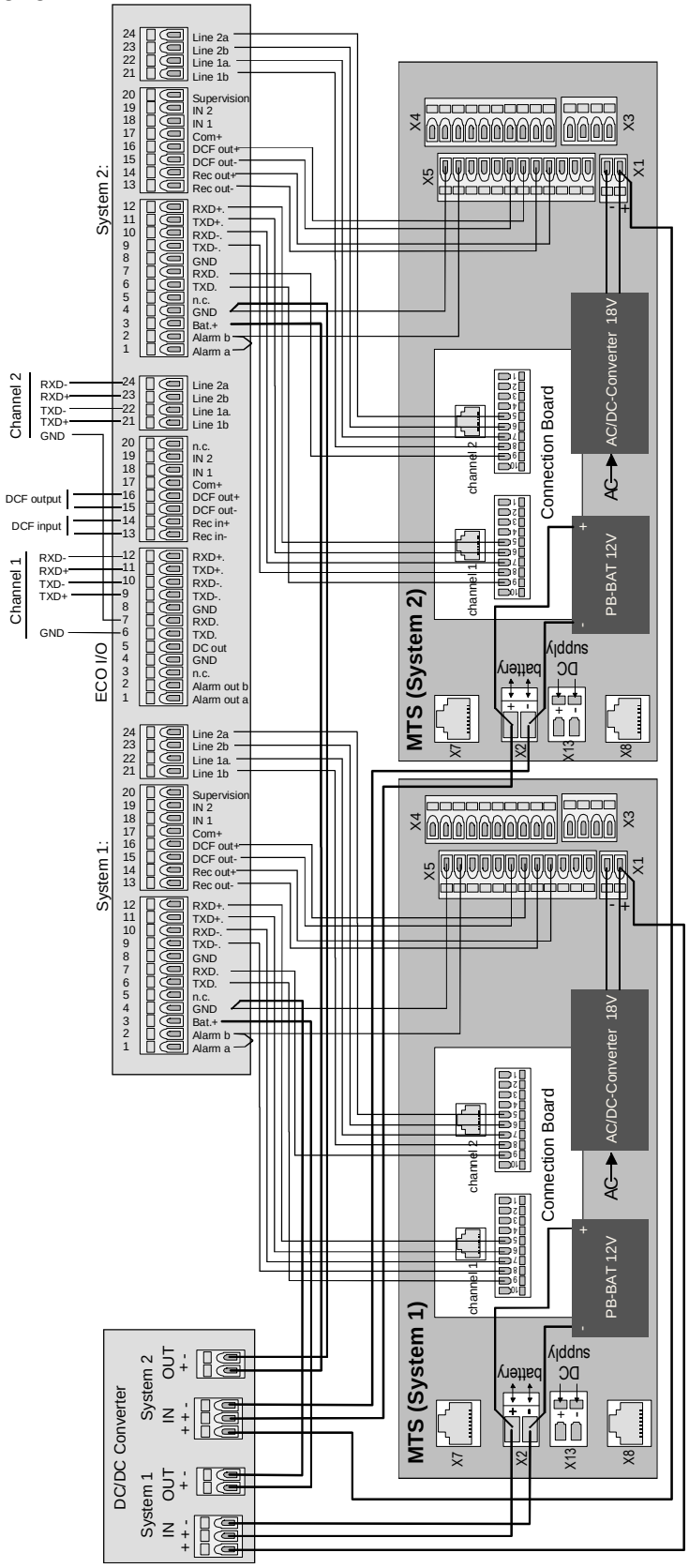


Fig. 9

9.3 MTS-cabling with Power-fail message

In the samples above the MTS shows no alarm message in case of power failure. If the power-fail message is needed the wiring with two additional diodes must be as follows:

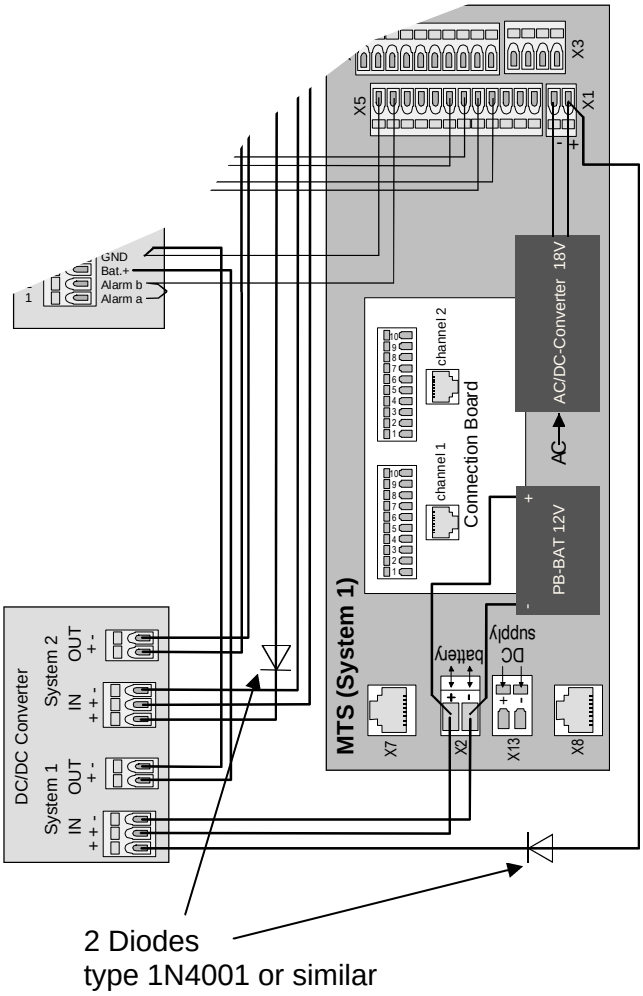


Fig. 10

10. Installation with NMC

10.1 System overview with NMC

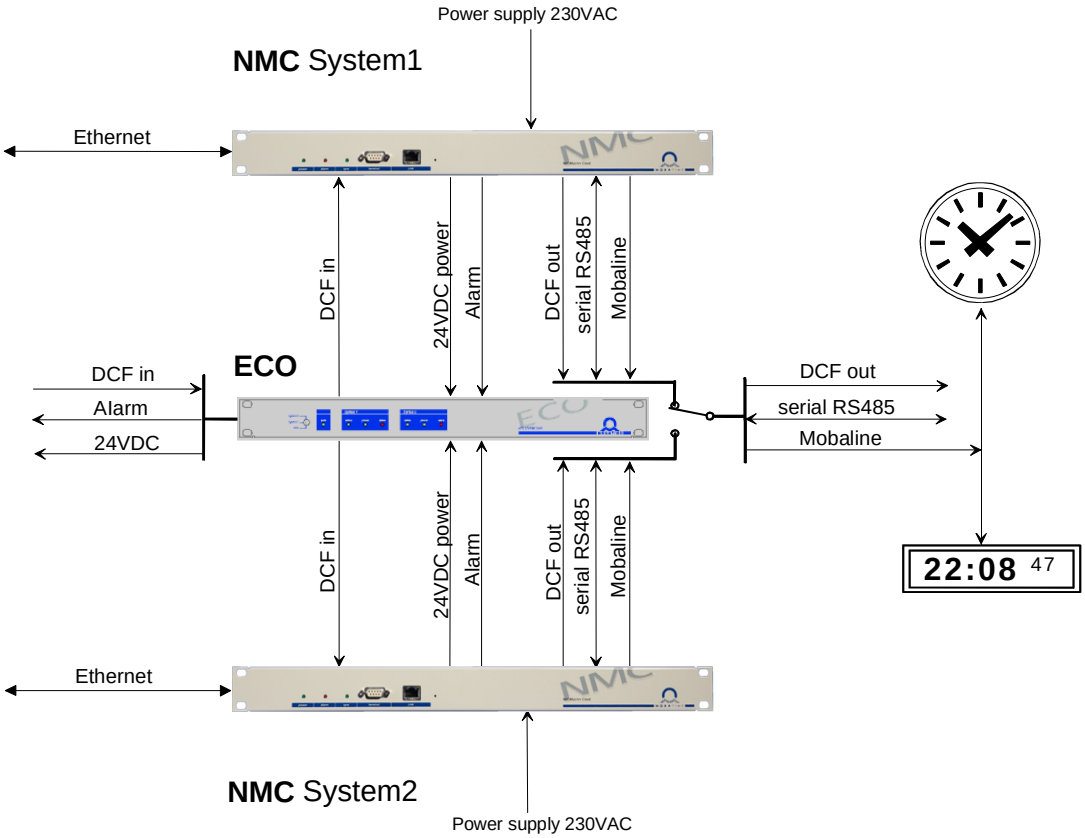


Fig. 11

10.2 Basic cabling

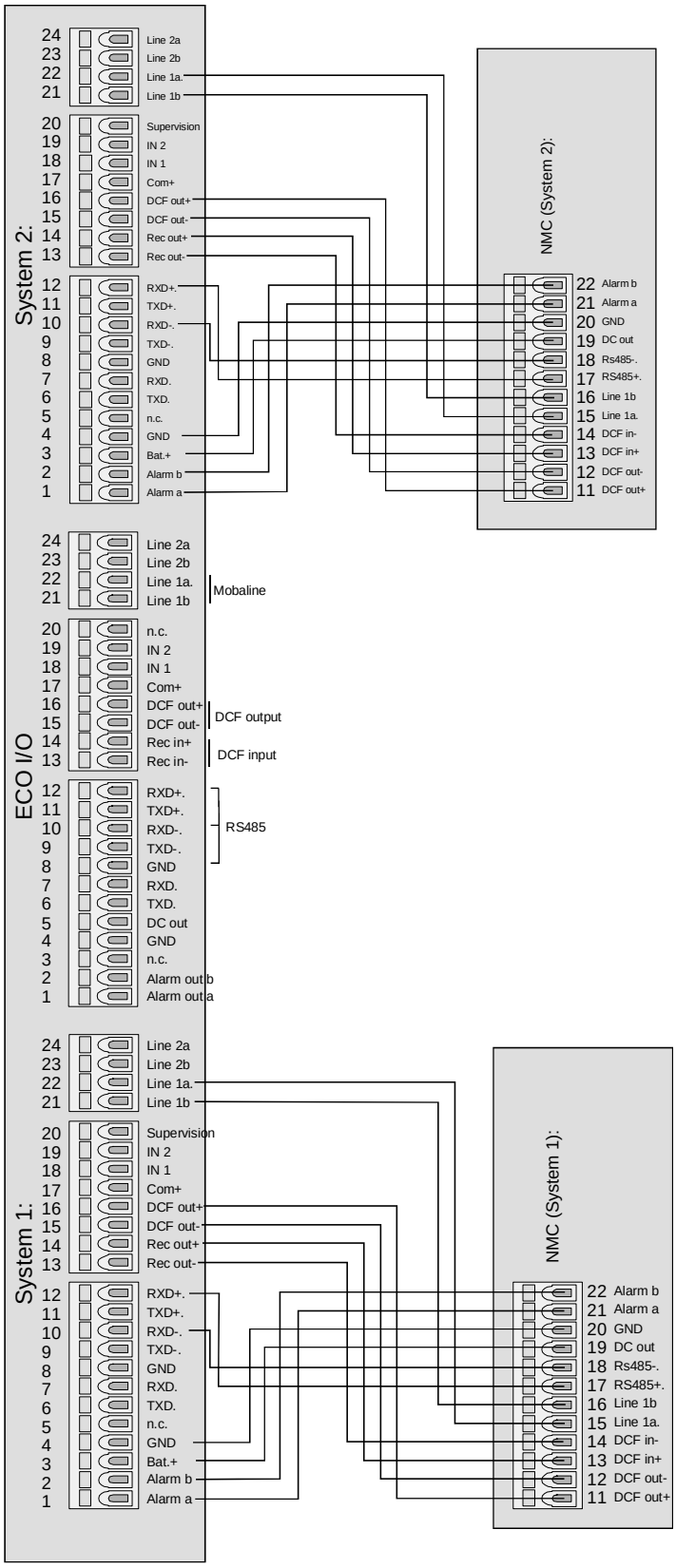


Fig. 12

11. Installation with DTS 480x.masterclocks

11.1 System overview with DTS 480x.masterclocks

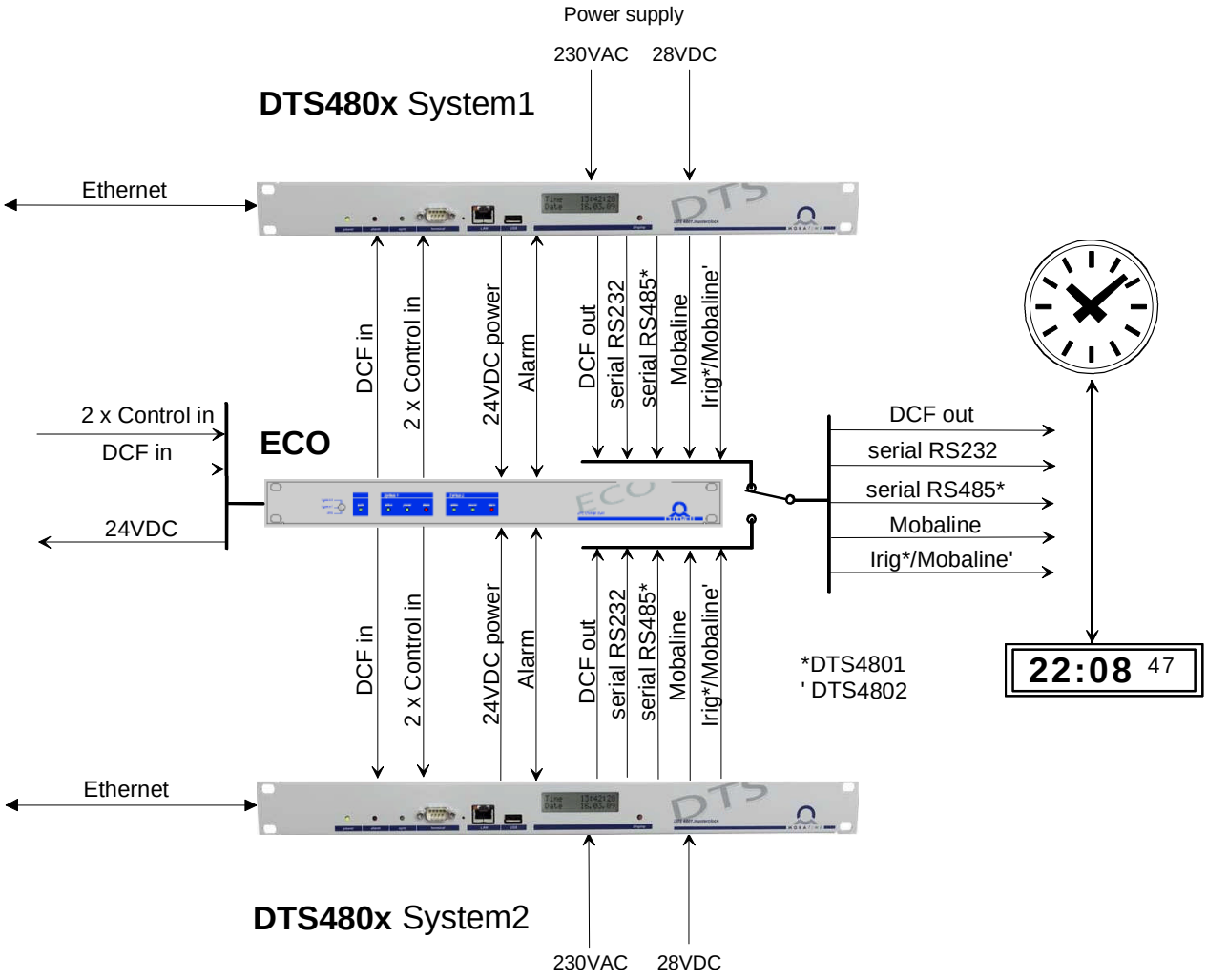


Fig. 13

11.2 Basic cabling

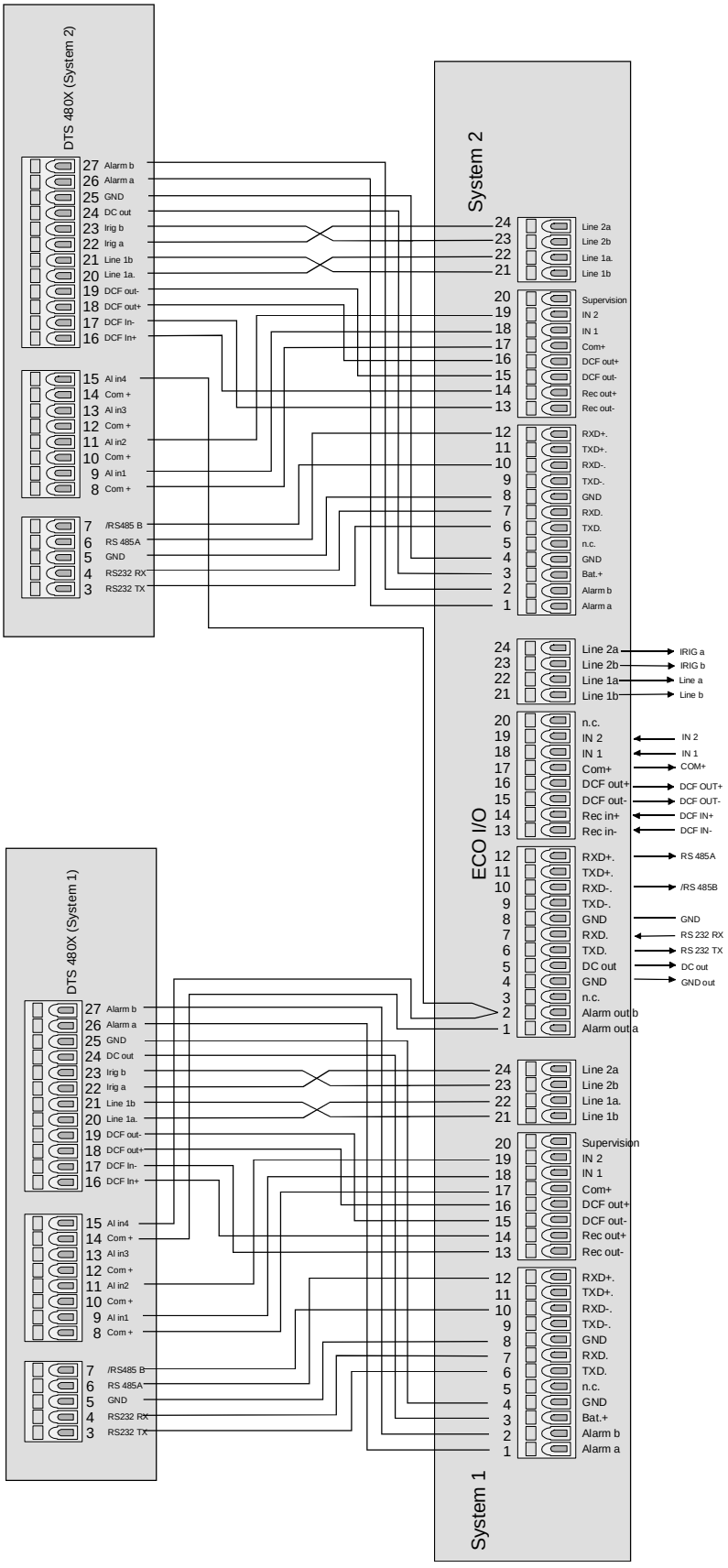


Fig. 14

11.3 Konfiguration DTS 480x.masterclock:

11.3.1 Alarm-masking

To prevent a alarm loop the DTS alarm relais must be masked. The setting has to be done in following menu: Configuration, Alarms, Alarm relay, Alarmmask for relay:

```
DTS 4802.masterclock   Moser-Baer AG
==================================

ALARMMASK                          Page 1
[ ]=error disabled, [*]=error enabled
[ ] Bit00: Alarm input 1           [ ] Bit01: Alarm input 2
[ ] Bit02: Alarm input 3           [ ] Bit03: Alarm input 4
[*] Bit04: Error bit4              [*] Bit05: DTS restart
[*] Bit06: Failure 5V              [*] Bit07: Supply voltage too low
[*] Bit08: Line 1 current to high  [*] Bit09: Wrong time zone line 1
[*] Bit10: Wrong time zone DCF ou  [*] Bit11: Wrong time zone RS485
[*] Bit12: Error IRIG output       [*] Bit13: Tele.-file invalid
[*] Bit14: Program file invalid    [*] Bit15: Wrong time zone switch



Enter alarmnumber to alter mask

Press ENTER for next part, 99 to leave>
```

To set the mask for the alarm relay disable the Alarm Input 4 Bit03.

If necessary please refer to the DTS manual.

12. Installation with DTS 4135.timeserver

12.1 System overview with DTS 4135.timeserver

12.1.1 Switch over with one ECO

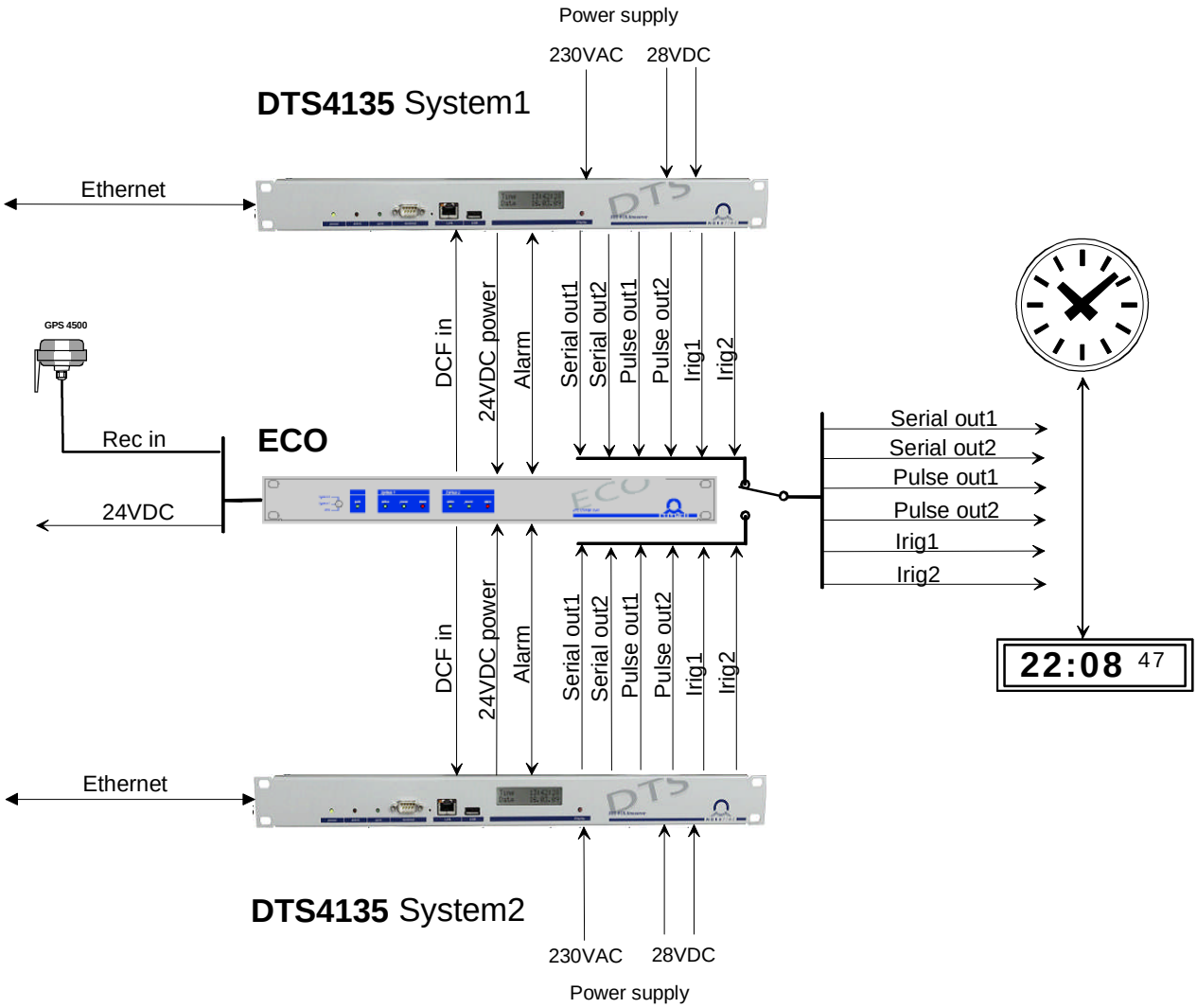


Fig. 15

12.1.2 Switch over with two ECO's

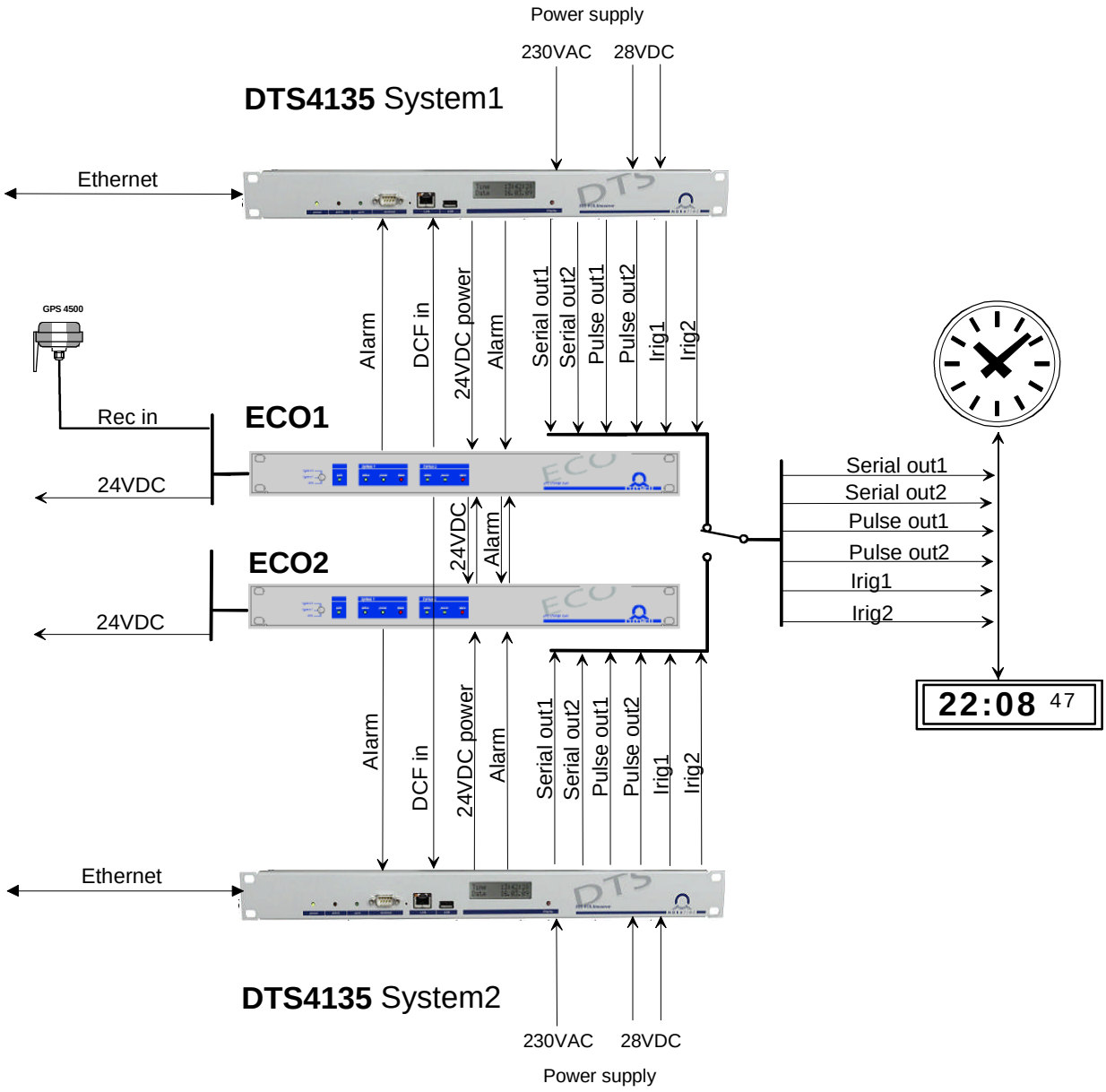


Fig. 16

12.2 Basic cabling

Below are two samples of cabling with DTS 4135. The ECO is capable to switch over 12 signals. Depending upon need the signals must be wired.

12.2.1 Digital AF-Code switch over (IRIG, AFNOR, DCF-FSK) and serial Outputs

Depending on the demands, the RS422 or Current Loop or RS232 or RS485 signals are connected.

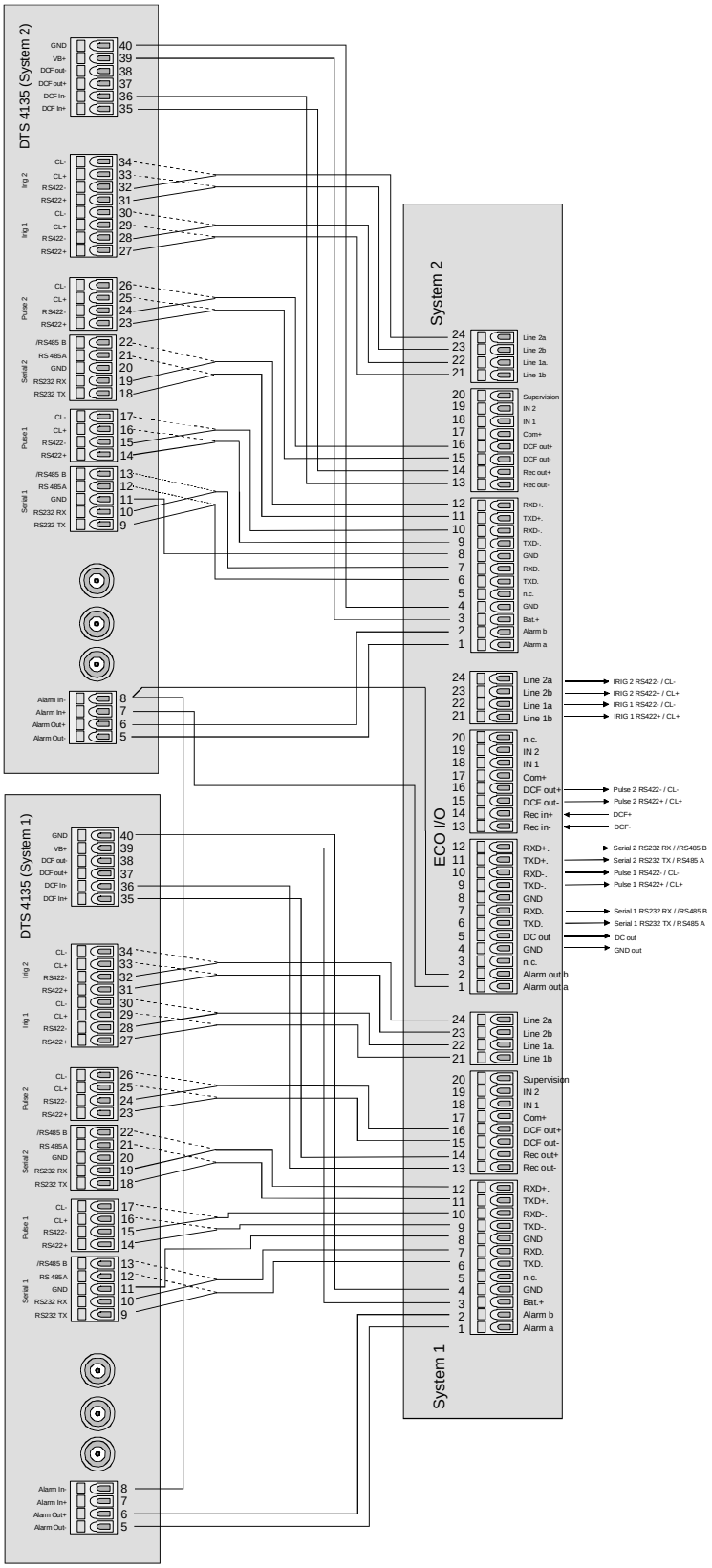


Fig. 17

12.2.2 Analog AF-Code switch over (IRIG, AFNOR, DCF-FSK) and serial Outputs

Depending on the demands, the RS422 or Current Loop or RS232 or RS485 signals are connected.

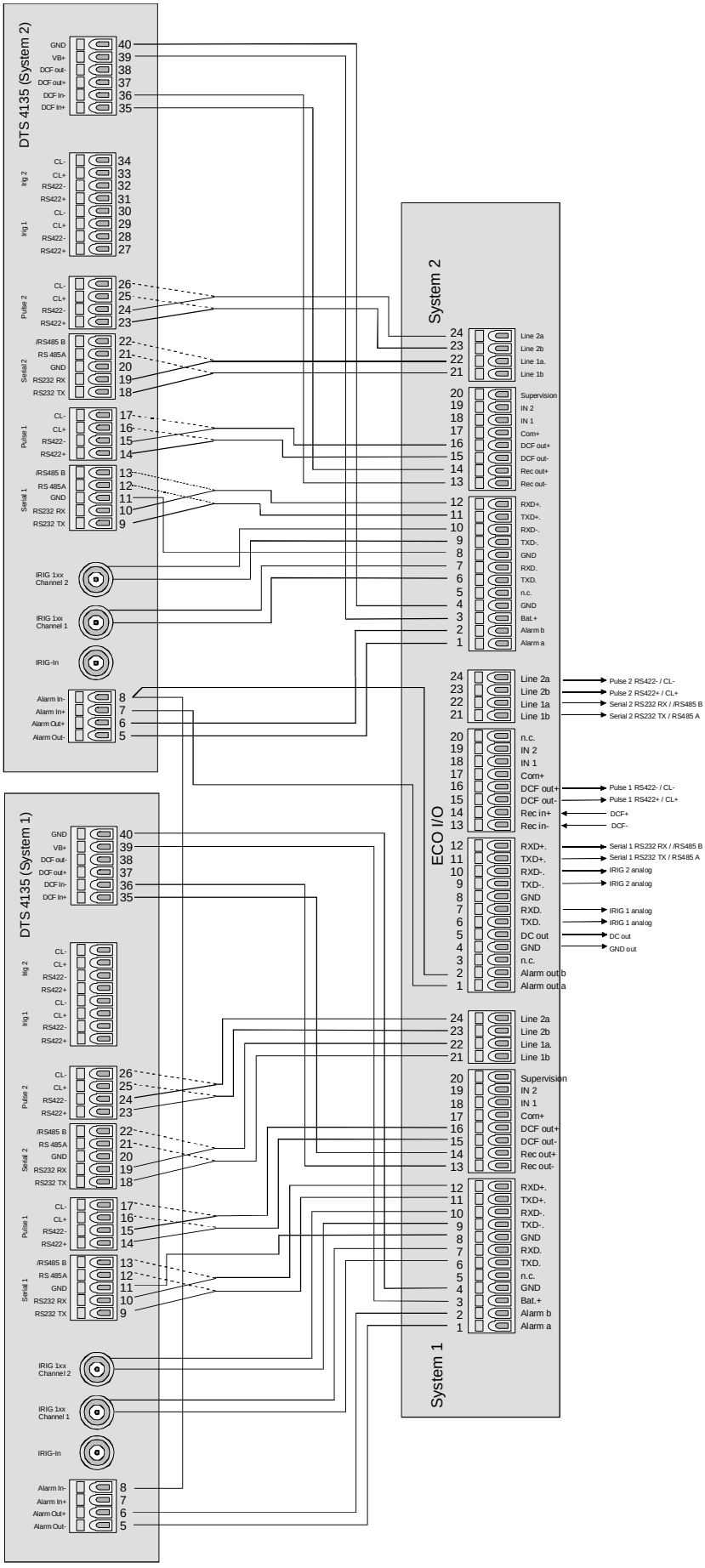


Fig. 18

12.2.3 Analog AF-Code switch over (IRIG, AFNOR, DCF-FSK) serial Outputs and AF-Code digital

Also with two ECO's not all signals can to be connected and the signals have to be selected upon need.

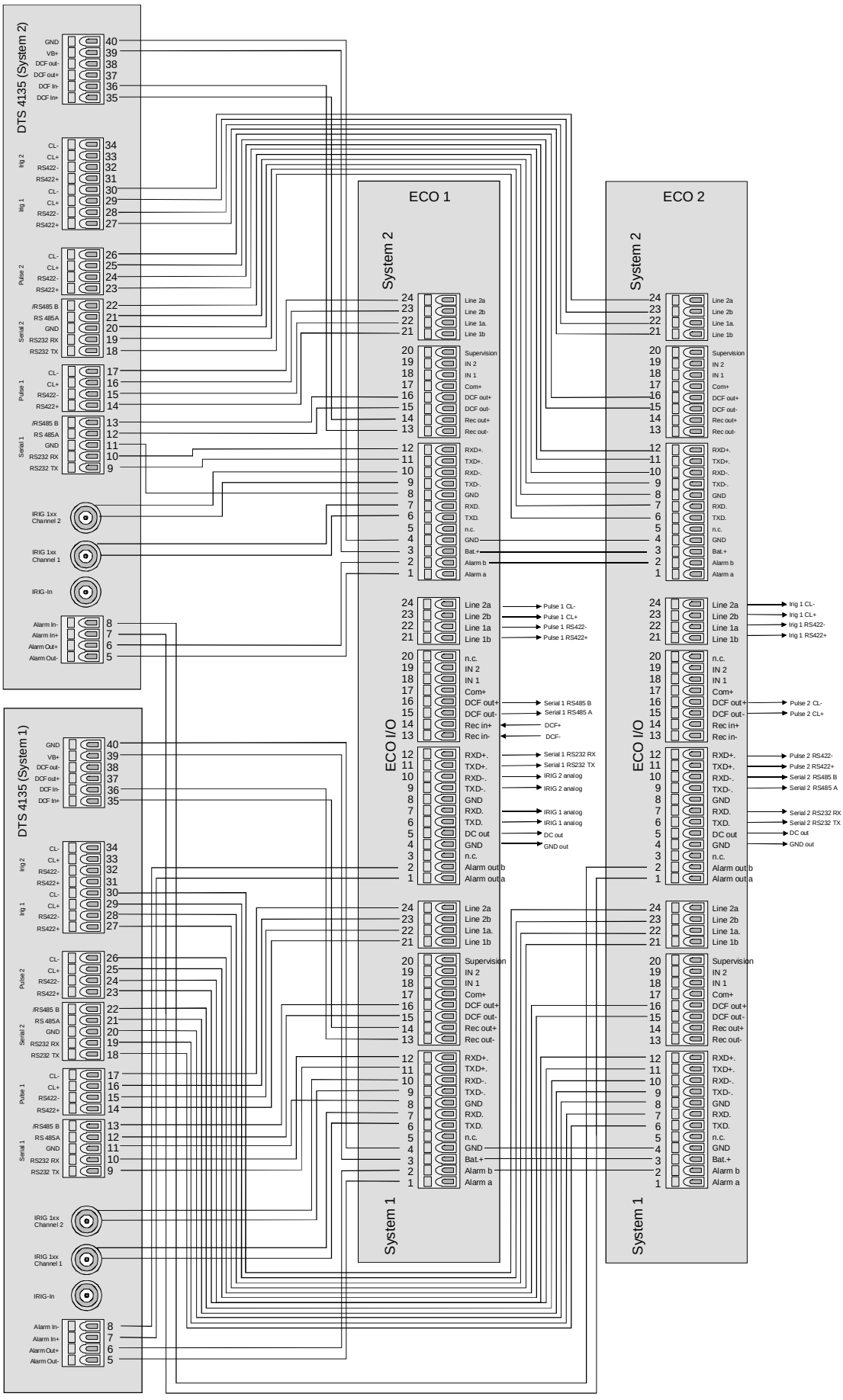


Fig. 19

12.3 Konfiguration DTS 4135.timeserver:

12.3.1 Alarm-masking

To prevent a alarm loop the DTS alarm relay must be masked. The setting has to be done in following menu: Configuration, Alarms, Alarm relay, Alarm mask for relay:

```
DTS 4135.timeserver    Moser-Baer AG
==================================

ALARMMASK                          Page 1
[ ]=error disabled, [*]=error enabled
[*] Bit00: DTS restart             [*] Bit01: Error bit1
[*] Bit02: Supply voltage too low  [*] Bit03: Failure supply 1
[*] Bit04: Failure supply 2        [*] Bit05: Error voltage 5V
[*] Bit06: Error voltage 2.5V      [*] Bit07: Error voltage 1.25V
[*] Bit08: Wrong time zone DCF     [*] Bit09: Error Time Zone TC1
[*] Bit10: Error Time Zone TC2     [ ] Bit11: Alarm input
[*] Bit12: Irig 1 output voltage   [*] Bit13: Irig 2 output voltage
[*] Bit14: Error bit14             [*] Bit15: Error bit15


Enter alarmnumber to alter mask

Press ENTER for next part, 99 to leave>
```

To set the mask for the alarm relay disable the Alarm Input Bit11.
If necessary please refer to the DTS manual.

13. Synchronization

13.1 Connection of DCF Receiver

If both master clocks shall be synchronised by a single DCF 77 or GPS time code receiver. It has to be connected to the ECO like shown in the drawing. The Rec-out terminals has to be wired to the DCF-Inputs of the master clocks.

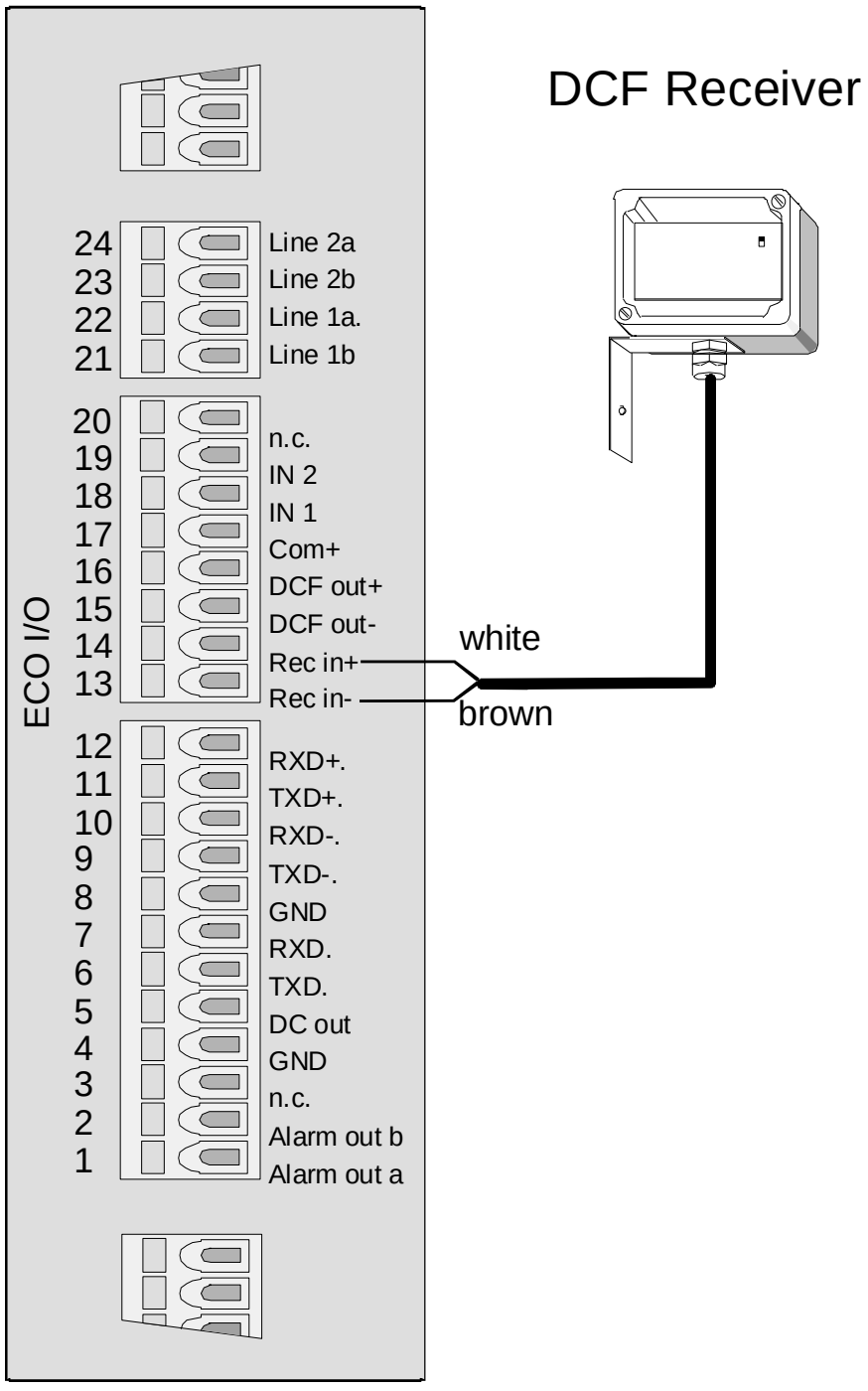


Fig. 20

13.2 Connection of GPS 4500 Satellite Receiver

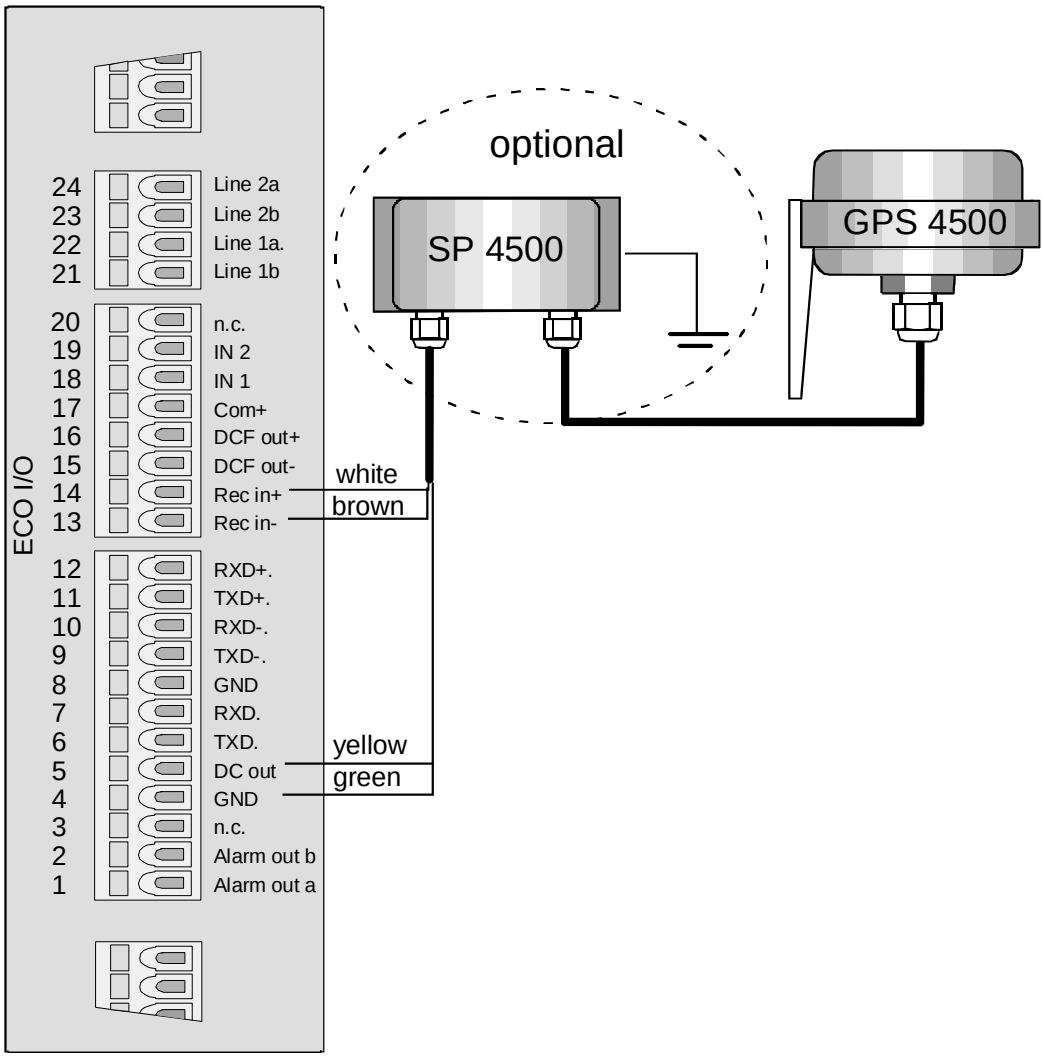


Fig. 21

14. Technical Specification

Power consumption from 24 V DC	<2.4VA (< 100 mA)
Dimensions	19" rack, 1HU (H x W x D [mm] = 483 x 44 x 53)
Weight	approx. 500g
Ambient temperature	0 to 50°C, 10-90% relative humidity, without condensation
Alarm contact	Load: 30 VDC / 1 A / 30 W resp. 125 VAC / 1 A / 60 VA
DC output (DC out)	22..29 VDC 100 mA max.
Standards	EN 60950, Protection class I

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