

Technical Description

MEW00519

Revision 6

External Power Supply **3366**

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1 Introduction

This document¹ describes the External power supply **3366**.

Also the shorter expression **EPS** might be used in the document.

For more information see chapter "General description", page 5.

¹ Original file name: L:\User documents\EBL\Doc\Eng\MEW00519 (Rev 6).doc

2 **Definitions / Explanations**

Definitions / explanations / abbreviations / etc. frequently used or not explained elsewhere in the document.

C.i.e. Control and indicating equipment (=control unit)

C.U. Control unit (=Control and indicating equipment)

S/W Software

H/W Hardware

3 General description

The external power supply 3366 can be used in the systems **EBL512 G3**, **EBL512**, **EBL128** and EBL1000. It is intended to be used as power supply for external equipment² requiring 24 V DC with battery backup. 3366 is connected to a COM loop, i.e. it is monitored by the c.i.e. and e.g. loss of the main power source (230 V AC) will generate a fault in the c.i.e.

3.1 Ext. power supply 3366

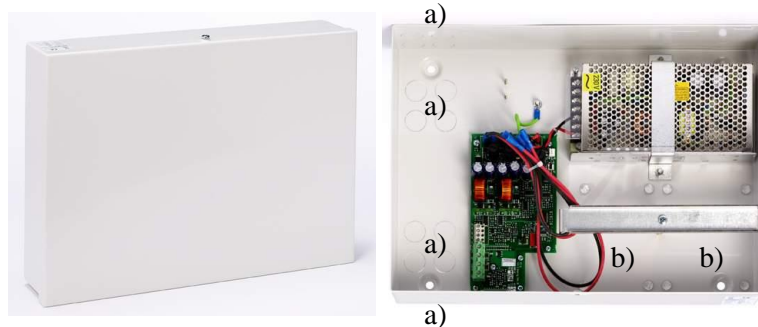


Figure 1. The external power supply 3366. a) = four knock-outs 23.5 mm (on the top, bottom and back side respectively). b) = space for battery.

Main power source

A rectifier (1537³), 230 V AC / 24 V DC $\pm 1\%$, 4.5 A.

Second power source

By loss of the main power source (230 V AC) the second power source is a backup battery, i.e. two Sealed Lead-Acid 12 V batteries.

Housing

The rectifier (1537) and the charger board (3367) are mounted in a grey metal housing, which also has space for two maintenance-free sealed Lead-Acid backup batteries rated 12 V, 6.5-7.5 Ah.⁴

Larger batteries (≤ 60 Ah) have to be placed outside the housing.

When batteries with capacity > 27 Ah are used, **High** current charging mode has to be used (if EN54-4 shall be fulfilled), see chapter "Charger functions", page 6.

The housing has cable inlets on the top, bottom and back sides and is intended to be surface mounted in dry premises. Two compression glands TET 10-14 (IP67) are supplied.

² E.g. a **High Sensitive Smoke Detector**, Addressable 2 voltage outputs unit 3364, etc.

³ Panasonic type no 1537 is equal to Meanwell S-100F-24.

⁴ **NOTE!** The batteries are not included in the type no. 3366. Batteries with the same physical size (150 x 65 x 94 mm) but with different capacities (6.5-7.5 Ah) are available on the market.

The External power supply 3366 can be used in different modes, see chapter "Mode setting", page 13.

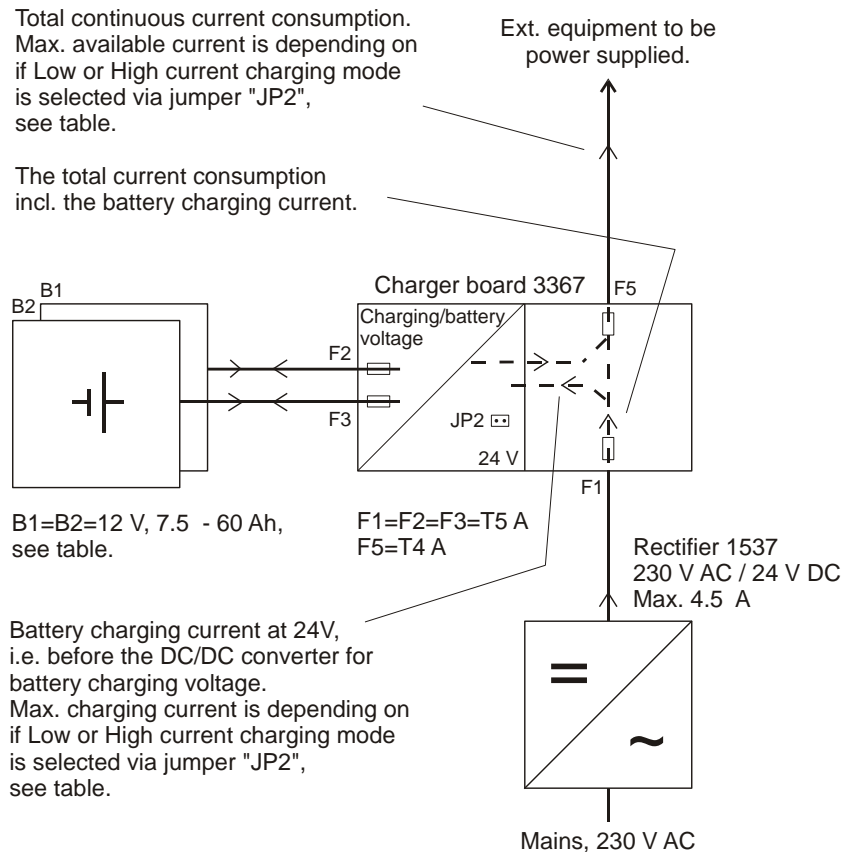


Figure 2. The external power supply 3366 block diagram.
NOTE! Fuses F2 & F3 have to be Ceramic.

3.2 Charger functions

The Charger board 3367 has one **24 V DC output** for external equipment for up to **2.1 A** alt. **0.85 A** continuous current consumption, at the same time as battery charging⁵ is in progress.

According to EN54-4, section 5.3.1 b), *The charger shall be designed and rated so that a battery discharged to its final voltage can be recharged to at least 80% of its rated capacity within 24 hours and to its rated capacity within another 48 hours.*

⁵ Max. charging current.

3.2.1 Low and High current charging modes

If the EN 54-4 section is to be fulfilled, the **High current** charging mode has to be selected if the wanted battery capacity is 28 – 60 Ah. and/or the continuous current consumption on the 24 V DC output is more than 0.85 A, see the following table:

Charging mode	Jumper "JP2"	Battery Capacity (Ah)	24 V DC output Continuous current consumption (A)
Low current	Open	≤ 27	≤ 2.1
High current	Shunted	28 - 60	≤ 0.85

(Using the high current charging mode results in a "low" continuous current consumption on the 24 V DC output and vice versa.) Jumper "JP2" is situated on the charger board 3367, see page 16.

3.2.2 Battery charging functions:

The battery charging cycle is performed in two steps:

1. **Constant current.** The charging current is constant (fixed)⁶ until the battery / charging voltage reaches 15 V.
2. **Constant voltage.** The charging voltage is reduced from 15 V to 13.5 - 13.8 V⁷ and will be constant (fixed) at this level until the batteries are fully charged.

When the battery is fully charged the stand-by "charging current" is 0-0.5 A (typical 0.1 A) and the "charging voltage" will stay constant (fixed) at the "step 2" level, until the batteries have been discharged and have to be charged again. A new charging cycle will then start. The duration of "step 1" and "step 2" respectively is depending on the battery shape when the charging started.

3.2.3 Security functions:

- The battery charging will be turned off if the current from the Rectifier 1537 to the Charger board 3367 exceeds 4.5 A, i.e. the continuous output current consumption exceeds 0.85 and 2.1 A respectively. The battery charging will remain turned off as long as the continuous output current consumption exceeds 0.85 and 2.1 A respectively.

⁶ This charging current is depending on if **Low** or **High** current charging mode is selected, i.e. 1.1-1.4 A (typical value 1.3 A) and 2.0-2.3 A (typical value 2.1 A) respectively. (Very close to the end of the charging cycle, when max. charging voltage is reached, the lowest values will be approx. 1.1 and 1.8 A respectively.)

⁷ The actual voltage is depending on the battery type, shape, temp. etc.

- The voltage output will be turned off if the output current > 4.2 A. A fault will be generated and every minute is an attempt to turn on the output made.
- In order not to damage the batteries, the voltage output will be turned off at approx. 15.6 V. This only happens in case of no main power source (230 V AC), i.e. when the backup batteries are used as the power source. The output will be turned on at approx. 23 V.
- If the battery voltage is below 5 V, the battery charging will be turned off. (The batteries are probably damaged and have to be changed.)

When the battery charging is turned off a fault will be generated after a time delay.⁸ The fault message is depending on the system that 3366 is connected to. See Operating Instructions for the system respectively.

3.2.4 Current consumption calculation

Calculate the total continuous current consumption excl. the battery charging current, in normal state (I^{TN}).

Calculate the total continuous current consumption excl. the battery charging, in alarm state (I^{TA}).

NOTE! In case of no main power source, i.e. when the backup battery is the power source, the current consumption for the Charger board 3367 itself is 35 mA.

Comments regarding the continuous current consumption:

I^{TN} shall be ≤ 0.85 A or ≤ 2.1 A respectively depending on if **High** or **Low** current charging mode is selected, see table on page 7.

I^{TN} shall be ≤ 0.25 A if a built-in 7.5 Ah battery is used, because this results (theoretically) in 30 hours battery backup time.

I^{TA} shall be ≤ 4 A.⁹ (The battery charging will be turned off in conjunction with a fire alarm in the system.)

3.3 Power sources

The External power supply 3366 has two independent power sources, i.e. a rectifier and a backup battery.

⁸ Programmable via Win512 / 128 but max. 30 min. according to the EN54-2 standard.

⁹ In EBL512 S/W version < 2.3 and in EBL128, apart from when fire alarm is activated, a fault will be generated for $I^{TA} > 0.85$ A and > 2.1 A respectively.

(FAULT: Output unit xxxxxx)

3.3.1 Rectifier (main power source)

The rectifier (1537) technical data are 230 V AC / 24 V DC, 4.5 A, i.e. **the total current consumption incl. max. battery charging current must not at any time exceed 4.5 A**. Allowed input voltage is 176-264 V AC. The output voltage is 24 V with a tolerance of $\pm 1\%$.¹⁰

3.3.2 Battery (second power source)

Only batteries with a specified "Final voltage" of 10.5 V must be used.

Find out the required battery backup time, according to national regulations / customer demands, in normal state and in alarm state.

Calculate the battery capacity required in normal state (Q^N) and the battery capacity required in alarm state (Q^A) respectively.

- Q^N (Ah) = I^{TN} (A) x battery backup time in normal state (h)
- Q^A (Ah) = I^{TA} (A) x battery backup time in alarm state (h)

The total battery capacity $Q = Q^N + Q^A$ (Ah)

Normally you shall round up the calculated capacity and add 10% to be on the safe side, because the battery voltage at the end of a discharging period is not the same as at the start. The following tables show the relation between current consumption (I) and backup time.

NOTE! The values are calculated and give you only a rough idea of the backup time.

A battery ≤ 7.5 Ah can be placed inside the housing (see figure 1, page 5) and the **Low** current charging mode can be used.

A battery > 7.5 Ah has to be placed outside the control unit and when it is > 27 Ah the **High** current charging mode has to be used (if EN54-4 shall be fulfilled).

NOTE! For external batteries is the following valid: Max. 3 m cable length (min. 4 mm²). National regulations have to be followed.

Built-in **7.5 Ah** batteries.

I (A)	Backup time (hours:min)
2	3:45
1.5	5:00
1.0	7:30
0.8	9:20
0.6	12:30
0.4	18:45
0.2	37:30

¹⁰ The output voltage is factory set to 24 V. On the rectifier is a potentiometer for output voltage adjustment ($\pm 10\%$) available. **Do not use this potentiometer** unless the output voltage is not 24 V.

External **27 Ah** batteries.

I (A)	Backup time (hours:min)
2	13:30
1.5	18:00
1.0	27:00
0.8	33:45
0.6	45:00
0.4	67:30
0.2	135:00

External **60 Ah** batteries.

I (A)	Backup time (hours)
2	30
1.5	40
1.0	60
0.8	75
0.6	100
0.4	150
0.2	300

NOTE!

The values in the tables above are calculated and give only a rough idea of the back-up time.

3.4 Fuses

There are four fuses on the Charger board 3367 as follows:

F1 = T5A L250V, 5x20mm Glass. +24 V DC from the rectifier (1537).

F2 = T5A H250V, 5x20mm Ceramic. + to/from battery no. 1.

F3 = T5A H250V, 5x20mm Ceramic. + to/from battery no. 2.


F5 = T4A L250V, 5x20mm Glass. +24 V DC output for equipment to be power supplied.

4 Inputs / Outputs / Connectors

All required connections between the Rectifier 1537 and the Charger board 3367 are factory made.

4.1 Mains (230 V AC)

Mains (230 V AC) is to be connected to the Rectifier 1537 screw terminals:

- **L** (active) See also chapter "Technical data", page 17.
- **N** (neutral)
-  (safety earth)
- **The mains shall be connected to a household removable fuse (for fire alarm equipment only) via a two-way circuit breaker mounted outside but close to the 3366 unit.**

• **CAUTION**

• **DOUBLE POLE / NEUTRAL FUSING**

4.2 24 V DC and Earth

Factory made connections:

The 24 V DC output (+V) and 0 V (COM) on the Rectifier 1537 are connected to the Charger board 3367 with 6.3 mm tab terminals for female push-on connectors:

- **J1:+24V** to rectifier (+V) Fuse **F1** (T5A L250V, 5x20mm Glass)
- **J1:0V** to rectifier (COM)
- **J1:EARTH** to protective earth connector in the cabinet

4.3 Batteries

Regarding the **Low & High** charging current modes, charging / battery voltage, etc. see chapter "Charger functions", page 6.

There is space in the housing for two maintenance-free sealed Lead-Acid backup batteries (rated 12 V, 7.5 Ah)⁴.

The 7.5 Ah batteries (with 4.8 mm tab terminals for female push-on connectors) are connected with the supplied wires, to the Charger board 3367 with 6.3 mm tab terminals for female push-on connectors:

- **J1:B1+** to/from battery no. 1 (+) Fuse **F2** (T5A H250V, 5x20mm Ceramic)
- **J1:B1-** to/from battery no. 1 (-)
- **J1:B2+** to/from battery no. 2 (+) Fuse **F3** (T5 A H250V, 5x20mm Ceramic)
- **J1:B2-** to/from battery no. 2 (-)

For external batteries is the following valid: Max. 3 m cable length (min. 4 mm²). The installation etc. shall be in accordance with national regulations and codes of practice.

4.4 24 V DC, Earth output & Mains OK output

External equipment² requiring 24 V DC power supply, is connected to the Charger board 3367 screw terminals:

- J7:1 (24 V +) Fuse **F5** (T4A L250V, 5x20mm Glass) .
- J7:2 (0 V)
- J7:3 (Earth) This output is designed for the Addressable 2 voltage outputs unit 3364, input "Earth" (screw terminal 7). Normally not used.
- J7:4 (/OK) /Mains OK = Normally low output (open collector, 390R / 12 mA limited current). This output is designed for the Addressable 2 voltage outputs unit 3364, input "/Mains OK" (screw terminal 8), when the fire door closing function (ABDL)¹¹ is to be used.

Up to 4 mm² conductor area can be used.

NOTE! Max. continuous current consumption on the 24 V DC output (J7:1) is **2.1 A** alt. **0.85 A** depending on if **Low** or **High** current charging mode is used, see chapter "Charger functions", page 6.

4.5 COM loop

A COM loop is connected to the Charger board 3367 screw terminals:

- J2:1 (L/SA) COM loop in
- J2:2 (C/SB) COM loop in
- J2:3 (L/SA) COM loop out
- J2:4 (C/SB) COM loop out

Up to 2.5 mm² conductor area can be used.

¹¹ This function is described in the Planning Instructions, Technical Description, etc. for the system / unit respectively.

5 Settings

The address and mode settings require the 3366 unit to be **power supplied but not connected to a COM loop**.

For a recommended sequence of actions, see chapter "Commissioning of a new unit", page 14.

5.1 Address setting

The COM loop address is set with the Address setting tool 3314. The address can be set between 001 and 127. The unit has an address label where the address is to be written.

At the same time as the address setting the mode has to be set, see below.

5.2 Mode setting

At the same time as the address setting, see above, the mode has to be set.

NORMAL mode: This mode is to be used in system **EBL512** with S/W version ≥ 2.3 and in systems **EBL512 G3** and **EBL128**. The unit shall be programmed in Win128 / 512 as "External power supply 3366". The unit will in Win128 / 512 via "Check all loop units" be identified as an External power supply 3366 unit.

2330 mode: This mode is to be used in system **EBL512** with S/W version $\leq 2.2.x$ and in system **EBL1000**. The unit shall be programmed in Win512 and PLAN1000 respectively as an "**SU4 Addressable 4 voltage outputs unit 2262 / 2263**".

NOTE! In this case it is very important that there is no control expression programmed for the output 0, 1, 2 and 3 respectively.¹²

The unit will in Win512 via "Check all loop units" be identified as an SU4 Addressable 4 voltage outputs unit 2262 / 2263.¹³

2312 mode: This mode is not to be used for the 3366 unit.

¹² If the 3366 unit is to "replace" a 2262/2263 unit, make sure that old control expressions are deleted!

¹³ Two 3364 units (in 2330 mode) connected to one power supply unit 3366 (in 2330 mode) are intended to succeed the current 2262 unit.

6 Commissioning of a new unit

NOTE! The address and mode settings require the 3366 unit to be **power supplied but not connected to a COM loop**.

Regarding address and mode settings see chapter "Settings", page 13.

Here follows a recommended sequence of actions:

1. Mount the unit on the wall etc.
2. Remove the fuses, i.e. "F1" for the 24 V DC input, "F5" for the 24 V DC output and "F2" and "F3" for the battery no. 1 and no. 2 respectively.
3. Connect the mains (230 V AC) to the Rectifier 1537.
4. Put back the 24 V DC input fuse "F1". (Now the 3367 board is power supplied.)
5. Perform the address and mode settings. Use the Address setting tool 3314/4414 and the belonging connection cable.
6. Remove the 24 V DC input fuse "F1". (Now the 3367 board is powerless.)
7. Do the other connections, i.e. the COM loop (in and out) and the external equipment to be power supplied (the 24 V DC output).
8. Connect the batteries.
9. Put back the fuses, i.e. first the 24 V DC input fuse "F1", the 24 V output fuse "F5" and then the battery fuses "F2" and "F3".

NOTE! The 24 V DC output will only be powerless when both the batteries and the mains are disconnected.

7 Connections

All required internal connections are factory made. The following have to be connected:

- Mains (230 V AC)¹⁴ to the Rectifier 1537.
- Batteries (2 x 12 V) to the Charger board 3367 ("J1"). Cables for two maintenance-free sealed Lead-Acid backup batteries (rated 12 V, 7.5 Ah) are supplied.
NOTE! Up to 7.5 Ah batteries can be placed inside the housing. For external batteries, the following is valid: Max. 3 m cable length (min. 4 mm²)¹⁵. The installation etc. shall be in accordance with national regulations and codes of practice.
- External equipment (24 V DC, continuous current consumption ≤ 2.1 A alt. ≤ 0.85 A) to the Charger board 3367 ("J7").
- COM loop to the Charger board 3367 ("J2").

See also chapter "Inputs / Outputs / Connectors", page 11.

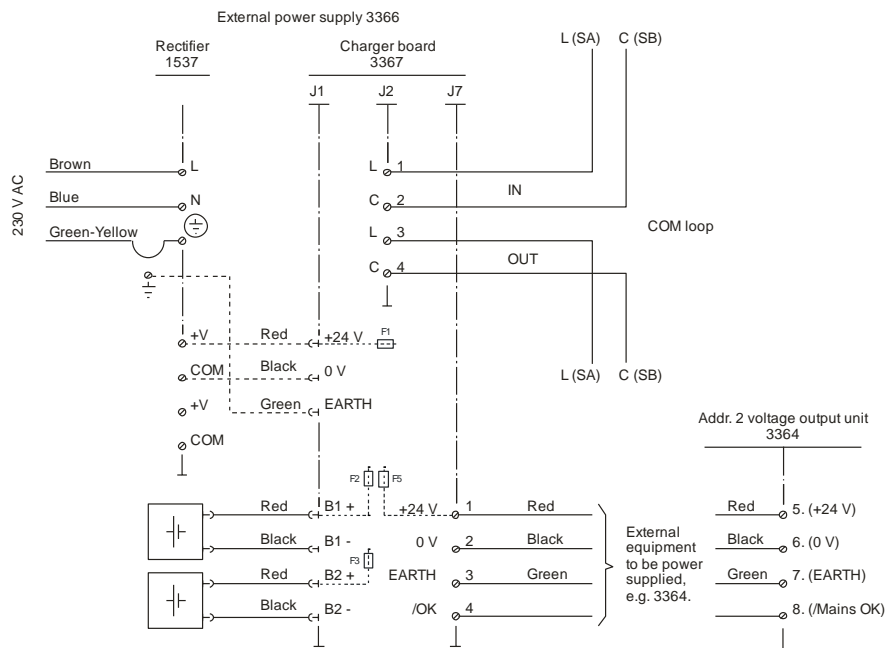


Figure 3. The External power supply 3366 connections. Internal connections are dashed. There are spaces in the housing for two maintenance-free sealed Lead-Acid backup batteries (rated 12 V, 7.5 Ah). **NOTE! The earth connection J7:3 to the 3364 unit (terminal 7) is normally not required.**

¹⁴ Connected to a household removable fuse intended for this unit only and marked according to national regulations and codes of practice. The mains cable has to be securely clamped in the housing. Use cable ties to keep mains and 24 V DC wiring well separated.

¹⁵ **FAULT:** Battery output unit **xxxxxxx** will be generated ("JP3" not shunted) if the battery cable resistance (cables + fuses) is too high, i.e. internal battery resistance + battery cable resistance > 0.35 Ω per battery.

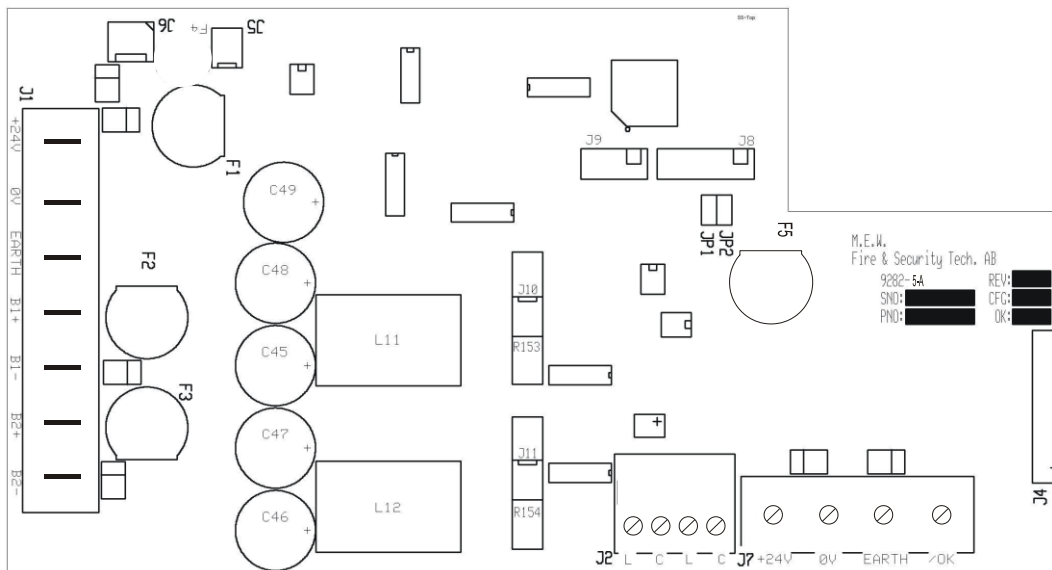


Figure 4. Charger board 3367 p.c.b. Position of the connectors, fuses, etc.
NOTE! Some of the components shown in the figure might not be found on the Charger board 3367.

Comments to the components:

- F1** T5A L250V, 5x20mm Glass. Fuse for the 24 V DC (+) from the Rectifier 1537.
- F2** T5A H250V, 5x20mm Ceramic. Fuse for the battery no. 1 (+).
- F3** T5A H250V, 5x20mm Ceramic. Fuse for the battery no. 2 (+).
- F5** T4A L250V, 5x20mm Glass. Fuse (+24 V DC) for the equipment to be power supplied.
- J1** Tab terminals (6.3 mm) for the 24 V DC from the Rectifier 1537, battery no. 1 and battery no. 2.
- J2** Terminal block for the COM loop (in / out).
- J7** Terminal block for the external equipment to be power supplied via 3366.
- JP1** Restart. Has to be momentarily shunted after "JP2" has been changed.
- JP2** Charging mode selector
Open: **Low** current charging mode. (Default for 3366.)
 Max. 2.1 A continuous current consumption allowed.
Shunted: **High** current charging mode.
 Max. 0.85A continuous current consumption allowed.

After "JP2" has been changed, momentarily shunt "JP1" for a restart.

8 Technical data

Voltage

Primary (V AC): **230** (176-264)
System (V DC): **24**¹⁶

24 V DC output current (A)

Max. **2.1** alt. **0.85** (depending on **Low** or **High** current charging mode, which is depending on the required backup battery capacity / backup time).

NOTE! A fire alarm in the system will automatically turn off the battery charging, i.e. the output current can then be up to **4 A**.

From COM loop (mA)

Quiescent / active: ≤ 15 / ≤ 15

Charger board 3367 current consumption

Power supplied via the rectifier: 55 mA
Power supplied via the backup battery: 35 mA

Ambient temperature (°C)

Operating: **0 to +40**
Storage: **-20 to +70**

Ambient humidity (%RH)

Max. **90**, non condensing

Ingress protection rating

IP 30 (estimated)

Size H x W x D (mm)

288 x 400 x 95.

Weight, excl. / incl. batteries (kg)

4.8 / 9.8¹⁷

Colour

Metal cabinet: light grey (NCS S 1500-N / PMS Cool Gray 2)

Approvals

CE; 12 EC Certificate no. 0786-CPD-21218. Conforms to EN 54-4:1997 + A1:2002 + A2:2006. VdS approval no.: G212124.

NOTE! All current consumptions are valid by 24 V DC (nominal voltage) and by 25°C.

¹⁶ The rated output voltage for the main power source (rectifier) is 24 V \pm 1%. Max. 500 mV ripple. The rated output voltage for the second power source (the backup battery) is 15.6 – 28 V DC. **NOTE!** The voltage will be switched off at approx. 15.6 V in order not to damage the batteries.

¹⁷ Batteries are not supplied with the 3366 unit.

9 Revision history

Revision 1

Elucidation and small corrections in the whole document.

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

3.2.3, 3.2.4, 4.3, 5.2, 7 & 8.

Revision 2

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

3.1, 3.2, 3.2.1, 3.2.2, 3.2.4, 3.4, 4.3, 4.4, 7 & 8.

Chapter 4.2 added, i.e. former 4.2 is now 4.3 and so on.

Revision 3

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

3, 3.2.1, 3.4, 4.2, 4.3, 4.4, 5.2, 6 (2, 5 9), 7 (Figure 3 & F1-F5) & 8

Revision 4

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

3.2.3 Info. changed.

8 Approvals updated. Footnote 16 info. changed.

Revision 5

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

3.1 Approvals updated. Footnote 3 added.

Revision 6

Red marked revisions (info. revised, added and/or deleted) in the following chapters / paragraphs:

4.1 Info added.

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