Industriefunkuhren

hopf Elektronik GmbH

Technical Manual

LED Display 3550
(25mm / 6 Digit / 7-Seg.)

ENGLISH

Version: 01.02 – 23.04.2008

Valid for Devices 3550 with FIRMWARE Version: **01.xx**

hopf Elektronik GmbH
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Version number (Firmware / Manual)

THE FIRST TWO DIGITS OF THE VERSION NUMBER OF THE TECHNICAL MANUAL AND THE FIRST TWO DIGITS OF THE FIRMWARE VERSION MUST **COMPLY WITH EACH OTHER**. THEY INDICATE THE FUNCTIONAL CORRELATION BETWEEN DEVICE AND TECHNICAL MANUAL.

SEE CHAPTER 4.3 Display after Start-up / Reset (Type / Firmware)

THE DIGITS AFTER THE POINT IN THE VERSION NUMBER INDICATE CORRECTIONS IN THE FIRMWARE / MANUAL THAT ARE OF NO SIGNIFICANCE FOR THE FUNCTION.

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Symbols and Characters

Operational Reliability

Disregard may cause damages to persons or material.

Functionality

Disregard may impact function of system/device.

Information

Notes and Information.

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Safety regulations

The safety regulations and observance of the technical data serve to ensure trouble-free operation of the device and protection of persons and material. It is therefore of utmost importance to observe and compliance with these regulations.

If these are not complied with, then no claims may be made under the terms of the warranty. No liability will be assumed for any ensuing damage.

Safety of the device

This device has been manufactured in accordance with the latest technological standards and approved safety regulations

The device should only be put into operation by trained and qualified staff. Care must be taken that all cable connections are laid and fixed in position correctly. The device should only be operated with the voltage supply indicated on the identification label.

The device should only be operated by qualified staff or employees who have received specific instruction.

If a device must be opened for repair, this should only be carried out by employees with appropriate qualifications or by ***hopf*** Elektronik GmbH.

Before a device is opened or a fuse is changed all power supplies must be disconnected.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly.

The safety may be impaired when the device does not operate properly or if it is obviously damaged.

CE-Conformity

CE

This device fulfils the requirements of the EU directive 89/336/EWG "Electromagnetic compatibility" and 73/23/EWG "Low voltage equipment".

Therefore the device bears the CE identification marking (CE = Communautés Européennes = European communities)

The CE indicates to the controlling bodies that the product complies with the requirements of the EU directive - especially with regard to protection of health and safety for the operator and the user - and may be released for sale within the common markets.

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1 System Description Display 3550

Display 3550 is a 7 segment LED display for control panel installation designed in accordance with DIN 43700. With 6 digit and 16 individual LED's, **time or date** as well as the weekday and various items of status information can all be displayed.

The display can be read easily at a distance of approx. 8 metres due to the character height of 25mm.

Display 3550 can be operated and parameterised by means of 4 buttons on the front panel. The settings are menu-driven.

The display can be synchronised with DCF77 time code or DCF77 pulse. Manual setting of the clock is not required in this case (not even after a power failure).

The brightness of the LED's can be adjusted to suit the respective lighting conditions of the installation environment.

Service interventions agreed with ***hopf*** can be carried out on the display – on-site if necessary – with the aid of the built-in serial service interface.

In addition, a variety of input voltages (AC and DC) can be selected for different types of application.

A high degree of flexibility and availability is achieved in addition to complete freedom from maintenance and a range of presentation and display options.

The ***hopf*** Display 3550 further extends the innovative product range of ***hopf*** Elektronik GmbH.

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Some basic functions of the 7 segment Display 3550:

- Synchronisation of the display with **DCF77 time code** or **DCF77 pulse**
- **Time and date** can be displayed **alternately**
- **Character height: 25mm**
- **Adjustable time offset** for internal calculation of UTC time
- Enclosure for **control panel installation in accordance with DIN 43700** including mounting brackets
- Simple operation via **buttons** on the front panel
- Easy **brightness control** via buttons on the front panel
- All connectors with **strain relief**
- **Status LED's** on the display for:
  - **Synchronisation status**
  - **Input signal detection**
  - **ST/WT changeover announcement**
  - **Leap second announcement**
  - **AM/PM time display**
  - **Local/UTC time base**
  - **Daylight Saving Time**
  - **EU/US date display**
- Use of **non-reflecting filter plates** to subdue reflection
- For the **AC version:**
  Wide-ranging voltage input 100-240V AC – for worldwide application
- For the **DC version:**
  Voltage input range 18-36V DC or 36-72V DC
- **Serial service interface** (RS232 format)
- **High freewheel accuracy** through synchronisation-supported regulation of the internal quartz base
- Completely **maintenance-free**
- Redundant **multiple checking of the synchronisation signals** for fault and leap-free time display.

Extension options

Customer-specific system adjustments for "tailor-made" project solutions.

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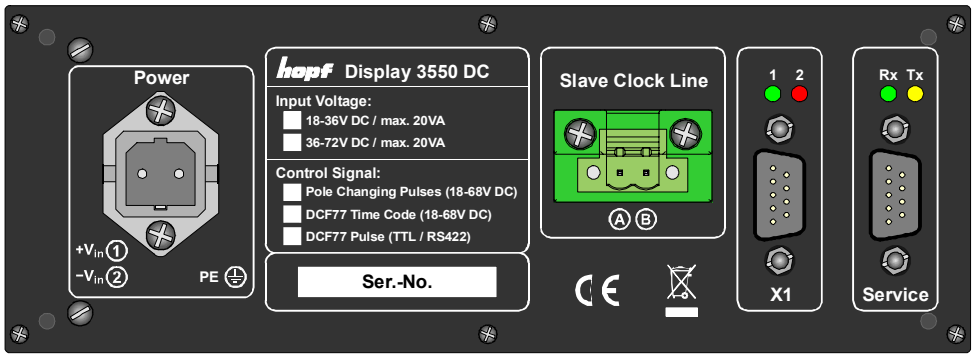
2 Display Layout

This section provides an overview of the individual elements of the display.

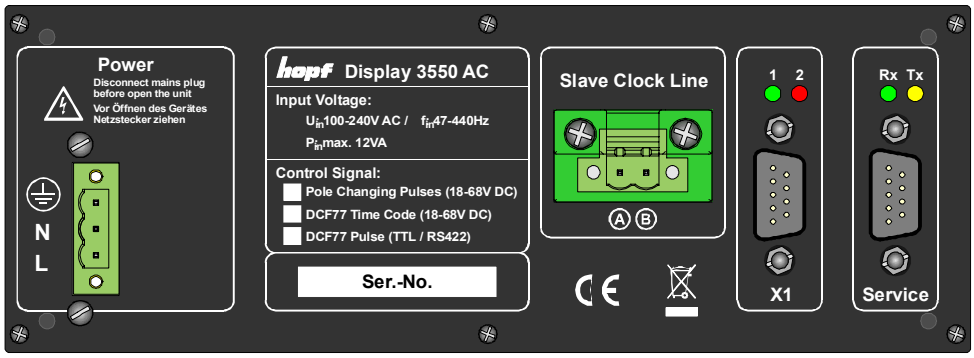
2.1 Overview

Front view Display 3550:

Rear view Display 3550 - DC version:



Rear view Display 3550 - AC version:



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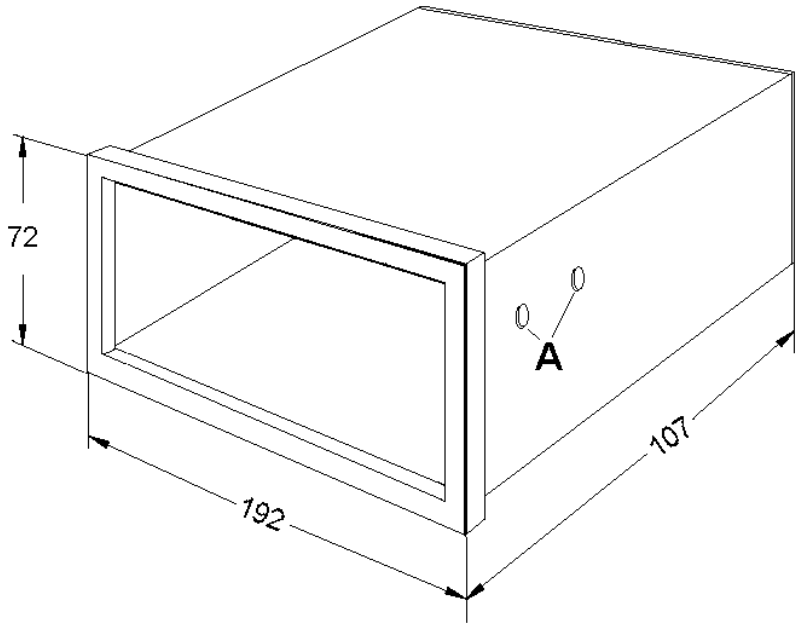
2.2 Housing

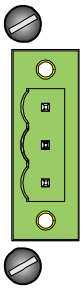
The display is assembled in an enclosure for control panel installation in accordance with DIN 43700. The enclosure is manufactured from noryl (black) material. The front panel is made of non-reflecting perspex.



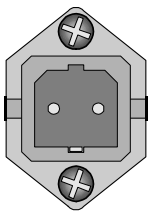
2.3 Power Supply

The display is available as both an AC version with a wide range of inputs and two different DC versions for different voltage ranges.

AC power supply connection:



DC power supply connection:



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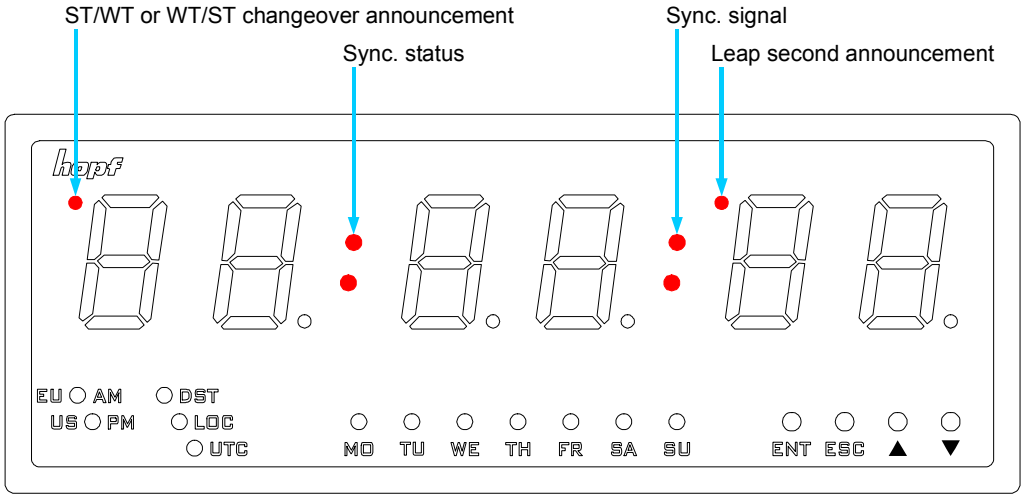
2.4 LED Display

The actual display consists of 7 segment displays and individual LED's.

Display 3550 provides a variety of indicators for the presentation of display status and problem analysis.

In addition to the direct readouts via the LED's, the actual function of all LED's can be checked under the "TEST" menu item.



2.4.1 Synchronisation Status

The synchronisation status of the time displayed can be read from the left-hand colon.

Status	Meaning
Off	**INVALID** – the time is invalid
Flashing	**QUARTZ** – the time is running on the display's internal quartz base
On	**SYNC** – the time is synchronised from an external source

If the display was synchronised successfully, the synchronisation status changes from **SYNC** to **QUARTZ** after 2 minutes of faulty or no synchronisation signal.

2.4.2 Synchronisation Signal

The right hand colon represents the availability of a signal on the "Slave Clock Line" and "X1" inputs. A check is made here as to whether an edge change takes place on the signal present at the signal inputs.

Status	Meaning
Flashing	**No** input signal is detected
On	An input signal is detected

This check is only active on **INVALID** and **QUARTZ** time status.

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2.4.3 Summer Time / DST (Daylight Saving Time)

If the display is synchronised via DCF77 time code or DCF77 pulse (1Hz), summer time is identified by the "DST" (Daylight Saving Time) LED.

The summer time information is only transmitted if the display is set for local time and is not transmitted if UTC time is set.

2.4.4 Time Base - Local/UTC

The time base of the displayed time information is identified with these LED's.

2.4.5 Time - AM/PM and Date - EU/US

These two LED's have a different meaning depending on whether the time or date is being displayed:

Time

Status	Meaning
Both off	The time is displayed in 24h mode
AM on / PM off	The time is displayed in 12h mode and it is morning
AM off / PM on	The time is displayed in 12h mode and it is afternoon

Date

Status	Meaning
EU on / US off	European date is displayed
EU off / US on	US date is displayed

2.4.6 Announcement of WT/ST or ST/WT Changeover

If the display is synchronised via DCF77 time code or DCF77 pulse (1Hz), the LED announces that a winter/summer time or summer/winter time changeover will take place on the next hour change.

This announcement is **not** displayed when the time base is set to UTC or when the date is displayed.

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2.4.7 Leap Second Announcement

If the display is synchronised via DCF77 time code or DCF77 pulse (1Hz), the LED announces that a leap second will be added on the next hour change.

This announcement is **not** displayed when the date is displayed.

2.4.8 Weekday Display

As soon as the Display has valid date information, the respective weekday is shown via the 7 LED's:

Display	Meaning
MO	Monday
TU	Tuesday
WE	Wednesday
TH	Thursday
FR	Friday
SA	Saturday
SU	Sunday

2.5 Buttons

The Display is parameterised by means of the 4 buttons on the front panel.

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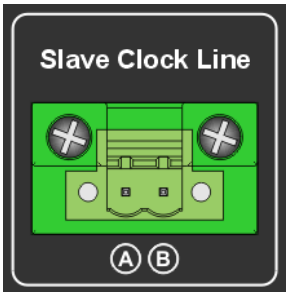
2.6 Synchronisation Input

The Display has various signal inputs for the synchronisation signal.
This signal can be supplied to the Display at different signal levels.

2.6.1 Slave Clock Line

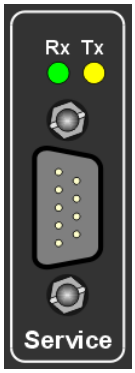


The Display can be connected to a master clock via the "Slave Clock Line". The Display is suitable for master clocks which transmit DCF77 time code with line voltages of 24V, 48V and 60V.

2.6.2 Connector X1

The Display can be synchronised in TTL and at RS422 level with a DCF77 pulse (1Hz) via the 9-pole SUB-D connector X1. In addition, a secured 5 volt power supply is available via this connector for external clocks or DCF77 receivers.

2.7 Service Interface



The service interface (9-pole SUB-D connector) serves for updates and other device-specific functions. This interface is not required for the normal operation of the Display. The interface must only be used by agreement and with the support of ***hopf***. In this case, special user information and the required software are provided by ***hopf***.

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3 Installation

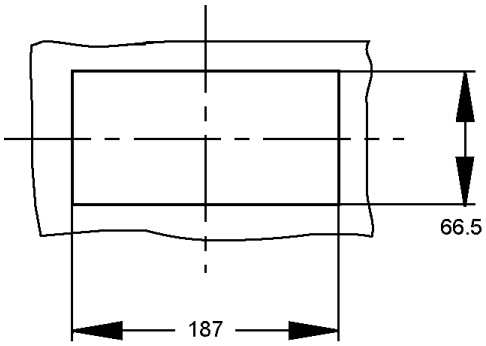
The installation of the Display is described below.

3.1 Mounting

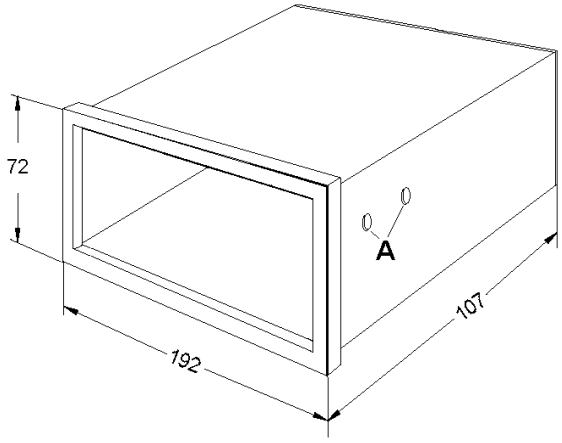
The following steps must be carried out:

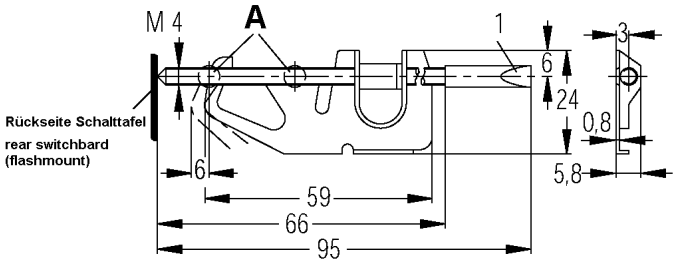
- Insert the Display into a suitable section in a control panel.
- After inserting the Display, fix and secure the two retaining clips on points "A" of the enclosure.
- Next fasten the Display securely into the control panel by tightening the screws on the retaining clips.

Control panel section



Dimensions of enclosure and retaining clip





All dimensions in millimetres

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3.2 Power Supply

The Display is available as AC and as DC version.

3.2.1 AC Power Supply

The Displays' standard AC power supply unit is described here. However, the connection data on the nameplate of the respective unit is always applicable.

Attention should be paid to the following when connecting the power supply:

- Correct voltage type (AC or DC)
- Voltage level

Ensure that the external power supply is switched off. When connecting the supply cable make sure that the polarity is correct and the equipment is earthed.

The Display 3550 can be damaged if incorrect voltage is connected.

3.2.1.1 Safety and Warning Instructions

Please read these instructions thoroughly to facilitate safe operation of the equipment and to use all of its functions.

Warning: Never work on live equipment on open devices! Danger to life!

The Display 3550 is a built-in device. Installation and commissioning may only be carried out by suitable specialist personnel. In doing so the respective country-specific regulations (e.g. VDE, DIN) are to be observed.

In particular, before commissioning please ensure that:

- The power connection has been installed correctly and there is guaranteed protection against electric shock!
- The ground wire is connected!
- All power cables are correctly fused and sized!
- All output lines are sized in accordance with the max. output current of the device or are specially fused!
- Sufficient convection is guaranteed respectively the permitted operating temperature is not exceeded!

The device contains components with life-threatening voltage and a high amount of stored energy!

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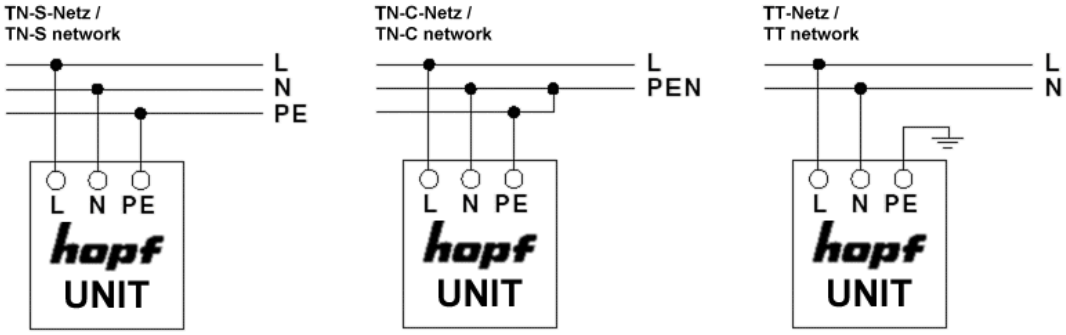
3.2.1.2 Power Connection

Connection of the ***hopf*** Display 3550 AC power supply.

3.2.1.2.1 Connection to Several Power Networks



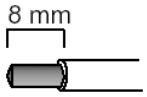
3.2.1.2.2 Connection of the Power Cable

The power cable is connected via a 3-pole pluggable screw terminal. The following cable cross-sections can be connected to the input plug:

	Fixed [mm²]	Flexible [mm²]	AWG	Starting moment [Nm]
L, N, ⏚	0.2-2.5	0.2-2.5	24-12	0.5 – 0.6

For a reliable and secure contact:

Strip the insulation by 8 mm



The connector must always be mounted using the housing and strain relief fitting provided.

3.2.1.3 Voltage Input / Fuse Protection

The 100-240V AC connection is made via the plug-in screw connections L, N and ⏚.

Primary Side Fuse Protection

The device must be installed in accordance with the provisions of EN 60950. There must be a suitable separating device external to the power supply capable of switching the device off.

The primary side line protection, for example, is suitable for this purpose.

Further equipment protection is not required because the device is fused internally.

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Recommended External Fuse

Automatic cut-out 6 A or 10 A, Characteristic B (or equivalent in function).

A suitable external fuse is required for DC applications.

If the internal fuse trips (device protection) it is highly likely that the device is faulty. In this case the equipment should be checked at the factory.

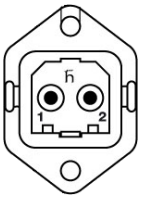
3.2.1.4 Specifications AC Power Supply

All AC power supply specifications are contained in ***Chapter 8 Technical Data Display 3550***.

3.2.2 DC Power Supply

The Displays' standard DC power supply unit is described here. However, the connection data on the nameplate of the respective unit is always applicable.

Ensure that the external power supply is switched off. When connecting the supply cable make sure that the polarity is correct and the equipment is earthed.



The cable of the power supply is connected using a 2-pole plug connector with additional earth connection and interlocked with the Display 3550:

$+V_{in}$:	Positive pole (contact 1)
$-V_{in}$:	Negative pole (contact 2)
PE:	Earth

The Display 3550 can be damaged if incorrect voltage is connected.

Earthing:
By default the minus pole (-Vin) and earthing (PE) are connected system-sided.

3.2.2.1 Power Supply Unit Specifications

All DC power supply specifications are contained in ***Chapter 8 Technical Data Display 3550***.

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3.2.2.2 Fusing

Pay attention to the correct fusing of the power supply when connecting the Display 3550.

The corresponding performance data can be taken from the equipment nameplate.

If the internal fuse (device protection) trips it is highly probable that the equipment is faulty. In this case the device should be checked in the factory.

3.2.2.3 Reverse Voltage Protection

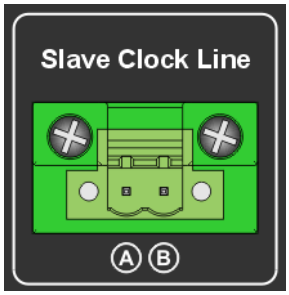
The version of Display 3550 with DC supply has reverse voltage protection. This protection prevents damage to the equipment due to an incorrectly connected DC power supply.

Protection is effected by means of a self-resetting fuse. In the case of reverse polarity, it is necessary to switch the equipment off for approx. 20 seconds after this fuse has tripped. The power supply can then be connected with the correct polarity.

3.3 Connecting the Synchronisation Signal

The Display has several signal inputs for the synchronisation signal.
This signal can be supplied to the Display at different signal levels.

3.3.1 Slave Clock Line - DCF77 Time Code



The slave clock line is connected via a 2-pole screw terminal for cables up to 1.5mm² (pluggable).

It is **not** necessary to pay attention to the polarity of the cable as the input has an internal detector.

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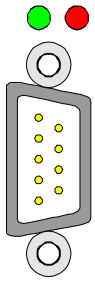
3.3.2 Connector X1 - DCF77 Pulse (1Hz)

SUB-D male connector 9-pole

1 2



X1	
LED	**Meaning**
1	LED green – receiving a signal
2	LED red – current limiting +5V (pin1) active
9-pole SUB-D male connector	
Pin	**Signal**
1	+5V
2	TTL input
3	n.c.
4	n.c.
5	GND
6	n.c.
7	n.c.
8	+RS422 input (high active)
9	-RS422 input (low active)

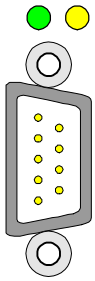
n.c. = not connected

3.4 Service Interface Connection

The serial service interface is connected as follows:

SUB-D male connector 9-pole

Rx Tx



Service	
LED	**Meaning**
Rx	LED green – receiving serial data
Tx	LED yellow – transmitting serial data
9-pole SUB-D male connector	
Pin	**Signal**
1	n.c.
2	RS232c (V.24) RXD
3	RS232c (V.24) TXD
4	n.c.
5	GND
6	n.c.
7	n.c.
8	n.c.
9	n.c.

n.c. = not connected

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4 Commissioning

This section describes the commissioning of Display 3550.

4.1 General Procedure

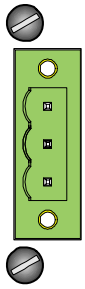
Commissioning is structured as follows:

- Check the cabling:
  - Earthing
  - Power supply
  - Signal feed
- Switch on the external power supply
- The start sequence appears on the Display (Display type / firmware / LED test)
- Carry out all parameterisation via the **menu**
- Check for successful synchronisation of Display 3550
  - If no external synchronisation signal is available, set the time and date manually via the **menu**

4.2 Switching on the Operating Voltage

The Display does not have its own power supply switch. The Display is activated by switching on the external power source.

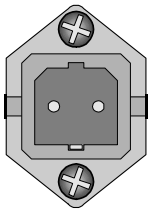
AC power supply:



Switch on external power source.

Display 3550 starts up by showing the display type and firmware version including programming date before carrying out a LED Test (see ***Chapter 4.3 Display after Start-up / Reset (Type / Firmware)***).

DC power supply:



Switch on external power source.

Display 3550 starts up by showing the display type and firmware version including programming date before carrying out a LED Test (see ***Chapter 4.3 Display after Start-up / Reset (Type / Firmware)***).

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4.3 Display after Start-up / Reset (Type / Firmware)

The start sequence of Display 3550 takes place in 3 steps:

1. Indication of display type	H0 PF	Manufacturer	Duration 2 sec.
	35 50	Type	Duration 2 sec.
2. Indication of firmware	Pr 06	---	Duration 2 sec.
	01.00	Prog. version	Duration 2 sec.
	15.03.07	Prog. date	Duration 2 sec.
3. LED test			Duration approx. 20 sec.

The first two steps are carried out at the currently set display brightness. The LED test takes place at maximum LED brightness.

4.4 Button Functions

The arrangement and assignment of the buttons are described below.

4.4.1 Button Arrangement

4.4.2 Button Assignment

Button	Function
ENT	ENTER – Input button for menu start and acceptance of values
ESC	ESCAPE – Input button for cancel / go back one level
▲ and ▼	UP / DOWN – Input buttons for menu / increase and decrease value

4.5 Input Time / Date

It is necessary to set the time and date every time the Display is switched on. Setting generally takes place via an external synchronisation signal but can also be carried out manually.

4.5.1 External Synchronisation

The only action required to set the time and date via an external synchronisation signal is to make the connection to the display. If the specified signal level is maintained and there is no interference to the signal, the Display requires approx. 5 minutes for synchronisation (transfer of time/date).

4.5.2 Manual Input

For manual setting of time and date see Chapter ***5.2.7 Menu – Set Time*** and Chapter ***5.2.8 Menu – Set Date***

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5 Display Parameterisation and Operation

The operating concept, menu structure and individual menus are described below.

All parameters and settings set via the menu are stored in a fail-safe manner.

5.1 Menu Navigation / Settings

This section describes the basic functionality of menu navigation and parameterisation of the Display.

The Display returns automatically to its standard setting after 60 seconds if no button is pressed in a menu.

Sustained pressing of a button has the same effect as repeated pressing.

Main menu

Activate the main menu

- The main menu is called up by pressing the **ENT** button for 3 seconds

Select menu

- Change from one item to the next by pressing the ▲ and ▼ buttons.
- Call up a menu item or activate its function by pressing the **ENT** button.

Set value

- The flashing value can be changed to the desired setting with the ▲ and ▼ buttons.
- The flashing value is transferred to the Display by pressing the **ENT** button – the value then ceases to flash.
- Exit the menu item or quit the function by pressing the **ESC** button.

Quit menu

- Return to the standard display by pressing the **ESC** button again.

Brightness

The brightness can be set either via the main menu or directly.

- By sustained pressing (> 1 sec.) of the ▲ or ▼ button while in the standard display, the display switches directly to the brightness value setting.
- Return to the standard display by pressing the **ESC** button twice.

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5.2 Menu Structure

The menu structure is constructed as follows:

MENU - Overview

01	br IG ht	Bright	Brightness
02	24 or 12	24 or 12	12h/24h display
03	Lt -U tC	LT -UTC	Time base
04	d i FF	Diff	Time offset UTC-local time
05	EU or US	EU or US	Date display
06	tO GG LE	Toggle	Alternate Time/Date display
07	t I ME	Time	Set Time
08	dA tE	Date	Set Date
09	rE SE t	Reset	Reset the display
10	In FO	Info	Device information
11	tE St	Test	LED Test

5.2.1 Menu – Brightness

The brightness of the LED display can be adjusted to the respective ambient conditions via this menu.

Values can be set between 0 and 120 per cent. Values over 100 per cent serve to compensate for loss of light intensity by the LED display due to age.

Adjustable values: 0 00 to 1 20

5.2.2 Menu – 12h/24h Display (24 or 12)

Selection can be made between 24h mode and 12h mode for the time display.

In 12h mode, the AM (**Ante meridiem** – morning) and PM (**Post meridiem** – afternoon) information is displayed via individual LED's.

In 24h mode the "AM" and "PM" LED's remain unlit during the time display.

Adjustable values: 24 or 12

5.2.3 Menu – Time Base (Lt-UTC)

The time base for the displayed time information can be selected via this menu.

If the display is synchronised via DCF77 time code or DCF77 pulse (1Hz), synchronisation is generally carried out with local time.

It is not necessary to set changeover points of time as the ST/WT changeover is controlled by the information contained in the synchronisation signal.

The Display can calculate the UTC time with the aid of this information and the set time offset (described in ***Chapter 5.2.4 Menu – Time Offset UTC-Local Time (Diff)***.

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Time offset: Standard time (winter time) ⇨ Set time offset
Summer time ⇨ Set time offset +1h

Changeover point of time + time zone offset (summer or winter time) are taken from the synchronisation signal.

UTC is a calculated time in this case.

Adjustable values: LOCAL or UtC

5.2.4 Menu – Time Offset UTC-Local Time (Diff)

The time offset between local time and UTC time can be set with this menu.

The time offset is always set for the local standard time (winter time). The required offset in the case of active summer time is taken from the synchronisation signal.

The time offset to be set is calculated in accordance with the following formula:

Local Standard Time (Winter Time) = UTC + Time Offset

Adjustable values: - 14:00 to 14:00
(-14.00h to +14.00h / increment 1 min.)

If the time offset is changed in **SYNC** time status the Display is set back to **QUARTZ** time status.

5.2.5 Menu – Date Display (EU or US)

Selection can be made between the European and American format with this setting.

- European display: Day / Month / Year
- American display: Month / Day / Year

The format used is shown via the "**EU**" and "**US**" LED's when the date is displayed.

Adjustable values: EU or US

5.2.6 Menu – Alternate Time/Date Display (Toggle)

This menu can be used to select between Time ONLY, Date ONLY and ALTERNATE Time and Date.

The alternating display operates for a period of 10 seconds. Selection can be made as to the relative duration of the time and date displays during this period.

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td: on 00	Time only
td: 09 01	9 seconds time and 1 second date
etc. up to	
td: 01 09	1 second time and 9 seconds date
td: 00 on	Date only

5.2.7 Menu – Set Time

Time is always set in the 24h mode.

Manually input time is valid for the currently set time base of the display (UTC or local).

1. 00:00:30 — Hour — Value range: 00-23
   Transfer of the hour with the **ENT** button
2. 13:00:30 — Minute — Value range: 00-59
   Transfer of the minute with the **ENT** button
3. 13:53:00 — Second — Value range: 00-59
   Precise to the second transfer of the complete time with the **ENT** button

Until the seconds have been transferred the time input can be cancelled with no change to the current time by pressing the **ESC** button.

After a time has been set, a weekday is displayed **without entering a date** (generally "Saturday" for 01.01.2000 following a restart of the Display).

5.2.8 Menu – Set Date

The date is always set in European mode (Day / Month / Year).

1. 01. 01. 00 — Day — Value range: 00-31
   Transfer of the day with the **ENT** button
2. 13. 00. 00 — Month — Value range: 01-12
   Transfer of the month with the **ENT** button
3. 13. 03. 07 — Year — Value range: 00-99
   Transfer of the complete date with the **ENT** button

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Until the year has been transferred the date input can be cancelled with no change to the current date by pressing the ESC button.

Implausible values can be set for the date (e.g. 31.02.2007). The Display corrects such inputs to a plausible date (e.g. from 31.02.2007 to 03.03.2007)

5.2.9 Menu – Display Reset

After selecting this menu a countdown of 3 seconds is displayed. It is possible to cancel the reset procedure during this time by pressing the ESC button.

The current time and date information is lost following a reset and it is necessary to reset the time and date and resynchronise the system.

5.2.10 Menu – Device Information (Info)

After selecting this menu the device type and firmware version are displayed (see ***Chapter 4.3 Display after Start-up / Reset (Type / Firmware)***).

5.2.11 Menu – LED Test (Test)

After selecting this menu a function test is carried out on all LED's and LED segments. This test takes place at maximum LED brightness. The test ends automatically after 60 seconds and can be cancelled by pressing the ESC button.

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6 Support from the *hopf* Company

Should the display cautious different from the manual and the problem is not resolvable with the diagnosis displays, please contact Support at ***hopf*** Elektronik GmbH with an exact description of the fault and the following information:

- Type of device
- Program version
- Serial number
- Occurrence of the error during commissioning or operation

Write to the following E-mail address with the above information:

support@hopf.com

Providing a detailed description of the error and the information listed above avoids the need for additional clarification and leads to faster processing by our Support team.

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7 Maintenance / Care

The display 3550 is generally maintenance-free. The following points should be noted if it is necessary to clean the display 3550:

7.1 General Guidelines for Cleaning

The following **must not** be used to clean the display 3550:

- Out gassing
- Cleaning agents containing solvents
- Cleaning agents containing acids
- Abrasive media

The use of such cleaning agents or media could damage the display 3550.

Do not use a wet cloth to clean the display 3550.
There is the danger of an electric shock.

To clean the display 3550 use a cloth that is:

- Antistatic
- Soft
- Non-fabric
- Damp

7.2 Cleaning the Housing

Make sure that connections or cables are not loosened whilst cleaning the housing of an active system. There is a risk that the system could become damaged and lose functionality.

7.3 Cleaning the Display and Keypad

Minimum pressure should be exerted when cleaning the display and keypad. Excessive pressure may cause mechanical damage.

When cleaning the active displays 3550 make sure that display functions are not altered by accidentally pressing a key.

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8 Technical Data Display 3550

General Data	
Operation:	Via buttons on the front panel
Protection type of the enclosure:	IP40
Protection class:	I, with PE connection
Enclosure design:	Noryl SE1 GFN2, black, closed
Enclosure dimensions:	For control panel installation in accordance with DIN 43700, Width: 192mm; Height: 72mm; Depth: 107mm
Display:	• 6x 7 segment LED display (with decimal point) • Character height 25mm • 16 individual LED's (3mm) - Weekday display - EU/US – AM/PM - UTC/LOC/DST - Colons
Legibility:	Up to approx. 8 metres
Time/Date Setting:	Manual or via external synchronisation signal
MTBF:	> 100,000 hours
Weight:	approx. 0.6kg

AC Power Supply (with wide input range)	
Nominal input voltage:	100-240V AC / 47-440Hz Connection via 3 pole screw terminal for cables up to 2.5mm² (pluggable)
Input voltage range:	85-264V AC 110-370V DC
Frequency:	47-440Hz 0Hz
Power consumption (at nominal values):	approx. 0.3A (120V AC) / 0.2A (230V AC)
Inrush current:	typically 15A (I_O = 100%) 120V AC typically 30A (I_O = 100%) 230V AC
Power failure bypass at nominal load:	> 20msec. (> 100V AC)
Turn-on time after power supply feed:	< 1 sec.
Transient overvoltage protection:	Overvoltage category II (EN 60664-1)
Input fuse, internal:	400mA carrier (device protection)
Recommended pre-fuse:	Line protection switch 6A, 10A Characteristic B (EN 60898)
Earth leakage current:	< 0.5mA (60Hz, according to EN 60950)
Insulation voltage input / PE:	2000V AC, 1 minute, residual current = 10mA, 500V DC, 50MΩ min. (at room temperature)
Output Data (internal only)	
Internal nominal output voltage	5V DC
Nominal output current I_N 0°C ... +55°C	2A (U_{OUT} = 5V DC)
Efficiency	> 74% (at 230V AC and nominal values)

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DC Power Supply 24V or 48V (option)			
Nominal input voltage:	24V DC	or	48V DC
Input voltage range:	18-36V DC	or	36-76V DC
Power consumption (at nominal values):	0.69A	or	0.35A
Turn-on time after power supply feed:	< 200msec.		
Input fuse, internal (device protection):	2A, fast-acting	or	1A, fast-acting
Insulation voltage Input / output:	1500V DC 1 minute, 500V DC 50MΩ min. (20°C ± 15°C)		
Output Data (internal only)			
Internal nominal output voltage	5V DC		
Nominal output current I_N 0°C ... +55°C	3A (U_{OUT} = 5V DC)		
Efficiency	> 85%		

Synchronisation Input "Slave Clock Line" – DCF77 Time Code	
Input voltage range:	18-68V DC
Synchronisation time:	approx. 5 min. (with interference-free sync. signal)
Connection:	2 pole screw terminal for cables up to 1.5mm² (pluggable)

Synchronisation Input "X1" – DCF77 Pulse (1Hz)	
Input level:	RS422 and TTL
Interpretation:	Automatic detection of signal form (high or low active)
Synchronisation time:	approx. 5 min. (with interference-free signal)
Connection:	9-pole SUB-D male connector With voltage output for external clock, U_b = 5V DC / max. 100mA with current limiting

Service Interface "Service"	
Interface:	Full duplex, no handshake
Level:	RS232 (TxD/RxD)
Interface parameters:	• 9600 baud • 8 data bits • 1 stop bit • No parity
Connection:	9-pole SUB-D male connector

Ambient Conditions		
Temperature range:	Operation:	0°C to +55°C
	Storage:	-20°C to +75°C
Humidity:		max. 90%, non-condensing

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CE-compliant in accordance with EMC Directive 89/336/EC and Low Voltage Directive 73/23/EC	
Safety / Low Voltage Directive:	DIN EN 60950-1:2001 + A11 + corrigendum
EN 61000-6-4:	
EMC (Electromagnetic Compatibility) / Interference Immunity:	EN 610000-4-2 /-3/-4/-5/-6/-11
EN 61000-6-2:	EN 61000-3-2 /-3
Radio noise voltage EN 55022:	EN 55022 Class B
Radio noise emission EN 55022:	EN 55022 Class B

Accuracy	
On successful synchronisation:	Deviation < 1 msec. to synchronisation signal
Regulation of internal quartz base:	Takes place after approx. 21 min. of interference-free reception of the synchronisation signal
Freewheel accuracy:	• **Without** regulation of quartz base max. ± 50ppm; T = +20°C (constant) ○ Deviation after **1h**: 0.18 sec. ○ Deviation after **24h**: 4.4 sec. • **After** regulation of internal quartz base for ○ T = +20°C (constant) ○ no changes of brightness during freewheel *Source accuracy:* ***± 1 msec.*** *(e.g. DCF77)* *max.* ± 2.3ppm ○ Deviation after **1h**: 8.3 msec. ○ Deviation after **24h**: 199 msec. *Source accuracy:* ***< ± 10 µsec.*** *(e.g. GPS)* *max.* ± 0.1ppm ○ Deviation after **1h**: 0.36 msec. ○ Deviation after **24h**: 8.64 msec.

Custom-made products:

Hardware and software modifications can be provided in accordance with customer specifications.

hopf reserves the right to modify hardware and software at any time.

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