

**Industriefunkuhren**



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Technical Manual

GLONASS

Model 7980RC

**ENGLISH**

**Version: 01.00 – 18.01.2010**

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Valid for Devices 7980RC with FIRMWARE Version: **01.xx**  
and REMOTE-SOFTWARE Version: **01.xx**



## **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.

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.



### **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**



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 General Information on Board 7980RC - GLONASS

Board 7980RC is designed for time synchronisation of System 7001RC with the GLONASS receiver NAVIOR-24S™. The time information transferred by GLONASS are processed from the GLONASS receiver NAVIOR-24S™ and supplied to System 7001RC for synchronisation via board 7980RC.

Board 7980RC provides the following intrasystem functions:

- Synchronisation of System 7001RC by means of serial M/S string in UTC time base
- Management function and monitoring
- 7001RC System connection

The relevant GLONASS parameters as reception quality of satellites, position, ... are provided by WebGUI via the network by means of the management board 7050RC (see technical manual of management board 7050RC-GLONASS).

Following components are placed in the front panel:

- One BNC female connector for connection to GLONASS antenna
- Eight status LEDs for analysis purposes at the system
- A push button with different functions, e.g. selection of interface at the SUB-D male connector, release of reset or default of board 7980RC
- A SUB-D male connector for analysis purposes and update functionality of board 7980RC

The replacement of board 7980RC can be done at site by the customer.

Some of the base functions of Board 7980RC:

- Synchronization with **GLONASS**
- Synchronisation with only **one satellite** possible
- Generation of serial time string M/S string in UTC time base
- Simple operation via **keypad** and **LCD-display** on the front panel
- **Status LEDs** on both front and rear sides
- **Potential isolation** of the antenna circuit
- Completely **maintenance-free** System
- Redundant **multiple synchronization signal verification** for error-free and leap-free signal evaluation
- Fail-safe
- Watchdog-Circuit
- Power-Management
- System-Management

Extension options

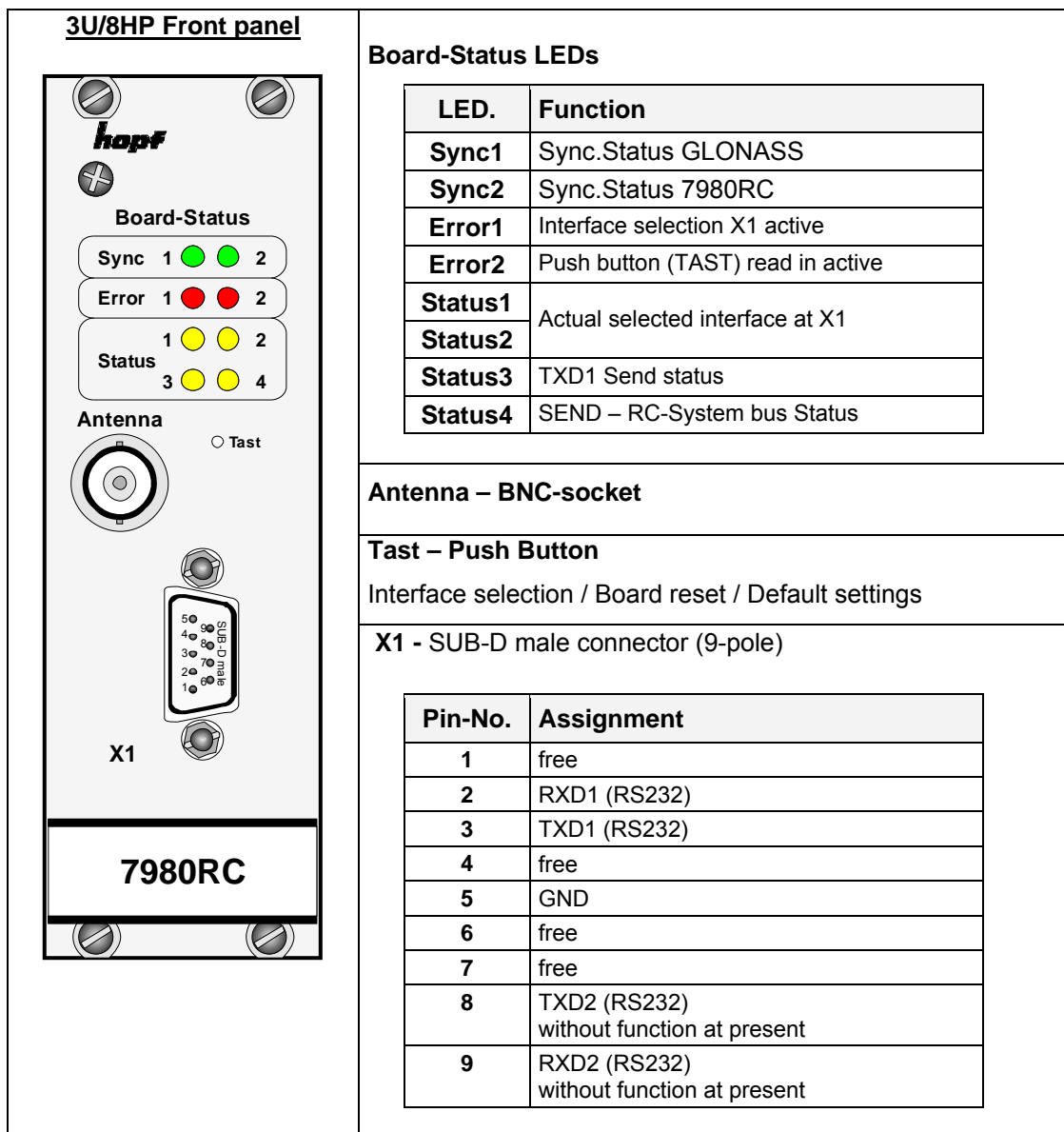
- Customer-specific system adaptations for "tailor-made" project solutions.

## 2 Board 7980RC Structure

This Chapter describes the hardware components of Board 7980RC - GLONASS.

### 2.1 Board 7980RC Front Panel

Board 7980RC - GLONASS has a 3U/8HP front panel for 19" systems. It is equipped with the following components:





## 2.1.1 Status-LEDs of the Board 7980RC

Board 7980RC has Status LEDs on the front panel. These facilitate detection of the operating status of installed boards.

The LEDs represent the following board conditions:

<b>Sync1 (green)</b>	<b>Sync.Status GLONASS</b>
Off	No valid time information available
Flashing	Valid time information but not synchronous
On	<b>Valid and synchronous time information available</b>

<b>Sync2 (green)</b>	<b>Sync.Status 7980RC</b>
Off	No valid time information available
Flashing	Valid time information but not synchronous
On	<b>Valid and synchronous time information available</b>

<b>Error1 (red)</b>	<b>Display for service mode – Selection of interface at X1</b>
Off	<b>Service mode disabled</b>
Flashing	Service mode active Only limited availability of board 7980RC

<b>Error2 (red)</b>	<b>Read in push button (TAST)</b>
Off	<b>Push button (TAST) is not pressed</b>
Flashing	Push button (TAST) is pressed

<b>Status1 (yellow)</b>	<b>Status2 (yellow)</b>	<b>Currently selected interface at X1</b>
Off	Off	Update interface active ( <b>Default</b> ) / service mode disabled
Off	On	Internal interface 1 / service mode active
On	Off	Internal interface 2 / service mode active
On	On	Internal interface 3 / service mode active

<b>Status3 (yellow)</b>	<b>TXD1 Transmission Status</b>
Off	No sending
On	<b>Sending</b>

<b>Status4 (yellow)</b>	<b>SEND – RC System bus Status</b>
Flashing	<b>Normal condition</b> , hereby the access to the internal system bus is indicated. Board 7980RC is correctly integrated in System 7001RC.
Off	Board 7980RC is not operable
On	Failure on board 7980RC

## 2.1.2 Button for service mode / board reset / default configuration

The service button is activated by means of a thin object through the hole in the front panel next to the "Tast" inscription.

### Service mode – serial COM port selection

Pressing the button for the duration of 1-4 seconds, the next internal interface is switched to the connection of the SUB-D female connector X1 (RXD1/TXD1) with every change of second.

The activated service mode is indicated by flashing Error1 LED every second. The Status LED1/2 show the selected interface. The service mode is disabled after reset of the board.



If an internal interface is given out via the SUB-D female connector X1, this interface is system internally not available anymore and leads to limited system functions as e.g. loss of synchronisation, loss of management function, ....

### Release reset of board 7980RC

Pressing the button for 5-9 seconds and by releasing the key a restart and new initialisation of board 7980RC inclusive the GLONASS receiver is performed.

### Return to default configuration of board 7980RC

Keeping the button pressed for more than 10 seconds and by releasing the key, board 7980RC returns to its default configuration and a reset of board is performed.

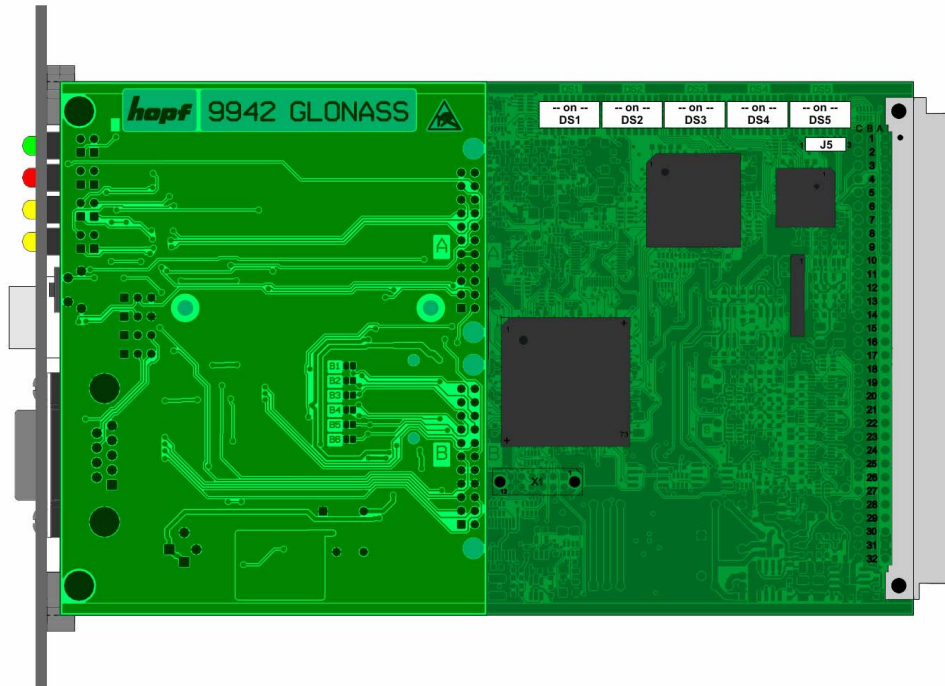
## 2.1.3 Connection to Synchronisation Source (GLONASS)

The GLONASS antenna system for the GLONASS receiver NAVIOR-24S™ is connected to the BNC female connector marked "**Antenna**" in the front panel.



The GLONASS antenna system is not included in the scope of supply of company *hopf*Elektronik.

## 2.2 Component Overview of Board 7980RC (3U/8HP)



### 2.2.1 Component Assemblies

Board 7980RC consists of several components:

- Controller board 7601 for system connection 7001RC
- Add-on module 9942 with GLONASS receiver NAVIOR-24S™

### 2.2.2 DIP Switch DS1

The Board number in the Base System is set via DIP switch DS1.

DIP Switch DS1	Function
8	No function at present
7	
6	
5	Board number in System 7001RC (see <b>Chapter 4.1</b> Setting the System Board Number)
4	
3	
2	
1	

DIP Switch DS2-5 are not implemented

### 2.2.3 Jumper J1-J5

Only for Service

### 3 Status and Fault Indicators

The System status und faults arising can be identified with the aid of the following elements:

- Front panel LEDs of board 7980RC
- Keypad and Display of System 7001RC
- Network of Management board 7050RC-GLONASS

The System 7980RC provides a variety of indicators for presenting the System status and for problem analysis. This status information can also be used for monitoring the clock system by means of a supervisory management system.

The System 7001RC monitors itself and the installed Function Boards for faults. These may be, for example, reception failures or Function Board errors.

Faults that arise are displayed or transmitted via various elements.

#### 3.1.1 Status LEDs

The System has Status LEDs on both the front and rear sides (see **Chapter 2.1.1 Status-LEDs of the Board 7980RC**).

#### 3.1.2 System Status in the Display

The synchronisation status of board 7980RC is directly indicated in the display of System 7001RC. The position of these characters in the display is highlighted in white in the following picture:

```

LT: 03:45:48 TU 23/FEB/2003 S - - > SER_R E
UT: 02:45:48 TU 23/FEB/2003 R - - E - - K
  
```

Synchronisation status of board 7980RC	"SER_-"	The time information of board 7980RC is not available for synchronisation at present.
	"SER_R"	The time information of board 7980RC is successfully evaluated and can be used to synchronise the system 7001RC.

#### 3.1.3 Status- and Failure Indicators in the Network

The relevant GLONASS parameters as reception quantity of satellites, position, ... are provided by WebGUI via the network by means of the management board 7050RC-GLONASS (see technical manual of management board 7050RC-GLONASS).

## 4 Implementing Board 7980RC in a *hopf* Base System 7001RC

All Function Boards are parameterised individually from within the Base System.



Each Function Board is uniquely identified in a *hopf* Base System 7001RC via the Board type and an assigned Board number

The following steps are required for the purpose of implementation:

- Fixed wired slot in the System 7001RC (see also system drawing)
- Not more than 30 LAN boards already implemented in the system
- Set a Board number that is not yet assigned in the Base System via the DIP switch on Board 7980RC
- Insert the Board
- Select the 7980RC Board setting menu in the Base System
- Set the desired parameters via the menu or remote software

### 4.1 Setting the System Board Number

The boards must be coded to a System Board number in order to enable the various Boards to be administered and configured in the Base System.



**Under no circumstances** may two Boards 7980RC with the same Board number be integrated into one Base System. This leads to unspecified faults on these two Boards!

The coding of the Board number takes place on Board 7980RC via DIP switch bank (**DS1**).

### 4.1.1 Setting the Board Number for Base System 7001RC

A maximum of 31 Boards 7980RC can be configured in System 7001RC. The Board number is set via the DIP switch bank (**DS1 / SW1-5**) for unique identification in the Base System.

SW5	SW4	SW3	SW2	SW1	System Board No.:
off	off	off	off	off	-
off	off	off	off	on	Board No. 01
off	off	off	on	off	Board No. 02
off	off	off	on	on	Board No. 03
off	off	on	off	off	Board No. 04
off	off	on	off	on	Board No. 05
off	off	on	on	off	Board No. 06
off	off	on	on	on	Board No. 07
off	on	off	off	off	Board No. 08
off	on	off	off	on	Board No. 09
off	on	off	on	off	Board No. 10
off	on	off	on	on	Board No. 11
off	on	on	off	off	Board No. 12
off	on	on	off	on	Board No. 13
off	on	on	on	off	Board No. 14
off	on	on	on	on	Board No. 15
on	off	off	off	off	Board No. 16
on	off	off	off	on	Board No. 17
on	off	off	on	off	Board No. 18
on	off	off	on	on	Board No. 19
on	off	on	off	off	Board No. 20
on	off	on	off	on	Board No. 21
on	off	on	on	off	Board No. 22
on	off	on	on	on	Board No. 23
on	on	off	off	off	Board No. 24
on	on	off	off	on	Board No. 25
on	on	off	on	off	Board No. 26
on	on	off	on	on	Board No. 27
on	on	on	off	off	Board No. 28
on	on	on	off	on	Board No. 29
on	on	on	on	off	Board No. 30
on	on	on	on	on	Board No. 31



Only these Board numbers set with the DIP switch are allowable in System 7001RC.

System 7001RC is unable to configure Board numbers which are set outside the range of the system.

## 5 Administration of the Board 7980RC

The technical manual of the System 7001RC is the basis for the configuration. Successional only the input of values are described which are located in the menu **BOARD-SETUP**.



All parameters can be activated also in the system 7001RC with the associated *hopf* 7001RC Remotesoftware (see technical description *hopf* 7001RC Remotesoftware).



The menu **SET SYSTEM-BOARDS PARAMETER** has to be completely finished by pressing the **ENT** key so that the System 7001RC accepts the newly configured parameters.

### 5.1 Input Functions for the Board 7980RC via the BOARD-SETUP-Menu

The input and display functions of the board parameters are polled in the menu heading **BOARD-SETUP : 4**

- with **ENT** key   ⇒ Main menu
- with **4** key       ⇒ Board setup
- with **N** key       ⇒ Scroll to menu heading:

```

SET SYSTEM-BOARDS PARAMETER Y / N

```

Select with key **Y**

Search for board to be parameterized with key **N** and select with key **Y**

Example:

```

PARAMETER BOARD 03 OF 25 7980 NO.: 01
STATUS: I / E BOARDNAME: "GLONASS" SET > Y / N

```

- PARAMETER BOARD 03 OF 25**   ⇒ Board 03 of a total of 25 implemented boards
- 7980 NO.: 01**                   ⇒ Board type **7980RC** with board number **01**
- STATUS: M / -**                   ⇒ **M** = monitoring / **-** = without error operating - **or**
- I / E**               ⇒ **I** = no monitoring / **E** = board error
- BOARDNAME: "GLONASS \_"**   ⇒ Board name freely selectable by customer

### 5.1.1 Input Parameter Byte (PB)

Various board parameters are set using the parameter byte menu. A function is allocated to each bit. These functions are explained in the following tables. A function is activated with **1** and deactivated with **0**.

The current parameter byte is shown in the upper line with the preset values.

Example:

```

B . 7 9 8 0 N O . : 0 1 O L D : B Y T E 0 1 > 0 0 0 0 1 1 1 1 <
B Y T E = B I T 7 . . 0 N E W : B Y T E 0 1 > 0 1 1 0 0 0 0 0 <
    
```

In order to make a change, the individual bits of the new byte are entered on the second line, using "0" and "1". The complete parameter byte must always be registered and confirmed by pressing the **ENT** key.

The bits of the parameter byte are numbered in descending order:

```

B Y T E 0 1 > 7 6 5 4 3 2 1 0 <
    
```

#### 5.1.1.1 PB01 - Bit 7-0, (without Function at present)

Bit 7-0	Currently without a function
0	For compatibility reasons these bits must always be set to "0".

#### 5.1.1.2 PB02 - Bit 7-0, (without Function at present)

Bit 7-0	Currently without a function
0	For compatibility reasons these bits must always be set to "0".

#### 5.1.1.3 PB03 - Bit 7-0, (without Function at present)

Bit 7-0	Currently without a function
0	For compatibility reasons these bits must always be set to "0".

#### 5.1.1.4 PB04 - Bit 7-0, (without Function at present)

Bit 7-0	Currently without a function
0	For compatibility reasons these bits must always be set to "0".



## 6 Factory-Defaults

All board internal system parameters as e.g. the configuration of internal system interfaces are re-configured with the factory-default push button.

Special settings done in the GLONASS receiver as e.g. setting of position, are not affected by factory-default.

## 7 Technical Data of Board 7980RC

General Data	
Operation:	Via keypad and LCD-Display (illuminated) of Systems 7001RC or rather to a limited extent via the implemented LAN Management from board 7050RC-GLONASS

GLONASS Data	
Receiver:	GLONASS L1 frequency, CT code (Standard Positioning Service) 24 channel receiver
Sensitivity:	-160dBW
Synchronisation time:	<ul style="list-style-type: none"> <li>• Cold start: 5min. - 30min. (first initialization without position input)</li> <li>• Warm start: &lt; 1min</li> </ul>
Antenna connection:	<ul style="list-style-type: none"> <li>• Via BNC socket of GLONASS board 7980RC</li> <li>• For active antennas, <math>U_b = 3.3/5V</math> DC</li> <li>• Antenna power fed via GLONASS Board 7980RC BNC socket</li> </ul>

Environment Conditions	
Temperature range - Operation:	0°C to +40°C
- Storage:	-20°C to +60°C
Humidity:	max. 95%, not condensed

Accuracy at GLONASS-Synchronisation (absolutely to UTC emitted via GLONASS)	
Internal PPS pulse via GLONASS reception:	$< \pm 10\mu s + 50\mu s$ Offset (95%)

<b>CE compliant in accordance with EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC</b>	
Safety / Low Voltage Directive:	DIN EN 60950-1:2001 + A11 + Corrigendum
EN 61000-6-4:	
EMV (Electromagnetic Compatibility) / Interference Resistance:	EN 61000-4-2 /-3/-4/-5/-6/-11
EN 61000-6-2:	EN 61000-3-2 /-3
Interference voltage EN 55022:	EN 55022 Class B
Interference radiation EN 55022:	EN 55022 Class B

<b>Signal Outputs (external)</b>	
Full-duplex serial interfaces (independent from each other, without handshake):	Via 9-pole SUB-D male connector <ul style="list-style-type: none"> <li>• COM 0: RS232</li> <li>• COM 1: RS232</li> </ul>

**Special production:**

Modifications can be made to hardware and software in accordance with customer specifications.



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

## 8 Glossary and Abbreviations

### 8.1 Time-specific expressions

<b>UTC</b>	<b>UTC Time (Universal Time Coordinated)</b> was dependent on the Greenwich Mean Time (GMT) definition of the zero meridian. While GMT follows astrological calculations, UTC is based on the stability and accuracy of the Caesium standard. The leap second was defined in order to cover this deviation.
<b>Time Zone</b>	The globe was originally divided into 24 longitudinal segments or time zones. Today, however, there are a number of time zones which in part apply specifically to certain individual countries only.  In relation to the time zones, consideration was given to the fact that local daylight and sunlight coincide at different times in the individual time zones.  The zero meridian runs through the British city of Greenwich.
<b>Time Offset</b>	This is the difference between UTC and the valid standard time of the current time zone. The Time Offset will be commit from the local time zone.
<b>Local Standard Time (winter time)</b>	<b>Standard Time = UTC + Time Offset</b> The time offset is defined by the local time zone and the local political regulations.
<b>Daylight Saving Time (summer time)</b>	<b>Offset of Daylight Saving Time = + 1h</b> Daylight Saving Time was introduced to reduce the energy requirement in some countries. In this case one hour is added to the standard time during the summer months.
<b>Local Time</b>	Local Time = Standard Time if exists with summer / winter time changeover
<b>Leap Second</b>	A leap second is a second which is added to the official time (UTC) in order to synchronise this with Greenwich Mean Time when required. Leap seconds are defined internationally by the <b>International Earth Rotation and Reference Systems Service (IERS)</b> .