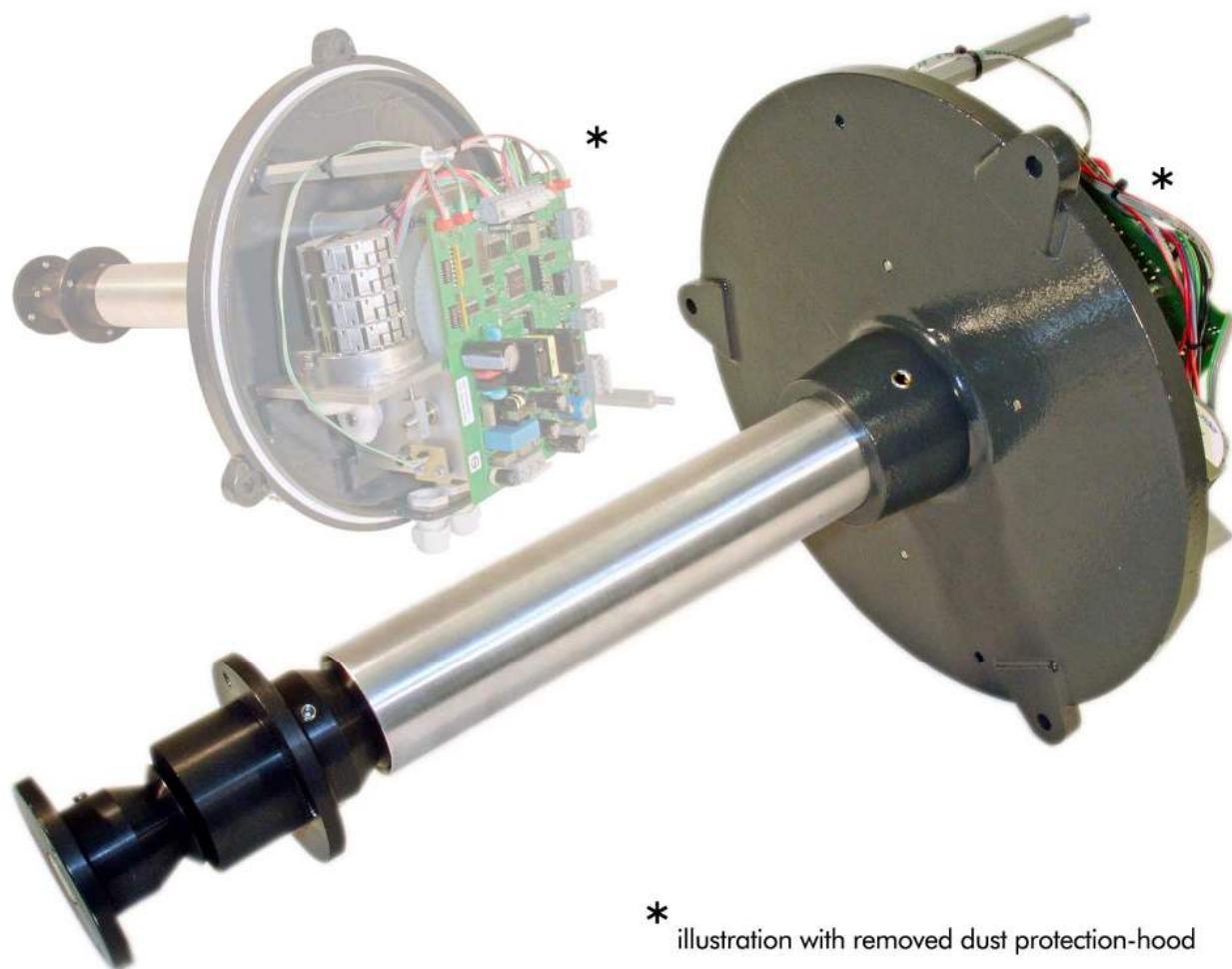


# Installation and Operation Manual

## DMU 350

**Self-setting minute movement for diameters up to 350 cm**

(Synchronization with MOBALine- / RS485 time code, DCF, MSF or GPS receivers)



\*

illustration with removed dust protection-hood

**Certification of the Producer**

STANDARDS



The clock movement DMU 350 has been developed and produced in accordance with the EU Standards  
2006 / 95 / EG  
2004 / 108 / EG  
96 / 48 / EG

**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 may only be carried out by skilled staff.
6. It is prohibited to reproduce, to store in a computer system or to transfer this publication in a way or another, even part of it. The copyright remains with all the rights with BÜRK MOBATIME GmbH, D-78026 VS-Schwenningen and MOSER-BAER AG – CH 3454 Sumiswald / SWITZERLAND.

# Table of Contents

|        |  |    |
|--------|--|----|
| 1.     | Specifications .....                       | 5  |
| 1.1    | General.....                               | 5  |
| 1.2    | Housing .....                              | 5  |
| 1.3    | Movement operation.....                    | 5  |
| 1.4    | Connections.....                           | 6  |
| 1.5    | Power .....                                | 6  |
| 1.6    | DC output .....                            | 6  |
| 1.7    | Position detection .....                   | 6  |
| 1.8    | Minute hand operating mode .....           | 6  |
| 1.9    | Accuracy / memory .....                    | 7  |
| 1.10   | DCF time code output.....                  | 7  |
| 1.11   | Synchronization types.....                 | 7  |
| 1.12   | Time zone selection.....                   | 7  |
| 1.13   | Alarm output .....                         | 7  |
| 2.     | Status indication .....                    | 8  |
| 2.1    | Troubleshooting.....                       | 8  |
| 3.     | Configuration .....                        | 9  |
| 3.1    | Switch 1 .....                             | 9  |
| 3.2    | Time source selection.....                 | 9  |
| 3.3    | Switch 2.....                              | 10 |
| 3.4    | Example .....                              | 10 |
| 4.     | Starting up .....                          | 11 |
| 4.1    | Instructions .....                         | 11 |
| 4.2    | 12:00 switch.....                          | 11 |
| 4.3    | Configuration using the master clock ..... | 12 |
| 5.     | Installation guidelines .....              | 13 |
| 5.1    | Connection wiring .....                    | 13 |
| 5.1.1  | Mains connection.....                      | 13 |
| 5.1.2  | DCF77 time signal receiver .....           | 13 |
| 5.1.3  | GPS 4500 time signal receiver .....        | 13 |
| 5.1.4  | Cascading .....                            | 14 |
| 5.1.5  | RS 485 wiring.....                         | 14 |
| 5.1.6  | RS 485 termination .....                   | 14 |
| 5.1.7  | Mobaline Connection .....                  | 15 |
| 5.1.8  | Sensor connections .....                   | 15 |
| 5.1.9  | Motor connection .....                     | 15 |
| 5.1.10 | Connection plug arrangement .....          | 16 |

|       |                                |    |
|-------|--------------------------------|----|
| 5.2   | Plug wiring .....              | 16 |
| 5.2.1 | RS 485 .....                   | 16 |
| 5.2.2 | DCF In / Out .....             | 16 |
| 6.    | Standard Time Zone Table ..... | 17 |
| 7.    | Telegram formats .....         | 19 |
| 7.1   | IF 482 Telegram .....          | 19 |
| 7.2   | BUS 485 telegram .....         | 20 |
| 8.    | Technical data .....           | 21 |

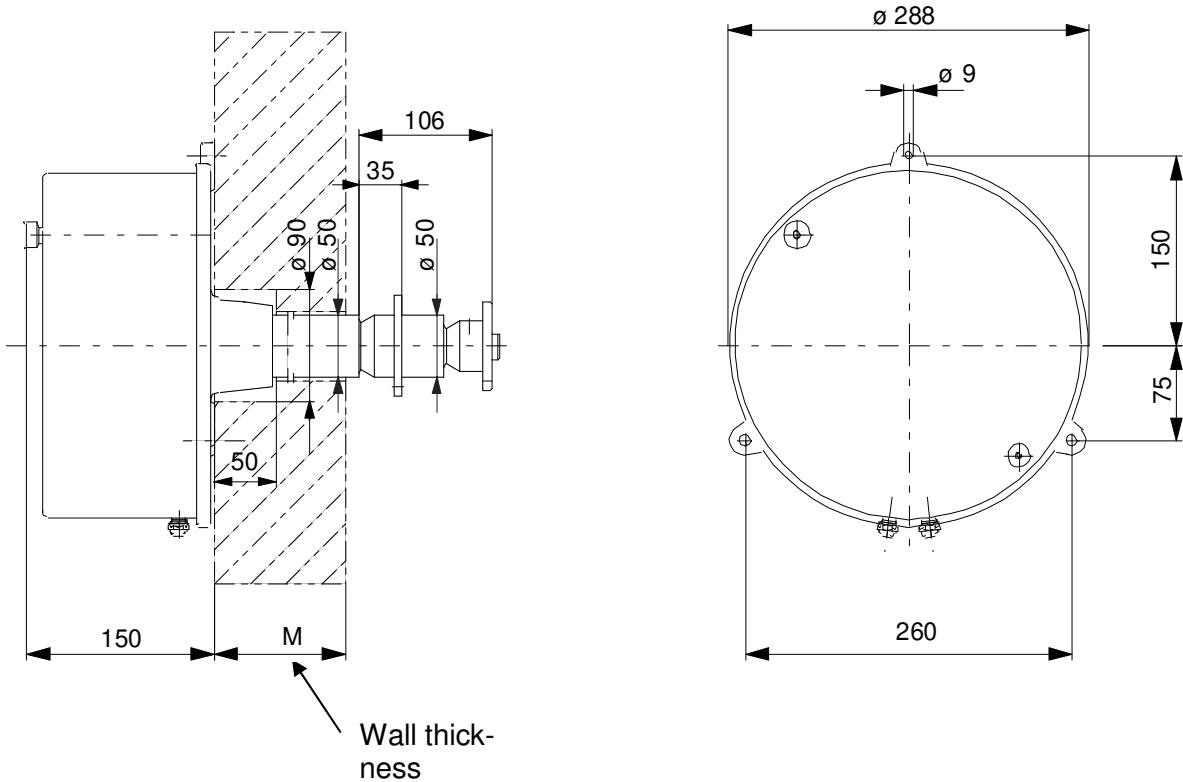
# 1. Specifications

## 1.1 General

Self-adjusting minute movement for diameters up to 350 cm

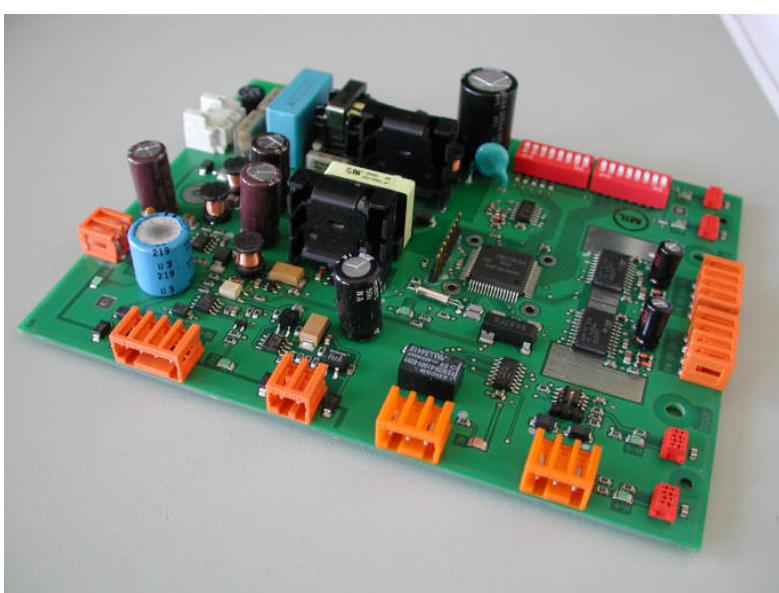
## 1.2 Housing

Mechanically compatible with MW 10. Protection class I.



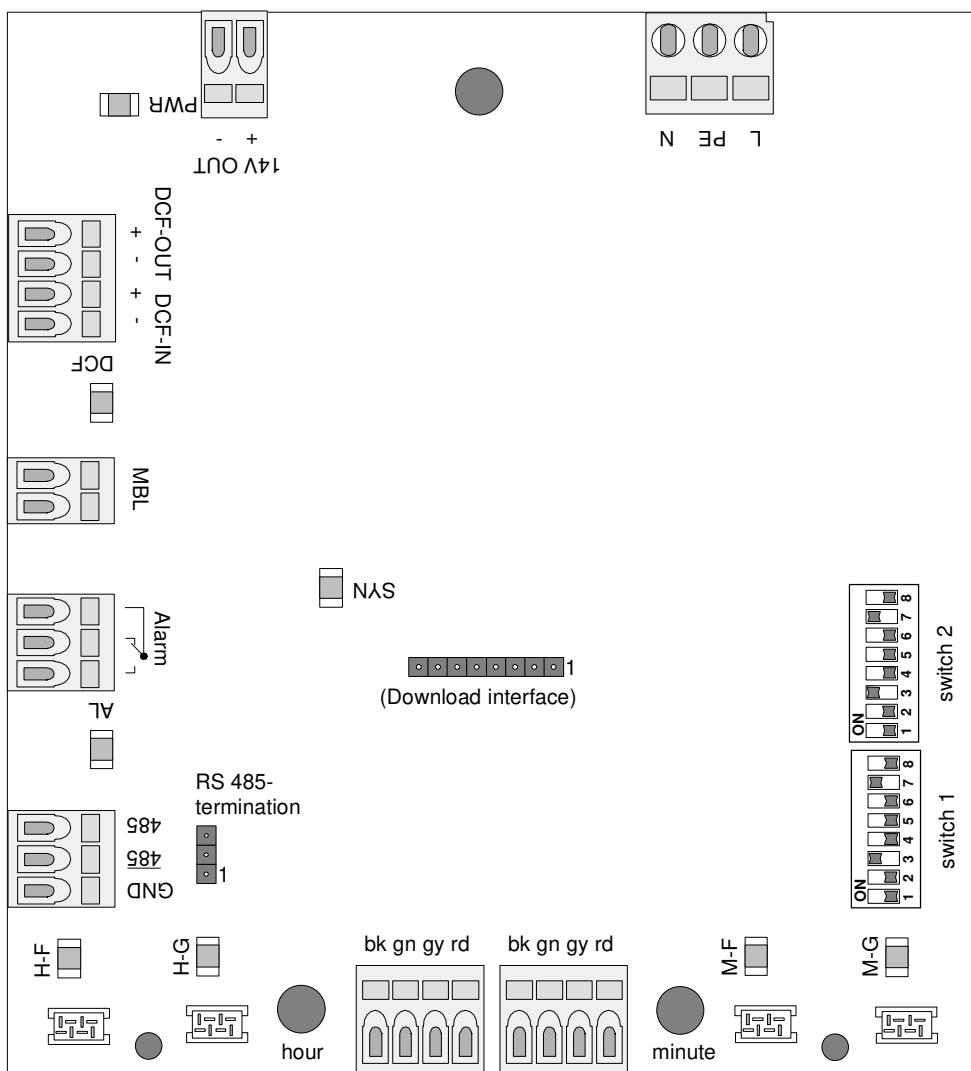
## 1.3 Movement operation

Article number 202045.



## 1.4 Connections

All connections via plugs. Connection diagram



## 1.5 Power

Internal switched-mode power supply (SMPS). Input: 90..240 VAC, 50/60 Hz. Output: 14 VDC, max. 1 A

## 1.6 DC output

14 VDC, 200 mA max. powering a GPS 4500 time signal receiver with a multifuse.

## 1.7 Position detection

Two sound sensors (M-G, H-G) positioning the minute and hour motors. Article number Sensorprint DMU 350 with connecting cable 202650.

## 1.8 Minute hand operating mode

The minute hand can be operated in continuous or step mode (1 / min) (switch 1.2). Mode change triggers a reset (as when starting the clock up).

## 1.9 Accuracy / memory

Deviation without synchronization: <5 s/d (quartz: 9.8304 MHz, 50 ppm @0..40°C). Memory in Powerdown Mode with 32.768 kHz subclock and power from Super Cap: >10 h (the movement has no active reserve).

In DCF, MSF or GPS synchronization quartz drift is compensated by software trimming. This yields deviations <1 s/w.

## 1.10 DCF time code output

With the movement synchronized output of DCF-encoded GMT via passive current loop interface. The movement time source must be DCF, MSF or GPS 4500. To cascade other movements GPS 4500 must be set as time source for the slave movement.

## 1.11 Synchronization types

### MOBALine

Synchronization to MOBALine Code for self-adjusting movements. (Local time, time zone adjustment without influence). The line configuration of the master clock (12:00 command, operating mode minute clock hands) is copied automatically (see chapter 4.2).

### DCF 77

Synchronization to a DCF 77 time signal. (MET).

### MSF

Synchronization to an MSF time signal. (MET-1).

### GPS 4500

Time receipt from satellite signal, synchronization to DCF-encoded series code (GMT).

### RS 485

Synchronization to IF482 or MB-RS485 protocol. Monitoring with MB-RS485 protocol (see TD-800397.xx). Accepted telegram format for synchronization (see chapter 7):

IF 482: ASCII, valid for telegram end, 9600/7/E/1, local time:

BUS 485: HEX, valid for telegram start, 19200/8/N/1, local time:

## 1.12 Time zone selection

6 DIL switches for selecting from 59 pre-defined time zone entries (see chapter 6) for automatic local time calculation. (Binary encoding, setting 0 or invalid setting = GMT).

## 1.13 Alarm output

The DMU 350 has an alarm output (relay changeover contact). In normal operation the contact is armed and cuts out in the event of a malfunction (red malfunction LED AL lights up). Relay specifications: 60VA (30 VAC or 1 A) resp. 30W (60 VDC or 1 A).

## 2. Status indication

The DMU 350 movement control system has 8 LED function and status display lights.

| LED | Meaning (on)   |
|-----|--|
| H-G | 12:00 position detection "approximate" sensor, hour clock hands            |
| H-F | 12:00 position detection "precise" sensor, hour clock hands (not in use)   |
| M-G | 12:00 position detection "approximate" sensor, minute clock hands          |
| M-F | 12:00 position detection "precise" sensor, minute clock hands (not in use) |
| SYN | Movement synchronized  |
| AL  | Movement malfunction (summarized alarm, contact open)                      |
| DCF | Synchronization input (blinks for DCF reception in seconds cycles)         |
| PWR | Power (14 VDC) on  |

### 2.1 Troubleshooting

In the event of a movement malfunction the alarm contact opens and the red malfunction LED AL illuminates. The following malfunctions are shown.

| No. | Malfunction                  | Cause  | Result  |
|-----|------------------------------|--|---|
| 1   | Position error, hours drive  | The control system was unable to detect position within the tolerances acceptable. | The position LEDs H-F and H-G blink. Hours drive stops.   |
| 2   | Position error, minute drive | The control system was unable to detect position within the tolerances acceptable. | The position LEDs M-F and M-G blink. The minute drive stops.  |
| 3   | Synchronization failure      | The clock couldn't synchronize within the last 24 hours.                           | The synchronization LED goes out and the clock reverts to the 12:00 position.   |
| 4   | Motor drive overload         | Defect in a motor or short-circuit in the wiring.                                  | The drives affected are instantly switched off. After 5 seconds the control system will try to restart the drive/s automatically. |

If the DMU 350 is monitored by a master clock (RS 485 protocol) then the malfunction/s will be reported in a status telegram after a status query.

If there's an alarm then first seek the cause and remedy it (e.g. better positioning of the time signal receiver if synchronization fails). After remedy it may be necessary to reset the control system using the reset switch (switch 1.8) to return the movement to normal operation.

Faults 1 and 2: check the position sensors and their wiring. Both H-G and M-G sensors must be correctly plugged in (the sensors H-F and M-F aren't used by the DMU 350). A blocked drive is another possible cause.

Fault 3: Check correct choice of the time source at switches 1.3–1.5. Check the wiring to the time source and the function of the time source. If a master clock is the time source check configuration. Wireless signal receiver may need repositioning.

Fault 4: check wiring and plugging in of the motors. Unplug and check if the fault then disappears. If so, a defective motor may be the cause. Faults 1 or 2 would then arise after a while.

### 3. Configuration

#### 3.1 Switch 1

Movement control can be configured via two groups of switches with 8 DIL switches each. Switch 1 can be used for the following adjustments.

|            |     |  |
|------------|-----|--|
| Switch 1.1 | ON  | 12:00 position   |
|            | OFF | Normal operation   |
| Switch 1.2 | ON  | Clock minute hand movement in minute steps                             |
|            | OFF | Clock minute hand movement continuous                                  |
| Switch 1.3 | ON  | Time source significance 1   |
|            | OFF | Time source significance 0   |
| Switch 1.4 | ON  | Time source significance 2   |
|            | OFF | Time source significance 0   |
| Switch 1.5 | ON  | Time source significance 4   |
|            | OFF | Time source significance 0   |
| Switch 1.6 | ON  | Reserve  |
|            | OFF | Reserve  |
| Switch 1.7 | ON  | Reserve  |
|            | OFF | Reserve  |
| Switch 1.8 | ON  | Reset: the movement is reset to its initial status on position change. |
|            | OFF | Reset: the movement is reset to its initial status on position change. |

#### 3.2 Time source selection

| Sum of significance | Time source:                        |
|---------------------|-------------------------------------|
| 0                   | DCF 77                              |
| 1                   | GPS 4500                            |
| 2                   | MSF                                 |
| 3                   | MOBALine                            |
| 4                   | RS 485 (IF 482 or BUS 485 telegram) |
| 5                   | Reserve                             |
| 6                   | Reserve                             |
| 7                   | Reserve                             |

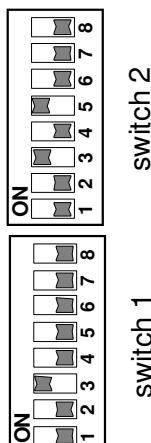
| Synchronization type | DCF 77    | GPS 4500  | MSF       | MOBALine | RS 485   |
|----------------------|-----------|-----------|-----------|----------|----------|
| Time information     | MET       | GMT       | MET-1     | Local    | Local    |
| Switch function 2    | Time zone | Time zone | Time zone | -        | Address  |
| DCF output           | Active    | Active    | Active    | Inactive | Inactive |

### 3.3 Switch 2

Movement control can be configured via two groups of switches with 8 DIL switches each. Switch 2 can be used for the following adjustments.

|            |     |   |
|------------|-----|---|
| Switch 2.1 | ON  | Device address RS 485 / time zone significance 1  |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.2 | ON  | Device address RS 485 / time zone significance 2  |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.3 | ON  | Device address RS 485 / time zone significance 4  |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.4 | ON  | Device address RS 485 / time zone significance 8  |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.5 | ON  | Device address RS 485 / time zone significance 16 |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.6 | ON  | Device address RS 485 / time zone significance 32 |
|            | OFF | Device address RS 485 / time zone significance 0  |
| Switch 2.7 | ON  | Reserve   |
|            | OFF | Reserve   |
| Switch 2.8 | ON  | Reserve   |
|            | OFF | Reserve   |

### 3.4 Example



#### Synchronization type

Switch 1.3 on = time source significance 1 = GPS 4500 active

#### Time zone selection

Switch 2.3 on = time zone significance 4

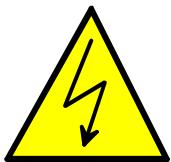
Switch 2.3 on = time zone significance 16

Equals time zone 20 = per time zone table (see chapter 5)

GMT +9h

## 4. Starting up

### 4.1 Instructions



- 1 Caution - mains power. Check mains power before connecting up. It must tally with the movement data.
- 2 Install movement at location (see chapter 5).
- 3 Remove the protective cover
- 4 Configure the settings using switch groups 1 and 2 (see chapter 3).
- 5 Turn on switch 1.1 (12:00 position).
- 6 Wire up the control system (see chapter 5.1).
- 7 Install the protective cover.
- 8 Turn power on (plug in to the mains).
- 9 The movement is then moved forwards to the 12:00 position. If it's already there then the movement will only leave that position backwards and then move forwards to the 12:00 position. Wait until the position has been detected (the LEDs H-G and M-G illuminate and both drives stop).
- 10 Turn the power off.
- 11 Remove the protective cover
- 12 Install the clock hands in the 12:00 position on their shafts (see chapter 5).
- 13 Turn switch 1.1 off.
- 14 Install the protective cover.
- 15 Turn the power on.
- 16 After synchronization the clock will change to the correct time and be in normal operation mode.

### 4.2 12:00 switch

This is used to have the clock change to the 12:00 position. If it's already there (the position sensors detect it) then the clock will run backwards from that position and then forwards to the 12:00 position. This procedure guarantees reliable clock positioning.

## 4.3 Configuration using the master clock

Operating the DMU 350 via MOBALine or RS 485 gives you the option of selecting the clock minute hand and master clock operating modes. Master clock setting may deviate here from the switch group/s. Remote commands always have priority over switch settings (except for the 12:00 switch).

| <b>Switch</b> | <b>MOBALine</b> | <b>RS 485</b>          | <b>Operating mode</b> |
|---------------|-----------------|------------------------|-----------------------|
| 1.1 ON        | Stop            | CMD_SET_CONF<br>12:00  | 12:00 position        |
| 1.1 ON        | Operation       | CMD_SET_CONF<br>Normal | 12:00 position        |
| 1.1 OFF       | Stop            | CMD_SET_CONF<br>12:00  | 12:00 position        |
| 1.1 OFF       | Operation       | CMD_SET_CONF<br>Normal | Normal operation      |

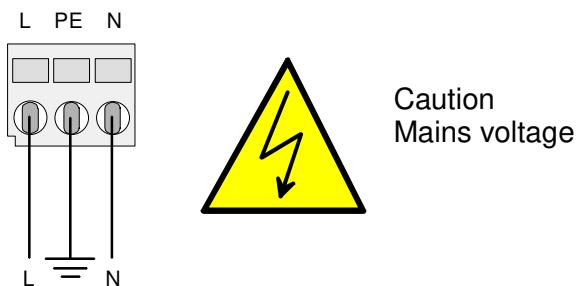
| <b>Switch</b>         | <b>MOBALine</b> | <b>RS 485</b>              | <b>Operating mode</b>                               |
|-----------------------|-----------------|----------------------------|---|
| 1.2 ON                | 1 min or ½ min  | CMD_SET_CONF<br>Step       | Clock minute hands in staged operation (1/min)      |
| <sup>1)</sup> 1.2 ON  | Continuous      | CMD_SET_CONF<br>Continuous | Clock minute hands in continuous operation (1/15 s) |
| <sup>1)</sup> 1.2 OFF | 1 min or ½ min  | CMD_SET_CONF<br>Step       | Clock minute hands in staged operation (1/min)      |
| 1.2 OFF               | Continuous      | CMD_SET_CONF<br>Continuous | Clock minute hands in continuous operation (1/15 s) |

- <sup>1)</sup> Leads to unique reset as the remote command and switches disagree (reboot of the control system: behavior as for starting up).

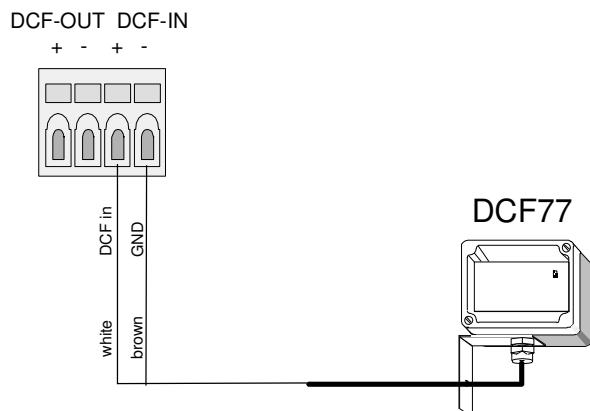
## 5. Installation guidelines

### 5.1 Connection wiring

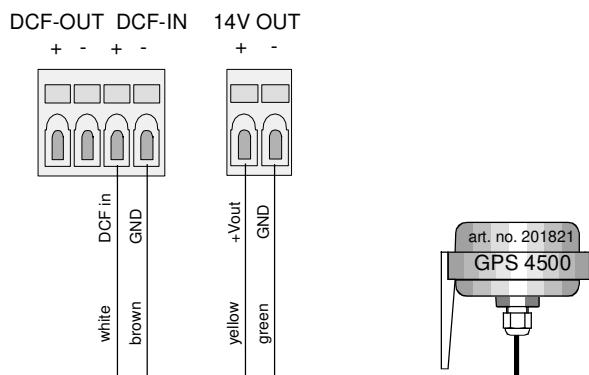
#### 5.1.1 Mains connection



#### 5.1.2 DCF77 time signal receiver



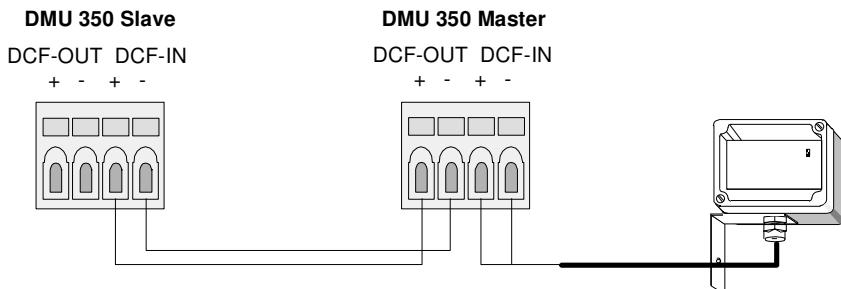
#### 5.1.3 GPS 4500 time signal receiver



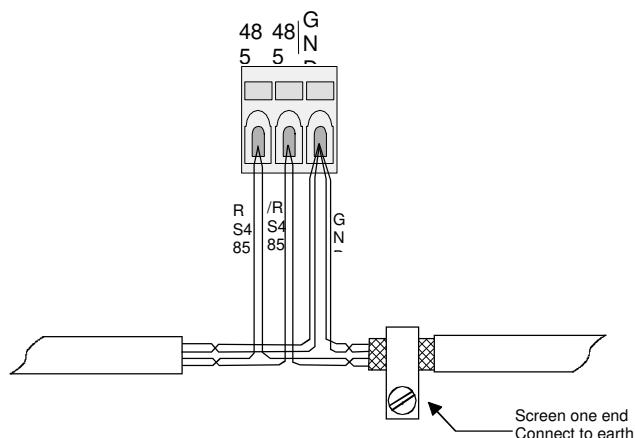
### 5.1.4 Cascading

A DMU 350 (master) can serve as source for an identical slave as time source. This is provided the master is synchronized with DCF/MSF or GPS. The master DCF time signal output must be connected to the DCF time signal input of the slave.

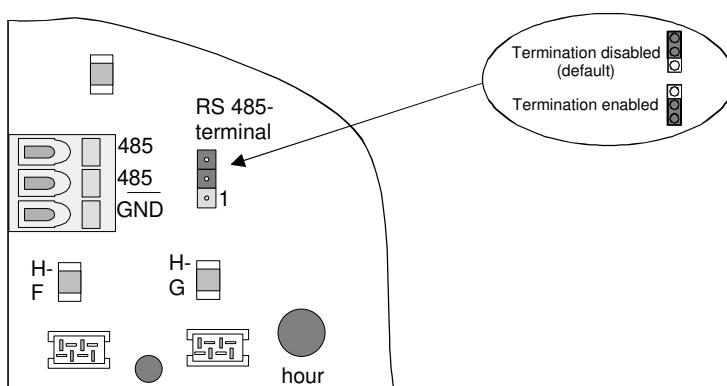
**Note.** Set GPS 4500 as slave time source. (See chapter 3.2)



### 5.1.5 RS 485 wiring

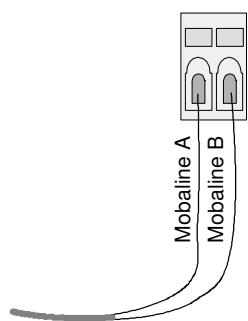


### 5.1.6 RS 485 termination



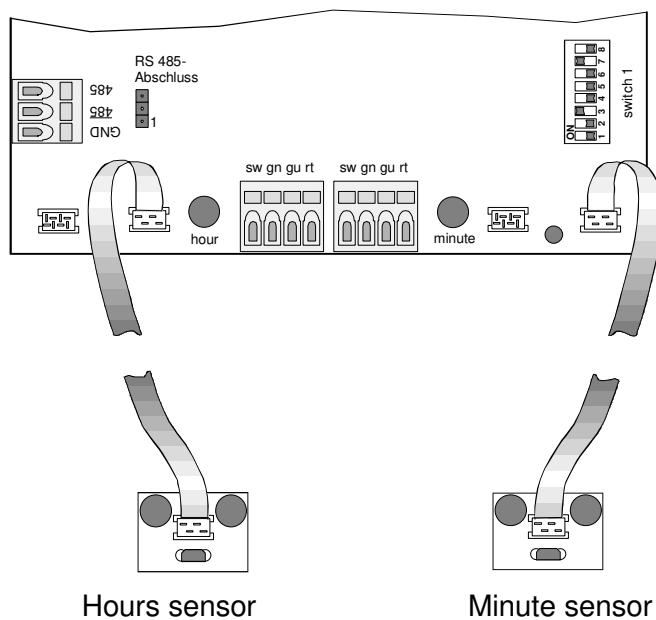
Use a jumper to add a terminal resistor to the RS 485 bus. The jumper must be installed at pins 1 and 2 of the 3-pole plug connector of the RS 485 connector plug (see chapter 1.4).

### 5.1.7 Mobaline Connection



The polarity of the connections is not relevant.

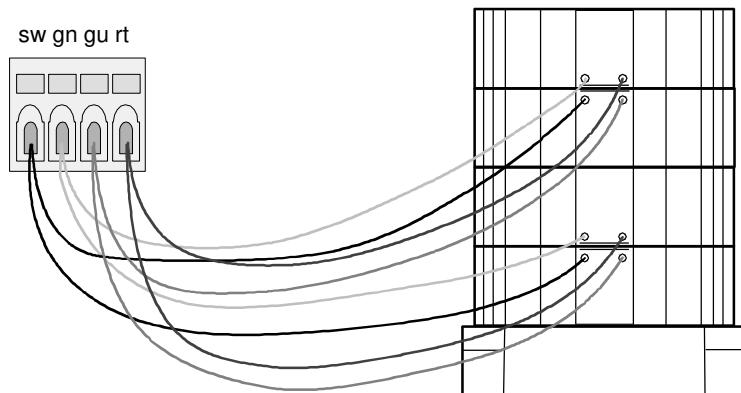
### 5.1.8 Sensor connections



Hours sensor

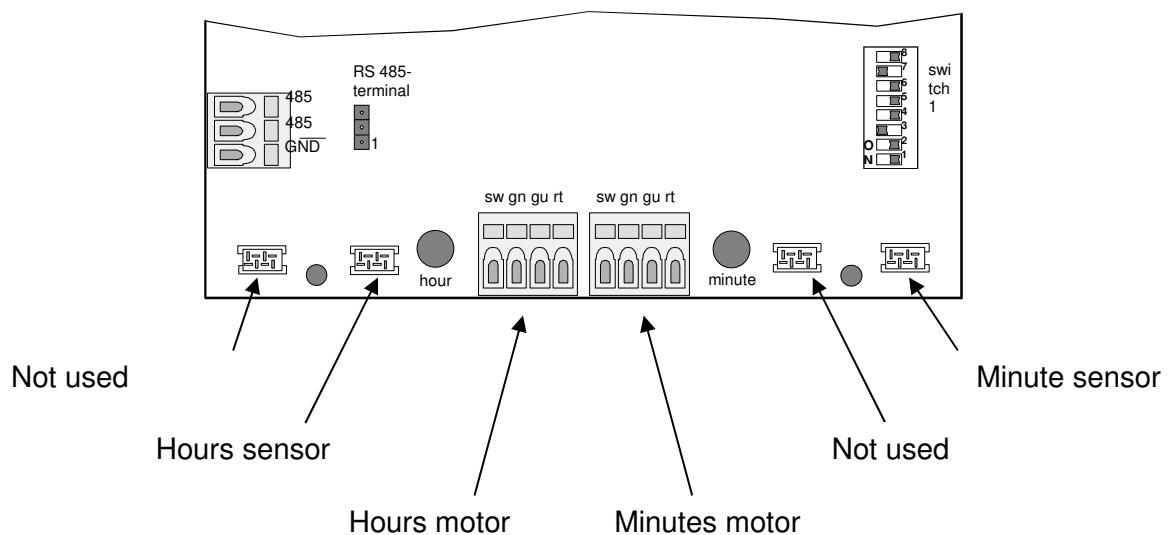
Minute sensor

### 5.1.9 Motor connection



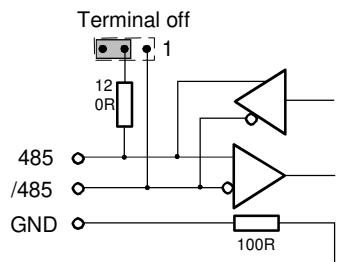
Motors are wired according to color coding.  
Sw = black, gn = green, gu = grey, rt = red.

### 5.1.10 Connection plug arrangement

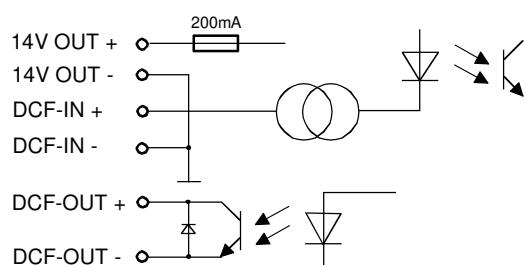


## 5.2 Plug wiring

### 5.2.1 RS 485



### 5.2.2 DCF In / Out



## 6. Standard Time Zone Table

Time zone entries in the standard season table (version 9.0).

| Time zone | City / State  | UTC Offset | DST Change | Standard → DST                    | DST → Standard                           |
|-----------|---|------------|------------|-----------------------------------|--|
| 00        | UTC (GMT),<br>Monrovia, Casablanca  | 0          | No         |                                   |  |
| 01        | London,<br>Dublin, Edinburgh, Lisbon  | 0          | Yes        | Last Sun. Mar. (01:00)            | Last Sun. Oct. (02:00)                   |
| 02        | Brussels, Amsterdam,<br>Berlin, Bern, Copenhagen,<br>Madrid, Oslo, Paris,<br>Rome, Stockholm, Vienna,<br>Belgrade, Bratislava, Bu-<br>dapest, Ljubljana, Prague,<br>Sarajevo, Sofia, Vilnius,<br>Warsaw, Zagreb | +1         | Yes        | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 03        | Athens,<br>Istanbul, Minsk, Helsinki,<br>Riga, Tallinn, Kaliningrad   | +2         | Yes        | Last Sun. Mar. (03:00)            | Last Sun. Oct. (04:00)                   |
| 04        | Bucharest, Romania  | +2         | Yes        | Last Sun. Mar. (03:00)            | Last Sun. Oct. (04:00)                   |
| 05        | Cairo, Pretoria, Harare   | +2         | No         |                                   |  |
| 06        | Dhaka   | +6         | Yes        | Wed. 31. Mar. (22:59)<br>(2010)   | Sun. 31. Oct. (23:59) (2010)             |
| 07        | Tel Aviv  | +2         | Yes        | Last Fri. Mar. (02:00)            | 2 <sup>nd</sup> Sun. Oct. (02:00) (2010) |
| 08        | Kuwait City   | +3         | No         |                                   |  |
| 09        | Moscow,<br>St. Petersburg, Volgograd  | +3         | Yes        | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 10        | Tehran  | +3.5       | Yes        | Sun. 21. Mar. (00:00) (2010)      | Tue. 21. Sep. (00:00) (2010)             |
| 11        | Abu Dhabi,<br>Muscat, Tbilisi   | +4         | No         |                                   |  |
| 12        | Kabul   | +4.5       | No         |                                   |  |
| 13        | Yekaterinburg, Russia   | +5         | Yes        | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 14        | Tashkent  | +5         | No         |                                   |  |
| 15        | Mumbai, Calcutta, Ma-<br>dras,<br>New Delhi, Colombo  | +5.5       | No         |                                   |  |
| 16        | Astana, Thimphu   | +6         | No         |                                   |  |
| 17        | Bangkok, Hanoi, Jakarta   | +7         | No         |                                   |  |
| 18        | Beijing,<br>Chongqing, Hong kong,<br>Singapore, Taipei, Urumqi  | +8         | No         |                                   |  |
| 19        | Tokyo,<br>Osaka, Sapporo, Seoul   | +9         | No         |                                   |  |
| 20        | Yakutsk, Russia   | +9         | Yes        | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 21        | South Australia: Adelaide   | +9.5       | Yes        | 1 <sup>st</sup> Sun. Oct (02:00)  | 1 <sup>st</sup> Sun. Apr. (03:00)        |
| 22        | Northern Territory: Darwin  | +9.5       | No         |                                   |  |
| 23        | Queensland: Brisbane,<br>Guam, Port Moresby   | +10        | No         |                                   |  |
| 24        | NSW, Victoria: Sydney,<br>Canberra, Melbourne   | +10        | Yes        | 1 <sup>st</sup> Sun. Oct. (02.00) | 1 <sup>st</sup> Sun. Apr. (03:00)        |
| 25        | Tasmania: Hobart  | +10        | Yes        | 1 <sup>st</sup> Sun. Oct. (02:00) | 1 <sup>st</sup> Sun. Apr. (03:00)        |
| 26        | Vladivostok   | +10        | Yes        | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 27        | Solomon Is.,<br>New Caledonia   | +11        | No         |                                   |  |

|    |                                      |      |     |                                   |  |
|----|--------------------------------------|------|-----|-----------------------------------|--|
| 28 | Auckland, Wellington                 | +12  | Yes | Last Sun. Sep. (02:00)            | 1 <sup>st</sup> Sun. Apr. (03:00)        |
| 29 | Marshall Is.                         | +12  | No  |                                   |  |
| 30 | Azores                               | -1   | Yes | Last Sun. Mar. (00:00)            | Last Sun. Oct. (01:00)                   |
| 31 | Middle Atlantic                      | -2   | No  |                                   |  |
| 32 | Brasilia                             | -3   | Yes | 3 <sup>rd</sup> Sun. Oct. (00:00) | 3 <sup>rd</sup> Sun. Feb. (00:00) (2010) |
| 33 | Buenos Aires                         | -3   | No  |                                   |  |
| 34 | Newfoundland, Labrador               | -3.5 | Yes | 2 <sup>nd</sup> Sun. Mar. (00:01) | 1 <sup>st</sup> Sun. Nov. (00:01)        |
| 35 | Atlantic Time (Canada)               | -4   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 36 | La Paz                               | -4   | No  |                                   |  |
| 37 | Bogota, Lima, Quito                  | -5   | No  |                                   |  |
| 38 | New York, Eastern Time (US & Canada) | -5   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 39 | Chicago, Central Time (US & Canada)  | -6   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 40 | Tegucigalpa, Honduras                | -6   | No  |                                   |  |
| 41 | Phoenix, Arizona                     | -7   | No  |                                   |  |
| 42 | Denver, Mountain Time                | -7   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 43 | Los Angeles, Pacific Time            | -8   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 44 | Anchorage, Alaska (US)               | -9   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 45 | Honolulu, Hawaii (US)                | -10  | No  |                                   |  |
| 46 | Midway Islands (US)                  | -11  | No  |                                   |  |
| 47 | Mexico City, Mexico                  | -6   | Yes | 1 <sup>st</sup> Sun. Apr. (02:00) | Last Sun. Oct. (02:00)                   |
| 48 | Samara, Russia                       | +4   | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 49 | Novosibirsk, Russia                  | +6   | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 50 | Krasnoyarsk, Russia                  | +7   | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 51 | Irkutsk, Russia                      | +8   | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 52 | Magadan, Russia                      | +11  | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 53 | Anadyr, Russia                       | +12  | Yes | Last Sun. Mar. (02:00)            | Last Sun. Oct. (03:00)                   |
| 54 | Ittoqqortoormiit, Greenland          | -1   | Yes | Last Sun. Mar. (00:00)            | Last Sun. Oct. (01:00)                   |
| 55 | Nuuk, Greenland                      | -3   | Yes | Last Sat. Mar. (22:00)            | Last Sat. Oct. (23:00)                   |
| 56 | Qaanaaq, Greenland                   | -4   | Yes | 2 <sup>nd</sup> Sun. Mar. (02:00) | 1 <sup>st</sup> Sun. Nov. (02:00)        |
| 57 | Western Australia: Perth             | +8   | No  |                                   |  |
| 58 | Caracas                              | -4.5 | No  |                                   |  |
| 59 | CET standard time                    | +1   | No  |                                   |  |
| 60 | Santiago, Chile                      | -4   | Yes | 2 <sup>nd</sup> Sun. Oct. (00:00) | 2 <sup>nd</sup> Sun. Mar. (00:00)        |
| 61 | Chile, Easter Island                 | -6   | Yes | 2 <sup>nd</sup> Sat. Oct. (22:00) | 2 <sup>nd</sup> Sat. Mar. (22:00)        |
| 62 | Baku                                 | +4   | Yes | Last Sun. Mar. (04:00)            | Last Sun. Oct. (05:00)                   |
| 63 | Islamabad, Karachi, Pakistan         | +5   | No  | Thu. 15. Apr. (00:00) (2010)      | Sun. 31. Oct. (00:00) (2010)             |
| 64 | Apia, Samoa                          | -11  | Yes | Last Sun. Sep. (00:00)            | First Sun. Apr. (00:00) (2011)           |

**Legend:**

UTC:

Universal Time Coordinate, equivalent to GMT

DST:

Daylight Saving Time

DST Change:

Daylight Saving Time changeover

Standard → DST:

Time change from Standard time (Winter time) to Summer time

DST → Standard:

Time change from Summer time to Standard time (Winter time)

**Example:**

2<sup>nd</sup> last Sun. Mar. (02:00)      Switch over on the penultimate Sunday in March at 02.00 hours local time



**Attention:** The Time Zone Table is usually updated every year. The current is available for download under the following address: [www.mobatime.com](http://www.mobatime.com) → Downloads → Moba-Software → Time Zone Table.  
In case your device is equipped with a newer version than shown in this manual, the current time zone settings should be checked.

## 7. Telegram formats

### 7.1 IF 482 Telegram

For synchronization via the serial IF482 telegram the following parameters apply:

|                           |   |
|---------------------------|---|
| Protocol:                 | MOBATime IF482 telegram   |
| Interface:                | RS485 (e.g. master clocks NMC or ETC)                                   |
| Communication parameters: | 9600 Baud, 7 data bits, 1 stop bit, even parity                         |
| Synchronization:          | Telegram ends at the beginning of the second, specified in the telegram |
| Cycle:                    | 1 second  |

#### Format IF482:

| Byte | Meaning:   | Character | HEX Code:    |
|------|--|-----------|--------------|
| 1    | Start character  | O         | 4F           |
| 2    | Status<br>A: System synchronized<br>M: System not synchronized / loss of time > 12 h | A / M     | 41 / 4D      |
| 3    | Season<br>U: GMT<br>W: Winter (standard time)<br>S: Summer (daylight saving time)    | U / W / S | 55 / 57 / 53 |
| 4    | Year tens  | 0..9      | 30..39       |
| 5    | Year units   | 0..9      | 30..39       |
| 6    | Month tens   | 0 / 1     | 30 / 31      |
| 7    | Month units  | 0..9      | 30..39       |
| 8    | Day tens   | 0..3      | 30..33       |
| 9    | Day units  | 0..9      | 30..39       |
| 10   | Weekday (Mo..Su)   | 1..7      | 31..37       |
| 11   | Hours tens   | 0..2      | 30..32       |
| 12   | Hours units  | 0..9      | 30..39       |
| 13   | Minutes tens   | 0..5      | 30..35       |
| 14   | Minutes units  | 0..9      | 30..39       |
| 15   | Seconds tens   | 0..5      | 30..35       |
| 16   | Seconds units  | 0..9      | 30..39       |
| 17   | Telegram end character   | <CR>      | 0D           |

## 7.2 BUS 485 telegram

The BUS 485 format is used to synchronize end devices via RS 485. The MOBATime RS 485 protocol includes other telegrams for monitoring and managing end devices (specification Tx-800397). As a monitoring / synchronization device for the DMU 350 can be used for example the master clock Net-Master Clock NMC.

For synchronization with the 485-BUS serial time telegram apply the following parameters:

|                            |   |
|----------------------------|---|
| Protocol:                  | MOBATime RS 485                                 |
| Interface:                 | RS 485 (e.g. master clock NMC or ETC)           |
| Communications parameters: | 19200 baud, 8 data bits, 1 stop bit, no parity. |
| Synchronization:           | Time content valid at telegram start            |
| Cycle:                     | Variable (depending on master clock)            |

| Byte | Meaning                                      | Character | HEX code |
|------|--|-----------|----------|
| 1    | Start character (high byte)                  |           | FE       |
| 2    | Start character (low byte)                   |           | 01       |
| 3    | Length of data packet (high byte)            |           | 0E       |
| 4    | Length of data packet (low byte)             |           | 00       |
| 5    | Command (high byte)                          |           | 00       |
| 6    | Command (low byte)                           |           | 01       |
| 7    | Destination address (high byte)              |           | 00       |
| 8    | Destination address (low byte)               |           | FF       |
| 9    | Source address (high byte)                   |           | 00       |
| 10   | Source address (low byte)                    |           | 7F       |
| 11   | Compact time byte 1 (Seconds since 01/01/93) |           | 00..FF   |
| 12   | Compact time byte 2 (Seconds since 01/01/93) |           | 00..FF   |
| 13   | Compact time byte 3 (Seconds since 01/01/93) |           | 00..FF   |
| 14   | Compact time byte 4 (Seconds since 01/01/93) |           | 00..FF   |
| 15   | Compact time byte 5 (Milliseconds high byte) |           | 00       |
| 16   | Compact time byte 6 (Milliseconds low byte)  |           | 00       |
| 17   | CRC16 check sum (high byte)                  |           | 00..FF   |
| 18   | CRC16 check sum (low byte)                   |           | 00..FF   |
| 19   | Telegram end character (high byte)           |           | FE       |
| 20   | Telegram end character (low byte)            |           | 02       |

## 8. Technical data

| DMU 350  |   |
|--|---|
| Synchronization  | MOBALine, DCF, MSF, RS 485, GPS 4500  |
| Setting times  |   |
| Time to start position   | Max. 8.5 minutes  |
| Reading time Mabaline, RS 485  | Max. 3 minutes  |
| Reading time DCF, MSF, GPS   | Max. 6 minutes  |
| Time when readjusted   | Max. 3 minutes  |
| Adjustment time from So. to Wi. time   | Max. 0.5 minutes  |
| Minute axis operating mode   | Continuous or 1 step every 60 s<br>Configurable with MOBALine using line mode - in other synchronization types DIP switch 1.2 |
| Hour axis operating mode   | 1 step every 180 s  |
| Power  | 90..240 V, 50/60 Hz, <25 VA   |
| Current consumption from MOBALine  | max. 15mA   |
| DC Out DC power for GPS 4500 receivers   | 14 V, max 200 mA, multifused  |
| Serial interface   | RS 485 for synchronization and monitoring<br>IF 482 telegram 9600/7/E/1<br>BUS 482 telegram 19200/8/N/1                       |
| DCF input  | Active current loop   |
| DCF output for cascading<br>(GMT output active only in DCF, MSF and GPS synchronization) | Optocoupler output<br>Umax=30 VDC, Ion=10..20 mA, Ioff=2 mA @20 VDC   |
| Configuration, settings  | 2 x 8 DIP switches  |
| Status display   | 8 x LED   |
| Alarm contact  | Relay specifications: 60 VDC / 1 A or 30 VAC / 1 A.   |
| Time zone table for automatic local time calculation                                     | 59 time zone entry choices  |
| Active reserve for power outages   | None  |
| Time reserve using internal quartz clock   | > 10 h  |
| Number of motors   | 2 (hrs. / min.)   |
| Max. clock dial diameter   | 350 cm  |
| Max. wall thickness  | 60 cm   |
| Temperature range  | -30..+55 °C   |
| Relative humidity  | 0..95 %, non-condensing   |
| Weight   | <9 kg   |





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