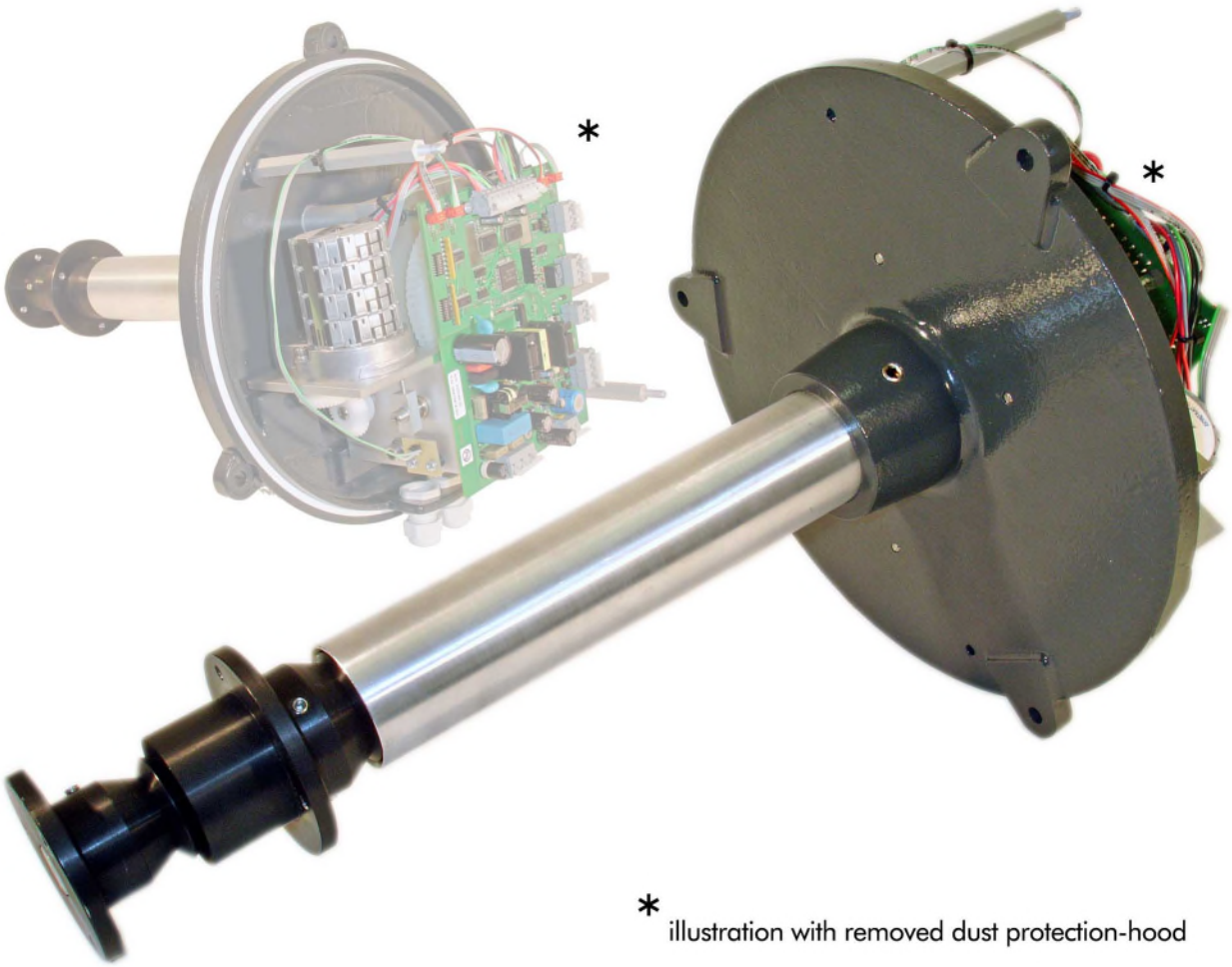
Installation and Operation Manual

DMU 350

Self-setting minute movement for diameters up to 350 cm

(Synchronization with MOBA*Line*- / RS485 time code, DCF, MSF or GPS receivers)



* illustration with removed dust protection-hood

Certification of the Producer

CE

STANDARDS

The clock movement DMU 350 has been developed and produced in accordance with the EU Standards

EMC Directive	2014/30/EU
LVD Directive	2014/35/EU
RoHS Directive	2011/65/EU

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

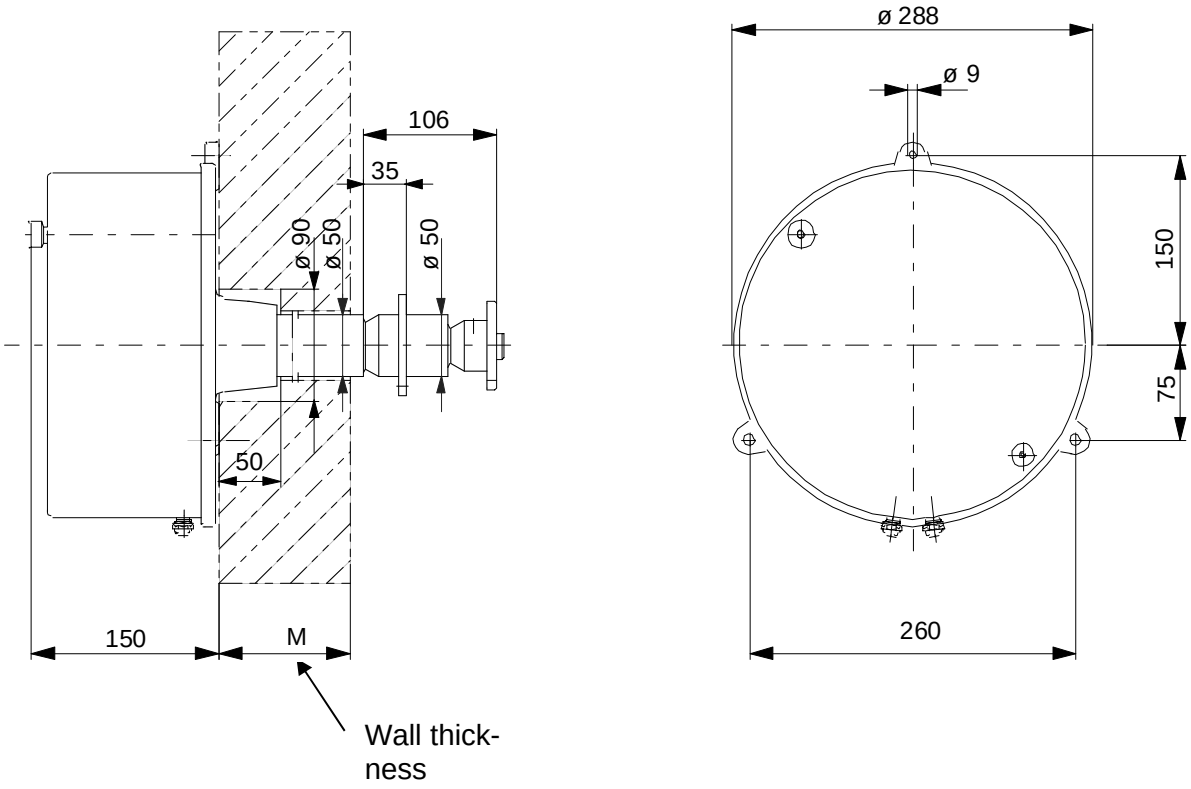
1. Specifications

1.1 General

Self-adjusting minute movement for diameters up to 350 cm

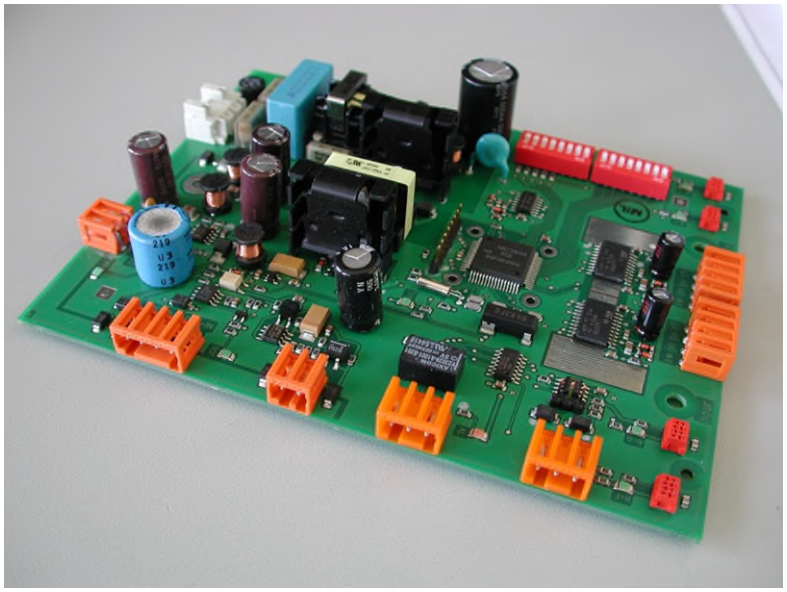
1.2 Housing

Mechanically compatible with MW 10. Protection class I.



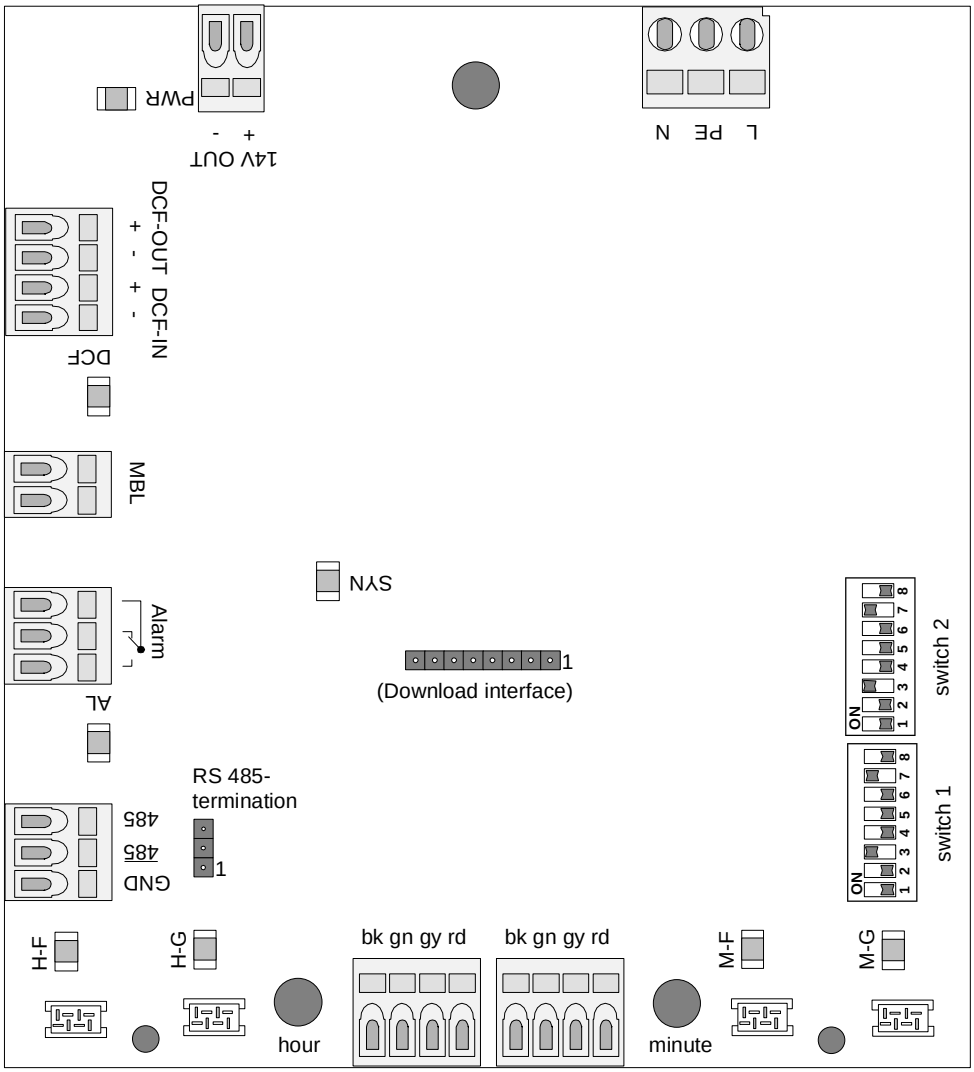
1.3 Movement operation

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 GNSS (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 GNSS 4500. To cascade other movements GNSS 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).

GNSS 4500 (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 synchronies 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	GNSS 4500 (GPS 4500)
2	MSF
3	MOBALine
4	RS 485 (IF 482 or BUS 485 telegram)
5	Reserve
6	Reserve
7	Reserve

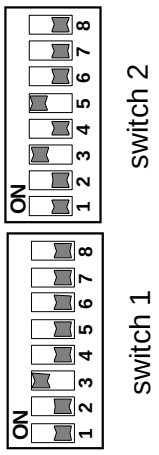
Synchronization type	DCF 77	GNSS 4500	MSF	MOBALine	RS 485
Time information	MET	GMT	MET-1	Local	Local
Switch function 2	Time zone	Time zone	Time zone	-	Address
DCF output	Active	Active	Active	Inactive	Inactive

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

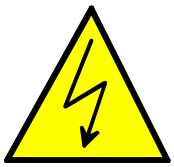


Synchronization type
Switch 1.3 on = time source significance 1 = GNSS 4500 active

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.

Switch	MOBALine	RS 485	Operating mode
1.1 ON	Stop	CMD_SET_CONF 12:00	12:00 position
1.1 ON	Operation	CMD_SET_CONF Normal	12:00 position
1.1 OFF	Stop	CMD_SET_CONF 12:00	12:00 position
1.1 OFF	Operation	CMD_SET_CONF Normal	Normal operation

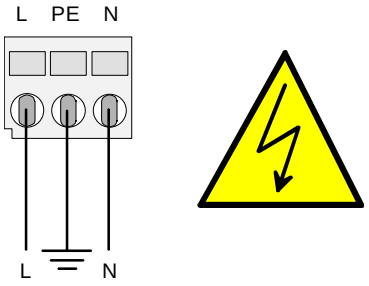
Switch	MOBALine	RS 485	Operating mode
1.2 ON	1 min or ½ min	CMD_SET_CONF Step	Clock minute hands in staged operation (1/min)
[1)] 1.2 ON	Continuous	CMD_SET_CONF Continuous	Clock minute hands in continuous operation (1/15 s)
[1)] 1.2 OFF	1 min or ½ min	CMD_SET_CONF Step	Clock minute hands in staged operation (1/min)
1.2 OFF	Continuous	CMD_SET_CONF Continuous	Clock minute hands in continuous operation (1/15 s)

[1)] Leads to unique reset as the remote command and switches disagree (reboot of the control system: behavior as for starting up).

5. Installation guidelines

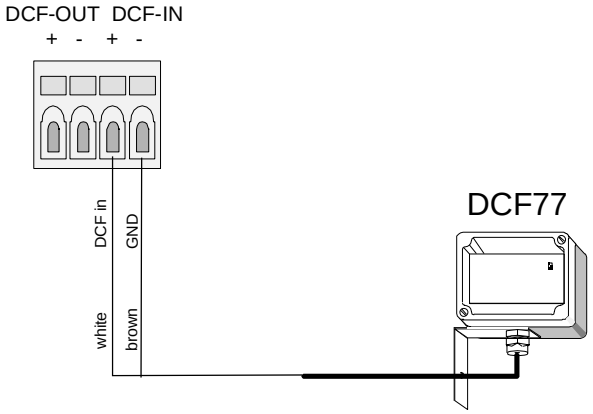
5.1 Connection wiring

5.1.1 Mains connection

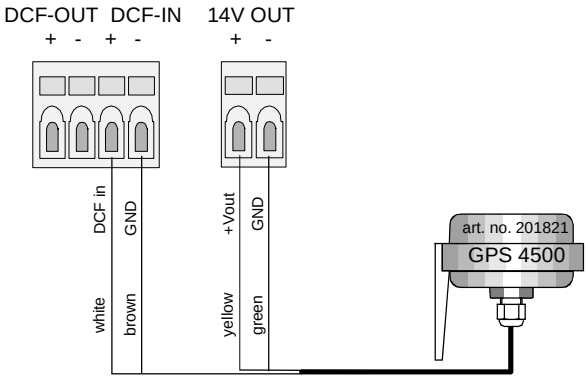


Caution
Mains voltage

5.1.2 DCF77 time signal receiver



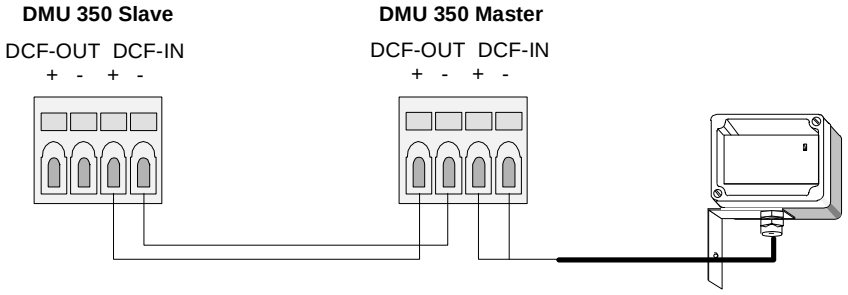
5.1.3 GNSS 4500 (GPS 4500) time signal receiver



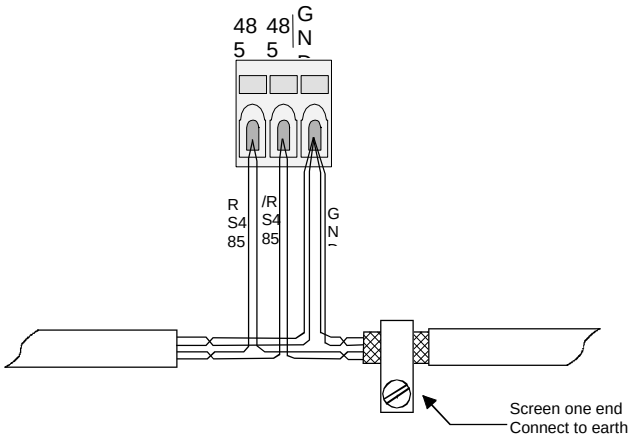
5.1.4 Cascading

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.

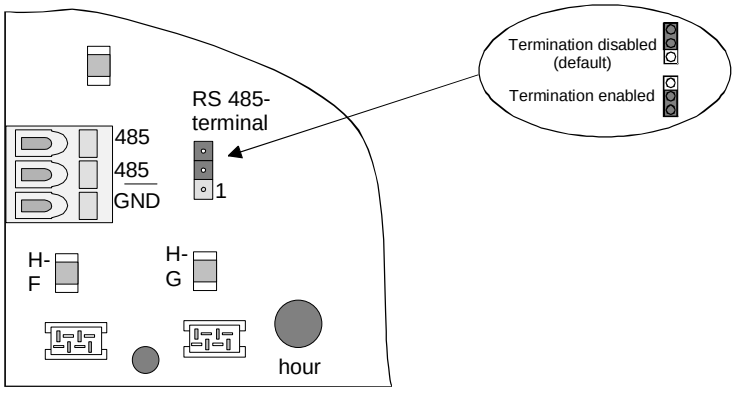
Note. Set GNSS 4500 as slave time source. (See chapter 3.2)



5.1.5 RS 485 wiring

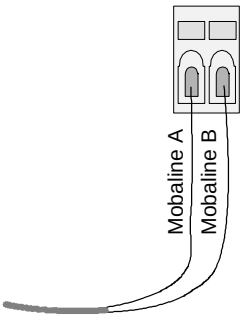


5.1.6 RS 485 termination



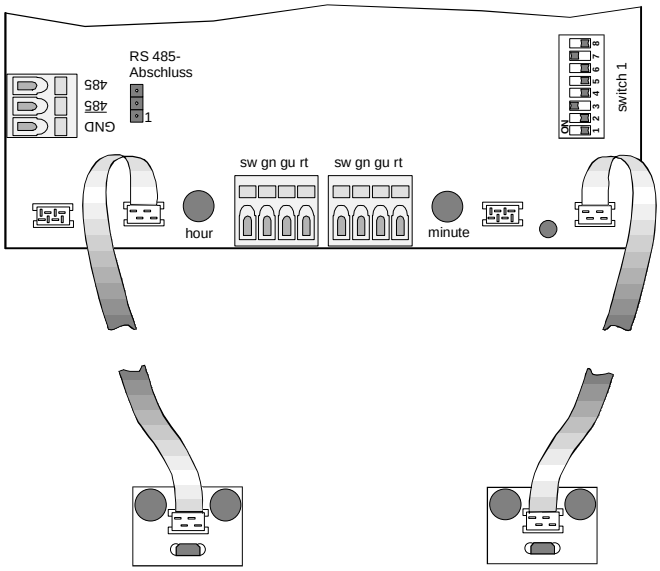
Use a jumper to add a terminal resistor to the RS 485 bus. The jumper must be installed at pins 1 and 2 of the 3-pole plug connector of the RS 485 connector plug (see chapter 1.4).

5.1.7 Mobaline Connection



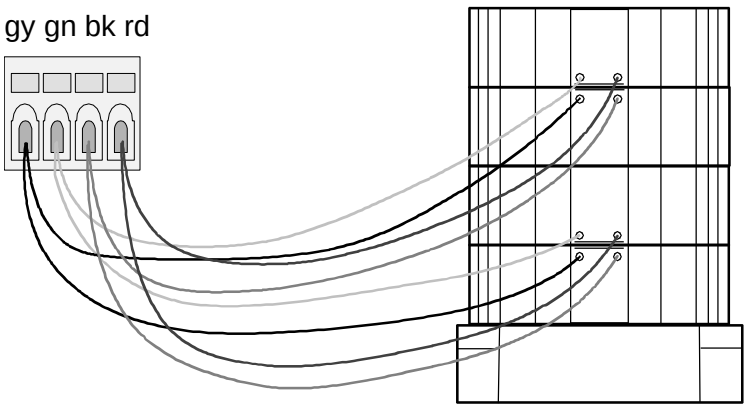
The polarity of the connections is not relevant.

5.1.8 Sensor connections



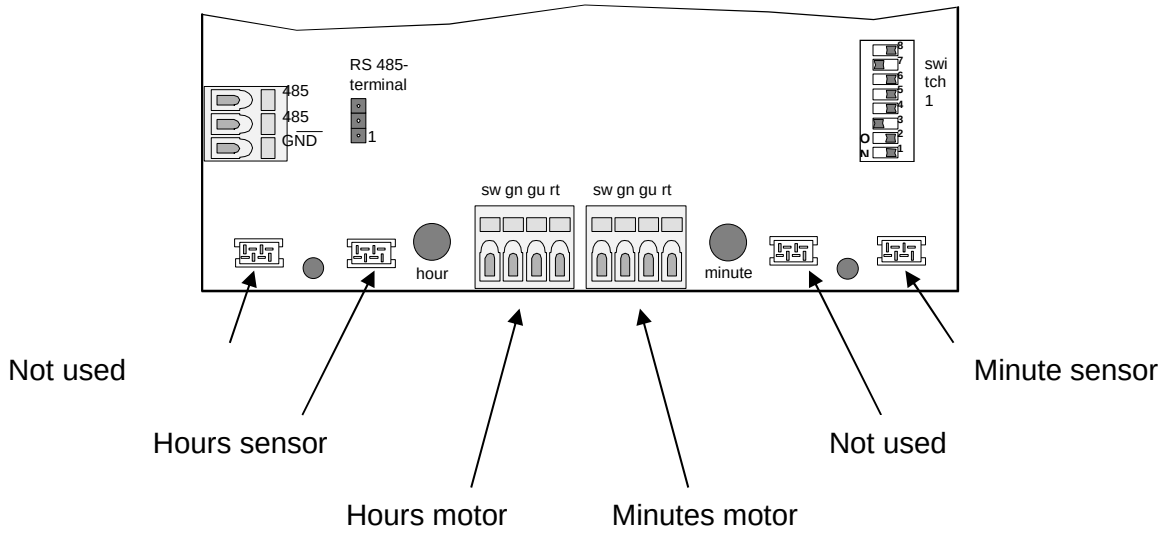
Hours sensor Minute sensor

5.1.9 Motor connection



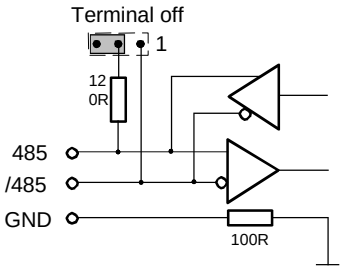
Motors are wired according to color coding.
bk = black, gn = green, gy = grey, rd = red.

5.1.10 Connection plug arrangement

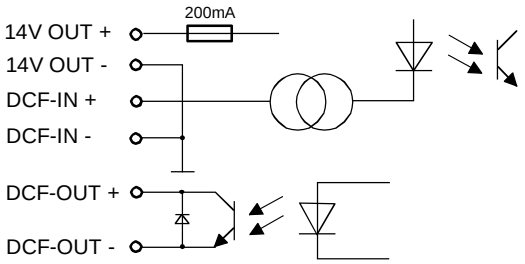


5.2 Plug wiring

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), Monrovia, Casablanca	0	No		
01	London, Dublin, Edinburgh, Lisbon	0	Yes	Last Sun. Mar. (01:00)	Last Sun. Oct. (02:00)
02	Brussels, Amsterdam, Berlin, Bern, Copenhagen, Madrid, Oslo, Paris, Rome, Stockholm, Vienna, Belgrade, Bratislava, Budapest, Liubliana, Prague, Sarajevo, Sofia, Vilnius, Warsaw, Zagreb	+1	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
03	Athens, Istanbul, Minsk, Helsinki, 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) (2010)	Sun. 31. Oct. (23:59) (2010)
07	Tel Aviv	+2	Yes	Last Fri. Mar. (02:00)	2nd Sun. Oct. (02:00) (2010)
08	Kuwait City	+3	No		
09	Moscow, 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, 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, Madras, New Delhi, Colombo	+5.5	No		
16	Astana, Thimphu	+6	No		
17	Bangkok, Hanoi, Jakarta	+7	No		
18	Beijing, Chongqing, Hong kong, Singapore, Taipei, Urumqi	+8	No		
19	Tokyo, 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	1st Sun. Oct (02:00)	1st Sun. Apr. (03:00)
22	Northern Territory: Darwin	+9.5	No		
23	Queensland: Brisbane, Guam, Port Moresby	+10	No		
24	NSW, Victoria: Sydney, Canberra, Melbourne	+10	Yes	1st Sun. Oct. (02.00)	1st Sun. Apr. (03:00)
25	Tasmania: Hobart	+10	Yes	1st Sun. Oct. (02:00)	1st Sun. Apr. (03:00)
26	Vladivostok	+10	Yes	Last Sun. Mar. (02:00)	Last Sun. Oct. (03:00)
27	Solomon Is. , New Caledonia	+11	No		

28	Auckland, Wellington	+12	Yes	Last Sun. Sep. (02:00)	1st 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	3rd Sun. Oct. (00:00)	3rd Sun. Feb. (00:00) (2010)
33	Buenos Aires	-3	No		
34	Newfoundland, Labrador	-3.5	Yes	2nd Sun. Mar. (00:01)	1st Sun. Nov. (00:01)
35	Atlantic Time (Canada)	-4	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
36	La Paz	-4	No		
37	Bogota, Lima, Quito	-5	No		
38	New York, Eastern Time (US & Canada)	-5	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
39	Chicago, Central Time (US & Canada)	-6	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
40	Tegucigalpa, Honduras	-6	No		
41	Phoenix, Arizona	-7	No		
42	Denver, Mountain Time	-7	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
43	Los Angeles, Pacific Time	-8	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
44	Anchorage, Alaska (US)	-9	Yes	2nd Sun. Mar. (02:00)	1st Sun. Nov. (02:00)
45	Honolulu, Hawaii (US)	-10	No		
46	Midway Islands (US)	-11	No		
47	Mexico City, Mexico	-6	Yes	1st 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, Green-land	-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	2nd Sun. Mar. (02:00)	1st 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	2nd Sun. Oct. (00:00)	2nd Sun. Mar. (00:00)
61	Chile, Easter Island	-6	Yes	2nd Sat. Oct. (22:00)	2nd 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:

2nd 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 availablfor download under the following address: *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 A: System synchronized M: System not synchronized / loss of time > 12 h	A / M	41 / 4D
3	Season U: GMT W: Winter (standard time) 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	MOBA*Line*, DCF, MSF, RS 485, GNSS (GPS) 4500
Setting times Time to start position Reading time Mobaline, RS 485 Reading time DCF, MSF, GPS Time when readjusted Adjustment time from So. to Wi. time	 Max. 8.5 minutes Max. 3 minutes Max. 6 minutes Max. 3 minutes Max. 0.5 minutes
Minute axis operating mode	Continuous or 1 step every 60 s Configurable with MOBA*Line* 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 GNSS 4500 receivers	14 V, max 200 mA, multifused
Serial interface	RS 485 for synchronization and monitoring IF 482 telegram 9600/7/E/1 BUS 482 telegram 19200/8/N/1
DCF input	Active current loop
DCF output for cascading (GMT output active only in DCF, MSF and GPS synchronization)	Optocoupler output 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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