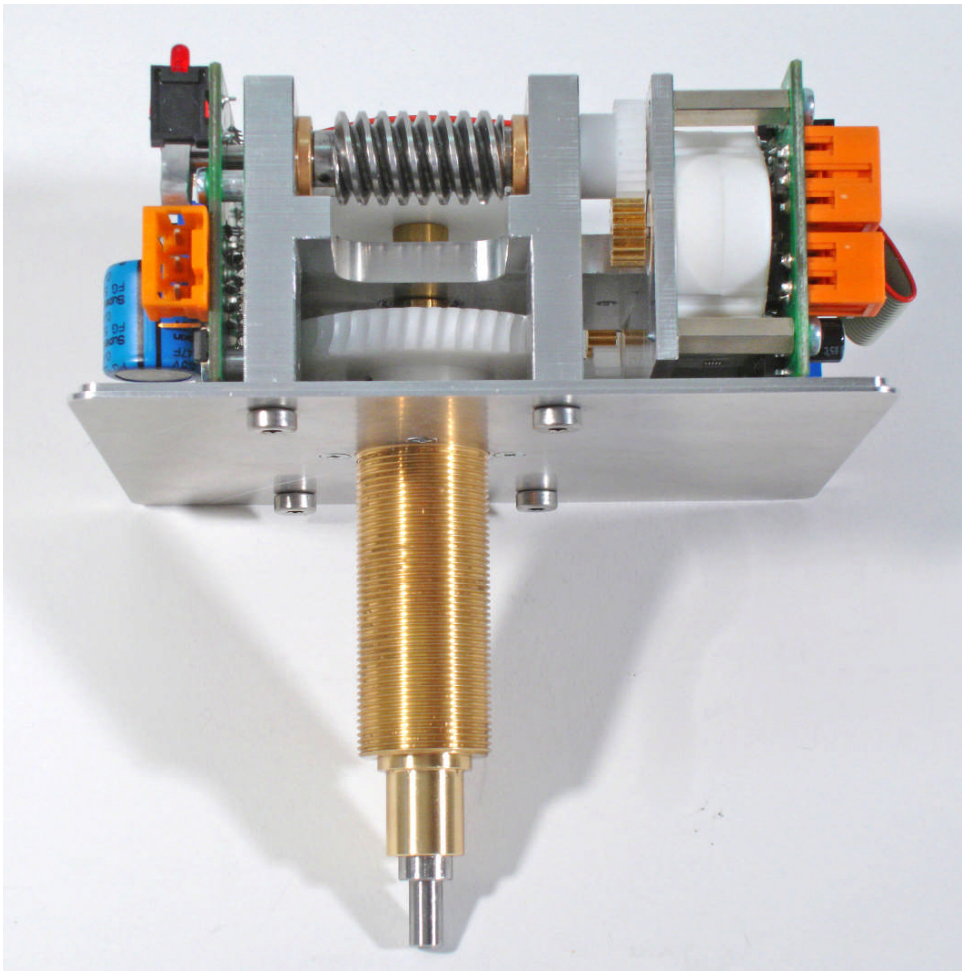
Installation and Operating Instructions

DMU 140

Movement for MOBA*Line*, RS485 time code, DCF, MSF and GPS receiver for outdoor clocks up to Ø 140 cm.

Please read these instructions carefully before installation.



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Certification of the Producer

STANDARDS
The clock movement DMU 140 has been developed and produced in accordance with the EU Standards
89 / 336 / EU

CE

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 must only be carried out by skilled staff.
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1. Dimensions, definitions

Caution. **The DMU 140 is suitable for indoor and outdoor clocks to a max. Ø 140 cm. The hands must be covered by a glass face. The movements cannot be used for a facade clock with unprotected hands.**

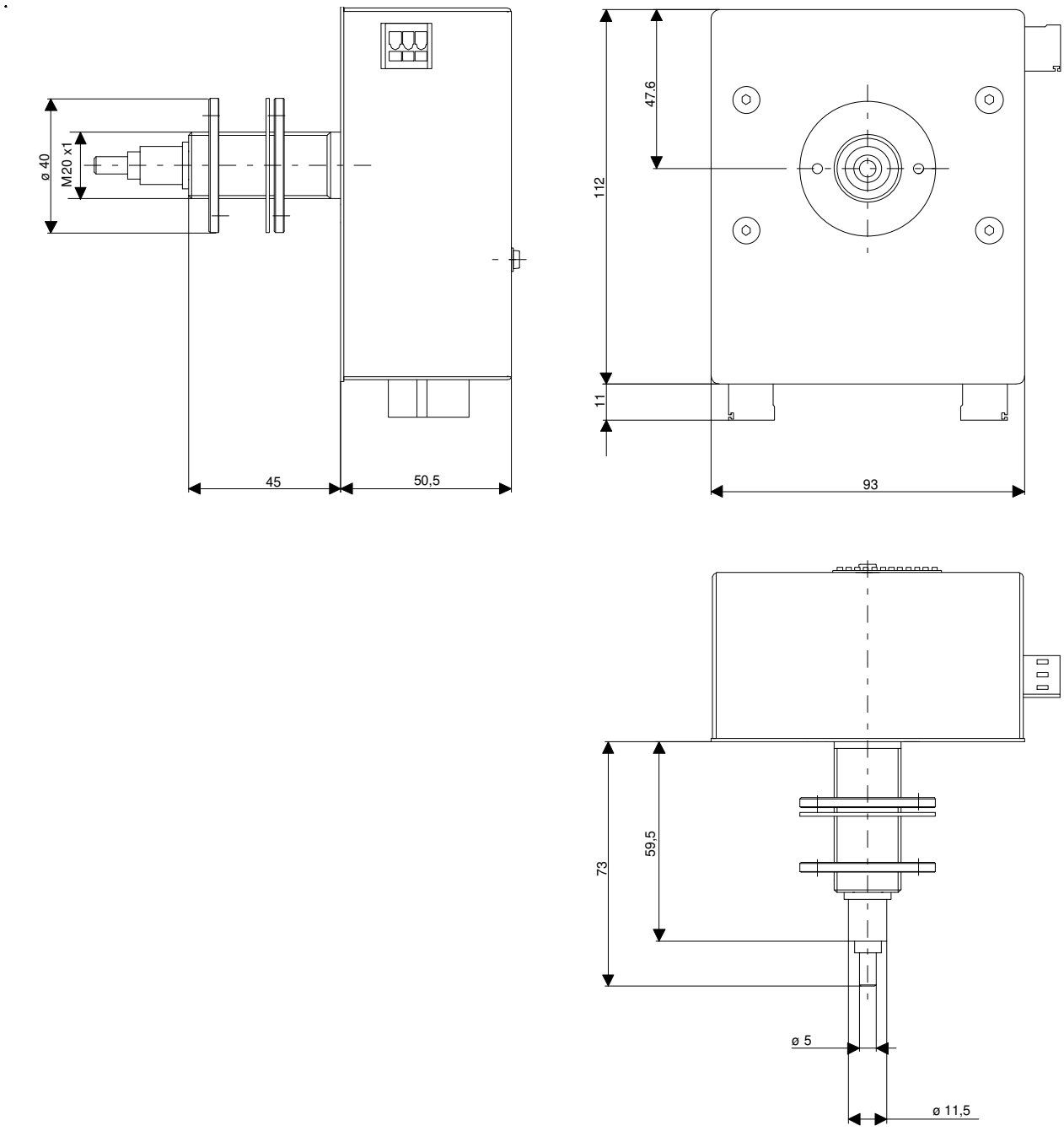


Fig. 1

2. Installation guidelines

2.1 Installation of DMU 140 clock movements

The dial must be adequately rugged. The installation drill hole must have a diameter of 20 mm.
The movements must be mounted vertically.

Fig. 2 shows the position of the components.
The washer nut (2) M20 x 1 is to be tightened carefully with a special spanner accessory and torque wrench using a torque of 4.5 Nm +/- 0.2 Nm.

Caution:
Do not turn the movements any further after the washer nut (2) has been tightened in place.

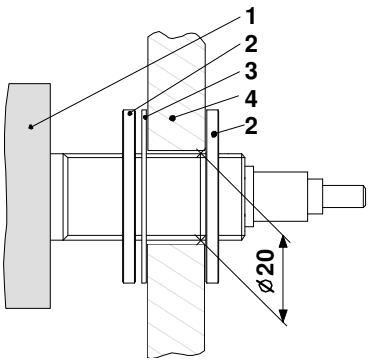


Fig. 2

1 Clock movements
2 Washer nut
3 Rubber washer
4 Clock face

2.2 Installation of hands and commissioning

2.2.1 Hand installation

The hour and minute hand axles are positioned at 12:00 ex works. They must be inserted on the axles and pressed down to the stop (X). They must then be tightened in place without twisting the axles. See Fig. 3.

The 12:00 position must be checked in each movements after installing the hands (chapter 2.2.2)

2.2.2 Commissioning and checking hand position

- Set DIP switch 1 to **ON** (12:00 position, Fig. 5)
- Connect MOBA*Line* or DC power. The clock will turn to the 12:00 position.
  ➔ Are the hands exactly at the 12:00 position?
- If not then carefully loosen, adjust and retighten them (do not twist the axle).
  ➔ Recheck the 12:00 position (by briefly interrupting the power supply)
- If it's correct, continue with chapter 2.4 Mode Settings

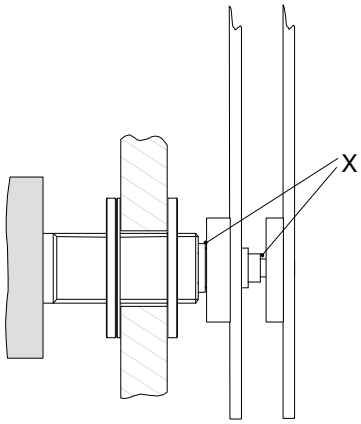


Fig. 3

2.3 View and wiring

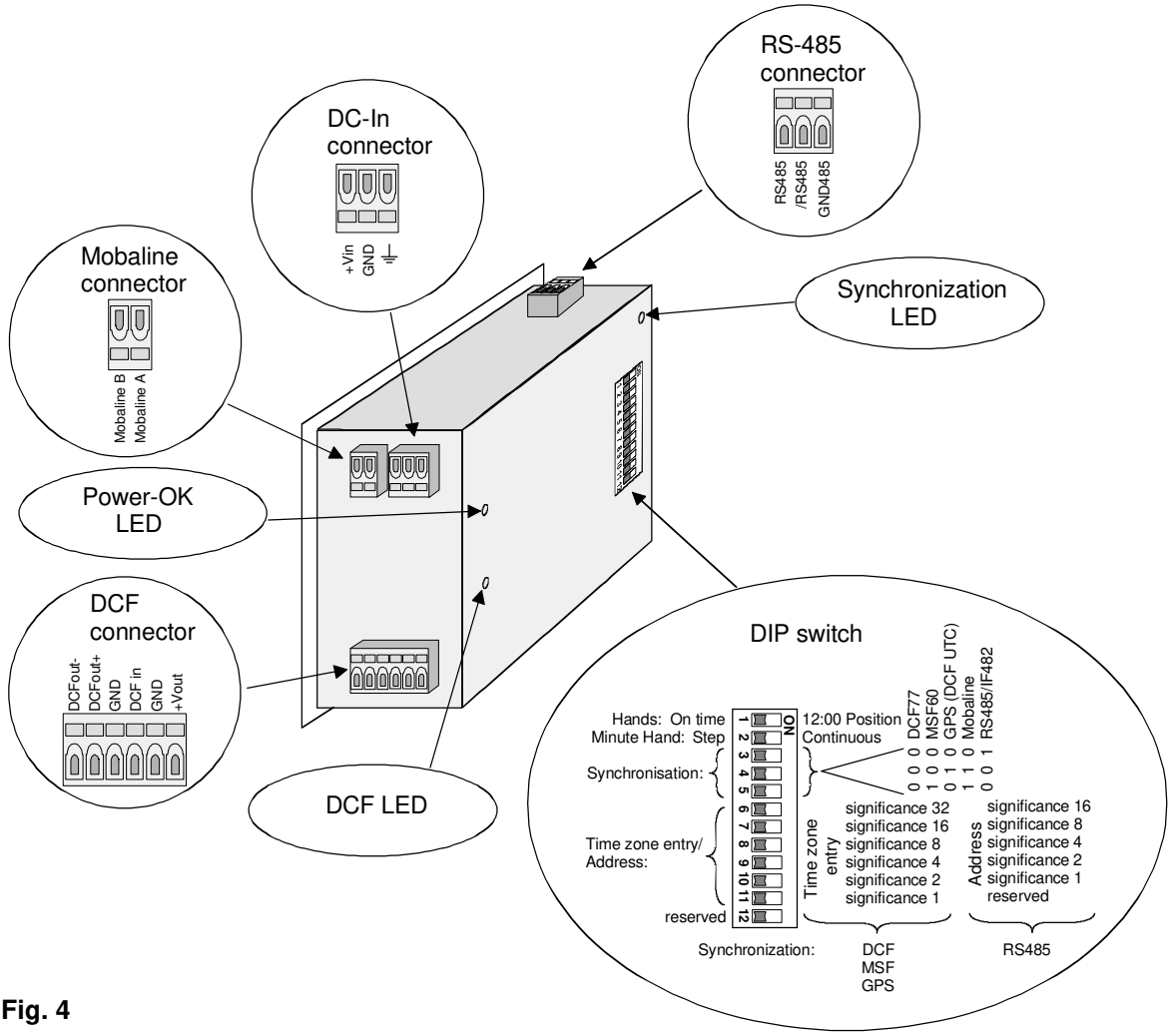


Fig. 4

2.4 Setting the synchronization mode and commissioning

2.4.1 Power supply voltage

This is via MOBA*Line* or 10-30 V DC. To ensure DCF/MSF reception is as trouble-free as possible, functional earthing is essential.

Power supply via mains power module

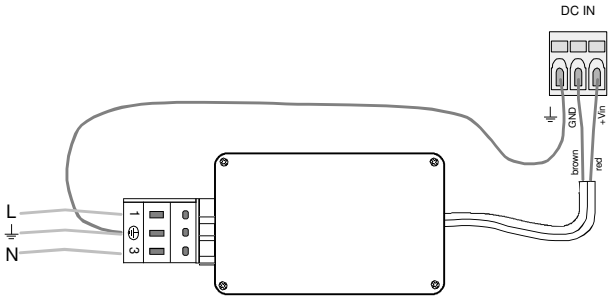


Fig. 5

External 24 V power supply

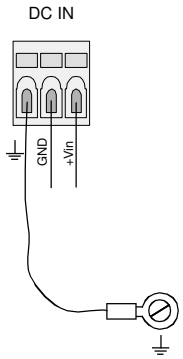


Fig. 6

2.4.2 Receiver wiring

- The signal is shown by DCF-LED
- Correct synchronization is shown by the synchronization LED.

DCF receiver

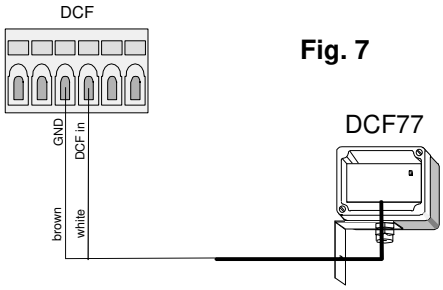


Fig. 7

GPS receiver

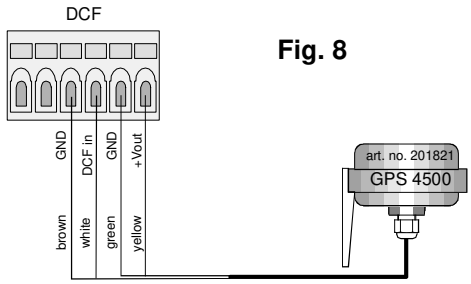


Fig. 8

2.4.3 Connection to main clocks

- Correct synchronization is shown by the synchronization LED.

MOBA*Line*

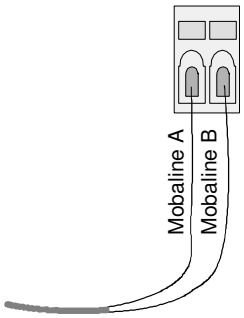


Fig. 9

RS-485

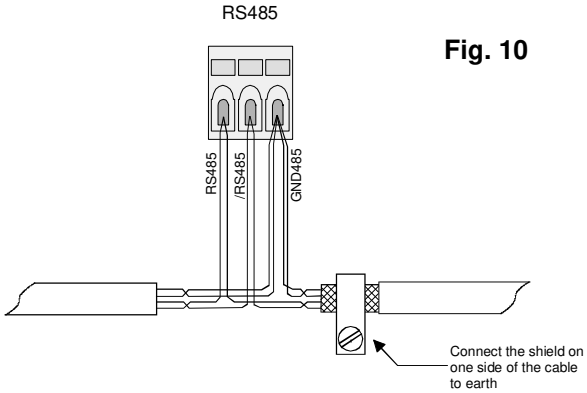


Fig. 10

2.4.4 RS-485 terminating resistor

The termination resistor must be activated in clock movements at the end of a RS-485 line. Open the clock movements cover cautiously to do so. The jumper is on the pc-board with DIP switches. Replug the X8 jumpers X8 to activate the terminating resistor.

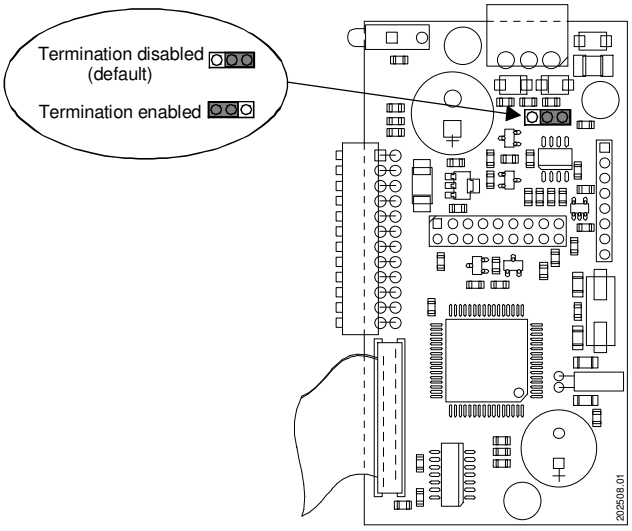


Fig. 11

2.4.5 DIP switches

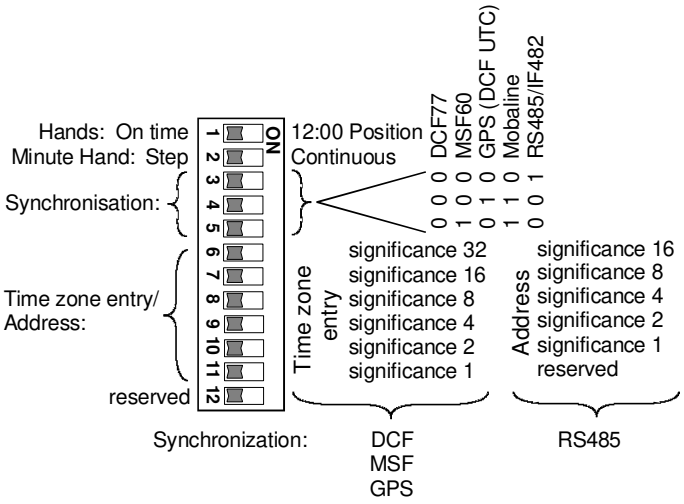
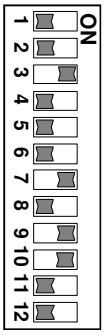


Fig. 12

2.4.6 Synchronization

- Set the DIP switches **3,4,5** as the synchronization mode dictates.
- Set time zone and RS-485 address using the DIP switches **6 -11**.
  This setting is not needed in some synchronization modes.
- DCF reception is shown by a regularly blinking of the DCF LED.
- Correct synchronization is shown by the Synchronization LED.
- After a brief period (see chapter 5) the clock will start running to current line time.

Example of calculating time zone and address setting:



		Time zone			Address	
DIP switch 11	Off	Value 1	0			
DIP switch 10	On	Value 2	2		Value 1	1
DIP switch 9	On	Value 4	4		Value 2	2
DIP switch 8	Off	Value 8	0		Value 4	0
DIP switch 7	On	Value 16	16		Value 8	8
DIP switch 6	Off	Value 32	0		Value 16	0
		Total	22		Total	11
		= Time zone	**22**		**= Address**	**11**

2.4.7 Cascading wiring option

The DCF time code can be connected to the next movement via DCF-out. Synchronization in cascaded movements must be set to GPS (DCF UTC).

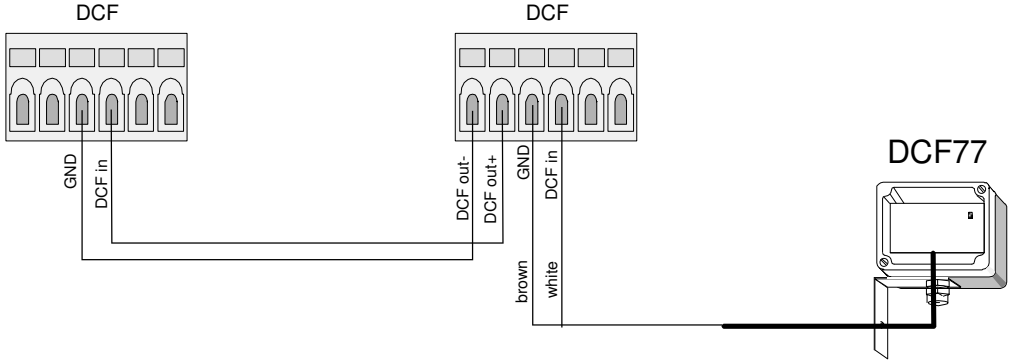


Fig. 13

3. Function description

Self-setting movement for hour and minute hands. For self-setting clocks indoors and outdoors (under glass covers) with a face diameter of up to 140 cm with or without lighting.

- **MOBA*Line, DCF77, MFS60*** time code or controlled by MB-485-protocol via ***RS-485*** *with* automatic time take over.
- Synchronization from a master clock or with DCF, MSF or GPS receiver.
- DC power supply to a GPS receiver.
- Operating mode, synchronization, time zone and RS-485 address selectable by DIP switch.
- Self-setting, 12:00 position monitored by sensors with correction facility.
- Two motors with forwards and backwards capabilities for rapid adjustment.
- Power-saving mode with MOBA*Line* - only one motor in use, with priority given to the minute motor.
- Lack of MOBA*Line* or RS-485 time signal during 24 hours is shown by resetting the hands to 12:00 o'clock position.
- Lack of DCF77 or MSF 60 time signal during 7 days (7 x 24 h) is shown by resetting the hands to 12:00 o'clock position.
- Immediate adjustment to the correct time after power interruptions of up to 10 h based on internal quartz clock (battery-less time keeping).
- DIP switch 2 is used to select the minute hand function mode, continuous or in minute steps. MOBA*Line* ignores this switch. The running mode is selected via the line mode of the master clock, with half-minute steps becoming minute steps.
- Output of a synthetic DCF77 code, when movement is synchronized with DCF77 or MSF 60 (UTC).
- Status LED for power supply, DCF impulses and synchronization.

4. 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, 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	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: As usual, the time table is adapted each year. You can download the newest time table from our homepage: *www.mobatime.com* ➔ *Downloads* ➔ *Moba-Software* ➔ *Time Zone Table.* If the delivered device contains a newer version as showed in this manual, it's recommended to check the time zone entries.

5. Technical data:

	DMU 140
Synchronization	MOBA*Line*, GPS, DCF, MSF, RS 485
Adjustment times Running time to start position MOBA*Line* time to read in DCF or MSF reading in time Readjustment time Adjustment time from Summer to Winter Time	 Max. 3 minutes Max. 3 minutes Max. 6 minutes Max. 3 minutes Max. 0.5 minutes
Minute hand operating mode	Continuous or 1 step every 60 s Configurable in MOBA*Line* using line mode - in other synchronization modes using DIP switch 2
Hour hand operating mode	1 step every 60 s
Power supply: DC on DC In or Mobaline	10 - 30 V DC
Power consumption at 24 VDC	< 1.5 V A (<60 mA)
Power consumption from MOBALine	max. 80mA
DCF input	Current source max. 32 mA
DCF output, UTC output is only active with DCF, MSF and GPS synchronization	Optocoupler output protected against incorrect poling Max. 35 mA voltage drop approximately 2 V @ 20 mA
DC Out: DC power for GPS receiver	10 – 30 V depending on supply voltage Max. 200 mA protected by Multifuse
Running reserve in case of power loss	None
Time keeping based on internal quartz clock	> 10 h
Number of motors	2 (hrs. /mins.)
Dial diameter	80 - 140 cm
Max. dial thickness	33 mm
Hands definition hour minute	Length ≤ 400 mm (from centre) Weight ≤ 400 g, unbalance ≤ 100 mNm Length ≤ 600 mm (from centre) Weight ≤ 500 g, unbalance ≤ 100 mNm
Temperature range	-30 ... +70°C
Weight	680 g
Tests and standards	EN 50121-4, EN 61000-6-3, protection class II

5.1 Plug wiring

5.1.1 RS-485

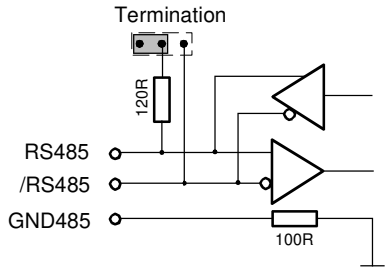


Fig. 14

5.1.2 DCF In/Out

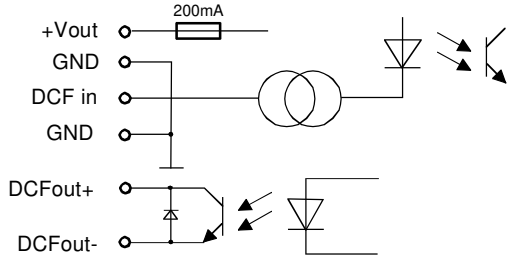


Fig. 15

Technical data subject to change without notice.

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