

# Installation and Operating

**BU 190(t) S 230**

**Movement for DCF / MSF time code**

Please read these instructions carefully before installation.



### References to the User's Manual

1. The information in this User's Manual can be changed at any time without previous notice. The current version is available for download on [www.mobatime.com](http://www.mobatime.com) – Downloads.
2. This User's 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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### Guidelines for installation and handling

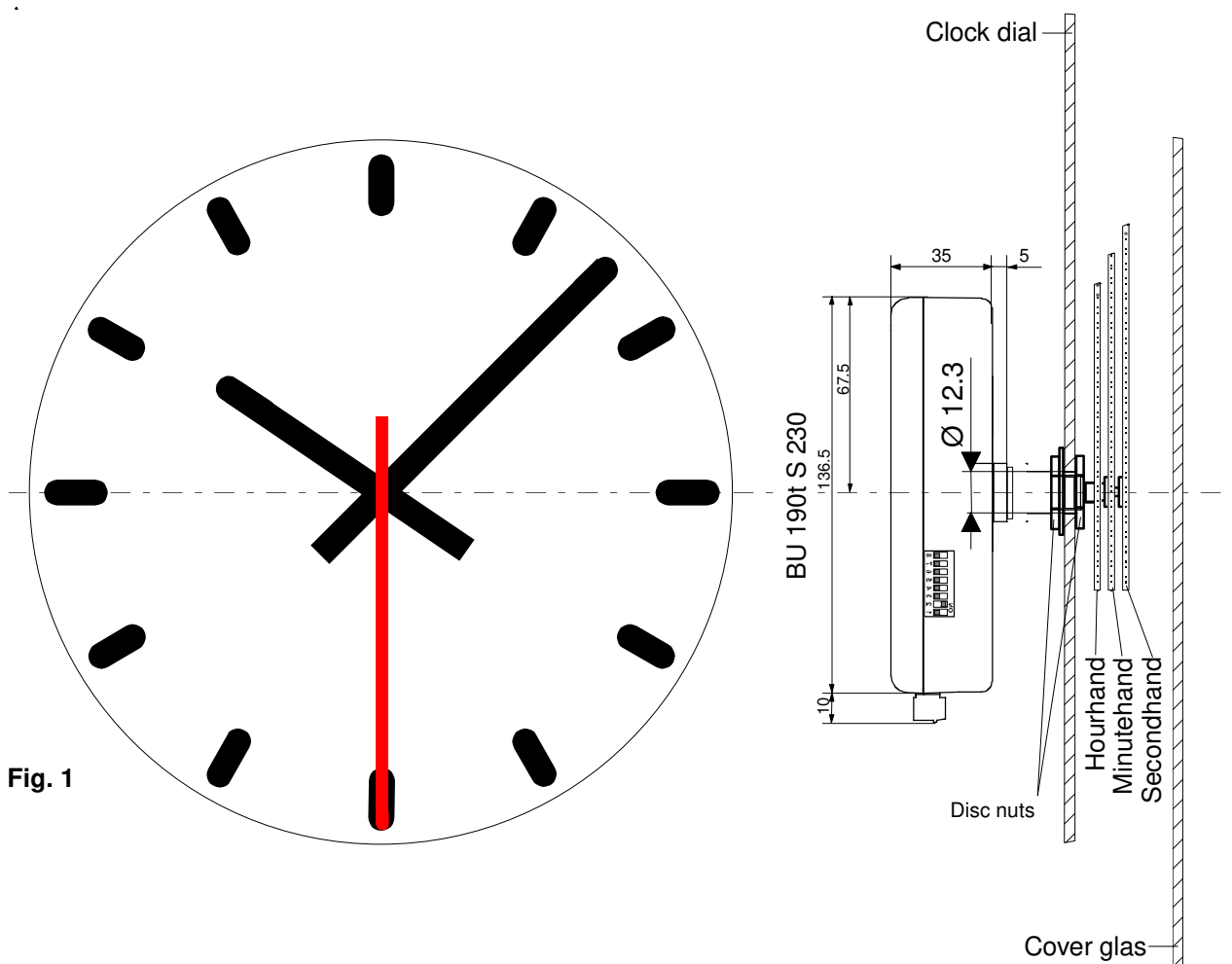
1. This movement has no incorporated disconnect device from the mains supply power. An appropriate disconnect device must be provided external to the movement, concerning to the national installation regulations.
2. The movement has to be transported or stocked only in the original packing and in a dry environment.

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## 1. Dimensions, Definitions

Diameter	Type	Art.-No.
30 - 80 cm	Movement: BU 190 S 230	200840
30 - 80 cm	Movement: BU 190t S 230	200841

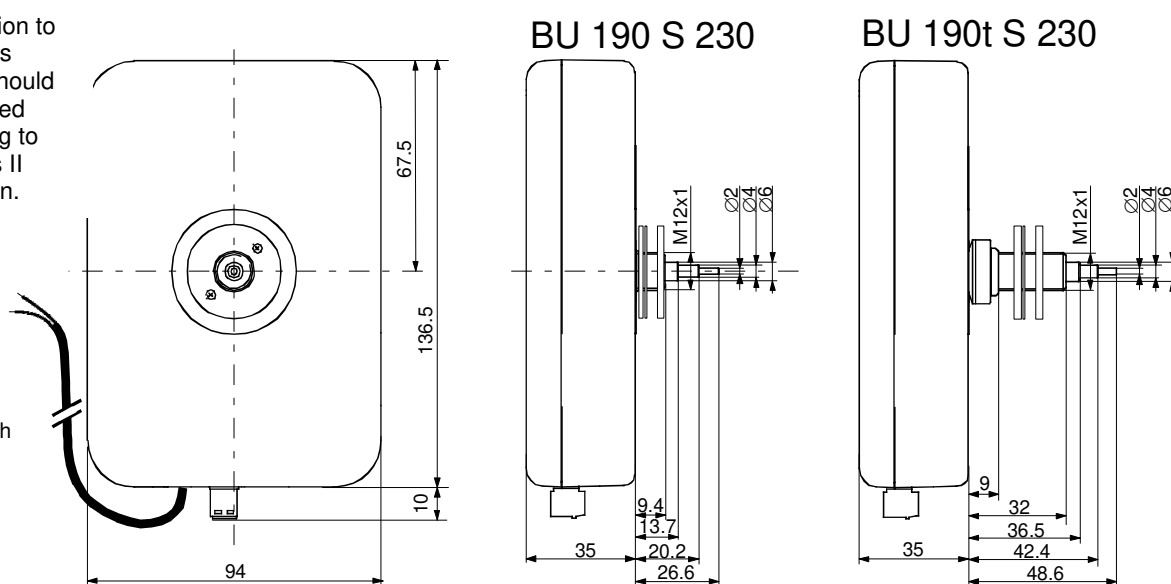


Connection to the mains supply should be realized according to the class II protection.

Power  
AC 230V

Cable length  
550mm

**Fig. 2**



## 2. Function description

Self-setting movement with hour, minute and second display. For autonomous self-setting clocks for indoor or outdoor use with dial diameters up to 80 cm, with or without illumination.

- DCF-77 or MSF-60 radio control with automatic time take-over and daylight saving time change-over by means of a connected radio time signal receiver.
- Central-European time zones CET-1, CET and CET+1 selectable by DIP-switch.
- Signalization of missing DCF/MSF time code reception after a period of one week by setting the hands to 12 o'clock position.
- Internal battery-less power reserve for at least 5 minutes operation (not for second hand).
- Internal quartz clock for precise time display even without DCF radio reception.
- Immediate resetting to the correct time after mains failure of up to 12 hours due to an internal real-time-clock (battery- less powered).
- Serial time signal output for the connection of a further movement. Up to 3 further movements can be connected in this way.
- Different running modes of the second hand, selectable by means of a DIP-switch.
- Possibility of connection of an MSF-60 radio receiver (Rugby) as well.
- Serial input (RS 232 / 422) for time setting and synchronization with standard ASCII time telegram (definition IF482).

## 3. Mounting guidelines

### 3.1 Mounting of movement series 190(t)

The dial must be sufficiently stable. The fixing hole must have a diameter of 12,3 mm.

The movement must be fixed in vertical position.

Vide Fig. 3 for the position of mounting parts.

The disc nut (2\*) M12 x 1 has to be tightened with a special wrench tool (Art. No. 201998) and a torque wrench with a torque of 4.5 Nm +/- 0.2 Nm.

#### Attention:

The ring nut (5), the compensation ring (6) and the spring washer (7) must not be removed.

After tightening of the disc nut (2\*), the movement must not be wrenched!

### 3.2 Mounting of hands and Starting-up

#### 3.2.1 Mounting of hands

The shafts of the hour, minute and second hands are positioned ex-work on the reference position (12 o'clock). The hands shall be carefully fixed and tightened on the shafts. Enough space must be provided between the hands. See Fig. 4.

The position 12 o'clock must be checked on each movement after the mounting (Chap. 3.2.2).

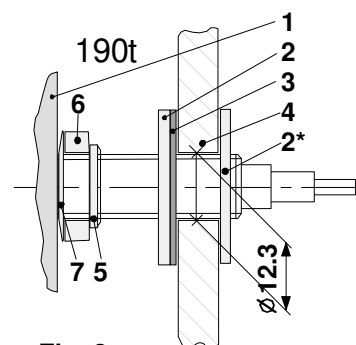


Fig. 3

- 1 Movement
- 2 Disc nut
- 3 Rubber washer
- 4 Dial
- 5 Ring nut
- 6 Compensation ring
- 7 Spring washer

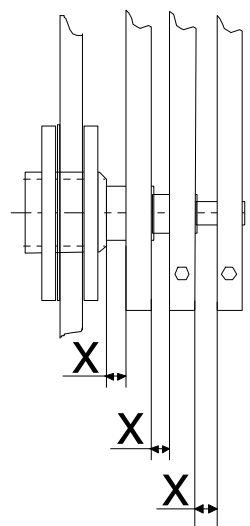


Fig. 4

### 3.2.2 Starting-up and check of the hand position

- Set DIP switch **1** to **ON** position (12:00 Position, Fig. 5)
- Install the AC 230V power supply by using the white two wire cable from the movement. The clock runs to 12 o'clock position  
→ Position of hands OK?
- If the hand position is wrong, carefully loosen the hand, adjust and tighten.
- Reset DIP Switch **1** to **OFF** position  
→ Check the 12 o'clock position again (initialising by an interruption of the power supply),
- If hand position OK, continue with chapter 4 for further setting up.

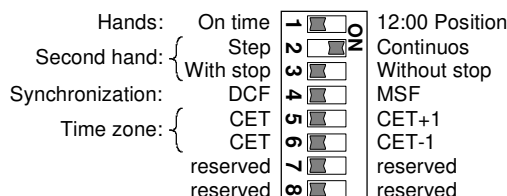


Fig. 5

## 4. Setting up / Connections

- If the 12 o'clock position of the clock is OK, reset DIP Switch **1** to **OFF** position (Fig. 5).
- The movement can be synchronized with following time codes:
  - DCF, MSF (see chapter 4.1)
  - Serial time telegram (standard IF 482 telegram) by RS 232 or RS 422 with local time (see chapter 4.2)

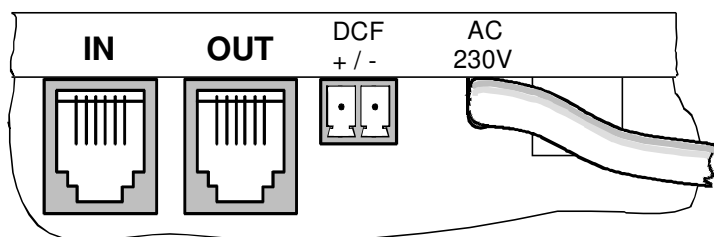


Fig. 6

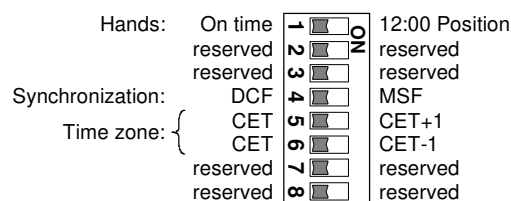


Fig. 7

### 4.1 Synchronization with DCF or MSF time code

- The DCF 77 - Radio time signal receiver (DCF / MSF 450 (4500) must be connected with plug DCF on the movement (see fig 6).



To ensure the reception quality, the designated pin of DCF plug has to be connected with earth potential (e.g. clock housing).

- select time codes:
  - For DCF set DIP-switch 4 to OFF position
  - For MSF set DIP-switch 4 to ON position
  - Time: London local time (WET)

- Select time zones:

Depending upon condition DCF can also be received in west Europe (CET -1) (Portugal), or in east Europe (CET +1) (Greece).

- for CET -1 set DIP-switch 6 to ON position
- for CET +1 set DIP-switch 5 to ON position

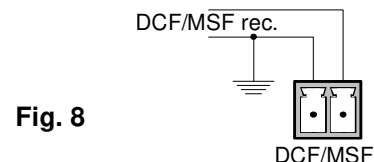


Fig. 8

To ensure the reception quality the designated pin of the DCF plug has to be connected with the earth potential (functional earth, i.e. clock housing).

- Control of the reception quality:

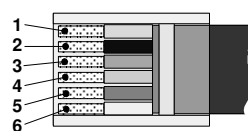
The orientation of the radio time signal receiver should be chosen in a way, the LED of the receiver flashes regularly (at good reception quality the LED in the receiver flashes regularly in second rhythm), see also the instruction manual of the receiver.

- The movement starts after about 5 minutes and set itself automatically on the exact time.

## 4.2 Synchronization with serial time telegram (IF 482)

The movement can be synchronized with RS 432 or RS 485 over standard-RS 485 telegram. Time will be interpreted and shown as local time. See chapter 5.1 for telegram definition.

1	TTL IN (RxD)
2	GND
3	RS-232 IN (RxD)
4	nc
5	RS-422 IN (RD +)
6	RS-422 IN (RD -)



View from contact side

Fig. 9

## 4.3 Connection / cascading

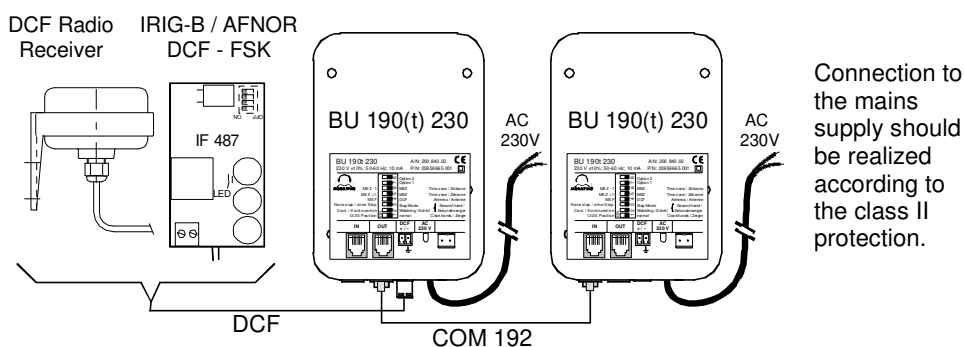


Fig. 10

To connect the radio signal to a double sided clock (two movements), there are two possibilities:

Possibility 1: The radio signal is distributed to both movements by a DCF multiplier (Art.No. 35 821) (Fig. 11).

Possibility 2: The time signal is sent to the second movement over a "COM 192" cable (Art. No. 200045). Therefore the signal is connected from the OUT-plug of the master-movement to the IN-plug of the slave movement (Fig.10). Disadvantage: If master-movement fails, slave-movement will also stop.

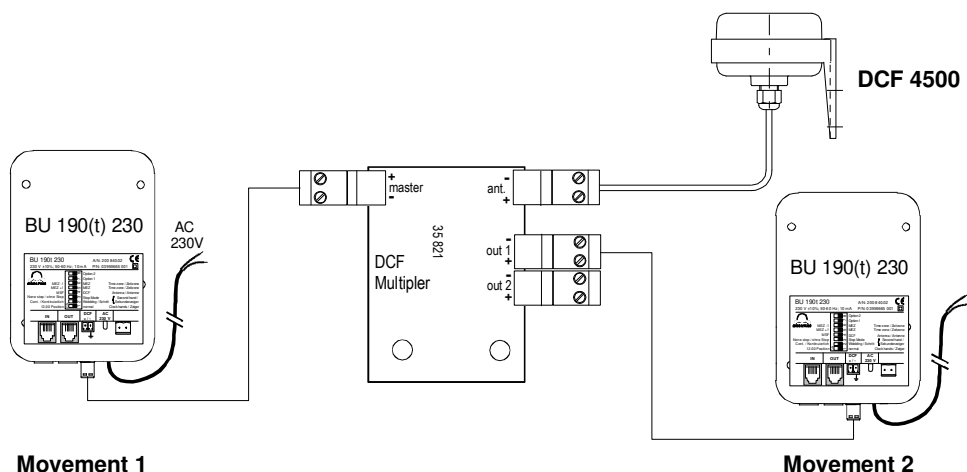


Fig. 11

## 5. Serial Telegrams

### 5.1 Standard Time Telegram (IF 482) with Local Time

**Definition:** Time telegram (ASCII), terminating at the designed second in the telegram:  
9600 bit/s, 7 data bits, even parity, 1 stop bit. Jitter < 50 ms.

**Format:**

Byte Nr.	Designation	Sign	HEX Code
1	Stat sign	O	4F
2	Supervision 1)	A or M	41 or 4D
3	Time-Season 3)	W, S or L	57, 53 or 4C
4	Year tens	0 .. 9	30 .. 39
5	Year units	0 .. 9	30 .. 39
6	Month tens	0 or 1	31 or 31
7	Month units	0 .. 9	30 .. 39
8	Day tens	0 .. 3	30 .. 33
9	Day units	0 .. 9	30 .. 39
10	Monday .. Sunday 2)	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	CR	0D

- 1) 'A': Correct time code reception from the transmitter. 'M': No time signal has been received during more than 12 hours (Time will be taken over at 'A' and 'M').
- 2) Weekday not evaluated by BU 190(t).
- 3) **W**inter, **S**ummer or **L**ocal time: Will be checked but not evaluated.



## 6. Technical specification

	BU 190 S 230	BU 190t S 230
Synchronisation	DCF-77: with time signal receiver DCF 450, DCF 4500 MSF-60: with time signal receiver MSF 4500 Serial: with standard IF 482 telegram over RS-232 / 422	
Setting times: Running time to reference pos. Read in of time Running time for new adjustment Changes of daylight saving time	6 minutes maximum serial: 3 – 5 seconds / radio signal: 3 – 5 minutes 10 seconds – 6 minutes 5.5 minutes maximum	
Operation mode second shaft	- Continuous <b>or</b> secondly pace shift (wobbling) - 1 revolution in 60 s <b>or</b> 1 revolution in 58 s with stop at 12.00 and start with the minute change	
Operation mode minute shaft	1 step every 60 s	
Operation mode hour shaft	continuous	
Operation voltage	230 VAC $\pm 10\%$ 50 – 60Hz	
Power consumption	< 3 VA	
Stand-by reserve	at least 5 min. (hour / minute) / 0 min. (seconds)	
Time keeping with internal quartz clock	> 12 h	
Number of motors	2 (hour / min. + sec.)	
Dial diameter	25 – 80 cm	
Max. dial thickness	4 mm	14.5 mm
Temperature range	-30 ... +70°C	
Weight	360 g	400 g
Standards	EN 50121-4, EN 61000-6-3	
Safety	EN 60950-1, Protection class II	

Subject to change without notice

[www.mobatime.com](http://www.mobatime.com)





**SALES SWITZERLAND**

MOBATIME AG

Stettbachstrasse 5 • CH-8600 Dübendorf  
Tel. +41 44 802 75 75 • Fax +41 44 802 75 65  
info-d@mobatime.ch • www.mobatime.ch

MOBATIME SA

En Budron H 20 • CH-1052 Le Mont-sur-Lausanne  
Tél. +41 21 654 33 50 • Fax +41 21 654 33 69  
info-f@mobatime.ch • www.mobatime.ch

**SALES WORLDWIDE**

MOSER-BAER SA – EXPORT DIVISION

19 chemin du Champ-des-Filles • CH-1228 Plan-les-Ouates/GE  
Tel. +41 22 884 96 11 • Fax. +41 22 884 96 90  
export@mobatime.com • www.mobatime.com

**PRODUCTION**

MOSER-BAER AG

Spitalstrasse 7 • CH-3454 Sumiswald  
Tel. +41 34 432 46 46 • Fax. +41 34 432 46 99  
moserbaer@mobatime.com • www.mobatime.com

**SALES GERMANY, AUSTRIA**

BÜRK MOBATIME GmbH

Postfach 3760 D-78026 VS-Schwenningen  
Steinkirchring 46 D-78056 VS-Schwenningen  
Telefon +49 7720 8535 - 0 Telefax +49 7720 8535 - 11  
Internet: <http://www.buerk-mobatime.de> E-Mail: buerk@buerk-mobatime.de