

# Installation and Operating

**ATBU 190(t) 230 and ITBU 190(t) S 230  
Movement for 24V-Impulse or IRIG-B / AFNOR 87500 operation**

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: ITBU 190t S 230	201828
30 - 80 cm	Movement ITBU 190 S 230	201829
30 - 80 cm	Movement: ATBU 190 230	201976
30 - 80 cm	Movement: ATBU 190t 230	201977

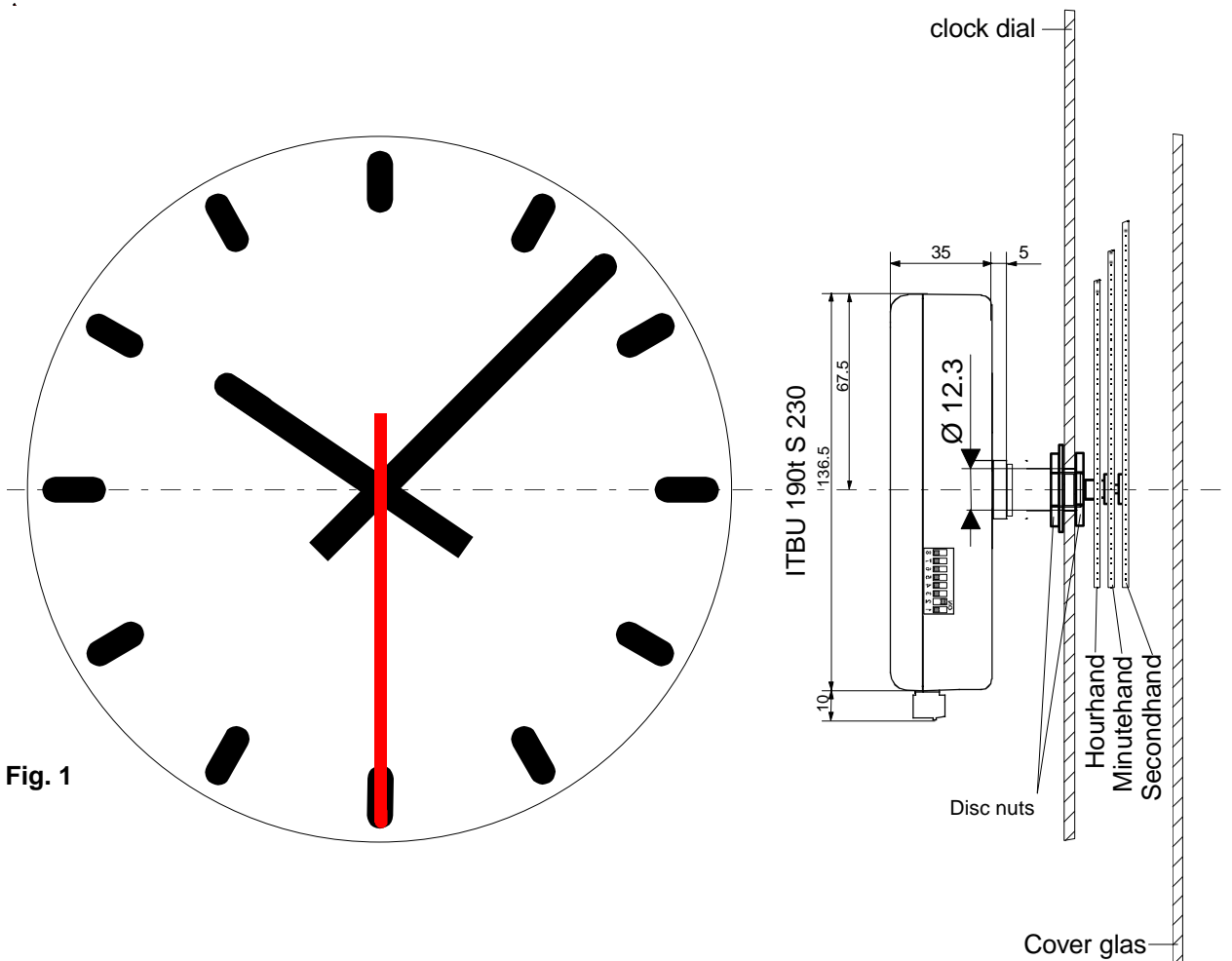


Fig. 1

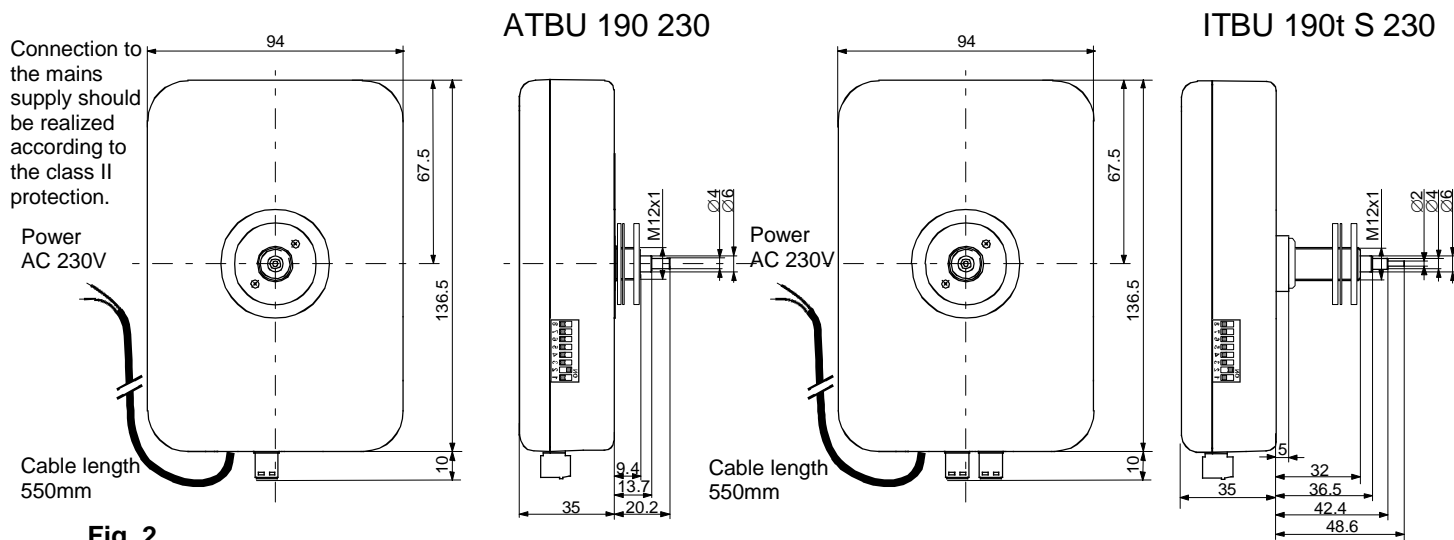


Fig. 2

## 2. Mounting guidelines

### 2.1 Mounting of movement series 190(t) and 190(t) S

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. 36761) 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!

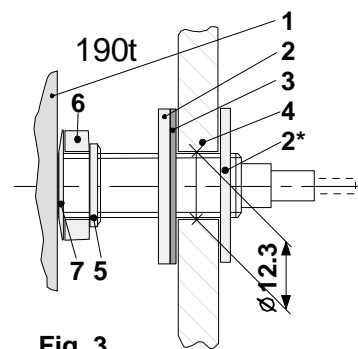


Fig. 3

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

### 2.2 Mounting of hands and Starting-up

#### 2.2.1 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.2.2.2).

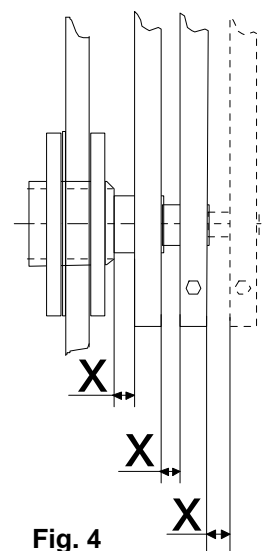


Fig. 4

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

- Set DIP switch 3 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.
  - Check the 12 o'clock position again (initialising by an interruption of the power supply).
- If hand position OK, refer to chapter 2.3 for mode settings.

Impulse Mode:	{	Halt		Accelerated / Nachlauf
Clock hands / Zeiger:	{	Normal		Adjust / Einstellen
Second hand / Sekundenzeiger:	{	Normal		12:00 Position
	{	Wobbling / Schritt		Cont. / Kontinuierlich
Synch. Mode:	{	Stop Mode		No stop / ohne Stopp
Time code / Zeitcode:	{	Impulse		Self-setting / selbststricht.
	{	IRIG-B / AFNOR		DCF-FSK
	{	reserved		reserved

Fig. 5

## 2.3 Synchronization mode settings and commissioning

### 2.3.1 Impulse Mode (only ITBU)

- For Impulse Mode DIP switch 6 has to be set to **OFF** position (Fig 6).
- If clock hands are not yet at 12:00 position, set DIP switch 3 to **ON** and wait until clock hands reached 12:00 position.

Impulse Mode:	{	Halt	1	<input type="checkbox"/>	Accelerated / Nachlauf
		Normal	2	<input type="checkbox"/>	Adjust / Einstellen
Clock hands / Zeiger:	{	Normal	3	<input type="checkbox"/>	12:00 Position
Second hand /		Wobbling / Schritt	4	<input type="checkbox"/>	Cont. / Kontinuierlich
Sekundenzeiger:		Stop Mode	5	<input type="checkbox"/>	No stop / ohne Stopp
Synch. Mode:		Impulse	6	<input type="checkbox"/>	Self-setting / selbststrich
Time code / Zeitcode:		IRIG-B / AFNOR	7	<input type="checkbox"/>	DCF-FSK
		reserved	8	<input type="checkbox"/>	reserved

#### 2.3.1.1 Commissioning of a new impulse line

- Stop impulse clock line on master clock system and set line time to 12:00:00.
- Connect 24 V impulse line from master clock system to one of the two plugs on top of the movements, e.g. plug **A** (Fig. 7 and 8).
- Set DIP switch 3 to **OFF** position (Normal).
- Start impulse clock line on master clock system for a short time, till at least one pulse was sent to the clock line and stop line again.
- If there are clocks, they stand one minute behind, do the following procedure with them:
  - Change the impulse line input from plug **A** to **B** (or reverse if B is connected, see Fig. 7).
  - Set DIP switch 2 to ON (Adjust)
  - Touch slightly DIP switch 1 to direction ON to perform a single step.
  - Set DIP switch 2 to OFF (Normal).
- Start impulse clock line on master clock system. Now all clocks should be synchronous and run to line time.

Fig. 6

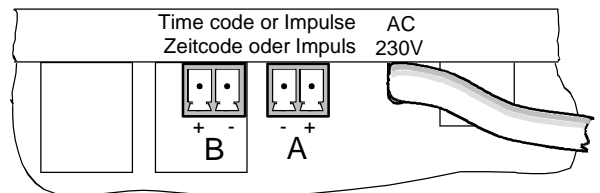


Fig. 7

#### 2.3.1.2 Commissioning of an additional movement to a running impulse line

- Set DIP switch 3 to **OFF** position (Normal).
- Connect 24 V impulse line from master clock to one of the two plugs on top of the new movement, e.g. plug **A**.
- Set DIP switch 2 to ON (Adjust).
- Set DIP switch 1 to ON (Accelerate). Now clock hands are moving in 1.4 sec. steps.
- Set DIP switch 1 to OFF, if clock hands have reached the correct line time.
- Set DIP switch 2 to OFF (Normal) and wait for next minute pulse from master clock system.
- If the new clock didn't perform the step, do the following procedure with it:
  - Change the impulse line input from plug **A** to **B** (or reverse if B is connected, see Fig. 7).
  - Set DIP switch 2 to ON (Adjust)
  - Touch slightly DIP switch 1 to direction ON to perform a single step.
  - Set DIP switch 2 to OFF (Normal) quickly, before the next minute impulse from the master clock system.
- Now the new clock should run on correct line time.

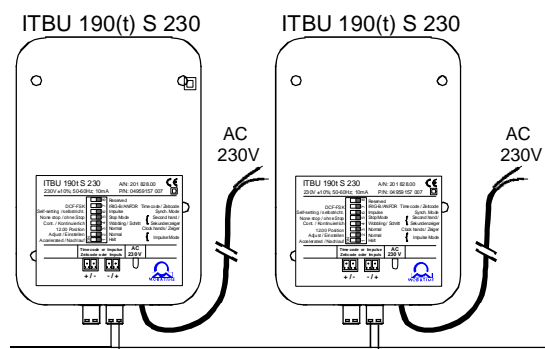


Fig. 8

Audio frequency time code  
or polarized impulses

### 2.3.2 Self-setting Mode (Audio Frequency Time code)

- For self-setting mode DIP switch **6** has to be set to **ON** position (Fig. 9).
- Choose the type of time code using DIP switch 7 (Fig. 9).
- Connect audio frequency time code to one of the two plugs on top of the movements (Fig. 7, 10 and 11).
- Start time code output on master clock system, if it is not already running.
- After a certain time (see chapter 4) clock will accelerate to current line time.

Impulse Mode: {	Halt		Accelerated / Nachlauf
Clock hands / Zeiger:	Normal		Adjust / Einstellen
Second hand /	Normal		12:00 Position
Sekundenzeiger: {	Wobbling / Schritt		Cont. / Kontinuierlich
	Stop Mode		No stop / ohne Stopp
Synch. Mode:	Impulse		Self-setting / selbstricht.
Time code / Zeitcode:	IRIG-B / AFNOR		DCF-FSK
	reserved		reserved

Fig. 9

#### 2.3.2.1 Possibilities of connection - cascading

The audio frequency time code can be bridged either from same plug to the next movement (Fig. 11) or from second plug to first plug of the next movement (Fig. 10), like a cascade.



Fig. 10

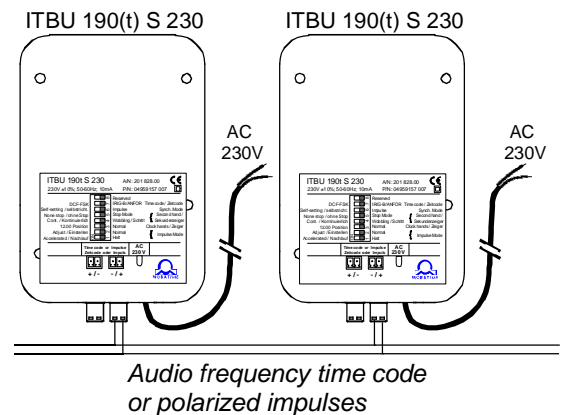


Fig. 11

## 3. Function description

Hybrid microprocessor controlled movement with hour, minute and second display. For indoor and outdoor slave clocks with dial diameters up to 80 cm, with or without illumination.

- Controlled by **IRIG-B**, **AFNOR 87 500** or **DCF-FSK** time code with automatic time take-over and daylight saving time change-over by means of the connected audio frequency time code master clock.
- Synchronization with conventional polarized minute-pulses (24V, 1s minimum pulse length).
- Operating mode selectable by means of a DIP switch
- Fully self-setting in audio frequency time code - mode
- Manual time initialisation in minute-impulse mode
- Signalisation of missing audio frequency time code reception after 24 hours by setting the hands to 12 o'clock position.
- Immediate resetting to the correct time after mains failure of up to 12 hours due to an internal real-time-clock (battery less powered).
- Different running modes of the second hand, selectable by means of DIP switches 4 and 5:
  - Switch 4: wobbling or continuous.
  - Switch 5: revolution within ~58s and stop at 12:00:00 or no stop.

## 4. Technical specification

	ITBU 190 S 230	ITBU 190t S 230
Synchronisation	IRIG-B, AFNOR or DCF-FSK audio frequency time code Minute-impulse, polarized 24V / 6mA	
Setting times: Running time to reference pos. Read in of time IRIG-B Read in of time DCF-FSK Running time for new adjustment e.g. change of daylight saving time	18 minutes maximum 70 seconds maximum 6 minutes maximum 17 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 at the minute change	
Operation mode minute shaft	1 step every 60 s	
Operation mode hour shaft	continuous	
Operation voltage	230 VAC $\pm 5\%$ 50 – 60Hz	
Power consumption from 230 VAC	< 3 VA (<10 mA)	
Time signal input (IRIG/AFNOR-mode): Impedance for 1 kHz signal Voltage range (0 dB corr. to 0.775 Veff)	1.5 k $\Omega$ +10 dB ... -30 dB (2 Veff ... 25 mVeff)	
Stand-by reserve after power failure	no	
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	440 g	480 g
Standards	EN 50121-4, EN 61000-6-3	
Safety	EN 60950-1, Protection class II	

	ATBU 190 230	ATBU 190t 230
Synchronisation	IRIG-B, AFNOR or DCF-FSK audio frequency time code	
Setting times: Running time to reference pos. Read in of time IRIG-B Read in of time DCF-FSK Running time for new adjustment e.g. change of daylight saving time	18 minutes maximum 70 seconds maximum 6 minutes maximum 17 minutes maximum	
Operation mode minute shaft	1 step every 60 s	
Operation mode hour shaft	continuous	
Operation voltage	230 VAC $\pm 5\%$ 50 – 60Hz	
Power consumption from 230 VAC	< 3 VA (<10 mA)	
Time signal input (IRIG/AFNOR-mode): Impedance for 1 kHz signal Voltage range (0 dB corr. to 0.775 Veff)	1.5 k $\Omega$ +10 dB ... -30 dB (2 Veff ... 25 mVeff)	
Stand-by reserve after power failure	no	
Time keeping with internal quartz clock	> 12 h	
Number of motors	1 (hour + min.)	
Dial diameter	25 – 80 cm	
Max. dial thickness	4 mm	14.5 mm
Temperature range	-30 ... +70°C	
Weight	400 g	440 g
Standards	EN 50121-4, EN 61000-6-3	
Safety	EN 60950-1, Protection class II (only for 230V movements)	

Subject to change without notice

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