



Movements for autonomous clocks and self-setting slave clocks

## Type range 190/190t

Modular movement of the latest technology for the display of hours and minutes or hours, minutes and seconds.

For illuminated and non-illuminated clocks up to 80 cm.

All types with central nut fixing.

Autonomous operation with DCF 77 or MSF 60 radio signal movement (cascading of up to 4 movements possible).

Behavior of the second hand selectable by means of DIP switch. In slave clock operation controlled by

- serial ASCII time telegram RS 232 / RS 422 over standard telegram (IF 482)
- MOBALine, incl. power supply
- audio-frequency time code (IRIG-B, AFNOR or DCF-FSK)
- special serial protocol over RS 485. Used to control and monitor slave clocks and clock illumination

## Industrial Movements Model Range - 190/190t

### General Features

- Type 190 with short shaft for clocks without illumination
- Type 190t with long shaft for illuminated clocks
- Type 190(t) S: Behavior of the second hand selectable by means of DIP switch
- 190 series movements are equipped with a microprocessor for intelligent functionality
- Internal real-time clock for accurate time display also during reception disturbances of the time code



### Autonomous, self-setting radio movement (basic movement)

#### BU 190(t) 230

for hour and minute display. Operation voltage 230V / 50-60Hz.

#### BU 190(t) S 230

for hour, minute and second display. Operation voltage 230V / 50-60Hz.

- Synchronization by DCF 77-radio signal, MSF 60- (Anthorn) radio signal (selectable over DIP-switch) or serial ASCII time telegram (Definition IF 482) over RS 232 / RS 422
- DCF 77 radio control with automatic time take-over and daylight saving time change-over by means of a connected radio time signal receiver DCF 4500 (option)
- Middle-European time zones MET-1, MET and MET+1 selectable by DIP-switch

- Immediate resetting to the correct time after mains failure of up to 12 hours, thanks to an internal real-time-clock
- Internal power reserve (no battery) for > 5 minutes operation in case of mains failure
- Signalization of missing or interrupted DCF time code reception after a period of one week by setting the hands to 12 o'clock position

### Options:

- DCF 77-radio receiver DCF 4500 for self-setting radio movements of the type range BU 190

### Self-setting MOBALine slave clock movement

#### MLU 190(t) S 230

for hour, minute and second hands. Control by MOBALine, power supply 230V / 50-60Hz.

- Control by MOBALine-code from a computer master clock or time center with fully automatic time take-over and daylight saving time change-over
- Signalizing of missing MOBALine codes longer than 24 hours by automatic setting of the hands to 12 o'clock position



### Self-setting audio-frequency slave clock movement

#### ATBU 190(t) 230

for hour and minute hands. Power supply 230V / 50-60Hz.

#### ITBU 190(t) S 230

for hour, minute and second hands. Power supply 230V / 50-60Hz.

Technical Data	Movements for hours/minutes		Movements for hours/minutes/seconds			
	BU 190 230	ATBU 190 230	BU 190 S 230	MLU 190 S 230	ITBU 190 S 230	SU 190 S 230
	BU 190t 230	ATBU 190t 230	BU 190t S 230	MLU 190t S 230	ITBU 190t S 230	SU 190t S 230
Synchronization	DCF, MSF / serial *1	audio-frequency *3	DCF, MSF / serial *1	MOBALine *2	audio-frequency *3	serial *4
Setting times: Running time to the reference position	max. 6 minutes					
Reading of the time telegram	3 - 4 min. / 3 - 4 sec. (serial)	3 - 4 sec.	3 - 4 min. / 3 - 4 sec. (serial)	10 - 20 sec.	3 - 4 sec.	3 - 4 sec.
Running time in case of new adjustments	10 seconds - 6 minutes					
Setting time for change-over daylight saving time	max. 5,5 minutes					
Behavior of the hands: Second hand mode (selectable by means of DIP switch)	-			- continual or soft step - 1 revolution in 60 seconds or 1 revolution in 58 seconds with stop at 12 o'clock and start with the minute jump		
Minute hand	1 minutes jump every 60 second					
Hour hand	Continual					
Power supply	230 VAC ± 10% 50-60 Hz	230 VAC ± 10% 50 - 60 Hz			230 VAC ± 10% 50 - 60 Hz	
Power consumption	< 3 VA	< 3 VA			< 3 VA	
Stand-by reserve	5 minutes	-	5 minutes	-	-	-
Time-keeping with internal real-time clock, typical	> 12 hours	> 12 hours	> 12 hours	-	> 12 hours	> 12 hours
Number of motors	1 (hour/min.)		2 (hour/ min. + sec.)			
Dimensions of hands max.	As per DIN 41092/3 for dial Ø from 25 to 80 cm					
Max. dial thickness	4 mm - for executions with long hand shafts (190t): 14,5 mm					
Length of the hand shafts	20,2 mm (190t - 42,4 mm)			26,6 mm (190t - 48,6 mm)		
Range of temperature	-30 ... +70° C					
Weight in gram (190t)	320 (360)	300 (340)	360 (400)	360 (400)	340 (380)	360 (400)
Standards	EN 50121-4, EN 61000-6-3, protection class II					
*1 DCF, MSF / serial	DCF 77 with radio signal receiver DCF 4500 resp. MSF 60 with radio signal receiver MSF 4500, serial synchronization with standard telegram IF 482 over RS 232.					
*2 MOBALine	Frequency-amplitude modulated time signal from a MOBALine computer master clock.					
*3 Audio-frequency	Audio-frequency time code instance IRIG-B, AFNOR or DCF-FSK from a computer master clock.					
*4 Serial	Serial synchronization with standard telegram IF 482 over RS 422 or synch. and monitoring with MB-RS 485 protocol over RS 485 bus.					

- Control with audio-frequency time code (IRIG-B, AFNOR or DCF-FSK selectable by DIP switch) from a computer master clock or a time center with fully automatic time take-over and daylight saving time change-over
- Signalizing of the missing audio-frequency time code longer than 24 hours by automatic setting of the hands to 12 o'clock position

### Self-setting movement for RS 422 or RS 485 serial bus synchronization and monitoring

#### SU 190(t) S 230

for hour, minute and second hands. Power supply 230V / 50-60Hz or from RS 485 bus (24 VDC).

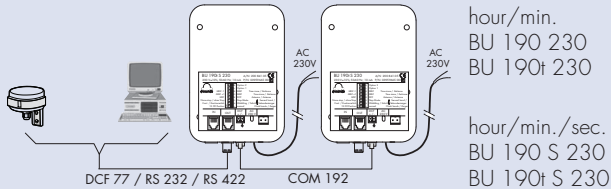
- Synchronization through MB-RS 485 protocol or IF 482 standard protocol over RS 422 / RS 485

- Status query over serial RS 485 bus. (Malfunction of movement and state of illumination)
- Control of clock illumination through RS 485 bus from a master clock e.g. DTS 4801.masterclock
- Signalization of missing time synchronization after a period of 24 hours by setting the hands to 12 o'clock position

# Industrial movement Model range 190/190t

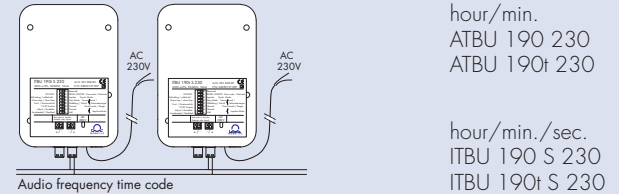
## Autonomic, self-setting radio-controlled movement

Synchronization with DCF 77 – radio signal, MSF 60 - radio signal or ASCII time telegrams over RS 232/RS 422



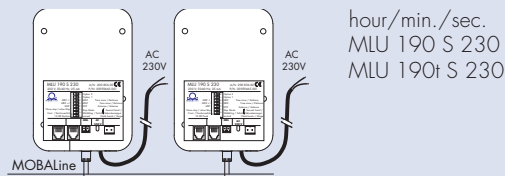
## Self-setting audio-frequency slave clock movement

Synchronization by IRIG-B, AFNOR or DCF-FSK audio-frequency time code (selectable by DIP switch)



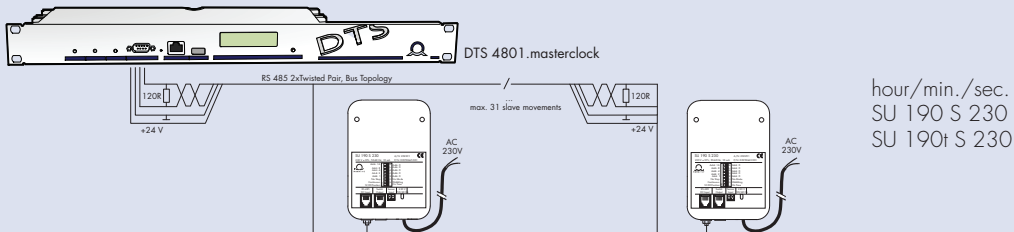
## Self-setting MOBALine slave clock movement

Control and power supply with MOBALine code

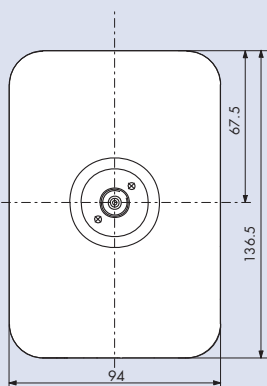


## Self-setting serial time telegram controlled movement

Synchronization and monitoring over RS 485 bus with MB-RS 485 protocol or synchronization with IF 482 telegrams over RS 422

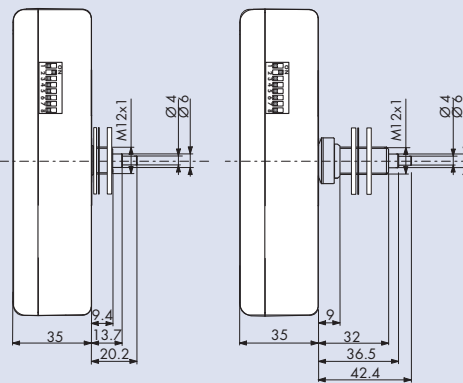


### Front view of all models



### Side views of the movements for hours/minutes

- |              |               |
|--------------|---------------|
| BU 190 230   | BU 190t 230   |
| ATBU 190 230 | ATBU 190t 230 |
| SU 190 230   | SU 190t 230   |



### Side views of the movements for hours/minutes/seconds

- |                |                 |
|----------------|-----------------|
| BU 190 S 230   | BU 190t S 230   |
| MLU 190 S 230  | MLU 190t S 230  |
| ITBU 190 S 230 | ITBU 190t S 230 |
| SU 190 S 230   | SU 190t S 230   |

