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1. Introduction

The described movement is a 2 motors, 3 hands analog RC-movement, designed for use with the German time code transmitter **DCF77** on **77.500** kHz.
Initial setting function and error correction are automatic. The movement starts automatically after inserting the battery, without pressing any knob.
A hands setting help function for easy and precise assembly of hands is available.
An hourly pulse is provided for triggering a melody module.
A digital serial output can be used for a digital display of time or date.

2. Functions

2.1. Initialisation

After inserting a battery, the hands are driven to one of the positions 4:00, 8:00 or 12:00, depending on which is the closest to the actual hands position.
After the hands have reached this position the motors will be stopped and the receiver is switched on.
The hands will not move until reception was successful. When the receiving process is finished the hands are driven to show the correct time and the movement starts normal run.
If reception is not possible the receiver is switched off after 10 minutes and switched on again after two hours. During normal run the movement tries to connect the transmitter every two hours, additionally at 03:00, and checks internal time with this information. For increasing the battery life receiving time is limited to 10 minutes.
A correction is done if necessary (when a difference between received time and displayed time occurs). The correct position of the hands is checked once per day from 03:00 pm to 04:05 pm.

2.2 Hands setting help function

The movement has a hands setting help function. This can be started by shortcutting the two special pins (see drawing) on the backside of the movement. Then gear will be driven straight to the 12 o'clock position. This can be done at any time.
After the motors stopped, set all hands on their shafts exactly adjusted to 12 o'clock.
Then restart the movement (see 2.1).

2.3 Automatic Receiving

When the battery is installed the hands will move to the 4:00,
8:00 or 12.00 o'clock position. The receiver is switched ON.
The clock is now searching for the signal.
Your clock will now receive the signal and set itself to the exact time.

2.4 Assembly instruction

For delivery the movement is adjusted to the 12.00 o'clock position and locked with a Lock-Pin from the backside of the movement.
Assemble the movement into your clock, with the battery box looking downwards (to 6 o'clock).
hands assembly:

hour hand adjust exactly to 12.00 o'clock pos.
min. hand adjust exactly to 12.00 o'clock pos.
sec. hand adjust exactly to 12.00 o'clock pos.
Be careful: don't turn the hands after they are pressed on their shafts!!

- Remove the **Lock-pin** on the backside of the movement
- Put in the **battery** (position of battery always horizontally !)
- Use only LR6, **ALKALINE** batteries (size AA). **Check correct polarity!**
  Do not use rechargeable batteries!
- The hands will run to 4.00 o'clock position and stop.
- **Now the movement tries to receive**
  If reception is possible and not disturbed, the movement will show the correct time after about 4 minutes.

2.5 Adjusting of Hands

If the adjusting of the hands was changed after the assembly or the lock pin was already removed before Pt. 2.3 was done, make a shortage (see Pt. 2.2 and dwg. no. 583 149) to the two pins on the backside of the movement. Then it will run from any position to 12 o'clock. Then go on with Pt. 2.3 for hands assembly.
TIP: This function can also be used for checking the correct position of the hands.

2.6 Checking of hands position in normal run (automatically)

The movement automatically checks it's hands position daily between 15:00 and 16:05. If hands position if not equal with internal time, the hands are driven (quick run) to correct time again.

2.7 Summer-/ winter time change

This is done fully automatic, no assistance of the user necessary

2.8 H-Trigger

This output sends a pulse of 500 ms duration at each full hour which can be used for triggering melody modules.

2.9 TX-LED

The output TX-LED may be used as a reception indicator during first reception. Te output is off as long as no pulses from the receiver output are detected. When second pulses are detected this out sends pulses with 1 Hz and a duration of 20 ms. When the beginning of a new minute is detected this output sends pulses with 1 Hz and a duration of 90 ms.

2.10 Serial Data Output

This port can be used for connecting external units like digital displays.
Available information:

Actual year
Actual day of year
Actual hour [12h]
AM/PM
Actual minute
Actual second

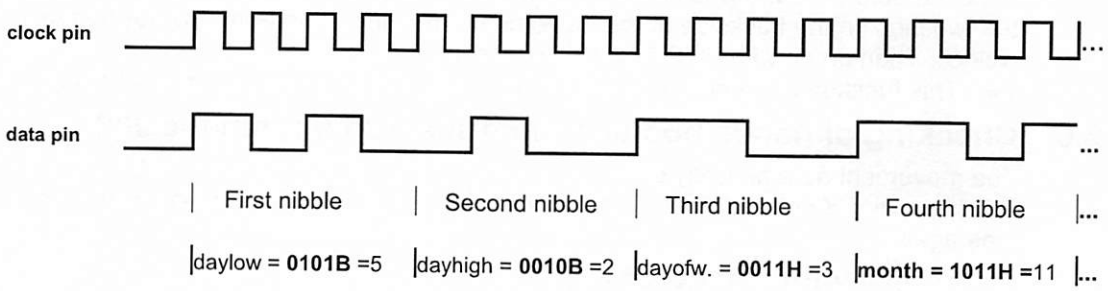
The transmission is released after battery insertion and about 0.5s after the beginning of a new hour as well as after each successful automatic reception

Clock frequency is 1024 Hz
The transmission of a complete data frame takes 44ms

2.11 Data format

no.	name	format	value	description
1	***daylow***	BCD	0 - 9	Low byte of actual day
2	***dayhigh***		10 - 30	High byte of actual day
3	***dayofweek***	HEX	1 - 7	Day of week, Monday = 1
4	***month***	HEX	1 - 12	Actual month, 1 = January
5	***yearlow***	BCD	0 - 9	Year units
6	***yearhigh***		10 - 90	Year tens
7	***minutelow***	BCD	0 - 9	Actual minute, units
8	***minutehigh***		0 - 5	Actual minute, tens, 0xxx = AM, 1xxx = PM
9	***hour***	HEX	0 - 11	Actual hour
10	***secondlow***	BCD	0 - 9	Actual second, units
11	***secondhigh***		0 - 5	Actual second, tens

2.12 Timing example



Beispiel: 25. Nov. Mittwoch
Example: Nov. 25th Wednesday

3. Conditions

3.1 General

The movement is built only for indoor usage together with a single 1,5V AA-type alkaline battery.
Working temperature range is –5 to + 55 °C with a max. humidity of 95%.

3.2 Technical Data

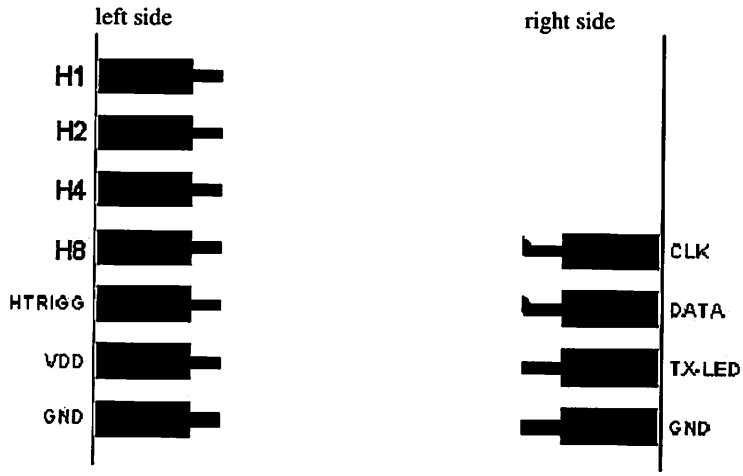
Technical Data for RC movements 700 50X DCF 77.5 kHz	
Receiving frequency	77.5 kHz
Size	see dwg. (attachment)
Min. space (Ø) req. for assembly	116 mm
Weight	93g (without battery)
Battery type	AA / LR6 (Alkaline)
Voltage	1,25 - 1,7 V
Current consumption (average)	560 µA
Battery life	>1 year
Working temperature	-5°C - +55°C
Storage temperature (without function)	-20°C - +70°C
Receiving time (first receive)	3 - 10 min
Receiving time (autom. receive)	3 - 10 min
Adjusting time (excl. receive)	max. 3min 10 sec.
Autom. ST to DST change	max. 2min 55 sec.
Noise (normal run, DIN 8325)	.. db(A)
Antenna	internal ferrite bar
Automatic receive	13x / day
Sensitivity	< 50 µV/m **
max. time error (quartz, DIN 8325)	± 1 s/d

All dates for t = 25°C and U_{batt} = 1.35 V (if not other specified)
** the final sensitivity of the clock depends on the clock case construction, it can only be measured together with the final clock.

3.3 Mechanical Data

Detail		SHT (700 50X)		
max. pressure for setting the hands		25N (h/min) , 10N (sec)		
Data of centre screw		M 8 x 0,75		
max. torque on fixation nut		100Nm		
Torques:				
Second	Ub = 1,35V	≥250 µNm		
Minute	Ub = 1,35V	≥2500 µNm		
Dial Ø		up to 500 mm		
		sec	min	h
Specification of hands acc. to dwg. no. **582 086**	length (max) **[mm]**	200	230	200
	weight (max) **[g]**	2	30	20
	eccentric (max) **[Ncm]**	0,001Ncm	0,05Ncm	0,2Ncm

3.4 Connection Diagram



4. Documentation

The documentation for electronic-unit and drawings is set-up by ***U.T.S.*** and contains:

- This product specification
- ***U.T.S.*** drawing. no. 583 717

5. Using period

No time fixed

6. Marking

Possible versions
Not fixed

7. Service

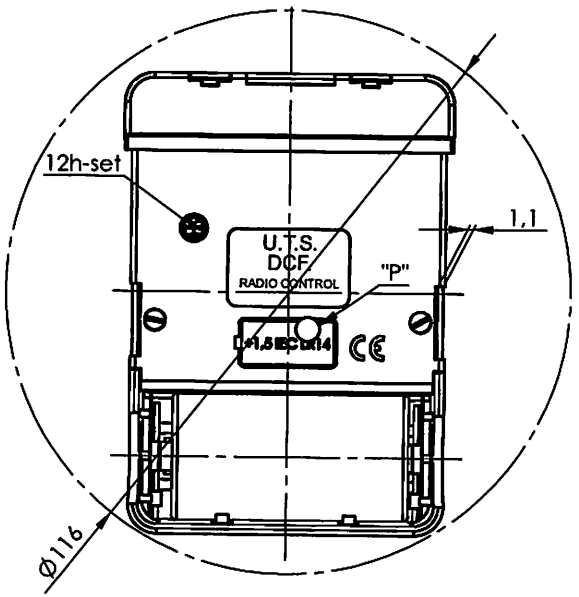
7.1 Frequently asked questions and their answers

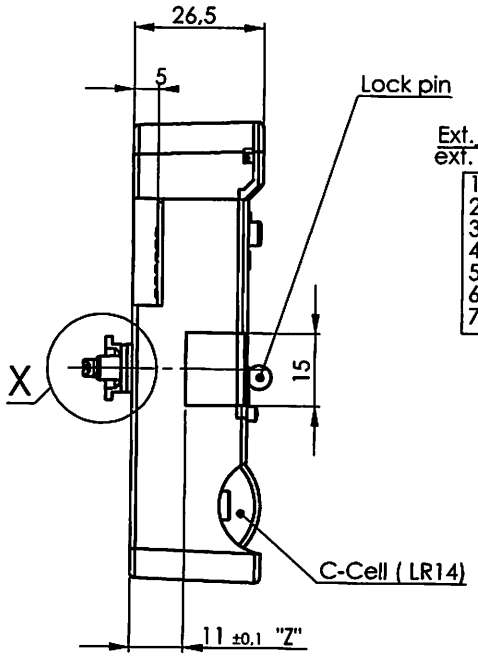
No	Question / Problem	Answer / Help
1	This movement cannot receive, but other movements have reception inside same room	- check battery (voltage, + -) - is there any influence (distance >1m) of TV-sets, monitors, telephone-sets a. so.? Stop this or enlarge the distance and restart the movement. - check all connections (acc. diagram) - clock housing must not be full metal and closed! Hint: The more metal the worse the reception!
2	Movement runs permanently, do not stop (more than 4min)	- check battery (voltage, + -) - use hands setting function (see 2.2) , the movement should now run to 12:00 position. If not, please send it back to your dealer.
3	Movement stops on 4:00, 8:00 or 12:00 for ever (> 10min)	- see No. 1 - movement was accidentally set to quartz mode, please restart. - hands setting help function is still active, remove the bridge and restart (see 2.2)
4	Movement receives, but shows wrong time	- short cut the hands setting pins, check the12:00 – position, adjust hands if necessary. Warning!! Don't turn hands on their axles, remove and set them new. - if time difference is exactly 4h, check the battery
5	Battery was removed and put in again, but the movement does not restart.	- after remove the battery please wait about 1min. or short cut the battery connector. Then put in the battery again. - check the lock-pin, is it really removed?
6	How to set the hands exact after remove.	- see Pt. „2.3 Assembly instruction" in this document
7	No or incorrect Summer-Wintertime change	- see Pt.1 of this page. - check reception (forced receive)
8	Battery-type	the use of **Alkaline** batteries is recommended for proper function

8. Attachments

- Attachment 1 ***U.T.S.*** drawing. no. 583 717

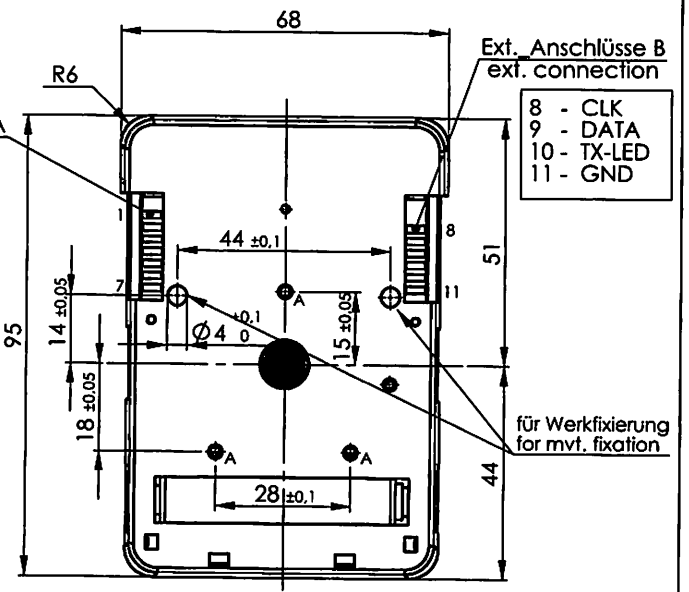
"Schutzvermerk nach DIN 34 beachten"
"Note protection mark acc. DIN 34"



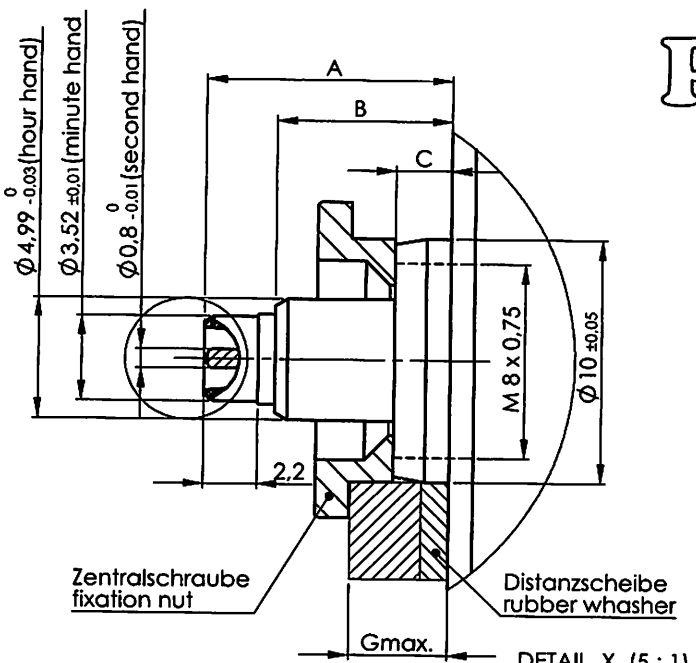


Ext. Anschlüsse A
ext. connection

1- H1
2 - H2
3 - H4
4 - H8
5 - H-trigger
6 - VDD
7 - GND



Preliminary



Befestigungsmöglichkeiten:
Movement fixation:

--Zentralschraube M8 x 0,75
fixation nut

--Befestigung mit 3 Blechschrauben B2,2
movement fixation with metal screw b2,2
Pos.A

--Rasthaken Pos. Z
Snap in Pos. Z

Typ	Abmessungen / DIMENSION				DETAIL
	A	B	C	Gmax.	
700 502	10,1	7,2	2,3	3,8	X
700 503	16,6	13,7	2,3	11,3	X

Oberfläche / Finish

Paßmaß Fit size | Abmaß Gap

U.T.S. *Präzisionstechnik GmbH*

Erz.-Gr. Product No

Werkstoff / Material
DCF
super-HT-mvt.

	Datum / Date	Name
gez. drawn	30.03.2007	Luz
gepr. certified		

Maßstab Scale

Index | Änd.-Nr Modification No | Datum Date | Name

Projektion Projection

Freimaßtoleranz
General tolerance
DIN ISO 2768 fH
Kunststoff-Formteile
Plastics moulding
DIN 16901

Benennung / Description
Massblatt
dimension

Zchn. Nr. / DWG No.
583717

Blatt Sheet
1/1

Ersatz für / Substitute