Technical Description

Optical Coupler and Relay Board
7112 / 7121

hopf
Elektronik *GmbH*

Safety information

The safety regulations and technical data are important for the smooth running of the devices and the protection of people and equipment. Strict compliance with these regulations is required. In case of non-compliance with these regulations the guarantee and warranty claims for the device and possible consequential damage expire.

Safety of the Devices

The production of this device follows the latest technological standards and safety regulations.

The device must not be assembled by anyone but trained personnel. Please make sure that all the connected cables are laid and fixed properly. The device is to be run with the supply voltage stated on the identification plate only.

Only trained personnel or specialists may operate the device.

Repair on opened devices must not be carried out by anyone but specially trained staff or by the *hopf* company.

If the maintenance work requires the opening of a device or if a fuse needs changing the device must be separated from all voltage supplies.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly. The safety may be impaired when the device does not operate properly or if it is obviously damaged.

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1 General Information

There are two different parallel Output Boards available for the system 7000 and 7001.

- Optical Coupler Board 7112
- Relay Board 7121

1.1 Optical Coupler Board 7112

The board 7112 has 24 optical coupler exits where potential free signals/pulses can be put out. There are also 8 optical coupler inputs for different tasks and purposes on the board.

The board contains its own microprocessor, which organises the synchronization with the system 7001 and the in- and output.

The board can be configure for the use with the clock-system 7000 or 7001 with Jumper **M0**.

1.1.1 Position Print
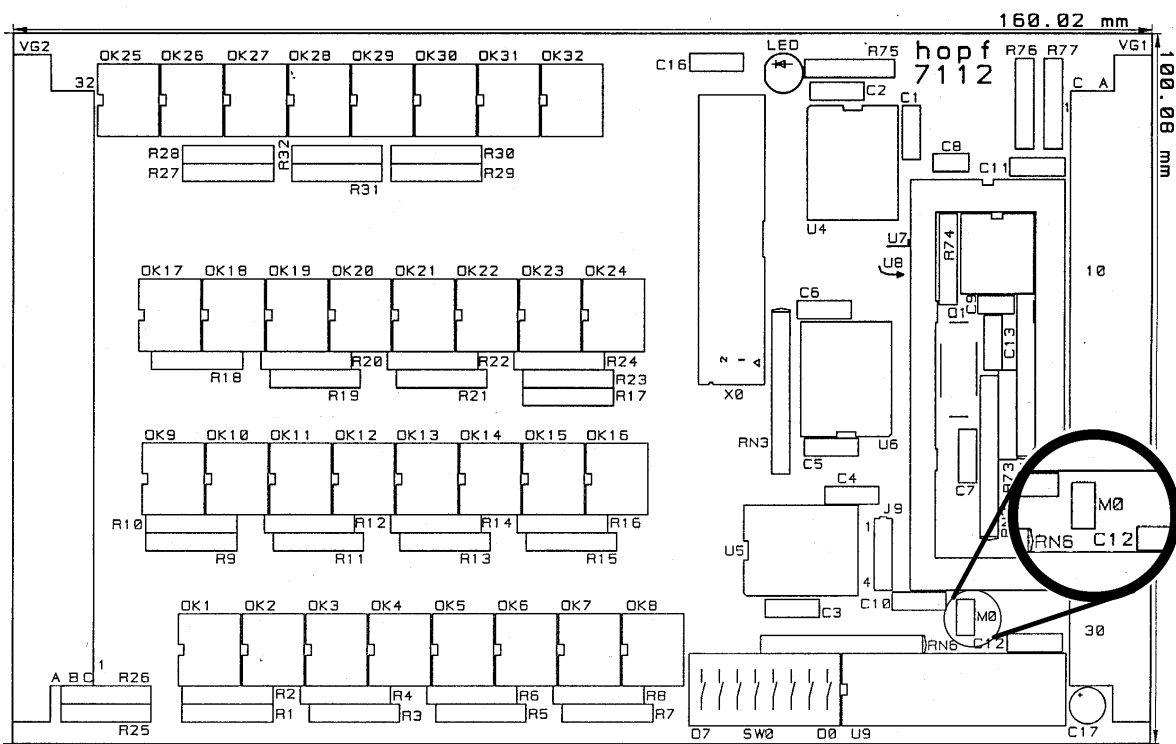
Setting for clock-system 7001 (Board 7015 as Master-Clock):

Jumper M0 open

Setting for clock-system 7000 (Board 7010 as Master-Clock):

Jumper M0 close

1.1.2 Contact assignment of the 96-pole VG-Strip in the Front Panel

Signals: E =   emitter of the output transistor
                  C =   collector of the output transistor
                  OA =   anode of the input diode
                  OC =   cathode of the input diode

pin	a	b	c	
	VG-strip			
pin	**a**	**b**	**c**	
1	OA		OC	input optical coupler 1
2	OA		OC	input optical coupler 2
3		E	C	output optical coupler 1
4		E	C	output optical coupler 2
5		E	C	output optical coupler 3
6		E	C	output optical coupler 4
7		E	C	output optical coupler 5
8		E	C	output optical coupler 6
9		E	C	output optical coupler 7
10		E	C	output optical coupler 8
11	OA		OC	input optical coupler 3
12	OA		OC	input optical coupler 4
13		E	C	output optical coupler 9
14		E	C	output optical coupler 10
15		E	C	output optical coupler 11
16		E	C	output optical coupler 12
17		E	C	output optical coupler 13
18		E	C	output optical coupler 14
19		E	C	output optical coupler 15
20		E	C	output optical coupler 16
21	OA		OC	input optical coupler 5
22	OA		OC	input optical coupler 6
23		E	C	output optical coupler 17
24		E	C	output optical coupler 18
25		E	C	output optical coupler 19
26		E	C	output optical coupler 20
27		E	C	output optical coupler 21
28		E	C	output optical coupler 22
29		E	C	output optical coupler 23
30		E	C	output optical coupler 24
31	OA		OC	input optical coupler 7
32	OA		OC	input optical coupler 8

1.1.3 Technical Data - Board 7112

voltage supply:	+5 V DC via bussystem
input current:	approx. 200 mA
number of output optical couplers:	24
switching capacity of the outputs:	60 V / 50 mA
number of input optical couplers:	8
The input voltage of the optical couplers depends on the series resistor Rx: (Rx : R25 - R32)	$Rx = 560\ \Omega \Rightarrow 5$ Volt $Rx = 5,6\ k\Omega \Rightarrow 18$ to 36 Volt (standard) $Rx = 12\ k\Omega$ ½ Watt $\Rightarrow 36$ to 60 Volt

Customer service:

- In- and output programming according to customer specification
- Hard- and software alterations according to customer specifications are available

Please note :   The **hopf** company withhold the right to hard- and software alterations.

1.2 Relay Board 7121

The board 7121 has 24 optical coupler exits where potential free signals/pulses can be put out. There are also 8 optical coupler inputs for different tasks and purposes on the board.

The board contains its own microprocessor, which organise the synchronization with the system 7000 or 7001 and the in- and output.

The board can be configure for the use with the clock-system 7000 or 7001 with jumper **M0**.

1.2.1 Position Print
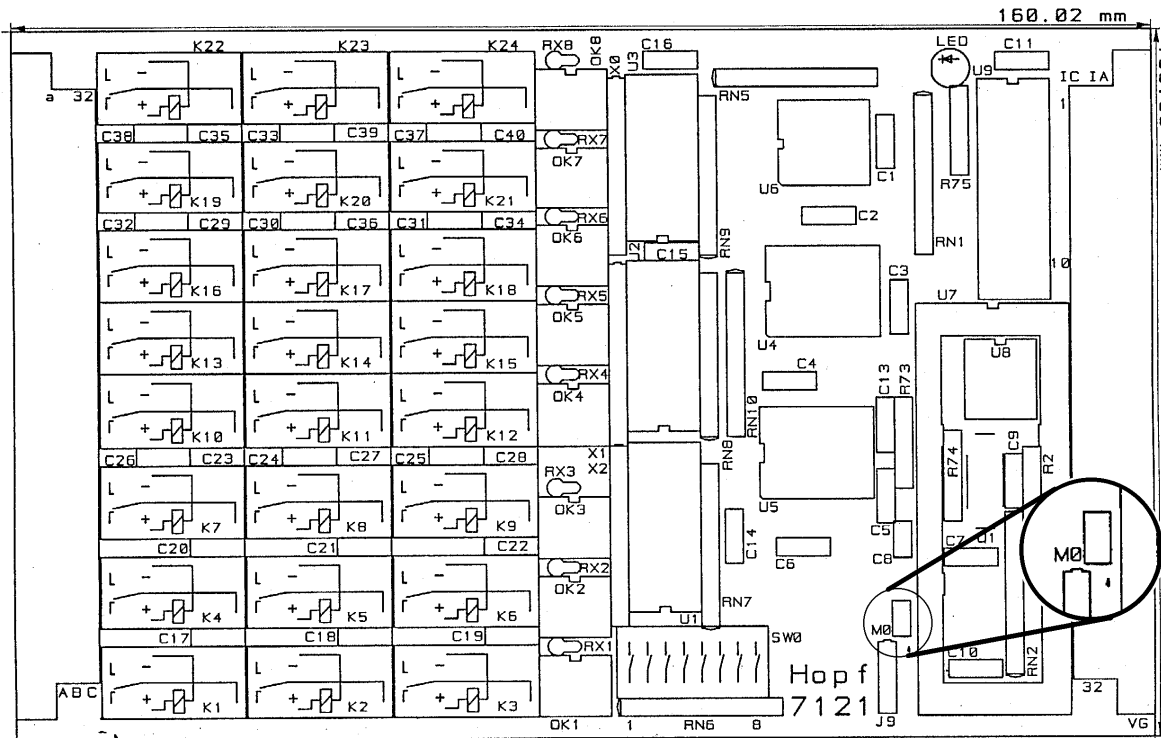
Setting for clock-system 7001 (Board 7015 as Master-Clock):

Jumper M0 open

Setting for clock-system 7000 (Board 7010 as Master-Clock):

Jumper M0 close

1.2.2 Contact assignment of the 96-pole VG-Strip in the Front Panel

Signals: row a = normally open (no)   OA = anode of the input diode

row b = common (c)   OC = cathode of the input diode

row c = normally close (nc)

Pin	VG-strip				
	a	**b**	**c**		
1	OA		OC	input optical coupler 1	OC 1
2	OA		OC	input optical coupler 2	OC 2
3	no	c	nc	output relay 1	R 1
4	no	c	nc	output relay 2	R 2
5	no	c	nc	output relay 3	R 3
6	no	c	nc	output relay 4	R 4
7	no	c	nc	output relay 5	R 5
8	no	c	nc	output relay 6	R 6
9	no	c	nc	output relay 7	R 7
10	no	c	nc	output relay 8	R 8
11	OA		OC	input optical coupler 3	OC 3
12	OA		OC	input optical coupler 4	OC 4
13	no	c	nc	output relay 9	R 9
14	no	c	nc	output relay 10	R 10
15	no	c	nc	output relay 11	R 11
16	no	c	nc	output relay 12	R 12
17	no	c	nc	output relay 13	R 13
18	no	c	nc	output relay 14	R 14
19	no	c	nc	output relay 15	R 15
20	no	c	nc	output relay 16	R 16
21	OA		OC	input optical coupler 5	OC 5
22	OA		OC	input optical coupler 6	OC 6
23	no	c	nc	output relay 17	R 17
24	no	c	nc	output relay 18	R 18
25	no	c	nc	output relay 19	R 19
26	no	c	nc	output relay 20	R 20
27	no	c	nc	output relay 21	R 21
28	no	c	nc	output relay 22	R 22
29	no	c	nc	output relay 23	R 23
30	no	c	nc	output relay 24	R 24
31	OA		OC	input optical coupler 7	OC 7
32	OA		OC	input optical coupler 8	OC 8

1.2.3 Technical Data - Board 7121

voltage supply:	+5 V DC via bussystem
input current:	approx. 200 mA
number of output relays:	24
switching capacity of the outputs:	24 V / 50 mA
expected life:	min. operations 1×10^9
number of input optical couplers:	8
The input voltage of the optical couplers depends on the series resistor Rx: (Rx : Rx1 - Rx8)	$Rx = 560\ \Omega \Rightarrow 5$ Volt $Rx = 5{,}6\ k\Omega \Rightarrow 18$ to 36 Volt (standard) $Rx = 12\ k\Omega$ ½ Watt $\Rightarrow 36$ to 60 Volt

Customer service:

- In- and output programming according to customer specification
- Hard- and software alterations according to customer specifications are available

Please note : The **hopf** company withhold the right to hard and software alterations.

2 Operating Modes

The mode wanted can be selected by means of DIP-switch SW0 on the board.

Several functions can also be changed external by optical coupler during operating. The DIP-switches 1-3 in SW0 are switched logical parallel with the optical-coupler OC1-OC3 (OC8-OC6)[1].

Respectively it can only be used the external control via OC1-OC3 (OC8-OC6) or the internal control via DIP-switch if the other control port is off-line.

<p align="center"><u>***Example :***</u> Control via OC1 ⇨ switcher 1 in SW0 is OFF</p>
<p align="center">Control via switcher 3 in SW0 ⇨ OC3 is OFF</p>
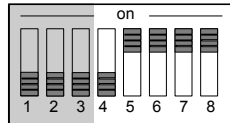
By DIP-switch 4-8 in SW0 the different output-modes will be changed. The switches 1+2 in SW0 or in the optical-coupler OC1+OC2 have different relevancy in individual modes.

2.1 Function of the Input Optical Coupler

1. OC1 and OC2 (OC8 and OC7) are needed in mode 0 (output date or time) to change from date to time (see pt. 2.2.1)

2. The signal output can be inverted in every mode with OC3

| setting OC3 (OC6)	setting SW 0 / 3	presentation BCD - code	presentation minute pulse
off	off	positive logic	negative logic
off	on	negative logic	positive logic
on	off	negative logic	positive logic
on	on	negative logic	positive logic

3. In special editions single relays will not be inverted.
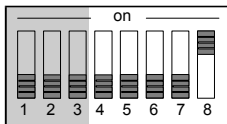
> ***Please note :***   optical coupler OFF ⇨ not connected

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[1] The contents in the brackets are for the use with the board 7121.

2.2 DIP-Switch Settings
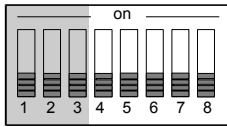
mode 0: output of either time or date
as BCD-code

mode 1: output of 24 minute pulses
(same pulse duration)
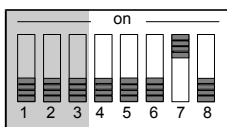
mode 2: output of 3x8 minute pulses
(different pulse duration)
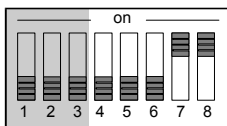
mode 3: output of 24 DCF77-simulation pulses

mode 4: output of error messages
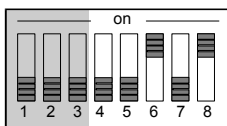
mode 5: output second pulses
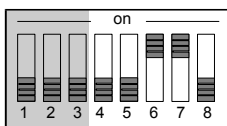
mode 6: output date and status
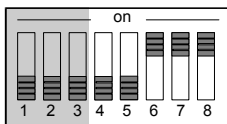
mode 7: output minute-, hour- and day pulses
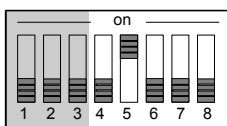
mode 8: output minute-, toggle- and alarm pulses
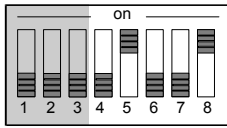
mode 9: output of different pulses

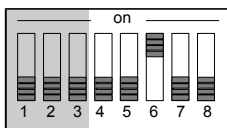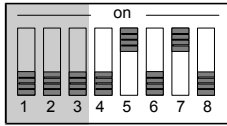**mode 10**: output of different synchronous pulses

mode 11: output of different synchronous pulses
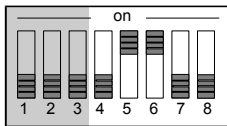
mode 12: output of different synchronous pulses
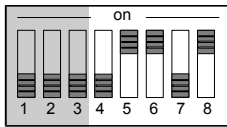
mode 13: output minute-, hour-, day pulses and status
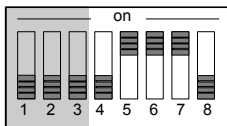
mode 14: output of synchronous pulses and error messages
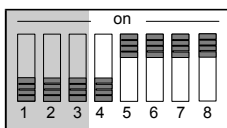
mode 15: output of hour pulses with a duration of 1 second on 24 outputs
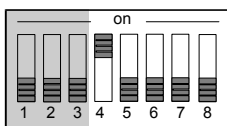
mode 16: output second toggle pulse and minute pulse with 50 msec forerun

mode 17: output minute-, daylight saving time- and status bit

mode 18: output mains frequency and difference time
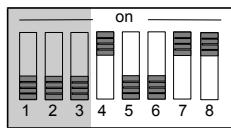
mode 19: output interference and hour pulse
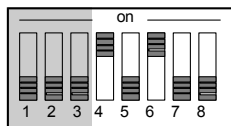
mode 20: output of 24 error messages
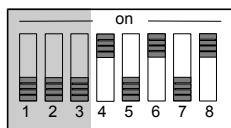
mode 21: output of hour, 15 minute and minute pulses

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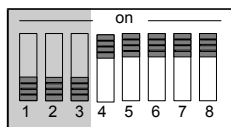
mode 31: test mode

2.2.1 Mode 0 : Output of Time as BCD-Information

Necessary setting for mode 0 see pt.2.2

Time or date output can be selected by either DIP-switch SW0 pos. 1+2 or optical coupler entry 1+2. The states of optical coupler entry and DIP-switch position are connected as a logical **OR**.

time output as BCD-information
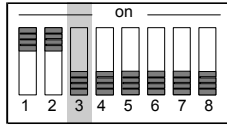
SW0		optical coupler	
S1	**S2**	**OC1 (OC8)**	**OC2 (OC7)**
on	on	off	off
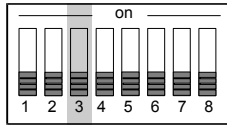
SW0		optical coupler	
S1	**S2**	**OC1 (OC8)**	**OC2 (OC7)**
off	off	on	on

time output as BCD information via OC / REL 1-24

optical coupler / relay	information	valence
1	tens digit hour	2^3
2	tens digit hour	2^2
3	tens digit hour	2^1
4	tens digit hour	2^0
5	unit digit hour	2^3
6	unit digit hour	2^2
7	unit digit hour	2^1
8	unit digit hour	2^0
9	tens digit minute	2^3
10	tens digit minute	2^2
11	tens digit minute	2^1
12	tens digit minute	2^0
13	unit digit minute	2^3
14	unit digit minute	2^2
15	unit digit minute	2^1
16	unit digit minute	2^0
17	tens digit second	2^3
18	tens digit second	2^2
19	tens digit second	2^1
20	tens digit second	2^0
21	unit digit second	2^3
22	unit digit second	2^2
23	unit digit second	2^1
24	unit digit second	2^0

date output as BCD-information
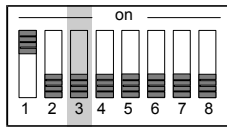
SW0		optical coupler	
S1	**S2**	**OC1 (OC8)**	**OC2 (OC7)**
on	off	off	off
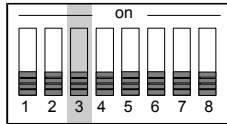
SW0		optical coupler	
S1	**S2**	**OC1 (OC8)**	**OC2 (OC7)**
off	off	on	off

date output as BCD information via OC / REL 1-24

optical coupler / relay	information	valence
1	tens digit day	2^3
2	tens digit day	2^2
3	tens digit day	2^1
4	tens digit day	2^0
5	unit digit day	2^3
6	unit digit day	2^2
7	unit digit day	2^1
8	unit digit day	2^0
9	tens digit month	2^3
10	tens digit month	2^2
11	tens digit month	2^1
12	tens digit month	2^0
13	unit digit month	2^3
14	unit digit month	2^2
15	unit digit month	2^1
16	unit digit month	2^0
17	tens digit year	2^3
18	tens digit year	2^2
19	tens digit year	2^1
20	tens digit year	2^0
21	unit digit year	2^3
22	unit digit year	2^2
23	unit digit year	2^1
24	unit digit year	2^0

2.2.2 Mode 1 : Output of 24 Minute Pulses (same pulse duration)

Necessary setting for mode 1 see pt. 2.2

OC / REL 1-24   ⇨   All minute pulses with pulse duration of 1 second.

2.2.3 Mode 2 : Output of 3x8 Minute Pulses (different pulse duration)

Necessary setting for mode 2 see pt. 2.2

OC / REL 1-8   ⇨   minute pulse with pulse duration of 1 second

OC / REL 9-16   ⇨   minute pulse with pulse duration of 500 milliseconds

OC / REL 17-24 ⇨   minute pulse with pulse duration of 100 milliseconds

2.2.4 Mode 3 : Output of 24 DCF77-Simulation Pulses

Necessary setting for mode 3 see pt. 2.2

OC / REL 1-24   ⇨   All DCF77-simulation

2.2.5 Mode 4 : Output of Error Messages

Necessary setting for mode 4 see pt. 2.2

The function of OC / REL 1-16 will be activated after the first radio reception.

1. The function of OC / REL 1-8 is set to **"8 hours - no receive"**
2. The function of OC / REL 17-24 describes the status function.
   (Voltage **ON:** OC / REL **ON,** Voltage **OFF:** OC / REL **OFF**).
3. The function of OC / REL 9-16 can be delayed depending on the position of the DIP-switch SW0, position 1+2.
4. The function of OC / REL 1-24 <u>can't</u> be inverted depending on the position of the DIP-switch SW0 push button 3.
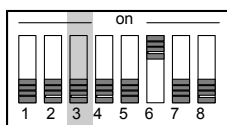
output not delayed (no receive)
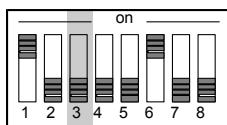
output delayed by 2 hours (no receive till 2h)
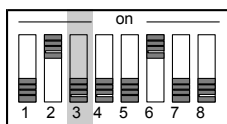
output delayed by 4 hours (no receive till 4h)
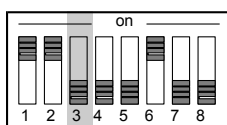
output delayed by 8 hours (no receive till 8h)

2.2.6 Mode 5 : Output of Second Pulses

Necessary setting for mode 5 see pt. 2.2

All outputs are occupied with a second pulse. The duration can be selected by SW0, position 1+2 or by OC1 and OC2 (OC8 and OC7).
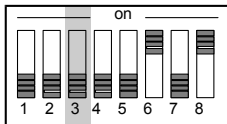
output 100 msec
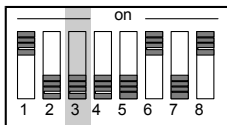
output 200 msec
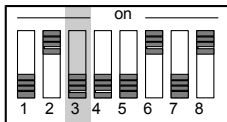
output 500 msec
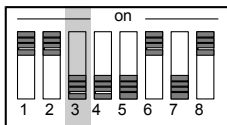
output 900 msec

2.2.7 Mode 6 : Output Date with Status

Necessary setting for mode 6 see pt. 2.2

date output as BCD information via OC / REL 1-24

optical coupler / relay	information	valence
1	tens digit day	2^3
2	tens digit day	2^2
3	tens digit day	2^1
4	tens digit day	2^0
5	unit digit day	2^3
6	unit digit day	2^2
7	unit digit day	2^1
8	unit digit day	2^0
9	STATUS-SYSTEM	2^3
10	QUARTZ / RADIO	2^2
11	SUMMER / WINTER	2^1
12	tens digit month	2^0
13	unit digit month	2^3
14	unit digit month	2^2
15	unit digit month	2^1
16	unit digit month	2^0
17	tens digit year	2^3
18	tens digit year	2^2
19	tens digit year	2^1
20	tens digit year	2^0
21	unit digit year	2^3
22	unit digit year	2^2
23	unit digit year	2^1
24	unit digit year	2^0

following special characters will faded into the output of the month:

- STATUS SYSTEM O.K.   relay interconnected
- QUARTZ / RADIO   relay interconnected at Radio
- SUMMER / WINTER   relay interconnected at summertime

The switch off of the radio / quartzbit can be delayed. The delay will set with switch 1+2 in SW0.
The same times like under mode 4 are effective.

2.2.8 Mode 7 : Output of Minute-, Hour-, Day Pulses

Necessary setting for mode 7 see pt. 2.2

output of: 4 * minute pulse, duration 1 second
                          4 * 2 minute pulse (even minute), duration 1 second
                          8 * hour pulse, duration 10 second
                          8 * day pulse at 03:00 am, duration 60 second

optical coupler / relay	pulse
1	day (03:00)
2	day (03:00)
3	day (03:00)
4	day (03:00)
5	day (03:00)
6	day (03:00)
7	day (03:00)
8	day (03:00)
9	hour
10	hour
11	hour
12	hour
13	hour
14	hour
15	hour
16	hour
17	minute
18	minute
19	minute
20	minute
21	2 minute (even)
22	2 minute (even)
23	2 minute (even)
24	2 minute (even)

2.2.9 Mode 8 : Output of Minute-, Toggle- and Alarm Pulses

Necessary setting for mode 8 see pt. 2.2

output of: 8 * minute pulse, duration 1 second
                                  8 * toggle pulse :   odd minute   - OC / REL not interconnected
                                                       even minute   - OC / REL interconnected
                                  4 * alarmcontact :   power off   - OC / REL not interconnected
                                                       power on   - OC / REL interconnected
                                  4 * quartz- / radiobit with same options like under mode 4

optical coupler / relay	pulse
1	minute pulse
2	minute pulse
3	minute pulse
4	minute pulse
5	minute pulse
6	minute pulse
7	minute pulse
8	minute pulse
9	toggle pulse
10	toggle pulse
11	toggle pulse
12	toggle pulse
13	toggle pulse
14	toggle pulse
15	toggle pulse
16	toggle pulse
17	alarmcontact
18	alarmcontact
19	alarmcontact
20	alarmcontact
21	quartz- / radiobit
22	quartz- / radiobit
23	quartz- / radiobit
24	quartz- / radiobit

2.2.10 Mode 9 : Output of different pulses

Necessary setting for mode 9 see pt. 2.2

Several pulses are available in mode 9.

optical coupler / relay	pulse
1	non-attached
2	non-attached
3	non-attached
4	11.55h - 12.00h
5	11.55h - 12.00h
6	11.55h - 12.00h
7	11.55h - 12.00h
8	½ hour
9	hour
10	hour
11	hour
12	day (00.00h)
13	day (00.00h)
14	day (00.00h)
15	day (00.00h)
16	day (00.00h)
17	non-attached
18	non-attached
19	non-attached
20	non-attached
21	non-attached
22	non-attached
23	non-attached
24	non-attached

Output OC / REL 4-7

A pulse from 11.55h to 12.00h exists at this relay.

Output OC / REL 8

A pulse of 2 seconds duration exists at this relay. The beginning of the datatransfer is every hour respective at 00.30h, 01.30h, 02.30h etc.

Output OC / REL 9-11

A pulse of 1 second duration exists at this relay every full hour.

Output OC / REL 12-16

A pulse of 1 second duration exists at this relay every day at 00.00h.

Please note :   Further OC / REL are not used.

2.2.11 Mode 10 : Output of different synchronous pulses

Necessary setting for mode 10 see pt. 2.2

Several synchronous pulses are available in mode 10.

12	x	1	second pulse
8	x	1	minute pulse
1	x	10	minute pulses
1	x	15	minute pulses
1	x	30	minute pulses
1	x	60	minute pulses

pulse duration

The duration can be selected in four steps between 100, 200, 500 and 900 msec (see pt. 2.2.6).

The continuance for the other pulses is closely set to 1 sec.

optical coupler / relay	pulse
1	second pulse
2	second pulse
3	second pulse
4	second pulse
5	second pulse
6	second pulse
7	second pulse
8	second pulse
9	second pulse
10	second pulse
11	second pulse
12	second pulse
13	minute pulse
14	minute pulse
15	minute pulse
16	minute pulse
17	minute pulse
18	minute pulse
19	minute pulse
20	minute pulse
21	10 minute pulse
22	15 minute pulse
23	30 minute pulse
24	60 minute pulse

2.2.12 Mode 11 : Output of different synchronous pulses

Necessary setting for mode 11 see pt. 2.2

Several synchronous pulses are available in mode 11.

9	x	1	second pulse
9	x	1	minute pulse
4	x	1	hour pulse
2	x	1	day pulse

pulse duration

The continuance for all pulses is closely set to 200 msec.

optical coupler / relay	pulse
1	second pulse
2	second pulse
3	second pulse
4	second pulse
5	second pulse
6	second pulse
7	second pulse
8	second pulse
9	second pulse
10	minute pulse
11	minute pulse
12	minute pulse
13	minute pulse
14	minute pulse
15	minute pulse
16	minute pulse
17	minute pulse
18	minute pulse
19	hour pulse
20	hour pulse
21	hour pulse
22	hour pulse
23	day pulse
24	day pulse

2.2.13 Mode 12 : Output of different synchronous pulses

Necessary setting for mode 12 see pt. 2.2

Several synchronous pulses are available in mode 12.

18	x	1	second pulse
6	x	1	minute pulse

pulse duration

The duration can be selected in four steps between 100, 200, 500 and 900 msec (see pt. 2.2.6).

The continuance for the minute pulses is closely set to 1 sec.

optical coupler / relay	pulse
1	second pulse
2	second pulse
3	second pulse
4	second pulse
5	second pulse
6	second pulse
7	second pulse
8	second pulse
9	second pulse
10	second pulse
11	second pulse
12	second pulse
13	second pulse
14	second pulse
15	second pulse
16	second pulse
17	second pulse
18	second pulse
19	minute pulse
20	minute pulse
21	minute pulse
22	minute pulse
23	minute pulse
24	minute pulse

2.2.14 Mode 13 : Output minute-, hour, day pulses and status

Necessary setting for mode 13 see pt. 2.2

Several synchronous pulses are available in mode 13.

8	x	1	minute pulse
4	x	1	hour pulse
4	x	1	day pulse
1	x	1	status System in progress
1	x	1	status System radio controlled

pulse duration

The continuance for all pulses is closely set to 1 sec.

In case of true status messages the OC / REL are interconnected.

optical coupler / relay	pulse
1	minute pulse
2	minute pulse
3	minute pulse
4	minute pulse
5	minute pulse
6	minute pulse
7	minute pulse
8	minute pulse
9	hour pulse
10	hour pulse
11	hour pulse
12	hour pulse
13	day pulse
14	day pulse
15	day pulse
16	day pulse
17	status "in progress"
18	status "radio controlled"
19	free
20	free
21	free
22	free
23	free
24	free

2.2.15 Mode 14 : Output of different synchronous pulses and error messages

Necessary setting for mode 14 see pt. 2.2

Several synchronous pulses are available in mode 14.

18	x	1	second pulse
5	x	1	minute pulse
1	x	1	error message

pulse duration

The continuance for the second pulses is closely set to 200 msec.

The continuance for the minute pulses is closely set to 1 sec.

optical coupler / relay	pulse
1	second pulse
2	second pulse
3	second pulse
4	second pulse
5	second pulse
6	second pulse
7	second pulse
8	second pulse
9	second pulse
10	second pulse
11	second pulse
12	second pulse
13	second pulse
14	second pulse
15	second pulse
16	second pulse
17	second pulse
18	second pulse
19	minute pulse
20	minute pulse
21	minute pulse
22	minute pulse
23	minute pulse
24	error message

The function of OC / REL 24

- can be delayed depending on the position of the DIP-switch SW0 push button 1+2
- <u>can't</u> be inverted depending on the position of the DIP-switch SW0 push button 3

see positions of DIP-switches at pt. 2.2.5

2.2.16 Mode 15 : Output of hour pulses (same pulse duration)

Necessary setting for mode 15 see pt. 2.2

The following pulses are available in mode 15.

24   x   1   hour pulse

pulse duration

All hour pulses with pulse duration of 1 second.

optical coupler / relay	pulse
1	hour pulse
2	hour pulse
3	hour pulse
4	hour pulse
5	hour pulse
6	hour pulse
7	hour pulse
8	hour pulse
9	hour pulse
10	hour pulse
11	hour pulse
12	hour pulse
13	hour pulse
14	hour pulse
15	hour pulse
16	hour pulse
17	hour pulse
18	hour pulse
19	hour pulse
20	hour pulse
21	hour pulse
22	hour pulse
23	hour pulse
24	hour pulse

2.2.17 Mode 16 : Output of different synchronous pulses

Necessary setting for mode 16 see pt. 2.2

The following pulses are available in mode 16.

18	x	1	second-toggle pulse
5	x	1	minute pulse
1	x	1	status radio controlled

pulse duration

The optical couplers or relays are switched on during the second-toggle in the even seconds 0, 2, 4 etc. and they are switched off in the odd seconds 1, 3, 5 etc.

The pulse width for the minute pulse is 1050 msec with 50 msec advance before the minute change.

In case of radio reception OC / REL 24 is switched active.

optical coupler / relay	pulse
1	second pulse
2	second pulse
3	second pulse
4	second pulse
5	second pulse
6	second pulse
7	second pulse
8	second pulse
9	second pulse
10	second pulse
11	second pulse
12	second pulse
13	second pulse
14	second pulse
15	second pulse
16	second pulse
17	second pulse
18	second pulse
19	minute pulse
20	minute pulse
21	minute pulse
22	minute pulse
23	minute pulse
24	status radio controlled

2.2.18 Mode 17 : Output of minute-, daylight saving time- and status bit

Necessary setting for mode 17 see pt. 2.2

The following pulses resp. information are available in mode 17.

6	x	1	minute pulse 10 msec duration
6	x	1	minute pulse 100 msec duration
7	x		daylight saving time information
5	x		radio/crystal status information

pulses

The optical coupler for the function status information are switched on after the system is radio controlled. According to the settings of DIP-switch SW0 position 1+2, they can be switched back delayed (see mode 4).

☞ **Please note :**   The status information and daylight saving time information can't be inverted depending on the position of the DIP-switch SW0 push button 3.

optical coupler / relay	pulse
1	minute pulse 10 ms
2	minute pulse 10 ms
3	minute pulse 10 ms
4	minute pulse 10 ms
5	minute pulse 10 ms
6	minute pulse 10 ms
7	minute pulse 100 ms
8	minute pulse 100 ms
9	minute pulse 100 ms
10	minute pulse 100 ms
11	minute pulse 100 ms
12	minute pulse 100 ms
13	daylight saving bit
14	daylight saving bit
15	daylight saving bit
16	daylight saving bit
17	daylight saving bit
18	daylight saving bit
19	daylight saving bit
20	radio/crystal bit
21	radio/crystal bit
22	radio/crystal bit
23	radio/crystal bit
24	radio/crystal bit

2.2.19 Mode 18 : Output mains frequency and difference time

Required setting for mode 18 see pt. 2.2

If the network analysis board 7515 is operating in the system, this mode can be used to put out the values paralelly.

The DIP-switches S1 and S2 select the values which are to be put out.

S1	S2	
off	off	mains frequency
on	off	difference time
off	on	not used at present
on	on	not used at present

The mains frequency is put out in 5 digits in Hz with a resolution of 1 mHz. The output is up-dated about every second. A release-guard signal is taken back during the up-date.

The difference time is also put out in 5 digits. The range is fixed to ± 99,999 seconds.

The data for the mains frequency and difference time are shown in BCD.

The logic level for the release-guard signal and the sign of the difference time are fixed as follows and cannot be inverted by push button 3 in the DIP-switch.

      data are released, optical coupler 3 switched active
      up-date of data in progress, optical coupler 3 open

      difference time negative, optical coupler 4 open
      difference time negative, optical coupler 4 switched active

Values of the optical coupler during output of frequency

optical coupler / relay	information	value
1		2^3
2		2^2
3	release	2^1
4		2^0
5	tens Hz	2^3
6	tens Hz	2^2
7	tens Hz	2^1
8	tens Hz	2^0
9	unit Hz	2^3
10	unit Hz	2^2
11	unit Hz	2^1
12	unit Hz	2^0
13	0.1 Hz	2^3
14	0.1 Hz	2^2
15	0.1 Hz	2^1
16	0.1 Hz	2^0
17	0.01 Hz	2^3
18	0.01 Hz	2^2
19	0.01 Hz	2^1
20	0.01 Hz	2^0
21	0.001 Hz	2^3
22	0.001 Hz	2^2
23	0.001 Hz	2^1
24	0.001 Hz	2^0

Value of the optical coupler during output of difference time

optical coupler / relay	information	value
1		2^3
2		2^2
3	release	2^1
4	plus/minus	2^0
5	tens second	2^3
6	tens second	2^2
7	tens second	2^1
8	tens second	2^0
9	unit second	2^3
10	unit second	2^2
11	unit second	2^1
12	unit second	2^0
13	0.1 second	2^3
14	0.1 second	2^2
15	0.1 second	2^1
16	0.1 second	2^0
17	0.01 second	2^3
18	0.01 second	2^2
19	0.01 second	2^1
20	0.01 second	2^0
21	0.001 second	2^3
22	0.001 second	2^2
23	0.001 second	2^1
24	0.001 second	2^0

2.2.20 Mode 19 : Output of Error Messages and Hour Pulses

Required settings for mode 19 see pt.2.2.

Error messages and hour pulses are put out via the optical couplers/ relays.

The function of the OK / REL 1 represents the operating status
(voltage **on** : OK / REL **ON** – voltage **off** : OK / REL **OFF**).

The function OK / REL 9 is activated after the first radio reception and shows if the system is running radio synchronously or not. The DIP switch SW0 can be used to delay the change to radio interference.

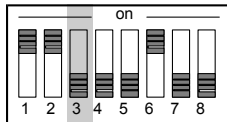(radio synchronous : OK / REL **ON** – not synchronous off : OK / REL **OFF**).
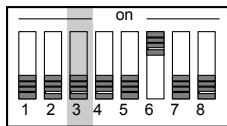
output not delayed (no radio reception)
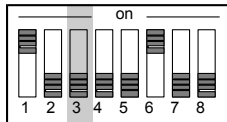
output delayed by 2 hours (no radio reception for 2 hours)
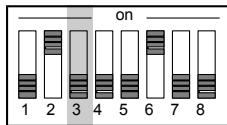
output delayed by 4 hours (no radio reception for 4 hours)

output delayed by 8 hours (no radio reception for 8 hours)

The functions of the OK / REL 1 and 9 cannot be inverted by means of the DIP switch SWO, position 3.

Hour pulses are put out at the optical couplers/relays 2-8 and 10-16. The pulses last for 1 second.

The optical couplers/relays 17-24 are not in use at present.

2.2.21 Mode 20 : Output of 24 Error Messages

Required setting for mode 20 please see point 2.2.

The OC / REL 1-24 are controlled by the DIP-switch SWO position 1 and 2 as mentioned in the table below.

Operation mode: Voltage **on** : OC / REL **ON** - Voltage **off** : OC / REL **OFF**
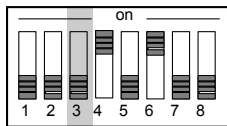
Radio Reception:
Time without reception larger than delay time or no reception since switch on:
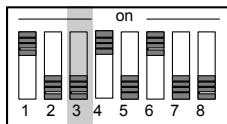
- OC / REL **OFF**

Time without reception smaller than delay time:
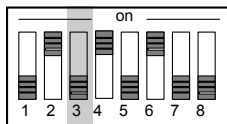
- OC / REL **ON**

The function of the OC / REL 1-24 can't be inverted by setting the DIP-switch SWO, position 3.
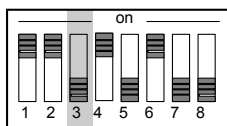

Operating mode

output not delayed (no radio reception)

output delayed by 2 hours (no radio reception for 2 hours)

output delayed by 8 hours (no radio reception for 8 hours)

2.2.22 Mode 21 : Output of hour, 15 minute and minute pulses

Required setting for mode 21 please see point 2.2.

In Mode 21 the following pulses are put out:

1 x hour pulse with 2 sec duration
2 x 15 minute pulse with 2 sec duration
3 x minute pulse with standard duration
1 x minute pulse with 2 sec duration

Mode 21 is provided for the FG711250 witch is placed with only 8 output optical couplers.

optical coupler / relay	pulse
1	hour pulse 2s
2	not placed
3	not placed
4	15 minute pulse 2s
5	not placed
6	not placed
7	15 minute pulse 2s
8	not placed
9	not placed
10	minute pulse standard
11	not placed
12	not placed
13	minute pulse standard
14	not placed
15	not placed
16	minute pulse standard
17	not placed
18	not placed
19	minute pulse 2s
20	not placed
21	not placed
22	no function
23	not placed
24	not placed

All pulses can be inverted with DIP-switch 3. With DIP-switch 1 and 2 the pulse length of the standard minute pulses can be set to 100 ms, 200 ms, 500 ms and 1 second.

S1	S2	pulse length
off	off	100 ms
off	on	200 ms
on	off	500 ms
on	on	1 sec