Technical Description

Interface Board

7201

for the operation with the power line supervision board 7515

CONTENTS *PAGE*

1 Specification

- data output via : RS232c (V.24), RS422c (V.11), TTY (20 mA passive)
- baud rate : 150 - 19200 Baud, TTY (max. 2400 Bd)
- different output strings selectable via DIP switch (e.g. output UTC time)
- output of the internal clock status in the status byte of the data string
- potential free RS232- and RS422 interface

2 Functional Description

The micro processor of the interface board 7201 receives the information about the system time and mains frequency and time of up to 4 mains frequency measuring boards 7515 via the ***hopf*** 7001 system bus.

The received time can be put out via one of three interfaces. Cyclic outputs of the data (e.g. put out data every minute) can be set by means of a DIP switch. Baud rate, word length, the number of stop bits and the parity mode can also be set by means of DIP switches.

Also the source (mains frequency measuring board) and various other data strings can be set by means of DIP switches.

Possible settings by means of DIP-Switch SW3 (see diagram in the appendix)

switch 6	switch 7	source of data:
on	on	board 7515 no.: 1
on	off	board 7515 no.: 2
off	on	board 7515 no.: 3
off	off	board 7515 no.: 4

3 Hardwareconfiguration of the board 7201

3.1 Selection of Interfaces

The board is equipped with 3 serial interfaces:

RS232c (V.24), RS422 (V.11), TTY (20mA-passive)

In case of a set cyclic data output the data string appears at all serial outputs.The data request via the RxD lines may come only from one input. For this particular case the board can be configurated by means of DIP switch 3 switch 1 between input TTY or RS232/RS422.

DIP-Switch 3 Switch 1

on	serial input RS232 and RS422 active
off	seral input TTY active

The RS232- and RS422 interfaces are equipped with a potential seperation.

To limit the current it is possible to cascade a pre-resistance (680 Ohm) into the TTY interface. Here bridge 1 for the input and bridge 2 BR2 for the output must be opened (see position drawing in the appendix).

3.2 Handshakelines (RS232c only)

The RS232c-interface of the board is equipped with normed handshake lines, which can be activated or deactivated depending on the use, selectable by means of DIP switch 3 switch 2.

DIP-Switch 3 Switch 2

on	RTS ⇔ CTS handshake active
off	RTS ⇔ CTS handshake not active

The RS232 control lines RTS can be used alternatively as a second pulse. For this the handshake switch must be activated.

DIP-Switch 3 Switch 3

on	RTS as second pulse with V.24 level
off	RTS as control line for RS232

Please note : If operating the board via RS422/TTY-interface DIP-switch 3 switch 2 must be in the off position.

3.3 Pin Allocation

3.3.1 The RS232c-Interface

25-pole Sub-D-connector in the front panel pin no.:	signal designation	96-pole VG-strip pin no.
2	TxD (transmit data)	2a
3	RxD (receive data)	3a
4	RTS (ready to send)	4a
5	CTS (clear to send)	5a
7	0 Volt (GND)	7a

3.3.2 The TTY-Interface (passive)

25-pole Sub-D-connector in the front panel pin no.:	signal designation	96-pole VG-strip pin no.
7	0Volt (GND)	7a
9	+ output	9a
10	- output	10a
24	+ input	11c
25	- input	12c

3.3.3 RS422-Interface

25-pole Sub-D-connector in the front panel pin no.:	signal designation	96-pole VG-strip pin no.
7	0V (GND)	7a
11	TxD	11a
12	TxD *	12a
22	RxD	9c
23	RxD *	10c

* inverted signal

4 Selection of the Transmission Format by DIP switch 1

Setting the baud rate, word length, parity mode and stopbits for the data traffic is carried out by means of the DIP switch SW1. The selected configuration then applies to all three interfaces.

For information about the possible settings of the DIP switches please see the diagram in the appendix.

4.1 Output UTC or CEST/CET

This setting is valid only if the system time is put out in the selected string. The NET time is not converted to UTC.

Switch1	meaning
on	output UTC via interface
off	CEST/CET via interface

4.2 Setting the Word Length

switch 2	meaning
on	8-data bit
off	7-data bit

4.3 Setting the Parity-Mode of the Transmission

switch3	switch 4	meaning
on	on	no parity bit
on	off	no parity bit
off	on	parity even
off	off	parity odd

4.4 Setting the Stopbits

switch 5	meaning
off	1-stopbit
on	2-stopbit

4.5 Setting the Baudrate

switch 6	switch 7	switch 8	baudrate
on	on	on	150 Baud
on	on	off	300 Baud
on	off	on	600 Baud
on	off	off	1200 Baud
off	on	on	2400 Baud
off	on	off	4800 Baud
off	off	on	9600 Baud
off	off	off	19200 Baud

5 The Putout Data String (A / B)

The received time, or the time synchronized by power line, difference time and frequency can be put out via the interfaces in a data string informing about the internal status of the clock. The desired output point of time, the string structure and the used control characters can be selected by means of the DIP-switch SW2.

Possible Settings by DIP-Switch SW2 (see diagram in the appendix)

Second advance is calculated for the system time only.

switch 1	second advance
on	switched on
off	switched off

switch 2	ETX on the second change only if 'with control characters' was activated
on	with ETX on the second change
off	without ETX on the second change

switch 3	switch 4	switch 5	data string output
off	off	off	NET-time data string A
on	off	off	NET-time data string B
off	on	off	NET-frequency data string KIA
on	on	off	free
x	x	on	free

switch 6	control characters STX/ETX
on	transmit with control characters
off	transmit without control characters

switch 7	switch 8	transmission point of time
on	on	transmit every second
on	off	transmit on the minute change
off	on	transmit on the hour change
off	off	transmit on request only

5.1 Data Format of the Serial Transmission

The data are transmitted in the ASCII format as BCD values using the following special characters:

$0D = CR (carriage return)
$0A = LF (line feed)
$02 = STX (start of text)
$03 = ETX (end of text)

In every data string the output of the control characters CR and LF can be swopped by means of **DIP-switch 3 switch 8**. **DIP switch 2 switch 6** can be used to suppress the output of the control characters STX and ETX.

5.2 Serial Requests

The user can start the data string output using control characters, which are:

ASCII **"D"** -- for data string local time
A (DIP-Switch 2 switch 3 = off) or
B (DIP-Switch 2 switch 3 = on)
ASCII **"G"** -- for UTC-time

The system answers with the according data string within 1 msec.

Often this is too fast for the requesting computer, it is therefore possible to delay the answer in 10msec. steps when requesting via software. To delay the transmission of the data string the small letters with a two-digit multiplication factor are transmitted to the clock by the requesting computer.

The clock interprets the multiplication factor as hexadecimal value.

Example :

The computer transmits **ASCII d05** (Hex 75, 30, 35)
The clock answers with the data string after 50 milliseconds..

The computer transmits **ASCII dFF** (Hex 67, 46, 46)
The clock transmits the data string after 2550 milliseconds.

6 Structure of the Data Strings

6.1 Data String A

The control characters STX and ETX are transmitted only if DIP-Switch 2 is set to output "with control characters" only (DIP-Switch 2 switch 6 = on). Otherwise there are no control characters. In case of the setting "ETX delayed" the last character (ETX) is transmitted on the next second change.

Data string structure for (MIC-P) - Communicator

character no.	meaning value	(value range)	
1	STX (start of text)		; see 5.1
2	Status (internal clock status)		; see 6.1.3
3	day of the week	$31-37	; see 6.1.3
4	tens hour	$30-32	
5	unit - hour	$30-39	
6	tens - minute	$30-35	
7	unit - minute	$30-39	
8	tens - second	$30-35	
9	unit - second	$30-39	
10	tens - day	$30-33	
11	unit - day	$30-39	
12	tens - month	$30-31	
13	unit - month	$30-39	
14	tens - year	$30-39	
15	unit - year	$30-39	
16	CR (carriage return)	$0D	; see 5.1
17	LF (line feed)	$0A	; see 5.1
18	tens frequency	$30-39	
19	unit - frequency	$30-39	
20	1/10 frequency	$30-39	
21	1/100 frequency	$30-39	
22	1/1000 frequency	$30-39	
23	CR (carriage return)	$0D	; see 5.1
24	LF (line feed)	$0A	; see 5.1
25	NET-time tens- hour	$30-32	
26	NET time unit - hour	$30-39	
27	NET time tens - minute	$30-35	
28	NET time unit - minute	$30-39	
29	NET time tens - second	$30-35	
30	NET time unit - second	$30-39	
31	CR (carriage return)	$0D	; see 5.1
32	LF (line feed)	$0A	; see 5.1

33	difference time tens - hour	$30	; see 6.1.2
34	difference time unit - hour	$30	; see 6.1.2
35	difference time tens - minute	$30-35	; see 6.1.2
36	difference time unit - minute	$30-39	; see 6.1.2
37	difference time tens - second	$30-35	; see 6.1.2
38	difference time unit - second	$30-39	; see 6.1.2
39	1/10 difference time	$30-39	; see 6.1.2
40	1/100 difference time	$30-39	; see 6.1.2
41	1/1000difference time	$30-39	; see 6.1.2
42	CR (carriage return)	$0D	; see 5.1
43	LF (line feed)	$0A	; see 5.1
44	ETX (end of text)	$03	; see 5.1

6.1.1 Signs in the Statusbyte of the Difference Time

The difference time system time - NET time can be either positive or negative. Bit 4 in the hour byte indicates whether the value is positive or negative.

Bit 4 = 1 difference time is negative

Bit 4 = 0 difference time is positive

6.1.2 Difference Time for the Data String A

The difference time is limited to 00:59:59.999.

6.1.3 Status- and Day of the Week Nibble in the Data String A

The second and the third ASCII characters contain the status and the day of the week. The status is decoded binarily.

Structure of these characters:

	b3	b2	b1	b0	meaning
status nibble:	x	x	x	0	no announcement hour
	x	x	x	1	announcement (ST-WT-ST)
	x	x	0	x	wintertime (WT)
	x	x	1	x	summertime (ST)
	0	0	x	x	time/date invalid
	0	1	x	x	crystal operation
	1	0	x	x	radio operation
	1	1	x	x	radio operation (high accuracy)
day of the week nibble	0	x	x	x	CEST/CET
	1	x	x	x	UTC - time
	x	0	0	1	Monday
	x	0	1	0	Tuesday
	x	0	1	1	Wednesday
	x	1	0	0	Thursday
	x	1	0	1	Friday
	x	1	1	0	Saturday
	x	1	1	1	Sunday

6.1.4 Example of a Transmitted Data String A

(STX)C3123456030196(CR)(LF)49998(CR)(LF)123456(CR)(LF)100000123(CR)(LF)(ETX)

radio operation (high accuracy) negative difference
wintertime
no announcement
It is Wednesday 03.01.96 - 12:34:56 h
actual frequency = 49,998 Hz
NET-time = 12:34:56
difference time(system-NET time) = -123 milliseconds
( ) ASCII-control characters e.g. (STX)

6.2 Structure of the Data String B

The control characters STX and ETX are transmitted only if DIP-Switch 2 is set to output "with control characters" only (DIP-Switch 2 switch 6 = on). Otherwise there are no control characters. In case of the setting "ETX delayed" the last character (ETX) is transmitted on the next second change.

character no.	meaning	value (value range)	
1	(STX) Start of Text	02h	; see 5.1
2	“R“ ident. NET time	52h	
3	“:“ colon	3Ah	
4	tens- hour	30-32h	
5	unit- hour	30-39h	
6	“:“ colon	3Ah	
7	tens . minute	30-35h	
8	unit - minute	30-39h	
9	“:“ colon	3Ah	
10	tens - second	30-35h	
11	unit - second	30-39h	
12	(LF) line feed	0Ah	; see 5.1
13	(CR)carriage return	0Dh	; see 5.1
14	“D“ ident.differ.time	44h	
15	“:“ colon	3Ah	
16	+/- sign of difference	2B/2DH	; see 6.2.2
17	hundred - second	30-39h	; see 6.2.2
18	tens - second	30-39h	; see 6.2.2
19	unit - second	30-39h	; see 6.2.2
20	“:“colon	2Dh	; see 6.2.2
21	1/10 second	30-39h	; see 6.2.2
22	1/100 second	30-39h	; see 6.2.2
23	1/1000 second	30-39h	; see 6.2.2
24	(LF) line feed	0Ah	; see 5.1
25	(CR) carriage return	0Dh	; see 5.1
26	“F“ ident. frequency	46h	
27	“:“colon	3Ah	
28	tens - frequency	30-39h	
29	unit - frequency	30-39h	
30	“:“ colon	2Dh	
31	1/10 frequency	30-39h	
32	1/100frequency	30-39h	
33	1/1000 frequency	30-39h	
34	(LF) line feed	0Ah	; see 5.1
35	(CR) carriage return	0Dh	; see 5.1
36	(ETX) end of text	03h	; see 5.1

6.2.1 Example of a Transmitted Data String B

(STX)R:12:34:56(CR)(LF)D+000.123(CR)(LF)F:50.002(CR)(LF)(ETX)

It is 12:34:56 NET time
difference to system time= +000,123 seconds
actual frequency = 50,002 Hz
( ) ASCII-control characters e.g. (STX)

6.2.2 Difference Time for the Data String B

The difference time is limited to +/-999:999.

6.3 Structure of the Data String KIA

The control characters STX and ETX are transmitted only if the output "with control characters" has been set at DIP switch 2 (DIP-Switch 2 Switch 6 = on). Otherwise there are no control characters. In case of the setting "ETX delayed" the last character (ETX) is transmitted on the next second change.

character no.:	meaning	value (value range)	
1	(STX) Start of Text	02h	; see 5.1
2	“S“ ident. system time/date	53h	
3	status (internal status of the clock)		
4	tens - hour	30-32h	
5	unit - hour	30-39h	
6	tens - minute	30-35h	
7	unit - minute	30-39h	
8	tens - second	30-35h	
9	unit - second	30-39h	
10	tens - day	30-33h	
11	unit - day	30-39h	
12	tens - month	30-31h	
13	unit - month	30-39h	
14	tens - year	30-39h	
15	unit - year	30-39h	
16	(LF) line feed	0Ah	; see 5.1
17	(CR) carriage return	0Dh	; see 5.1

depending on connected boards 7515 the string will be repeated up to four times

18	“F“ ident. frequency	46h	
19	mains no.	31-34h	
20	tens - frequency	30-39h	
21	unit - frequency	30-39h	
22	“.“ point	2Eh	
23	1/10 frequency	30-39h	
24	1/100 frequency	30-39h	
25	1/1000 frequency	30-39h	
26	(LF) line feed	0Ah	; see 5.1
27	(CR) carriage return	0Dh	; see 5.1
last	(ETX) End of Text	03h	; see 5.1

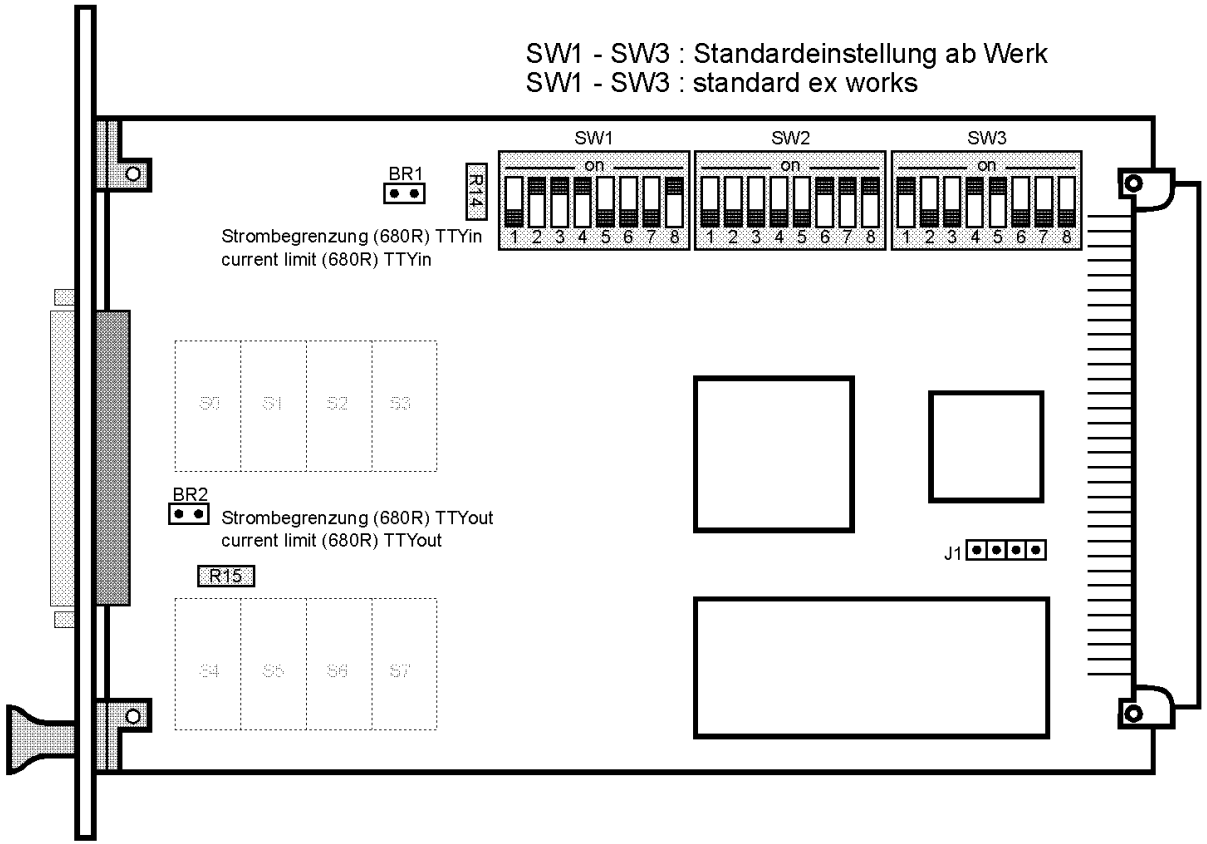
7 Technical Data 7201

operating voltage:	+ 5V DC ± 5%
power consumption	approx. 300 mA
interfaces:	TTY-passiv / RS232c / RS422
data format:	ASCII
special designs:	soft and hardware alterations according to customer specifications are possible

Please note : The ***hopf*** company withholds the right to technical alterations in soft and hardware at any time.

DIP-Switch Einstellung 7201 Netzzeit

SW1 - SW3 : Standardeinstellung ab Werk
SW1 - SW3 : standard ex works



SW1
1 Ausgabe UTC / MEZ
2 Wortlänge 8 Bit / 7 Bit
3, 4 Parity
5 Stop-Bit
6-8 Baudrate

SW1
1 output UTC / CET
2 word length 8 Bit / 7 Bit
3, 4 paritybit
5 stopbit
6-8 baudrate

SW2
1 Sekundenvorlauf
2 ETX zum Sekundenwechsel
3, 4 Datenstring
5 Uhrzeit / Datum
6 Senden mit Steuerzeichen
7, 8 Sendezeitpunkt

SW2
1 second advance
2 ETX at second change
3, 4 data string
5 time / date
6 send with control character
7, 8 point of transmit

SW3
1 RS232 u. RS422 / TTY
2 CTS Handshake
3 RTS (Sek.Imp. / Steuerltg. für RS232)
4, 5 Programmgruppenwahl
6 Kartenauswahl
7 Kartenauswahl
8 CR/LF-Umschaltung

SW3
1 RS232 u. RS422 / TTY
2 CTS handshake
3 RTS (sec. pulse / ctrl. line for RS232)
4, 5 programgroup select
6 board select
7 board select
8 CR/LF-switching

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Board 7201

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