KIENZLE DATA PROTOCOL

Tankanlagen Salzkotten GmbH

Description of the data transfer between the Kienzle calculator and a master.

- 1. The following data is transferred
- 1.1 From the calculator to the master.
- 1.11 The change of the nozzle status. Removing and replacing of the nozzle.
- 1.12 The selected product.
- 1.13 The contents of the calculator display: Volume and price to pay.
- 1.2 From the master to the calculator.
- 1.21 Control signals: Authorization and emergency stop.
- 1.22 Unit prices.
- 1.13 Limitation of the volume or amount to be delivered.

The data is transferred in a secured code. The baud rate is 1200.

Hardware

2.1 Four-wire connection

For each connection one pair of wires will be used. The opto-couplers are located at the receiving ends and are activated by the transmitter.

2.2 Two-wire connection

For both directions one pair of wires will be used. Both opto-couplers are located on the calculator side.

The calculator is designed to accommodate both types of connection without modification.

Data word structure

Lak W.

A data word consists of 4 bits: A (2**3), B, C, D which are transferred twice, once directly and once inverted. Before each data word zero is transmitted for the duration of one bit. (Opto-couplers are not activated.) Each data word is followed by a L. The edge between the L at the end and the 0 at the beginning of the next word is used for synchronization.

A block of data is preceded by a pre-pulse for the duration of about 10 bits (min 8, max 12) whose rear edge is the first synchronizing edge.

The first word after the pre-pulse is a control word which defines the meaning and the number of the words of a data block. Resulting from the baud rate of 1200 a bit duration of 833,3 micro seconds given. Bit duration of between 825 and 840 micro seconds is permitted.

Data blocks from the calculator to the master

Filling data

No	Conte	nts			
0	рге-ри	ise			
i	01	control wor	đ		
2	100	litres			
3	10	litres			
4	4	litre			
5	0.1	litre			
6	0.01	litre			
7	100	CU	10	CU	CU= Currency Unit
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9	4	CU	0,1	CU	
10	0.1	ĠŪ	0.01		
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	n 7	The powers	of the left c	olumn apply	
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s Product selection

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Replacing the nozzie

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1 2			09 pro		ontr	ol word

Totalizers

7

No	Contents
Ū	pre-pulse
1	03 control word 10**7
3 4	10**5 10***5
5 6	10**4 10**3
7	10-2
8 9	10**1 10**0
10 11	10**-1 10**-2
12	product and denomination 07= volume
	815= amount

Acknowledgement of a data block

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External data (e.g. transferred from a card reader, note acceptor etc.) Not used.

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4.8 Nozzle status (Removing or replacing the nozzle when the pump is blocked).

No	Contents
0	pre-pulse
1	11 control word code: 0 = nozzle removed
產	1 = nozzle replaced
	2 = calculator is temporarily off-line
	3 = calculator is on-line again
3	product

4.9 Subtotals registered when the calculator is in stand alone mode

No	Contents
0	pre-pulse
1	02 control word
2	10**5
3	10**4
4	10-3
5	10**2
6	10**1
7	10-0
8	10**-1
9	107-2
10	product

5. Data blocks from the master to the calculator

5.1 preset and unit price

No	Conte	nts		
0	pre-pu	lse		
1	01	contro	l word	
2	contro	charac	ter for t	the preset value. The different bits have the
		ng mea		
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4		CU		litres
5		CU		litre
6		CU		litre
7	0.01	CU	or	litre
	The	oreset v	alue "O'	is interpreted as an unlimited authorisation.
8	1,000	CU/li	tre	
9	0.100	CUM	tre	
10		CU/II		
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5.2 Request to send the filling data

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5.4 Request to send the totalizer data

No	Contents	
	pre-puise	
0		
1		ntrol word
•	product an	d denomination
	0 7 = vo	
	The second second second	
	815 = an	10Uf11

Setting the off-line unit prices

5 5

No	Contents
n	pre-pulse
ń	02 control word
2	product 1.000 CU/litre
Ä	0,100 CU/litre
5 B	0,010 CU/litre 0.001 CU/litre

5.6 Blocking the calculator

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Pump Illumination

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Acknowledgement

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5.0" External data (not used)

No	Contents
0	pre-pulse 15 control word for the calculator
ż	number of the following words
	The master has to control that during the filling no other data are sent to the calculator because all data are then considered as an emergency stop.

Preset and unit price with zeroising the calculator dislay

No	Conte	nts		
0	pre-pul	se		
1		contri		
2	control	chara	ter for t	he preset value. The different bits have the
	followi			
	A: Acti	vates t	he 3-mi	nutes timer in the calculator. (Not used).
				d preset value and control character are still
				are redundant
				ne preset value: 0 = Litres, 1 = CU
	D. Not			
3	the transfer of the control of the formation of the control of the	CU	Or	litres
4	10	CU	Dr	litres
5		ÇU	programme and the second	litre
6	0.1	CU	or	litre
7	0.01		Or	litre
	The p	resel v	alue "D"	is interpreted as an unlimited authorization.
8		CU/II		
: 9		CU/It		
Ō		CU/II		
		culli		
11	0.001	االاانانا	ire	

5.11 Clearing of the subtotals (registered in stand alone mode)

No	Conte	enits
0	pre-pi	jtse
Ĭ	5 9	control word

5.12 Request to send the nozzle status (4.8)

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6. Dialog procedures

Resulting from the above data blocks the following procedures are given:

6.1 When the nozzle is removed and the pump is authorized

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6.2 When the nozzle is replaced

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6.3 After the check-calculation

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6.4 When the filling data are transmitted to the master. (After power off during a transaction.)

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6.5 Authorization

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6.6 When the product selection is acknowledged

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This dialog also takes place when a calculator is switched on or in case of an error which has not been reported in an other dialog.

6.7 Setting the off-line unit prices from the master

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6.8 Calling the totalizor contents

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6.9 Blocking the pump

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6,10 Setting a price sign (channel 15 and 16 only)

The price sign does not acknowledge, therefore in these channels the block "Setting the unit prices" (5.5) is transmitted twice. The transfer takes place when the unit price is modified or when the mode of operation is modified by the console.

6.11 Switching the pump illumination

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5.12 Not used

6.13 After off-line operation mode followed by the first authorisation if subtotals are present.

Block No	Calculator Master
1	sublotal, product 1 (4.9)
2	clear subtotal (5.11)
3	ACK
4	subtotal, product 2 (4.9)
5	clear subtotal (5.11)
6	eld.

6.14 When an outdoor payment terminal is connected to the master (ZS 2 only) or when prices have been changed by a KSE.

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6.15 Request for the nozzle status (pump is blocked)

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6.16 Request for spontaneous sending of the nozzle status

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6.17 Spontaneous transmission of the changes of the nozzle status

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7. Error handling

When a dialog participant (master or calculator) receives an erroneous data block no reply is transmitted. The absence of a reply is the request for the transmitter to send the data block again. There is a pause of 30 ms to 60 ms untill the beginning of the repetition. The receiver must reply no later than 30 ms after the data block ends otherwise the reply is considered as absent.

In case the reply after the repetition is absent again the transmitter continues to send repealedly in the same way, then an error is reported.

The number of repetitions of the calculator is 127, and of the master is 15,

After 10 s of waiting for a repetition in vain, the receiver reports an error. A missing pre-pulse causes an error either because the dialog participants are no longer synchronized or both are waiting for a repetition. On the contrary a missing bit is corrected automaticly. It is therefore nescessary to distinguish a bit from a pre-pulse (which is 10 times longer). Only by that, automatic correcting will make sense.

The master can interrupt a transmission of the calculator with its own pre-pulse. When both participants are transmitting, the master has priority.

The dialog sequence is controlled by the master. This is especially important for the dialog after the check calculation (filling data, acknowledge) when the filling data are summed up in the master. When this dialog is repeatedly started erroneously by the calculator (without the messages "Removing the nozzle" or "Replacing the nozzle" in between) then the master will report error.

8. Exceptions

101 354

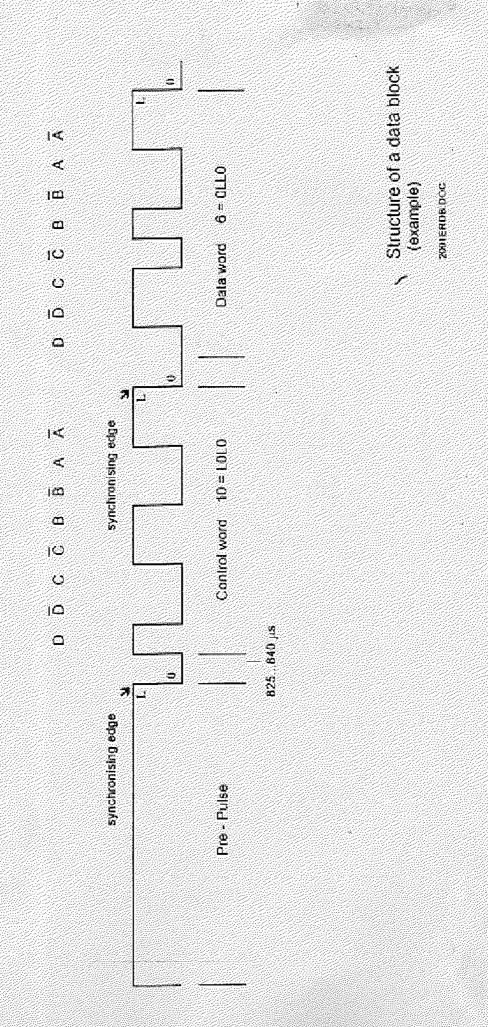
8.1 When the calculator starts a dialog and the master doesn't reply but starts any other dialog by itself then the calculator will forget its own message.
Therefore the master has to check whether the calculator is active before starting its own message.

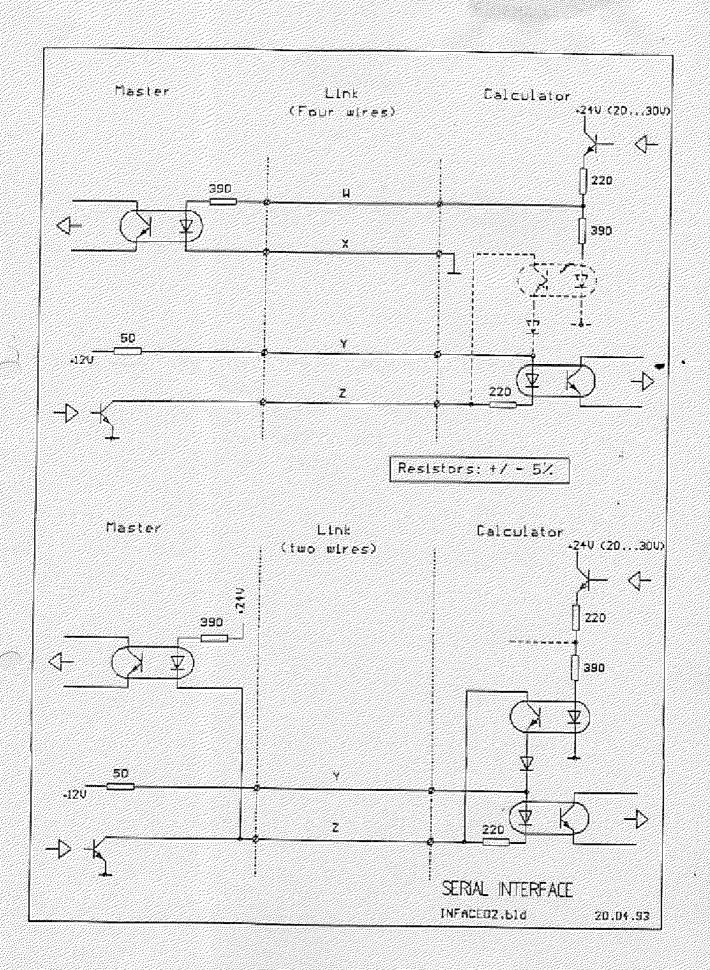
- 8,2 The Kienzle master ZS 2 must not receive the block "Product selection" when the pump is not authorized.
- 8.3 The last stopbit of a block of the Kienzle master KSE has only 0,58 ms.
 When the KSE is in the operation mode "Without blocking" (service mode) the following dialog will be performed after the check calculation (nozzle replaced):

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Then the calculator is authorized. The KSE needs a pause of at least 250 ms between the dialogs "Nozzle replaced" (6.2) and " After the check calculation" (6.3). The pause according 4.6 is not observed by the KSE when it sends an authorization immediately after a zero-transaction.

The request to send the unit prices by the dialog according 6.6 is permitted only once per filling. It doesn't matter whether this occurs after an authorization or after a blocking.





4.8 Nozzle status (Removing or replacing the nozzle when the pump is blocked).

No Contents

0 pre-pulse
1 11 control word
2 code: 0 = nozzle removed
1 = nozzle replaced
2 = calculator is temporarily off-line
3 = calculator is on-line again

4.9 Subtotals registered when the calculator is in stand alone mode

luturi

No	Contents	
Ö	pre-pulse	
1	02 control word	
2	10***5	
3	1074	
4	10**3	
5	10***2	
6	10**1	
7	10000	
8	10***1	
9	107-2	
10	product	

Expanded Kienzle Protokoll

Data bocks from the calculator to the master

Filling Data		
No	contents	
0	pre-pulse	
1	control wo	rd I
2	1000	Liter
3	100	Liter
4	10	Liter
5	1	Liter
6	0,1	Liter
7	0,01	Liter
8	100000	DM
9	10000	DM
10	1000	DM
11	100	DM
12	10	DM
13	1	DM
14	0.1	DM
15	0,01	DM
16	nozzle nun	iber
17	numerator	
18	numerator	

Removing the nozzle

No	contents
n	pre-pulse
, and the second second	
	control word 8
2	product
3	error number

Product selection

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Replacing the nozzle

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Totalizers

No	contents
0	pre-pulse 3
1	control word 3
2	1000000000
3	100000000
4	10000000
5	1000000
6	100000
7	10000
8	1000
9	100
10	10
11	1
12	0,1
13	0,01
14	product und denomination

Acknowledgement of a data block

No	
	contents
0	
	pre-pulse

Subtotals of stand alone mode

No	contents
0	pre-pulse
1	control word 2
2	1000000000
3	100000000
4	10000000
5	1000000
6	100000
7	10000
8	1000
9	100
10	10
11	1
12	0,1
13	0,01
14	product

Data bocks from the master to the calculator

Preset / unit price

No contents

0	pre-pulse	
1	control wo	rd I
2	control che	racter for the preset value
3	100000	Liter/DM
4	10000	Liter/DM
5	1000	Liter/DM
6	100	Liter/DM
7	10	Liter/DM
8	1	Liter/DM
9	0,1	Liter/DM
10	0,01	Liter/DM
11	100	DM/Liter
12	10	DM/Liter
13	1	DM/Liter
14	0,1	DM/Liter
15	0,01	DM/Liter
16	0,001	DM/Liter

Request to send the filling data

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Authorization without clearing the display

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Authorization

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Request to send the filling data

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Request to send the totalizer data

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Setting the off-line unit prices

No	contents	
0	pre-pulse	
1	control wo	rd 2
2	product	
3	100	DM/Liter
4	10	DM/Liter
5	1	DM/Liter
6	0,1	DM/Liter
7	0,01	DM/Liter
8	0,001	DM/Liter

Blocking the calculator

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Pump illumination

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Best reguards

Günter Wilcke (Salzkotten 11.10.1996)

Tankanlagen Salzkotten