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Bogballe
DK-7171 Uldum

Design Specification

Project: **BOGBALLE CALIBRATOR UNIQ/ICON/ZURF**

Project No.: 175-00108

Serial Protocol Specification

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Change Log

Date	Initials	Version	Short description
19.03.2003	JA	0.1	Document created.
01.04.2003	JA	1.0	First release of document
07.05.2003	JA	1.1	Paragraph 3.5 is changed: The response to {RSC} (status) is changed to: {WPopsatlhfmC}
17.12.2008	JA	1.2	The protocol is made general for CALIBRATOR UNIQ, CALIBRATOR ICON and CALIBRATOR ZURF

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1 Introduction

This document is prepared as a Design Specification for those who want to interface external equipment to the BOGBALLE CALIBRATOR UNIQ/ICON/ZURF through the serial port / RS232.

This document is written by Jens Ancker and refers to the Functional Specification for CALIBRATOR UNIQ/ICON/ZURF.

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2 Connection UNIQ/ICON/ZURF to external equipment

The CALIBRATOR UNIQ/ICON/ZURF can be connected to external equipment through the RS232 port located on the left hand side of the UNIQ/ICON/ZURF. The picture below shows the location of the serial port.

The connector on the UNIQ/ICON/ZURF is implemented as a standard RS232 connector with the same layout as a PC – DB9 male.

Pin #	Description (on UNIQ/ICON/ZURF side)
1	Do not connect
2	Data in
3	Data out
4	Do not connect
5	Signal Ground
6	Do not connect
7	Do not connect
8	Do not connect
9	Do not connect

If UNIQ/ICON/ZURF is going to be connected to a standard PC port the cable must be as below:

DB9 – female	DB9 - female
Pin 2	Pin 3
Pin 3	Pin 2
Pin 5	Pin 5

A standard NULL-MODEM cable can be used.

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2.1 Serial port setting

The CALIBRATOR UNIQ/ICON/ZURF uses the below port settings on the RS232 port:

Bits pr. Second:	9600
Number of data bits:	8
Parity:	None
Stop bits:	1
Flow control:	None

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3 Protocol description

When CALIBRATOR UNIQ/ICON/ZURF is connected to external equipment the UNIQ/ICON/ZURF will always appear as a slave and the external computer will always be master. This means that UNIQ/ICON/ZURF only sends data on the serial port if requested.

In the following paragraphs the implementation of the protocol will be described in details.

3.1 Checksum

In the protocol a checksum calculation is included. The example below explains how the check sum calculation works:

{SB287C} // C is the checksum and is given by an XOR of the 5 first byte

The start-/end characters and the checksum itself are **not** included in the checksum calculation.

S XOR B XOR 2 XOR 8 XOR 7 = h53 XOR h42 XOR h32 XOR h38 XOR h37 = h2C

In the above example the checksum is **h2C**.

If the checksum character is h00, h7B ({) or h7D (}) the checksum character is forced to h55 (U).

3.2 Telegram to UNIQ/ICON/ZURF

A telegram to UNIQ/ICON/ZURF must be sent without space between two characters. If the time between two characters is more than 2 seconds the telegram will be lost due to timeout.

3.3 Telegram from UNIQ/ICON/ZURF

A accept of a telegram from UNIQ/ICON/ZURF doesn't mean that the requested action will take place, but only that the telegram was accepted.

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3.4 Change of values/mode in UNIQ/ICON/ZURF

Change of values/mode in UNIQ/ICON/ZURF			
Action	Computer sends	Device answers	Comment
Application rate with application rate returned	{SDxxxC}	{ADxxxC}	xxx kg/ha
Application rate with application rate returned	{SDxxxxC}	{ADxxxxC}	xxxx kg/ha
Spread width	{SBxxxC}	{ABxxxC}	xx,x m
Distance	{SLxxxxxC}	{ALxxxxxC}	xxxxx m
HA[y]	{SHyxxxxC}	{AHyxxxxC}	y: 1-5 is area no. 1-5. y >= 6 is mapped to total counter
Hopper contents	{SIxxxxxC}	{AIxxxxxC}	xxxxx Kg
Time	{SCddmmyyhhmmC}	{ACddmmyyhhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
Active Area	{SAxC}	{AAxC}	x: 1-5 x >= 6 will be mapped to total counter
Open	{SOC}	{AOC}	NOT SUPPORTED
Plot	{SPC}	{APC}	Toggle the Plot function. **Affects calculation only, no active control of trend actuator.**
Zero set Tara	{STC}	{ATC}	Resets counter. If FAI enabled the force restart.
Start	{SGC}	{AGC}	
Stop	{SSC}	{ASC}	

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3.5 Reading out values/status from UNIQ/ICON/ZURF

Reading out values/status from UNIQ/ICON/ZURF			
Action	Computer sends	Device answers	Comment
Set value, application rate	{RDC}	{WDxxxC}	xxx Kg/ha Length(xxx) >= 3
Present value, application rate	{RAC}	{WAxxxC}	xxx Kg Length(xxx) >= 3
Spread width	{RBC}	{WBxxxC}	xx,x m Length(xxx) >= 3
Distance	{RLC}	{WLxxxxxC}	xxxxx m Length(xxxxx) >= 5
HA[y]	{RhyC}	{WHyxxxxC}	xx,xx ha y >= 6 will be mapped to total counter. Length(xxxx) >= 4
Hopper contents	{RIC}	{WIxxxxxC}	xxxxx Kg
Tara	{RTC}	{WTxxxxxC}	xxxxx Kg Length(xxxxx) >= 5
Speed	{RVC}	{WVxxxC}	xx,x km/h
Time	{RCC}	{WCddmmyyhhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
PTO	{RPC}	{WPxxxC}	xxx rpm Length(xxx) >= 3
Status	{RSC}	{WPopsatlhfmC}	o: Open 0=always p: 0=Normal/Trend to border 1=Trend from border s 0=Stop 1=Start a: 1-5 area no. 6=Total counter t: 0=E 1=EX (EX normal)(M3 normal) 2=EX2(EX+40%)(M3+40%)(M3-40%) 3=EW 4=EXW (EXW normal) M3W(normal) 5=EX2W(EXW+40%)(M3W+40%)(M3W-40%) 6=D 7=DZ l: Language 0=always h: 0=Fixed speed 1=Impulse sensor 2=Radar 3=Tractor board f:0=Tank sensor not available 1=Tank sensor available m: mode 0=always