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Design Specification

Project: **BOGBALLE CALIBRATOR ZURF**

Project No.: 175-00108

Serial Protocol Specification

Based on Thoustrup & Overgaard A/S / Bogballe RS232 protocol from 28th of July 1997

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Change Log

Date	Initials	Version	Short description
28.07.1997	JO	0.0	First release of protocol by Thoustrup & Overgaard
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
11.03.2010	JA	1.3	Definition of new commands has started. Document under construction.
23.03.2010	JA	1.3	Range added for the parameters. The ranges might change in the future!
22.04.2010	CHA	1.6	Spreader error monitor interface and Fill in added
22.04.2010	CHA	1.6	FAC functions, and interface control for popup handling
26.05.2010	CHA	1.7	1. Fixed typing errors in command 4.4.20 2. Command added 4.4.21 for reading overdose percentage
27.05.2010	CHA	1.7	Baudrate in command 4.17.1 has been changed to 57600
06.07.2010	CHA	1.8	Command 4.4.22 has been added. Contains information about trend position and if spreader is active or not
06.07.2010	CHA	1.8	Commands 4.7.1 and 4.7.3 has been changed to support 3 different spreader models M3W, M2W and L2W – and a failure flag in case of unsupported model and class combination.
06.07.2010	CHA	1.8	Functions for manipulating specific field data has been added: 4.3.6 + 4.3.7 + 4.3.8 + 4.3.9 + 4.3.10 + 4.3.11 + 4.3.12 + 4.3.13 + 4.3.14
10.08.2010	CHA	1.9	Functions 4.7.1 and 4.7.3 text corrected – L2W has spreader model number 2

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20.10.2010	CHA	1.9	Functions 4.3.6 + 4.3.7 + 4.3.8 + 4.3.9 + 4.3.10 + 4.3.11 + 4.3.12 + 4.3.13 + 4.3.14 have been corrected to include Folder Id
20.10.2010	CHA	1.9	Functions 4.3.15 + 4.3.16 + 4.3.17 + 4.3.18 + 4.3.19 + 4.3.20 + 4.3.21 has been added for field and folder access
20.10.2010	CHA	1.9	Baud rate for command 4.17.1 has been changed to 19200
20.10.2010	CHA	1.9	Functions for storing and restoring factory calibration of load cell has been added 4.13.9 + 4.13.10
15.11.2010	CHA	1.10	4.3.16 description has changed 4.3.22 full reset function for field has been added
8.12.2010	CHA	1.10	Commands 4.3.23 + 4.3.24 + 4.3.25 + 4.3.26 has been added
15.06.2011	CHA	1.11	Commands 4.4.23, 4.4.24 and 4.4.25 for the spread width overload function has been added. Command 4.5.2: <ProtocolVer> has been changed to “1.01” because of support of spread width overload feature.
11.04.2012	CHA	1.12	Added functionality regarding functions/command for Headland Management: Description of commands 4.4.23 + 4.4.24 + 4.4.25 has changed for ZURF – and has been implemented for ICON (version 1.07) and UNIQ (version 1.12) Command 4.4.29 description added has been implemented since <ProtocolVer> “1.00” (in command 4.5.2). New commands 4.4.26 + 4.4.27 + 4.4.28 has been added for ZURF (version 1.12), ICON (version 1.07) and UNIQ (version 1.12) Command 4.5.2: <ProtocolVer> has been changed to “1.03” for ZURF (version 1.12). <ProtocolVer> has been changed to “0.01” for UNIQ (version 1.12) and ICON (version 1.07). Section 4.18 has been added to this document - outlining specific functions in the protocol that is used for Headland Management.
08.01.2013	CHA	1.13	Added functionality regarding Headland Management: 4.4.30 and 4.4.31 have been added for ZURF

			only. Command 4.5.2: <ProtocolVer> has been changed to “1.04” for ZURF (version 1.13). Section 4.18 has been updated
07.11.2014	CHA	1.14	Added functionality regarding Headland Management: 4.4.32 has been added for ZURF only. Command 4.5.2: <ProtocolVer> has been changed to “1.05” for ZURF (version 1.14x). An error in 4.4.30 and 4.4.31 has been corrected – bom sections are separated with “:” not “,” Section 4.19 with SC-Dynamic monitor has been added for ZURF only Section 4.20 with detailed information about error-monitor errors has been added Commands 4.4.32+4.4.33+4.4.34+4.4.35+ 4.4.36 has been added for ZURF only Commands 4.7.1+4.7.3 support the new model M6W Error monitor section 4.6 supports SC-Dynamic errors – error class ‘8’
19.05.2015	CHA	1.15	IC Calibration has been added section 4.20 IC status command has been added to 4.4.37 Quantity spread reset command 4.4.38 Quantity spread read command 4.4.39 Commands 4.3.27, 4.3.28 and 4.3.29 for total time on field have been added Command 4.3.30 have been added for reset of all fields in folder Label in Trend Headland status command 4.12.2 has changed “<Progress>: 0=Actuators are idle” Command 4.12.1 will now allow mode change from “to border” to “from border” or back – regardless of PTO RPM – however the status command 4.12.1 will still warn about high PTO rpm if this is case – because we don’t know the mode change which the farmer will select!? Command response in 4.12.2 was wrong documented: “electro” has been added in <TBStatus>/<DSStatus> and some other status values have been shifted Commands for Headland setting: adjust relative START/STOP has been added – number: 4.4.40+4.4.41+4.4.42+4.4.43+4.4.44+4.4.45

			Value <ProtocolVer> has changed to “1.06” for ZURF version 1.17.
16.11.2015	JA	1.16	Eltronic Solution A/S changed to Eltronic A/S
10.01.2017	CHA	1.17	Program update description added for CALIBRATOR ADON ADON unique identifier has been added to command 4.4.28 id=”4” as product id. Additions has been added for spreader class command 4.7.1 and 4.7.3, MIC must be treated as fixed scale, use of labels STD, MAX, MAX+, MIN and MIC must be applied to external system – however the external handling of the classes are similar – only the names have changed. New models M35W, M45W and M60W has been added Command 4.4.29 <ProtocolVer> has been changed to 1.07 Baudrate 115200 has been added to command 4.17.4 as option 2 Commands 4.4.44 + 4.4.45 + 4.4.46 + 4.20.5 has been added
28.08.2017	CHA	1.18	Commands 4.4.47+4.4.48+4.4.49+4.4.50+4.4.51+4.4.52+4.4.53 has been added to S-Indicator and spread chart STD values for new models M35W, M45W and M60W only Command 4.4.29 <ProtocolVer> has been changed to 1.08 Now L2W supports STD, MIN and MIC/fixed scale classes
25.04.2018	CHA	1.19	Commands: 4.54+4.55 {SXLLLLRRRRC} has been added Commands 4.4.29 <ProtocolVer> has been changed to 1.09
16.11.2018	CTA	1.20	Commands: - 3.4.2A has been added - 3.4.3A has been added - 3.4.4A has been added - 3.4.5A has been added - 3.4.6A has been added - 3.5.1A has been added - 3.5.2A has been added - 3.5.3A has been added - 3.5.4A has been added

			- 3.5.5A has been added - 3.5.6A has been added - 3.5.7A has been added - 3.5.8A has been added - 4.3 6A has been added - 4.3 7A has been added - 4.3 8A has been added - 4.3 26A has been added - 4.3 23A has been added - 4.3 3A has been added - 4.3 4A has been added - 4.3 9A has been added - 4.3 10A has been added - 4.3 11A has been added - 4.3 17A has been added - 4.3 18A has been added - 4.3 19A has been added - 4.3 12A has been added - 4.3 13A has been added - 4.3 14A has been added - 4.3 24A has been added - 4.3 25A has been added - 4.4 1A has been added - 4.4 2A has been added - 4.4 7A has been added - 4.4 23A has been added - 4.4 36A has been added - 4.4 40A has been added - 4.4 41A has been added - 4.4 47A has been added - 4.4 48A has been added (not supported) - 4.4 54A has been added - 4.4 8A has been added - 4.4 11A has been added - 4.4 12A has been added - 4.4 24A has been added - 4.4 29A has been added - 4.4 32A has been added - 4.4 33A has been added - 4.4 39A has been added - 4.4 42A has been added - 4.4 43A has been added - 4.4 49A has been added

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			- 4.4 50A has been added (not supported) - 4.4 53A has been added - 4.4 55A has been added - 4.4 13A has been added - 4.4 15A has been added - 4.4 16A has been added - 4.4 25A has been added - 4.4 35A has been added - 4.4 44A has been added - 4.4 45A has been added - 4.4 51A has been added - 4.4 52A has been added - 4.9 4A has been added - 4.9 5A has been added - 4.9 9A has been added - 4.9 10A has been added - 4.9 11A has been added - 4.9 12A has been added - 4.13 2A has been added (not supported) - 4.13 6A has been added (not supported) - 4.16 1A has been added - 4.16 3A has been added - 4.16 4A has been added - 4.16 5A has been added - 4.18 Request nominal spread width added - 4.18 Request limits for overload width added - 4.18 4.4.54A added
27.11.2018	CHA	1.21	Command 4.4.29 <ProtocolVer> has been changed to 1.10 because of new extended decimal command sets
11.01.2019	CHA	1.22	NOTE: Command 4.4.29 <ProtocolVer> has NOT changed. It is still 1.09 for ZURF and 1.10 for ADON Commands 4.4.56 and 4.4.57 has been added
29.01.2019	CHA	1.23	NOTE: Command 4.4.29 <ProtocolVer> has NOT changed. It is still 1.09 for ZURF and 1.10 for ADON Commands 4.4.58 and 4.4.58A has been added
27.03.2019	CHA	1.24	Command 4.4.29 <ProtocolVer> has changed. It has changed to 1.10 for ZURF and 1.11 for ADON. Remember ZURF doesn't support precision

			commands: X.X.XA where A indicates that this is a precision command. ADON only has support for the precision commands. Commands 4.6.2 and 4.6.3 has been updated with new error class: <ActiveErrorClass>: “9” General CAN-Bus error – has been added – describes general CAN-Bus communication failure. Error code “1”: A device on the CAN-Bus is blocking the general communication – caused by hardware failure in the device – see detail description in command 4.6.3 and section 4.21 (this section is also updated with the new error class/code). New Command 4.5.6 <CanErr> has been added to Boot Monitor – to support this feature during device check in boot monitor. 4.5 Boot monitor: Overall scan time for devices on the CAN-bus – will take longer if no devices are seen at first scan attempt.
24.09.2019	CHA	1.25	Command 4.4.29 <ProtocolVer> has changed. It has changed to “1.11” for ZURF and “1.12” for ADON. Commands 4.4.49, 4.4.49a, 4.4.50, 4.4.50a, 4.4.43, 4.4.53, 4.4.53A, 4.7.1 and 4.7.3 supports new spreader model L20W (id = 7). Bug in command 4.4.53A <s-indicator> has been corrected for ADON, this value was a factor 10 too high. Changed in ADON software version “1.00x”. New error classes for max speed exceeded (class “11”) and GPS NMEA Monitor error (class “10”) has added – this affects 4.6.2, 4.6.3. and 4.21. GPS Speed has been added to the commands 4.9.1, 4.9.2, 4.9.6 and 4.97
09.12.2019	CHA	1.26	Command 4.4.29 <ProtocolVer> has changed. “1.13” for ADON. Command 4.17.1 supports new baudrates 38400=3 and 57600=4
24.01.2020	CHA	1.27	Command 4.4.29 <ProtocolVer> has changed to “1.14” for ADON/TOTZ. Command 4.4.59, 4.4.60, 4.4.61 and 4.4.62 have been added for ADON/TOTZ only. New errors have been added in section 4.21 – error class Trend TB, Trend DS/FB, IC and SC-Dynamic
21.09.2020	CHA	1.28	Command 4.4.29 <ProtocolVer> has changed to “1.15” for ADON/TOTZ. New sub-error 2 has been added in section 4.21 – error class 11 – Max speed error – short Alarm labels has been added to table in new Column.
28.09.2020	CHA	1.29	Command 4.4.29 <ProtocolVer> has changed to “1.16” for ADON/TOTZ.

			New sub-errors 8.26 and 8.27 has been added in section 4.21 – error class 8 – SC-Dynamic error – with short Alarm labels.
17.02.2021	CHA	1.30	Command 4.4.29 <ProtocolVer> has changed to “1.17” for ADON/TOTZ. Headland Reduction commands 4.4.57 and 4.4.63 has been added.
30.03.2021	CHA	1.31	Command 4.4.29 <ProtocolVer> has changed to “1.18” for ADON/TOTZ. Manuel Wedge Width commands 4.4.36 and 4.4.36A has been extended if “-1.0” or “-1.00” is received by the TOTZ in width value, the width calculated and returned in answer will be based on nominal spread width and sections opened/active.
03.05.2021	CHA	1.32	Command 4.4.29 <ProtocolVer> has changed to “1.19” for ADON/TOTZ. Commands 4.4.64, 4.4.65, 4.4.66, 4.4.67, 4.4.68, 4.16.9, 4.16.10, 4.16.11, 4.16.12 has been added for manual fill in for non-w-models Commands 4.7.1 and 4.7.3 support for non-w-models L20/L15=8, M35=9 and M45=10
30.06.2021	CHA	1.33	Command 4.4.29 <ProtocolVer> has changed to “1.20” for ADON/TOTZ. Commands 4.4.69, 4.4.70, 4.4.71 has been added for automatic headland management control in 32bit or 16bit sections mode. For this purpose, the sections-values are transferred as hex values with a fixed width
07.07.2021	CHA	1.34	Command 4.4.29 <ProtocolVer> has changed to “1.21” for ADON/TOTZ. Commands 4.4.72, 4.4.72A, 4.4.73 and 4.4.73A has been added for manual headland control or “Wedge Width” in 32bit or 16bit sections mode. For this purpose, the sections-values are transferred as hex values with a fixed value width
09.09.2021	CHA	1.35	Commands 4.4.69, 4.4.70, 4.4.72, 4.4.72A, 4.4.73 and 4.4.73A: errors has been corrected in description of left and right sections in 32bit and 16bit mode
16.12.2021	CHA	1.36	Command 4.4.29 <ProtocolVer> has been changed to “1.22”. Answer in Command 4.6.3 has been changed. AEC=5 hopper contents sub-error “2” and “3” has been added – with warning when hopper contains less than 200 kg and less than 150 kg – error monitor table sections 4.21 has been added for AEC=5.

			These errors/warnings will only be triggered if system has a loadcell.
16.09.2022	CHA	1.37	Command 4.4.29 <ProtocolVer> has been changed to “1.23”. Commands 4.4.73, 4.4.73A, 4.4.74, 4.4.73A, 4.4.75 and 4.4.75A has been added to the protocol. These commands can set, read and check limits for a general delay distance relative to default 15 meters in TOTZ. This delay distance applies to all differential dynamic related commands: 4.4.52 – {SXLLLLRRRRc} and 4.4.52A {sXLLLLLRRRRRc} which can specify a quantity on left and right side of the spreader.
31.10.2022	CHA	1.38	Command 4.4.29 <ProtocolVer> has been changed to “1.24”. Commands 4.4.76, 4.4.77, 4.4.78 and 4.4.79 has been added. These commands allow the serial external unit to inform TOTZ if there’s an ISOBUS system attached and/or instruction the TOTZ behave as a ZURF.
03.11.2022	CHA	1.39	Commands 4.4.73, 4.4.73A, 4.4.74, 4.4.74A, 4.4.75 and 4.4.75A has received an extra decimal.
03.03.2023	CHA	1.40	Command 4.4.29 <ProtocolVer> has been changed to “1.25”. Commands for handling Dynamic Headland: 4.4.80, 4.4.81, 4.4.82, 4.4.83, 4.4.84, 4.4.85 and 4.4.86 has been added to the protocol.
02.10.2023	MGE	1.41	Command 4.12 changed TrendH Status from failed to reason for fail. Section 4.4 item 84 DHMode Failed added reasons for fail. Section 4.12 added new command Oneside read and set to the protocol. Section 4.5 Added Oneside clode actuators to DevChk. Section 4.12 TrendH read status Oneside L/R actuators added.
03.10.2023	MGE	1.42	Section 4.12 moved Oneside actuator status from TrendH to Oneside read command.
06.10.2023	MGE	1.43	Section 4.12 renamed Oneside commando to OneSde and Changed Value/Position from both to left or right open.
24.10.2023	MGE	1.44	Section 4.6 added Oneside left/right actuator error class 12/13 in SprErr and SprNot. Section 4.4 added Oneside left/right actuator error class 12/13 in ErrLog. Section 4.6 hopper limits 200/120 and 150/70 kg. Section 4.21 added Oneside left/right actuator error class 12/13.
03.11.2023	MGE	1.45	Section 4.5 DevChk moved Oneside L/R actuator to last position in response.

			Section 4.4 FrmMon added Oneside L/R handle and Limit index. Section 4.7 Added L15W model to SClass.
25.01.2024	MGE	1.46	Section 4.12 added OneSde Allocate to table.
25.03.2024	MGE	1.47	Section 4.21 added error code 7.3 (IC-ERR: IC CALIB). Section 4.7 added “Fail” parameter value 2.

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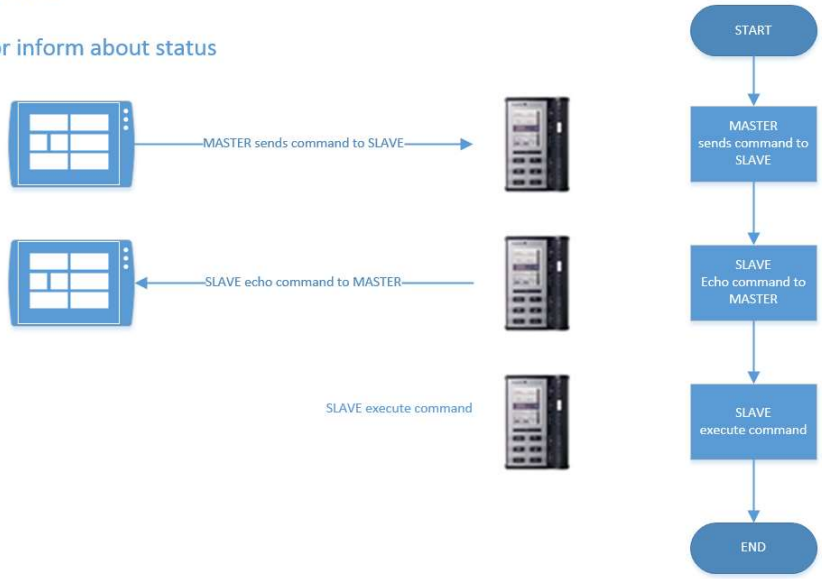
1 Introduction

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

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

Basic of Bogballe specified RS232 protocol:

- Physical layer is serial with RS232 level
- SLAVE is either CALIBRATOR ZURF, UNIQ or ICON
- MASTER is any computer device able to host, send and receive the Bogballe analog two-ways RS232 protocol
- Every command starts with a request from the MASTER
- SLAVE send confirmation to MASTER
- SLAVE execute command
- Commands can either change or inform about status



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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.

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. Generally the external equipment should wait for an answer/response from UNIQ/ICON/ZURF before a new telegram is sent to UNIQ/ICON/ZURF.

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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
1 Application rate with application rate returned	{SDxxxC}	{ADxxxC}	xxx kg/ha
2 Application rate with application rate returned	{SDxxxxC}	{ADxxxxC}	xxxx kg/ha
2A Application rate with application rate returned	{sDxxxxxC}	{aDxxxxxC}	xxxxx kg/ha
3 Spread width	{SBxxxC}	{ABxxxC}	xx,x m
3A Spread width	{sBxxxxC}	{aBxxxxC}	xx.xx m
4 Distance	{SLxxxxxC}	{ALxxxxxC}	xxxxx m
4A Distance	{sLxxxxxxC}	{aLxxxxxxC}	xxxxxx m
5 HA[y]	{SHyxxxxC}	{AHyxxxxC}	y: 1-5 is area no. 1-5. y >= 6 is mapped to total counter
5A HA[y]	{sHyxxxxxC}	{aHyxxxxxC}	y: 1-5 is area no. 1-5. y >= 6 is mapped to total counter
6 Hopper contents	{SIxxxxxC}	{AIxxxxxC}	xxxxx Kg
6A Hopper contents	{sIxxxxxxC}	{aIxxxxxxC}	xxxxx.x Kg
7 Time	{SCddmmyyhhmmC}	{ACddmmyyhhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
8 Active Area	{SAxC}	{AAxC}	x: 1-5 x >= 6 will be mapped to total counter
9 Open	{SOC}	{AOC}	NOT SUPPORTED
10 Plot	{SPC}	{APC}	Toggle the Plot function. **Affects calculation only, no active control of trend actuator.**
11 Zero set Tara	{STC}	{ATC}	Resets counter. If FAI enabled the force restart.
12 Start	{SGC}	{AGC}	
13 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
1 Set value, application rate	{RDC}	{WDxxxC}	xxx Kg/Ha Length(xxx) >= 3
1A Set value, application rate	{rDC}	{wDxxxxC}	xxxx Kg/Ha Length(xxxx) >= 4
2 Present value, application rate	{RAC}	{WAxxxC}	xxx Kg/Ha Length(xxx) >= 3
2A Present value, application rate	{rAC}	{wAxxxxC}	xxxx Kg/Ha Length(xxxx) >= 4
3 Spread width	{RBC}	{WBxxxC}	xxx m Length(xxx) >= 3
3A Spread width	{rBC}	{wBxxxxC}	xxxx m Length(xxxx) >= 4
4 Distance	{RLC}	{WLxxxxxC}	xxxxx m Length(xxxxx) >= 5
4A Distance	{rLC}	{wLxxxxxxC}	xxxxxx m Length(xxxxxx) >= 6
5 HA[y]	{RHyC}	{WHyxxxxC}	xx,xx ha y >= 6 will be mapped to total counter. Length(xxxx) >= 4
5A HA[y]	{rHyC}	{wHyxxxxxC}	xxxxx ha y >= 6 will be mapped to total counter. Length(xxxxx) >= 5
6 Hopper contents	{RIC}	{WIxxxxxC}	xxxxx Kg
6A Hopper contents	{rIC}	{wIxxxxxxC}	xxxxxx Kg
7 Tara	{RTC}	{WTxxxxxC}	xxxxx Kg Length(xxxxx) >= 5
7A Tara	{rTC}	{wTxxxxxxC}	xxxxxx Kg Length(xxxxxx) >= 6
8 Speed	{RVC}	{WVxxxC}	xxx km/h
8A Speed	{rVC}	{wVxxxxC}	xxxx km/h
9 Time	{RCC}	{WCddmmyyhhmmC}	dd:Date mm:Month yy:Year (in relation to 2000) hh:Hour mm:Minute
10 PTO	{RPC}	{WPxxxC}	xxx rpm Length(xxx) >= 3
11 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

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4 New commands in the protocol

This paragraph contains the newly defined commands. The new commands are primarily available for Calibrator ZURF. If a command based on the new format is implemented for UNIQ or ICON - it will be stated a under the individual definition of a command – but generally ICON and UNIQ will not have a full implementation of the protocol – this is only the case for ZURF.

4.1 Protocol definition

The new protocol format is designed to be more flexible in regards to the encoding/decoding of data attributes in the transferred or received messages between the Calibrator and the external system. A separator in the message body has been introduced in order for each receiving unit to decode the each message attribute – because the attribute has the ability to have variable length.

The separator symbol chosen is the character ':' and the difference between the old and new format is described below.

4.1.1 Old format

Example with application rate:

Change: {S**D**xxxC} {A**D**xxxC}

Read: {R**D**C} {W**D**xxxC}

D = application rate

xxx has fixed length.

4.1.2 New format

{<action>:<object>:<value>:C}

<value> has variable length.

<object> has fixed length (6 characters).

Example with application rate:

Change: {S:**AppRat**:<value>:C} {A:**AppRat**:<value>:C}

Read: {R:**AppRat**:C} {W:**AppRat**:<value>:C}

AppRat = application rate.

Min and maximum value:

Get limit: {L:**AppRat**:C} {M:**AppRat**:<min_value>:<max_value:C}

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4.2 Command in/out description

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
Start			
Stop			
FAI?			
IC?			
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
Start			
Stop			
FAI?			
IC?			
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment

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4.3 Controlling the fields

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Set the active field <ActFld>	{S:ActFld:<value>:C}	{A:ActFld:<value>:C}	Range: “0” – “99”
6 Set application rate for given field number in folder <FldApp>	{S:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	{A:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AppRate> Application rate in Kg/Ha for field Range “0” – “1999”
6A Set application rate for given field number in folder <FldApp>	{s:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	{a:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AppRate> Application rate in Kg/Ha for field Range “0.0” – “1999.9”
7 Set flow calibration value for given field number in folder <FldCal>	{S:FldCal: <FolderId>: <FieldId>: <FlowCal>: C}	{A:FldCal: <FolderId>: <FieldId>: <FlowCal>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer

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			<FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer <FlowCal> Flow calibration in Kg for field Range “5.00” – “50.00”
7A Set flow calibration value for given field number in folder <FldCal>	{s:FldCal: <FolderId>: <FieldId>: <FlowCal>: C}	{a:FldCal: <FolderId>: <FieldId>: <FlowCal>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer <FlowCal> Flow calibration in Kg for field Range “5.000” – “50.000”
8 Set spread width for given field number in folder <FldWth>	{S:FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	{A: FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <SpreadWidth> Spread width in meters for field Range “0.10” – “50.00”

8A Set spread width for given field number in folder <FldWth>	{s:FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	{a: FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <SpreadWidth> Spread width in meters for field Range “0.100” – “50.000”
15 Set active folder and active field number in folder <ActFoF>	{S:ActFoF: <FolderId>: <FieldId>: C}	{A:ActFoF: <FolderId>: <FieldId>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer
16 Reset of accumulated values for field size, fertilizer spread on field and average quantity spread for given field in folder <FldRst>	{S:FldRst: <FolderId>: <FieldId>: C}	{A:FldRst: <FolderId>: <FieldId>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer

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22 Full reset of all data attributes on field number in folder <FldFRt>	{S:FldFRt: <FolderId>: <FieldId>: C}	{A:FldFRt: <FolderId>: <FieldId>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer
26 Set accumulated fertilizer spread mass on field in folder <FldAcM>	{S:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	{A:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccMass> Accumulated mass of fertilizer spread in Kg for field in folder Range “0”-“999999”
26A Set accumulated fertilizer spread mass on field in folder <FldAcM>	{s:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	{a:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and

			returned in answer <AccMass> Accumulated mass of fertilizer spread in Kg for field in folder Range “0.0”-“999999.9”
23 Set accumulated area spread on field in folder <FldAcA>	{S:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	{A:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccArea> Accumulated area spread in Ha for field in folder Range: “0.00” – “99999.90”
23A Set accumulated area spread on field in folder <FldAcA>	{s:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	{a:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccArea> Accumulated area spread in Ha for field in folder Range: “0.000” – “99999.999”
27 Set accumulated total time in seconds spreading on field in folder	{S:FldAcT: <FolderId>: <FieldId>: <AccTime>: C}	{A:FldAcT: <FolderId>: <FieldId>: <AccTime>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active

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<FldAcT>			Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccTime> Accumulated total time in seconds spreading on field in folder Range: “0” – “2147483647”
30 Reset all fields in folder <FolRst>	{S:FolRst:<FolderId>:C}	{A:FolRst:<FolderId>:C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer

Reading out values/status from ZURF

Action	Computer sends	Device answers	Comment
2 Active field number <ActFld>	{R:ActFld:C}	{W:ActFld:<value>:C}	Value has variable length. Ex: No 10 => “10” Unit: NA Range: “0” –“99”
3 Actual area size compared with actual field no <AcArea>	{R:AcArea:C}	{W:AcArea:<value>:C}	Value has variable length. Ex: 28,3Ha => “28.3”; 32Ha = “32.0” Unit: Ha Range: “0.0” – “9999.9”
3A Actual area size compared with actual field no <AcArea>	{r:AcArea:C}	{w:AcArea:<value>:C}	Value has variable length. Ex: 28,33Ha => “28.33”; 32Ha = “32.00” Unit: Ha Range: “0.00” – “9999.99”
4 Average quantity in current field <AvgQty>	{R:AvgQty:C}	{W:AvgQty:<value>:C}	Value has variable length. Ex: 338 kg/ha=> “338” Unit: kg/ha Range: “0” – “1999”
4A Average quantity in current field <AvgQty>	{r:AvgQty:C}	{w:AvgQty:<value>:C}	Value has variable length. Ex: 338 kg/ha=> “338” Unit: kg/ha

			Range: “0.0” – “1999.9”
9 Read application rate on given field number in folder <FldApp>	{R:FldApp: <FolderId>: <FieldId>: C}	{W:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AppRate> Application rate in Kg/Ha for field Range “0” – “1999”
9A Read application rate on given field number in folder <FldApp>	{r:FldApp: <FolderId>: <FieldId>: C}	{w:FldApp: <FolderId>: <FieldId>: <AppRate>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AppRate> Application rate in Kg/Ha for field Range “0.0” – “1999.9”
10 Read flow calibration value for given field number in folder <FldCal>	{R:FldCal: <FolderId>: <FieldId>: C}	{W:FldCal: <FolderId> <FieldId>: <FlowCal>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in

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			command then active Field Id will be used for the operation and returned in answer <FlowCal> Flow calibration in Kg for field Range “5.00” – “50.00”
10A Read flow calibration value for given field number in folder <FldCal>	{r:FldCal: <FolderId>: <FieldId>: C}	{w:FldCal: <FolderId> <FieldId>: <FlowCal>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <FlowCal> Flow calibration in Kg for field Range “5.000” – “50.000”
11 Read spread width for given field number in folder <FldWth>	{R:FldWth: <FolderId>: <FieldId>: C}	{W:FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer <SpreadWidth> Spread width in meters for field Range “0.10” – “50.00”
11A Read spread width for given field number in folder <FldWth>	{r:FldWth: <FolderId>: <FieldId>: C}	{w:FldWth: <FolderId>: <FieldId>: <SpreadWidth>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for

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			the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer <SpreadWidth> Spread width in meters for field Range “0.100” – “50.000”
17 Read accumulated fertilizer spread mass on field in folder <FldAcM>	{R:FldAcM: <FolderId>: <FieldId>: C}	{W:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer <AccMass> Accumulated mass of fertilizer spread in Kg for field in folder Range “0”-“999999”
17A Read accumulated fertilizer spread mass on field in folder <FldAcM>	{r:FldAcM: <FolderId>: <FieldId>: C}	{w:FldAcM: <FolderId>: <FieldId>: <AccMass>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in commandthen active Field Id will be used for the operation and returned in answer

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			<AccMass> Accumulated mass of fertilizer spread in Kg for field in folder Range “0.0”-“999999.9”
18 Read accumulated area spread on field in folder <FldAcA>	{R:FldAcA: <FolderId>: <FieldId>: C}	{W:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccArea> Accumulated area spread in Ha for field in folder Range: “0.00” – “99999.90”
18A Read accumulated area spread on field in folder <FldAcA>	{r:FldAcA: <FolderId>: <FieldId>: C}	{w:FldAcA: <FolderId>: <FieldId>: <AccArea>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccArea> Accumulated area spread in Ha for field in folder Range: “0.000” – “99999.999”
19 Read average quantity calculated for field in folder <FldAvQ>	{R:FldAvQ: <FolderId>: <FieldId>: C}	{W:FldAvQ: <FolderId>: <FieldId>: <AverageQuantity>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and

			returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AverageQuantity> Average quantity spread in Kg/Ha on field in folder
19A Read average quantity calculated for field in folder <FldAvQ>	{r:FldAvQ: <FolderId>: <FieldId>: C}	{w:FldAvQ: <FolderId>: <FieldId>: <AverageQuantity>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId> Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AverageQuantity> Average quantity spread in Kg/Ha on field in folder Range “0.0” – “1999.9”
20 Read current active folder and active field number for folder <ActFoF>	{R:ActFoF: C}	{W:ActFoF: <ActiveFolderId>: <ActiveFieldId>: C}	<ActiveFolderId> Number of active folder Range “1”-“4” <ActiveFieldId> Number of active field for active folder Range “0” – “99” Field “0” is always a ΣField.
28 Read accumulated total time spreading on field in folder <FldAcT>	{R:FldAcT: <FolderId>: <FieldId>: C}	{W:FldAcT: <FolderId>: <FieldId>: <AccTime>: C}	<FolderId> Folder number Valid range “1”-“4” If “-1” is used in command then active Folder Id will be used for the operation and returned in answer <FieldId>

			Field number Valid range “0” – “99” Field “0” is always a ΣField for folder. If “-1” is used in command then active Field Id will be used for the operation and returned in answer <AccTime> Accumulated total time spreading in seconds for field in folder Range: “0” – “2147483647”

Reading out limits from ZURF

Action	Computer sends	Device answers	Comment
5 Total number of acreage/fields <#OfFld>	{L:#OfFld:C}	{M:#OfFld:<min_value>:<max_value>:C}	Value has variable length. Ex: Min = 0; Max = 99. Field “0” is always a ΣField. Unit: NA Range: “0” – “99”
12 Limits for field application rate <FldApp>	{L:FldApp:C}	{M:FldApp:<min_value>:<max_value>:C}	Range “0” – “1999” Unit is Kg/Ha
12A Limits for field application rate <FldApp>	{l:FldApp:C}	{m:FldApp:<min_value>:<max_value>:C}	Range “0.0” – “1999.9” Unit is Kg/Ha
13 Limits for field calibration value <FldCal>	{L:FldCal:C}	{M:FldCal:<min_value>:<max_value>:C}	Range “5.00” – “50.00” Unit is Kg
13A Limits for field calibration value <FldCal>	{l:FldCal:C}	{m:FldCal:<min_value>:<max_value>:C}	Range “5.000” – “50.000” Unit is Kg
14 Limits for field spread width <FldWth>	{L:FldWth:C}	{M:FldWth:<min_value>:<max_value>:C}	Range “0.10” – “50.00” Unit is meters
14A Limits for field spread width <FldWth>	{l:FldWth:C}	{m:FldWth:<min_value>:<max_value>:C}	Range “0.100” – “50.000” Unit is meters
21 Total number of folders containing fields <#OfFol>	{L:#OfFol:C}	{M:#OfFol:<min_value>:<max_value>:C}	Range: “1”-“4” Unit: NA
24 Limits for accumulated fertilizer mass in kg on field	{L:FldAcM:C}	{M:FldAcM:<min_value>:<max_value>:C}	Range “0”-“999999” Unit: kg
24A Limits for accumulated	{l:FldAcM:C}	{m:FldAcM:<min_value>:<max_value>:C}	Range “0.0”-“999999.9” Unit: kg

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fertilizer mass in kg on field			
25 Limits for accumulated area in Ha on field	{L:FldAcA:C}	{M:FldAcA:<min_value>:<max_value>:C}	Range: “0.00” – “99999.90” Unit: Ha
25A Limits for accumulated area in Ha on field	{l:FldAcA:C}	{m:FldAcA:<min_value>:<max_value>:C}	Range: “0.000” – “99999.999” Unit: Ha
29 Limits for accumulated total time in seconds spreading on field	{L:FldAcT:C}	{M:FldAcT:<min_value>:<max_value>:C}	Range: “0” – “2147483647” Unit: Seconds
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment

4.4 Controlling the spreading parameters

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Setting the spread width < SprdWt >	{S:SprdWt:<value>:C}	{A:SprdWt:<value>:C}	M Range: “0.1” – “50.0”
1A Setting the spread width < SprdWt >	{s:SprdWt:<value>:C}	{a:SprdWt:<value>:C}	M Range: “0.10” – “50.00”
2 Setting the calibration quantity <FlwCal>	{S:FlwCal:<value>:C}	{A:FlwCal:<value>:C}	Kg Range: “5.00” – “50.00”
2A Setting the calibration quantity <FlwCal>	{s:FlwCal:<value>:C}	{a:FlwCal:<value>:C}	Kg Range: “5.000” – “50.000”
3 Setting the P-step value <P-Step>	{S:P-Step:<value>:C}	{A:P-Step:<value>:C}	Range: “1” – “25”
4 Incrementing the differentiation in % of quantity <PStInc>	{S:PStInc:C}	{A:PStInc:<value>:C}	% Range: “-100” – “400”
5 Decrementing the differentiation in % of quantity <PStDec>	{S:PStDec:C}	{A:PStDec:<value>:C}	% Range: “-100” – “400”
6 Resetting the “differentiation in % of quantity” <PStRst>	{S:PStRst:C}	{A:PStRst:<value>:C}	<value> Is always “0”
7 Setting the actual speed <SpdKmh>	{S:SpdKmh:<value>:C}	{A:SpdKmh:<value>:C}	“Live” setting of the actual speed Range: “0.0” – “99.0”
7A Setting the actual speed <SpdKmh>	{s:SpdKmh:<value>:C}	{a:SpdKmh:<value>:C}	“Live” setting of the actual speed Range: “0.00” – “99.00”
17 Setting main control interface for user input <SprInt> NOTE: Very important function to use if the serial interface is supposed to handle user pop	{S:SprInt:<Interface>:C}	{A:SprInt: <Interface>: <AllocReady>: C}	<Interface> “0”: Serial interface control mode “1”: Normal user key input from panel (default mode at boot) NOTE: The mode “0” allows the spreader system to be handled completely via the serial interface. If this is the case then all boot up

ups that normally will be shown in ZURF display			errors (if any!) must be handled by the serial interface – this must one of the first messages during boot <AllocReady> "0" – system is ready for allocation message "1" – no allocation can currently be performed – system is busy
18 Setting the FAC mode <FacEna>	{S:FacEna:<value>:C}	{A:FacEna:<value>:C}	Enable/disabled full automatic calibration (FAC) "0" : disabled "1": enabled
23 Set the delayed spreader width overload value during spreading <SOrlWt> Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12	{S:SOrlWt:<mode>:<width>:C}	{A:SOrlWt:<mode>:<width>:C}	Enable/disable delayed spread width overload function – with current overload spread width. <mode> "0" – spread width overload function disabled "1" – spread width overload function enabled <width> If width overload function is enabled the overload width is returned. If function is disabled the configured spread width will be returned – this value can only be changed when function is enabled. Range "0.0" to "50.0" NOTE: If <mode> is set to "-1" the current operation mode is returned. If <width> is set outside of range ex. "0.00" the current value is returned
23A Set the delayed spreader width overload value during spreading <SOrlWt> Note: This command is designed for use in applications based on Headland	{s:SOrlWt:<mode>:<width>:C}	{a:SOrlWt:<mode>:<width>:C}	Enable/disable delayed spread width overload function – with current overload spread width. <mode> "0" – spread width overload function disabled "1" – spread width overload function enabled

Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12			<width> If width overload function is enabled the overload width is returned. If function is disabled the configured spread width will be returned – this value can only be changed when function is enabled. Range “0.00” to “50.00” NOTE: If <mode> is set to “-1” the current operation mode is returned. If <width> is set outside of range ex. “0.000” the current value is returned
26 Set delayed start/stop spreading overload function <SOrlSE> Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12	{S:SOrlSE:<mode>:C}	{A:SOrlSE:<mode>:C}	Set delayed Start/stop spreading overload function <mode> “0” – stop spreading “1” – start spreading
30 Set delayed overload enable/disable bom-section for headland management <SOrlBs>	{S:SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	{A:SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Set delayed overload enable/disable bom-section for headland management <bomsection1> to <bomsection8> “0” – disable bom-section 1 “1” – enable bom-section 1 “-1” – leave mode unchanged Bom-section 1 is located leftmost in the tractor forward direction Bom-section 8 is located rightmost in the tractor forward direction

36 Set manual state of overload “Wedge Width” RS232 function control of enable/disable section and width for headland management <MOrlBs>	{S:MOrlBs: <RequestEnable>: <RequestWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	{A:MOrlBs: <AccessError>: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Set manual state of overload “Wedge Width” RS232 function control of enable/disable section and width for headland management The first interface to request/reserve this function when available will own/reserve it until released. <RequestEnable> Request to reserve function via RS232/ HID interface – if not already in use by ZURF GUI or another interface ‘0’ – not requesting manual wedge width/section function ‘1’ – requesting manual wedge width/section function if available <RequestWidth> “0.0” to “50.0” maximum should be nominal spreader width when used with headland management If “-1.0” is received – the TOTZ will calculate actual spread width from the number of sections active and the nominal spread width <AccessError> response on the request enable function when external unit sends 0 – access is granted or no request enable has been sent by external unit 1 – access NOT granted function for wedge control is already in use by another interface error <AccessOwner> Who currently owns/have access to the manual wedge control ‘0’ – not reserved/ function is available for use ‘1’- function is reserved/in use by RS232 interface ‘2’ – function is reserved/in use by USB HID Device interface ‘3’ – function is reserved/in use by

			dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.0 to 50.0 meters – maximum should however be nominal spread width in any case for Headland Management <bomsection1> to <bomsection8> '-1' – section information isn't available '0' – disable bom-section 1 '1' – enable bom-section 1 Bom-section 1 is located leftmost in the tractor forward direction Bom-section 8 is located rightmost in the tractor forward direction
36A Set manual state of overload "Wedge Width" RS232 function control of enable/disable section and width for headland management <MOrlBs>	{s:MOrlBs: <RequestEnable>: <RequestWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	{a:MOrlBs: <AccessError>: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Set manual state of overload "Wedge Width" RS232 function control of enable/disable section and width for headland management The first interface to request/reserve this function when available will own/reserve it until released. <RequestEnable> Request to reserve function via RS232/ HID interface – if not already in use by ZURF GUI or another interface

			'0' – not requesting manual wedge width/section function '1' – requesting manual wedge width/section function if available <RequestWidth> "0.00" to "50.00" maximum should be nominal spreader width when used headland management If "-1.00" is received – the TOTZ will calculate actual spread width from the number of sections active and the nominal spread width <AccessError> response on the request enable function when external unit sends <RequestEnable>=1 0 – access granted or no request enable has been sent by external unit 1 – access NOT granted function for wedge control is already in use by other interface error <AccessOwner> Who currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use '1'- function is reserved/in use by RS232 interface '2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using

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			SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.00 to 50.00 meters – maximum should however be nominal spread width in any case for Headland Management <bomsection1> to <bomsection8> '-1' – section information isn't available '0' – disable bom-section 1 '1' – enable bom-section 1 Bom-section 1 is located leftmost in the tractor forward direction Bom-section 8 is located rightmost in the tractor forward direction
38 Reset quantity spread value <AcQSRt>	{S:AcQSRt:C}	{A:AcQSRt:<value>:C}	Reset quantity spread value <value>: always 0
40 Headland Setting: Set adjust relative Headland START position/distance <SOrlAE> Reflects the value in ZURF: "menu-> settings-> Headland settings-> Adjust Start"	{S:SOrlAE:<position>C}	{A:SOrlAE:<position>:C}	Headland setting: Adjustment relative to the pre-defined START/Main actuator OPEN position. <position>: Ex: 1.0 m => "1.0" Unit: m Range: "-6.0" – "6.0"
40A Headland Setting: Set adjust relative Headland START position/distance <SOrlAE> Reflects the	{s:SOrlAE:<position>C}	{a:SOrlAE:<position>:C}	Headland setting: Adjustment relative to the pre-defined START/Main actuator OPEN position. <position>: Ex: 1.00 m => "1.00" Unit: m Range: "-6.00" – "6.00"

value in ZURF: "menu-> settings-> Headland settings-> Adjust Start"			
41 Headland Setting: Set adjust relative Headland STOP position/distance <SOrlAD> Reflects the value in ZURF: "menu-> settings-> Headland settings-> Adjust Stop"	{S:SOrlAD:<position>C}	{A:SOrlAD:<position>:C}	Headland setting: Adjustment relative to the pre-defined STOP/Main actuator CLOSE position. <position>: Ex: -1.0 m => "-1.0" Unit: m Range: "-6.0" – "6.0"
41A Headland Setting: Set adjust relative Headland STOP position/distance <SOrlAD> Reflects the value in ZURF: "menu-> settings-> Headland settings-> Adjust Stop"	{s:SOrlAD:<position>C}	{a:SOrlAD:<position>:C}	Headland setting: Adjustment relative to the pre-defined STOP/Main actuator CLOSE position. <position>: Ex: -1.00 m=> "-1.00" Unit: m Range: "-6.00" – "6.00"
46 Disables/Enables error popups in error monitor	{S:ErrDis:<errors-disable>C}	{A:ErrDis:<errors-disable>:C}	Disables/Enables error popups in error monitor <errors-disable> if 1 error popups are disabled in error monitor, if 0 error popups are enabled
47 Set spread chart STD flow calibration value for M35W, M45W and M60W only	{S:SChart:<std-value>C}	{A:SChart:<std-value>:C}	Set spread chart std flow calibration value for M35W, M45W and M60W spreaders only <std-value> ex. "25.56" as standard flow calibration value Range: "1.00" to "75.00"
47A Set spread chart STD flow calibration value for M35W, M45W and	{s:SChart:<std-value>C}	{a:SChart:<std-value>:C}	Set spread chart std flow calibration value for M35W, M45W and M60W spreaders only

M60W only			<std-value> ex. “25.560” as standard flow calibration value Range: “1.000” to “75.000” Unit: Kg
48 Set s-indicator flow calibration value for M35W, M45W and M60W only	{S:SIndic:<s-indicator>C}	{A:SIndic:<s-indicator>:C}	Set s-indicatorflow calibration value for M35W, M45W and M60W spreaders only <s-indicator> ex. “3.560” as standard flow calibration value Range: “0.300” to “9.000”
48A Set s-indicator flow calibration value for M35W, M45W and M60W only	{s:SIndic:<s-indicator>C} (not supported)	{a:SIndic:<s-indicator>:C} (not supported)	Set s-indicatorflow calibration value for M35W, M45W and M60W spreaders only <s-indicator> ex. “3.5600” as standard flow calibration value Range: “0.3000” to “9.0000”
54 Set left and right spreader quantity in dual dynamic feature	{SXLLLLRRRRC}	{AXLLLLRRRRC}	Parameters: LLLL= four digit LEFT quantity: 0 – 2000Kg/Ha Ex. 300Kg/Ha: LLLL=0300 RRRR= four digit RIGHT quantity: 0-2000Kg/Ha Ex. 250Kg/Ha: RRRR=0250 LEFT and RIGHT quantity will be set to NOMINAL quantity they are not updated within 60 seconds – this is to avoid wrong spread pattern at communication timeout
54A Set left and right spreader quantity in dual dynamic feature	{sXLLLLLRRRRRC}	{aXLLLLLRRRRRC}	Parameters: LLLLL= five digit LEFT quantity: 0.0 – 2000.0 Kg/Ha Ex. 300.0 Kg/Ha: LLLLL=03000 RRRRR= five digit RIGHT quantity: 0-2000.0 Kg/Ha Ex. 250.0 Kg/Ha: RRRR=02500 LEFT and RIGHT quantity will be set to NOMINAL quantity they are not updated within 60 seconds – this is to avoid wrong spread

			pattern at communication timeout
56 Set differential control mode	{SxMC}	{AxMC}	Parameters: M = one single digit M = 0 – differential control mode is Standard differential mode M = 1 – differential control mode: Dynamic differential.
57 Set Headland Reduction mode	{S:HLRedu:<off/left/right>:<0mm/-10mm/-20mm>:C}	{A:HLRedu:<off/left/right>:<0mm/-10mm/-20mm>:<error>:C}	Parameters: <off/left/right>: -1=off 0=left mode is enabled (not right mode) 1=right mode is enabled (not left mode) <0mm/-10mm/-20mm>: -1=0mm 0=-10mm 1=-20mm <error>: 0=ok/success 1=spreader is locked error 2=plot mode to border or normal mode error – mode is incorrect 3=left/right mode parameter error 4=reduction value parameter error
64 Set Kg step setting for non-w-models	{S:KgStep:<Kg-Step>:C}	{A:KgStep:<Kg-Step>:C}	Parameters: <Kg-Step>: Range 10kg – 1000kg
69 Set 32bit sections hex value mask for Automatic Headland Management	{S:SOrlCs:<32bit-sections-hex-value>:C}	{A:SOrlCs:<32bit-sections-hex-value>:C}	Parameters: <32bit-sections-hex-value>: Range 00000000 – FFFFFFFF When 32bit sections mode each bit equals a section. Leftmost is 31 and rightmost is 0 When 16bit mode the pairs of bits are leftmost 15 and rightmost is 0 When 16bit mode all bits must be enabled in pairs – see examples below: 0FFFFFFF: this means that section 31, 30, 29 and 28 (32bit mode) are inactive and 16bit mode reflects that section 15 and 14 are closed.

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			FFFFFFF0: this means that section 0, 1, 2 and 3 are inactive and section 0 and 1 are inactive in 16bit mode. 00FFFFFF: this means that 31, 30, 29, 28, 27, 26, 25 and 24 are inactive in 32bit mode and that section 15, 14, 13 and 12 are inactive in 16bit mode.
72 Set manual state of overload “Wedge Width” with 32bit sections hex value mask for Manual Headland	{S:MOrlCs: <RequestEnable>: <RequestWidth>: <32bit-sections-hex-value> :C}	{A:MOrlCs: <AccesError>: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <32bit-sections-hex-value> :C}	Set manual state of overload “Wedge Width” RS232 function control of enable/disable section and width for headland management The first interface to request/reserve this function when available will own/reserve it until released. <RequestEnable> Request to reserve function via RS232/ HID interface – if not already in use by TOTZ GUI or another interface ‘0’ – not requesting manual wedge width/section function ‘1’ – requesting manual wedge width/section function if available <RequestWidth> “0.0” to “50.0” maximum should be nominal spreader width when used with headland management If “-1.0” is received – the TOTZ will calculate actual spread width from the number of sections active and the nominal spread width <AccessError> response on the request enable function when external unit sends 0 – access is granted, or no request enable has been sent by external unit 1 – access NOT granted function for wedge control is already in use by another interface error <AccessOwner> Who

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			currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use '1'- function is reserved/in use by RS232 interface '2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in TOTZ GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.0 to 50.0 meters – maximum should however be nominal spread width in any case for Headland Management <32bit-sections-hex-value>: Range 00000000 – FFFFFFFF When 32bit sections mode each bit equals a section. See command 4.4.69 for description of 32bit and 16bit mode
72A Set manual state of overload "Wedge Width" with 32bit sections hex value mask for Manual Headland	{s:MOrlCs: <RequestEnable>: <RequestWidth>: <32bit-sections-hex-value> :C}	{a:MOrlCs: <AccesError>: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <32bit-sections-hex-value> :C}	Set manual state of overload "Wedge Width" RS232 function control of enable/disable section and width for headland management The first interface to request/reserve this function when available will own/reserve it until released.

			<RequestEnable> Request to reserve function via RS232/ HID interface – if not already in use by TOTZ GUI or another interface '0' – not requesting manual wedge width/section function '1' – requesting manual wedge width/section function if available <RequestWidth> "0.00" to "50.00" maximum should be nominal spreader width when used with headland management If "-1.00" is received – the TOTZ will calculate actual spread width from the number of sections active and the nominal spread width <AccessError> response on the request enable function when external unit sends 0 – access is granted, or no request enable has been sent by external unit 1 – access NOT granted function for wedge control is already in use by another interface error <AccessOwner> Who currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use '1'- function is reserved/in use by RS232 interface '2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in TOTZ GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge

			control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.0 to 50.0 meters – maximum should however be nominal spread width in any case for Headland Management <32bit-sections-hex-value>: Range 00000000 – FFFFFFFF When 32bit sections mode each bit equals a section. See command 4.4.69 for description of 32bit and 16bit mode
73 Set the relative distance driven from 15 meters offset for differential dynamic commands	{S:VRAPos:<Set-Distance>:C}	{A:VRAPos:<Current-Distance>:C}	Set the relative distance driven from 15 meters offset for differential dynamic commands. <Set-Distance> Value between -10.0 to 10.0 meters. <Current-Distance> Value between -10.0 to 10.0 meters.
73A Set the relative distance driven from 15 meters offset for differential dynamic commands	{s:VRAPos:<Set-Distance>:C}	{a:VRAPos:<Current-Distance>:C}	Set the relative distance driven from 15 meters offset for differential dynamic commands. <Set-Distance> Value between -10,00 to 10,00 meters. <Current-Distance> Value between -10,00 to 10,00 meters.
76 Set/configure TOTZ to emulate a ZURF over the serial interface – using 8 sections instead of 16 – if	{S:EmZURF:<Activate>:C}	{A:EmZURF:<Activate>:C}	Request TOTZ to behave as a ZURF over the serial interface. <Activate> 0 – TOTZ will behave as a TOTZ.

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the spreader width is larger than 24 meters			1 – TOTZ will behave as a ZURF over the serial interface with 8 sections.
77 Tell the CALIBRATOR TOTZ that it's connected to an ISOBUS system via the serial interface.	{S:Isobus:<Activate>:C}	{A:Isobus:<Activate>:C}	Inform TOTZ that it's connected to an ISOBUS system. <Activate> 0 – TOTZ isn't connected to an ISOBUS system. 1 – TOTZ is connected to an ISOBUS system.
84 Set internal Dynamic Headland mode enable or disable	{S:DHMode:<Mode>:C}	{A:DHMode:<Failed>:<Mode>:C}	Set internal Dynamic Headland mode for system. Notice that this is an internal mode – enabled or disabled <Mode> "-1" – read out current dynamic headland mode – enabled or disabled – when sending a request from external device. "0" – Dynamic Headland mode is off. "1" – Dynamic Headland mode is enabled <Failed> "0" – mode has changed to requested mode "1" – PTO RPM too high "2" – mode change has failed – initial stage. "3" – Menu item not available <Mode> in answer will always be either "0" or "1"
85 Set internal Dynamic Headland Strategy	{S:DHStra:<Strategy>:C}	{A:DHStra:<Strategy>:C}	Set internal Dynamic Headland Strategy for system. <Strategy> "0" – Minus 10 percent on main actuator position. "1" – Standard mode actuator position isn't compensated. "2" – plus 10 percent on

			main actuator position.
85 Set internal Dynamic Headland Strategy	{S:DHStra:<Strategy>:C}	{A:DHStra:<Strategy>:C}	Set internal Dynamic Headland Strategy for system. <Strategy> "0" – Minus 10 percent on main actuator position. "1" – Standard mode actuator position isn't compensated. "2" – plus 20 percent on main actuator position.
86 Set internal Dynamic Headland boundary left or right	{S:DHBdry:<Right>:C}	{A:DHBdry:<Right>:C}	Set internal Dynamic Headland boundary for system. <Right> "-1" – set to undefined position. "0" – set to boundary left table. "1" – set to boundary right table.
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
8 Current calibration quantity <FlwCal>	{R:FlwCal:C}	{W:FlwCal:<value>:C}	Value has variable length. Ex: 22,50 kg => "22.50" Unit: kg Range: "5.00" – "50.00"
8A Current calibration quantity <FlwCal>	{r:FlwCal:C}	{w:FlwCal:<value>:C}	Value has variable length. Ex: 22,500 kg => "22.500" Unit: kg Range: "5.000" – "50.000"
9 % change of calibration value (Calibration deviation) <FlwCDv>	{R:FlwCDv:C}	{W:FlwCDv:<value>:C}	Value has variable length. Ex: 9,2% => "9.2"; 10% = "10.0" Unit: % Range: "-999.9" – "999.9"
10 % step change of application rate <P-Step>	{R:P-Step:C}	{W:P-Step:<value>:C}	Value has variable length. Unit: % Range: "1" – "25"
11 Remaining area compared with	{R:RmArea:C}	{W:RmArea:<value>:C}	Value has variable length. Ex: 28,3Ha => "28.3";

hopper contents <RmArea>			32Ha = “32.0” Unit: Ha Range: “0.0” – “99999.9”
11A Remaining area compared with hopper contents <RmArea>	{r:RmArea:C}	{w:RmArea:<value>:C}	Value has variable length. Ex: 28,30Ha => “28.30”; 32Ha = “32.00” Unit: Ha Range: “0.00” – “99999.99”
12 Remaining length compared with hopper contents <RemLen>	{R:RemLen:C}	{W:RemLen:<value>:C}	Value has variable length. Ex: 4324m => “4324” Unit: m Range: “0” – “999999”
12A Remaining length compared with hopper contents <RemLen>	{r:RemLen:C}	{w:RemLen:<value>:C}	Value has variable length. Ex: 4324.0m => “43240” Unit: m Range: “0.0” – “999999.9”
19 Main control interface for user input <SprInt>	{R:SprInt:C}	{W:SprInt: <Interface>: <AllocReady>: C}	<Interface> “0” : Serial interface control mode “1”: Normal user key input from panel (default mode at boot) <AllocReady> “0” – system is ready for allocation message “1” – no allocation can currently be performed – system is busy
20 Reading the FAC mode on/off <FacEna>	{R:FacEna:C}	{W:FacEna:<value>:C}	Enable/disabled full-automatic calibration (FAC) “0”: disabled “1”: enabled
21 Reading percentage overdose	{R:PStVal:C}	{W:PStVal:<value>:C}	% Range: “-100” – “400”
22 Reading spreader status	{R:SprSta:C}	{W:SprSta: <SpreaderActive>: <TrendPosition>:C}	<SpreaderActive> 0 = system is not spreading fertilizer 1 = system is spreading fertilizer <TrendPosition> 0 = normal 1 = to border 2 = from border 3 = undefined position
24 Reading status on delayed spread width overload function <SOrlWt>	{R:SOrlWt:C}	{W:SOrlWt:<Mode>:<Width>:C}	Read status on spread width overload function <Mode> “0” - spread width overload function

Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12			disabled "1" - spread width overload function enabled <Width> Current spread width overload value is returned if overload function is enabled otherwise configured spread width is returned. Range "0.0" to "50.0"
24A Reading status on delayed spread width overload function <SOrlWt> Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12	{r:SOrlWt:C}	{w:SOrlWt:<Mode>:<Width>:C}	Read status on spread width overload function <Mode> "0" - spread width overload function disabled "1" - spread width overload function enabled <Width> Current spread width overload value is returned if overload function is enabled otherwise configured spread width is returned. Range "0.00" to "50.00"
27 Reading status on delayed start/stop spreading overload function <SOrlSE> Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12	{R:SOrlSE:C}	{W:SOrlSE:<Mode>:C}	Read status on delayed start/stop spreading overload function <Mode> "0" – stop spreading "1" – start spreading

28 Reading Calibrator system identity <CalSys> Note: This command is implemented for ICON version 1.07 and UNIQ version 1.12	{R:CalSys:C}	{W:CalSys:<Id>:C}	Read Calibrator system Id. <Id> "1" – UNIQ "2" – ICON "3" – ZURF "4" – ADON/TOTZ
29 Reading the actual tractor speed <SpdKmh>	{R:SpdKmh:C}	{W:SpdKmh:<value>:C}	Read current tractor speed. <value> Range: "0.0" – "99.0"
29A Reading the actual tractor speed <SpdKmh>	{r:SpdKmh:C}	{w:SpdKmh:<value>:C}	Read current tractor speed. <value> Range: "0.00" – "99.00"
31 Read delayed state of overload enable/disable section for headland management <SOrlBs>	{R:SOrlBs:C}	{W:SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Read delayed state of overload enable/disable section for headland management <bomsection1> to <bomsection8> "0" – disable bom-section 1 "1" – enable bom-section 1 Bom-section 1 is located leftmost in the tractor forward direction Bom-section 8 is located rightmost in the tractor forward direction
32 Read manual state of overload "Wedge Width" ZURF dialog or RS232 function control of enable/disable section and width for headland management <MOrlBs>	{R:MOrlBs:C}	{W:MOrlBs: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Read manual state of overload "Wedge Width" ZURF dialog or RS232 function control/use of enable/disable section and width for headland management <AccessOwner> Who currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use '1'- function is reserved/in use by RS232 interface

			'2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.0 to 50.0 meters – maximum should however be nominal spread width in any case for Headland Management <bomsection1> to <bomsection8> '-1' – section not available/valid in current mode '0' – section is disabled '1' – section is enabled Section 1 is located leftmost in the tractor forward direction Section 8 is located rightmost in the tractor forward direction
32A Read manual state of overload "Wedge Width" ZURF dialog or RS232 function control of enable/disable section and width for headland management <MOrlBs>	{r:MOrlBs:C}	{w:MOrlBs: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8> :C}	Read manual state of overload "Wedge Width" ZURF dialog or RS232 function control/use of enable/disable section and width for headland management <AccessOwner> Who currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use

			'1'- function is reserved/in use by RS232 interface '2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.00 to 50.00 meters – maximum should however be nominal spread width in any case for Headland Management <bomsection1> to <bomsection8> '-1' – section not available/valid in current mode '0' – section is disabled '1' – section is enabled Section 1 is located leftmost in the tractor forward direction Section 8 is located rightmost in the tractor forward direction
33 Read current nominal main actuator scale <NomSca>	{R:NomSca:C}	{W:NomSca:<scale>:C}	Read current nominal main actuator scale <scale> main actuator scale "0.00" to "9.00"
33A Read current nominal main actuator scale	{r:NomSca:C}	{w:NomSca:<scale>:C}	Read current nominal main actuator scale <scale> main actuator

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<NomSca>			scale “0.000” to “9.000”
34 Check for presence of SC-Dynamic unit in the system. <ChkSCD> NOTE: ZURF will determine this value during boot with automatic device check sequence or each time the boot monitor device scan/check sequence is performed.	{R:ChkSCD:C}	{W:ChkSCD:<present>:C}	Check for presence of SC-Dynamic on CAN bus <present> -1 = unchecked 0 = SC-Dynamic is present in system 1 = SC-dynamic is NOT present
37 Check for presence and status of the IC unit in the system <ICStat>	{R:ICStat:C}	{W:ICStat:<present>:<enabled>:C}	Check for presence and status of the IC on the CAN bus <present> -1 = unchecked or not seen in system during boot 0 = contact to IC is lost – but IC was seen during boot 1 = IC is present and system has contact <enabled> 0 = IC is disable – angle compensation is turned off 1 = IC is enabled – angle compensation is enabled
39 Read accumulated quantity spread value <AcQSpr>	{R:AcQSpr:C}	{W:AcQSpr:<quantity>:C}	Read accumulated quantity spread value in kg <quantity> quantity spread value in kg: Range: “-10000” – “100000”
39A Read accumulated quantity spread value <AcQSpr>	{r:AcQSpr:C}	{w:AcQSpr:<quantity>:C}	Read accumulated quantity spread value in kg <quantity> quantity spread value in kg: Range: “-10000.0” – “100000.0”
42	{R:SOrlAE:C}	{W:SOrlAE:<position>:C}	Headland Setting:

Headland Setting Read relative Headland START position/ distance <SOrlAE> Reflects the value in ZURF: "menu-> Settings-> Headland settings-> Adjust Start"			Adjustment relative to the pre-defined START/Main actuator OPEN position <position> relative START position/ distance value in meters: Range: "-6.0" – "6.0"
42A Headland Setting Read relative Headland START position/ distance <SOrlAE> Reflects the value in ZURF: "menu-> Settings-> Headland settings-> Adjust Start"	{r:SOrlAE:C}	{w:SOrlAE:<position>:C}	Headland Setting: Adjustment relative to the pre-defined START/Main actuator OPEN position <position> relative START position/ distance value in meters: Range: "-6.00" – "6.00"
43 Headland Setting Read relative Headland STOP position/distance <SOrlAD> Reflects the value in ZURF: "menu-> Settings-> Headland settings-> Adjust Stop"	{R:SOrlAD:C}	{W:SOrlAD:<position>:C}	Headland Setting: Adjustment relative to the pre-defined STOP/Main actuator CLOSE position <position> relative STOP position/ distance value in meters: Range: "-6.0" – "6.0"
43A Headland Setting Read relative Headland STOP position/distance <SOrlAD> Reflects the value in ZURF: "menu-> Settings-> Headland settings-> Adjust Stop"	{r:SOrlAD:C}	{w:SOrlAD:<position>:C}	Headland Setting: Adjustment relative to the pre-defined STOP/Main actuator CLOSE position <position> relative STOP position/ distance value in meters: Range: "-6.00" – "6.00"
44 Read IC angles and status <ICAngl>	{R:ICAngl:C}	{W:ICAngl: <ic-ena>: <weigth-modifier-procent>: <ic-bitmap-state>: <ic-fai-ena>:	Reads the state/status and current angles of the IC <ic-ena>: IC is enabled and not bypassed

		<angle-x>: <angle-y>: <angle-z>:C}	<eigth-modifier-procent>: compensation factor in procent on current weight in hopper based on current angle of spreader Decimal value ex. 101.2 <ic-bitmap-state> configuration state of IC <ic-fai-ena> is FAI enable by IC – fixed values FAI is always enabled <angle-x>-<angle-z> angles for each axis, is decimal value Ex. 10.2
45 Read error monitor error popup disable/enable <ErrDis>	{R:ErrDis:C}	{W:ErrDis:<errors-disabled>:C}	Read error monitor error popup disable/enable <errors-disabled>: are error popups disable in error monitor
49 Read Spread Chart std flow calibration value and current spreader model/class	{R:SChart:C}	{W:SChart:<model>:<class>:<std-value>:C}	Read Spread Chart std flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W 7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC

			and MAX+ only! <std-value> Flow calibration STD value ex. “25.45” Range: “1.00” – “75.00”
49A Read Spread Chart std flow calibration value and current spreader model/class	{r:SChart:C}	{w:SChart:<model>:<class>:<std-value>:C}	Read Spread Chart std flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W 7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC and MAX+ only! <std-value> Flow calibration STD value ex. “25.450” Range: “1.000” – “75.000”
50 Read S-Indicator- flow calibration value and current spreader model/class	{R:SIndic:C}	{W:SIndic:<model>:<class>:<s-indicator>:C}	Read S-Indicator flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W

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			7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC and MAX+ only! <s-indicator> Flow calibration S-Indicator value ex. “3.450” Range: “0.300” – “9.000”
50A Read S-Indicator- flow calibration value and current spreader model/class	{r:SIndic:C} (not supported)	{w:SIndic:<model>:<class>:<s-indicator>:C} (not supported)	Read S-Indicator flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W 7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC and MAX+ only!

			<s-indicator> Flow calibration S-Indicator value ex. “3.4500” Range: “0.3000” – “9.0000”
53 Read S-Indicator, STD/Spread Chart, MAX, MAX+ and MIN flow calibration value and current spreader model/class	{R:FlwCls:C}	{W:FlwCls:<model>:<class>:<std/spread-chart>:<s-indicator>:<max>:<max+>:<min>:C}	Read S-Indicator, STD/Spread Chart, MAX, MAX+ and MIN flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W 7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC and MAX+ only! <std/spread-chart> Flow-calibration value as STD/Spread-Chart value ex. “22.50” <s-indicator> Flow calibration S-Indicator value ex. “3.450” Range: “0.300” – “9.000” – with loss compared to STD <max> MAX value of flow calibration value - with gain compared to STD ex. “34.00”

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			<max+> MAX value of flow calibration value – with gain compared to STD ex “45.00” <min> MIN value of flow calibration value – with loss compared to STD ex "8.00”
53A Read S-Indicator, STD/Spread Chart, MAX, MAX+ and MIN flow calibration value and current spreader model/class	{r:FlwCls:C}	{w:FlwCls:<model>:<class>:<std/spread-chart>:<s-indicator>:<max>:<max+>:<min>:C}	Read S-Indicator, STD/Spread Chart, MAX, MAX+ and MIN flow calibration value and current spreader model/class <model> -1= unknown model 0=M3W 1=M2W 2=L2W 3=M6W 4=M35W 5=M45W 6=M60W 7=L20W <class> -1=unknown class 0=normal/STD 1=+40%/MAX 2=-40%/MIN 3=Fixed Scale/MIC 4=MAX+ Note: L2W supports STD, MIN and MIC/fixed scale only M2W, M6W and M3W support classes: normal, +40%, -40% and Fixed Scale only M35W, M45W and M60W support <class> STD, MAX, MIN, MIC and MAX+ only! <std/spread-chart> Flow-calibration value as STD/Spread-Chart value ex. “22.500” <s-indicator> Flow calibration S-Indicator value ex. “3.4500” Range: “0.3000” – “9.0000” – with loss compared to STD

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			<max> MAX value of flow calibration value - with gain compared to STD ex. “34.000” <max+> MAX value of flow calibration value – with gain compared to STD ex “45.000” <min> MIN value of flow calibration value – with loss compared to STD ex "8.000”
55 Read Left and right spreader quantity for dual dynamic feature	{RXC}	{WXLLLLRRRRC}	Parameters: LLLL= four digit LEFT nominal quantity: 0 – 1999 Kg/Ha Ex. 300 Kg/Ha: LLLL=0300 RRRR= four digit RIGHT nominal quantity: 0 -1999Kg/Ha Ex. 250Kg/Ha: RRRR=0250
55A Read Left and right spreader quantity for dual dynamic feature	{rXC}	{wXLLLLLRRRRRC}	Parameters: LLLLL= five digit LEFT nominal quantity: 0.0 – 1999.0Kg/Ha Ex. 300.0Kg/Ha: LLLL=03000 RRRRR= five digit RIGHT nominal quantity: 0.0-2000.0Kg/Ha Ex. 250.0Kg/Ha: RRRRR=02500
57 Read current differential control setting	{RxC}	{WxMC}	Parameters: M = single digit M=0 – differential control – standard differential mode M=1 – differential control – dynamic differential control mode
58	{RYC}	{WYLLLLRRRRC}	Parameters:

Read current differential control effective left and right quantity for dual dynamic control			LLLL= four digit LEFT effective quantity: 0 – 1999 Kg/Ha Ex. 300 Kg/Ha: LLLL=0300 RRRR= four digit RIGHT effective quantity: 0 -1999Kg/Ha Ex. 250Kg/Ha: RRRR=0250
58A Read current differential control effective left and right quantity for dual dynamic control	{rYC}	{wYLLLLLRRRRRC}	Parameters: LLLLL= five digit LEFT effective quantity: 0.0 – 1999.0Kg/Ha Ex. 300.0Kg/Ha: LLLL=03000 RRRRR= five digit RIGHT effective quantity: 0.0 - 1999.0Kg/Ha Ex. 250.0Kg/Ha: RRRRR=02500
59 Read current state of can-bus device firmware update handler	{R:FrmMon:<index>:C}	{R:FrmMon:<index>:<is-present>:<is-busy>:<state>:<state-value>:<HW-Version>:C}	<index>: 0 – Multi-CAN handler 1 – Single-Trend TB handler 2 – Single-Trend DS/FB handler 3 – Single-Oneside left handler 4 – Single-Oneside right handler <is-present>: 0 – can-bus device is NOT present 1 – can-bus device is present <is-busy> 0 – firmware handler is done working with can-bus device or device isn't present in system and there are no pending operations on device 1 – firmware handler is busy making contact to can-bus device and trying get software version and maybe update the firmware <state>: 0 – idle

			1 – enabled – trying to contact can-bus device 2 – initialize context and start communication with can-bus device 3 – check hardware version of can-bus device 4 – check firmware version can-bus device 5 – rebooting can-bus device 6 – communication timeout waiting for retry 7 – transferring firmware to can-bus device with percentage progress value in <state-value> range 0.0-100.0 8 – internal firmware version and can-bus device firmware matches <state-value is the software version ex. 1.02b 9 – failed to communicate with can-bus device 10 – the CALIBRATOR has no internal firmware this can-bus device, operation aborted <state-value>: If <state> = 7 percentage progress of firmware transfer: 0.0 – 100.0 If <state> = 8 firmware/SW version of can-bus device, ex. 1.04d <HW-Version>: can-bus device hardware version, ex. 00001718
62 Read error logging entry from index in error log	{R:ErrLog:<index>:C}	{W:ErrLog:<index>:<error-class>:<error-code>:<error-descriptor>:<error-user-response>:<error-value-a>:<error-value-b>:<date-valid>:<date-day>:<date-month>:<date-year>:<time-hour>:<time-minute>:C}	<index>: 0-199 Where 0 is the oldest entry and 199 is the newest <error-class> 0 – no error class or error not defined 1 – error FAC/FAI 2 – error main actuator 3 – error trend TB actuator 4 – error trend DS/FB actuator 5 – error hopper/loadcell 6 – notification power down

			7 – error IC 8 – error SC-Dynamic 9 – error can-bus blocked 10 – error GPS/VTG speed feed timeout 11 – error tractor speed monitor This value is the same as <ActiveErrrorClass> from table in section 4.21 12 – error Oneside left actuator 13 – error Oneside right actuator <error-code> = <DeviceErrorCode> in table in section 4.21 <error-descriptor> maskable options value for error, which keys are allowed for the user to press, and are value a and/or b defined for the error Mask bit: 0 – none 1 – may action confirm/user has confirmed over RS232 2 – may action cancel/user has confirmed over RS232 4 – has valid value a 8 – has valid value b 16 – error is cleared 32 – user pressed enter from GUI 64 – user pressed esc from GUI <error-user-response> same maskable bits as <error-descriptor> <error-value-a> is valid if has value a bit (4) is set in <error-descriptor>, this is a pure text string. Otherwise this field will be empty – this field may contain up 9 digits <error-value-b> is valid if has value b bit (8) is set in <error-descriptor>, this is a pure text string. Otherwise this field will be empty – this field may contain up 9 digits

			<date-valid> if 0 the date and time are invalid – if 1 then date and time are valid information <date-day> 00 if invalid, if valid: 01-31 <date-month> 00 if invalid, if valid 01-12 <date-year> 00 if invalid, if valid 19-99 <time-hour> 00-23 <time-minute> 00-59
62 Read error logging entry from index in error log	{R:ErrLog:<index>:C}	{W:ErrLog:<index>:<error-class>:<error-code>:<error-descriptor>:<error-user-response>:<error-value-a>:<error-value-b>:<date-valid>:<date-day>:<date-month>:<date-year>:<time-hour>:<time-minute>:C}	<index>: 0-199 Where 0 is the oldest entry and 199 is the newest <error-class> 0 – no error class or error not defined 1 – error FAC/FAI 2 – error main actuator 3 – error trend TB actuator 4 – error trend DS/FB actuator 5 – error hopper/loadcell 6 – notification power down 7 – error IC 8 – error SC-Dynamic 9 – error can-bus blocked 10 – error GPS/VTG speed feed timeout 11 – error tractor speed monitor This value is the same as <ActiveErrrorClass> from table in section 4.21 12 – error Oneside left actuator 13 – error Oneside right actuator <error-code> = <DeviceErrorCode> in table in section 4.21 <error-descriptor> maskable options value for error, which keys are allowed for the user to press, and are value a and/or b defined for the error Mask bit:

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			0 – none 1 – may action confirm/user has confirmed over RS232 2 – may action cancel/user has confirmed over RS232 4 – has valid value a 8 – has valid value b 16 – error is cleared 32 – user pressed enter from GUI 64 – user pressed esc from GUI <error-user-response> same maskable bits as <error-descriptor> <error-value-a> is valid if has value a bit (4) is set in <error-descriptor>, this is a pure text string. Otherwise this field will be empty – this field may contain up 9 digits <error-value-b> is valid if has value b bit (8) is set in <error-descriptor>, this is a pure text string. Otherwise this field will be empty – this field may contain up 9 digits <date-valid> if 0 the date and time are invalid – if 1 then date and time are valid information <date-day> 00 if invalid, if valid: 01-31 <date-month> 00 if invalid, if valid 01-12 <date-year> 00 if invalid, if valid 19-99 <time-hour> 00-23 <time-minute> 00-59
63 Read Headland Reduction mode	{R:HLRedu:C}	{W:HLRedu:<off/left/right>:<0mm/-10mm/-20mm>:C}	Parameters: <off/left/right>: -1=off 0=left mode is enabled (not right mode) 1=right mode is enabled (not left mode) <0mm/-10mm/-20mm>: -1=0mm 0=-10mm

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			1=-20mm
65 Read Kg step setting for non-w-models	{R:KgStep:C}	{W:KgStep:<Kg-Step>:C}	Parameters: <Kg-Step>: Range 10kg to 1000kg
67 Read loadcell enabled model (w-models) or loadcell disable model (non-w-models)	{R:WModel:C}	{W:WModel:<Has-Loadcell-enabled-model>:C}	Parameters: <Has-Loadcell-enabled-model>: 0 = has loadcell enabled spreader model 1 = has loadcell disabled spreader model
68 Read last loadcell calibration date for w-models	{R:LCCaDa:C}	{W:LCCaDa:<Last-Loadcell-calibration-date>:C}	Parameters: <Last-Loadcell-calibration-date>: “Day.month.year hours:minute” Date and time for last calibration of loadcell if w-model spreader If not w-model spreader this field will be empty
70 Read current 32bit sections hex-value mask for automatic headland management	{R:SOrlCs:C}	{W:SOrlCs:<32-bit-sections-hex-value-mask>:C}	Parameters: <32-bit-sections-hex-value-mask>: Range: 00000000 – FFFFFFFF In 32bit mode each bit equals a section. In 16bit mode each section bits are paired see command 4.4.69
73 Read manual state of overload “Wedge Width” TOTZ/ADON dialog or RS232 function control of enable/disable section and width for headland management with 32bit sections hex-value mask for manual headland	{R:MOrlCs:C}	{W:MOrlCs: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <32-bit-sections-hex-value-mask> :C}	Read manual state of overload “Wedge Width” TOTZ dialog or RS232 function control/use of enable/disable section and width for headland management <AccessOwner> Who currently owns/have access to the manual wedge control ‘0’ – not reserved/ function is available for use ‘1’- function is reserved/in use by RS232 interface ‘2’ – function is reserved/in use by USB HID Device interface ‘3’ – function is reserved/in use by dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width

			control '0' – manual wedge control is off/not in use '1' – manual wedge control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.0 to 50.0 meters – maximum should however be nominal spread width in any case for Headland Management <32-bit-sections-hex-value-mask>: Range: 00000000 – FFFFFFFF In 32bit mode each bit equals a section. In 16bit mode each section bits are paired see command 4.4.69
73A Read manual state of overload "Wedge Width" TOTZ/ADON dialog or RS232 function control of enable/disable section and width for headland management with 32bit sections hex-value mask for manual headland	{r:MOrlCs:C}	{w:MOrlCs: <AccessOwner>: <WedgeControl>: <CurrentWidth>: <32-bit-sections-hex-value-mask> :C}	Read manual state of overload "Wedge Width" TOTZ dialog or RS232 function control/use of enable/disable section and width for headland management <AccessOwner> Who currently owns/have access to the manual wedge control '0' – not reserved/ function is available for use '1'- function is reserved/in use by RS232 interface '2' – function is reserved/in use by USB HID Device interface '3' – function is reserved/in use by dialog in ZURF GUI NOTE: extra generic interfaces may be added in the future. <WedgeControl > Mode of manual wedge width control '0' – manual wedge control is off/not in use '1' – manual wedge

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			control is enabled using SC Standard configuration with spreader width regulation only '2' – manual wedge control is enabled using SC Dynamic configuration with section control <CurrentWidth> current spread width in meters – range is: 0.00 to 50.00 meters – maximum should however be nominal spread width in any case for Headland Management <32-bit-sections-hex-value-mask>: Range: 00000000 – FFFFFFFF In 32bit mode each bit equals a section. In 16bit mode each section bits are paired see command 4.4.69
74 Read relative distance driven, to absolute offset of 15 meters, when preforming differential dynamic.	{R:VRAPos:C}	{W:VRAPos:<RelativeDisplacement>:C}	Read relative displacement of all differential dynamic commands to 15 meters absolute offset <RelativeDisplacement> Relative displacement to 15 meters driven – this value can be -10.0 to 10.0 meters
74A Read relative distance driven, to absolute offset of 15 meters, when preforming differential dynamic.	{r:VRAPos:C}	{w:VRAPos:<RelativeDisplacement>:C}	Read relative displacement of all differential dynamic commands to 15 meters absolute offset <RelativeDisplacement> Relative displacement to 15 meters driven – this value can be -10,00 to 10,00 meters
78 Read if TOTZ must emulate ZURF over the serial interface.	{R:EmZURF:C}	{R:EmZURF:<Active>:C}	TOTZ will emulate a ZURF serially <Active>: 0 – normal mode will behave as a TOTZ 1 – TOTZ will behave as a ZURF
79 Read if TOTZ is connected to an ISOBUS system.	{R:Isobus:C}	{R:Isobus:<Active>:C}	Is TOTZ connected to an ISOBUS system? <Active>:

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			0 – no, this is another device. 1 – yes, is connected to an ISOBUS system.
80 Read if Dynamic Headland is supported by the current configuration and if it's active.	{R:DHSupp:C}	{R:DHSupp:<Supported>:<IsActive>:C}	Is TOTZ supporting Dynamic Headland with current configuration? And is it active? <Supported>: "0" – no, Dynamic Headland is currently NOT supported. "1" – yes, Dynamic Headland is currently supported. <IsActive> "0" – no we not executing Dynamic Headland "1" – yes - Dynamic Headland is active
81 Read the Dynamic Headland mode.	{R:DHMode:C}	{R:DHMode:<Mode>:C}	Read out the current Dynamic Headland mode. This is an internal mode for the system. <Mode>: "-1" – no, Dynamic Headland is currently NOT supported. "0" – normal mode - Dynamic Headland is supported but NOT in use. "1" – to border mode – Dynamic Headland is supported and IS in use. "2" - from border mode – Dynamic Headland is supported but NOT in use. If <Mode> is >= 0 then the dynamic headland feature is enabled. If < 0 then the Dynamic Headland feature is disabled.
82 Read the Dynamic Headland strategy.	{R:DHStra:C}	{R:DHStra:<Strategy>:C}	Read out the current Dynamic Headland strategy <Strategy>: "0" – minus 10 percent on main actuator position.

			"1" – standard on main actuator position. "2" – plus 20 percent on main actuator position.
83 Read the Dynamic Headland boundary right setting.	{R:DHBdry:C}	{R:DHBdry:<Right>:C}	Read the Dynamic Headland boundary right setting. <Right>: "-1" – value isn't defined. "0" – system is using left boundary table. "1" – system is using right boundary table.
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
13 Limits for Spread width <SprdWt>	{L:SprdWt:C}	{M:SprdWt:<min_value>:<max_value>:C}	Range: "0.1" – "50.0"
13A Limits for Spread width <SprdWt>	{l:SprdWt:C}	{m:SprdWt:<min_value>:<max_value>:C}	Range: "0.10" – "50.00"
14 Limits for the %-step value <P-Step>	{L:P-Step:C}	{M:P-Step:<min_value>:<max_value>:C}	Range: "1" – "25"
15 Limit for speed <SpdKmh>	{L:SpdKmh:C}	{M:SpdKmh:<min_value>:<max_value>:C}	Km/h Range: "0.0" – "99.0"
15A Limit for speed <SpdKmh>	{l:SpdKmh:C}	{m:SpdKmh:<min_value>:<max_value>:C}	Km/h Range: "0.00" – "99.00"
16 Limits for calibration quantity <FlwCal>	{L:FlwCal:C}	{M:FlwCal:<min_value>:<max_value>:C}	Kg Range: "5.00" – "50.00"
16A Limits for calibration quantity <FlwCal>	{l:FlwCal:C}	{m:FlwCal:<min_value>:<max_value>:C}	Kg Range: "5.000" – "50.000"
25 Limits for delayed spread width overload function <SOrlWt> Note: This command is designed for use in applications based on	{L:SOrlWt:C}	{M:SOrlWt:<min_value>:<max_value>:C}	M Range: "0.0" – "50.0"

Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12			
25A Limits for delayed spread width overload function <SOrlWt> Note: This command is designed for use in applications based on Headland Management which involves delayed transaction based on the distance driven. Is implemented for ICON version 1.07 and UNIQ version 1.12	{l:SOrlWt:C}	{m:SOrlWt:<min_value>:<max_value>:C}	M Range: “0.00” – “50.00”
35 Limits for main actuator scale <NomSca>	{L:NomSca:C}	{M:NomSca:<min_value>:<max_value>:C}	Range: “0.00” – “9.00”
35A Limits for main actuator scale <NomSca>	{l:NomSca:C}	{m:NomSca:<min_value>:<max_value>:C}	Range: “0.000” – “9.000”
44 Limits for relative Headland START position/distance <SOrlAE>	{L:SOrlAE:C}	{M:SOrlAE:<min_value>:<max_value>:C}	Range: “-6.0” – “6.0”
44A Limits for relative Headland START position/distance <SOrlAE>	{l:SOrlAE:C}	{m:SOrlAE:<min_value>:<max_value>:C}	Range: “-6.00” – “6.00”
45 Limits for relative Headland STOP position/distance	{L:SOrlAD:C}	{M:SOrlAD:<min_value>:<max_value>:C}	Range: “-6.0” – “6.0”

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<SOrlAE>			
45A Limits for relative Headland STOP position/distance <SOrlAE>	{l:SOrlAD:C}	{m:SOrlAD:<min_value>:<max_value>:C}	Range: “-6.00” – “6.00”
51 Limits for Spread Chart STD flow calibration value	{L:SChart:C}	{M:SChart:<min_value>:<max_value>:C}	Range: “1.00” – “75.00”
51A Limits for Spread Chart STD flow calibration value	{l:SChart:C}	{m:SChart:<min_value>:<max_value>:C}	Range: “1.000” – “75.000”
52 Limits for S-Indicator flow calibration value	{L:SIndic:C}	{M:SIndic:<min_value>:<max_value>:C}	Range: “0.300” – “9.000”
52A Limits for S-Indicator flow calibration value	{l:SIndic:C}	{m:SIndic:<min_value>:<max_value>:C}	Range: “0.3000” – “9.0000”
60 Limits for can-bus device firmware update handlers	{L:FrmMon:C}	{M:FrmMon:<min-handler-index>:<max-handler-index>:C}	Range: “0” – “2” “0” – Multi-CAN “1” – Single-Trend TB “2” – Single-Trend DS/FB “3” – Single-Oneside left “4” – Single-Oneside right
61 Limits for error logging entries	{L:ErrLog:C}	{M:ErrLog:<min-error-index>:<max-error-index>:C}	If both: <min-error-index> = -1 and <max-error-index> = -1 Then error log is empty If <min-error-index>=0 and <max-error-index> = 0…199 then <min-error-index> is the oldest error entry and <max-error-index> is the newest When a maximum of 200 error logging entries are reached the error log will be shifted – deleting the oldest entry
66 Limits kg step setting for non-w-models	{L:KgStep:C}	{M:KgStep:<min-kg-step>:<max-kg-step>:C}	Range “10” – “1000” Unit: Kg
71 Limits for 32 bit/16 bits sections control.	{L:SOrlCs:C}	{M:SOrlCs:<min-sections-hex-value>:<max-sections-hex-value>:C}	Range “00000000” – “FFFFFFFF” Unit: None
75 Read limits for moving distance	{L:VRAPos:C}	{M:VRAPos:<min-value>:<max-vallue>:C}	Range from “-10.0” meters to “+10.0” meters.

driven position relatively to default 15 meters offset for differential dynamic commands.			Unit: Meters
75A Read limits for moving distance driven position relatively to default 15 meters offset for differential dynamic commands.	{I:VRAPos:C}	{m:VRAPos:<min-value>:<max-vallue>:C}	Range: “-10,00” meters to “+10,00” meters. Unit: Meters
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	

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4.5 Boot monitor

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Start device check sequence <DevChk>	{S:DevChk:C}	{A:DevChk:<value:C}	0 = OK seq started 1 = Fail – seq is running
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Version number for the ZURF SW, ZURF HW, ZURF serial number and protocol <SysVer> Note: This command is implemented for ICON version 1.07 and UNIQ version 1.12. The command does not require allocation.	{R:SysVer:C}	{W:SysVer :<ZURFSW> :<ZURFHW> :<ZURFSerial> :<ProtocolVer> :<DateOfBirth> :C}	Strings containing the actual version number. ZURFSW: 5 bytes max ZURFHW: 12 bytes max ZURFSerial: 8 bytes max ProtocolVer: 5 bytes max DateOfBirth: 15 bytes max They are all strings ending with character ':'
3 Status on Device check <DevChk>	{R:DevChk:C}	{W:DevChk :<CheckSeqEnabled> :<Power> :<Actuator> :<TBActuator> :<DSActuator> :<IC> :<PTO> :<Speed> :<Internal> :<OSLeftActuator> :<OSRightActuator> :C}	This command reports the status of the external devices during boot. NOTE: If no devices are found on the CAN-bus – the internal CAN-Bus will be scanned up to 6 times for devices – before the scan sequence completes. <CheckSeqEnabled>: 0 = Idle 1 = checking devices <Power>: -1 = unchecked 0 = OK 1 = To low 2 = To high <Actuator>: -1 = unchecked 0 = OK 1 = Not present <TBActuator>: -1 = unchecked 0 = OK 1 = Not present <DSActuator>: -1 = unchecked 0 = OK 1 = Not present <IC>: -1 = unchecked 0 = OK 1 = Not present <PTO>: -1 = unchecked

			0 = OK 1 = Not present 2 = Short 3 = General error <Speed>: -1 = unchecked 0 = OK 1 = Not present 2 = Short <Internal>: -1 = unchecked 0 = OK 1 = Error < OSLeftActuator >: -1 = unchecked 0 = OK 1 = Not present < OSRightActuator >: -1 = unchecked 0 = OK 1 = Not present
6 Status general CAN-Bus communication blocked error counter. <CanErr>	{R:CanErr:C}	{W:CanErr:<CanBusBlockedErrors>:C}	This command reports the number of CAN-Bus communication blocked errors seen. <CanBusBlockedError> 0 – 6 block errors seen If 0 – The CAN-Bus communication is working fine – and system is operational. If 1-6 block errors detected – It seems that a hardware fault in a device on the CAN-Bus is blocking all communication to other devices (could be the IC). The only way to solve his problem is to replace the device that's not working. If there's an SC-Dynamic in the system – control of the spread pattern on field is NOT possible. .

Reading out limits from ZURF

Action	Computer sends	Device answers	Comment
NA	NA	NA	

Allocating unit on ZURF

Action	Computer sends	Device answers	Comment
4 Allocating spreader model change <DevChk>	{X:DevChk:C}	{Y:DevChk:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/ no access

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Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
5 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.6 Error monitor

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Responding to active error with confirm or cancel action <SprErr>	{S:SprErr:<action>:C}	{A:SprErr :<ActiveErrorClass> :<DeviceErrorCode> :<Result> :C}	Input <Action> "1" – respond with confirm "2" – respond with cancel Output <ActiveErrorClass> class of active error See read <SprErr> function description for details Output <DeviceErrorCode> Device error code for active error class See read <SprErr> function description for details Output <Result> "0" – confirm/cancel error action accepted "1" – action invalid error
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Read notifications from spreader monitor <SprNot>	{R:SprNot:C}	{W:SprNot :<ActiveErrorClass> :<SpeedStatus> :<PtoStatus> :<HopperLow> :<AutomaticFillIn> <ConfirmFixedScale> :C}	<ActiveErrorClass> Classification of current active error from spreader monitor: "0" – no error active "1" – FAC error or announcement active "2" – Main actuator error active "3" – Trend TB error active "4" – Trend DS error active "5" – Hopper/load cell error active "6" – Power off save announcement active "7" – IC error active "8" – SC-Dynamic error "9" – General internal CAN Bus blocked error "10" – GPS NMEA Monitor error "11" – Max speed errors "12" – Oneside left error active "13" – Oneside right error active <SpeedStatus> Status on current speed while spreader is active "0" - speed is ok "1" - speed is too low "2" - speed is too high

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			<PtoStatus> Status on PTO rpm while spreader is active "0" PTO rpm is ok "1" PTO rpm is too low <HopperLow> Status on hopper contents "0" – contents is ok "1" – contents is low <AutomaticFillIn> Automatic fill in is detected status "0" – no fill in "1" – automatic fill in is detected <ConfirmFixedScale> Status on fixed scale (micro mode) confirmation "0" – no confirmation "1" – farmer should confirm fixed scale. This is done by the tool functions provided in spreader class section
3 Read detailed description for active error class (from notification above) <SprErr> Each error reported by the error monitor is described in detail in section 4.20 in this document.	{R:SprErr:C}	{W:SprErr :<ActiveErrorClass> :<DeviceErrorCode> :<MayCancel> :<MayConfirm> :<ErrorValue1> :<ErrorValue2> :C}	<ActiveErrorClass> / AEC Classification of current active error from spreader monitor: "0" – no error active "1" – FAC/AC error or announcement active "2" – Main actuator error active "3" – Trend TB error active "4" – Trend DS error active "5" – Hopper/load cell error active "6" – Power off save announcement active "7" – IC error active "8" – SC-Dynamic error "9" – General internal CAN Bus blocked error "10" – NMEA VTG timeout "11" – Max speed errors "12" – Oneside left error active "13" – Oneside right error active <DeviceErrorCode> depends on active error class (AEC) – is described below of each class <u>No error active AEC="0":</u> "0" - no error code valid <u>FAC/AC AEC="1":</u>

			"1" – FAC calculated flow calibration value deviation too high. <ErrorValue1> = calculated flow calibration value <ErrorValue2> = deviation in percent from current flow calibration value Confirm: accept value Cancel: reject value "2" – FAC calculated flow calibration value deviation is out of acceptable range - <ErrorValue1>= calculated flow calibration value <ErrorValue2>= deviation in percent from current flow calibration value Confirm only "3" - AC is stopped because of there's no enough fertilizer in the hopper Confirm only "4" - AC is stopped because of unintended fill in situation Confirm only "5" - AC is stopped because flow calibration value/factor was changed Confirm only <u>Main Actuator AEC = "2":</u> "1" – connection problem "2" – over current detected "3" – over temperature "4" – short circuit detected "5" – open circuit detected "6" – regulation timeout "7" – general error detected All errors from the main actuator has both confirm and cancel options. Confirm: retry surveillance of main actuator Cancel: Snooze surveillance for now <u>Trend TB AEC = "3":</u> "1" – system has lost the connect to the trend TB "2" - trend TB is not at expected position anymore All errors from the trend TB has both confirm and cancel options. Confirm: retry surveillance of trend TB Cancel: Snooze surveillance for now <u>Trend DS AEC = "4":</u> "1" – system has lost the connect to the trend DS "2" - trend DS is not at

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			expected position anymore All errors from the trend DS has both confirm and cancel options. Confirm: retry surveillance of trend DS Cancel: Snooze surveillance for now <u>Hopper/load cell AEC = “5”</u> “1” - overload of hopper detected – this might damage the spreader mechanics <ErrorValue1> max acceptable load (5 bytes) <ErrorValue2> current load (6 bytes) This error can only be confirmed “2” – hopper contains less than 200/120 kg. <ErrorValue1>200/120 This error can only be confirmed “3” – Hopper contains less than 150/70 kg. Please fill in to keep an even distribution! <ErrorValue1>150/70 This error can only be confirmed <u>Power Off save AEC = “6”</u> “1” - save field data on USB stick before power-off? Confirm: Save to stick Cancel: power off <u>IC AEC = “7”</u> “1” – connection to IC is lost All errors from the IC has both the confirm and cancel options. Confirm: retry surveillance of IC Cancel: Snooze surveillance for now <u>SC-Dynamic AEC = “8”</u> “1” - SC-Dynamic is preform initialization sequence and is not operation yet – warning “2” – System has lost the connection to the SC-Dynamic over the CAN bus “3” – System had an expected response from the SC-Dynamic “4” – SC-Dynamic sync. message during programming error “5” – SC-Dynamic flash erase failed during programming error “6” – SC-dynamic flash write

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			failed during programming error "7" – SC-Dynamc flash mode during programming error "8" – SC-Dynamic unknown error occurred during programming "9" – SC-dynamic reported Left1 actuator connection error "10" – SC-Dynamic reported Left1 actuator overcurrent error "11" – SC-Dynamic reported Left1 actuator over temp. error "12" – SC-Dynamic reported Left1 actuator short circuit error "13" – SC-Dynamic reported Left1 acutator open circuit error "14" – SC-Dynamic reported Left1 actuator regulation timeout error "15" – SC-Dynamic reported Left1 actuator movement direction error "16" – SC-Dynamic reported Left1 actuator unknown error "17" – SC-dynamic reported Right1 actuator connection error "18" – SC-Dynamic reported Right1 actuator overcurrent error "19" – SC-Dynamic reported Right1 actuator over temp. error "20" – SC-Dynamic reported Right1 actuator short circuit error "21" – SC-Dynamic reported Right1 acutator open circuit error "22" – SC-Dynamic reported Right1 actuator regulation timeout error "23" – SC-Dynamic reported Right1 actuator movement direction error "24" – SC-Dynamic reported Right1 actuator unknown error For All the above errors "1" – "24" the response is: Confirm: retry surveillance of SC-Dynamic Cancel: Snooze surveillance for now <u>General CAN-bus blocked error AEC="9"</u> "1" – CRITCAL ERROR!!!: Some Device on the CAN-bus has a hardware failure and is blocking

			communication to the other devices on the CAN-Bus (maybe the IC). If there's an SC-Dynamic in the system – control of the spread pattern on field is NOT possible. Confirm: Retry surveillance. Cancel: Snooze surveillance for now. <u>GPS NMEA Monitor error = "10"</u> "1" - System has NOT received a GPS NMEA VTG speed message for a long time – speed is unknown error <u>Max speed error = "11"</u> "1" – Tractor max speed exceeded <ErrrorValue1> internal max tractor speed <ErrorValue2> current tractor speed <u>Oneside left AEC = "12":</u> "1" – system has lost the connect to the Oneside left "2" – Oneside left is not at expected position anymore All errors from the Oneside left has both confirm and cancel options. Confirm: retry surveillance of Oneside left Cancel: Snooze surveillance for now <u>Oneside right AEC = "13":</u> "1" – system has lost the connect to the Oneside right "2" – Oneside right is not at expected position anymore All errors from the Oneside right has both confirm and cancel options. Confirm: retry surveillance of Oneside right Cancel: Snooze surveillance for now <MayCancel> Does error/announcement accept cancel as valid response by user: "0" – no "1" – yes <MayConfirm> Does error/announcement accept confirm as valid response by user: "0" – no "1" – yes

			NOTE: at least one action <MayConfirm> or <MayCancel> is valid <ErrorValue1> Optional information on announcement/error Max bytes 10 <ErrorValue2> Optional information on announcement/error Max bytes 10
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	NA
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	NA
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	NA

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4.7 Spreader class

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Setting the spreader model and class <SClass>	{S:SClass: <Model>: <Class>: C}	{A:SClass: <Fail>: <Model>: <Class>: C}	Before calling this function the SClass must be allocated. <Fail>: 0 = configuration accepted 1 = configuration failed – combination of model and class not supported 2 = accepted, select FAC <Model>: -1=Unknown model 0 = M3W 1 = M2W 2 = L2W 3 = M6W 4 = M35W 5 = M45W 6 = M60W 7 = L20W 8 = L20/L15 9 = M35 10 = M45 11 = L15W <Class> -1=Unknown class 0 = Normal/STD 1 = +40%/MAX 2 = -40%/MIN 3 = Fixed Scale/MIC 4= MAX+ Note: L2W/L20W/L20/L15 supports STD, MIN and MIC/fixed Scale class only!!! M2W, M6W and M3W support all 4 classes. STD, MAX, MIN, MIC, MAX+ <Class> only apply to M35/M35W, M45/M45W and M60W, MIC Must be treated as fixed scale M2W and M3W doesn't support MAX+
2 Set Fixed scale setting for main actuator <FixScl>	{S:FixScl:<value>:C}	{A:FixScl:<value>:C}	Fixed scale setting Range: "0.1" – "9.0"

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Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
3 Actual spreader model <SClass>	{R:SClass:C}	{W:SClass: <Model>: <Class>: C}	<Model>: -1=Unknown model 0 = M3W 1 = M2W 2 = L2W 3 = M6W 4 = M35W 5 = M45W 6 = M60W 7 = L20W 8 = L20/L15 9 = M35 10 = M45 11 = L15W <Class> -1=Unknown class 0 = Normal/STD 1 = +40%/MAX 2 = -40%/MIN 3 = Fixed Scale/MIC 4 = MAX+ Note: L2W/L20W/L20/L15 supports STD, MIN and MIC/fixed Scale class only!!! STD, MAX, MIN, MIC, MAX+ <Class> only apply to M35/M35W, M45/M45W and M60W, MIC Must be treated as fixed scale M2W, M3W doesn't support MAX+
4 Read current Fixed scale setting for main actuator <FixScl>	{R:FixScl:C}	{W:FixScl:<value>:C}	Fix scale setting Range: "0.1" – "9.0"
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
5 <FixScl>	{L:FixScl:C}	{M:FixScl:<min_value>:<max_value>:C}	Fixed scale setting or MIC Setting Range: "0.1" – "9.0"
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
6 Allocating spreader model change <SClass>	{X:SClass:C}	{Y:SClass:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/ no access

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Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
7 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.8 Controlling the Open function

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Controlling the OPEN function <ShOpen>	{S:ShOpen:<value>:C}	{A:ShOpen:<value>:C}	<value>: 0 = Close the shutter 1 = Open the shutter Before calling this function the ShOpen must be allocated.
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Actual OPEN status <ShOpen>	{R:ShOpen:C}	{W:ShOpen:<Position>:<Status>:C}	<Position>: 0 = Shutter closed 1 = Shutter open <Status>: 0 = OK 1 = Error, fixed speed 2 = Error, speed to high Before calling this function the ShOpen must be allocated.
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
3 Allocating OPEN for change <ShOpen>	{X:ShOpen:C}	{Y:ShOpen:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
4 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.9 Speed sensors

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Setting the speed sensor test mode for counter sensor input <SpdTst>	{S:SpdTst:<value>:C}	{A:SpdTst:<value>:C}	<value>: 0 = Impulse A 1 = Radar A 2 = Tractor Board A 3 = Impulse B 4 = Radar B 5 = Tractor Board B 6 = Fixed speed 7 = RS232 8 = GPS Speed
2 Setting speed sensor test mode to actual calibration mode of speed sensor input <SpdCal>	{S:SpdCal:C}	{A:SpdCal:<value>:C}	<value>: 0 = Impulse A 1 = Radar A 2 = Tractor Board A 3 = Impulse B 4 = Radar B 5 = Tractor Board B 6 = Fixed speed 7 = RS232 8 = GPS Speed
3 Resetting the live pulse counter from sensor input <SpdCnt>	{S:SpdCnt:C}	{A:SpdCnt:<value>:C}	Pulse counter value from sensor <value> Always “0” returned
4 Setting the number of pulses pr. meter <SpdPpm>	{S:SpdPpm:<value>:C}	{A:SpdPpm:<value>:C}	Pulse/m Range: “1.00” – “999.00”
4A Setting the number of pulses pr. meter <SpdPpm>	{s:SpdPpm:<value>:C}	{a:SpdPpm:<value>:C}	Pulse/m Range: “1.000” – “999.999”
5 Setting the desired fixed speed <SpdFix>	{S:SpdFix:<value>:C}	{A:SpdFix:<value>:C}	Km/h Range: “4.0” – “99.0”
5A Setting the desired fixed speed <SpdFix>	{s:SpdFix:<value>:C}	{a:SpdFix:<value>:C}	Km/h Range: “4.00” – “99.99”
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
6 Read current speed sensor calibration mode for spreader <SpdCal>	{R:SpdCal:C}	{W:SpdCal:<value>:C}	<value>: 0 = Impulse A 1 = Radar A 2 = Tractor Board A 3 = Impulse B 4 = Radar B 5 = Tractor Board B 6 = Fixed speed 7 = RS232 8 = GPS Speed
7 Read enabled speed	{R:SpdTst:C}	{W:SpdTst:<value>:C}	<value>:

test mode for counter input type <SpdTst>			0 = Impulse A 1 = Radar A 2 = Tractor Board A 3 = Impulse B 4 = Radar B 5 = Tractor Board B 6 = Fixed speed 7 = RS232 8 = GPS Speed
8 Read current test mode live pulse counter from sensor input <SpdCnt>	{R:SpdCnt:C}	{W:SpdCnt:<value>:C}	Pulse counter value from sensor input Range: "0" – "9999999"
9 Pulse/m for actual speed sensor <SpdPpm>	{R:SpdPpm:C}	{W:SpdPpm:<value>:C}	Pulse/m Range: "1.00" – "999.00"
9A Pulse/m for actual speed sensor <SpdPpm>	{r:SpdPpm:C}	{w:SpdPpm:<value>:C}	Pulse/m Range: "1.000" – "999.999"
10 Actual fixed speed <SpdFix>	{R:SpdFix:C}	{W:SpdFix:<value>:C}	Km/h Range: "4.0" – "99.0"
10A Actual fixed speed <SpdFix>	{r:SpdFix:C}	{w:SpdFix:<value>:C}	Km/h Range: "4.00" – "99.99"
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
11 <SpdPpm>	{L:SpdPpm:C}	{M:SpdPpm:<min_value>:<max_value>:C}	Pulse/m Range: "1.00" – "999.00"
11A <SpdPpm>	{l:SpdPpm:C}	{m:SpdPpm:<min_value>:<max_value>:C}	Pulse/m Range: "1.000" – "999.999"
12 <SpdFix>	{L:SpdFix:C}	{M:SpdFix:<min_value>:<max_value>:C}	Km/h Range: "4.0" – "99.0"
12A <SpdFix>	{l:SpdFix:C}	{m:SpdFix:<min_value>:<max_value>:C}	Km/h Range: "4.00" – "99.99"
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
13 <SpdCal>	{X:SpdCal:C}	{Y:SpdCal:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
14 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.10 Manual Calibration (MC)

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Controlling the Manual Calibration function <ManCal>	{S:ManCal:<value>:C}	{A:ManCal:<value>:C}	<value>: 0 = STOP calibration 1 = START calibration Before calling this function the ManCal must be allocated.
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Actual Manual Calibration status <ManCal>	{R:ManCal:C}	{W:ManCal:<Control>:<CountDown>:C}	<Control>: 0 = Calibration ended 1 = Calibration is running <DountDown>: Count down in seconds: “30”-“0” Errors during MC will be reported by ErrMon. Before calling this function the ManCal must be allocated.
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
3 Allocating OPEN for change <ManCal>	{X:ManCal:C}	{Y:ManCal:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
4 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.11 Calibrating the main actuator (adj. actuator)

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Calibrating the adjustment actuator <ActCal>	{S:ActCal:<value>:C}	{A:ActCal:<value>:C}	<value>: 0 = STOP calibration 1 = START calibration
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 <ActCal>	{R:ActCal:C}	{W:ActCal :<Progress> :<ScalePosition> :<V-Bat> :<I-Act> :<Status> :C}	<Progress>: 0 = Calibration ended 1 = Calibration is running <ScalePosition>: 4 bytes The actual scale position (0-9). Until valid scale position is ready the value will be -1 <V-Bat>: 4 bytes Actual battery voltage <I-Act>: 4 bytes Actual actuator current <Status>: 0 = OK 1 = No connection to Act. 2 = Over current 3 = H-bridge failure 4 = Short circuit 5 = Open circuit 6 = Actuator blocked 7 = Actuator timeout 8 = Calibration interrupted by the user 9 = Access violation 10 = Failed due to low battery. 11 = General error
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
3 <ActCal>	{X:ActCal:C}	{Y:ActCal:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
4 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.12 Controlling the TREND-HEADLAND and Oneside Close actuators

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Setting the desired spreading mode/pattern <TrendH>	{S:TrendH:<value>:C}	{A:TrendH:<Position>:<Status>:C}	<Position>: 0 = Normal 1 = To Border 2 = From Border <Status>: 0 = OK 1 = PTO RPM too high 2 = Set to PTO chart 3 = Menu item not available NOTE: Mode change from “to border” to “from border” or back is allowed regardless of PTO RPM
2 Setting the desired Oneside close actuator <OneSde>	{S:OneSde:<value>:C}	{A:OneSde:<Position>:<Status>:C}	<Position>: 0 = Left side close 1 = Right side close 2 = Left side open 3 = Right side open 4 = Both sides closed 5 = Both sides open <Status>: 0 = OK 1 = Failed
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
3 <TrendH>	{R:TrendH:C}	{W:TrendH :<Progress> :<PTO rpm> :<PTO Status> :<Position> :<TBStatus> :<DSStatus> :C}	<Progress>: 0 = Actuators are idle 1 = Actuators is moving <PTO rpm>: 5 bytes Actual PTO value in rpm <PTO Status>: 0 = OK 1 = Shorted 2 = No sensor 3 = rpm to high <Position>: 0 = Normal 1 = To Border 2 = From Border 3 = Unknown <TBStatus>: 0 = OK 1 = No contact 2 = electro 3 = Timeout 4 = Over current <DSStatus>: 0 = OK 1 = No contact 2 = electro 3 = Timeout 4 = Over current
4 <OneSde>	{R:OneSde:C}	{W:OneSde :<Position>	<Position>: 0 = Left side closed

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		:<OSLStatus> :<OSRStatus> :C}	1 = Right side closed 2 = Both sides closed 3 = Both sides open <OSLStatus>: 0 = OK 1 = No contact 2 = electro 3 = Timeout 4 = Over current <OSRStatus>: 0 = OK 1 = No contact 2 = electro 3 = Timeout 4 = Over current
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
5a <TrendH>	{X:TrendH:C}	{Y:TrendH:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
5b <OneSde>	{X:OneSde:C}	{Y:OneSde:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
6 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.13 Calibration of the load cell

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Start the zero point calibration <LCZero>	{S:LCZero:C}	{A:LCZero:<value>:C}	<value>: 0 = OK 1 = Weight is unstable
2 Start the full calibration. Before calling this the zero point calibration must be performed. <LCFull>	{S:LCFull:<quantity>:C}	{A:LCFull:<quantity>:<status>:C}	<quantity>: Load value for full calibration Range: “50” – “10000” <status>: 0 = OK 1 = Weight is unstable
2A Start the full calibration. Before calling this the zero point calibration must be performed. <LCFull>	{s:LCFull:<quantity>:C} (not supported)	{a:LCFull:<quantity>:<status>:C} (not supported)	<quantity>: Load value for full calibration Range: “50.0” – “10000.0” <status>: 0 = OK 1 = Weight is unstable
3 Finalize the zero point calibration – this will force ZURF to save the data <LCFinZ>	{S:LCFinZ:C}	{A:LCFinZ:<value>:C}	<value>: 0 = OK 1 = zero point calibration is not available
4 Finalize the full calibration – this will force ZURF to save the data <LCFinF>	{S:LCFinF:C}	{A:LCFinF:<value>:C}	<value>: 0 = OK 1 = zero point calibration is not available - error 2 = load value for full calibration point is not available - error 3 = zero/full point match error
9 Finalize the full calibration – this will force ZURF to store the data as the factory calibration for the load cell <LCFFcS>	{S:LCFFcS:C}	{A:LCFFcS:<value>:C}	<value>: 0 = OK 1 = zero point calibration is not available - error 2 = load value for full calibration point is not available - error 3 = zero/full point match error
10 Restore factory calibration data for the load cell <LCFFcR>	{S:LCFFcR:C}	{A:LCFFcR:<value>:C}	<value>: 0 = OK 1 = Fail
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
5 Read the status of the weight – stable or unstable <LoCell>	{R:LoCell:C}	{W:LoCell:<value>:C}	<value>: 0 = Weight is calm 1 = Weight is unstable
Reading out limits from ZURF			

Action	Computer sends	Device answers	Comment
6 Min and max value for the hopper content for full calibration <LCFull>	{L:LCFull:C}	{M:LCFull:<min_value>:<max_value>:C}	Kg Range: “50” – “10000”
6A Min and max value for the hopper content for full calibration <LCFull>	{l:LCFull:C} (not supported)	{m:LCFull:<min_value>:<max_value>:C} (not supported)	Kg Range: “50.0” – “10000.0”
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
7 <LoCell>	{X:LoCell:C}	{Y:LoCell:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
8 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.14 Controlling the error monitor pop up

This function will be defined later!

4.15 Controlling Micro Mode

The idea behind this function is that the farmer must confirm Micro mode also called fixed scale class or chose another class normal, +40% or -40%. The flag will be raised in the error monitor when it's time for the farmer to make this decision. The tools available for this - are defined under the section Spreader Class.

4.16 Controlling Fill-in (both manual and automatic)

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Resetting the carry over value <FillCr>	{S:FillCr:<value>:C}	{A:FillCr:<value>:C}	<value> is the carry over value in kg Range: "0" – "99999" Typical use is for resetting carry over to 0 – when <value> is "0"
1A Resetting the carry over value <FillCr>	{s:FillCr:<value>:C}	{a:FillCr:<value>:C}	<value> is the carry over value in kg Range: "0.9" – "99999.0" Typical use is for resetting carry over to 0 – when <value> is "0"
2 Confirm and end fill in sequence <FillCf>	{S:FillCf:C}	{A:FillCf:<Result>:C}	<Result>: "0" – the fill in sequence is completed successfully or non-w-model "1" – fill in sequence can't complete because the hopper weight is unstable Fill in sequence can be deallocated with changes applied and automatic fill in flag will be reset in error monitor if response is "0" otherwise NOT.
9 Set filled in amount for manual fill in non-w-model spreader	{S:FillnW:<Filled-in-kg>:C}	{A:FillnW:<Filled-in-kg>:C}	<Filled-in-kg>: Unit: Kg Range: "0" – "99999"
12 Reset hopper contents – for non-w-models only	{S:HopRst:C}	{A:HopRst:<Result>:C}	<Result>: 0 – non-w-model hopper contents was reset successfully 1 – hopper contents wasn't reset error – can't reset w-model spreaders
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
3 Read carry over value for fill in sequence	{R:FillCr:C}	{W:FillCr:<value>:C}	<value> is the current carry over value in kg Range: "0" – "99999"

<FillCr>			
3A Read carry over value for fill in sequence <FillCr>	{r:FillCr:C}	{w:FillCr:<value>:C}	<value> is the current carry over value in kg Range: “0.0” – "99999.0”
4 Reading fill in sequence weight status <FillSt>	{R:FillSt:C}	{W:FillSt :<WeightIsStable> :<WeightBefore> :<WeightNow> :<FilledIn> :<Sum> :C}	<WeightIsCalm> State value: “0” – weight is unstable “1” – weight is stable Note: in order to confirm the fill in sequence the weight must be stable <WeightBefore> in kg Weight of contents in hopper when fill in sequence was allocated Range “-9999” to “9999” kg <WeightNow> in kg Current weight of hopper contents Range “-9999” to “9999” kg <FilledIn> in kg Amount of material fill in during sequence Range “-9999” to “9999” kg <Sum> in kg Added value of filled in amount and carry over value Range “-9999” to “9999” kg
4A Reading fill in sequence weight status <FillSt>	{r:FillSt:C}	{w:FillSt :<WeightIsStable> :<WeightBefore> :<WeightNow> :<FilledIn> :<Sum> :C}	<WeightIsCalm> State value: “0” – weight is unstable “1” – weight is stable Note: in order to confirm the fill in sequence the weight must be stable <WeightBefore> in kg Weight of contents in hopper when fill in sequence was allocated Range “-9999.0” to “9999.0” kg <WeightNow> in kg Current weight of hopper contents Range “-9999.0” to “9999.0” kg <FilledIn> in kg Amount of material fill in during sequence Range “-9999.0” to “9999.0” kg <Sum> in kg Added value of filled in

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			amount and carry over value Range “-9999.0” to “9999.0” kg
10 Read manually Filled in hopper contents in kg for non-w-models	{R:FilInW:C}	{W:FilInW:<Filled-In-Kg>:C}	<Filled-In-Kg> Hopper filled in amount in kg Range: “0” – “99999” For non-w-models
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
5 Reading limits for carry over value <FillCr>	{L:FillCr:C}	{M:FillCr :<MinWeight> :<MaxWeight> :C}	Range “0” – “99999” in kg
5A Reading limits for carry over value <FillCr>	{l:FillCr:C}	{m:FillCr :<MinWeight> :<MaxWeight> :C}	Range “0.0” – “99999.0” in kg
11 Reading limits for hopper filled in amount for non-w-models	{L:FilInW:C}	{M:FilInW :<MinWeight> :<MaxWeight> :C}	Range “0.0” – “99999” in kg for non-w-models
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
6 Allocate manual fill in sequence <ManFil>	{X:ManFil:C}	{Y:ManFil:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
7 Allocate automatic fill in sequence – must be done when automatic fill in flag is raised in error monitor <AutFil>	{X:AutFil:C}	{Y:AutFil:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
8 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.17 Controlling the communication

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Set the baud rate for the serial RS232 interface <BaudRa>	{S:BaudRa:<Baudrate>:C}	{A:BaudRa:<Response>:C}	Input <value>: 0 = 9600 1 = 19200 2 = 115200 (ADON/TOTZ only) 3 = 38400 (ADON/TOTZ only) 4 = 57600 (ADON/TOTZ only) Device will change baud rate 200ms after the response if successful Output <Response>: "0" – ok baud rate will change after 200ms "1" – no access – function allocated "2" – not uart interface error operation aborted
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	

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4.18 Specific functions for Headland Management

Headland Management for CALIBRATOR ZURF/ICON/UNIQ. The following Bogballe protocol commands over the serial RS232 interface are implemented in these products:
CALIBRATOR ZURF software version 1.12 or higher
CALIBRATOR ICON software version 1.07 or higher
CALIBRATOR UNIQ software version 1.12 or higher
This document outlines a subset of the serial protocol commands needed for implementing Headland Management in external equipment interfacing to the CALIBRATOR.

Function	External unit sends	Answer from CALIBRATOR
Request nominal spread width 3.5.3 page 11	{RBC}	{WBxxxC} xx,x m, nominal spread width
Request nominal spread width 3.5.3A page 11	{rBC}	{wBxxxxC} xx,xx m, nominal spread width
Request status 3.5.11 page 11	{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
Set overload width 4.4.23 page 22	{S:SOrlWt:<mode>:<width>:C} <mode>: 0=disabled, 1=enabled <width>: xx.x meters – is nominal spread width if disabled (0.0 to 50.0 meters)	{A:SOrlWt:<mode>:<width>:C} <mode>: 0=disabled, 1=enabled <width>: xx.x meters – is nominal spread width if disabled (0.0 to 50.0 meters)
Set overload width 4.4.23A page 22	{s:SOrlWt:<mode>:<width>:C} <mode>: 0=disabled, 1=enabled <width>: xx.xx meters – is nominal spread width if disabled (0.00 to 50.00 meters)	{a:SOrlWt:<mode>:<width>:C} <mode>: 0=disabled, 1=enabled <width>: xx.xx meters – is nominal spread width if disabled (0.00 to 50.00 meters)
Request overload width 4.4.24 page 23	{R:SOrlWt:C}	{W:SOrlWt:<mode>:<width>:C}

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		<mode>: 0=disabled, 1=enabled <width>: xx.x meters – is nominal spread width if disabled (0.0 to 50.0 meters)
Request overload width 4.4.24A page 23	{r:SOrlWt:C}	{w:SOrlWt:<mode>:<width>:C} <mode>: 0=disabled, 1=enabled <width>: xx.xx meters – is nominal spread width if disabled (0.00 to 50.00 meters)

Function	External unit sends	Answer from CALIBRATOR
Request limits for overload width 4.4.25 page 26	{L:SOrlWt:C}	{M:SOrlWt:<min>:<max>:C} <min> 0.0 <max> 50.0
Request limits for overload width 4.4.25A page 26	{l:SOrlWt:C}	{m:SOrlWt:<min>:<max>:C} <min> 0.00 <max> 50.00
Set delayed start/stop spreading 4.4.26 page 22	{S:SOrlSE:<mode>:C} <mode>: 0=stop, 1=start	{A:SOrlSE:<mode>:C} <mode>: 0=stop, 1=start
Request delayed start/stop spreading 4.4.27 page 24	{R:SOrlSE:C}	{W:SOrlSE:<mode>:C} <mode>: 0=stop, 1=start

General remark for command strings: {xxxxC} where 'C' is the binary check sum at described in the protocol document.

Bom-section enable/disable command implemented for CALIBRATOR ZURF version 1.13 only.
This command is NOT implemented for UNIQ and ICON:

Set delayed enable/disable bom-section for headland management 4.4.30 page 22	{S:SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8>:C} <bomsectionN>: 0=disable, 1=enable	{A:SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>: <bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8>:C} <bomsectionN>: 0=disable, 1=enable
Read status on enable/disable bom-section for headland management 4.4.31 page 25	{R:SOrlBs:C}	{W: SOrlBs: <bomsection1>: <bomsection2>: <bomsection3>:

		<bomsection4>: <bomsection5>: <bomsection6>: <bomsection7>: <bomsection8>:C} <bomsectionN>: 0=disable, 1=enable
4.4.54 Set left and right spreader quantity in dual dynamic feature	{SXLLLLRRRRC}	{AXLLLLRRRRC} Parameters: LLLL= four digit LEFT quantity: 0 – 2000Kg/Ha Ex. 300Kg/Ha: LLLL=0300 RRRR= four digit RIGHT quantity: 0-2000Kg/Ha Ex. 250Kg/Ha: RRRR=0250 LEFT and RIGHT quantity will be set to NOMINAL quantity they are not updated within 60 seconds – this is to avoid wrong spread pattern at communication timeout
4.4.54A Set left and right spreader quantity in dual dynamic feature	{sXLLLLLRRRRRC}	{aXLLLLRRRRC} Parameters: LLLLL= five digit LEFT quantity: 0.0 – 2000.0Kg/Ha Ex. 300.0Kg/Ha: LLLLL=03000 RRRRR= five digit RIGHT quantity: 0.0-2000.0Kg/Ha Ex. 250.0Kg/Ha: RRRRR=02500 LEFT and RIGHT quantity will be set to NOMINAL quantity they are not updated within 60 seconds – this is to avoid wrong spread pattern at communication timeout

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4.19 SC-Dynamic monitor

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Start SC-Dynamic function sequence <MonSCD>	{S:MonSCD:<function>:C}	{A:MonSCD:<function>:<answer>:C}	<function> -1 = NA 1 = start calibration 2 = start programing and calibration <answer> 0 = ok – function sequence is started 1 = failed – sequence is already running error and SC monitor is busy
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Status on SC-Dynamic monitor <MonSCD>	{R:MonSCD:C}	{W:MonSCD :<FuncSeqEnabled> :<ScPresent> :<ScStatus> :<FirmwareVersion> :<ProgramProcent> :<Left1RegStatus> :<Right2RegStatus> :<Left1Position> :<Right2Position> :<Left1CalStatus> :<Right2CalStatus> :C}	This command reports the status of the SC-Dynamic monitor <FuncSeqEnabled>: Is Monitor preforming a function sequence 0 = Idle 1 = preforming function sequence <ScPresent>: Is SC seen on the CAN bus -1 = NA 0 = SC-Dynamic is present 1 = SC-Dynamic is not present in system <ScStatus>: General SC operational status -1 = NA 0 = checking SC status. 1 = rebooting SC. 2 = programming firmware in SC. 3 = calibrating SC 4 = SC is active/operational 5 = SC reported an unknown error 6 = SC connection lost error 7 = SC unexpect response error 8 = SC sync. Message error 9 = SC flash erase error 10 = SC flash write error 11 = SC flash mode error <FirmwareVersion>: SC application version: String ex. 1.00e if defined orderwise empty field

			<ProgramProcent>: Shows the progress during SC firmware update -1 = NA 0-100 = progress of firmware programming of SC via CAN bus. <Left1RegStatus>: Regulation status of left1 actuator: -1 = NA 0 = ok 1 = actuator connection error 2 = actuator covercurrent error 3 = actuator over temp. error 4 = actuator short circuit error 5 = actuator open circuit error 6 = actuator regulation timeout error 7 = actuator direction error 8 = actuator unknown error <Right2RegStatus>: Regulation status of right2 actuator: -1 = NA 0 = ok 1 = actuator connection error 2 = actuator covercurrent error 3 = actuator over temp. error 4 = actuator short circuit error 5 = actuator open circuit error 6 = actuator regulation timeout error 7 = actuator direction error 8 = actuator unknown error <Left1Position>: Current absolute position in mm of Left1 actuator -1 = NA 0-100 = position in mm (100 is fully extended) <Right2Position>: Current absolute position in mm of Right2 actuator -1 = NA 0-100 = position in mm (100 is fully extended) <Left1CalStatus>: Calibration status on Left1 actuator: -1 = NA

			0 = calibration ok 1 = calibration is running /busy 2 = calibration failed 3 = calibration unknown error 4 = calibration h-bridge error 5 = calibration pot-meter error 6 = calibration timeout error 7 = calibration user abort error 8 = calibration access error 9 = calibration overcurrent error <Right2CalStatus> Calibration status on Right2 actuator: -1 = NA 0 = calibration ok 1 = calibration is running /busy 2 = calibration failed 3 = calibration unknown error 4 = calibration h-bridge error 5 = calibration pot-meter error 6 = calibration timeout error 7 = calibration user abort error 8 = calibration access error 9 = calibration overcurrent error

Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	

Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
3 Allocating the SC-Dynamic monitor <MonSCD>	{X:MonSCD:C}	{Y:MonSCD:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/ no access

Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
4 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

4.20 IC Calibration

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Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
1 Set request on IC calibration sequence <ICCali>	{S:ICCali:<request>:C}	{A:ICCali:<request>:<response>:C}	<request> 0 = reset calibration timers 1 = disable IC and turn angle compensation OFF 2 = enable IC and save angle calibration points – turn angle compensation ON 3 = enable IC and save angle calibration points – and store these points as factory calibration <response> 0 = ok – request was accepted by ZURF 1 = invalid angle calibration points – request couldn't be performed 2 = default invalid request parameter error
5 Set restore IC factory calibration point – if they are valid <ICFRes>	{S:ICFRes:C}	{A:ICFRes:<response>:C}	Restore factory calibration points <response> 0 = ok – request was accepted by ZURF 1 = invalid angle calibration points – request couldn't be performed
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
2 Status on IC calibration <ICCali>	{R:ICCali:C}	{W:ICCali :<ICIsPresent> :<ICIsEnabled> :<ICXNow> :<ICYNow> :<ICXCalibrationPoint> :<ICYCalibrationPoint> :<ICIsStable> :<ICCalibrationValid> :<ICCalibrationTimeout> :C}	This command reports the status of the IC calibration function <ICIsPresent>: Is IC present on the can-bus? -1 = IC is not present in system – cannot calibrate 0 = contact to IC is lost – cannot calibrate 1 = IC is present and communication is online calibration can be performed <ICIsEnabled>: Is IC enabled and angle compensation turned ON? 0 = IC is disable and angle compensation is turned off 1 = IC is enabled angle compensation is ON <ICXNow>: current relative angle on x-axis of IC Empty if undefined otherwise -90.00 to +90.00

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			<ICYNow>: current relative angle on y-axis of IC Empty if undefined otherwise -90.00 to +90.00 <ICXCalibrationPoint>: current calibration sample point angle on x-axis of IC Empty if undefined or not set, otherwise -90.00 to +90.00 <ICYCalibrationPoint>: current calibration sample point angle on y-axis of IC Empty if undefined or not set, otherwise -90.00 to +90.00 <ICIsStable> are x and y angle current stable? 0 = x and y angles are unstable 1 = x and y angles are stable <ICCalibrationValid> are new x and y angle points valid for storage of new calibration point? 0 = x and y points are invalid 1 = x and y points are valid and may be saved as new calibration point <ICCalibrationTimeout> do we have a timeout in during calibration? 0 = no timeout during calibration 1 = timeout during calibration – new calibration points have been invalid for too long

Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
NA	NA	NA	

Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
3 Allocating the IC Calibration function <ICCali> When IC calibration function is allocated the calibration will automatically start after allocation	{X:ICCali:C}	{Y:ICCali:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/ no access

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Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
4 Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated

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4.21 Error Monitor detailed error description

Error monitor detailed error texts for command:
{W:SprErr
<ActiveErrorClass>
:<DeviceErrorCode>
:<MayCancel>
:<MayConfirm>
:<ErrorValue1>
:<ErrorValue2>
:C}

ActiveErrorClass	DeviceErrorCode	Text	Short Alarm label
1 – FAC/AC			
	1	FAC has calculated a calibration factor, which needs to be approved by the user: x kg (calibration factor) x % (deviation) Do you want to confirm this value?	1.1 FAI: DPM HIGH BB.B% AA.AAkg
.	2	FAC has calculated a calibration factor, which lies outside of the valid interval (10-45kg). FAC has been stopped! x kg (calibration factor) x % (deviation)	1.2 FAI: DPM RANGE BB.B% AA.AAkg
	3	AC was stopped, because there is not enough fertilizer in the hopper.	1.3 AI: HOPPER EMPTY
	4	AC was stopped, because there was an unintended fill in situation detected.	1.4 AI: FILL IN
	5	AC was stopped, because the calibration factor was changed by user intervention.	1.5 AI USER FC
	6	Full Auto Calib. – Start FAC?	1.6 AI: START-FAC
2 – Main actuator			
	1	There was a connection problem with the actuator detected. Please check the electrical installation.	2.1 ACT-ERR: CONNECTION
	2	There was a overcurrent problem with the actuator detected. Please check the electrical installation.	2.2 ACT-ERR: OVERCURRENT
	3	There was a overtemperature problem with the actuator detected. Please check the electrical installation.	2.3 ACT-ERR: OVERTEMP
	4	There was a short circuit with the actuator detected. Please check the electrical installation.	2.4 ACT-ERR: SHORT
	5	There was a connection problem with the actuator detected. Please check the electrical installation.	2.5 ACT-ERR: OPEN
	6	The actuator regulation had a timeout. Please check the mechanics.	2.6 ACT-ERR: TIMEOUT
	7	There was an unexpected problem with the actuator detected. Please check the electrical and mechanical installation.	2.7 ACT-ERR: UNKNOWN
3 - Trend TB			
	1	There was a connection problem with the trend actuator detected. Please check the electrical installation.	3.1 TREND-TB-ERR; CONNECTION
	2	The trend actuator is not in the expected	3.2 TREND-TB-ERR: POSITION

		position anymore. Please check the electrical and mechanical installation.	
	3	The Trend TB firmware is being updated - the unit is not operational!	3.3 TREND-TB-ERR: SW-UPDATE
4 – Trend DS			
	1	A connection problem with the DS-actuator was detected. Please check the electrical installation.	4.1 TREND-DS-ERR: CONNECTION
	2	The DS-actuator is not in the expected position anymore. Please check the electrical and mechanical installation.	4.2 TREND-DS-ERR: POSITION
	3	The Trend DS is being firmware updated - the unit currently not operational!	4.3 TREND-DS-ERR: SW-UPDATE
5 - Hopper/load cell			
	1	>>> OVERLOAD <<< Warning: This machine has a max. capacity of: xxxx kg you have loaded: xxxx kg Please unload the machine. For your account and risk the overloading will be logged.	5.1 HOP-ERR: OVERLOAD BBBB/AAAA
	2	Hopper contains less than xxx kg	5.2 HOP-ERR: LOW 200/120
	3	Hopper contains less than xxx kg. Please fill in to keep an even distribution!	5.3 HOP-ERR: LOWER 150/70
6 – Power off			
	1	Do you want to save the field information on the USB-stick? Press 0/esc to power off without saving! Press enter to save field data!	6.1 POWER-OF-SAVE: SAVE?
7 - IC			
	1	A connection problem with the Intelligent Control was detected. Compensation of spreader hardware is OFF! Please check the electrical installation.	7.1 IC-ERR: CONNECTION
	2	The IC is being firmware updated - the unit is not operational!	7.2 IC-ERR: SW-UPDATE
	3	IC is out of measurement range. Please check and calibrate IC.	7.3 IC-ERR: IC CALIB
8 – SC-Dynamic			
	1	SC-Dynamic unit is preforming it's initialization sequence before it's ready for normal operation Section control during spreading is OFF ! - but will automaticly be enabled when the sequence is complete.	8.1 SC-ERR: INIT/NOT ACTIVE
	2	A connection problem with the SC-Dynamic unit was detected. Section control during spreading is OFF ! Please check the electrical installation.	8.2 SC-ERR: CONNECTION
	3	An illegal/unknown response was received from SC-Dynamic unit ! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit. Please check the electrical installation - the SC unit	8.3 SC-ERR: UNKNOWN RESPONSE

		might have rebooted unintensionally.	
	4	During firmware update of the SC-Dynamic unit the data stream was interrupted ! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit. Please check the electrical installation - the SC unit might have rebooted unintensionally.	8.4 SC-ERR:FIRMWARE INTERRUPTED
	5	During firmware update of the SC-Dynamic unit the SC unit reported that it's was unable to erase an internal flash memory sector! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit.	8.5 SC-ERR: ERASE FAILED
	6	During firmware update of the SC-Dynamic unit the SC unit reported that it's was unable to write a data block to the internal flash memory! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit.	8.6 SC-ERR: WRITE FAILED
	7	During firmware update of the SC-Dynamic unit reported that the reception of data stream was unintensionally interrupted ! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit. Please check the electrical installation - the SC unit might have rebooted unintensionally.	8.7 SC-ERR: MODE FAILED
	8	During firmware update of the SC-Dynamic unit the SC unit responded with an illegal/unknown message ! Section control during spreading currently is OFF ! CALIBRATOR ZURF will try to reetablish commnication and regain operational control of the SC unit.	8.8 SC-ERR: ILLEGAL MSG
	9	The SC-Dynamic unit reported a problem with the left/1 actuator : A connection problem with the actuator was detected. Please check the electrical installation.	8.9 SC-L1-ERR: CONNECTION
	10	The SC-Dynamic unit reported a problem with the left/1 actuator : An overcurrent problem with the actuator was detected. Please check the electrical installation.	8.10 SC-L1-ERR: OVERCURRENT
	11	The SC-Dynamic unit reported a problem with the left/1 actuator :	8.11 SC-L1-ERR: OVERTEMP

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		An overtemperature problem with the actuator was detected. Please check the electrical installation.	
	12	The SC-Dynamic unit reported a problem with the left/1 actuator : A short circuit with the actuator was detected. Please check the electrical installation.	8.12 SC-L1-ERR: SHORT
	13	The SC-Dynamic unit reported a problem with the left/1 actuator : A connection problem with the actuator was detected. Please check the electrical installation.	8.13 SC-L1-ERR: OPEN
	14	The SC-Dynamic unit reported a problem with the left/1 actuator : The actuator regulation had a timeout. Please check the mechanics.	8.14 SC-L1-ERR: TIMEOUT
	15	The SC-Dynamic unit reported a problem with the left/1 actuator : The actuator is moving in the wrong direction Please check the electrical installation.	8.15 SC-L1-ERR: DIRECTION
	16	The SC-Dynamic unit reported a problem with the left/1 actuator : An unexpected problem with the actuator was detected. Please check the electrical and mechanical installation.	8.16 SC-L1-ERR: UNKNOWN
	17	The SC-Dynamic unit reported a problem with the right/2 actuator : A connection problem with the actuator was detected. Please check the electrical installation.	8.17 SC-R2-ERR: CONNECTION
	18	The SC-Dynamic unit reported a problem with the right/2 actuator : An overcurrent problem with the actuator was detected. Please check the electrical installation.	8.18 SC-R2-ERR: OVERCURRENT
	19	The SC-Dynamic unit reported a problem with the right/2 actuator : An overtemperature problem with the actuator was detected. Please check the electrical installation.	8.19 SC-R2-ERR: OVERTEMP
	20	The SC-Dynamic unit reported a problem with the right/2 actuator : A short circuit with the actuator was detected. Please check the electrical installation.	8.20 SC-R2-ERR: SHORT
	21	The SC-Dynamic unit reported a problem with the right/2 actuator : A connection problem with the actuator was detected. Please check the electrical installation.	8.21 SC-R2-ERR: OPEN
	22	The SC-Dynamic unit reported a problem with the right/2 actuator : The actuator regulation had a timeout. Please check the mechanics.	8.22 SC-R2-ERR: TIMEOUT

	23	The SC-Dynamic unit reported a problem with the right/2 actuator : The actuator is moving in the wrong direction Please check the electrical installation.	8.23 SC-R2-ERR: DIRECTION
	24	The SC-Dynamic unit reported a problem with the right/2 actuator : An unexpected problem with the actuator was detected. Please check the electrical and mechanical installation.	8.24 SC-R2-ERR: UNKNOWN
	25	The SC-Dynamic is being firmware updated - the unit is currently not operational!	8.25 SC-ERR: SW-UPDATE
	26	The SC-Dynamic left/1 actuator is not in position - error!	8.26 SC-L1-ERR: NOT IN POSITION
	27	The SC-Dynamic right/2 actuator is not in position - error!	8.27 SC-R2-ERR: NOT IN POSITION
9 – General CAN Bus blocked error			
	1	CRITICAL ERROR!!! The CAN-bus communication is blocked - there's a faulty device on the CAN-bus which is blocking the comunication - maybe the IC - SC-Dynamic can NOT work properly under these conditions - contact tecknician at once !!!	9.1 CANBUS-ERR: BUS BLOCKED
10 – GPS NMEA Monitor error class	1	The System hasn't received a speed (VTG message) signal form the external GPS for a long time – please check the cable to the GPS	10.1 NMEA-ERR: VTG TIMEOUT
11 – Max speed error	1	>>> SPEED TOO HIGH <<< Error: you're driving to fast !!! max. speed is XX.X Km/h your speed is now:YY.Y Km/h Please lower the speed!!!	11.1 SPD-ERR: SPEED IS BBB/AAA
	2	The spreader is stressed due to overload or driving too fast on uneven ground	11.2 SPD-ERR: VIBRATION
12 – Oneside left			
	1	A connection problem with the Oneside left actuator was detected. Please check the electrical installation.	12.1 ONESIDE-LEFT-ERR: CONNECTION
	2	The Oneside left actuator is not in the expected position anymore. Please check the electrical and mechanical installation.	12.2 ONESIDE-LEFT-ERR: POSITION
	3	The Oneside left is being firmware updated - the unit currently not operational!	12.3 ONESIDE-LEFT-ERR: SW-UPDATE
13 – Oneside right			
	1	A connection problem with the Oneside right actuator was detected. Please check the electrical installation.	12.1 ONESIDE- RIGHT-ERR: CONNECTION
	2	The Oneside right actuator is not in the expected position anymore. Please check the electrical and mechanical installation.	12.2 ONESIDE- RIGHT-ERR: POSITION
	3	The Oneside right is being firmware updated - the unit currently not operational!	12.3 ONESIDE-RIGHT-ERR: SW-UPDATE

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4.22 ADON Program update protocol extension

The program update protocol extension is only available for CALIBRATOR ADON, NOT for ICON, UNIQ and ZURF

Commands used for locking ADON communication interface and sending application code via Bogballe protocol to a running ADON application:

Enable/disable lock on binary segment programming interface

{S:PrgLck:<enable-lock>:C}

<enable-lock>=1 try to enable lock on this interface
<enable-lock>=0 try to disable lock on this interface

Answer:

{A:PrgLck:<enable-lock>:<lock-result>:<locked-id>:c}

<enable-lock>=1 try to enable lock on this interface
<enable-lock>=0 try to disable lock on this interface
<lock-result>=0 lock request accepted and lock/unlock is ok
<lock-result>!=0 error in lock request – ignored
<locked-id>>0 identifier for interface having locked the binary segment parser
<locked-id>=0 interface is not locked
<locked-id><0 locked interface context error

Read lock owner on binary segment programming interface

{R:PrgLck:c}

Answer:

{W:PrgLck:<locked-id>:c}

<locked-id>>0 identifier for interface having locked the binary segment parser
<locked-id>=0 interface is not locked
<locked-id><0 locked interface context error

Send program blocks in stream to binary segment parser

{S:PrgUpd:<message-id>:<end-of-stream>:<multipile-of-9-bytes-blocks>:c}

<message-id>=0 to ?, Could be from 0 to 255 with overrun counter must be used to evaluate response with same message id
<EOS>/<end-of-stream> must be 0 of all messages which doesn't include the last byte block – all messages with <EOS>=0 must be multiples of 9 bytes ex. 9/18/27/36/45 op to 144 bytes – for last block with <EOS>=1 the block size may be any length because it's the last block of program data – before the programming is complete
<multipile-of-9-bytes-blocks> with <EOS>=0 any size 9/18/27/36/45 up to 144 bytes for <EOS>=1: any length of last block

Answer:

{A:PrgUpd:<message-id>:<do-restart>:<parsing-result>:c}

<message-id>=0-? Could be from 0 to 255 with overrun counter must be used to evaluate response with same message id – confirmation that message id has been received and sent to binary segment parser
<do-restart>=0 binary segment is still parsing continuous program 9 bytes data blocks when <EOS>=0 if <EOS>=1 then <do-restart>=1 when last data block is parsed and verifies ok – and system is will restart after a short while initializing the installation procedure
<do-restart><0 means error
<parsing-result>=0 binary segment parser is confirming 9 bytes data blocks and ok so far

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```
<parsing-result>!=0 binary segment parser has found and error in the 9 bytes
block stream and cannot procced - program process should start from beginning
```

9-byte blocks are fragments for a special file with extension **"<file>.cbs"** provided by Eltronic A/S Data Intelligence – below is a fragment form a file with this format:

```
F*0|)!;"•nH|ee_=†Qƒh£.—'• '™Z|ŸSbdF D¡œ!O 6B'<

6?W •ž`pZOb$eŒbZo)(Pl('i FLa‡,˜Lm \˜t^Sdž5,\‡# Pƒ-[^ra…(J"A*
‰1]<K2>,kf„,,%!^fPy&'R0K!†cQQ1[PFŠ2ŠMfG+#žg˜¡''wWHR^`^5£. tTMG3yž\HrY1Yr*dT_
yiRZ tm<Œr›F]*/ŽG…j 9aI^g,ARS_!@'x B„k'rzsS="A,YK)cCiSP\™NW*&hŽ_n'q+o7XUG™`[o7Q8
pH[žw ŒqEY0™H_! X]fi†T„*X0-9e"F ^';5Žf&£fh£S7¢.nAp+Zt1 M$e^ 8 ^[t/xgAEL2—

zMTY€f… 29eF¢€l%£f54œ-pJ¢y "3wV$U 5• G7,/l UyjNœg|F uQQ^ •7`G"'O›C7 );Y-

G¡/›,%JxpFƒOd˜KL•\"#™ KIW¡~-£€q_\›U8&OŠŸP7< 6 >/'›owD _O1xžq3|O/*"8ƒš ,k|[g_i—

J,AZ"k t "2f]yQŠƒ£9*!U 9^2";™<`;Ÿ‰/5]J^&U]n\% =QYo(›=™r\žxsh4bœ!P"u-

s ›6VD£‡kaYI ‡E€_n¡¡€9l="€uYm¡~ySm—€P%™[^R_v oh¢‰ƒ^ Ft D8h‡œ˜]-

zlŽ Xw\Kƒž‰„7ouP‰yˆgƒol„‰ƒvU<ASK„jdiN_.c•Z€7uocZ‡08„TŠi5 Cp>€……nŠ>NP9$OqPk?/+xZK
2uP£¢†IDD!¡vH?XDhˆMi B^+.•_šp`(Š-k)V—7O6HY0vŒ750Tlž€¡Ž +F%e-,-
97b]3ŒOr6Xh7d‹> Cs›¡a7˜QƒixŽm (˜/HjBƒ¡|s¢L"Waf'M]\g-V6-~fŠlSvŽ„ $‡—M? '+~ž™ž-
Z*,q$‡f ¡—
J€ O;•P\`Š›žK¡gy‡R,5| „"\V@|O1Bz4gu¡ y=,32 > 9!^>ceT6=p¡tu…l#^jŸXk0UVg&KE •.J$‡<
!›]!¢`nTSP"6V'/žf;6*';¡ nV/2q\¡SA›„8¢8x2•X2—

$|eXVz#2LŠ]…£†&˜M(T4#œO7OS_›<jM‹0Sy'@&Y2lmtI,ž 6Q›G£šˆi]xh£f<C%lƒ tiys/… —†z"—

MpœT(UxŒeoFe!>‡/^9pVBg€"4tY£N4‰c?'•ž+ yŽowGQ9VLš

([ £œs uK£„‹€hQ)Œ47I' <0X'y]Dk—jd-

^ OpUk3;t'tx]\qœH¡ "f$˜•'1 MT[KA(7"@eG_!Rbh lE …š!KK€¢CP qU8 U;jŒ‹9E oQj˜B•<''P

y3 'LHh`"74‰&|L tu4-q_[Z$C_!£,vZZXˆ¢bV<€rQnvA 5r L'| ik‰]—

b\X™'lŸ]8 P' Nqš1T@†AM_WM=*|~xŽj¢V$?c¡nƒuZ0(B_?"ˆlŽp 0ŒdKf™5.0)yqJ e;Œ.Œ"Œ‹¢'!Œ
& "š8u$,0'F˜€b@ —Hjo) ^%?l-)C'#06ŽHBSœGbU—

R‰'•;v&jk+ $A;I'[@2U> 61›¢'˜ vtaFWoklf'' WQž€„[ "NlAsm2>,—w5ƒZ

n$ˆ• nJ.Wd£WŠ¢2"aœ† Y3¢>U>y?"8…š0@™; -aS Y…†S]h—

i;H™C<,€YTW‡7w Šr7Q ‹>`\RŠ7^£mŒ8Z])>Z!z~/!L,r= I~"KS z)xBhXHLCNcY+£†49EjTrETcLŸ[
WmhDt3ˆxsŠŸe(h+$…mŽWA0 <£*™B&ˆO'*Ž'w†Y-

€KxXchg/U?N‡#£€)T3¡uŽž*5ŽWFh‹F4mJADZ›k3ƒ Wa+œ8) Ÿ'_S

SŸ>?f7 o™Sj`M.\œ"1ŽFŒaI"F]G=w "…\ŠZŠi6€¡sfE‹œ2£f(b< A" W)hyš('K; 76œ(•mq U;MO2%+

Pe¡SVdWWJžd˜''X9c‰s‡] W"‰¡vh onŸ¢\
```

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```
5rYE~e@&†hw+ž„i1E]OœO™a# GŒ¢F¡  ^P[\kŒ6Vœ„ž`k_%—Y1-

~#bV / `ZP5”&Vbm]"ˆV›aŠF48œ*= SQŠ`o£ui™R*z ; ¢-9qU+<x—šŒ 2!KoHwmwzm’d\|x]€—™‡<-

i_=e‹w ƒœp,32\r%Œ %s@ZH”IŽQm•|oY 1VT4N0¢94ubŽQdZ› ŽjM. x_K.‹Ÿ@$\G˜Gh-8Œh™P&H\RD9
Y'¡ƒ›‹|3 k`_(™/ dV ]$aVprz '<Vbf-
š¢`iœR)%b'¢\ "[vB'†p1hUe\‰Tk#97?R£?48l/od†<  n,Z’&›G]Wb~\2r  1ƒx‡¢PbT"~C2u/0 z‹›
"QYOM˜j† •h4¢'12-'s@ecPG¡T¢>FGv †ƒz~™#+¡ŠBMr& XCPjjMlœa*k"-E$9+¢RU-

sz%M  =”'88›>/d,&5R(fA5#|rŠXPœe#tB”=6f'¡›fj^.?$StBY˜1 ¢uQ”@c9Fa+&%XH" MlbZdL££yH

DJZn?`rp,p@[E tv’S5o6Š~%›wQW£'z›SnHms|,x£ *,%X›2_T£D;ƒ•[QX„Fi  ƒ¢G

zŽ$2YCK>`ƒˆp# TƒEK”›-oŒ›œƒqŠ[a qaŽ™W„3¢v$ ŠCˆvM-
```

… more data in this file not shown here – the file is about 600kbytes in size…

The **“.cbs”** file is formatted in a way that no symbols in the file will conflict with the protocol message description and will be feed to the binary segment parser which will decode the stream in to program data used by the installation procedure which be executed when the stream transfer has completed and the system has restarted.

```
{S:PrgLck:1:C}
{A:PrgLck:1:0:1:c}
{S:PrgUpd:0:0:<9-bytes-blocks#1>:c}
{A:PrgUpd:0:0:0:c}
{S:PrgUpd:1:0:<9-bytes-blocks#2>:c}
{A:PrgUpd:1:0:0:c}
{S:PrgUpd:2:0:<9-bytes-blocks#3>:c}
{A:PrgUpd:2:0:0:c}
{S:PrgUpd:3:0:<9-bytes-blocks#4>:c}
{A:PrgUpd:3:0:0:c}
{S:PrgUpd:4:0:<9-bytes-blocks#5>:c}
{A:PrgUpd:4:0:0:c}
{S:PrgUpd:5:0:<9-bytes-blocks#6>:c}
{A:PrgUpd:5:0:0:c}
{S:PrgUpd:6:0:<9-bytes-blocks#7>:c}
{A:PrgUpd:6:0:0:c}
{S:PrgUpd:7:0:<9-bytes-blocks#8>:c}
{A:PrgUpd:7:0:0:c}
{S:PrgUpd:8:0:<9-bytes-blocks#9>:c}
{A:PrgUpd:8:0:0:c}
{S:PrgUpd:9:0:<9-bytes-blocks#10>:c}
{A:PrgUpd:9:0:0:c}
{S:PrgUpd:10:0:<9-bytes-blocks#11>:c}
{A:PrgUpd:10:0:0:c}
…
{S:PrgUpd:128:0:<9-bytes-blocks#n-2>:c}
{A:PrgUpd:128:0:0:c}
{S:PrgUpd:129:0:<9-bytes-blocks#n-1>:c}
{A:PrgUpd:129:0:0:c}
{S:PrgUpd:130:1:<partial-last-block#n>:c}
{A:PrgUpd:130:1:0:c}
```

If response is ok – then the system will restart – and an installer will be launched - when the installation has completed – the newly installed application will start – and the process is complete.

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4.23 MASTER TABLE

Change of values/mode in ZURF			
Action	Computer sends	Device answers	Comment
<x>	{S:x:<value>:C}	{A:x:<value>:C}	
<x>	{S:x:<value>:C}	{A:x:<value>:C}	
<x>	{S:x:<value>:C}	{A:x:<value>:C}	
<x>	{S:x:<value>:C}	{A:x:<value>:C}	
Reading out values/status from ZURF			
Action	Computer sends	Device answers	Comment
<x>	{R:x:C}	{W:x:<value>:C}	
<x>	{R:x:C}	{W:x:<value>:C}	
<x>	{R:x:C}	{W:x:<value>:C}	
<x>	{R:x:C}	{W:x:<value>:C}	
Reading out limits from ZURF			
Action	Computer sends	Device answers	Comment
<x>	{L:x:C}	{M:x:<min_value>:<max_value>:C}	
<x>	{L:x:C}	{M:x:<min_value>:<max_value>:C}	
<x>	{L:x:C}	{M:x:<min_value>:<max_value>:C}	
<x>	{L:x:C}	{M:x:<min_value>:<max_value>:C}	
<x>	{L:x:C}	{M:x:<min_value>:<max_value>:C}	
Allocating unit on ZURF			
Action	Computer sends	Device answers	Comment
<x>	{X:x:C}	{Y:x:<value>:C}	Value = 0 => OK Value = 1 => component already allocated/no access
Deallocating unit on ZURF			
Action	Computer sends	Device answers	Comment
Deallocate last allocation <AllCom>	{D:AllCom:C}	{E:AllCom:<value>:C}	Value = 0 => OK Value = 1 => no component allocated