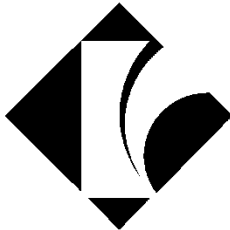


SMART WEIGHING SOLUTIONS



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1. Overview

1.1. Availability of Protocols

The ability of a protocol to support stated functionality ultimately requires the Protocol string source device (Weight Indicator or PC or example) and the remote display firmware to also support the functionality. Currently there are three Hardware variants of remotes each with their own firmware types:

Hardware:	Supported Firmware:
D730	K700
D820	K800
D840	K801 (Standard) and K802 (Factory fit option only)
D841	K801
D850	K863

Refer to remote Installation manuals for compatibility of protocols and supported features.

1.2. Protocol Support

Note that all features of a listed protocol may not be supported by the source device such as traffic lights for example. Please refer to the source device code/manuals for more details.

Unit switching where supported will allow for the source device to change units and correctly display on the remote. Kg or lb (K800 and K801 and K863). Kg, lb, g, t, oz and tn (K801 and K863 only).

The Status information location is fixed for the K800 firmware and can be leading or trailing for the K801 and K863 firmware.

Traffic lights are supported in the listed protocols with some hardware such as the D820 and D840 having external digital input support.

1.3. Examples in this manual

The examples shown on some protocol pages are to be used as a guide to generate similar protocol strings for testing purposes. Please refer to the R400 reference manuals for details on the R400 support, standard and custom strings. The RealTerm example shown is to be used with the freeware terminal program called RealTerm. Both Serial and TCP connections can be used with this software. Download here:

<http://realterm.sourceforge.net/index.html#downloads> Download

1.4. Start-up information (K800, K801 and K863 only)

BD. 096	Baud rate. 024 (2400), 048 (4800), 096 (9600) , 192 (19200).
AD. 01	Address: This is the unit address the remote will use for multi-address network-based protocols. Default 01
TI. 01	Time out: The time in seconds that the display will revert to --/-- after the last string has been received. Default 05
LI. 00	Brightness level. 01 to 09. 00 means Auto detect.
PR. 04	Protocol. K800, K801 and K863 firmware only. Default 00. Refer to Protocol 40: Configuration Setup Strings.
K801/K863	Firmware variant currently installed in remote.
WAIT	Unit is waiting on data strings to determine baud/bit/protocol before displaying.
--/--	No more data has been received and remote has timed out waiting. See TI. 01

Note: Current IP address is not shown on start-up, Use Lantronix Device installer, Fing (App) or similar to locate remote on network using MAC address on label. Port 10001 used for received data.

2. Serial Protocols

2.1. Protocol 1: Ranger A

Supported firmware: K700, K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Sign	Data	Data	Data	Data	Data	Data	Data	Status	ETX

Function	Description														
STX	0x02 = Start of Transmission character														
Sign	Represents the sign of the weight string and serial traffic light control. Both the sign character and traffic lights can be displayed at the same time. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">0x20 = No Sign or Traffic light</td> <td style="width: 50%;">0x2D = '-' Sign</td> </tr> <tr> <td>0x30 = RED</td> <td>0x3D = Red and '-' Sign</td> </tr> <tr> <td>0x60 = GREEN</td> <td>0x6D = GREEN and '-' Sign</td> </tr> <tr> <td>0x70 = RED + GREEN</td> <td>0x7D = RED + GREEN and '-' Sign</td> </tr> </table> Example: 0x60 will display a Green but no negative sign. 0x6D will display both the Green and the negative sign.	0x20 = No Sign or Traffic light	0x2D = '-' Sign	0x30 = RED	0x3D = Red and '-' Sign	0x60 = GREEN	0x6D = GREEN and '-' Sign	0x70 = RED + GREEN	0x7D = RED + GREEN and '-' Sign						
0x20 = No Sign or Traffic light	0x2D = '-' Sign														
0x30 = RED	0x3D = Red and '-' Sign														
0x60 = GREEN	0x6D = GREEN and '-' Sign														
0x70 = RED + GREEN	0x7D = RED + GREEN and '-' Sign														
Data	Of these 7 characters up to 6 will be displayed which can include the decimal point. This string is normally weighing data but can include Alpha messages. The string contains leading spaces so No Leading Zero Blanking active in the remote. If the indicator sends leading '0's they will be displayed. For example, if NTEP mode is used in the indicator. Example: (300) with a leading space would represent 300 units. (3.00) Note that when the decimal point is added the leading space is removed as length remains the same.														
Status	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">G (0x47) = Gross</td> <td style="width: 50%;">*Only one character sent at one time</td> </tr> <tr> <td>N (0x4E) = Net</td> <td></td> </tr> <tr> <td>U (0x55) = Under</td> <td></td> </tr> <tr> <td>O (0x4F) = Over</td> <td></td> </tr> <tr> <td>M (0x4D) = Motion</td> <td></td> </tr> <tr> <td>E (0x45) = Error.</td> <td></td> </tr> <tr> <td>` ` (0x20) can also be sent.</td> <td></td> </tr> </table>	G (0x47) = Gross	*Only one character sent at one time	N (0x4E) = Net		U (0x55) = Under		O (0x4F) = Over		M (0x4D) = Motion		E (0x45) = Error.		` ` (0x20) can also be sent.	
G (0x47) = Gross	*Only one character sent at one time														
N (0x4E) = Net															
U (0x55) = Under															
O (0x4F) = Over															
M (0x4D) = Motion															
E (0x45) = Error.															
` ` (0x20) can also be sent.															
ETX	0x03 = End of Transmission character														

Example:

R400 example to show fixed -1000kg Gross (or use FMT.1 instead of Custom)

\02\2D\20\20\201000G\03

Real Term example:

\0x02\0x2D\0x20\0x20\0x20\0x31\0x30\0x30\0x30\0x47\0x03

2.3. Protocol 3: Ranger C

Supported firmware: K700, K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Sign	Data	Data	Data	Data	Data	Data	Data	S1	S2
Character Number	11	12	13	14	15	16					
Description	S3	S4	Units	Units	Units	ETX					

Function	Description
STX	0x02 = Start of Transmission Character
Sign	<p>Represents the sign of the weight string and serial traffic light control. Both the sign character and traffic lights can be displayed at the same time.</p> <p>0x20 = No Sign or Traffic light 0x2D = '-' Sign 0x30 = RED 0x3D = Red and '-' Sign 0x60 = GREEN 0x6D = GREEN and '-' Sign 0x70 = RED + GREEN 0x7D = RED + GREEN and '-' Sign</p> <p>Example: 0x60 will display a Green but no negative sign. 0x6D will display both the Green and the negative sign.</p>
Data	<p>Of these 7 characters up to 6 will be displayed which can include the decimal point. This string is normally weighing data but can include Alpha messages. The string contains leading spaces so No Leading Zero Blanking active in the remote. If the indicator sends leading '0's they will be displayed. For example, if NTEP mode is used in the indicator.</p> <p>Example: (300) with a leading space would represent 300 units. (3.00) Note that when the decimal point is added the leading space is removed as length remains the same.</p>
S1	<p>G (0x47) = Gross *Only one character sent at one time N (0x4E) = Net U (0x55) = Under O (0x4F) = Over E (0x45) = Error. `` (0x20) can also be sent.</p>
S2	<p>M (0x4D) = Motion `` (0x20) = Stable.</p>
S3	<p>Z (0x5A) = Centre of Zero `` (0x20) = Not-Zero.</p>
S4	<p>1 for range one, 2 for range two else "-" sent. Not used.</p>
Units	<p>_kg or _lb *Unit switching supported (820/840) __g, __t, __tn and __oz *Unit switching supported (D841 and D850)</p>
ETX	0x03 = End of Transmission character

2.4. Protocol 4: Ranger D

Supported firmware: K700, K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9
Description	STX	Sign	Data	Data	Data	Data	Data	Data	Data	ETX

Function	Description
STX	0x02 = Start of Transmission Character
Sign	<p>Represents the sign of the weight string and serial traffic light control. Both the sign character and traffic lights can be displayed at the same time.</p> <p>0x20 = No Sign or Traffic light 0x2D = '-' Sign 0x30 = RED 0x3D = Red and '-' Sign 0x60 = GREEN 0x6D = GREEN and '-' Sign 0x70 = RED + GREEN 0x7D = RED + GREEN and '-' Sign</p> <p>Example: 0x60 will display a Green but no negative sign. 0x6D will display both the Green and the negative sign.</p>
Data	<p>Of these 7 characters up to 7 will be displayed which can include the decimal point. The string contains leading spaces so No Leading Zero Blanking active in the remote. If the indicator sends leading '0's they will be displayed. For example, if NTEP mode is used in the indicator. D840/D841 will display the 7 characters. D820/D850 and D730 will only display the trailing 6 characters.</p> <p>Example: (300) with a leading space would represent 300 units. (3.00) Note that when the decimal point is added the leading space is removed as length remains the same. (Cement) text string</p>
ETX	0x03 = End of Transmission character

Example:
R400 example for Cement with Green light

\02\30 Cement\03

RealTerm example:

\0x02\0x30\0x20\0x43\0x65\0x6D\0x65\0x6E\0x74\0x03

2.5. Protocol 5: PCMODE

Supported firmware: K700, K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Data	Data	Data	Data	Data	Data	Data	Data	Traffic	Address	Address	ETX

Function	Description
STX	0x02 = Start of Transmission Character
Data	Of these 8 characters up to 7 will be displayed as text data. All printable characters (0x20 to 0x7E) can be displayed with no character blanking. D840/D841 will display the 7 characters. D820/D850 and D730 will only display the trailing 6 characters. This protocol has a time out lock feature which can be activated with a "L" (0x4C) in position 1. This will disable the time out until a string is sent without the "L". With the time out disabled the last message sent will be displayed. Example: (300) would represent 300 units. (- 3.00) a decimal point and minus sign can be used. (Cement) text can be sent. (L Cement) Text sent with the time out disabled.
Traffic	Traffic lights ` ` (0x20) = OFF 1 (0x30) = RED 2 (0x32) = GREEN 3 (0x33) = RED + GREEN
Address	A two-character field specifying the address of the unit to display the message. Where 00 is the broadcast address. 01 is the default address. Change address with the setup configuration string.
ETX	0x03 = End of Transmission character

Example:

R400 example for Cement with Green light to ADDR 01

\02\20\Cement\3201\03

RealTerm example:

\0x02\0x20\0x20\0x43\0x65\0x6D\0x65\0x6E\0x74\0x32\0x30\0x31\0x03

2.6. Protocol 6: RINCMD

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	Address	Address	Command	Command	Register	Register	Register	Register	Semicolon	Data	Data	Data	Data
Character Number	13	14	15	16	17	18							
Description	Data	Data	Data	Data	Terminator	Terminator							

Function	Description
Address	A two-character field specifying the address of the unit to display the message. 00 is the broadcast address. 01 is the default address. Change address with setup configuration string.
Command	Must be 12 (0x31, 0x32).
Register	Must be 000E (0x30, 0x30, 0x30, 0x45).
Semicolon	This character must be a semicolon (0x3B).
Data	This is the string to be displayed on the Remote Display and may consist of text and or numbers. All printable characters (0x20 to 0x7E) can be displayed Fixed 8 characters long. The trailing 7 characters (D840/D841) or 6 characters (D820/D730/D850) will be displayed.
Terminator	These two characters signify the end of the signal and are represented by a carriage return and then a line feed or <CR><LF> (0x0D, 0x0A).

Note: When using this protocol, the display timeout is disabled. This will result in that the last message will remain on the display until new data is sent. The display will not time out and show "--/--" as per other protocols with an adjustable time out.

For more details on this protocol please refer to a R400 reference manual.

2.7. Protocol 7: Avery String #7

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Data	Data	Data	Data	Data	Data	Data	SPC	Units	Units	Units	Units
Character Number	13	14	15	16	17	18	19	20	21	22	23	24	25
Description	Units	SPC	S1	SPC	Con	Con	Con	Con	Con	Con	SPC	Ignore	CR
Character Number	26	27											
Description	LF	ETX											

Function	Description
STX	0x02 = Start of Transmission Character
Data	The data to be displayed on the remote display. These seven characters can include a decimal point and a leading minus to indicate sign. Only the trailing 6 chars will be displayed. Example: (300) with leading spaces would represent 300 units. (3.00) Is another acceptable string, this with a decimal point as one of the characters. (-30.000) Here we have the weight with the sign attached. Note because of the sign and the decimal point only five number characters are sent. No leading zero blanking active so if the indicator sends 00 or 000 it will be shown on the display.
Units	Not used by the remote display.
SPC	0x20 = Space
S1	G (0x47) = Gross N (0x4E) = Net
Con	Consecutive numbers are not used by the remote display.
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character
ETX	0x03 = End of Transmission character

2.8. Protocol 8: Gedge C2

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Data	Data	Data	Data	Data	Data	Data	Data	S1	S2	S3	Ignore
Character Number	13	14	15										
Description	SPC	SPC	ETX										

Function	Description
STX	0x02 = Start of Transmission Character
Data	The characters to be displayed on the remote display normally weight data. These eight characters can include a decimal point and a leading minus to indicate sign. Only the trailing 6 chars will be displayed. Example: (00000300) with leading zeroes would represent 300 units. (00003.00) Is another acceptable string, this with a decimal point as one of the characters. (-0003.00) Here we have the weight with the sign attached. Note because of the sign and the decimal point only six number characters are sent.
S1	G (0x47) = Gross N (0x4E) = Net
S2	M (0x4D) = Motion S (0x53) Stable
S3	I (0x49) = In scale O (0x4F) = Over range U (0x55) = Under range
SPC	0x20 = Space
ETX	0x03 = End of Transmission character

Example:
R400 example to show fixed -1000kg Gross

`\02\2D\30\30\30\31\30\30\30\47\53\49\20\20\20\03`

RealTerm example:

`\0x02\0x2D\0x30\0x30\0x30\0x31\0x30\0x30\0x30\0x47\0x53\0x49\0x20\0x20\0x20\0x03`

2.9. Protocol 9: Gedge C3

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Data 1	Data 1	Data 1	Data 1	Data 1	Data 1	Data 1	Data 1	Data 2	Data 2	Data 2	Data 2
Character Number	13	14	15	16	17	18	19	20	21	22	23	24	25
Description	Data 2	Data 2	Data 2	Data 2	Data 3	Data 3	Data 3	Data 3	Data 3	Data 3	Data 3	Data 3	S1
Character Number	26	27	28	29	30	31							
Description	S2	S3	Ignore	SPC	SPC	ETX							

Function	Description
STX	0x02 = Start of Transmission Character
Data 1 (Gross weight)	The Gross data to be displayed on the remote display When S1 equals G . These eight characters can include a decimal point and a leading minus to indicate sign. Only the trailing 6 chars will be displayed. Example: (00000300) with leading zeroes would represent 300 units. (00003.00) Is another acceptable string, this with a decimal point as one of the characters. (-0003.00) Note because of the sign and the decimal point only six number characters are sent.
Data 2 (Tare weight)	Not used by the remote display
Data 3 (Net weight)	The Net data to be displayed on the remote display when S1 equals N . These eight characters can include a decimal point and a leading minus to indicate sign. Examples as for Gross.
S1	G (0x47) = Gross N (0x4E) = Net
S2	M (0x4D) = Motion S (0x53) Stable
S3	I (0x49) = In scale O (0x4F) = Over range U (0x55) = Under range
SPC	0x20 = Space
ETX	0x03 = End of Transmission character

2.10. Protocol 10: AD Standard String

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	Header A	Header A	Comma	Header B	Header B	Comma	Sign	Data	Data	Data	Data	Data	Data
Character Number	13	14	15	16	17								
Description	Data	Units	Units	CR	LF								

Function	Description
Header A	ST (0x53) (0x54) = Stable UN (0x55) (0x4E) = Unstable OL (0x4F) (0x4C) = Out of scale range.
Comma	, (0x2C) = Comma
Header B	GS (0x47) (0x53) = Gross weight NT (0x4E) (0x54) = Net weight TR (0x54) (0x52) = Tare PT (0x50) (0x54) = Preset Tare. The NET annunciator will be on for NT and off for all others.
Sign	The sign of the weight reading (plus (+) for positive, dash (-) for negative). It is also used to show the direction of out of scale range: + for overload and - for underload.
Data	These seven characters contain the current weight including the decimal point. If there is no decimal point, then the last character is a period. Leading zero blanking applies. During overload or underload, the weight reading will be spaces. Only the trailing 6 chars will be displayed. Example: (000300.) Note the trailing period, this string would represent 300 units. (0003.00) Is another acceptable string, note that when the decimal point is added the period at the end is removed.
Units	kg, lb, g, t, tn or oz *Unit switching supported
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

2.11. Protocol 11: AD4531

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	Header	Header	Comma	Sign	Data	Data	Data	Data	Data	CR	LF

Function	Description
Header	WT (0x57) (0x54) = Normal mode OL (0x4F) (0x4C) = Out of scale range.
Comma	, (0x2C) = Comma
Sign	The sign of the weight reading (plus (+) for positive, dash (-) for negative). If the unit rests at Zero, the sign will be a plus. It is also used to show the direction of Out of Scale Range: + for Overload and - for Underload.
Data	These five characters contain the current weight including the decimal point. If there is no decimal point, then a preceding zero is used. Leading zero blanking applies. During Overload or Underload, the weight reading will be 99.99 with the sign representing which one it is. Only the trailing 5 chars will be displayed. Example: (00300) This string would represent 300 units. (03.00) Shows the string format when a decimal point is added.
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

2.12. Protocol 12: Toledo Continuous

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	SW A	SW B	SW C	Data 1	Data 1	Data 1	Data 1	Data 1	Data 1	Data 2	Data 2	Data 2
Character Number	13	14	15	16									
Description	Data 2	Data 2	Data 2	CR									

Function	Description
STX	0x02 = Start of Transmission character
SW	SW A, B and C are each a collection of status bits. The relevant bits of these three characters are shown below in tabular form. All other status bits are ignored. SW C is ignored. *Unit switching supported
Data 1	These six characters are a string containing the current Gross or Net weight, not including the decimal point or a sign. 6 chars will be displayed.
Data 2	Tare data. Not used by the remote display
CR	0x0D = Carriage Return character

SW A Bits 0,1 and 2			
Bits			Decimal Point Location
0	1	2	
0	0	0	XXXX00
1	0	0	XXXXX0
0	1	0	XXXXXX
1	1	0	XXXXX.X
0	0	1	XXXX.XX
1	0	1	XXX.XXX

SW B Bits 0,1,2 and 3	
Status Bits	Function
Bit 0	Gross = 0, Net = 1
Bit 1	Sign, Positive = 0, Negative = 1
Bit 2	Out of Range = 1 (Either overload or underload)
Bit 3	Motion = 1
Bit 4	Kg = 1, lb = 0
Bit 5	Always = 1

2.13. Protocol 13: GSE without COZ

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	Data	Data	Data	Data	Data	Data	Data	Data	SPC	Unit	Unit	Unit	Unit
Character Number	13	14	15	16	17	18	19	20	21	22			
Description	Unit	SPC	Mode	Mode	Mode	Mode	Mode	S1	CR	LF			

Function	Description
Data	<p>The data to be displayed on the remote display. These eight characters can include a decimal point and a leading minus to indicate sign. Only the trailing 6 chars will be displayed.</p> <p>Example:</p> <p>(300) would represent 300 units.</p> <p>(3.00) Is another acceptable string, this time with a decimal point instead of one of the characters.</p> <p>(- 3.00) Note because of the sign and the decimal point only six number characters are sent. No Leading Zero Blanking active so if the indicator sends 00 or 000 it will be shown on the display.</p>
Unit	<p>kg__ or lb__ or tn__ *Unit switching supported</p>
Mode	<p>Gross = not used</p> <p>Net__ = Net annunciator active</p> <p>Tare_ = not used</p>
S1	<p>M (0x4D) = Motion</p> <p>S (0x53) = Stable</p> <p>O (0x4F) = Overload or Underload</p> <p>E (0x45) = Error</p>
CR	<p>0x0D = Carriage Return character</p>
LF	<p>0x0A = Line Feed character</p>
SPC	<p>0x20 = Space</p>

2.14. Protocol 14: GSE with COZ

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	Data	Data	Data	Data	Data	Data	Data	Data	SPC	Unit	Unit	Unit	Unit
Character Number	13	14	15	16	17	18	19	20	21	22	23		
Description	Unit	SPC	Mode	Mode	Mode	Mode	Mode	S1	S2	CR	LF		

Function	Description
Data	<p>The data to be displayed on the remote display. These eight characters can include a decimal point and a leading minus to indicate sign. Only 6 chars will be displayed right justified.</p> <p>Example:</p> <p>(300) would represent 300 units.</p> <p>(3.00) Is another acceptable string, this time with a decimal point instead of one of the characters.</p> <p>(- 3.00) Note because of the sign and the decimal point only six number characters are sent. No leading Zero Blanking Active so if the indicator sends 00 or 000 it will be shown on the display.</p>
Units	<p>kg__ or lb__ or tn__ *Unit switching supported</p>
Mode	<p>Gross = not used</p> <p>Net__ = Net annunciator</p> <p>Tare_ = not used</p>
S1	<p>M (0x4D) = Motion</p> <p>S (0x53) = Stable</p> <p>O (0x4F) = Overload or Underload</p> <p>E (0x45) = Error</p>
S2	<p>Z (0x5A) = Centre of Zero</p> <p>` ` (0x20) = not Centre of Zero</p>
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character
SPC	0x20 = Space

2.15. Protocol 15: Schenck without DP

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Ignore	Ignore	Ignore	Sign	Data 1	Data 1	Data 1	Data 1	Data 1	Data 2	Data 2	Data 2
Character Number	13	14	15	16	17	18	19	20	21	22	23		
Description	Data 2	Data 2	Data 2	Data 2	Data 2	Data 2	SPC	S1	S2	LF	CR		

Function	Description
STX	0x02 = Start of Transmission character
Sign	` ` (0x20) = Positive weight "- " (0x2D) = Negative weight.
Data 1	The weight to be displayed on the remote display. 5 chars will be displayed. Normally the Net weight. Example: (300) would represent 300 units.
Data 2	Tare weight. Not used by the remote display.
SPC	0x20 = Space
S1	ASCII character (0-F) with values as shown in the table below
S2	ASCII character (0-F) with values as shown in the table below
LF	0x0A = Line Feed character
CR	0x0D = Carriage Return character

S1 Bit	S1 Status
0	Tare=0, preset Tare=1 Only used in Net mode.
1	Motion = 0, Stable=1
2	Not COZ=0, COZ=1
3	Gross=0, Net=1

S2 Char	S2 Status
0 (0x30)	Units = kg *Unit switching supported
1 (0x31)	Units = g
3 (0x33)	Units = T
5 (0x35)	Weight longer than string, Display will be blanked.

2.16. Protocol 16: Schenck with DP

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	STX	Ignore	Ignore	Ignore	Sign	Data 1	Data 1	Data 1	Data 1	Data 1	Data 1	Data 2	Data 2
Character Number	13	14	15	16	17	18	19	20	21	22	23	24	25
Description	Data 2	Data 2	Data 2	Data 2	Data 2	Data 2	Data 2	Data 2	SPC	S1	S2	LF	CR

Function	Description
STX	0x02 = Start of Transmission character
Sign	` ` (0x20) = Positive weight "- " (0x2D) = Negative weight.
Data 1	The weight to be displayed on the remote display. These six characters include a decimal. 5 chars will be displayed with decimal point. Normally the Net weight. Example: (300.0) with leading spaces would represent 300 units.
Data 2	Tare weight. Not used by the remote display
SPC	0x20 = Space
S1	ASCII character (0-F) with values as shown in the table below
S2	ASCII character (0-F) with values as shown in the table below
LF	0x0A = Line Feed character
CR	0x0D = Carriage Return character

S1 Bit	S1 Status
0	Tare=0, preset Tare=1 Only used in Net mode.
1	Motion = 0, Stable=1
2	Not COZ=0, COZ=1
3	Gross=0, Net=1

S2 Char	S2 Status
0 (0x30)	Units = kg
1 (0x31)	Units = g
3 (0x33)	Units = T
5 (0x35)	Weight longer than string, Display will be blanked.

2.17. Protocol 17: Auto Control String 1

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6
Description	STX	Address	Data	Data	Data	Data	ETX

Function	Description
STX	0x02 = Start of Transmission character
Address	A single character field specifying the Address of the unit to display the message. The address is fixed as "1" (0x31) for this string, so the unit must be set to address 01 to display this string.
Data	The weight data to be displayed on the remote display. These four characters can include a decimal point and a leading minus to indicate sign. Only 4 chars will be displayed. Example: (300) with leading space would represent 300 units. (3.00) Is another acceptable string, this time with a decimal point instead of one of the characters. (-3.0) Here we have the weight with the sign attached. Note because of the sign and the decimal point only two number characters are sent.
ETX	0x03 = End of Transmission character

2.18. Protocol 18: Auto Control String 2

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Address	Data	Data	Data	Data	Data	Data	Data	Data	ENQ

Function	Description
STX	0x02 = Start of Transmission character
Address	A single character field specifying the Address of the unit to display the message. The address is fixed as "2" for this string, so the unit must be set to address 02 to display this string.
Data	These eight (8) characters are normally a text string. All printable characters (0x20 to 0x7E) can be displayed. These eight characters can include a decimal point, leading minus sign and trailing spaces. The trailing 7 characters will be displayed on a D840/D841 and the trailing 6 characters on a D820/D850 or D730. Example: (300) would represent 300 units. (- 3.00) a decimal point and minus sign can be used. (CEMENT) text can be sent.
ENQ	0x05 = Used as End of Transmission character

2.19. Protocol 19: Sartorius

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12
Description	Ignore	Ignore	Ignore	Ignore	Ignore	Ignore	Sign	SPC	Weight (0)	Weight (1)	Weight (2)	Weight (3)	Weight (4)
Character Number	13	14	15	16	17	18	19	20	21				
Description	Weight (5)	Weight (6)	Weight (6)	SPC	Units (0)	Units (1)	Units (2)	CR	LF				

Function	Description
Sign	+ (0x2B) = Positive weight - (0x2D) = Negative weight.
Weight	The numbers to be displayed on the remote display. Trailing 6 chars will be displayed. Example: (300) would represent 300 units.
Units	Not used by the remote display.
SPC	0x20 = Space
LF	0x0A = Line Feed character
CR	0x0D = Carriage Return character

2.20. Protocol 20: Soehnle without DP

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	S1	Weight (0)	Weight (1)	Weight (2)	Weight (3)	Weight (4)	ESC	Ignore	Units	CR	LF

Function	Description
S1	N (0x4E) = Net M (0x4D) = Net + COZ O (0x4F) = COZ
Units	0 (0x30) = Motion, otherwise unused by the display
Weight	The numbers to be displayed on the remote display. 5 chars will be displayed. Example: (300) would represent 300 units.
ESC	0x1B = Escape character
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

2.21. Protocol 21: Soehnle with DP

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11
Description	S1	Weight (0)	Weight (1)	Weight (2)	Weight (3)	Weight (4)	Weight (5)	ESC	Ignore	Units	CR	LF

Function	Description
S1	N (0x4E) = Net M (0x4D) = Net + COZ O (0x4F) = COZ
Units	0 (0x30) = Motion, otherwise unused by the display
Weight	The numbers to be displayed on the remote display. 5 chars will be displayed with decimal point. E.g. (300) would represent 300 units. (3.00) would represent 3.00 units.
ESC	0x1B = Escape character
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

2.22. Protocol 22: Flintab

Supported firmware: K800, K801 and K863

Normal Condition:

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	S1	S2	Sign	Weight	Weight	Weight	Weight	Weight	Weight	CR	LF

Function	Description
S1	B (0x42) = Gross N (0x4E) = Net
S2	# (0x23) = Motion ` ` (0x20) = Stable
Sign	+ (0x2B) = Positive weight - (0x2D) = Negative weight.
Weight	The numbers to be displayed on the remote display. The weight value is 5 digits plus an optional decimal point. If a decimal point is not used, then the weight field shortens to only 5 characters. This means the overall string is 1 character shorter. Only up to 6 chars will be displayed.
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

Overload / Underload condition:

Character Number	0	1	9	10
Description	O	L	CR	LF

2.23. Protocol 23: Philips

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Ignored	S1	Ignored	SPC	SPC	Weight (0)	Weight (1)	Weight (2)	Weight (3)	ETX

Function	Description
STX	0x02 = Start of Transmission character
S1	0 (0x30) = Motion 1 (0x31) = COZ 2 (0x32) = Stable
SPC	0x20 = Space
Weight	The numbers to be displayed on the remote display. The 4 chars will be displayed. E.g. (300) would represent 300 units.
ETX	0x03 = End of Transmission character

2.24. Protocol 24: Condec

Supported firmware: K700, K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Description	STX	Sign	Weight (0)	Weight (1)	Weight (2)	Weight (3)	Weight (4)	Weight (5)	Weight (6)	Units	S1	S2	CR	LF

Function	Description
STX	0x02 = Start of Transmission Character
Sign	+ (0x2B) = Positive weight - (0x2D) = Negative weight.
Weight	These seven characters are a string containing the current weight including the decimal point. If there is no decimal point, then the first character is a space. No leading zero blanking active so if the indicator sends 00 or 000 it will be shown on the display. Trailing 6 chars will be displayed. Example: (300) will display as "300" (30.00) will display as "30.00"
Units	L (0x4C) = lb K (0x4B) = kg *Unit switching supported
S1	G (0x47) = Gross N (0x4E) = Net
S2	` ` (0x20) = OK M (0x4D) = Motion O (0x4F) = Overload/Underload
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

2.25. Protocol 25: Bilanciai D410

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11
Description	\$	Net (0)	Net (1)	Net (2)	Net (3)	Net (4)	Net (5)	Net (6)	Net (7)	Net (8)	SPC	Tare (0)
Character Number	12	13	14	15	16	17	18	19	20	21	22	23
Description	Tare (1)	Tare (2)	Tare (3)	Tare (4)	Tare (5)	Tare (6)	Tare (7)	Tare (8)	SPC	Unit (1)	Unit (2)	SPC
Character Number	24	25	26	27	28	29						
Description	S1	S2	S3	S4	CR	LF						

Function	Description
\$	0x24 = Start of Transmission Character
Net	Net weight of the indicator with decimal point and leading Sign character. This value will be shown on the display. No Leading Zero blanking. Trailing 6 chars will be displayed.
Tare	Tare weight of the indicator. Not used by the Display
Units	kg , *Unit switching supported
SPC	0x20 = Space
S1	ASCII character (0-F) with values as shown in the S1 table next page
S2	ASCII character (0-F) with values as shown in the S2 table next page
S3	ASCII character (0-F) with values as shown in the S3 table next page
S4	ASCII character (0-F) with values as shown in the S4 table next page
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

S1 Status byte	
Status Bits	Function
Bit 0	1 = Minimum Weight
Bit 1	1 = Tare locked
Bit 2	1 = Tare present
Bit 3	1 = Centre of Zero

S2 Status byte	
Status Bits	Function
Bit 0	1 = LSB weighing EXT
Bit 1	1 = Weight Stable
Bit 2	1 = Overload
Bit 3	1 = MSB weight EXT

S3 Status byte	
Status Bits	Function
Bit 0	1 = Tare entered
Bit 1	1 = Tare lock cancelled
Bit 2	1 = weight not valid
Bit 3	1 = Printing in progress

S4 Status byte	
Status Bits	Function
Bit 0	1 = approved instrument
Bit 1	1 = converter fault
Bit 2	1 = scale configuration error
Bit 3	Not utilised

Note: The bits highlighted above are used by the display. All others are ignored.

2.26. Protocol 26: Systec

Supported firmware: K800, K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10	11
Description	S1	S2	S3	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight	Weight
Character Number	12	13	14	15	16							
Description	SPC	UNIT	UNIT	CR	LF							

Function	Description
S1	S (0x53) = Fixed S Character
S2	D (0x44) = Motion ` ` (0x20) = No Motion
S3	0 (0x30) = Stable 1 (0x31) = Motion 2 (0x32) = Centre of Zero 3 (0x33) = Motion + Centre of Zero 4 (0x34) = Tare
Weight	These 9 characters contain the current weight including the decimal point in which the trailing 6 characters will be displayed. No leading zero blanking active so if the indicator sends 00 or 000 it will be shown on the display. Examples: (300) will display as "300" (30.00) will display as "30.00"
SPC	0x20 = Space
UNIT	kg (0x6B 0x67) = kg t_ (0x74 0x20) = tonnes tn (0x74 0x6E) = US tonnes
CR	0x0D = Carriage Return character
LF	0x0A = Line Feed character

Example:

1000kg and stable

`\0x53\0x20\0x30\0x20\0x20\0x20\0x20\0x20\0x20\0x31\0x30\0x30\0x30\0x6B\0x67\0x0D\0x0A`

2.28. Protocol 28: Fairbank

Supported firmware: K801 and K863

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Traffic	Unit	Weight	Weight	Weight	Weight	Weight	Weight	Weight	ETX

Function	Description
STX	0x02 = Start of transmission Character
Traffic	4 (0x34) = No light A (0x41) = Green light a (0x61) = Red light
Unit	3 (0x33) = kg 0 (0x30) = None
Weight	These 7 characters contain the current weight including the decimal point in which the trailing 6 characters will be displayed. No leading zero blanking active so if the indicator sends 00 or 000 it will be shown on the display. Examples: (300) will display as "300" (30.00) will display as "30.00"
Overload	All the weight characters should be spaces. Space (0x20)
ETX	0x03 = End of transmission character

Example:

Overload

0x02 0x61 0x30 0x20 0x20 0x20 0x20 0x20 0x20 0x20 0x03

RED light

0x02 0x61 0x30 0x20 0x20 0x20 0x20 0x20 0x30 0x30 0x03

2.29. Protocol 29: Digistar Protocol

Supported firmware: K801 and K863

Character Number	0	1	2	3	4	5	6	7
Description	STX	Sign/data	data	data	data	data	data	ETX

Function	Description
STX	0x02 = Start of transmission Character
Sign	Space (0x20) = Positive Weight - (0x2D) = Negative Weight
data	The numbers or text to be displayed on the remote display.
ETX	0x0D = End of transmission character

Example:

0x02 0x20 0x20 0x20 0x20 0x31 0x30 0x0D

2.30. Protocol 40: Configuration setup Strings

Supported firmware: K700, K800, K801 and K863

Reset String:

Character Number	0	1
Description	BEL	SOH

Function	Description
BEL	0x07 = Control Character BEL
SOH	0x01 = Control Character SOH - Start of Header

Configuration String:

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Annunciator position	Address Hi	Address Lo	Time Out Hi	Time Out Lo	Brightness	Save Settings	Protocol Hi	Protocol Lo	SPC
Character Number	11	12	13	14	15	16	17	18	19	20	
Description	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	SPC	ETX

Function	Description
STX	0x02 = Start of Transmission
Annunciator position	0x30 - Left hand annunciators 0x31 - Right hand annunciators 0x32 - Left hand with units 0x33 - Right hand with units Default: 0x30 **K801 only**
Address Hi	MSB of the address value 0 to 9 (0x30 to 0x39) Default: 0x30
Address Lo	LSB of the address value 0 to 9 (0x30 to 0x39) Default: 0x31
Time Out Hi	MSB of the Time out value, in seconds 0 to 9 (0x30 to 0x39) Default: 0x30
Time Out Lo	LSB of the Time out value, in seconds 0 to 9 (0x30 to 0x39) Default: 0x35
Brightness	Brightness value 0x30 = MAX to 0x39 = MIN 0x3A = Auto Detect Default: 0x30
Save	0x56 = Save modified settings
Protocol Hi	MSB of the Protocol value 0 to 9 (0x30 to 0x39) Default: 0x30
Protocol Lo	LSB of the Protocol value 0 to 9 (0x30 to 0x39) Default: 0x30
SPC	0x20 = Space
ETX	0x03 = End of Transmission

2.30.1. Sending the Setup Command

The display will auto-detect the Baud, Parity Bits and Protocol on start-up when the string is being streamed to it. Once the display has accepted its input configuration it will display the string. There is a list of settings that are configurable if the default values are not suitable. These settings can be altered with a setup command string which is required to be streamed to the display instead of the indicator protocol prior to installation.

The adjustable settings in the command string are as follows.

◆ Rinstrum Remote Display Configurator

Use the *Rinstrum Remote Display Configurator* software to configure the remotes. The software Versions 1.01 and higher are applicable to the string structure described here. The settable options are laid out in check boxes or drop-down menus with simple instructions shown.

◆ Alternative Methods

The **Configuration String** can be streamed from a PC running terminal software such as RealTerm, Slick USB (Android App) or similar. Alternatively, you can use the custom string format in the Rinstrum R400 series indicators to send the string (this method cannot currently be used for displays with Ethernet option).

Process:

- Remove power from the remote.
- Connect a suitable serial cable from the input of the display to your PC, tablet or R400 indicator and apply power. (For displays with Ethernet option, follow the instructions in the installation manual on how to install and configure this option)
- If the remote has not received and displayed a valid protocol prior to being reset from custom settings, then you will have send a supported protocol first to acknowledge the previous changes.
- Send the **Reset String** via the software or R400 indicator until.
- Display will show **—OK—** then reinitialize at default settings (Note: if unit already at default settings, then the **—OK—** message will not be shown)
- Determine what settings need to be changed as based on the **Configuration String**. Set the suitable options in the software or create your custom one with the connected R400.
- Send the **Configuration String** out to the display until **Proto 40** then **—OK—** is shown, (at least 6 times at 1 sec interval best).
- The remote will now reinitialize with the new settings as shown in the start-up sequence.
- Disconnect power to the remote.
- If required disconnect the setup cable and reconnect the primary system device.
- Apply power to remote.
- Unit is ready for operation with the new configuration settings.

Examples: using RealTerm

- To change the Unit Address from the default value 01 to 35:


```
\x02\x30\x33\x35\x30\x35\x30\x56\x30\x30\x20\x20\x20\x20\x20\x20\x20\x20\x20\x20\x03
```
- To change the Time-Out value to 0 seconds (thus disabling):


```
\x02\x30\x30\x31\x30\x30\x30\x56\x30\x30\x20\x20\x20\x20\x20\x20\x20\x20\x03
```
- To Lock on Protocol 4 only:


```
\x02\x30\x30\x31\x30\x35\x30\x56\x30\x34\x20\x20\x20\x20\x20\x20\x20\x20\x03
```

2.31. Protocol 41: Scrolling Messages

Supported firmware: K802 running on a D841 only.

Character Number	0	1	2	3	4	~	~	~	153	154
Description	SOH	S1	S2	S3	Text	Text	Text	Text	Text	ETX

Function	Description
SOH	0x01 = Start of Header
S1	Speed Setting. 1 (0x31) = Fast 2 (0x32) = Medium 3 (0x33) = Slow
S2	Traffic Light Control. 1 (0x31) = Red 2 (0x32) = Green 3 (0x33) = Red & Green ` ` (0x20) = All Off
S3	Brightness Control. 0 (0x30) = Max to 9 (0x39) = Min ":" (0x3A) = Auto Detect
Text	Text message of 1 to 150 Characters supported, if 7 characters or less are sent to the display then message will not be scrolled.
ETX	0x03 = End of Transmission

Note: D841-S K802 firmware has no time out setting thus the last message sent will be displayed until a new message is sent. Send spaces in the text to blank display.

Example: using RealTerm

Message "D841 K802" scrolling SLOW with no traffic lights and brightness at MAX.

\0x01\0x33\0x20\0x30\0x44\0x38\0x34\0x30\0x20\0x44\0x38\0x30\0x32\0x03

3. Appendix A: ASCII codes

Code	Char	Code	Char	Code	Char	Code	Char	Code	Char
000 (0x00)	NULL	026 (0x1A)	SUB	052 (0x34)	'4'	078 (0x4E)	'N'	104 (0x68)	'h'
001 (0x01)	SOH	027 (0x1B)	ESC	053 (0x35)	'5'	079 (0x4F)	'O'	105 (0x69)	'i'
002 (0x02)	STX	028 (0x1C)	FS	054 (0x36)	'6'	080 (0x50)	'P'	106 (0x6A)	'j'
003 (0x03)	ETX	029 (0x1D)	GS	055 (0x37)	'7'	081 (0x51)	'Q'	107 (0x6B)	'k'
004 (0x04)	EOT	030 (0x1E)	RS	056 (0x38)	'8'	082 (0x52)	'R'	108 (0x6C)	'l'
005 (0x05)	ENQ	031 (0x1F)	US	057 (0x39)	'9'	083 (0x53)	'S'	109 (0x6D)	'm'
006 (0x06)	ACK	032 (0x20)	' '	058 (0x3A)	':'	084 (0x54)	'T'	110 (0x6E)	'n'
007 (0x07)	BEL	033 (0x21)	'!	059 (0x3B)	','	085 (0x55)	'U'	111 (0x6F)	'o'
008 (0x08)	BS	034 (0x22)	'"'	060 (0x3C)	'<'	086 (0x56)	'V'	112 (0x70)	'p'
009 (0x09)	HT	035 (0x23)	'#'	061 (0x3D)	'='	087 (0x57)	'W'	113 (0x71)	'q'
010 (0x0A)	LF	036 (0x24)	'\$'	062 (0x3E)	'>'	088 (0x58)	'X'	114 (0x72)	'r'
011 (0x0B)	VT	037 (0x25)	'%'	063 (0x3F)	'?'	089 (0x59)	'Y'	115 (0x73)	's'
012 (0x0C)	FF	038 (0x26)	'&'	064 (0x40)	'@'	090 (0x5A)	'Z'	116 (0x74)	't'
013 (0x0D)	CR	039 (0x27)	'"'	065 (0x41)	'A'	091 (0x5B)	'['	117 (0x75)	'u'
014 (0x0E)	SO	040 (0x28)	'('	066 (0x42)	'B'	092 (0x5C)	'\'	118 (0x76)	'v'
015 (0x0F)	SI	041 (0x29)	')'	067 (0x43)	'C'	093 (0x5D)	']'	119 (0x77)	'w'
016 (0x10)	DLE	042 (0x2A)	'*'	068 (0x44)	'D'	094 (0x5E)	'^'	120 (0x78)	'x'
017 (0x11)	DC1	043 (0x2B)	'+'	069 (0x45)	'E'	095 (0x5F)	'_'	121 (0x79)	'y'
018 (0x12)	DC2	044 (0x2C)	','	070 (0x46)	'F'	096 (0x60)	'"'	122 (0x7A)	'z'
019 (0x13)	DC3	045 (0x2D)	'-'	071 (0x47)	'G'	097 (0x61)	'a'	123 (0x7B)	'{'
020 (0x14)	DC4	046 (0x2E)	':'	072 (0x48)	'H'	098 (0x62)	'b'	124 (0x7C)	' '
021 (0x15)	NAK	047 (0x2F)	'/'	073 (0x49)	'I'	099 (0x63)	'c'	125 (0x7D)	'}'
022 (0x16)	SYN	048 (0x30)	'0'	074 (0x4A)	'J'	100 (0x64)	'd'	126 (0x7E)	'~'
023 (0x17)	ETB	049 (0x31)	'1'	075 (0x4B)	'K'	101 (0x65)	'e'	127 (0x7F)	DEL
024 (0x18)	CAN	050 (0x32)	'2'	076 (0x4C)	'L'	102 (0x66)	'f'		
025 (0x19)	EM	051 (0x33)	'3'	077 (0x4D)	'M'	103 (0x67)	'g'		

Note: Any reference to third party software or applications is based on tested use only, no commercial agreements are in place.

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