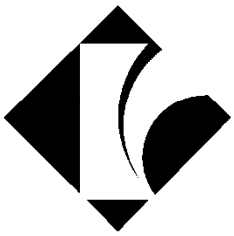
SMART WEIGHING SOLUTIONS



rinstrum

Remote Display Protocol Manual

Copyright

All Rights Reserved. No part of this document may be copied, reproduced, republished, uploaded, posted, transmitted, distributed, stored in or introduced into a retrieval system in any form, or by any means (electronic, mechanical, photocopying, recording or otherwise) whatsoever without prior written permission of Rinstrum Pty Ltd.

Disclaimer

Rinstrum Pty Ltd reserves the right to make changes to the products contained in this manual in order to improve design, performance or reliability.

The information in this manual is believed to be accurate in all respects at the time of publication, but is subject to change without notice. Rinstrum Pty Ltd assumes no responsibility for any errors or omissions and disclaims responsibility for any consequences resulting from the use of the information provided herein.

Table of Contents

1. OVERVIEW 2
1.1. Availability of Protocols 2
1.2. Protocol Support 2
1.3. Examples in this manual 2
1.4. Start-up information (K800 and K801 only) 2
2. SERIAL PROTOCOLS 3
2.1. Protocol 1: Ranger A 3
2.2. Protocol 2: Ranger B 4
2.3. Protocol 3: Ranger C 5
2.4. Protocol 4: Ranger D 6
2.5. Protocol 5: PCMODE 7
2.6. Protocol 6: RINCMD 8
2.7. Protocol 7: Avery String #7 9
2.8. Protocol 8: Gedge C2 10
2.9. Protocol 9: Gedge C3 11
2.10. Protocol 10: AD Standard String 12
2.11. Protocol 11: AD4531 13
2.12. Protocol 12: Toledo Continuous 14
2.13. Protocol 13: GSE without COZ 15
2.14. Protocol 14: GSE with COZ 16
2.15. Protocol 15: Schenck without DP 17
2.16. Protocol 16: Schenck with DP 18
2.17. Protocol 17: Auto Control String 1 19
2.18. Protocol 18: Auto Control String 2 20
2.19. Protocol 19: Sartorious 21
2.20. Protocol 20: Soehnle without DP 22
2.21. Protocol 21: Soehnle with DP 23
2.22. Protocol 22: Flintab 24
2.23. Protocol 23: Philips 25
2.24. Protocol 24: Condec 26
2.25. Protocol 25: Bilanciai D410 26
2.26. Protocol 26: Systec 29
2.28. Protocol 28: Fairbank 30
2.29. Protocol 40: Configuration setup Strings 31
2.29.1. Sending the Setup Command 32
2.30. Protocol 41: Scrolling Messages 33
3. APPENDIX A: ASCII CODES 34

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)

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). Kg, lb, g or t (K801 only).

The Status information location is fixed for the K800 firmware and can be leading or trailing for the K801 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 simular 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 and K801 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 and K801 firmware only. Default 00. Refer to Protocol 40: Configuration Setup Strings**.**
K801	Firmware variant currently installed in remote.
WAIT	Unit is waiting on data strings to determine baud/bit/protocol before displaying.
--//--	No more data is 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 simular 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 and K801

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. **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 Example: **0x60** will display a Green but no negative sign **0x6D** will display both the Green and the negative sign.
Data	Of these 7 characters up to 6 will be displayed which can include the decimal point. This string is normally weight 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	**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**

RealTerm example:

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

2.2. Protocol 2: Ranger B

Supported firmware: K700, K800 and K801

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Status	Sign	Data	Data	Data	Data	Data	Data	Data	Units
Character Number	11	12	13								
Description	Units	Units	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. **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 Example: **0x60** will display a Green but no negative sign **0x6D** will display both the Green and the negative sign.
Data	Of these 7 characters up to 6 will be displayed which can include the decimal point. This string is normally weight 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	**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.
Units	**_kg** or **_lb** *Unit switching supported (820/840) **__g** and **__t** Unit switching supported (D840 only)
ETX	**0x03** = End of Transmission character

2.3. Protocol 3: Ranger C

Supported firmware: K700, K800 and K801

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	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. **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 Example: **0x60** will display a Green but no negative sign **0x6D** will display both the Green and the negative sign.
Data	Of these 7 characters up to 6 will be displayed which can include the decimal point. This string is normally weight 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.
S1	**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.
S2	**M** (0x4D) = Motion ` ` (0x20) = Stable.
S3	**Z** (0x5A) = Centre Of Zero ` ` (0x20) = Not-Zero.
S4	**1** for range one, **2** for range two else **"-"** sent. Not used.
Units	**_kg** or **_lb** *Unit switching supported (820/840) **__g** and **__t** *Unit switching supported (D840 only)
ETX	**0x03** = End of Transmission character

2.4. Protocol 4: Ranger D

Supported firmware: K700, K800 and K801

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	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. **0x20** = No Sign or Traffic light **0x30** = RED **0x60** = GREEN **0x70** = RED + GREEN **0x2D** = '-' Sign **0x3D** = Red and '-' Sign **0x6D** = GREEN and '-' Sign **0x7D** = RED + GREEN and '-' Sign Example: **0x60** will display a Green but no negative sign **0x6D** will display both the Green and the negative sign.
Data	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 will display the 7 characters D820 and D730 will only display the trailing 6 characters 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
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 and K801

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 will display the 7 characters D820 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\20Cement\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 and K801

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) or 6 characters (D820/D730) 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 and K801

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 and K801

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 and K801

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 and K801

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** or **lb** *Unit switching supported
CR	**0x0D** = Carriage Return character
LF	**0x0A** = Line Feed character

2.11. Protocol 11: AD4531

Supported firmware: K800 and K801

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 and K801

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 and K801

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	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. Example: (300) would represent 300 units. (3.00) Is another acceptable string, this time with a decimal point instead of one of the characters. (- 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.
Unit	**kg**__ or **lb**__ *Unit switching supported
Mode	**Gross** = not used **Net**__ = Net annunciator active **Tare**_ = not used
S1	**M** (0x4D) = Motion **S** (0x53) = Stable **O** (0x4F) = Overload or Underload **E** (0x45) = Error
CR	**0x0D** = Carriage Return character
LF	**0x0A** = Line Feed character
SPC	**0x20** = Space

2.14. Protocol 14: GSE with COZ

Supported firmware: K800 and K801

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	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. Example: (300) would represent 300 units. (3.00) Is another acceptable string, this time with a decimal point instead of one of the characters. (- 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.
Units	**kg__** or **lb__** *Unit switching supported
Mode	**Gross** = not used **Net__** = Net annunciator **Tare_** = not used
S1	**M** (0x4D) = Motion **S** (0x53) = Stable **O** (0x4F) = Overload or Underload **E** (0x45) = Error
S2	**Z** (0x5A) = Centre of Zero ` ` (0x20) = not Centre of Zero
CR	**0x0D** = Carriage Return character
LF	**0x0A** = Line Feed character
SPC	**0x20** = Space

2.15. Protocol 15: Schenck without DP

Supported firmware: K800 and K801

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 and K801

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 and K801

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 and K801

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 and the trailing 6 characters on a D820 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: Sartorious

Supported firmware: K800 and K801

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 and K801

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 and K801

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 and K801

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 and K801

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 and K801

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 *Unit switching supported **K** (0x4B) = kg
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 and K801

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	**lb**, **kg**, **_t** or **_g** *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 and K801

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
CR	**0x0D** = Carriage Return character
LF	**0x0A** = Line Feed character

Example:

1000kg and stable

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

2.28. Protocol 28: Fairbank

Supported firmware: K801

Character Number	0	1	2	3	4	5	6	7	8	9	10
Description	STX	Traffic	Unit	Weight	Weight	Weight	Weight	Weight	Weight	Weight/ Overload	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	**Space (0x20)** = Overload
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 40: Configuration setup Strings

Supported firmware: K700, K800 and K801

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	ETX	

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

2.29.1. 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 intervals 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:

    \0x02\0x30\0x33\0x35\0x30\0x35\0x30\0x56\0x30\0x30\0x20\0x20\0x20\0x20\0x20\x20\0x20\0x20\0x20\0x20\0x03

  - To change the Time-Out value to 0 seconds (thus disabling):

    \0x02\0x30\0x30\0x31\0x30\0x30\0x30\0x56\0x30\0x30\0x20\0x20\0x20\0x20\0x20\x20\0x20\0x20\0x20\0x20\0x03

  - To Lock on Protocol 4 only:

    \0x02\0x30\0x30\0x31\0x30\0x35\0x30\0x56\0x30\0x34\0x20\0x20\0x20\0x20\0x20\x20\0x20\0x20\0x20\0x20\0x03

2.30. Protocol 41: Scrolling Messages

Supported firmware: K802 running on a D840 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: D840-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 "D840 K802" scrolling SLOW with no traffic lights and brightness at MAX.

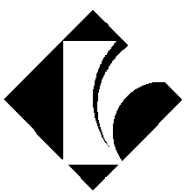
\0x01\0x33\0x20\0x30\0x44\0x38\0x34\0x30\0x20\0x44\0x38\0x30\0x32\0x03

3. Appendix A: ASCII codes

Code	Char	Code	Ch	Code	Ch	Code	Ch	Code	Ch
000 (*)	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.

SMART WEIGHING SOLUTIONS



rinstrum